ENVIRONMENT AND PLANNING COMMITTEE

ATTACHMENTS PROVIDED UNDER SEPARATE COVER

Tuesday 5 August 2025

Central Coast Council

ATTACHMENTS PROVIDED UNDER SEPARATE COVER to the

Environment and Planning Committee

To be held ,
2 Hely Street, Wyong
on Tuesday 5 August 2025
Commencing at 7:00 PM

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NSW GOVERNMENT

Manly Hydraulics Laboratory

Tuggerah Lakes Flood Study Review

Draft Report

Report MHL2929
20 May 2025

Prepared for: Central Coast Council

Central Coast Council

Department of Climate Change, Energy, the Environment and Water

Cover Photograph: Looking across Geoffrey Road, Chittaway Point over Tuggerah Lake towards The Entrance, 3 March 2022, courtesy of Central Coast Council.

Tuggerah Lakes Flood Study Review

Draft Report

Report MHL2929

20 May 2025

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Foreword

The NSW Government's professional specialist advisor, Manly Hydraulics Laboratory (MHL), were commissioned by Central Coast Council to undertake a review of the Tuggerah Lakes Flood Study, improve understanding of flood behaviour and impacts, and better inform management of flood risk in the study area in consideration of the available information and relevant standards and guidelines.

The report was prepared by Kyle Hasler, Armaghan Severi, Matthew Phillips, Atikul Islam and Matthieu Glatz.

Classification: Public

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Executive summary

The original Tuggerah Lakes Flood Study was completed in 1994 by Lawson and Treloar. The study was undertaken to determine the flood behaviour events with Annual Exceedance Probabilities (AEP) of 50%, 20%, 5% and 1% as well as the Probable Maximum Flood (PMF). The model results from this study form the basis of Council's currently adopted flood planning levels for Tuggerah Lakes.

This study was followed by the Tuggerah Lakes Floodplain Risk Management Study and Plan (FRMSP) published in 2014 (WMA Water, 2014). The Tuggerah Lakes FRMSP provided management recommendations to reduce risk to life, public and private infrastructure associated with flooding.

A review and update of the original flood study investigations is now warranted for a number of reasons including recent advances in rainfall and runoff modelling techniques, significant changes in key guidelines (Australian Rainfall and Runoff, ARR 2019), an additional 30 years of monitoring data available throughout the catchment, several historical floods including a number of recent events, new interim entrance management procedures (MHL, 2022), increased development of the foreshores of Tuggerah Lakes and the benefits associated with making more informed land use planning decisions. As such, this flood study provides an updated assessment of flooding in the Tuggerah Lakes region, with a specific focus on inundation originating from the Tuggerah Lakes themselves.

The scope of this study does not encompass catchment flooding from the Tuggerah Lakes tributaries, such as the Wyong River, Ourimbah Creek, and Wallarah Creek, or overland flooding, as these matters have been extensively addressed in the respective catchment and overland flood studies in the area. The key components of the flooding assessment included:

- Review of existing studies and data;
- Community consultation;
- Extreme value analysis;
- Hydrological and hydraulic analysis and modelling;
- Sensitivity analysis;
- Flood mapping;
- Evaluation of climate change impacts;
- Assessment of flooding consequences on the community; and
- Development of this draft flood study report.

The flood modelling included a comprehensive range of events, from the 20% to the 1 in 500 Annual Exceedance Probability (AEP) events and the Probable Maximum Flood (PMF) scenarios, representing the critical durations and patterns for the Tuggerah Lakes.

To supplement this modelling, an extreme value analysis was performed on the long-term partial peak water level series and more recent continuous water level data using the annual maximum and peak-over-threshold approaches, respectively, to estimate the flood levels for the abovementioned AEP events.

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As part of the hydrologic and hydraulic modelling process, this report identified that the lack of well-rated water level stations upstream of the study area limited flow data quality for calibration, potentially introducing uncertainties regarding inflows. Furthermore, significant uncertainty was found to exist regarding the behaviour of the entrance channel, particularly in the largest flooding events, for which no detailed data for entrance behaviour are available. To enhance the reliability of the findings of a similar study, future research should consider establishing enhanced gauging stations and ensuring detailed data capture for any large events which may occur in the meantime.

A comprehensive sensitivity analysis was undertaken to evaluate the influence of key hydrologic and hydraulic parameters on flood behaviour within the Tuggerah Lakes system under the 1% AEP flood event scenario. This analysis aimed to assess the relative sensitivity of peak lake water levels and hydrograph characteristics to variations in rainfall losses, catchment response, entrance dynamics, and boundary conditions.

- Rainfall Losses: Varying rainfall loss parameters demonstrated the most significant impact on flood peak levels. The removal of losses led to an increase of 0.14 m in peak water level compared to baseline conditions, while doubling the losses reduced the peak by 0.13 m. These results highlight the critical influence of rainfall-runoff processes on flood magnitude.
- Catchment Lag: Adjustments to catchment lag (±10%) had a minimal impact on peak water levels (±0.01 m), with effects primarily confined to the rising limb of the hydrograph. This indicates the timing of inflows is less critical than total runoff volume for this system.
- Hydraulic Roughness: Increasing or decreasing channel roughness by 20% resulted in changes of ±0.04 m in peak lake levels. Reduced roughness facilitated quicker recession, whereas increased roughness caused higher and more prolonged flood peaks due to lower conveyance efficiency.
- Initial lake level: Shifting the initial lake water level to 0.2 mAHD and 0.5 mAHD resulted in variations of -0.05 m and +0.04 m respectively in peak water level. Differences were most pronounced early in the event, with convergence towards baseline levels over time.
- Tailwater Conditions: Tailwater level had a moderate to significant impact, depending on scenario. A high (Type C) ocean water level (2.35 mAHD) increased the lake peak by +0.12 m, reflecting tidal backflow potential. Changes in timing of peak tailwater level (±6 hours) resulted in only minor variations (±0.01–0.03 m), indicating limited sensitivity within a 12-hour alignment window.
- Entrance Configuration: Scenarios modifying entrance geometry and scour dynamics yielded varied results:
  - A higher initial berm increased peak levels by +0.06 m.
  - A narrower or shallower channel configuration increased peak levels by up to +0.04 m.
  - Delayed scour or slower scour duration raised peaks by up to +0.15 m.
  - A deeper final channel or faster scour duration led to reductions of up to -0.07 m.

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- Pre-dredged shoals: A dredged entrance scenario (based on 2019 post-dredging survey) resulted in a negligible change (-0.01 m) to peak levels but showed slightly improved recession characteristics during the falling limb of the hydrograph.

The sensitivity analysis confirmed that rainfall losses, scour duration, and tailwater level are the most influential parameters affecting flood peak levels and hydrograph shape. While other factors such as roughness, initial conditions, and entrance configuration also play a role, their relative influence is more modest.

Analysis of the results of the hydrologic and hydraulic modelling found that flooding within the Tuggerah Lakes catchment is relatively slow onset in nature, driven by prolonged rainfall events of moderate intensity, with critical durations ranging between 72 and 144 hours. While short-duration, high-intensity events may cause overland runoff in adjoining areas, the flood mechanism of interest to this study is lake-driven. Floodwaters typically recede within hours to days following peak levels. Key flood-prone districts were identified as:

- Chittaway Point;
- Tacoma and Tacoma South;
- Tuggerawong; and
- The Entrance North behind the Wilfred Barrett Drive levee, but only in events equal to or greater than the 1% AEP, among other areas.

Flood mapping was prepared for each of the abovementioned scenarios, consisting of peak water level, depth and velocity mapping. Various oceanic inundation scenarios under present-day and future climate change scenarios were also modelled. Post-processing of these results was performed to confine the mapped results only to those areas arising directly because of lake flooding and excluding areas that may be inundated by catchment tributaries and/or overland flow. Furthermore, from these post-processed results, flood hazard, flood function, and preliminary flood emergency response classifications communities were defined as per the Floodplain Guidelines and mapped.

A preliminary impact assessment of flood consequences on the community was undertaken by identifying the number of lots, key infrastructure, and roads affected by inundation by the lakes in the various scenarios modelled. This also involved the definition of a preliminary flood planning area, where a freeboard of 0.8 m was determined to be appropriate to account for the moderate levels of modelling uncertainties and potential effects of future climate change.

Moreover, climate change scenarios projected for 2040, 2090, and 2120 indicate increases in rainfall intensity and ocean tailwater, which could exacerbate flood conditions. However, it is noted that these effects may be partially counteracted by higher hydrological losses in these future scenarios. Specifically, for the representative 1% AEP event:

- 2040 tailwater and hydrological conditions may lead to a 0.28 m rise in lake levels.
- 2070 tailwater and hydrological conditions may lead to a 0.50 m rise in lake levels.
- 2120 tailwater and hydrological conditions may lead to a 0.83 m rise in lake levels.

This study lays a robust technical foundation for ongoing flood risk management and further investigations into the Tuggerah Lakes, contributing to enhanced resilience against future flooding events.

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1 Introduction

1.1 Background

Under the NSW Flood Prone Land Policy and Flood Risk Management Manual (2023; superseding the 2005 Floodplain Development Manual), the management of flood liable land remains the responsibility of local government.

The original Tuggerah Lakes Flood Study was completed in 1994 by Lawson and Treloar. The study was undertaken to determine the flood behaviour events with Annual Exceedance Probabilities (AEP) of 50%, 20%, 5% and 1% as well as the Probable Maximum Flood (PMF). The model results from this study form the basis of Council's currently adopted flood planning levels for Tuggerah Lakes.

This study was followed by the Tuggerah Lakes Floodplain Risk Management Study and Plan (FRMSP) published in 2014 (WMA Water, 2014). The Tuggerah Lakes FRMSP provided management recommendations to reduce risk to life, public and private infrastructure associated with flooding. A number of recommendations were made to reduce flood risk including adaptation planning for foreshore suburbs, flood emergency management planning, development of public education and awareness, adoption of development controls and formalising an entrance management strategy. The FRMSP was based on modelled flood behaviour from the Tuggerah Lakes Flood Study (Lawson and Treloar, 1994).

A review and update of the original flood study investigations is now warranted for a number of reasons including recent advances in rainfall and runoff modelling techniques, significant changes in key guidelines (Australian Rainfall and Runoff, ARR 2019), additional 29 years of monitoring data available throughout the catchment, several historical floods including a number of recent events, new interim entrance management procedures (MHL, 2022), increased development of the foreshores of Tuggerah Lakes and the benefits associated with making more informed land use planning decisions.

1.2 Study objectives

The objective of this study is to improve understanding of flood behaviour and impacts, and better inform management of flood risk in the Tuggerah Lakes study area in consideration of the available information, and relevant standards and guidelines. The aim of this study is to inform:

- Relevant government information systems;
- Government and strategic decision makers on flood risk;
- The community;
- Flood risk management planning for existing and future development;
- Emergency management planning for existing and future development, and strategic and development scale land-use planning to manage growth in flood risk; and
- Other key stakeholders (including utility providers and the insurance industry) on flood risk.

The outputs of the study may be able to assist this by facilitating information sharing on flood

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risk across government and with the community, and providing a better understanding of:

- The variation in flood behaviour, flood function, flood hazard and flood risk in the study area;
- Impacts and costs for a range of flood events or risks on the existing and future community;
- Impacts of changes in development and climate on flood risk;
- Emergency response situation and limitations; and
- Effectiveness of current management measures.

1.3 Study area

The Tuggerah Lakes system is located within the traditional boundaries of Darkinjung (Darkinyung) land on the Central Coast of NSW, approximately 80 km north of Sydney. The study area comprises three main interconnected lakes including Tuggerah Lake, Budgewoi Lake and Lake Munmorah. Tuggerah Lake is the largest of the three lakes and is connected to Budgewoi Lake and Lake Munmorah by narrow channels at Gorokan and Budgewoi. The lakes system is connected to the ocean via a tidal channel through the barrier dune at The Entrance. The condition of the entrance of Tuggerah Lakes, where flows exchange to/from the ocean, is dynamic and subject to entrance sediment infilling and scour, such that the estuary is classified as an Intermittently Closed and Open Lakes and Lagoon (ICOLL).

The Tuggerah Lakes system covers a total catchment area of approximately 790 km^2 of which approximately 10% is covered by lakes. Wyong River, Ourimbah Creek, Tumbi Umbi Creek and Wallarah Creek are the major catchments contributing to the lakes system. Wyong River, Ourimbah Creek and Tumbi Umbi Creek drain catchment areas of approximately 447 km^2, 160 km^2 and 14 km^2 respectively to the southern end of Tuggerah Lake, and Wallarah Creek drains a catchment area of around 32 km^2 into Budgewoi Lake.

Prior to European settlement in 1825, Aboriginal peoples occupied the Tuggerah Lakes catchment area (Darkinjung land) with minimal environmental impact, utilising the lakes and adjacent beaches for the collection of a variety of seafood (CSIRO, 1999). After European settlement in the 19th and 20th centuries, properties were acquired (originally for farming purposes) around the low-lying foreshore of the lakes. Nowadays, around 80% of the shorelines of the Tuggerah Lakes are urbanised, primarily in the form of residential land use, and is susceptible to flood damages. In 2014, it was estimated that approximately 1,300 buildings would be impacted by the 1% AEP lake flood event and with a long-term annual average damage for the foreshore properties surrounding Tuggerah Lakes of $2.2 million (WMA Water, 2014).

Ocean tides in the region are microtidal with mean spring and neap ranges of 1.3 m and 0.8 m, respectively. The regional wave climate is of moderate to high energy. The tidal range within the lakes is relatively small in the order of centimetres and average lake levels vary between 0.2 to 0.3 m AHD due to the dynamic constriction of the entrance channel and shoals. Over the past 29 years, recorded lake levels at Long Jetty (211418) typically vary between 0.09 and 0.50 m AHD (90% of the time) and have been measured to reach in excess of 1.75 m AHD during flood events.

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The study area is presented in **Figure 1.1**. Hydrologic modelling for the present study covered the full catchment area presented, while hydraulic modelling and analysis of flood impacts and behaviour in the present study was focussed on flooding of the Tuggerah Lakes system in lower reaches of the catchment, with elevations less than approximately 3 mAHD.

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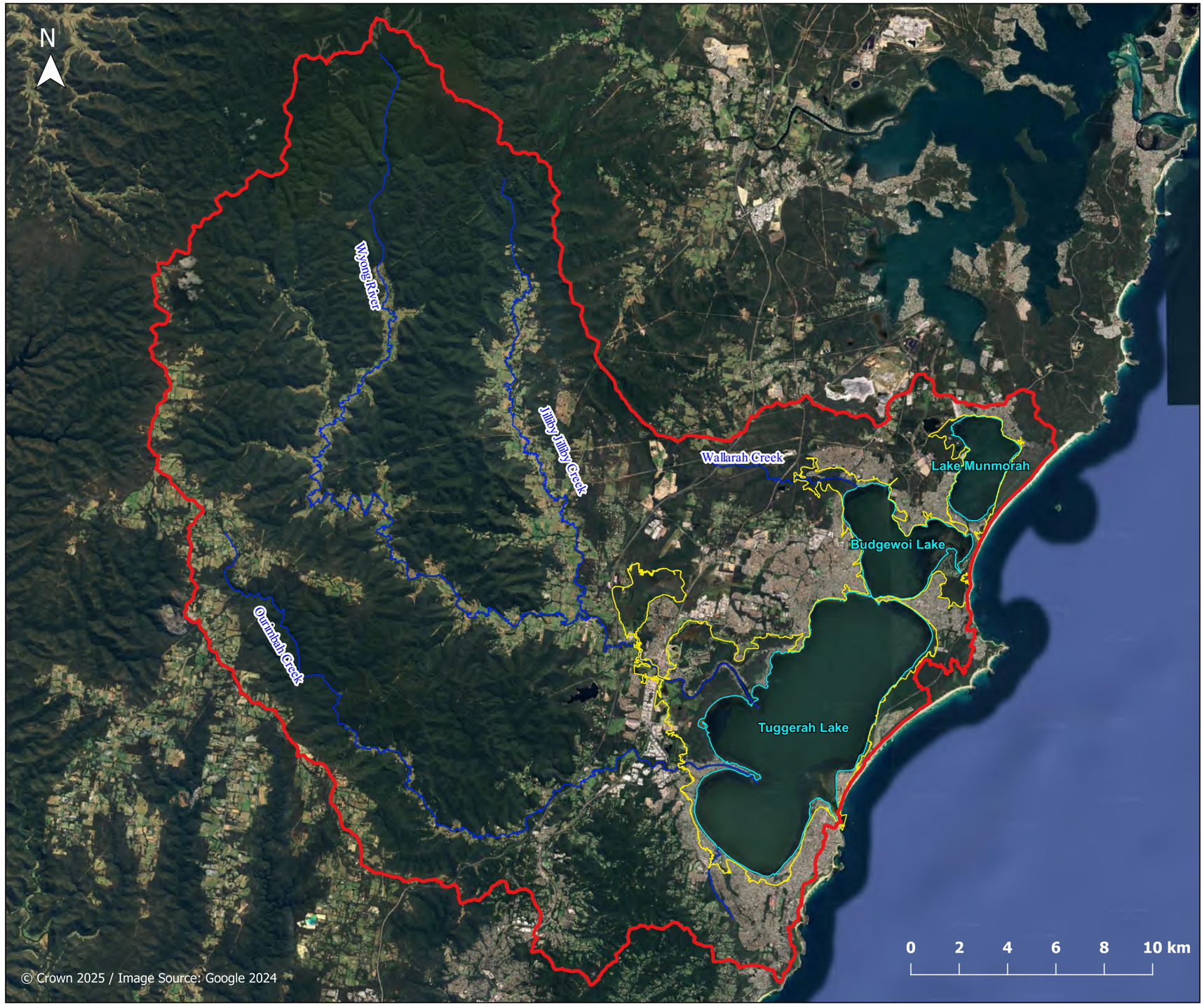

Figure 1.1

Tuggerah Lakes catchment and study area

Legend

- Catchment boundary
- 3 mAHD Contour
- Primary tributaries

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1.4 History of flooding and rainfall

Historical records and observations provide valuable evidence of historic flood behaviour in the Tuggerah Lakes catchment in response to heavy rainfall. Flood events have had a history of resulting in inundation of land and, in some instances, built assets. A summary of historical peak lake water levels for Tuggerah Lakes is shown in **Table 1.1**. It is noted that accurate gauged water levels measurement commenced in Tuggerah Lakes in 1985 after installation of the Toukley and Killarney Vale gauges. Prior lake water levels are based on historical observations.

The largest known flood occurred on the 18 June 1949, reaching a lake level of approximately 2.1 m AHD. Lake flood levels are estimated to have equalled or exceeded 1.5 m AHD at least 14 times over the last 100 years and five times since gauged water level records began in 1985 (February 1990, June 2007, February 2020, March 2021 and July 2022). Recent flooding in July 2022 resulted in lake levels reaching 1.76 m AHD at Toukley and Wallarah Creek Bridge gauges, the highest on record since gauging began in 1985.

Table 1.1 Summary of historical peak lake water levels (adapted from WMA Water, 2014)

Event	Historical recorded peak lake level (m AHD)	Measured gauge peak lake level (m AHD)		
		Toukley	Wallarah Creek Bridge	Long Jetty
18 June 1949	2.10	-	-	-
April 1946	1.88	-	-	-
2 May 1964	1.87	-	-	-
April 1927	1.81	-	-	-
1931	1.81	-	-	-
6 July 2022	-	1.76	1.76	1.72
11 Feb 2020	-	1.66	1.66	1.67
10 June 2007	-	1.68	1.65	1.64
4 February 1990	-	1.61	-	-
4 March 1977	1.59	-	-	-
22 March 2021	-	1.50	1.49	1.52
1963	1.53	-	-	-
1953	1.49	-	-	-
1941	1.48	-	-	-

Notes: Historical records obtained from WMA Water (2014) and Lawson and Treloar (1994). It is likely that several floods prior to 1970 may not have been recorded. Gauged lake levels can be subject to wind and wave setup effects.

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Photographs of recent and historical flood events have been provided by community members as part of the community consultation process and from Central Coast Council's Library Service. Selected photos and historical accounts of past flood events (chronologically listed) are shown below (**Figure 1.2** to **Figure 1.18**).

A detailed summary of historical flood information and accounts spanning 1867 to 1992 is provided in *Tuggerah Lakes Flood Study Compendium of Data. New South Wales. Coast and Rivers Branch. October 1992*.

Also associated with past flood events is historical information describing changing entrance conditions and past interventions at the dynamic entrance channel opening to the ocean. This information is summarised in the *Tuggerah Lakes Entrance Management Study, MHL, 2022.*

Additional flood history in various upstream catchments and tributaries feeding into Tuggerah Lakes is documented in previous flood studies (see **Section 2**).

Figure 1.2 Flooding c. 1909 looking south from Wyong through to Tuggerah over the road and train lines. Courtesy of Central Coast Council

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Figure 1.3 Damages to the original Long Jetty (built 1914 by William Henry Price) following flooding in Easter 1927. Courtesy of Central Coast Council

Figure 1.4 Northern railway line just north of Tuggerah Station covered by flood waters, Wyong 1927. Courtesy of Central Coast Council

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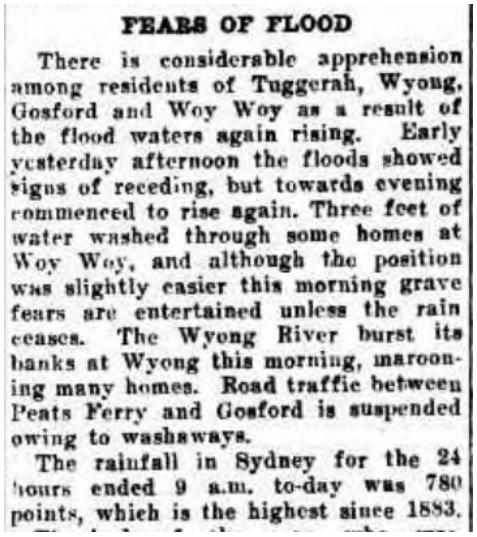
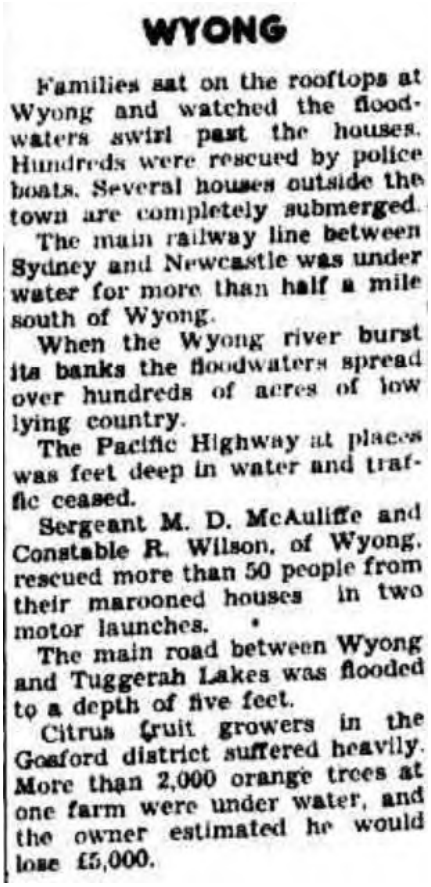


FEARS OF FLOOD

There is considerable apprehension among residents of Tuggerah, Wyong, Gosford and Woy Woy as a result of the flood waters again rising. Early yesterday afternoon the floods showed signs of receding, but towards evening commenced to rise again. Three feet of water washed through some homes at Woy Woy, and although the position was slightly easier this morning grave fears are entertained unless the rain ceases. The Wyong River burst its banks at Wyong this morning, marooning many homes. Road traffic between Peats Ferry and Gosford is suspended owing to washaways.

The rainfall in Sydney for the 24 hours ended 9 a.m. to-day was 780 points, which is the highest since 1883.

Figure 1.5 The Northern Star Newspaper, Page 7, July 8 1931
https://trove.nla.gov.au/newspaper/article/94187368



WYONG

Families sat on the rooftops at Wyong and watched the floodwaters swirl past the houses. Hundreds were rescued by police boats. Several houses outside the town are completely submerged.

The main railway line between Sydney and Newcastle was under water for more than half a mile south of Wyong.

When the Wyong river burst its banks the floodwaters spread over hundreds of acres of low lying country.

The Pacific Highway at places was feet deep in water and traffic ceased.

Sergeant M. D. McAuliffe and Constable R. Wilson, of Wyong, rescued more than 50 people from their marooned houses in two motor launches.

The main road between Wyong and Tuggerah Lakes was flooded to a depth of five feet.

Citrus fruit growers in the Gosford district suffered heavily. More than 2,000 orange trees at one farm were under water, and the owner estimated he would lose £5,000.

Figure 1.6 The Canberra Times, Page 1. 20 June 1949
https://trove.nla.gov.au/newspaper/article/2809821

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Figure 1.7 Parry's Jetty under flood c. 1960s. Bailey, Harold. Courtesy of Central Coast Council

Figure 1.8 Payne's boat shed on Tuggerah Lake at Long Jetty during flood 1960s. Bailey, Harold. Courtesy of Central Coast Council

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Figure 1.9 Approximately 250 m north along South Tacoma Rd from Kingsland Cl, facing northwest, 5th February 1990. Courtesy of a local resident

Figure 1.10 Marine Rescue Tuggerah Lakes Unit, Peet St, Toukley, 10th February 2020. Courtesy of a local resident

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Figure 1.11 Leonard St, The Entrance North, Facing southwest, 11th February 2020. Courtesy of a local resident

Figure 1.12 Lakedge Ave, Berkeley Vale, immediately south of Kingsford Smith Dr, facing east, 4th March 2022. Courtesy of a local resident

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Figure 1.13 Lakedge Ave, Berkeley Vale, 100 m south of Kingsford Smith Dr intersection, Facing south, July 2022. Courtesy of a local resident

Figure 1.14 Lakedge Ave, Berkeley Vale, Facing south along Albatross Road at the intersection of Lakedge Avenue and Albatross Road, 8th July 2022. Courtesy of a local resident

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Figure 1.15 Tuggerah Pde, Long Jetty, Facing east along Venice Street at the intersection of Tuggerah Pde and Venice Street, July 2022. Courtesy of a local resident

Figure 1.16 Moui Ave, Chittaway Bay, July 2022. Courtesy of a local resident

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Figure 1.17 230 Geoffrey Road facing southwest, Chittaway Point. July 2022. Courtesy of a local resident

Figure 1.18 Facing north along Crosby Crescent, Killarney Vale, July 2022. Courtesy of a local resident

1.5 Land use and zoning

Land zoning GIS spatial data was provided by the Council, shown in **Figure 1.19**. The land zoning within the floodplain surrounding the lakes is classified under a range of zonings. Land use within the catchment primarily consists of Forestry (RU3), National parks and natural reserves (E1), Environmental management (E3), Primary production (RU1), Recreational waterways (W2), Environmental conservation (E2), Low density residential (R2).

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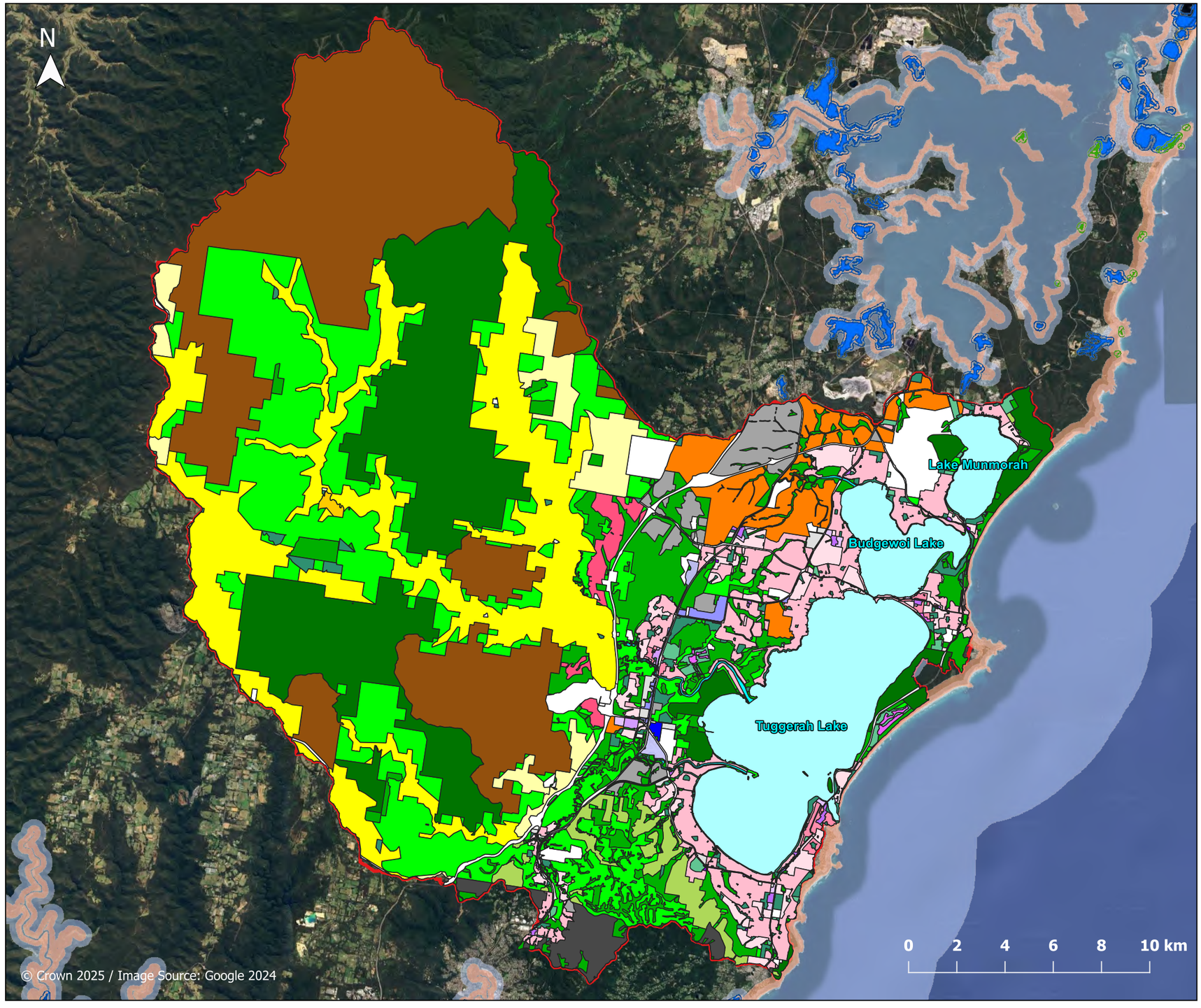

Figure 1.19

Land use

LEP 2022 Zoning

- B1 - Neighbourhood Centre
- B2 - Local Centre
- B3 - Commercial Core
- B4 - Mixed Use
- B5 - Business Development
- B6 - Enterprise Corridor
- B7 - Business Park
- C1 - National Parks and Nature Reserves
- C2 - Environmental Conservation
- C3 - Environmental Management
- C4 - Environmental Living
- DM - Deferred Matter
- IN1 - General Industrial
- IN2 - Light Industrial
- R1 - General Residential
- R2 - Low Density Residential
- R3 - Medium Density Residential
- R5 - Large Lot Residential
- RE1 - Public Recreation
- RE2 - Private Recreation
- RU1 - Primary Production
- RU2 - Rural Landscape
- RU3 - Forestry
- RU5 - Village
- RU6 - Transition
- SP1 - Special Activities
- SP2 - Infrastructure
- SP3 - Tourist
- W1 - Natural Waterways
- W2 - Recreational Waterways

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1.6 Demographic overview

Understanding the social characteristics of the study area can help ensure appropriate risk management practices are adopted and shape the methods used for community engagement. House tenure and age distribution data obtained from census data can indicate the community's experience with recent flood events, and hence an indication of community's flood awareness. As per The Bureau of Meteorology Flood Preparedness Manual, using the population census data and other information held by councils and state agencies can help to identify the potential number and location of people in an area with special needs or requiring additional support during floods (Australian Government (Attorney – General's Department), 2009). The relevant information has been extracted from the 2021 Census for Wyong and tabulated in **Table 1.2**.

1.7 Relevant Policies, legislation and guidance

The NSW Floodplain Risk Management Process

The Tuggerah Lakes Flood Study Review has been prepared in accordance with the New South Wales Government's *Flood Risk Management Manual* (NSW Government, 2023). The primary objective of which is to:

> *"reduce the impact of flooding and flood liability on communities and individual owners and occupiers of flood prone property, and to reduce private and public losses resulting from floods, utilising ecologically positive methods wherever possible."*

Under the policy, primary responsibility for flood risk management rests with local government. Financial and technical assistance is provided to councils by the NSW Government.

The *Flood Risk Management Manual* defines the following steps in the Flood Risk Management Process:

- Formation of a Project Technical Group
- Data Collection
- Flood Study Preparation
- Floodplain Risk Management Study Preparation
- Floodplain Risk Management Plan Preparation
- Floodplain Risk Management Plan Implementation

By following the NSW Flood Risk Management Process, Central Coast Council is and has been adopting a best practice, State supported pathway for the methodical identification, assessment and implementation of robust and effective flood risk management measures in order to reduce the impacts of flooding on the community and existing development, and to ensure that future development is compatible with flood risk. Councils following the NSW Flood Risk Management Process demonstrate duty of care with respect to the management of flood liable land and are exempted from liability under Section 733 of the Local Government Act 1993.

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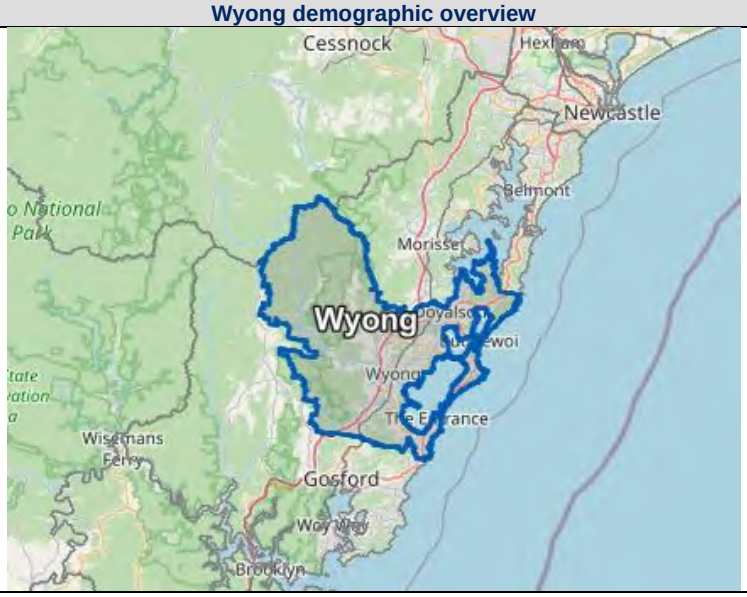
Table 1.2 Wyong demographic overview based on the 2021 census.

Wyong demographic overview	
	
Source: https://www.abs.gov.au/census/find-census-data/quickstats/2021/10202	
Population	168,171
Number of private dwellings	69,505 (either occupied or unoccupied)
Number of single-person householders	16,890 (26.8%)
Property tenure	Owned: 42,999 (68.1%, either outright or with a mortgage) Rented: 18,062 (28.6%)
Number of persons over the age of 75	16,874 (9.9%)
Number of single-parent families	9,840 (21.4%)
Language	English only is spoken at home: 149,094 (88.7%) A non-English language spoken at home: 5,095 (8.1%)
Average number of children per families with children	1.8
Average number of children per all households	0.7
Number of educated people aged 15 years and over	120,219 (87.7%)
Employed (including worked full-time, part-time and away from work)	70,958 (94.8%)

Following the NSW Flood Risk Management Process, Central Coast Council have undertaken the Tuggerah Lakes Flood Study (Lawson and Treloar, 1994) to understand flood behaviour and the Tuggerah Lakes Floodplain Risk Management Study and Plan (WMA Water, 2014) to provide management recommendations to reduce risk to life, public and private infrastructure associated with flooding (see **Section 1.1**).

A review and update of the Tuggerah Lakes Flood Study ensures that an understanding and predictions of flood behaviour, a fundamental component of the Flood Risk Management Process, are technically robust and meet contemporary standards and guidelines.

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Environmental Planning and Assessment Act 1979

The NSW Environmental Planning and Assessment Act 1979 (EP&A Act) creates the mechanism for development assessment and determination by providing a legislative framework for the development and protection of the environment from adverse impacts arising from development. The EP&A Act outlines the level of assessment required under State, regional and local planning legislation and identifies the responsible assessing authority.

Central Coast Local Environmental Plan 2022

The EP&A Act is the governing legislation for planning and controlling land uses and development within NSW. Central Coast Council's planning provisions as enabled by this Act include the Central Coast Local Environmental Plan (LEP) 2022.

The Central Coast LEP 2022 has been developed in accordance with NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW) requirements to control development via land zonings and other relevant planning provisions.

Standard Instrument (Local Environmental Plans) Amendment (Flood Planning) Order 2021 modified previous clauses 5.21 and 5.22 of all LEPs. Clause 5.21 is a compulsory inclusion while Council's can "opt in" to include clause 5.22. Amongst other changes, clause 5.21 explicitly requires that the impact of climate change on flooding be considered. The wording also sharpens the focus on the Flood Planning Area as the principal area in which flood related development controls apply. Clause 5.22 allows for development controls to be applied to land between the flood planning area (FPA) and the Probable Maximum Flood (PMF) for sensitive and hazardous development such as caravan parks, hospitals, seniors housing, etc.

Tuggerah Lakes Coastal Management Program (currently in development).

Coastal Management Programs (CMP's) set the long-term strategy for the management of Council's coastal environments including the various lakes, lagoons, estuaries, beaches and their associated catchments. Central Coast Council has begun preparing the Tuggerah Lakes CMP in accordance with the NSW Government Coastal Management Framework. The CMP will replace existing Estuary & Coastal Zone Management Plans which were prepared under previous legislation.

SEPP (Resilience and Hazards) 2021 – Chapter 2 Coastal Management

SEPP (Resilience and Hazards) 2021 Ch. 2 Coastal Management aims to promote an integrated and coordinated approach to land use planning in the coastal zone. Mapping of the coastal zone under the SEPP is shown in **Figure 1.20**. For areas mapped as 'coastal wetland and littoral rainforests' – including sizeable areas in the study area near the three lakes – development consent is required for the clearing of native vegetation, and for earthworks, construction of a levee, draining the land and environmental protection works, and for any other development. For areas mapped as 'coastal environment areas' – covering much of the study area – development consent must not be granted unless the consent authority has considered whether the proposed development is likely to cause an adverse impact on "the integrity and resilience of the biophysical, hydrological (surface and groundwater) and ecological environment" amongst other factors. The development must be designed, sited and managed to either avoid, minimise or mitigate adverse impacts.

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Figure 1.20

SEPP (Resilience and Hazards) 2021 - Coastal Mapping

Legend

- Primary tributaries

SEPP (Resilience and Hazards) Coastal Mapping

- Coastal Environmental Area
- Coastal Use Area
- Coastal Wetlands
- Proximity Area for Coastal Wetlands
- Littoral Rainforest
- Proximity Area for Littoral Rainforest

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SEPP (Infrastructure) 2007

SEPP (Infrastructure) 2007 aims to facilitate the effective delivery of infrastructure within NSW by public authorities. It does this by prescribing the infrastructure related works that may be undertaken without development consent, although the public authority may still be required to obtain an approval, licence or permit under another Act, such as the Fisheries Management Act 1994.

Under Clause 49, Division 7 of State Environmental Planning Policy (SEPP) Infrastructure 2007, flood mitigation work is defined as;

> *"work designed and constructed for the express purpose of mitigating flood impacts. It involves changing the characteristics of flood behaviour to alter the level, location, volume, speed or timing of flood waters to mitigate flood impacts. Types of works may include excavation, construction or enlargement of any fill, wall or levee that will alter riverine flood behaviour, local overland flooding, or tidal action so as to mitigate flood impacts."*

Under Clause 50, Division 7 of SEPP Infrastructure 2007, development for the purpose of flood mitigation may be carried out by or on behalf of a public authority without consent on any land. This includes reference to development for any of the following purposes if the development is in connection with flood mitigation work:

- Construction works
- Routine maintenance works
- Environmental management works

Under Clause 129, Division 25 of SEPP Infrastructure 2007, waterway or foreshore management activities (including instream management or dredging to rehabilitate aquatic habitat or to maintain or restore environmental flows or tidal flows for ecological purposes) undertaken by a public authority are permissible without consent.

Should the works be deemed not to require development consent, a Review of Environmental Factors (REF) is prepared in accordance with the requirements of the Environmental Planning and Assessment Act, 1979.

Tuggerah Lakes Interim Entrance Management Procedure (MHL, 2022)

Under the NSW Flood Risk Management Manual (2023), the management of flood liable land remains the responsibility of local government. The Tuggerah Lakes Floodplain Risk Management Study and Plan (FRMSP) (WMA Water, 2014) provides management recommendations to reduce risk to life, public and private infrastructure associated with flooding. The FRMSP recommended a number of high priority actions to reduce flood risk including adaptation planning for foreshore suburbs, flood emergency management planning, development of public education and awareness program, adoption of development controls and formalisation of an entrance management strategy.

The Tuggerah Lakes Interim Entrance Management Procedure provides an evidence-based Interim Entrance Management Procedure for Tuggerah Lakes in accordance with the objectives of the FRMSP and supporting Council's transition to a Coastal Management Program (CMP) under the Coastal Management Act 2016 to see thriving and resilient coastal

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communities living and working on a healthy coast, now and into the future. The procedure is an interim entrance management procedure until an Entrance Management Strategy is formalised through the CMP process.

The main purpose of the interim entrance management strategy is to account for critical environmental issues and facilitate an approved opening at short notice under formulated, documented and agreed procedures and criteria (DPI, 2013). The Tuggerah Lakes Interim Entrance Management Procedure provides a rational decision-making framework for Central Coast Council to undertake entrance management works to the entrance throat channel and berm at the Tuggerah Lakes entrance. The procedure is supported by decision support tools that utilise real-time quantitative data to facilitate a rational, proactive and informed approach to management actions.

Other State legislative and policy requirements

- *Protection of the Environment Operations Act 1997* (POEO Act): Activities should be carried out in a manner which does not result in the pollution of waters.

- *National Parks and Wildlife Act 1974* (NPW Act) and *Amendment* 2010: Provides protection of Aboriginal cultural heritage in NSW. DCCEEW administers the NPW Act and requires Aboriginal consultation to be undertaken in accordance with statutory requirements.

- *Crown Lands Management Act 2016*: The purpose of this Act is to consolidate statutory provisions dealing with the ownership, use and management of Crown land into one Act. The objects of the Act include facilitating Aboriginal people's use of Crown land, with emphasis on the co-management of Crown land where appropriate.

- *Biodiversity Conservation Act 2017*: Provides legislative requirements for environmental assessment for potential impact on threatened species, or ecological communities listed in the *NSW Fisheries Management Act* or *NSW Biodiversity Conservation Act*, or their habitats.

- *Fisheries Management Act 1994 (FM Act)*: The FM Act 1994 contains provisions that allow for the preparation of threat abatement plans, threatened species recovery plans and habitat protection plans. These tools are enacted by legislation, and they outline actions to protect and rehabilitate aquatic habitats and threatened species, populations and communities.

- *Policy and guidelines for fish habitat conservation and management* (DPI, 2013): policy and guidance for artificial management of ICOLL entrances.

- *Marine Estate Management Act 2014* and *Marine Estate Management Regulation 1999*: The Act declares and manages NSW marine parks. The Regulation outlines requirements for protection of various zones within marine parks.

- *Water Management Act 2000*: The objects of the Water Management Act 2000 are to provide for the sustainable and integrated management of the water sources of the state for the benefit of both present and future generations and, in particular: Ecologically sustainable development. Protect, enhance and restore water recourses.

- *Coastal Management Act 2016* - The Coastal Management Act 2016 replaced the Coastal Protection Act 1979 and establishes a new strategic framework and objectives for managing coastal issues in NSW. The Act defines the coastal zone as comprising four coastal management areas. SEPP (Resilience and Hazards) 2021 Ch. 2 Coastal Management gives effect to the objectives of the Act from a land use planning perspective, by specifying how

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development proposals are to be assessed if they fall within the coastal zone. The four coastal management areas are:

1. Coastal wetlands and littoral rainforests area — areas which display the characteristics of coastal wetlands or littoral rainforests that were previously protected by SEPP 14 and SEPP 26
2. Coastal vulnerability area — areas subject to coastal hazards such as coastal erosion and tidal inundation
3. Coastal environment area — areas that are characterised by natural coastal features such as beaches, rock platforms, coastal lakes and lagoons and undeveloped headlands. Marine and estuarine waters are also included
4. Coastal use area — land adjacent to coastal waters, estuaries and coastal lakes and lagoons.

Tuggerah Lakes and its entrance region fall within the coastal environment area and coastal use area.

The objectives of the coastal environment area are:

- to protect and enhance the coastal environmental values and natural processes of coastal waters, estuaries, coastal lakes and coastal lagoons
- to enhance natural character, scenic value, biological diversity and ecosystem integrity
- to reduce threats to, and improve the resilience of, coastal waters, estuaries, coastal lakes and coastal lagoons, including in response to climate change to maintain and improve water quality and estuary health
- to support the social and cultural values of coastal waters, estuaries, coastal lakes and coastal lagoons
- to maintain the presence of beaches, dunes and the natural features of foreshores, taking into account the beach system
- to maintain and, where practicable, improve public access, amenity and use of beaches, foreshores, headlands and rock platforms.

The objectives of the coastal use area are:

- to protect and enhance the scenic, social and cultural values of the coast by ensuring that:

  (i) the type, bulk, scale and size of the development are appropriate for the location and natural scenic quality of the coast;

  (ii) adverse impacts of development on cultural and built environment heritage are avoided or mitigated;

  (iii) urban design, including water sensitive urban design, is supported and incorporated into development activities;

  (iv) adequate public open space is provided, including for recreational activities and associated infrastructure; and

  (v) the use of the surf zone is considered.

- to accommodate both urbanised and natural stretches of coastline.

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The Tuggerah Lakes Estuary Management Plan (2006) is a gazetted document and has the status of a certified Coastal Zone Management Plan (under the transitional provisions outlined in the Coastal Management Act 2016) until such time as it is replaced by a certified Coastal Management Program.

Commonwealth Legislation

Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act): the EPBC Act identifies the following matters of national environmental significance:

- World heritage;
- National heritage;
- Wetlands of international importance;
- Listed threatened species and communities;
- Listed migratory species;
- Protection of the environment from nuclear actions; and
- Marine environment.

A preliminary matters of national environmental significance search has identified the following for the Tuggerah Lakes Study area:

- Listed Threatened Ecological Communities: 5
- Listed Threatened Species: 96
- Listed Migratory Species: 76

1.8 Flood behaviour

The Tuggerah Lakes system is susceptible to different modes of flooding, including inundation from both catchment rainfall-runoff and oceanic processes. Flood behaviour exhibited within the study is summarised as follows.

1.8.1 Mainstream flooding

Mainstream flooding is a result of relatively high-water flows which overtop the natural or artificial banks along any part of a watercourse (rivers, creeks, tributaries), lake, dam or lagoon. This study focuses on mainstream flooding of the lake waterbodies (Tuggerah Lake, Budgewoi Lake and Lake Munmorah) in the lower region of the Tuggerah Lakes catchment.

During high catchment rainfall events, there is a significant lag between the water level in the lakes and those in upstream reaches of tributaries (Wyong River, Ourimbah River, etc.), due to the substantial overbank flood storage capacity in the lake's floodplain areas.

Previous flood study investigation found critical flood durations of approximately 48 hours and 24 hours for the 1% Annual Exceedance Probability (AEP) and Probable Maximum Flood (PMF) events respectively (Lawson and Treloar, 1994). Longer duration extreme floods were noted to be critical for Tuggerah Lakes due to the volume of runoff being the principal factor in raising flood levels in the Lake system. The large surface area of the Lake system requires a considerable volume of runoff to raise the water level. The extent, rate and duration of flooding is governed by the volume of catchment runoff, temporal and spatial distributions of rainfall runoff over the catchment, ocean conditions (waves, tides and ocean anomalies) and the

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dynamic morphology of the entrance region (degree of entrance constriction).

The dynamic morphology of the entrance region is detailed in the Tuggerah Lakes Entrance Management Study (MHL, 2022). Using tidal harmonic analysis of historical lake level records, the study classified entrance dynamics into five characteristic morphological states, namely wide open, moderately open, moderately constricted, heavily constricted and fully closed. In the lead up to a flood event, the entrance may be any of these states depending on antecedent rainfall and ocean conditions in the several months and years prior. During the course of a flood event, the entrance naturally scours and widens with the release of floodwaters from the Lake system, with the entrance channel in some cases reaching widths in excess of 100 m. Following a flood and during periods of relatively low rainfall, the entrance naturally infills with marine sand to a more constricted state. Further information on entrance dynamics and modelling approach is provided in **Section 3.9**.

1.8.2 Overland flooding

Overland flooding is caused by heavy rainfall flowing across the ground or overflowing pipes, pits and gutters. It is inundation as a result of local runoff rather than inundation created by overbank flows discharging from a watercourse, lake or dam. Local overland flooding is often characterised by a rapid rise in flood levels, particularly where the local catchment is relatively steep and small. Overland flooding can be important for upstream areas of the Tuggerah Lakes catchment with lower reaches typically dominated by flooding of the lake water body with catchment runoff and coastal inundation.

1.8.3 Coastal inundation

Generally elevated ocean levels occur in combination with increased wave activity (wave setup at the entrance), spring tidal cycles and ocean anomalies (storm surge, coastal trapped waves, etc.). With the entrance channel relatively scoured and open, the water level in Tuggerah Lakes can temporarily increase as a result of elevated ocean water levels. Given the large storage volume of the Lakes system, this rise in water levels is relatively minor (rise of typically less than 1 m) compared to that associated with long duration heavy rainfall events. Lake levels may rise with long duration coastal storm events, occurring over multiple days, which create a pumping effect of ocean inflows over consecutive tidal cycles. The influence of coastal events on lake levels are reduced with more constricted entrance morphology that acts to throttle the amount ocean inflows into the Lake system. Projected sea level rise is likely to increase the impacts of coastal inundation on Tuggerah Lakes foreshores over the coming decades. While coastal inundation is not the main focus of this study, the influence of the ocean conditions on lake flooding are assessed and incorporated in this study.

1.8.4 Combination of flood modes

These modes of flooding may occur in isolation or in combination with each other. For example, in May 1974 a significant coastal event with relatively minor rainfall resulted in lake levels increasing to approximately 1.2 m AHD to 1.3 m AHD with an estimated entrance width of around 40 m (Lawson and Treloar, 1994). During this event, the moderately constricted entrance likely provided some degree of restriction to ocean inflows and alleviated potential coastal inundation. On the other hand, in July 2022 lake levels reached a peak of 1.72 m AHD at Long Jetty and 1.76 m AHD at Toukley due to flooding associated with heavy catchment rainfall and subsiding ocean conditions (relatively minor compared with the May 1974 event).

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Flooding is worsened during heavy catchment rainfall events that coincide with large coastal events, during which elevated ocean levels acts to reduce the outflows at the Lakes entrance.

Antecedent entrance conditions are noted also to have an effect on flooding in the Lake system, particularly when the entrance is fully closed. Umwelt (2011) estimated that historically the entrance has been fully closed at least 13 times over the last 100 years due to the progressive sediment infilling and entrance berm growth by wave activity. Full entrance closure is historically noted during the 1940's and may have exacerbated flood level during the large floods recorded during this period, however this is difficult to confirm due to lack of records.

1.8.5 Observed flood prone areas

Details of specific flood prone areas have been collated from the previous studies outlined in **Section 2** and from new accounts obtained through the community consultation process undertaken for this flood study. The aim is to capture and convey the key areas within the Tuggerah Lakes study area that have been susceptible to known lake flooding issues in the past. Listed flood prone areas include:

- Low-lying foreshore areas of Tuggerah Lake including regions in The Entrance North, The Entrance, Long Jetty, Killarney Vale, Berkeley Vale, Chittaway Bay, Chittaway Point, Tacoma, Tacoma South, Tuggerawong, Gorokan, Toukley and Canton Beach.
- Low-lying foreshore areas of Budgewoi Lake including regions in Gorokan, Toukley, Budgewoi, Buff Point, San Remo and Charmhaven.
- Low-lying foreshore areas of Lake Munmorah including regions in Budgewoi and Halekulani.
- Lower reaches of Wallarah Creek including Blue Haven.
- Lower reaches of the Wyong River including Wyong, Tacoma, Tacoma South and Tuggerah.
- Lower reaches of Ourimbah Creek including Chittaway Bay, Chittaway Point and Kangy Angy.
- Lower reaches of Tumbi Umbi Creek.

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2 Previous studies

A review of previous relevant studies was undertaken to provide context and inform the present work as well as identify any critical knowledge gaps. A summary of this review focusing on key relevant studies is presented below.

2.1 Tuggerah Lakes Flood Study, Lawson & Treloar Pty. Ltd, 1994

The Flood Study Report for Tuggerah Lakes (Tuggerah, Budgewoi and Munmorah), completed for the former Wyong Shire Council in September 1994 by Lawson & Treloar Pty. Ltd, was undertaken to determine the flood behaviour events with Annual Exceedance Probabilities (AEP) of 50%, 20%, 5% and 1% AEP as well as the Probable Maximum Flood (PMF). The model results from this study form the basis of Council's currently adopted flood planning levels for Tuggerah Lakes.

The flood frequency analysis was conducted based on the data collected from 1927 to 1992. The study utilised a WBNM hydrologic model covering the entire catchment area and a 1D MIKE11 hydraulic model (with representative cross-sections) of the lake systems in the lower catchment east of Wyong. The WBNM hydrologic model covered the area of approximately 790 km^2 which was divided into 43 sub-catchments. The WBNM model was originally calibrated using the initial loss of 15 mm, continuing loss of 2.5 mm/hr, non-linearity parameter of n = 0.23 and lag parameter of C = 1.15. Both hydraulic and hydrologic models were calibrated based on the recorded flood levels in February 1990, August 1990, and February 1992 events.

For design analysis the entrance scour behaviour was simulated from a MIKE11 entrance breach model with a combined incised scouring channel (trapezoidal) to represent entrance channel flows and long overflow barrier (or weir) to represent berm overflows. The entrance breach parameters (similar to those of a dambreak) were calibrated based on limited information sources available.

The calibrated and validated hydrologic and hydraulic models were used to investigate flood behaviour for the 50%, 20%, 5%, 1% AEP design events (using Australian Rainfall and Runoff - ARR1987 methodologies) and the PMF. The design flood levels were produced using the initial lake water level of 0.3 m AHD. The key findings from the report are summarised below:

- Flooding in Tuggerah Lake is influenced by both elevated ocean levels and catchment runoff. Joint probability analysis was undertaken to investigate the relationship between ocean levels, catchment runoff and wind. It was concluded that the storms producing severe rainfall on the catchment did not necessarily coincide with significant elevated ocean levels. Storm duration and entrance conditions were found to be the contributing factors in the propagation of the elevated ocean level.
- The 1% AEP flood level was modelled with the following parameters:
  - Ocean conditions characterised by spring tides, wave setup of 0.07 m (corresponding with an offshore significant wave height of 4.5 m) and an inverse barometric effect determined from the average of historical flood events (value not specified). Due to the relatively slow response of the lake system, the timing of the peak tide and flood was tested and found to be relatively insensitive by

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comparison with other parameters.

- A 20 m wide initial entrance channel which scours to a wider channel during the flood simulated using a MIKE11 entrance breach model.
- An initial lake level of 0.3 m AHD.
- Wind setup effects were determined to be small during flooding and inconclusive such that these were not included in the design flood model runs.

- The results of the Flood Study showed that in 1% AEP event 48 hours was the critical duration; however, it was found that 24 hours was the critical duration for the PMF event.
- The study provides design flood levels within Tuggerah Lake that were prepared based on frequency analysis and hydrologic/hydraulic computer modelling summarised in **Table 2.1**. The design flood levels are based on an entrance breach model that was calibrated against historic floods. However, the outcomes of sensitivity analysis showed that peak 1% AEP water levels could change by up to 0.1 m if alternate breach parameters were adopted. Nevertheless, it is considered that the levels presented in **Table 2.1** provide the best contemporary description of design flood levels within the Tuggerah Lakes system.

Table 2.1 Design flood levels within the lakes system (Lawson & Treloar Pty. Ltd, 1994).

Design event	Flood level (m AHD)
PMF	2.70
1% AEP	2.23
5% AEP	1.80
20% AEP	1.36
50% AEP	0.91

- The Flood Study results found a significant lag time (approx. 24 - 48 hours) between the peak flood level upstream of Wyong and the peak water level in the lakes due to the retardation of flow through various road and railway crossings, and the substantial overbank flood storage areas in the lakes and floodplain downstream of Wyong. The entrance condition is one of the contributing factors controlling the flood behaviour in the lakes.
- The Flood Study results revealed that the water level in Tuggerah Lake rises faster than Lake Munmorah. One reasonable explanation is that the majority of the catchments drains from the southern part of the lake system via Ourimbah Creek and Wyong River into the Tuggerah Lake and the Lake Munmorah drains more slowly. However, the peak water levels are very similar and occur at roughly the same time.
- Entrance breach mechanisms were noted to be a key factor influencing lake flood levels. Limited data was available on the scour behaviour of the entrance during floods.

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An entrance breach model was developed based on limited entrance information, documented lagoon breakouts at other locations and other flood studies including entrance breakout. Sensitivity to entrance breach parameters was conducted indicating a 1% AEP peak lake level change of between -0.12 m and +0.08 m for ±10% change to entrance breach parameters (particularly side erosion index and head loss factors).

- During model development wave setup was estimated at the entrance for historical flood events using wave refraction computation, surf zone model (Goda, 1985) and MIKE21 simulation of the entrance. Results are shown below.

Table 2.2: Modelled wave setup in the entrance (from Lawson and Treloar, 1994)

Historical flood	Peak Hs (m)	Tz (s)	Direction (deg)	Wave Setup for different entrance channel depths (m)			
				0.5 m	1 m	1.5	2.0 m
02-07/02/90	3.7	6.7	62	0.21	0.10	0.05	0.00
01-05/08/90	7.2	7.3	133	0.45	0.34	0.30	0.25
09-10/02/92	4.5	5.9	148	0.25	0.14	0.10	0.05

- The report recommended long-term data collection at the entrance to the Pacific Ocean to better define entrance breach processes and streamflow gauging at the upstream river gauging stations to improve model calibration.

2.2 Tuggerah Lakes Floodplain Risk Management Study and Plan, WMA Water, 2014

Tuggerah Lakes Floodplain Risk Management Study and Plan was prepared by WMA Water on behalf of the former Wyong Shire Council in November 2014. The study was prepared to identify and evaluate a range of measures that could be potentially implemented to reduce the impact of flooding across the floodplain of the Tuggerah Lakes system.

The study was mainly focused on land that is located below 3 m AHD. That is, it did not consider flooding along each of the major tributary inflows to the lake system, including Wallarah Creek. Nevertheless, it does provide useful information regarding flooding mechanisms across the Tuggerah Lakes system. Wallarah Creek catchment drains into Budgewoi Lake. Accordingly, the prevailing water levels in Budgewoi Lake can influence flood behaviour along the downstream reaches of Wallarah and Spring Creek.

The study utilised a calibrated and verified WBNM hydrologic model and a MIKE11 1D hydraulic model developed as part of the Flood Study in 1994 to investigate several flood risk management measures. WBNM model was used to calculate flows based on the rainfall over the entire catchment area.

It was noted that the severity of flooding across the lake system is strongly influenced by the level of the beach berm and whether there are elevated ocean levels at the time of a flood (elevated ocean levels may prevent the egress of floodwaters from the lake system). The report

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also notes that rainfall over a period of 2 to 5 days is typically required to elevate lake levels significantly.

The study notes that the non-flood water level within the lakes is typically 0.3 m AHD with no apparent tidal fluctuation. However, the water level can vary from 0.1 to 0.5 m AHD depending on the volumes of inflow from the contributing catchments and the prevailing entrance conditions.

This report recommended several options to manage flooding in Tuggerah Lakes, which led to a short-list of 14 actions, tabulated in **Table 2.3**. The Floodplain Risk Management Plan also investigated a range of options which were not recommended for implementation. One of these investigated options aimed at increasing the capacity of the entrance channel under two scenarios including:

- Scenario A: a 250 m wide (dredged to -1 m AHD) channel from the road bridge to the ocean; and
- Scenario B: as above plus removal of the beach berm at the entrance.

It was concluded that increasing the capacity of the entrance channel through implementing scenario A would lower peak flood levels in 1% AEP events by up to 0.31 m (reducing the water level from 2.23 m to 1.92 m). Also, scenario B resulted in lower peak flood levels in 1% AEP events by up to 0.45 m (reducing from 2.23 m AHD to 1.78 m AHD). Although enlarging the entrance channel would reduce the peak water level for the 1% AEP event, this measure was not recommended for the following reasons:

- Maintaining a fully open channel of these dimensions is not physically or economically viable;
- Adverse environmental impacts on the Tuggerah Lakes ecosystem;
- Adverse impacts on local tourist industry;
- Potential adverse ocean wave impacts in the entrance channel;
- Potential negative impacts on the local coastal environment; and
- Concerns about the need to better consider scenarios that consider the impacts of large ocean swell events, which may produce higher levels in the lakes.

Table 2.3 Proposed floodplain risk management options (WMA Water, 2014).

Priority	Measure	Description
High	Adaption Planning for foreshore suburbs	Detailed investigation into the long-term land use planning for low-lying lands that feasibly cannot be protected against future sea-level rise by structural measures.
	Flood Emergency Management Planning	SES should confirm any evacuation procedure that can be realistically achieved and will not endanger lives.

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Priority	Measure	Description
	Public Education and Raising Flood Awareness	-
	Development of management plan for vulnerable water and sewer assets	Develop a management plan for vulnerable water and sewer assets which had been turned off during significant flood events as well as minor evens.
	Formalise an entrance management strategy to manage flooding	Aiming to include emergency entrance opening for the management of flooding considering sea-level rise and its impact on geomorphic and environmental characteristics of the area.
	Develop asset management procedures for the Wilfred Barrett Drive levee	Develop asset management procedures for the levee of Wilfred Barrett Drive as well as the stormwater outlets and rubber backflow valves.
	Update Section 149(2) planning certificates	-
	Address and manage local frequent flooding issues	Investigate and manage measures to address the local flooding issues identified and recorded after significant floods.
	Maintenance of water level and rainfall gauges	Ensure the existing water level and rainfall gauges in the catchment are in working order at all times.
	Undertake transfer of all relevant flood related information to the community Insurance Council of Australia and NSW State Emergency Service	Provide the Insurance Council of Australia and NSW State Emergency Service with the updated flood maps and flood related information.
Medium	Review Tuggerah Lakes Flood Study and Floodplain Risk Management Plan	Review could include assessment of wind wave run up along with sea-level rise in Tuggerah Lakes, assessment of recommended entrance management measures.
Low	Assess and manage the risk of electrocution during floods	Risk of electrocution should be addressed and managed by both the asset owner and electricity provider due to the high risk of electrocution during floods.
	Investigate opportunities for house raising	Raise the vulnerable properties above the flood planning level within the floodplain of Tuggerah Lake.
	Develop specific flood related controls for existing and future tourist parks	Address and manage the risk to the safety of occupants and damage to structures.

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2.3 Tuggerah Lakes Entrance Management Study, MHL, 2022

MHL was commissioned by Central Coast Council to undertake Tuggerah Lakes Entrance Management Study which was completed in August 2022. The study was prepared to develop an Interim Entrance Management Procedure for Tuggerah Lakes, based on sound evidence, to reduce the risk to life, public and private infrastructure and public health.

The condition of the entrance was found to be a contributing factor controlling lake flood levels. While the channel does temporarily scour and widen during flood events, increasing the lake tidal range by a factor of two, the typically low tidal prism of the entrance results in net marine sediment infilling over time, requiring mechanical intervention to maintain open conditions.

Modelling of interim management options for the Tuggerah Lakes entrance was undertaken to assess impacts on flooding and lake level variability under a range of events. Multi-criteria analysis was undertaken to assess interim management options against a range of environmental, social and economic criteria to determine a preferred approach.

The interim procedure aimed to reduce the risk to life, public and private infrastructure associated with flooding in accordance with the FRMSP (WMA Water, 2014). Flood level reductions associated with the procedure were expected to be small (typically less than 0.2 m), however, were considered beneficial in assisting to reduce flood damages. These reductions were reported likely to diminish for floods coinciding with extreme coastal anomalies and/or with projected sea level rise over the next 50 - 100 years.

It was noted that the flooding in Tuggerah Lakes cannot be eliminated. The impacts of flooding will continue to be experienced even under the implementation of the proposed interim management procedure and will likely worsen with sea level rise. It is important that the community in the Tuggerah Lakes Floodplain understand their level of flood risk as well as adapt and prepare to live with the impacts of flooding. The interim procedure is to be implemented alongside of other floodplain risk management controls identified in the FRMSP to reduce flood risk. Reviewing and updating planning controls will be vital for future flood risk management in Tuggerah Lakes given the significant low-lying development situated along the Tuggerah Lakes foreshores.

It was recommended that further work as part of the Floodplain Risk Management process and Coastal Management Program include review/provision of priority floodplain risk management controls identified in the FRMSP (WMA Water, 2014), review of sea level rise impacts on flooding and coastal inundation in Tuggerah Lakes, and investigation of entrance shoal dredging to support entrance management including recreational, environmental, and social outcomes. It was also recommended that Council continue to investigate potential new technologies and methods that may improve entrance condition monitoring and support management works as they become available in the future.

2.4 Wyong River Catchment Flood Study, BMT, 2014

The Wyong River Catchment Flood Study was prepared by BMT WBM Pty Ltd on behalf of the former Wyong Shire Council in October 2014. The study was prepared to define the existing flood behaviour in the Wyong River catchment and establish the basis for subsequent floodplain management activities. The Wyong River acts as the primary tributary to the Tuggerah Lakes system, draining approximately 60% of the total catchment area of the lakes.

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The Wyong River Catchment Flood Study involved the development of hydrologic and hydraulic models to simulated flood conditions in the catchment. The hydrologic model was developed using XP-RAFTS software to simulate the rainfall-runoff process. The hydraulic model comprised a two-dimensional TUFLOW model with a uniform 8 m grid.

Calibration was undertaken by means of comparison to recorded water levels at streamflow gauge locations, with the WaterNSW derived rating curves at each of these locations deemed inappropriate for use in model calibration and accordingly adjusted to hydraulic model results. The hydrologic and hydraulic models were calibrated principally against the June 2007, and additionally against the February 1990, March 1977, June 1964, and June 1949 events.

The model calibration parameters adopted for all calibration events included an IL of 35 mm, which was justified as being '*larger*' as it was '*found to give a better representation of the initial catchment response to the input rainfall conditions.'* However, it is noted that the June 2007 modelled calibration event commences at 9am on 7 June 2007, *after* a burst of rainfall averaging approximately 30 mm across the catchment had already fallen over the preceding nine hours, and therefore the effective initial loss of the modelling approach is higher. A CL of 2.5 mm is adopted as it was similar to the '*design continuing loss rate as recommended in ARR (2001).*'

The calibration of the February 1990 event at the streamflow gauge locations on the Wyong River at Yarramalong and Gracemere suggested that actual effective rainfall (rainfall - losses) was much less than that derived with standard IL/CL method. As such, the Runoff Curve Number (RCN) loss method was found to provide a better match when events had a higher initial rainfall, whereas events with lower initial rainfall intensity, such as the June 2007 event, were found to be less sensitive to the adopted loss model.

In terms of the aptitude of the final calibrated model, results saw a tendency towards underestimation of peak flood levels, and a comparatively early rise and fall of flood levels across both calibration events with continuous flood level data to which to compare. In the June 2007 event, peak flood levels were approximately 500mm lower than recorded at Yarramalong, and 300 mm lower than recorded at Gracemere and the Fishway.

When progressing to design events, preliminary design simulations adopted standard IL and CL values of 15 mm and 2.5 mm/h, respectively. For impervious areas, adopted IL and CL values were taken as 2 mm and 0 mm/h. This approach was found to result in '*significant over-estimations of peak flood levels for the more frequent events*' as compared to observed annual maxima at the gauging sites and as such a Runoff Curve Number method was adopted for rainfall loss representation, with a curve number of 70. Critical durations of 36 hr and 9 hr were determined for the Wyong River and Mardi Creek catchments. Relevant to the present study, the adopted design events also saw flood levels in Tuggerah Lake increasing from a fixed IWL of 0.25 m AHD to peak flood levels ranging between 1.36 mAHD for the 20% AEP event and 2.7 mAHD for the PMF.

2.5 Other studies

Several flood studies have been undertaken for the catchments draining to Tuggerah Lakes. **Table 2.4** summarises the hydrologic and hydraulics modelling parameters for a potential consideration in the present study.

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Table 2.4 Summary of relevant studies

Study	Year	Client	Author	Hydrologic model		Hydraulic model			ARR	Adopted critical duration	Calibration events	Comment
				Type	Design event parameters	Type	Cell Size	Downstream boundary conditions				
Tuggerah Lakes Flood Study	September 1994	former Wyong Shire Council	Lawson & Treloar Pty. Ltd	WBNM	● Initial loss (IL): 15 mm ● Continuing loss (CL): 2.5 mm/hr ● Non-linearity parameter (n): 0.23 ● Lag parameter (C): 1.15	MIKE11	-	Water level at the ocean: a realistic astronomic tide level of 0.8 m AHD with a storm surge of 0.4 m leading to an ocean level of 1.2 m AHD plus 0.2 m shoreline wave set-up	1987	Design events: 48 hr PMF: 24 hr	February 1992, August 1990, February 1990 May 1974	-
Tumbi Umbi Creek Flood Study Review	December 1994	former Wyong Shire Council	Paterson Consultants	WBNM	-Not specified	MIKE11	-	-	-	-	January 1978, February 1981, April 1990, February 1992	-
Porters Creek Flood Study	July 2009	former Wyong Shire Council	Cardno	XP-RAFTS	● Impervious surfaces: IL: 1.5 mm CL: 0.0 mm/hr ● Partially developed areas: IL: 10 mm CL: 2.5 mm/hr ● Forested areas: IL :15 mm CL: 4 mm/hr	TUFLOW	● Floodplain: 15 m ● Urban areas: a nested 4 m	Constant water level at the confluence with Wyong River ranging from 5.03 to 6.53 m AHD for 10%AEP to PMF events.	1987	Design events: 9 hr PMF: 1 hr	June 2007, October 2004	-
Ourimbah Creek Catchment Flood Study	October 2013	former Wyong Shire Council	Catchment Simulation Solutions	XP-RAFTS	● Pervious areas: IL: 15 mm CL: 4 mm/hr ● Impervious areas: IL: 1.5 mm CL: 0 mm/hr	TUFLOW	● Rural area: 8 m ● Urban area: 4 m	Tuggerah Lake level increasing from "normal" level to peak Tuggerah Lake flood level ranging between 1.36 m AHD for 20% AEP and 2.7 m AHD for PMF and considering Tuggerah Lakes peaks 20 hour after rainfall onset.	1987	Critical storm duration varies from 2 hr to 48 hr throughout the catchment.	June 2011, June 2007, February 1992	Study stated sandy nature of catchment.
Killarney Vale / Long Jetty Catchments Overland Flood Study	May 2014	former Wyong Shire Council	Catchment Simulation Solutions	XP-RAFTS	● Pervious areas: IL: 10 mm CL: 2.5 mm/hr ● Impervious areas: IL: 1 mm CL: 0 mm/hr	TUFLOW	2 m	Tuggerah Lake level increasing from "normal" level to peak Tuggerah Lake flood level ranging between 1.36 m AHD for 20% AEP and 2.7 m AHD for PMF and considering Tuggerah Lakes peaks 20 hour after rainfall onset.	1987	Peak catchment outflow occurs approximately 1.5 hr after the initial onset of the design rainfall, while the peak lake stage occurs about 20 hr after the onset of rainfall	December 2010, June 2007, February 1981	30 minute, 2 hour and 3 hour storms produced worst case flooding in upstream sections, along major waterways and within major detention basins, respectively.
Wyong River Catchment Flood Study	October 2014	former Wyong Shire Council	BMT WBM Pty Ltd	XP-RAFTS	● Pervious areas: IL: 15 mm CL: 2.5 mm/hr ● Impervious areas: IL: 2 mm CL: 0 mm/hr	TUFLOW	8 m	Tuggerah Lake level increasing from 0.25 m AHD to peak Tuggerah Lake flood level ranging between 1.36m AHD for 20% AEP and 2.7 m AHD for PMF.	1987	Design events: Critical duration of 36 hr and 9 hr for Wyong River and Mardi Creek catchment. PMF: Critical duration of 24 hr and 2 hr for Wyong	June 2007, February 1990, March 1977, June 1964, June 1949	-

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Study	Year	Client	Author	Hydrologic model		Hydraulic model			ARR	Adopted critical duration	Calibration events	Comment
				Type	Design event parameters	Type	Cell Size	Downstream boundary conditions				
										River and Mardi Creek catchment.		
Tuggerah Lakes Floodplain Risk Management Study and Plan	November 2014	former Wyong Shire Council	WMA Water	WBNM	The study adopted the model developed as part of 1994 study and no updates were made to the model. ● IL: 15 mm ● CL: 2.5 mm/hr ● Non-linearity parameter (n): 0.23 ● Lag parameter (C): 1.15	MIKE11	-	Water level at the ocean: a realistic astronomic tide level of 0.8 m AHD with a storm surge of 0.4 m leading to an ocean level of 1.2 m AHD plus 0.2 m shoreline wave set-up	1987	Design events: 48 hr PMF: 24 hr	February 1992, August 1990, February 1990, May 1974	● A completely new entrance breach mechanism was applied due to the superseded entrance mechanism adopted in MIKE11. ● The study was mainly focused on land that is located below 3 m AHD.
Northern Lakes Flood Study	October 2015	former Wyong Shire Council	Cardno	No hydrologic modelling was undertaken.	Direct rainfall approach has been used. ● Pervious areas: IL: 15 mm CL: 1.5 mm/hr ● Impervious areas: IL: 5 mm CL: 0.5 mm/hr	TUFLOW (Direct Rainfall)	2 m	Lake level of 0.5 m AHD was adopted for the 20% and 5% AEP events and 0.6 m AHD was adopted for the 1% AEP and PMF events	1987	1% AEP: 1.5 hr PMF: 15 min and 30 min	-	
Wallarah Creek Catchment Flood Study	April 2016	former Wyong Shire Council	Catchment Simulation Solutions	XP-RAFTS	● Pervious areas: IL: 10 mm CL: 2.5 mm/hr ● Impervious areas: IL: 1 mm CL: 0 mm/hr	TUFLOW	● Floodplain: 4 m ● Urban areas: 2 m	A constant water level of 0.67 and 0.92 m AHD in Budgewoi Lake for the 5% and 1% AEP events, respectively.	1987	The following storm duration were simulated for each design event: 1.5, 2, 6 and 9 hr. The 1.5 hr storm generally dominates in areas of shallow flow while the 2 hr storm duration dominates along the upstream sections of major creek as well as major overland flow paths.	April 2015, June 2007	
Tuggerah Lakes Southern Catchments Flood Study	February 2018	Central Coast Council	WMA Water	WBNM	● Lag parameter (C): 0.7 to 2.8. ● Pervious areas: IL: 20 mm CL: 4 mm/hr ● Impervious areas: IL: 1.5 mm CL: 0 mm/hr	TUFLOW	Urban areas: 2 m	Constant level of 0.6 m AHD for design events	1987	Design events: 2 hr and 9 hr PMF: 1 hr or 2 hr depending on the location	April 2015, June 2007	-
Tuggerah Lakes Entrance Management Study	August 2022	Central Coast Council	MHL	WBNM	● Pervious areas: IL: 0-60 mm CL: 3.5 mm/hr ● Lag parameter (C): 2.5	MHLFIT tool	-	Ocean water level	2019	-	-	-

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2.6 Summary

This section provides an overview of previous flood-related investigations in the Tuggerah Lakes catchment. Over the past 30 years, numerous studies have been conducted to better understand the flooding issues in the area. These investigations offer valuable insights for the current study, including survey data (such as creek cross-sections and bridge/culvert details), historical flood damage areas, and flood marks from past events.

The review highlighted variability in the modelling approaches and parameters used in these studies, making it challenging to accurately replicate historical flood behaviour, especially during initial flood responses. It was also noted that flood levels in the Tuggerah Lakes are influenced by various factors, including catchment inflows, entrance conditions, and ocean dynamics.

Specifically, the existing Flood Study and Floodplain Risk Management Study and Plan (FRMSP) for Tuggerah Lakes, completed in 1994 and 2014 respectively, require updates to incorporate advancements in flood modelling capabilities, new data collected since then, and the latest best practices outlined in ARR2019. Additionally, the completion of an evidence-based interim entrance management procedure in 2022 has enhanced understanding of the complex interactions between catchment flooding, entrance conditions, and ocean dynamics, particularly during various flow events, providing valuable insights for the current study.

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3 Data collection and review

This section summarises the collation and review of available and relevant data in the study area.

3.1 Water level and rainfall data

MHL manages a network of water level (15-minute recording frequency) and near-real-time rainfall recording stations within or in the vicinity of the study area. The Bureau of Meteorology (BoM) also operate a network of near-real-time rainfall recording stations within or in the vicinity of the study area. WaterNSW manages a network of water level (15-minute recording frequency) recording stations within or in the vicinity of the study area, a subset of which possess derived stage-discharge rating curves and associated rated discharge time series.

These relevant gauge networks are detailed in **Table 3.1** and their location is illustrated in **Figure 3.1**.

3.2 Topographic data

Light Detection and Ranging (LiDAR) data is aerial survey data that provides a detailed topographic representation of the ground. The accuracy of the ground information obtained from the LiDAR survey can be adversely affected by the nature and density of vegetation, the presence of steeply varying terrain, the vicinity of buildings and/or the presence of water.

LiDAR survey of the study area and its immediate surroundings was obtained for the study from ELVIS (https://elevation.fsdf.org.au/). 1-metre resolution LiDAR data from the 'Gosford' dataset (NSW Spatial Services 2011-2020) was used. The horizontal accuracy of the data is 0.8 m at 95% confidence interval, while the vertical accuracy is 0.3 m at 95% confidence interval. The terrain topography is shown in **Figure 3.2.**

Also, a consolidated 1 m resolution LAS data was provided by CCC and utilised in the present study.

As part of the data review, a comparison was made between the 2011 - 2020 LiDAR dataset and elevation of reference marks obtained from Sixmaps. Under the S&SI Reg 2017, only marks that have a vertical class of L2A, LA, LB, LC, LD, 2A, A or B should be used for the adoption of AHD. Therefore, marks classified as "E" (marks with approximate positions) and "U" (marks with an unknown position or height) were excluded from the assessment. The difference between the 2011-2020 LiDAR dataset and the elevation of the reference marks were calculated and presented in **Figure 3.2** and **Figure 3.3**. It was observed that this difference ranges from -1.0 to 1.0 m with the majority of elevation differences falling between -0.1 to 0.3 m which is consistent with the vertical accuracy of the dataset. Marks with differences exceeding ± 0.3 m were inspected; many were near vegetation, fences, road signs, or resurfaced areas, contributing to observed discrepancies.

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Table 3.1 Summary of relevant rainfall and water level stations

Type	Ownership	Number	Name	GDA 94/MGA Zone 56		Data period	Used?	Purpose
				Easting	Northing			
Near-real-time rainfall	DCCEEW BC	211401	Toukley	362599	6318531	Feb 1985-ongoing	✓	Hydrologic model input
	DCCEEW BC	211417	Wyong Weir Upstream	351596	6316778	Jan 1986-Apr 2008	✓	
	DCCEEW BC	561026	Dooralong (Whitemans Ridge)	343653	6324899	Apr 1989-ongoing	✓	
	DCCEEW BC	561078	Kulnura (Pioneer Park)	333796	6321517	June 1989-ongoing	✓	
	DCCEEW BC	561133	Hamlyn Terrace	357399	6319854	Mar 2010-ongoing	✓	
	DCCEEW BC	561082	Mardi Dam	351038	6314555	Oct 1988-ongoing	✓	
	DCCEEW BC	561132	Kangy Angy	350168	6310609	Aug 2010-ongoing	✓	
	DCCEEW BC	561134	Berkeley Vale	353191	6309376	Jun 1988-ongoing	✓	
	DCCEEW BC	561069	Bateau Bay	358098	6305653	Jan 1980-ongoing	✓	
	DCCEEW BC	561079	Lisarow	348900	6305317	Apr 1989-ongoing	✓	
	DCCEEW BC	561137	Yarramalong	338869	6322377	Nov 1988-ongoing	✓	
	DCCEEW BC	567138	Sterland	342433	6315335	Apr 1989-ongoing	✓	

Classification: Public

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Type	Ownership	Number	Name	GDA 94/MGA Zone 56		Data period	Used?	Purpose
				Easting	Northing			
	SRA	5SRA05	Warnervale	356155	6320015	Jan 1986-Apr 2010		Alternative nearby sites
	DCCEEW BC	561072	Chittaway	350336	6310109	Dec 1989-Aug 2010		Alternative nearby sites
	BoM	61381	Mount Elliot	350641	6302971	Dec 2000-Jul 2022		Alternative nearby sites
	DCCEEW BC	561084		350646	6302980	Dec 1987-ongoing	✓	Hydrologic model input
	DCCEEW BC	561085	Narara	344310	6304220	Apr 1989-ongoing	✓	
	DCCEEW BC	561136	Strickland	345377	6305541	Dec 1985-ongoing	✓	
	WaterNSW	211010	Jilliby	350148	6320358	May 2016-ongoing	✓	
	DCCEEW BC	561081	Mandalong	351103	6335474	Dec 1988-ongoing	✓	
	BoM	61201	Watagan Central	330768	6344394	May 1959-Jun 2022	✓	
	DCCEEW BC	561097	Wyee	358855	6327981	May 1992-ongoing	✓	
	DCCEEW BC	561067	Martinsville	351277	6341500	Mar 1988-ongoing	✓	
	BoM	61385	Wyong (Olney Forest)	345215	6338888	Dec 2000-Nov 2023	✓	
	BoM	61382	Kulnara (Jeavons)	333848	6328663	Dec 2000-ongoing	✓	

Classification: Public

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Type	Ownership	Number	Name	GDA 94/MGA Zone 56		Data period	Used?	Purpose
				Easting	Northing			
	BoM	61432	Palm Grove (Lyrebird Lane)	341906	6314401	Nov 2018-May 2023		Sterland (567138) nearby
AWS	BoM	61375	Mangrove Mountain AWS	333388	6315201	Jul 1994-ongoing		Alternative nearby sites
AWS	BoM	61366	Norah Head AWS	367450	6316613	Feb 1995-ongoing	✓	Hydraulic model calibration (wind data)
Water level	DCCEEW BC	211420	Wallarah Creek Bridge	360913	6323587	May 1994-ongoing	✓	Hydraulic / hydrologic model calibration
Water level	DCCEEW BC	211401	Toukley	362599	6318531	Feb 1985-ongoing	✓	
Water level	DCCEEW BC	211417	Wyong Weir Upstream	351596	6316778	Jul 1990-ongoing	✓	
Water level	DCCEEW BC	211425	Lees Bridge	353684	6311538	May 1993-ongoing	✓	
Water level	DCCEEW BC	211418	Long Jetty	358757	6308079	Sep 1991-ongoing	✓	
Water level	DCCEEW BC	211419	Tumbi Umbi	355321	6307480	Apr 1994-ongoing	✓	
Water level	CCC	61384	Kangy Angy	350168	6310609	Dec 2000-Feb 2017		No data available for key events
Water level	CCC	212464	Lisarow (Cutrock Creek)	348883	6305388	Jul 2009-ongoing		
Water level	CCC	2124127	Lisarow (Tall Timbers)	349098.6	6305933	Mar 2014-ongoing		
Water level	CCC	61386	Wyong River upstream Bridge	353247	6315353	Jun 2020-ongoing	✓	Hydraulic / hydrologic model calibration

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Type	Ownership	Number	Name	GDA 94/MGA Zone 56		Data period	Used?	Purpose
				Easting	Northing			
	CCC	561001	Tuggerah Lake Entrance	360059	6309209	Jan 1996-Aug 2016	✓	
	DCCEEW BC	211416	Wyong River downstream Bridge	353402	6315330	Sep 1993-Jun 2003	✓	
	MHL	2114111	Wyong River at Gears	343031	6319600	Nov 2005-ongoing	✓	Hydraulic / hydrologic model calibration
	DCCEEW BC	213470	Sydney	338842	6255833	Sep 1987-ongoing	✓	Downstream boundary condition
	DCCEEW BC	212440	Patonga	339821	6286294	Jun 1992-ongoing		
Water level (with flow rating curve)	WaterNSW	211009	Wyong River at Gracemere	347220	6317541	Dec 1972-ongoing	✓	Hydrologic model calibration
	WaterNSW	211014	Wyong River at Yarramlong	339346	6323343	Nov 1976-ongoing	✓	
	WaterNSW	211017	Wyong River at Fishway	351563	6316778	Sep 2011-ongoing	✓	
	WaterNSW	211010	Jilliby Creek upstream Wyong River (Durren Lane)	350148	6320358	Dec 1972-ongoing	✓	
	WaterNSW	211013	Ourimbah Creek upstream Weir	345841	6308872	Nov 1976-ongoing	✓	
	WaterNSW	211015	Ourimbah Creek downstream Bangalow Creek	350107	6311190	Oct 2003-ongoing	✓	

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Notes:

- DCCEEW BC: Department of Climate Change, Energy the Environment and Water - Biodiversity and Conservation Group
- CCC: Central Coast Council
- SRA: former State Rail Authority
- AWS: Automated Weather Station

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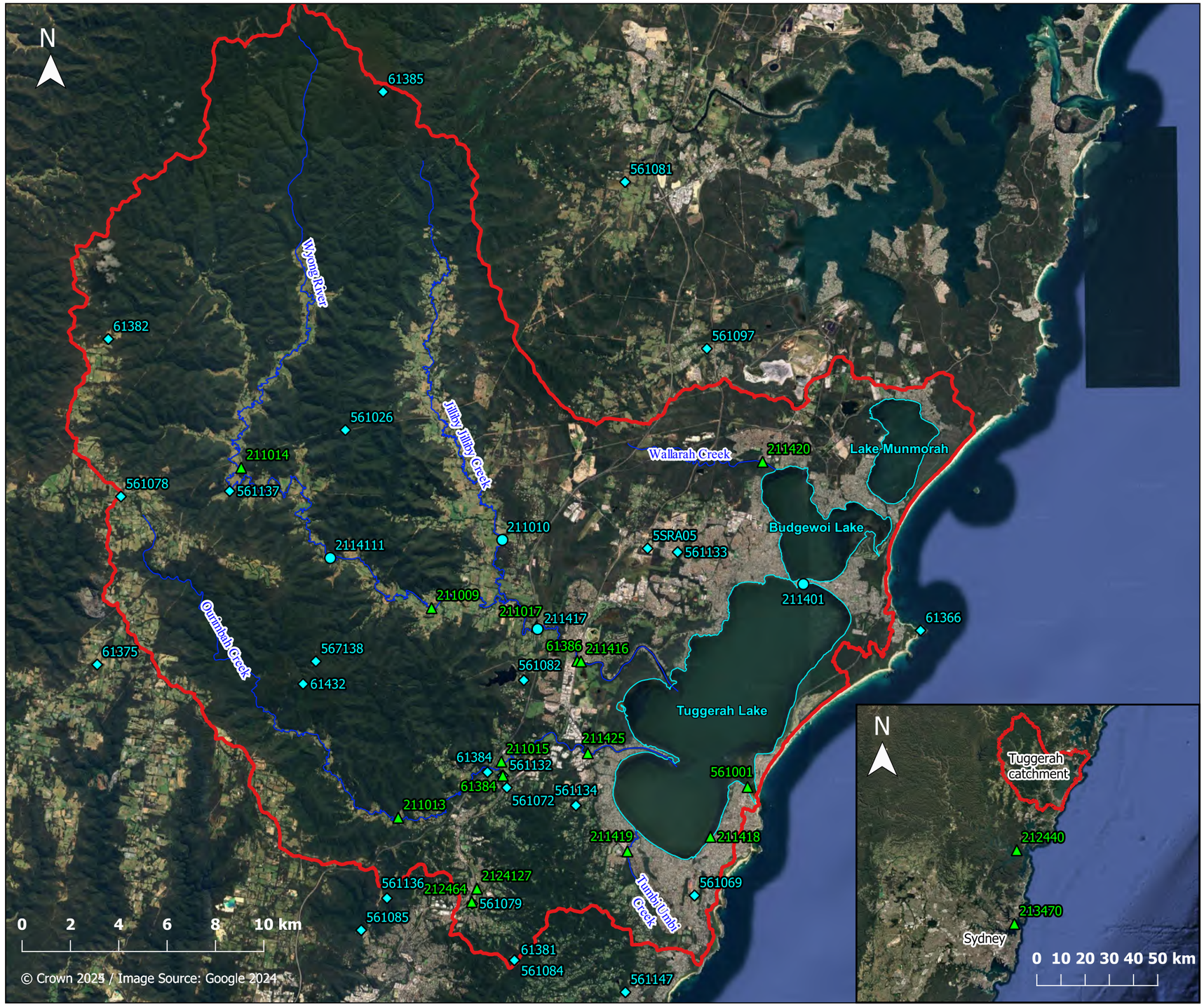

Figure 3.1

Rainfall, discharge and water level stations

Legend

- Catchment boundary
- Primary tributaries

Monitoring stations

- Rain
- Water level and rain
- Water level

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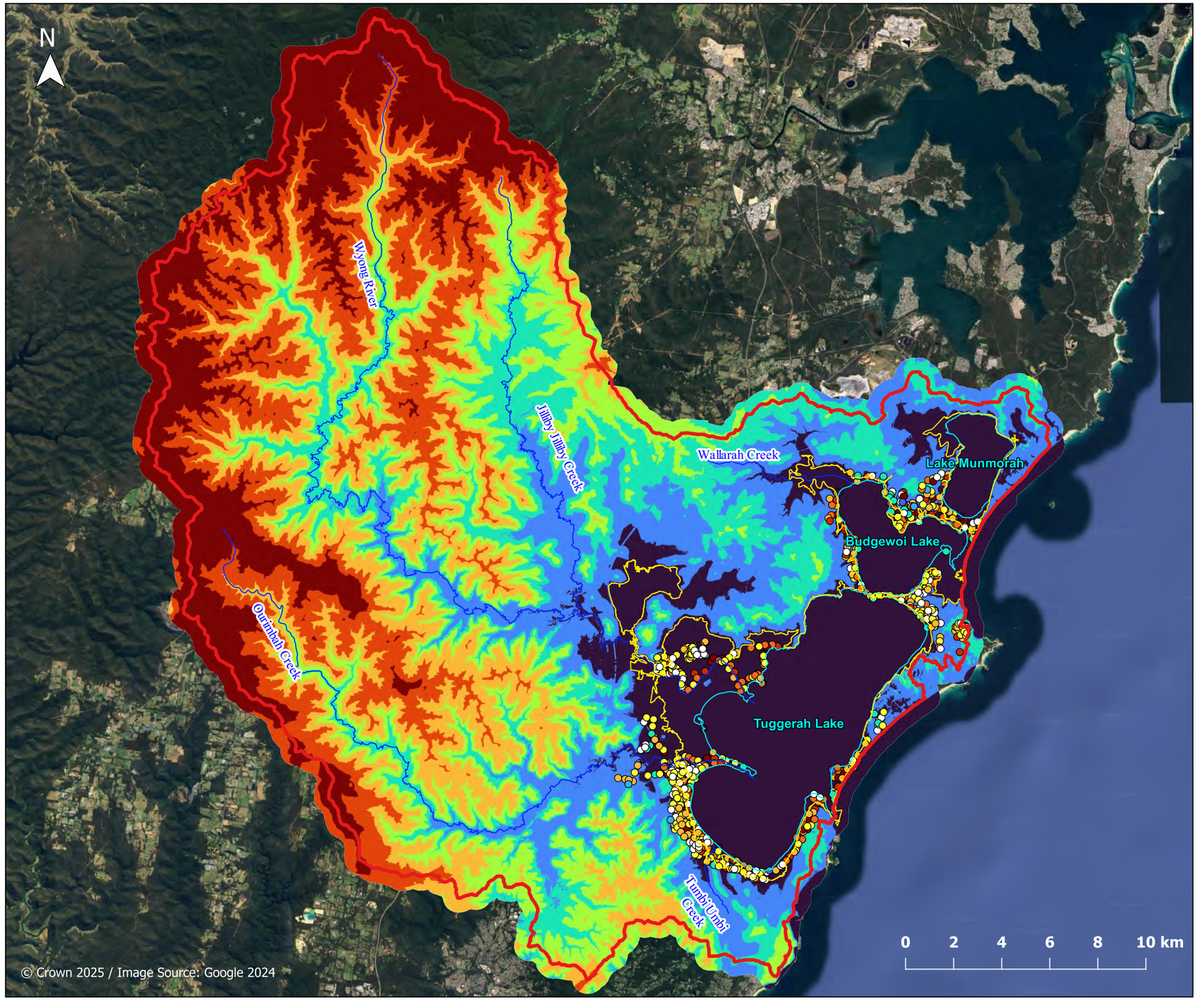

Figure 3.2

Topographic data and comparison of 1 m resolution 2011-2020 LiDAR

Legend

- Catchment boundary
- 3 mAHD Contour
- Primary tributaries

LiDAR minus survey mark elevation (m)

- < -0.4
- -0.4 - -0.3
- -0.3 - -0.2
- -0.2 - -0.1
- -0.1 - 0.0
- 0.0 - 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- > 0.4

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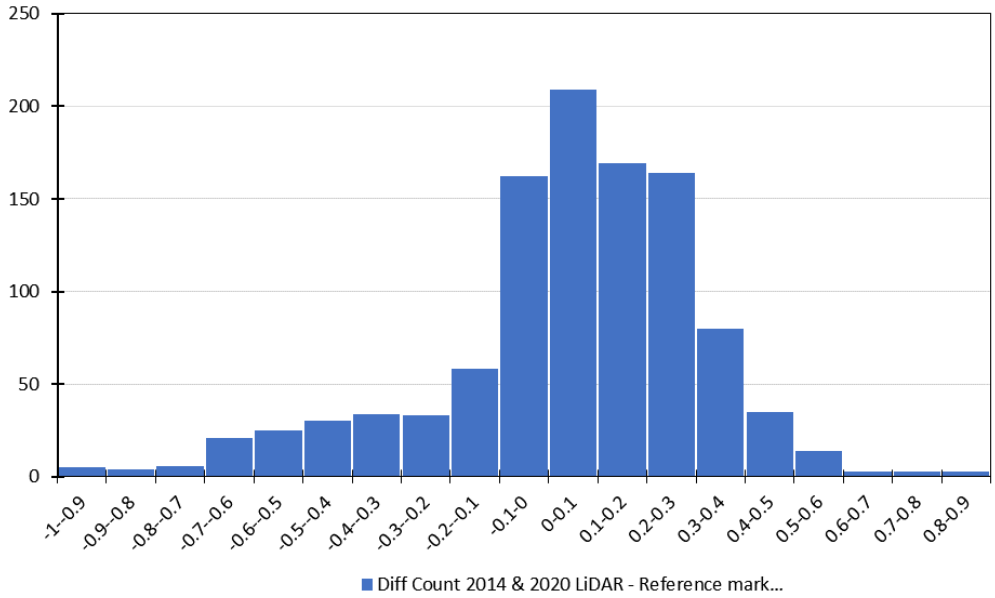

Figure 3.3 Distribution of the difference between 2011-2020 Gosford LiDAR data and the reference marks.

3.3 Lake bathymetry and entrance channel survey data

A bathymetric survey is the study of underwater beds and banks of the lakes. As the LiDAR data does not accurately represent lake profiles when water is present, bathymetric survey is necessary to reliably define the stage-storage curve of lakes.

There were existing bathymetric survey datasets covering lake bathymetry and entrance channel including:

- The survey datasets collected in 1975 covering the entire lakes area, by the then NSW Office of Environment and Heritage.
- The survey datasets collected in 1979 covering the entrance channel and parts of the lakes, by the then NSW Office of Environment and Heritage.
- Entrance and nearshore bathymetry survey datasets collected in 2008 and 2011, provided by Council.
- The survey datasets of the entrance channel and marina collected in 2018 - 2021 by Central Coast Council.
- The Marine LiDAR dataset DCCEEW in 2018 by DCCEEW.

The lake bathymetry for this study was created incorporating the survey points collected in 1975 covering the entire area of the lakes and bathymetry survey data collected between 2011 and 2022 covering the entrance channel. The extents of the available bathymetry datasets are displayed in **Figure 3.4.**

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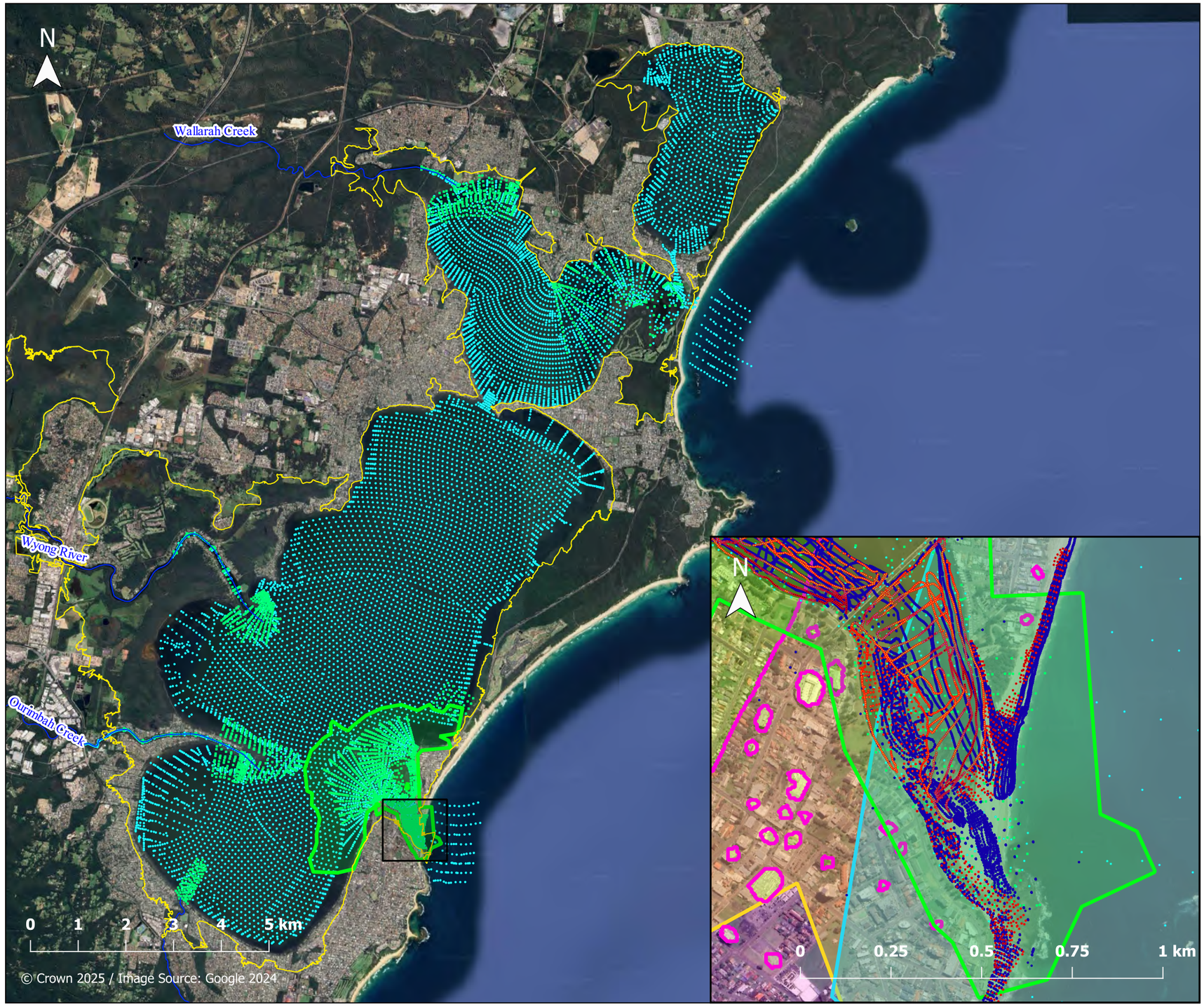

Figure 3.4

Lake bathymetry and entrance channel survey data

Legend

- 3 mAHD contour
- Primary tributaries

Bathymetry survey datasets

- 2008 survey
- 2011 survey
- 2011 survey
- 5m 2018 NSW Marine
- 1975
- 1979
- 2020
- 2021

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3.4 Aerial photography

The most recent available aerial imagery was obtained from Google Earth (www.googleearth.com), captured in 2022 to observe current features within the study area.

Moreover, Council provided Web Map Services (WMS) URLs connecting to the aerial photography tabulated in **Table 3.2**.

Table 3.2 Aerial photography details provided by the Council.

Date	Extent	Resolution (cm)
2019	Central Coast LGA	5
2018	Central Coast LGA	5
2016	Central Coast LGA	10
2016	Wyong LGA	10
December 2015	Gosford LGA	5
April 2015	Gosford LGA	5
2014	Wyong LGA	10
2014	Gosford urban and partial rural	10
2012	Gosford urban coverage only	5
2012	Central Coast LGA	10
2010	Gosford LGA	10 cm Urban / 20 cm Rural
2010	Wyong LGA	10
2007	Gosford urban coverage only	10
2006	Wyong LGA	10
2005	Gosford LGA	15

3.5 Drainage network

Council provided a number of GIS layers to represent the drainage system surrounding the Tuggerah Lakes. The layers included pits, pipes, culverts, headwall, gross pollutant traps (GPT), drainage channel, flood gates as well as levees.

The various layers were compared with the information existing in previous models as part of the hydraulic model development. The review identified some missing data required for modelling of the stormwater network as follows:

- Pipe data including approximate locations and pipe sizing were available for the majority of the catchment except for some areas with missing pipe network details (e.g., pipe size).
- Minimum pipe size of 0.3 m was included in the hydraulic model.
- Locations of pits were mostly available; however, invert level and pit sizes were not always present in the data provided.

In the absence of these data, a minimum cover depth of 0.3 m for all provided pits using

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standard pipe grading as a guide to ensure hydraulic continuity has been assumed. Furthermore, all kerb-type pits will be assumed to be 1800 mm wide and 200 mm high.

It is noted that inclusion of these drainage network structures will exclusively focus on areas in lower reaches of the catchment that may be directly subject to inundation as a result of backwater from the lakes (e.g., with elevations less than approximately 3 m AHD) and/or considered to be significantly influential on lake inundation levels. Noting this intent, the assumptions discussed above are not expected to be consequential.

This drainage network is shown in **Figure 3.5.**

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Figure 3.5

Drainage network

Legend

- Catchment boundary
- 3 mAHD Contour

Culverts and pipes

- C
- R

Pits

- Q
- R
- Node
- N
- J

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3.6 Bridges

Bridges located within the lower reaches of the catchment (with elevations less than approximately 3 m AHD) shown in **Figure 3.6**, include:

- Wyong Road Bridge over Tumbi Umbi Creek
- A foot bridge over Tumbi Umbi Creek
- Wyong Road Bridge over Ourimbah Creek
- A coupled Pacific Hwy Bridge and railway bridge over Wyong River
- Pacific Motorway Bridge over Wyong River
- Yarramalong Road Bridge over Wyong River
- Alison Road Bridge over Porters Creek
- Pacific Motorway Bridge over Deep Creek
- Mardi Road Bridge over Deep Creek
- Collie Lane Bridge over Deep Creek
- Pacific Highway Bridge over Wallarah Creek
- A railway bridge over Wallarah Creek
- Motorway Link Bridge over Spring Creek
- Central Coast Highway over Budgewoi Creek
- Budgewoi Footbridge over Budgewoi Creek
- Main Road Bridge
- The Entrance Bridge over the Tuggerah Lake Entrance Channel

3.7 Weirs

The Wyong River Weir is located on the Wyong River on the western side of Tuggerah Lake approximately 230 m downstream of Pacific Motorway, shown in **Figure 3.6.** The Wyong River Weir was originally a sheet-pile and concrete weir that formed the tidal barrier, limiting upstream intrusion of estuarine waters to provide local landholders and Wyong Shire Council with a more reliable fresh water source. In September 1993, a rock ramp fishway was constructed using sandstone blocks. As of 2023, the weir has a rock ramp and a trapezoidal fishway as shown in **Figure 3.7**. The rock ramp fishway is a traditional lateral ridge design and is only engaged during higher flows. The trapezoid fishway has a central chute for high flows and vertical slots on each side for fish to link the tidal reaches of the Wyong River with the upper reaches of the river. The crest of the weir is at approximately 1.2 m AHD and is visible in the LiDAR data.

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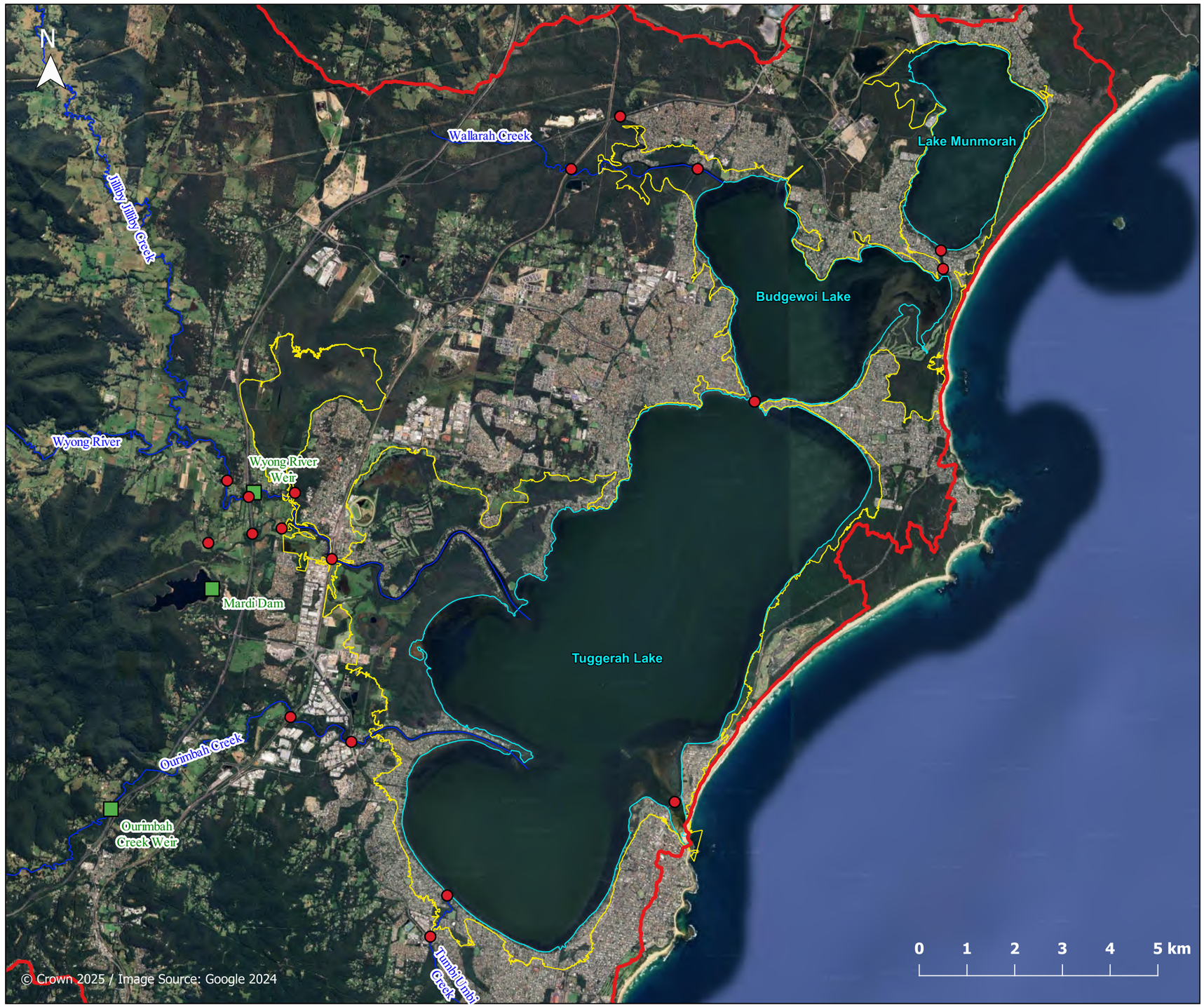

Figure 3.6

Bridges and weirs

Legend

- Catchment boundary
- 3 mAHD Contour
- Primary tributaries

Structures

- Bridge
- Weir

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Figure 3.7 Wyong River Weir and fishway (reprinted from Newcastle Herald published on 17 October 2016)

Ourimbah Creek Weir is located on Ourimbah Creek on the western side of Tuggerah Lake approximately 1.6 km upstream of Pacific Highway and Motorway bridges over Ourimbah Creek, shown in **Figure 3.6**. The structure includes a fishway and is presented in **Figure 3.8**.

Figure 3.8 Ourimbah Creek Weir and fishway (obtained from NearMap: captured on 18 August 2022)

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Mardi Dam is located 4 km south-west of Wyong, shown in **Figure 3.6.** Mardi Dam was built in 1962. Mardi Dam is an off-stream storage facility, meaning it is not fed directly by a stream and must be filled by pumping water from Wyong River and Ourimbah Creek. Water is pumped to Mardi Treatment Plant and then to residents.

3.8 Flood level classifications

The Bureau of Meteorology (BoM) flood level classifications for the Tuggerah Lakes at Long Jetty water level station are currently defined as (BoM, 2024):

- **Major:** 1.6 m AHD
- **Moderate:** 1.3 m AHD
- **Minor:** 0.9 m AHD

It is noted that these flood level classifications were recently updated to better reflect the impacts that have been experienced in recent flooding events. Prior to this update, the BoM flood level classifications for Tuggerah Lakes at Long Jetty water level station were defined as (BoM, 2013):

- **Major:** 2.2 m AHD
- **Moderate:** 1.8 m AHD
- **Minor:** 0.9 m AHD

3.9 Entrance behaviour

MHL recently undertook the Tuggerah Lakes Entrance Management Study (MHL2811, 2022). As part of this project and to support the development of the Tuggerah Lakes Interim Entrance Management Procedure, MHL undertook the following investigations:

- A review and summary of over 25 studies from 1987 to present relevant to the context of entrance management at Tuggerah Lakes. Findings from the review have been used to provide a conceptual understanding of entrance processes and inform subsequent works and stages of the project.
- Historical data analysis to evaluate characteristic entrance behaviour including typical lake level variability, tidal range, historical trends in entrance constriction as well as interactions between entrance configuration and lake water levels for both flood and dry-weather events.
- Development of a combined hydrology and one-dimensional entrance model to simulate water level variability in Tuggerah Lakes for scenarios with varying entrance constriction, ocean water levels and catchment flows. The model was calibrated and validated to measured lake levels during flood and dry-weather events. The model was used to evaluate effects of indicative entrance channel geometry and constriction on lake level variability for both flood and dry-weather events.

The condition of the Tuggerah Lakes entrance channel and shoals is dynamic and continuously shaped by catchment and coastal processes including rainfall, ocean waves, and tides. By analysing tidal signals (M2 constituent) in the Lake water levels and investigating historical satellite imagery and surveys, the Tuggerah Lakes Entrance Management Study

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(MHL2811, 2022) classified the condition of the Tuggerah Lakes entrance into characteristic states shown in **Figure 3.9**:

- ***Wide open entrance:*** relatively wide open entrance conditions with scoured shoals and channel typically greater than 90 m wide (at 0 m AHD) with high tidal penetration. These conditions were observed to occur occasionally following heavy rainfall and an elevated lake level typically greater than the moderate flood level classification for Tuggerah Lakes of 1.3 m AHD.
- ***Moderately open entrance:*** moderately open entrance conditions with a throat channel typically 50 - 90 m in width (at 0 m AHD), associated with moderate tidal penetration and only minor flood tide shoals in the entrance region. This was observed to be a common state of the entrance.
- ***Moderately constricted entrance*:** moderately constricted entrance conditions with a throat channel typically 20 - 50 m in width (at 0 m AHD), associated with moderately low tidal penetration and developing flood tide shoals. This was observed to be a common state of the entrance.
- ***Heavily constricted entrance:*** heavily constricted entrance conditions with a throat channel less than 20 m in width (at 0 m AHD), associated with low tidal penetration and dominant flood tide shoals filling the entrance channel. These conditions were observed to occur only occasionally, particularly with prolonged periods of low catchment rainfall.

A heavily constricted entrance may remain open to the ocean (with low entrance flows) or, with extended low rainfall, can historically enter a fifth state where the entrance channel fully closes to the ocean described below:

- ***Fully closed*:** Entrance channel completely closes to the ocean due to the progressive sediment infilling and entrance berm growth by wave activity. No flow exchange occurs between the estuary and the ocean during any tidal stage.

Example satellite images in **Figure 3.9** show the entrance in each of the above conditions and historical trends in classification over the last 29 years using lake level tidal harmonic analysis are shown in **Figure 3.10** (from MHL2811, 2022).

The interim procedure was developed recognising this dynamic variability of the Tuggerah Lakes entrance and to provide tailored works for each of the different characteristic entrance states described above.

Information and datasets of entrance behaviour at the ocean boundary will be used in the present study to inform entrance behaviour modelling at the downstream ocean boundary of the model.

It is also noted that a rock groyne that has been constructed by the NSW State Government in 2017 to maintain sand on the South Entrance beach appears to generate erosion on its northern side. This appears to guide the primary entrance channel further south than in the past.

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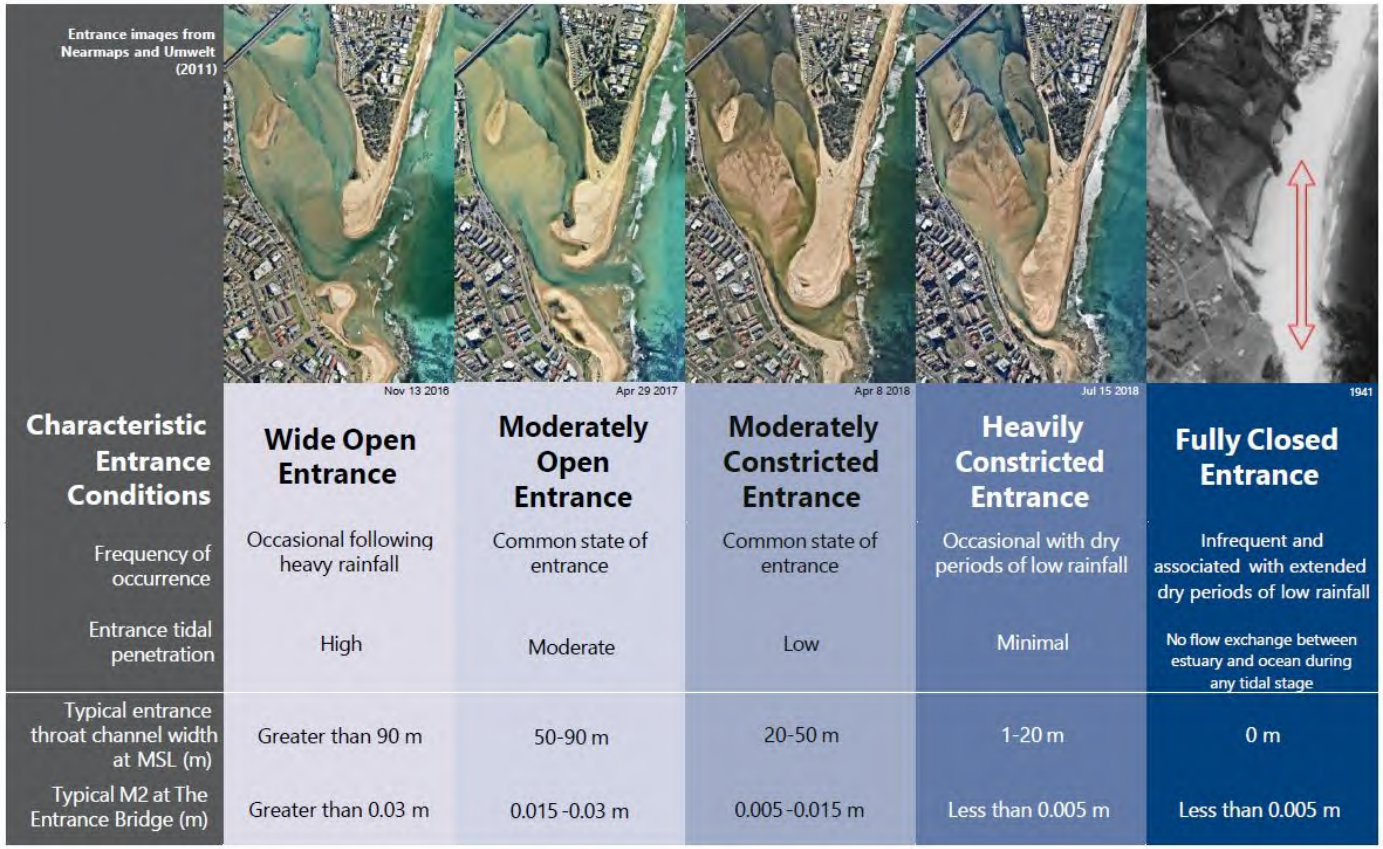

Figure 3.9 Characteristic entrance conditions (MHL2811, 2022)

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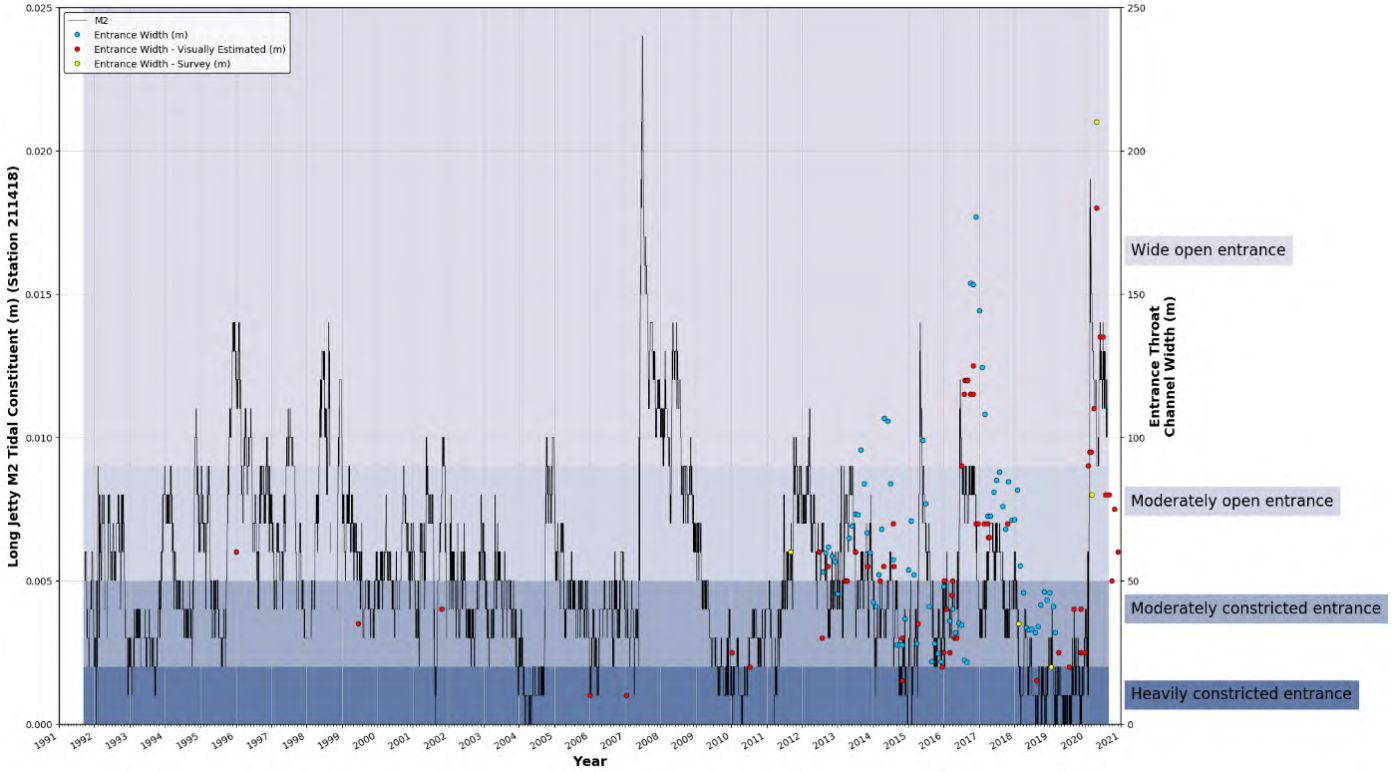

Figure 3.10 Trends in characteristic entrance conditions 1991 - 2020 using tidal harmonics and entrance width (MHL2811, 2022)

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3.10 Other relevant GIS information

A number of GIS layers were provided by Council including:

- Cadastral information representing the lot boundaries of all properties located within the entire Central Coast Council Local Government Area (LGA). This will be utilised to assess the number of properties impacted by flooding.
- The footprints of all buildings located within the Central Coast Council LGA. This layer will inform the number of buildings that may become affected by flooding.

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4 Community consultation

4.1 Consultation process

Consultation provides an opportunity for various stakeholders, including the community, to collaborate in developing the Tuggerah Lakes Flood Study Review. Engaging the community throughout the process provides opportunities to both garner useful feedback and increase community acceptance of the floodplain risk management process.

The consultation program for the flood study review has included the following activities:

- Inception and progress meetings between MHL and Council's Catchment and Coast Advisory Committee;
- Consultation with agencies and stakeholders; and
- Letter and questionnaire for property owners and local residents.

These activities are described at greater length below.

4.2 Catchment and Coast Advisory Committee

The Catchment and Coast Advisory Committee (the Committee) was formed by Council to provide a forum that brings together the diverse expertise and community knowledge that is needed to address technical, social, economic and ecological issues concerning floodplain risk management in the study area. The committee fulfills the functions of a Flood Risk Management Committee as described in the *Flood Risk Management Manual (DCCEEW, 2023)*.

The committee comprises representatives from:

- Central Coast Council, including planners and engineers;
- NSW Department of Climate Change, Energy, the Environment and Water, Biodiversity Conservation Division (BCD); and
- The community.

Meeting with the Committee occurred at key stages of the project.

4.3 Website

A 'Your Voice Our Coast" webpage was developed by Council to provide information to local residents about the study, general flooding information, and a link to an online questionnaire as described in the following section.

4.4 Letter and questionnaire

4.4.1 General approach

In November 2022, 8852 letters were distributed to all owners and renters that may be at risk of flooding within the study area. The community letter introduced the flood study review and alerted the residents and businesses of an online questionnaire that was available to complete. A copy of the letter is included in **Appendix A**.

The online questionnaire was developed using the SurveyMonkey platform and was made

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available until end of December 2022 seeking community input about historic flooding and general information to understand the level of flood awareness of and gather information from the community. The questionnaire is also included in **Appendix A**.

4.4.2 Questionnaire results

A total of 484 responses were received. This represents a response rate in the order of 5.5%. Results of the questionnaire are provided in **Appendix A**.

The following key observation were made based on the community questionnaire respondents:

- The vast majority of respondents have a residential property (97.7%). A few properties are commercial and farming/rural.
- 83.7% of respondents are owner occupied.
- Many residents have been living in the catchment for a long time (22.3% lived there between 10 and 20 years, 27.9% have lived there for over 20 years and 28.5% lived there for less than 5 years).
- About 78.5% of the respondent mentioned that their property was affected by flooding. It is important to note the personal interpretation of flood affectation (i.e., flooding of property vs. flooding of building) and to note that the questionnaire was sent to residents in the Tuggerah Lakes floodplain as highlighted by the previous study. A map showing the location of the respondents and whether that reported being flood-affected or not is provided in **Figure 4.1**.
- Nearly half (48.5%) of the respondents provided one or multiple examples of flood events. The most commonly impacted part of the property included the ground (~50%) and the garage/shed (~33%). However, approximately 20% of the respondent mentioned that their building was affected.
- Observed flood depths were typically described as being over 0.3 m (~61% over 0.3 m, ~40% over 0.5 m and ~20% over 1 m).
- Flooding durations are typically long and range between a few hours to several weeks with the majority of respondent (~76%) describing flooding as lasting for more than 24 hours.
- The main events mentioned by respondents in the questionnaire include July 2022, February-March 2022, March 2021, February 2020 and June 2007.
- A number of residents provided photographs as well as other flood information. Examples of photographs are provided in **Section 1.4**.

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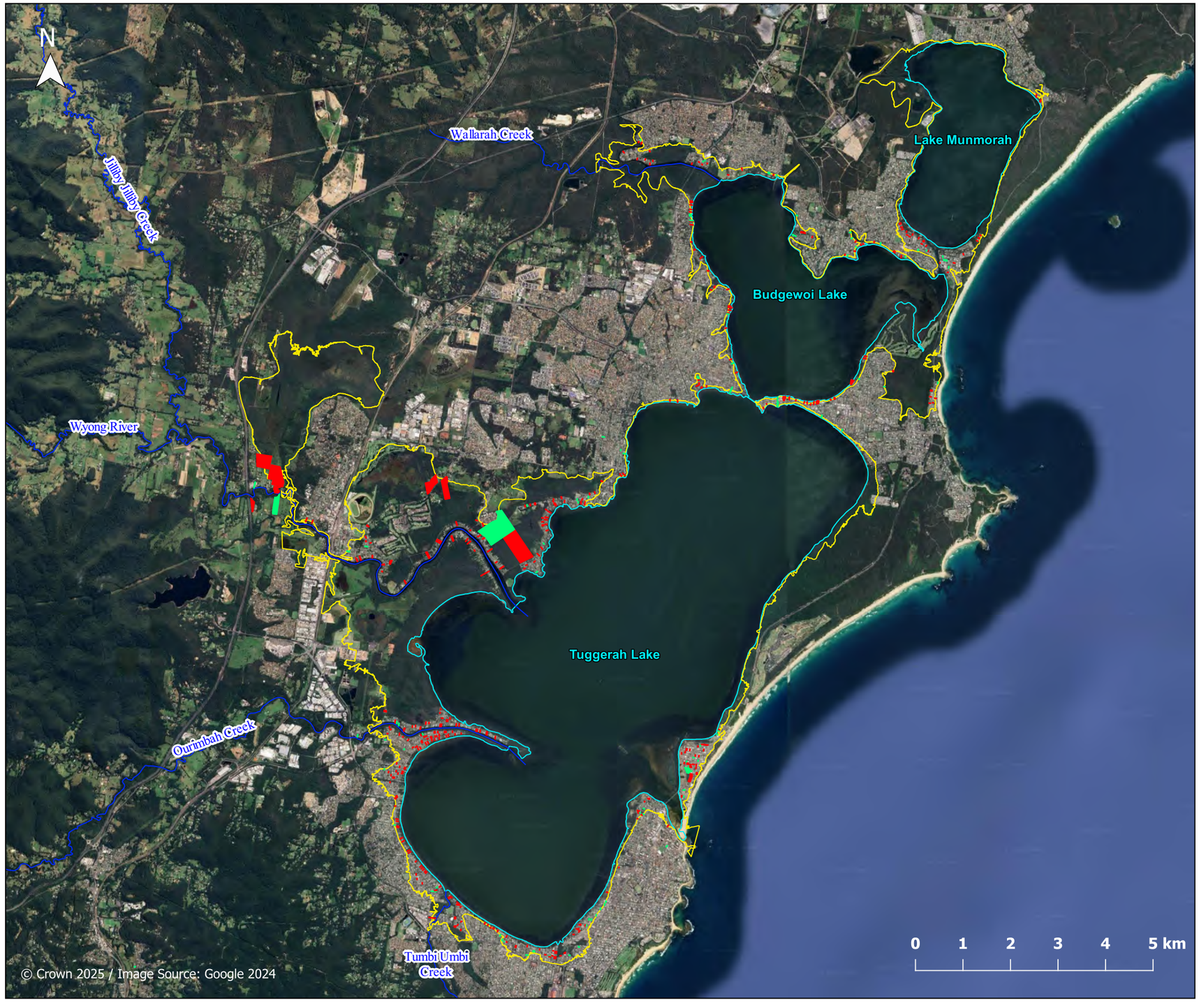

Figure 4.1

Location of questionnaire respondents

Legend

- 3 mAHD Contour
- Primary tributaries

Properties impacted by flood

- No
- Yes

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5 Extreme value analysis for Tuggerah Lake

As was the case in the previous *Tuggerah Lakes Flood Study (1994)*, an extreme value analysis (EVA) on recorded annual peak water levels in the Tuggerah Lakes was performed and is described below.

5.1 Preamble

An EVA is a statistical technique used to examine the extreme deviations from the median of probability distributions. Its purpose is to assess the likelihood of events that are equal to or more extreme than those previously observed. An EVA typically uses historical data, such as peak water levels, to estimate the probability of future extreme events, which is particularly valuable for floodplain risk assessment and management.

One of the key outputs of the EVA is the return period, which indicates the average time interval expected between occurrences of specific extreme water levels. This concept aligns with the foundations of floodplain planning, such as policy development and decisions related to expansion. The EVA approach provides a relatively simple method for understanding the flooding behaviour of the Tuggerah Lakes.

Flood peaks are influenced by a complex joint probability process that involves multiple random variables associated with rainfall events, antecedent conditions, entrance conditions and rainfall-runoff dynamics. It is noted that a key assumption of any EVA is data homogeneity over the record period, which necessitates the assumption that the previously mentioned processes that can influence the manifestation of peak lake levels are consistent over time.

To ensure statistically significant results, EVA relies on the collection of historical data over an extended period. This data is typically segmented into unbiased periods, such as an annual maximum (AM) series, or a series of independent flood peaks over a given threshold (POT) can be extracted. These series are then able to be utilised to identify trends and fit an appropriate statistical model to estimate extreme values among and beyond the recurrence intervals of the observations.

Common statistical models used to fit AM and POT series include the Generalised Pareto (GP), or Generalized Extreme Value (GEV) distributions, which are formulated to capture the upper-tail behaviour of extreme events.

Section 2.2.2.3 of ARR 2019 provides guidance on when practitioners should prefer either the AM or POT approach. It recommends using the AM series for recurrence intervals with an AEP of less than 10% (i.e., the most extreme floods), as it is easier to extract and define over long, discontinuous data periods with the allowance of censored events, and therefore offers more reliable estimates for low AEP floods. On the other hand, for events with an annual exceedance probability greater than 0.2 (i.e., events more frequent than the approximate 20% AEP), the POT approach is generally preferred, as it captures all flood events in this range. This is because the AM series may overlook many events that are of a similar magnitude to these more frequent floods, as they are often not the largest event each year. Therefore, based on the rationale outlined above, both approaches are used for defining events, with each applied as recommended.

The next section summarises the available data taken forth for both analysis approaches.

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5.2 Data review

As described and presented in the *Tuggerah Lakes Flood Study (1994)*, partial historical peak flood level data for the period from 1927 to 1985 is available. Between 1927 and 1960 this data is highly partial, with only major peaks available, however these peaks are some of the highest on record, so their inclusion for the AM series analysis is considered essential. The remaining annual maximum series from 1961 to 1985 was mostly captured, with six years of data unavailable. From 1986 to 2024, water level monitoring stations have been in place on Tuggerah Lake (see **Table 3.1**), from which complete AM and POT series were able to be derived.

It is therefore noted that a complete annual maximum series was not able to be established prior to 1986, and therefore an assumption would have to be made about the data gaps during the residual data period in order to perform the AM series analysis. Furthermore, it is noted that the POT approach could only be performed on the period of continuous water level monitoring available from 1986.

Table 5.1 Annual maximum series data summary for Tuggerah Lake (1927-2024)

Start	End	Period (yr)	Data (yr)	Missing (yr)	Type
1927	1960	34	6	28	Major peaks
1961	1985	25	19	6	Most peaks
1986	2024	39	39	0	Continuous
	TOTAL	98	64	34	

5.3 Annual maximum series analysis

5.3.1 Plotting position

As is discussed in the *Tuggerah Lakes Flood Study (1994)*, the water level record for the Tuggerah Lakes is largely partial, and an assumption would have to be made regarding the plotting position approach for the missing years. The 1994 study posits two approaches to deal with the period of partial data from 1921 to 1985:

1. Assume the 32 available records from the partial data period to be a continuous record with an effective length of 32 years.

   This approach is expected to overestimate the frequency of larger events, since there is an effective decrease of the length of the record, and since the partial data is likely biased towards the capture of larger events.

2. Assume the 32 available records from the partial data period to be the largest events occurring during the 59-year partial data period.

   This approach is expected to much more reliably predict the frequency of larger events, since the full length of the record is preserved, but may underestimate the frequency of small events not captured in the missing years of data.

   The concern regarding the low-end fit is also slightly offset by the practice of adding the 34 missing years as censored data, assuming all these years had a peak lake level

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below the smallest observation during the partial data period (0.42 mAHD, 1972). This technique was not available at the time of the 1994 study.

Since the focus of the present study is towards the events of a larger scale, the second approach was adopted, noting that the missing data years of the partial data period could be included as censored data.

5.3.2 Fitting

FLIKE is an extreme value analysis package that calculates the probability of flood events based on historical records. FLIKE is fully compliant with Book 3 of ARR 2019 and although it has been developed specifically for discharge estimation, it can be applied to any extreme value analysis.

It supports five probability distributions, namely:

- Log-Normal,
- Log-Pearson 3 (LP3),
- Gumbel,
- Generalised Extreme Value (GEV), and
- Generalised Pareto.

FLIKE uses an advanced Bayesian methodology for the estimation of distribution parameters, which enables the inclusion of historic partial series data. The data discussed previously was used to fit all five available probability models using the software, with the result of each approach exhibited in **Figure 5.1**.

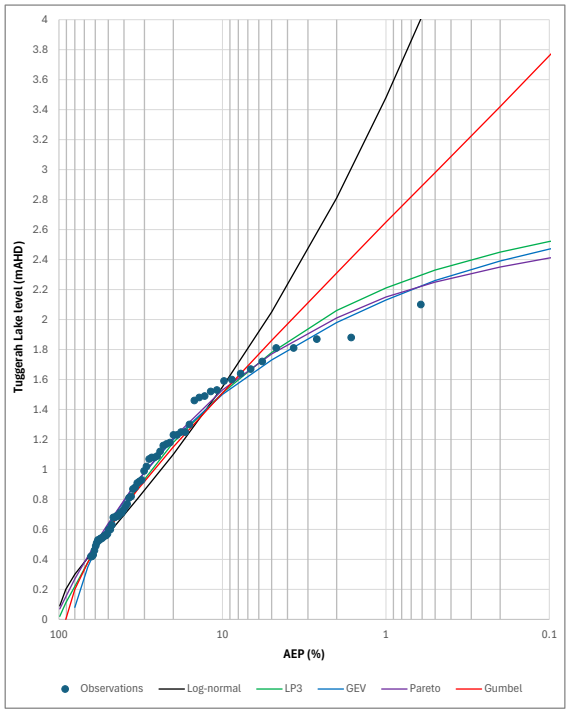

Figure 5.1 Tuggerah Lakes AM series EVA (1927-2024)

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It can be seen that the Log-Normal and Gumbel models, with their inability to asymptote to a reasonable upper bound, are poor fits and further consideration of these models was excluded.

The remaining models, namely the LP3, GEV and Pareto models offered a reasonable match to the observed data. These models generally behaved similarly, matching the less frequent observations closely, slightly underestimating the moderate events, and generally slightly overstating the observations at the upper tail of the curve. This is typical of statistical fits of this type on a data series of this length and when considering the complex, and possibly statistically heterogeneous variables. It is also noted that these fits are generally conservative with regards to events with annual exceedance probabilities greater than around 3% AEP.

5.4 Peak over threshold analysis

To maximise the use of all recorded extremes, peak-over-threshold methods include all events over a suitably chosen threshold generally set at two standard deviations above the mean (refer **Section 5.4.1**) which are at least some days apart (refer **Section 5.4.2**). This is then fitted to the Generalised Pareto (GP) distribution.

5.4.1 Threshold selection

POT models focus on flood peaks exceeding a specified threshold. As a result, the choice of threshold is a critical aspect of the POT methodology and has a significant influence on both the magnitude and the shape of the confidence intervals. The threshold should be set to capture the maximum number of extreme events without being unduly influenced by the central tendency of the data. According to ARR 2019, several studies offer guidance on threshold selection, with recommendations suggesting that the threshold should be chosen so that the number of events exceeding it is at least greater than the number of years represented in the data. In totality, the studies presented guide that the ratio should fall within a range of one to five. Sensitivity analyses which assessed the quality of fit, determined that the optimal peak-over-threshold level was two standard deviations above the mean, specifically at a value of 0.54 mAHD. This resulted in the inclusion of approximately 64 events (after the declustering process discussed below) for a given 39 years of data, which lies within the acceptable ratio.

5.4.2 Declustering

When performing an EVA, it is a key assumption that all peaks selected are independent. As discussed in ARR 2019, when analysing a flood record, the selection of independent peaks can be subjective as the interval recorded between flood peaks may be quite short. If left unaddressed, extreme water levels associated with the same flooding event may be sampled over numerous consecutive samples within the record. To mitigate this phenomenon, an approach called declustering is performed. Noting that a typical flooding event in the Tuggerah Lakes can last in the order of weeks, declustering was applied using a block length of 14 days. This meant no two values could occur in the peak-over-threshold dataset if they were within 14 days of each other. The sampled extreme values considering the aforementioned threshold selection and declustering considerations are presented in **Figure 5.2**.

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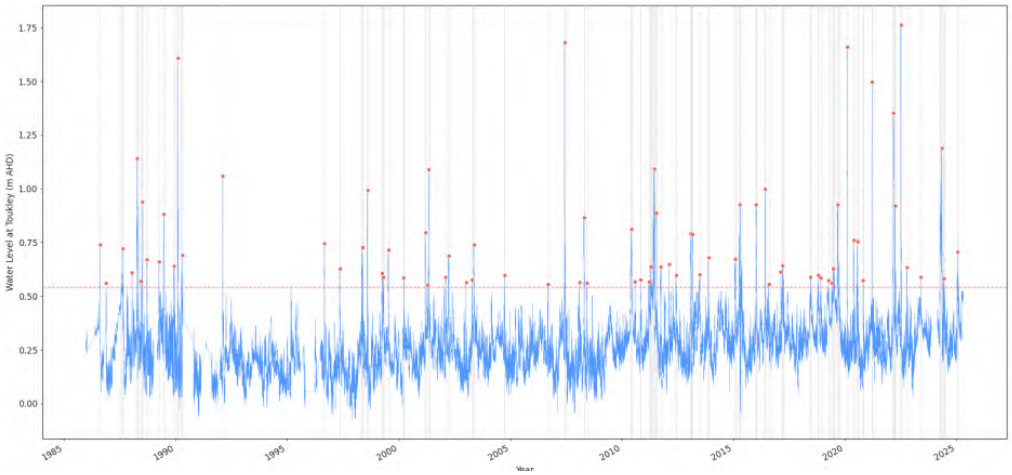

Figure 5.2 Data points selected for Tuggerah Lakes POT EVA (1986-2024)

5.4.3 Fitting

The data discussed above was used to fit the Generalised Pareto probability model using the *pyextremes* Python library, with the result of each approach exhibited in **Figure 5.3**.

The model offered a reasonable match to the observed data, matching the less frequent observations closely, slightly underestimating the moderate events, and generally overstating the observations at the upper tail of the curve. This is typical of statistical fits of this type on a data series of this length and when considering the complex, and possibly statistically heterogeneous variables. It is also noted that this fit is broadly not applicable above the approximate 10% AEP result.

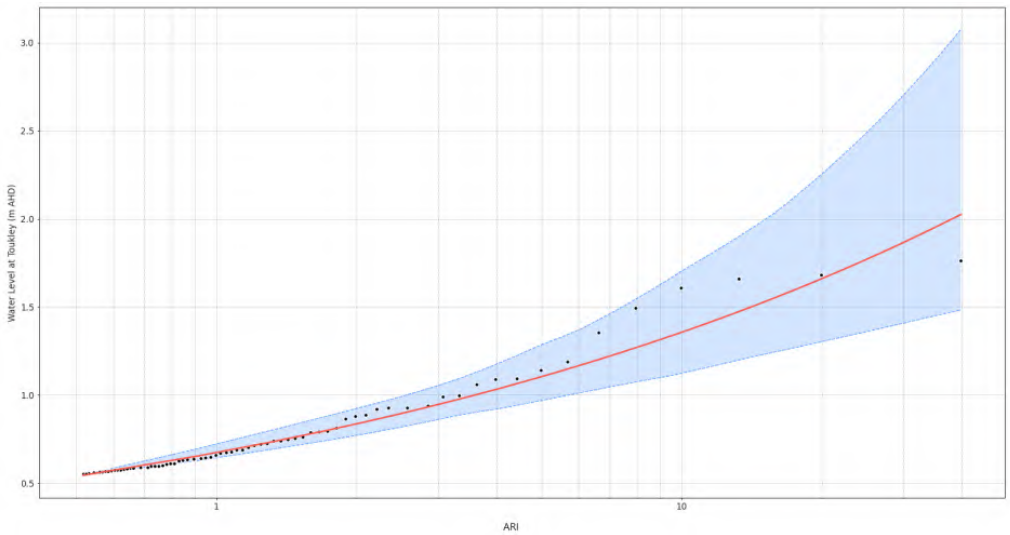

Figure 5.3 Tuggerah Lakes POT EVA (1986-2024)

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5.5 Results and discussion

Table 5.2 summarises the results of each of the EVA approaches detailed above. The central estimate for each approach is presented in the larger text, while the 95th percentile confidence interval is shown in smaller surrounding text.

Table 5.2 EVA-based design flood level estimates for Tuggerah Lakes

Event	Peak Tuggerah Lakes flood level (mAHD)				
	1994 study	AM series			POT
		LP3	GEV	Pareto	Pareto
Upper bound*		2.76	2.89	2.60	
1 in 500 AEP		2.17 - 2.45 - 3.20	2.08- 2.39 - 3.30	2.10- 2.35 - 3.00	
1 in 200 AEP		2.08 - 2.33 - 2.90	2.00- 2.26 - 2.90	2.02- 2.25 - 2.70	
1% AEP	2.20	1.97- 2.21 - 2.70	1.91- 2.13 - 2.60	1.94- 2.15 - 2.50	
2% AEP		1.83- 2.06 - 2.40	1.80- 1.98 - 2.40	1.83- 2.01 - 2.30	
5% AEP	1.90	1.60- 1.78 - 2.00	1.58- 1.73 - 2.00	1.60- 1.77 - 2.00	
10% AEP		1.35- 1.51 - 1.70	1.36- 1.50 - 1.70	1.37- 1.53 - 1.70	1.11 - 1.34 - 1.67
20% AEP	1.35				0.94 - 1.07 – 1.23
50% AEP	0.90				0.71 - 0.76 - 0.86

* represents the asymptote of the fitted probability distribution, which is purely a statistical characteristic that may not be meaningful in situations where a physical upper limit does not exist or is not applicable.

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6 Hydrologic analysis

Hydrologic modelling consists of determining the volume of water and the flows generated in a catchment based on various parameters including rainfall, catchment area, percentage of the ground that is pervious (such as grass or bare earth for example) or impervious (such as concrete or roads) and typical lag coefficient (which defines the time the flood water takes to travel through the catchment).

6.1 Model selection

A Watershed Bounded Network Model (WBNM 2017_004) was adopted for hydrologic modelling of the Tuggerah Lakes catchment. It is an event-based hydrologic model that utilises storage routing to simulate flood hydrographs based on rainfall-runoff relationships for Australian catchments (Boyd, 1979). The WBNM model has been widely adopted for similar studies in Australia including the Tuggerah Lakes Flood Study (Lawson & Treloar Pty. Ltd, 1994) and more recently the Tuggerah Lakes Southern Catchments Flood Study (WMA Water, 2018).

The WBNM software is one of the few modelling packages that currently incorporates Australian Rainfall and Runoff 2019 (ARR 2019) design rainfalls and procedures. It has been used to simulate a wide range of hydrological behaviour in natural and urban catchments and requires relatively few catchment parameters in comparison to other runoff routing models. Hence, a WBNM model (version 2017) was considered appropriate for this study. This version of the model has been developed to include the 2016 Intensity-Frequency-Duration (IFD) diagrams that are at the basis of the ARR 2019 guideline requirements.

6.2 Model setup

6.2.1 Catchment delineation

A GIS-based terrain analysis tool called CatchmentSIM (version 3.6) was used to delineate the overall Tuggerah Lakes catchment into 71 individual sub-catchments using the available 1m LiDAR data (**Section 3.2**). The delineation considered the location of hydraulic constraints, gauging stations and topographic features. CatchmentSIM also allows for the determination of the surface characteristics of each sub-catchment such as area and percentage imperviousness.

The investigation showed that the total catchment area at the outlet of Tuggerah Lakes is approximately 797 km^2. Wyong River contributes 55% of the catchment area, Ourimbah Creek comprises 21%, the lakes themselves contribute 14%, and the remaining 10% covers other catchment areas such as Wallarah Creek and Tumbi Creek, as illustrated in **Figure 6.1**.

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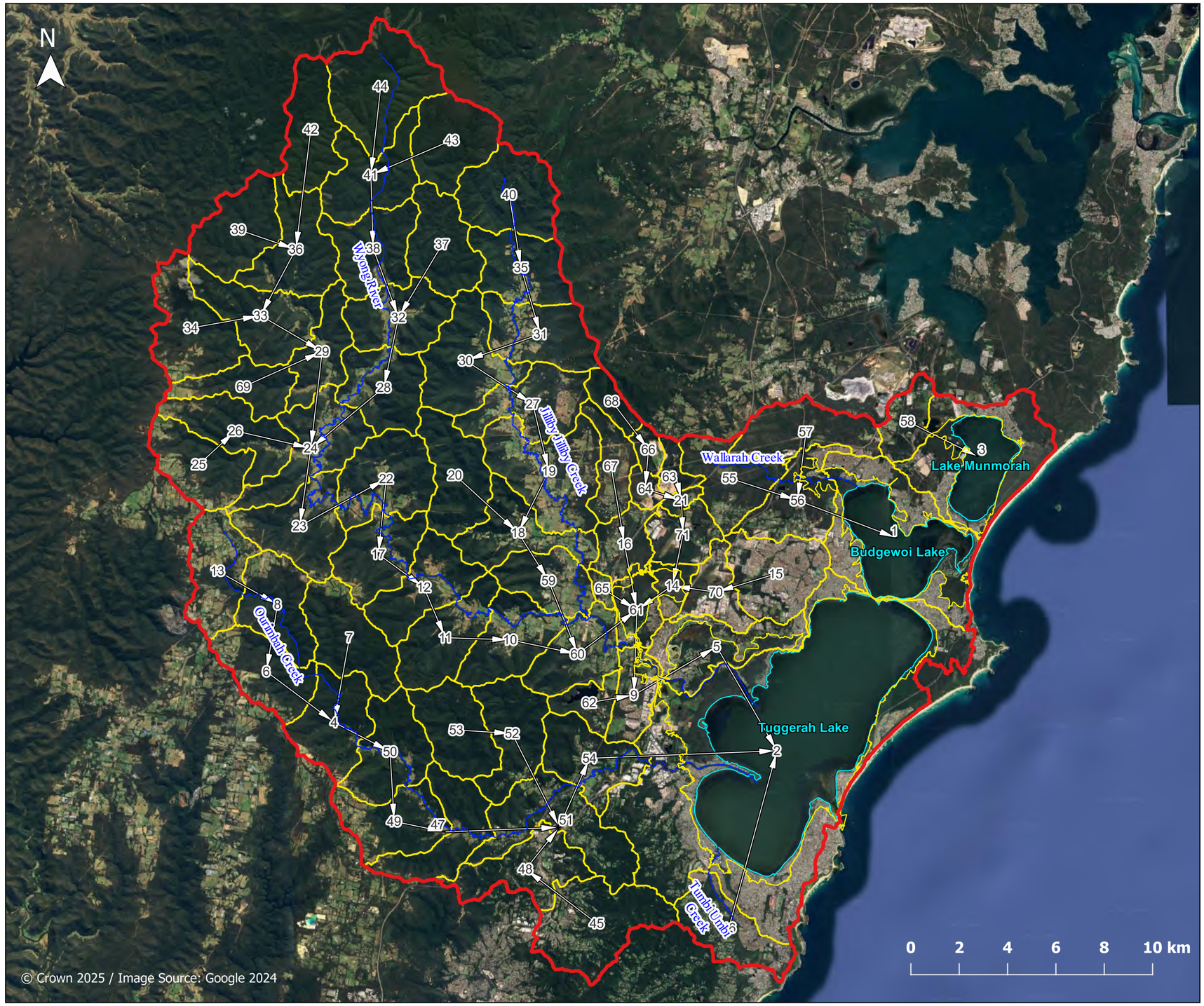

Figure 6.1

Hydrologic model catchment delineation

Legend

- Catchment boundary
- Primary tributaries
- Subcatchment boundary
- Nodal Link

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6.2.2 Model parameters

Parameters required by the WBNM model include sub-catchment area and linkage, pervious and impervious percentage, runoff lag factor, stream routing lag factor, rainfall input, initial losses and continuing losses.

6.2.2.1 Impervious areas

Impervious areas were derived by adopting impervious percentages for various land uses obtained from the NSW Department of Climate Change, Energy, the Environment and Water. A land use map is presented on **Figure 1.19**. Based on land use areas, a weighted average was calculated for each sub-catchment using CatchmentSIM. The urbanised/residential areas were assumed to be 60% impervious, roadway corridors and water bodies/basins 100% impervious while the rest was assumed as pervious surface. **Table 6.1** summarises the percentage imperviousness used for each sub-catchment as per **Figure 1.19**.

Table 6.1 Adopted percentage impervious for each sub-catchment

Sub-catchment ID	% Impervious	Sub-catchment ID	% Impervious	Sub-catchment ID	% Impervious
1	78.28	25	3.45	49	4.99
2	71.98	26	2.88	50	3.43
3	48.96	27	3.76	51	9.73
4	3.53	28	2.20	52	0.23
5	33.01	29	3.92	53	0.00
6	3.11	30	1.40	54	13.54
7	0.66	31	2.48	55	12.2
8	1.32	32	2.27	56	23.63
9	46.43	33	4.56	57	12.47
10	2.76	34	3.63	58	21.63
11	1.94	35	1.44	59	3.51
12	1.96	36	1.66	60	4.57
13	5.50	37	0.00	61	19.76
14	17.32	38	0.33	62	39.47
15	62.8	39	0.98	63	13.73
16	16.19	40	0.00	64	8.05
17	4.27	41	0.00	65	28.17
18	3.14	42	0.00	66	8.43
19	3.79	43	0.00	67	5.22

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Sub-catchment ID	% Impervious	Sub-catchment ID	% Impervious	Sub-catchment ID	% Impervious
20	0.12	44	0.00	68	2.81
21	11.58	45	12.34	69	2.35
22	2.46	46	29.07	70	51.81
23	5.12	47	3.60	71	14.03
24	4.63	48	21.33	-	-

6.2.2.2 Rainfall losses

Rainfall losses including initial loss (IL) and continuing loss (CL), can be widely variable from storm to storm and catchment to catchment. The amount of loss is dependent on a number of factors such as catchment topography, soil, vegetation, and the antecedent soil moisture (M. El-Kafagee, 2011). It is recommended in ARR 2019 that practitioners undertaking flood investigations in New South Wales should use a hierarchical approach to design loss estimation. A summary of this recommended hierarchy is provided in **Table 6.2**, ranked from the most preferred to the least preferred approach.

Table 6.2 ARR 2019 hierarchical approach to design rainfall loss estimation

Preference	Approach
1	Average of calibration losses from the actual study on the catchment, if available
2	Average of calibration losses from other studies in the catchment, if available and appropriate for the study
3	Average calibration losses from other studies in the similar adjacent catchments, if available and appropriate for the study
4	NSW FFA-reconciled losses available through the ARR Data Hub
5	Default ARR data hub losses

It is noted that the most preferred approach, being the use of the average of calibration losses from the actual study on the catchment, inherently relies on the accurate and appropriate determination of losses as part of the calibration of the hydrologic model. To give further confidence to the validity of these parameters and for the purposes of comparison, losses determined through each approach from across the hierarchy have been determined.

At the bottom of the hierarchy, the default ARR data hub losses were extracted for a representative area of the Tuggerah Lakes catchment region, yielding an IL value of 49.0 mm and a CL of 1.2 mm/h (3.0 mm/h * 0.4 NSW factor).

Next, it was found that the NSW FFA-reconciled losses were available for the upper and lower Wyong River, Jilliby Jilliby Creek and Ourimbah Creek catchments. A summary of the key parameters from this repository is shown in **Table 6.3**.

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Table 6.3 NSW FFA-reconciled losses summary for Tuggerah Lakes catchments

Source: https://data.arr-software.org/static/pdf/appendix.pdf

Station	Station Name	Fit Quality	IL (mm)	CL (mm/h)
H25	Wyong River at Yarramalong	Good	18.2	5.00
H28	Wyong River at Gracemere	Good	50.0	3.92
H27	Jilliby Creek upstream Wyong River	Poor	14.3*	1.50*
H26	Ourimbah Creek upstream Weir	Good	64.3	4.81

**Initial and continuing loss values appear inconsistent with other neighbouring gauges values and this is likely the result of the poor FFA fit quality.*

As outlined in the **Chapter 2**, several studies have been conducted within the Tuggerah Lakes catchment. Unfortunately, there was no consistency among these studies in relation to IL and CL values for pervious areas, underscoring the highly variable and complex hydrology of the Tuggerah Lake catchment. Previously calibrated continuing losses for pervious surfaces have ranged between 1.5 and 4.0 mm/h, while impervious surfaces have consistently been 0 mm/h. Due to the variable nature of historically adopted initial losses, their values were investigated once again. Optimal calibration results were achieved by adopting a CL of 1.0 mm/h and IL of 58-80 mm (depending on the historic event). While these values appear larger than the initial loss values described in **Table 2.4**, it is noted that this table summarises the parameters that have been adopted for the design events and calibration initial loss values often exceed the design value. These values were considered reasonable given the IL and CL losses derived from the ARR Datahub are 49 mm and 1.2 mm/h respectively. Detailed calibration and validation results are further detailed in **Section 6.3**.

6.2.2.3 Lag parameter

A lag parameter (C) is used for the conversion of rainfall to runoff on pervious surfaces. WBNM developers recommend lag parameter values ranging between 1.3 and 1.8 (Boyd and Bodhinayake, 2006). The value of the lag factor can vary based on the characteristics of the watershed, including soil type, land use, slope, and vegetation. Generally, a lag parameter value down to 1.3 is recommended for catchments with steep slopes and fast drainage and thus a peakier flow profile, while a value of up to 1.8 is suggested for catchments with a flatter flow profile (i.e., flow with a longer duration and lower peak).

Investigation of gauging data and the topography of the Tuggerah Lakes catchment indicates that Tuggerah Lakes tributaries are largely expected to demonstrate a faster response in flow, featuring a peaky rising limb and a flatter tailing limb.

Calibration outcomes, as described in **Section 6.3**, revealed that a C parameter value of 1.3 adequately replicates the flow across gauging locations. The upper catchments of the model consist of steep topography leading to a quick response in flow and therefore justifying a lower lag factor. Lower in the catchment, flows then fill floodplain fringe and storage areas, which acts to attenuate flows reaching the lakes. It is noted that the latter effect sometimes cannot

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be accounted for by the lag parameter alone.

The impervious lag factor is used to reduce the C lag parameter to a value appropriate for impervious surfaces. An impervious lag factor of 0.1 was adopted based on calibration results against measured flow data during flood events for sub-catchments upstream of the Wyong Weir. Flow paths were routed using nonlinear routing (type = R) with a value of 1.0 as recommended by Boyd et al. (2017) for natural channels and streams. Refer to **Table 6.7** for the values of the lag parameter.

6.3 Model calibration and validation

Model calibration is an essential step in the modelling process to confirm that the model can adequately simulate historical events. To undertake model calibration, it is necessary to have suitable recorded data sets against which to evaluate model outcomes. The selection of appropriate historical events for model calibration is, therefore, mostly dependent on the availability of relevant data. The model calibration process also demands a high degree of confidence in the recorded data to which the model is to be calibrated to converge towards.

Event selection for model calibration and validation was performed through consideration of a number of factors, including the magnitude, recency, data availability, significance and complexity of the event. Through consideration of these factors and reference to the historical flood record presented in **Table 1.1**, it was determined that the July 2022 and June 2007 events be selected for model calibration, with the March 2021 event selected for model validation. The July 2022 and March 2021 events were selected as they are the most recent significant flood events that occurred in the Tuggerah Lakes, whereas the June 2007 event was selected as a result of its comparably large peak flood level, notoriety and availability of supplementary data through other previously adopted flood studies covering the Tuggerah Lakes catchment area (e.g., the Wyong River Catchment Flood Study). It is noted that the February 2020 event was considered as it is another large event in recent times. However, this event was not selected as a result of the artificial intervention of multiple channels being dredged at The Entrance during the event, making this event too complex to accurately represent in the hydraulic model.

Having decided on relevant events, an important first step in the model calibration process is the acquisition and confirmation of relevant calibration data quality. Being a hydrologic model, the most essential parameter to calibrate against is flow discharge. As outlined in **Section 3.1**, a number of water level gauge locations exist across the Tuggerah basin, with a subset of these sites possessing a stage-discharge rating curve derived from observed flow gaugings. However, the reliability of these rating curves is critical in determining an accurate discharge, particularly during larger flow events which are presently of interest. As a result, the calibration gauges are introduced in the following section and their rating curve confidence assessed.

6.3.1 Rating curve analysis

The Tuggerah Lakes catchment is made up of several distinct tributaries. The two largest are the Wyong River and Ourimbah Creek, which account for nearly 60% and 20% of the catchment area, respectively. The remaining approximately 20% of the Tuggerah Lakes catchment consists largely of the lakes themselves, and a handful of smaller creeks and overland catchments, on which rating curve analyses cannot be performed.

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6.3.1.1 Wyong River at Yarramalong (211014)

The gauge located highest within the catchment is on the Wyong River at Yarramalong (211014). The rating curve and measured flow gauging points at this gauge location are presented in **Figure 6.2**.

As can be seen in this diagram, the rating curve exhibits a fair relationship with the data, where available. However, only one flow gauging point is available for flows in excess of ~30 m^3/s (~2,500 ML/d), and with extrapolation relied upon to derive a rating relationship for flows above ~100 m^3/s (~8,500 ML/d), at the time coinciding with a measured stage of 25.110 m AHD. It is noted that the peak water levels in all three of the calibration events significantly exceed this rating extrapolation threshold.

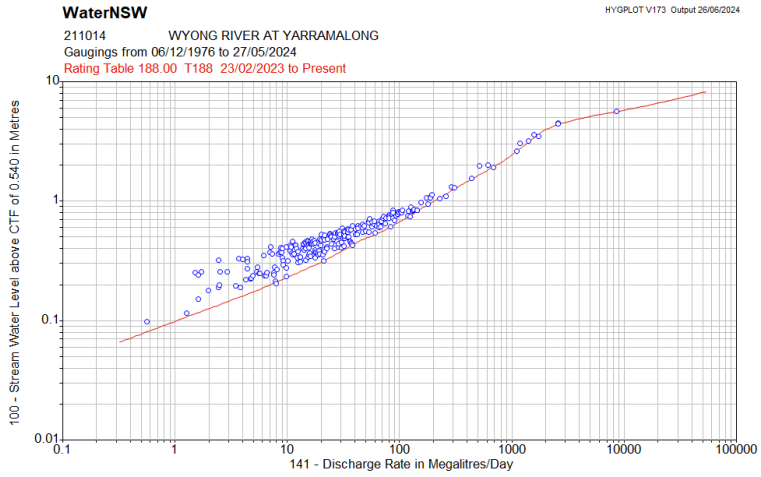

Figure 6.2 Comparison plot of gaugings and latest ratings for Wyong River at Yarramalong (211014) (WaterNSW)

This conclusion was similarly reached by the Wyong River Catchment Flood Study (2014), which noted that *"[the] bank-full level at the gauge is around 24 m AHD, equivalent to almost 40 m^3/s flow"* and that there was *"a close match between the [modelled and site] rating curves until around 100 m^3/s [(8640 ML/day)] when the two curves begin to deviate*". The modelled and existing rating curve at the time of the 2014 study are presented in **Figure 6.3**.

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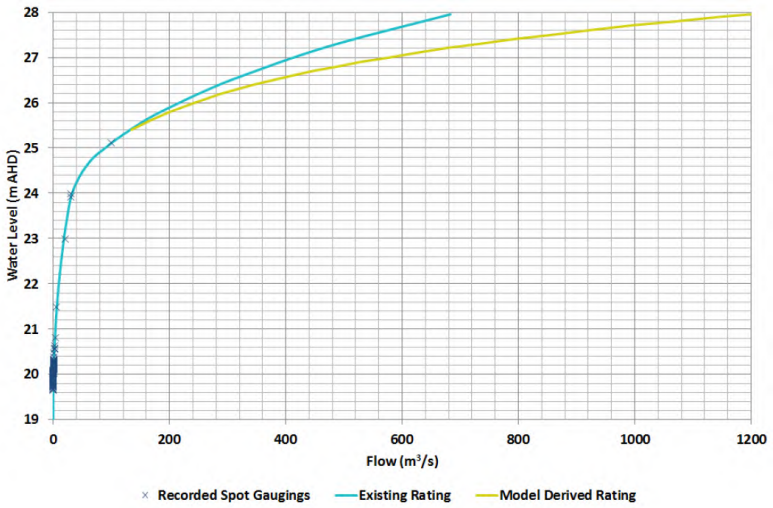

Figure 6.3 Comparison plot of modelled and WaterNSW-derived ratings, as extracted from the Wyong River Catchment Flood Study (2014), for the Wyong River at Yarramalong (211014)

It was therefore determined that flows derived from the WaterNSW derived stage-discharge rating at this location be considered unreliable for the purpose of the calibration of the hydrologic model.

6.3.1.2 Wyong River at Gracemere (211009)

The next gauge progressing down the Wyong River is located at Gracemere (211009). The rating curve and measured flow gauging points at this gauge location are presented in **Figure 6.4**.

As can be seen in this diagram, the rating curve exhibits a fair relationship with the data, where available. However, extrapolation of the rating curve is relied upon to derive a rating relationship for flows above ~80 m^3/s (~7,000 ML/d), at the time coinciding with a measured stage of 11.235 m AHD. It is noted that the peak water levels in all three of the calibration events significantly exceed this rating extrapolation threshold.

A similar conclusion was again reached by the Wyong River Catchment Flood Study (2014), which noted that *"[the] bank-full level at the gauge is around 10.5m AHD, equivalent to around 60 m^3/s flow*" and that there was "*a close match between the [modelled and site] rating curves until around 80 m^3/s when the two curves begin to deviate*".

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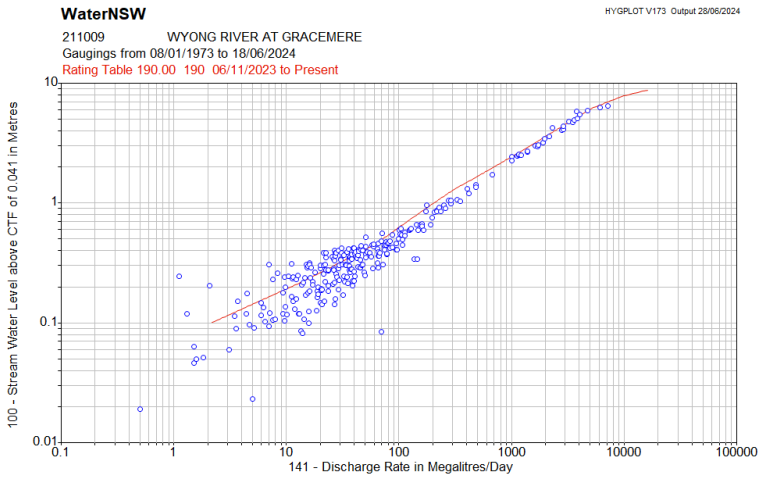

Figure 6.4 Comparison plot of gaugings and latest ratings for Wyong River at Gracemere (211009) (WaterNSW)

Further concerns regarding the reliability of the stage-discharge rating curve are raised through an inspection of the rating curve history plot for the Wyong River at Gracemere gauge, which shows that over the period of operation of the gauge, the shape of the adopted stage-flow rating curve has undergone significant and regular modifications, indicating the high uncertainty surrounding the relationship, particularly at higher stages. The modelled and existing rating curve at the time of the 2014 study are presented in **Figure 6.5**.

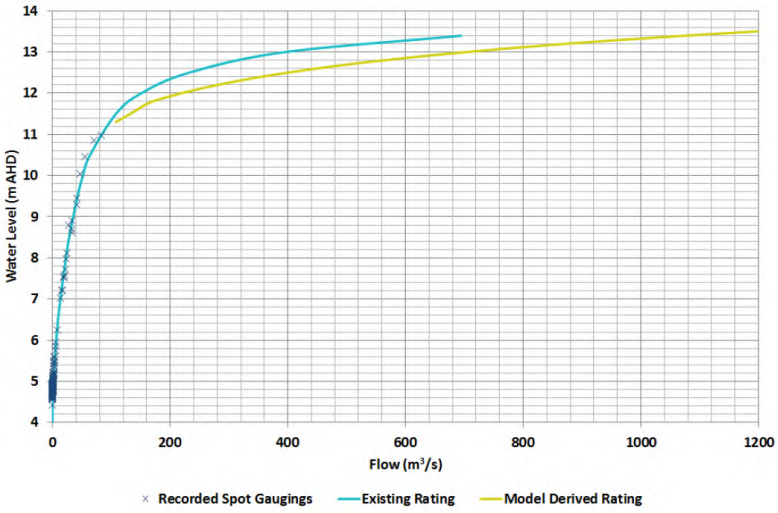

Figure 6.5 Comparison plot of modelled and WaterNSW-derived ratings, as extracted from the Wyong River Catchment Flood Study (2014), for the Wyong River at Gracemere (211009)

It was therefore determined that flows rated from the WaterNSW derived stage-discharge relationship at this location be considered unreliable for the purpose of the calibration of the hydrologic model.

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6.3.1.3 Wyong River at Wyong Fishway (211017)

The final gauge with an adopted stage-discharge rating progressing downstream the Wyong River is located at the Wyong Fishway (211017). The rating curve and measured flow gauging points at this gauge location are presented in **Figure 6.6**.

As can be seen in this diagram, minimal flow gauging data exists at this location, with WaterNSW tending to censor flow values above 70 m^3/s likely as a result of this significant uncertainty.

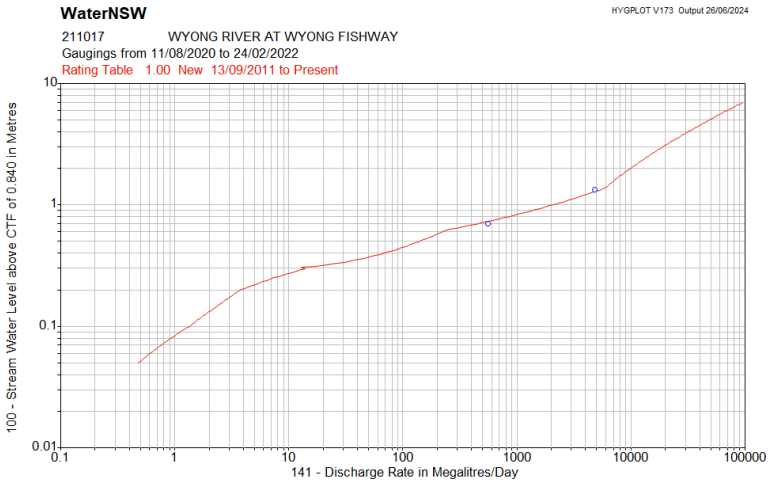

Figure 6.6 Comparison plot of gaugings and latest ratings for Wyong River at Wyong Fishway (WaterNSW)

It was therefore determined that flows derived from the WaterNSW derived stage-discharge rating curve at this location be considered unreliable for the purpose of the calibration of the hydrologic model.

6.3.1.4 Jilliby Creek upstream Wyong River (211010)

Jilliby Jilliby Creek is a tributary of the Wyong River, joining downstream of Gracemere. The Jilliby Creek upstream Wyong River (211010) gauge is located on this tributary near Durren Lane. The rating curve and measured flow gauging points at this gauge location are presented in **Figure 6.7**.

As can be seen in this diagram, the rating curve exhibits a fair relationship with a portion of the flow gauging data, with a secondary alignment of points seen above the adopted curve. However, extrapolation of the rating curve is relied upon to derive a rating relationship for flows above ~20 m^3/s (~1,700 ML/d), at the time coinciding with a measured stage of 10.058 mAHD. It is noted that the peak water levels in all three of the calibration events significantly exceed this rating extrapolation threshold.

A similar conclusion was again reached by the Wyong River Catchment Flood Study (2014), which noted that *"[the] site was known to be unreliable for estimating flood flows due to the nature of the floodplain topography and this is still the case, even with a modelled rating*" and that "*[the] modelled rating is extremely flat above the bank-full level of 11m AHD… making it difficult to establish a reliable rating curve.*"

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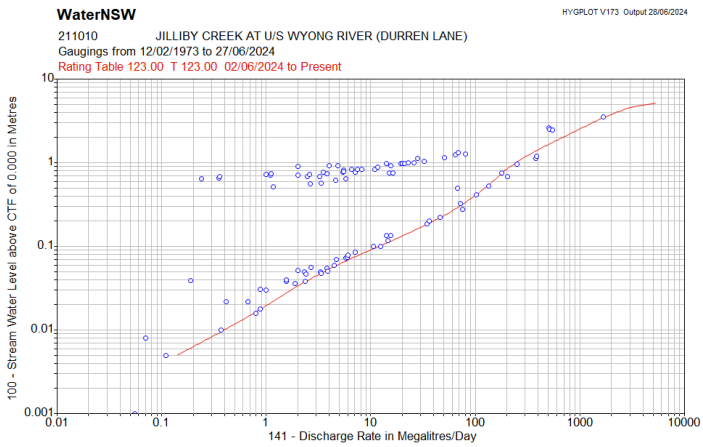

Figure 6.7 Comparison plot of gaugings and latest ratings for Jilliby Creek upstream Wyong River (211010) (WaterNSW)

The modelled and existing rating curve at the time of the 2014 study are presented in **Figure 6.10.**

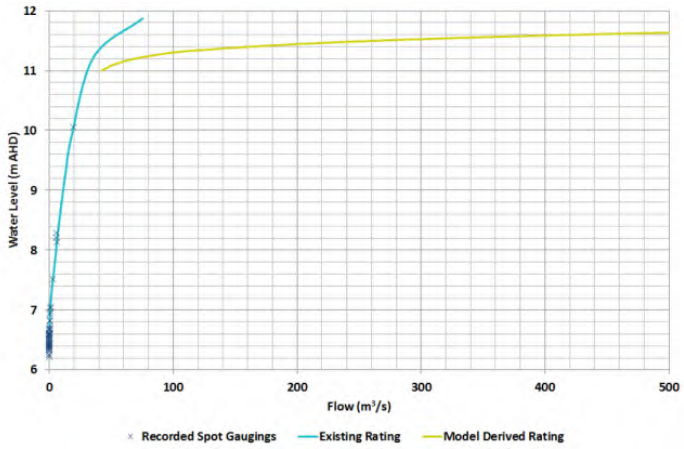

Figure 6.8 Comparison plot of modelled and WaterNSW-derived ratings, as extracted from the Wyong River Catchment Flood Study (2014), for Jilliby Creek upstream Wyong River (211010)

It was therefore determined that flows derived from the stage-discharge rating curve at this location be considered unreliable for the purpose of the calibration of the hydrologic model.

6.3.1.5 Ourimbah Creek upstream Weir (211013)

The gauge located highest within the Ourimbah Creek catchment is located at Ourimbah Creek upstream Weir (211013). The rating curve and measured flow gauging points at this gauge location are presented in **Figure 6.9**.

As can be seen in this diagram, the rating curve exhibits a good relationship with the flow gauging data. However, extrapolation of the rating curve is relied upon to derive a rating relationship for flows above ~40 m^3/s (~3,500 ML/d), at the time coinciding with a measured stage of 17.249 m AHD. It is noted that the peak water levels in all three of the calibration events exceed this rating extrapolation threshold.

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On the matter, the Ourimbah Creek Catchment Flood Study (2013) concluded that *"the rating curve and the associated discharge estimates are likely to be reliable although discharge estimates at very high stages … will be prone to some uncertainty.*"

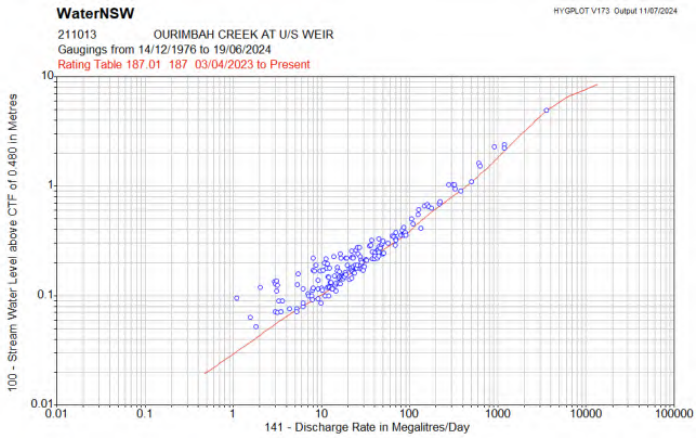

Figure 6.9 Comparison plot of gaugings and latest ratings for Ourimbah Creek upstream Weir (211013) (WaterNSW)

It was therefore determined that flows derived from the stage-discharge rating curve at this location be considered reliable for the purpose of the calibration of the hydrologic model.

6.3.1.6 Rating curve analysis summary

Noting the lack of reliable flow gauge locations along the entirety of the significant Wyong River catchment, and in order to adequately calibrate the hydrologic model, an alternative calibration approach was required.

As such, it was determined that the TUFLOW model developed as part of the Wyong River Catchment Flood Study could be modified to accept the outputs of the calibrated hydrologic model. This would allow for the hydraulic model to be utilised to translate flows as determined by the new hydrologic model into water levels at key gauge locations. This has the effect of removing the reliance on unsuitable flow time series derived from the abovementioned extrapolated rating curves and instead allows direct comparison of modelled flood levels to gauged water level time series of much higher reliability.

While this approach was adopted with the aim of translating the outputs of the hydrologic model into a form that can be reliably calibrated, the use of a secondary hydraulic model to achieve this inherently introduces the effect of any underlying deficiencies that may exist in the hydraulic model of the Wyong River Catchment Flood Study. However, this model was also calibrated against a variety of events and was adopted as such and is therefore considered to be appropriate for this purpose and the results of the calibration for the three selected calibration/validation events are described in **Sections 6.3.2** to **6.3.4**.

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6.3.2 July 2022 calibration

6.3.2.1 Rainfall data and event summary

The July 2022 flooding event saw intense rainfall which broke numerous longstanding records across much of the NSW east coast. The event was associated with an East Coast Low that formed off the Hunter coast of NSW on 2 July. The East Coast Low moved offshore on 3 July, but onshore flow continued to bring persistent rain to the Central Coast and Greater Sydney. Rainfall intensified on the June 4 and 5 when a trough extending from the East Coast Low passed over the Central Coast and Greater Sydney. The event sustained heavy rainfall and caused widespread damage across the Central Coast, Greater Sydney and Illawarra regions (BoM, 2022). A high-level review of the rainfall records indicates that an average of over 400 mm of rain fell over a ten-day period between 2 and 12 July 2022.

The distribution of rainfall gauge locations within the Tuggerah Lakes catchment are exhibited in **Figure 3.1**, with their respective periods of record shown in **Table 3.1**. A comprehensive coverage of continuous rainfall data was available across the catchment in the July 2022 event from both the BoM and MHL.

First, a comparison was performed between these continuous gauges in terms of the rainfall depth and temporal pattern across the event. A summary of cumulative precipitation at all relevant continuous gauges in the region plot is shown in **Figure 6.10**.

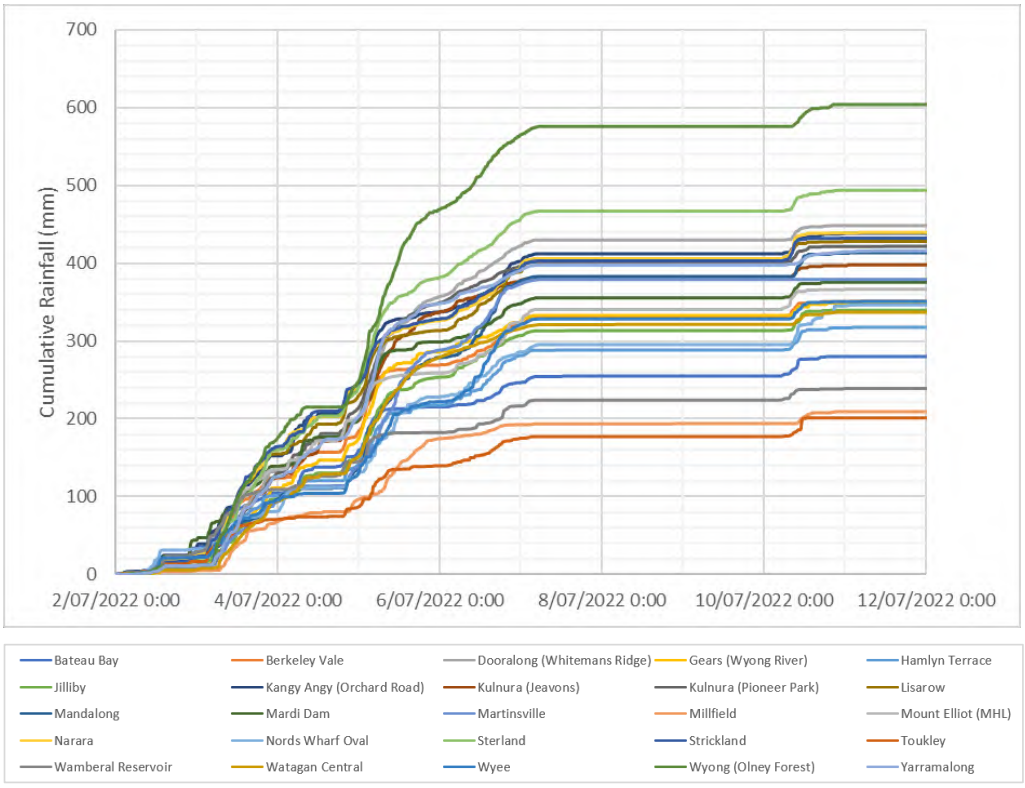

Figure 6.10 Cumulative recorded rainfall depths during the July 2022 calibration event

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As can be seen, a wide variability in rainfall depth and modest variability in temporal pattern was observed across the catchment during this event. This is typical of catchments which see the effects of orographic variability and may additionally be because of the complex meteorological lifecycle of the July 2022 event. **Figure 6.11** presents the spatial coverage of the available continuous rainfall data across the catchment and is overlaid with recorded rainfall isohyets derived from the observed data at these points. It is noted that rainfall depths and temporal patterns from each gauge location are applied according to the WBNM Theissen polygon approach. The zones of influence of each gauge under this approach are also shown in **Figure 6.12**.

Data from the Martinsville gauge location were excluded because of missing or erroneous data on 10 July 2022, verified by means of comparison with a nearby gauge location at Mandalong. The exclusion of this sites does not significantly compromise the spatial coverage of rainfall data across the catchment, and the data for the rest of the event is closely represented by that at Mandalong.

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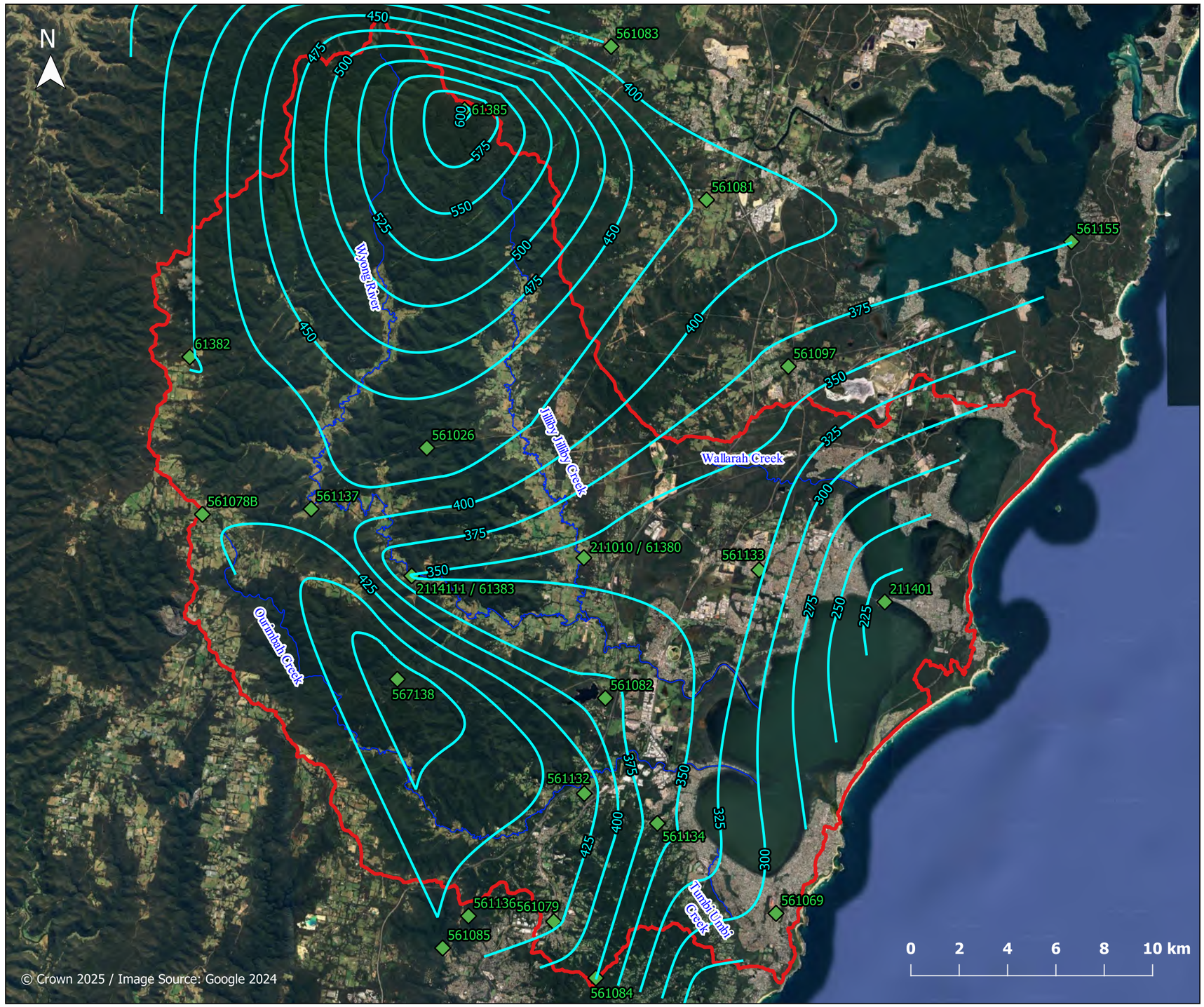

Figure 6.11

July 2022 calibration event - recorded rainfall distribution

Legend

- Catchment boundary
- Primary tributaries
- Rainfall stations
- 2-10 July 2022 Rainfall Depth Contour (mm)

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Tuggerah Lakes Flood Study Review

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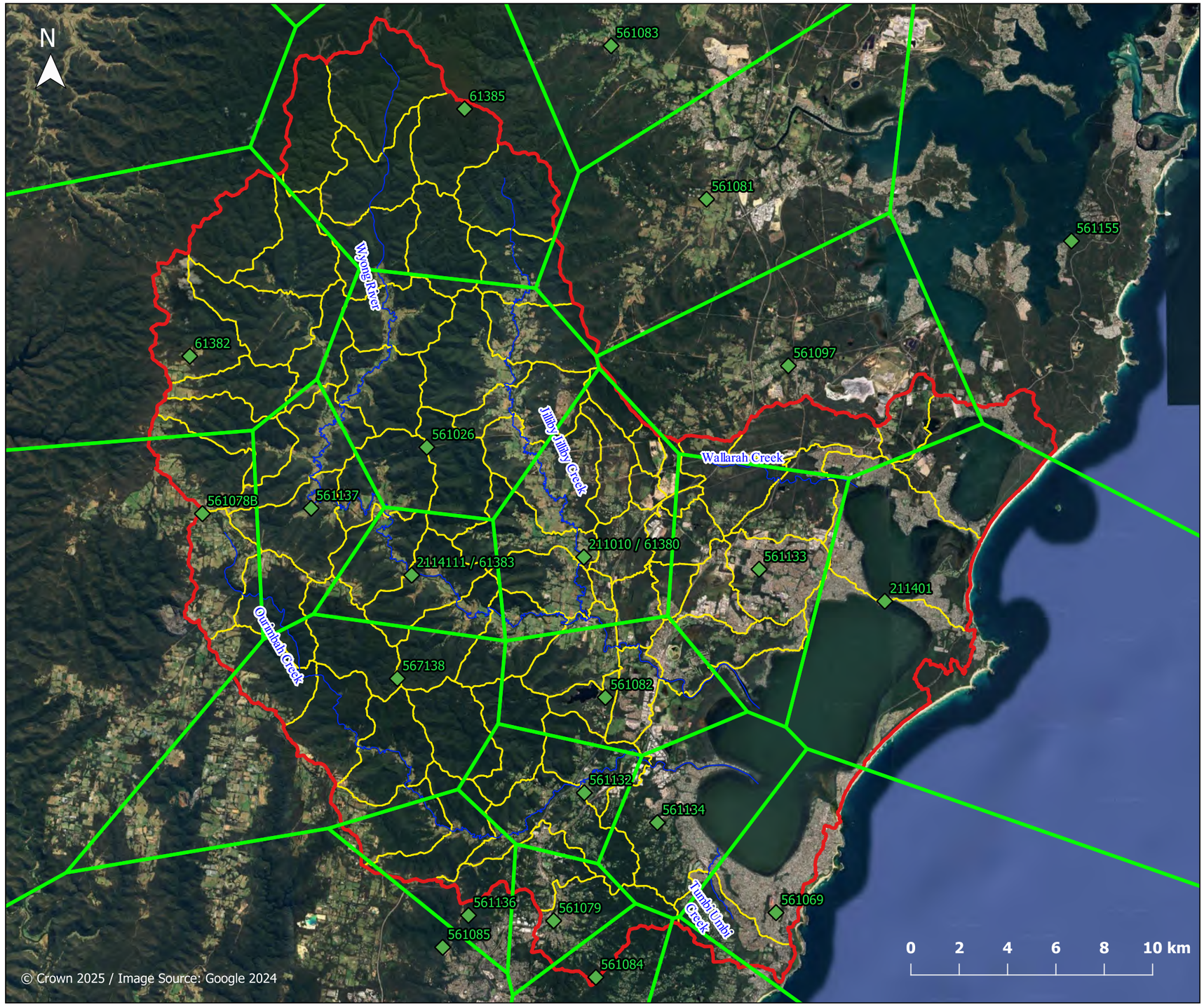

Figure 6.12

July 2022 calibration event - rain gauge zones of influence

Legend

- Catchment boundary
- Primary tributaries
- Hydrologic model sub-catchment
- Rainfall stations
- Station zone of influence

Report MHL2929

Tuggerah Lakes Flood Study Review

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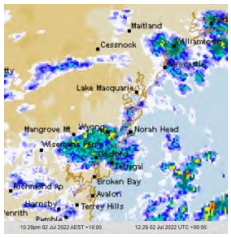
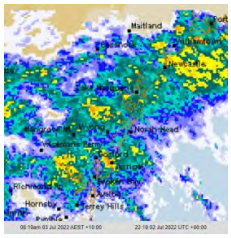
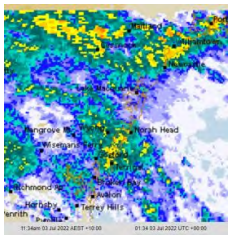
To further validate the observed depths and temporal patterns recorded at the remaining continuous rainfall gauge locations, radar data available from the Sydney (Terry Hills) radar station, located approximately 50 km to the south, was acquired for interrogation from *theweatherchaser.com*. A selection of these radar images is presented and discussed in **Table 6.4**.

Table 6.4 Selected Sydney (Terry Hills) radar imagery during the July 2022 calibration event

Description	Radar image	Description	Radar image
7:49am 2 July 2022 The event begins on the morning of the 2 July with some patchy, low intensity rainfall, with some more intense cells nearer the coast		10:20pm 2 July 2022 By evening, these patchy showers form heavier large cell near the coast, which clears to the west	
3:24am 3 July 2022 By early morning, an intense band of storms crosses the catchment from east to west		8:19am 3 July 2022 Across the morning band grows to cover the entire catchment in moderate to intense rainfall	
11:34am 3 July 2022 Consistent and intense rainfall, as described above, continues into the afternoon		4:04pm 3 July 2022 Consistent rainfall, as described above, continues into the evening, becoming more moderate	
1:24am 4 July 2022 By early morning, the widespread rain has localized into a band of rain, linearly streaming from south-east to north-west		7:34am 4 July 2022 A train of rain continues to progress from south-east to north-west, causing isolated intense rainfall along its length	

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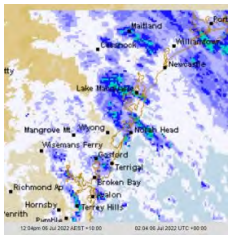
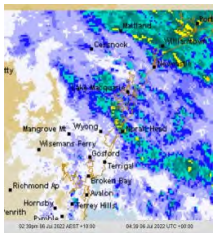
Description	Radar image	Description	Radar image
6:19pm 4 July 2022 After a period of relative calm during the day on 4 July, another thick band of intense rainfall approaches the catchment from the south		8:39pm 4 July 2022 The abovementioned band crosses the catchment during the evening	
12:54am 5 July 2022 Moderate to intense falls are ongoing into the morning of 5 July, now crossing the catchment from east to west		4:29am 5 July 2022 As above	
8:39am 5 July 2022 As above, with falls becoming more moderate and banded on the afternoon of 5 July		12:04pm 6 July 2022 Falls become patchy and less intense throughout the morning of 6 July	
2:39pm 6 July 2022 By the afternoon, a final group of moderate intensity rainfall bands approaches the catchment, now from the north-east		Significant rainfall abates early on the morning of 7 July	

6.3.2.2 Antecedent conditions

The antecedent catchment condition in respect to its degree of wetness prior to a major rainfall event can significantly influence the runoff and loss behaviour of the catchment.

Inspection of the rainfall data preceding the July 2022 event at a representative gauge location as shown in **Figure 6.13** revealed that the early months of 2022 saw some significant rainfall events, with the first five months of the year seeing above average rainfall. Conversely, the month of June immediately preceding the event saw a total rainfall of only 14.6 mm, far below the long-term average for June of 94.6 mm.

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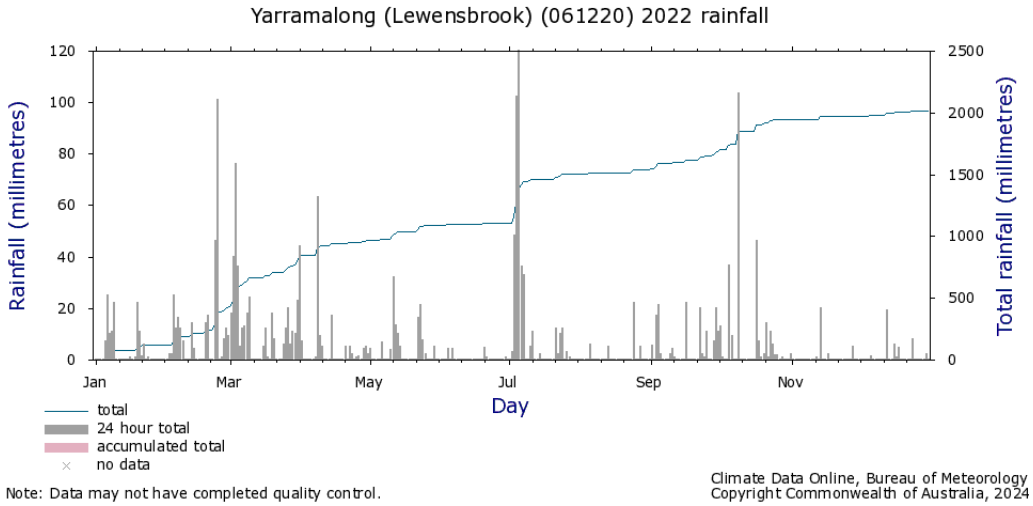

Figure 6.13 2022 daily rainfall at Yarramalong

It is anticipated that the significant rainfall amounts seen in the early months of 2022 likely resulted in the deep saturation of soils in the Tuggerah Lakes catchment, with high soil moistures likely. However, the period of below-average rainfall immediately prior to the event may have had the result of moderating soil moisture, particularly at the soil surface. These antecedent moisture and soil conditions were considered further throughout the model calibration process.

6.3.2.3 Model parameter adjustment

The initial adopted model parameters for this calibration run consisted of those recommended by ARR, namely a CL of 1.2 mm/h, and an IL of 49 mm. These values were adjusted to obtain a CL value of 1.0 mm/hr and an IL value of 58 mm, with the increase in IL value potentially being necessary as a result of the relatively dry period immediately prior to the event. A routing factor of 1.3 was adopted initially as it was thought that the relevant catchments would display a 'peakier' behaviour owing to their steep upstream topography and geometry, with no further adjustments found to be required.

6.3.2.4 Observed and simulated flood behaviour

Comparison of the hydrologic model results to available measured level and flow data, where appropriate, for the July 2022 calibration event are presented in **Figure 6.14** and **Figure 6.15.**

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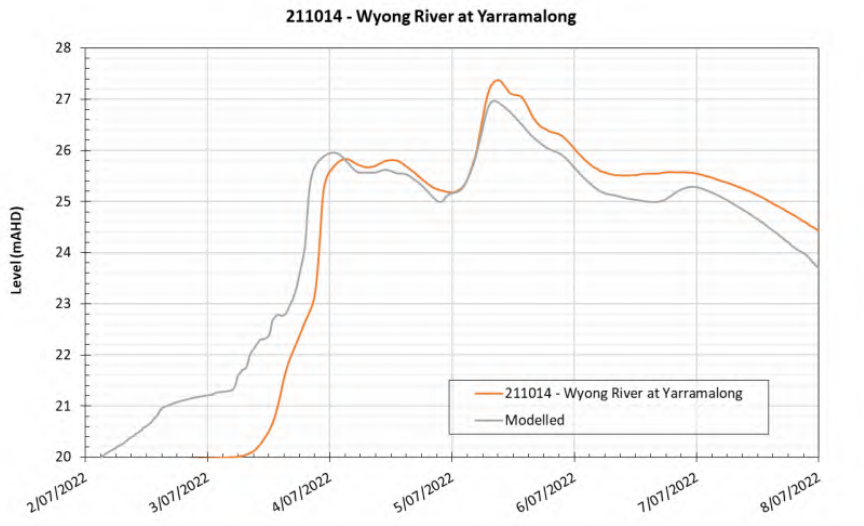
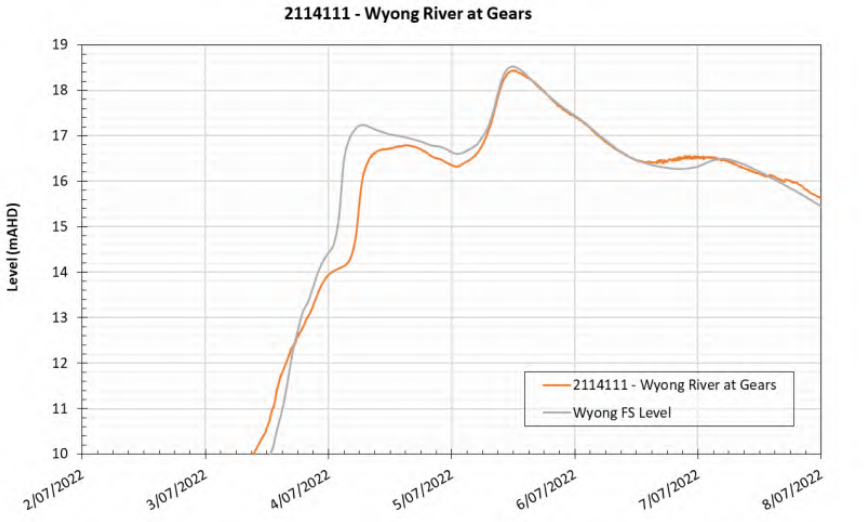

211014 - Wyong River at Yarramalong
Level (mAHD)
28
27
26
25
24
23
22
21
20
2/07/2022
3/07/2022
4/07/2022
5/07/2022
6/07/2022
7/07/2022
8/07/2022
211014 - Wyong River at Yarramalong
Modelled


2114111 - Wyong River at Gears
Level (mAHD)
19
18
17
16
15
14
13
12
11
10
2/07/2022
3/07/2022
4/07/2022
5/07/2022
6/07/2022
7/07/2022
8/07/2022
2114111 - Wyong River at Gears
Wyong FS Level

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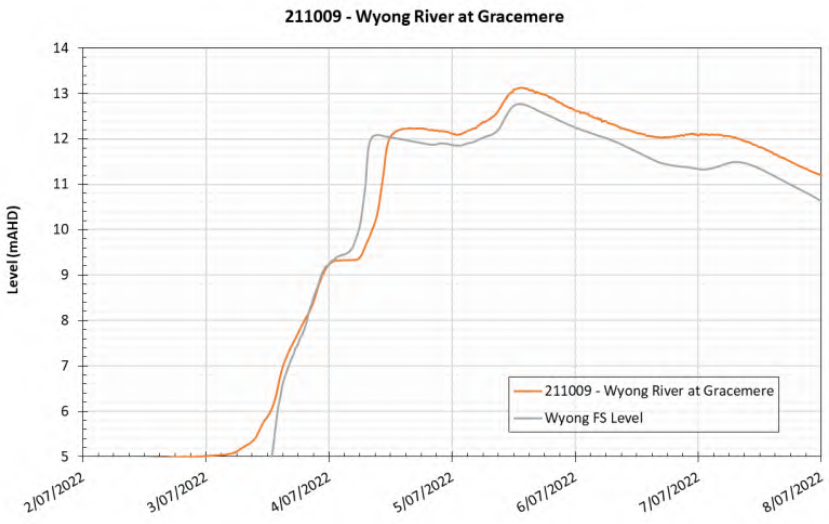
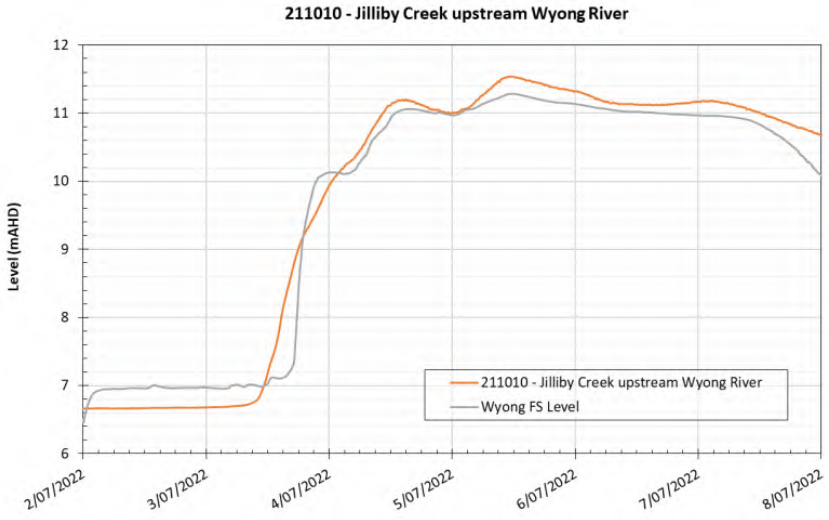

211009 - Wyong River at Gracemere
Level (mAHD)
14
13
12
11
10
9
8
7
6
5
2/07/2022
3/07/2022
4/07/2022
5/07/2022
6/07/2022
7/07/2022
8/07/2022
211009 - Wyong River at Gracemere
Wyong FS Level


211010 - Jilliby Creek upstream Wyong River
Level (mAHD)
12
11
10
9
8
7
6
2/07/2022
3/07/2022
4/07/2022
5/07/2022
6/07/2022
7/07/2022
8/07/2022
211010 - Jilliby Creek upstream Wyong River
Wyong FS Level

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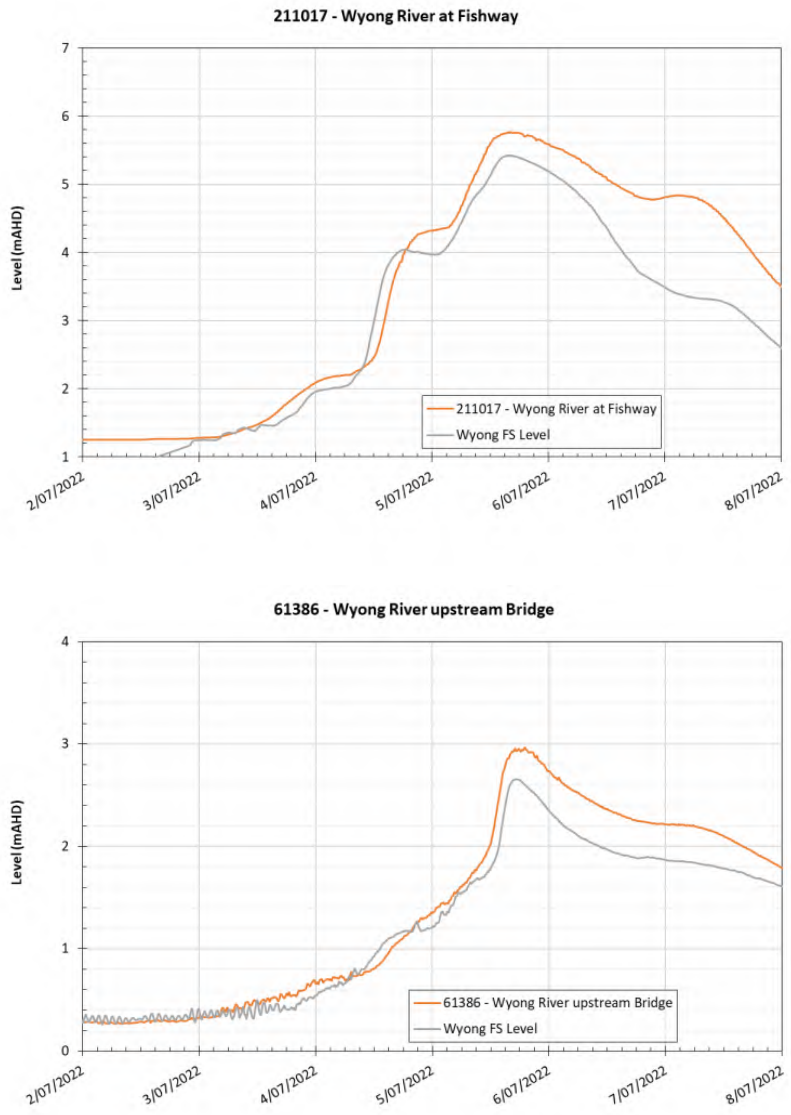

Figure 6.14 Comparison of simulated and observed water level data on the Wyong River for the July 2022 calibration event

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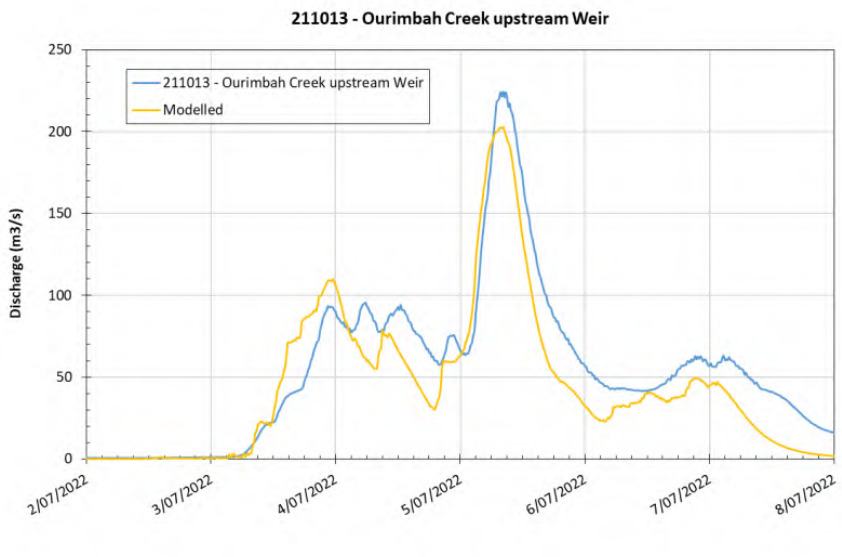

Figure 6.15 Comparison of simulated and flow-rated level data at Ourimbah Creek upstream Weir (211013) for the July 2022 calibration event

For the July 2022 calibration event on the Wyong River, the modelled results provide a reasonable representation of the recorded water levels at all locations.

Being the highest gauge in the catchment, it is reasoned that the Wyong River at Yarramalong gauge was expected to be subject to less hydraulic effects such as storage, losses, structures obstructions, backwater effects from the downstream lake levels and other complex interactions. The result of the model at this location is therefore considered to be closely reflective of the aptitude of the hydrologic model. Noting this, it is observed that the result at this location shows close agreement with that recorded in terms of both timing and magnitude.

Modelled water levels at Gears can be seen to also be in close accordance with those recorded.

Results at Gracemere are also good in the rising limb and peak flood phases, however, do tend to be underestimated in the falling limb.

Close agreement is also demonstrated on Jilliby Jilliby Creek at the Jilliby Creek upstream Wyong River gauge.

In the lower reaches of the Wyong River at Wyong Fishway and Wyong Bridge, the model can be seen to provide a good match between simulated and recorded hydrographs at these locations, accurately capturing the timing and general shape of the event. Key features such as the rising limb, flood peak, and recession phase are well represented in terms of their relative timing and magnitude. Minor discrepancies are noted, including a slight underestimation in peak level and a tendency towards underestimation of level falling limb of the hydrograph. These effects are suspected to be due to a range of factors, including the fact that bathymetry at these locations is estimated, the relatively course grid size of the hydraulic model acting to reduce modelled conveyance, backwater effects from the nearby lake, and potential floodplain and storage losses within the hydraulic model upstream of these locations.

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Storage losses can occur when inundated areas are not able to drain fully within the model due to limitations in the representation of small drainage features and groundwater flow.

It is considered that the model reliably reproduces the key flood dynamics observed in this calibration event for the Wyong River, particularly in terms of volume and timing, which are of direct relevance to the present study.

On Ourimbah Creek, a good representation of the timing and shape of the recorded flow-rated levels at the Ourimbah Creek upstream Weir site is demonstrated. However, it is reiterated that these rated flow data are converted from recorded water levels, and the conversion may be unreliable at high stages.

6.3.3 June 2007 calibration

6.3.3.1 Rainfall data and event summary

The June 2007 flooding event was associated with an East Coast Low that formed off the coast of NSW, just north of Newcastle. The storm produced strong winds, elevated ocean levels and sustained heavy rainfall and caused widespread damage across the Central Coast and Hunter regions. This storm event is often associated with the grounding of the *Pasha Bulker* on 8 June at Nobbys Beach (AIDR, 2024).

A high-level review of the rainfall records indicates that an average of over 300 mm of rain fell over a three-day period between 8 and 10 June 2007.

The distribution of rainfall gauge locations within the Tuggerah Lakes catchment are exhibited in **Figure 3.1**, with their respective periods of record shown in **Table 3.1**.

A comprehensive coverage of continuous rainfall data was available across the catchment in the June 2007 event from both the BoM and MHL.

First, a comparison was performed between these continuous gauges in terms of the rainfall depth and temporal pattern across the event. A summary of cumulative precipitation at all relevant continuous gauges in the region plot is shown in **Figure 6.16**. As can be seen, a wide variability in rainfall depth and modest variability in temporal pattern was observed across the catchment during this event. Consistent, widespread rainfall is observed across all sites in the afternoon of 7 June and morning hours of 8 June, with a significant burst of rainfall falling across the catchment in the early afternoon of 8 June. This burst is followed by ongoing steady rainfall at some sites, while other sites see much lower totals. Another burst of rainfall is seen across most sites on the morning of 9 June.

Figure 6.17 presents the spatial coverage of the available continuous rainfall data across the catchment and is overlaid with recorded rainfall isohyets derived from the observed data at these points. It is noted that rainfall depths and temporal patterns from each gauge location are applied according to the WBNM Theissen polygon approach. The zones of influence of each gauge under this approach are also shown in **Figure 6.18**.

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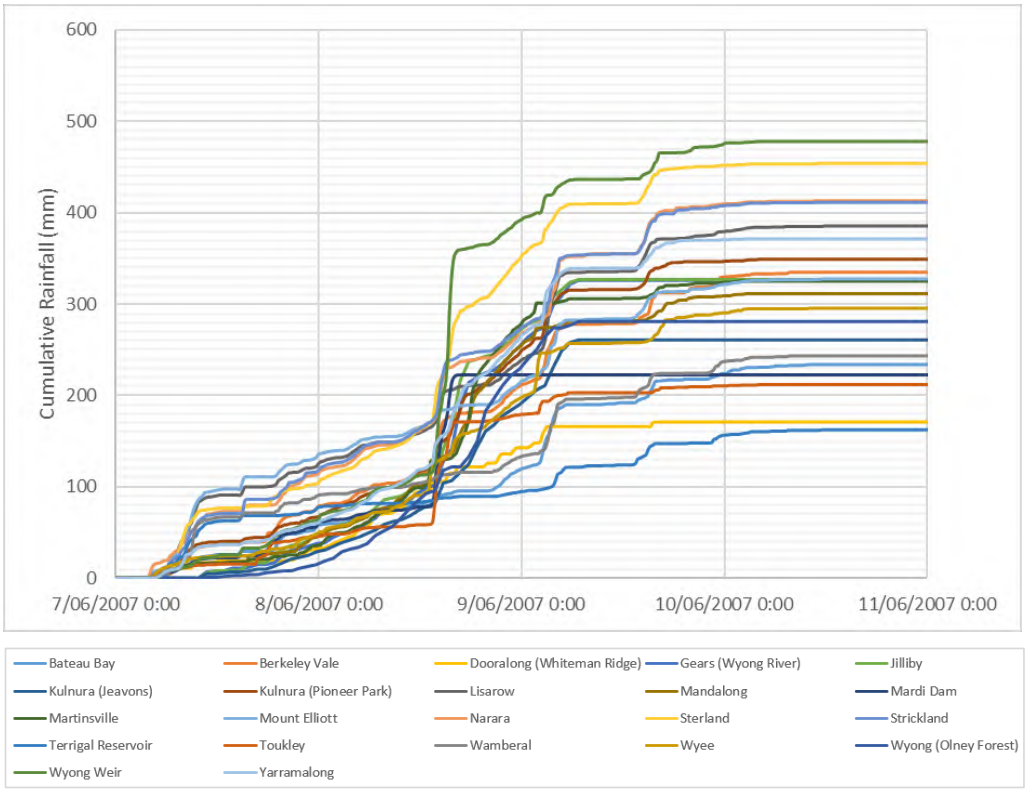

Figure 6.16 Cumulative recorded rainfall depths during the June 2007 calibration event

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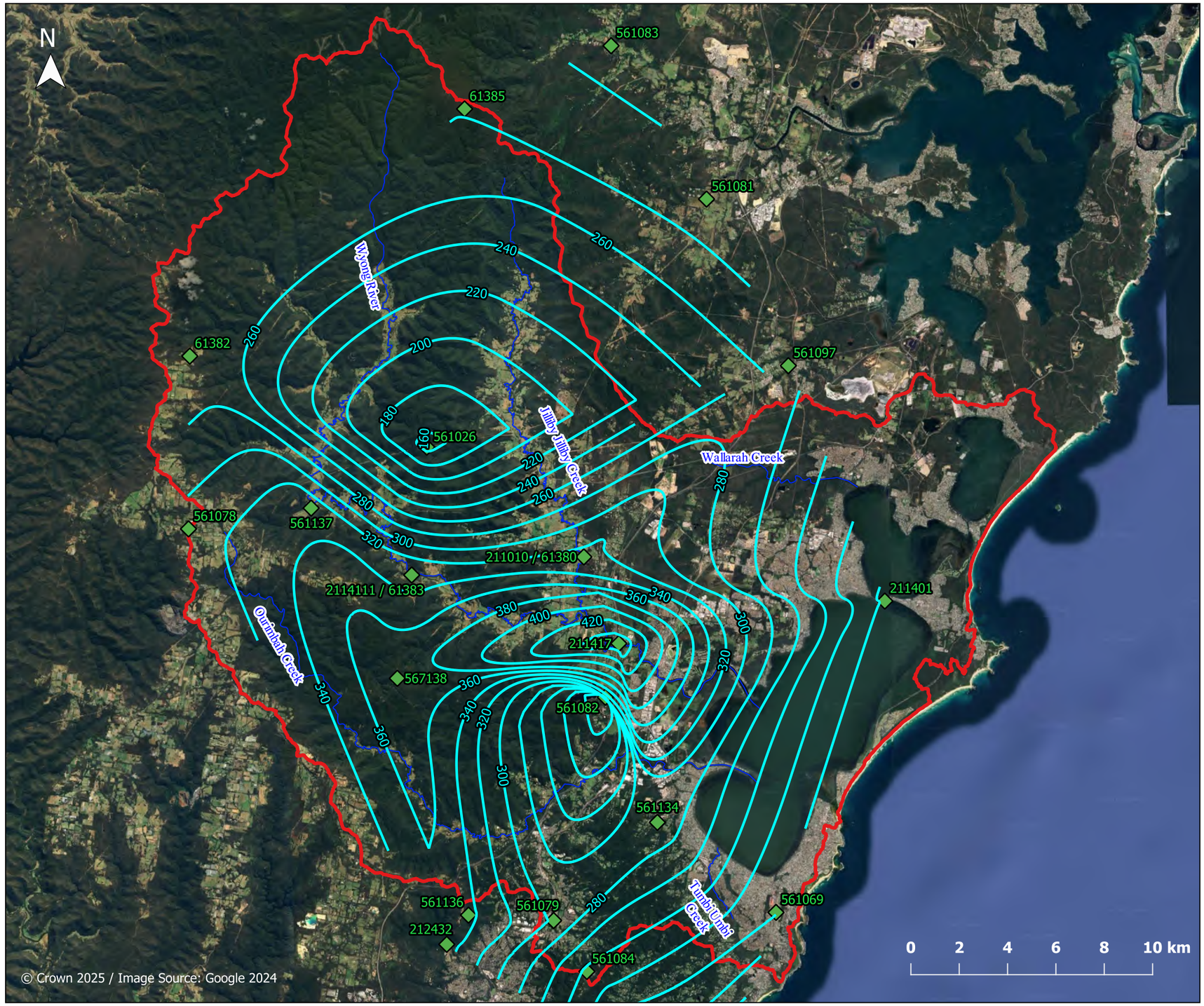

Figure 6.17

June 2007 calibration event - recorded rainfall distribution

Legend

- Catchment boundary
- Primary tributaries
- Rainfall stations
- 7-10 June 2007 Rainfall Depth Contour (mm)

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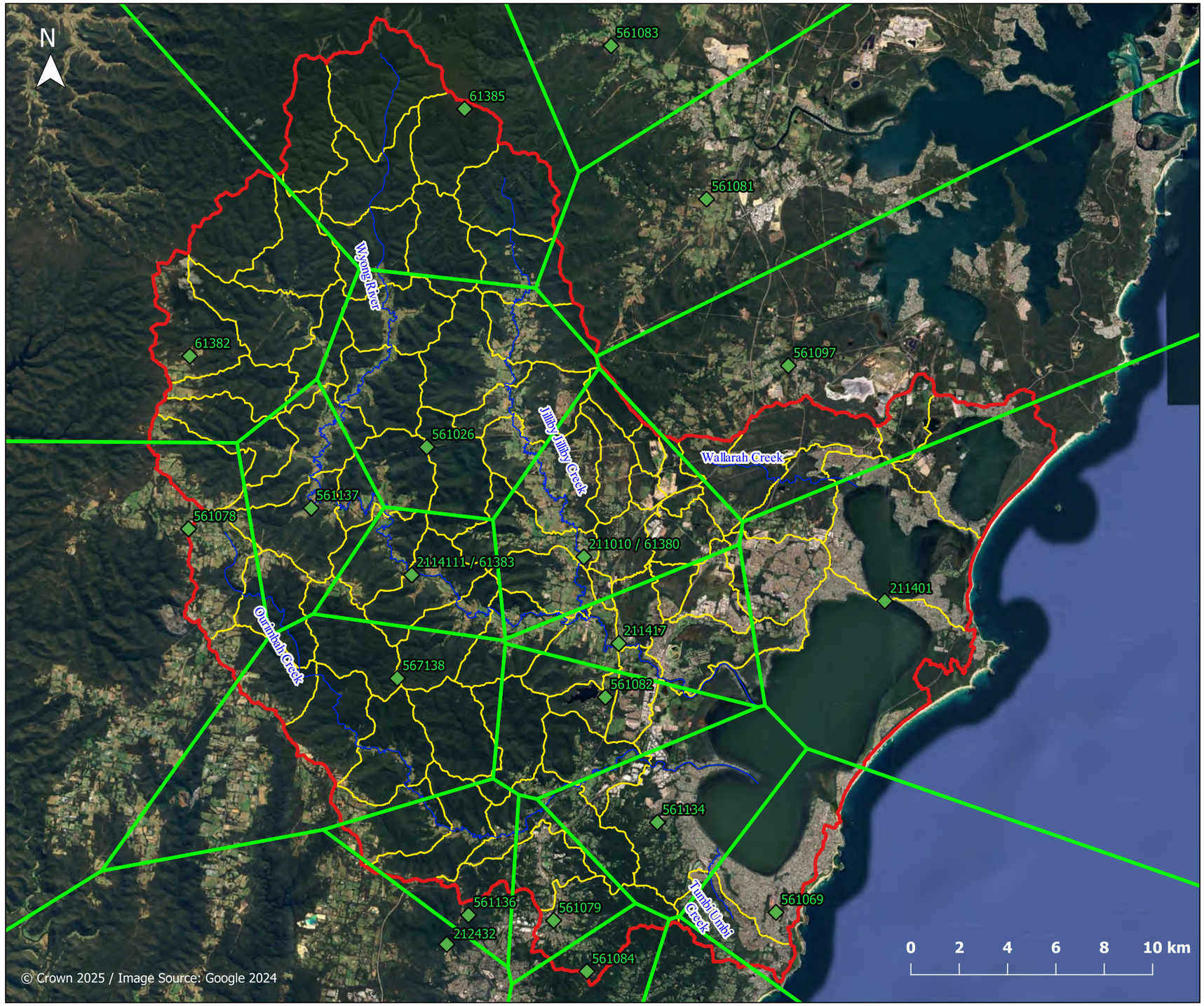

Figure 6.18

June 2007 calibration event – rain gauge zones of influence

Legend

- Catchment boundary
- Primary tributaries
- Hydrologic model sub-catchment
- Rainfall stations
- Station zone of influence

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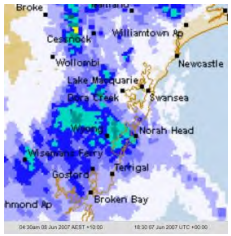
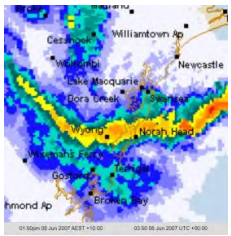
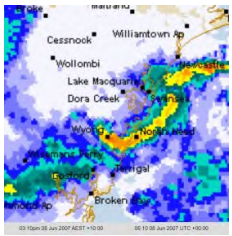
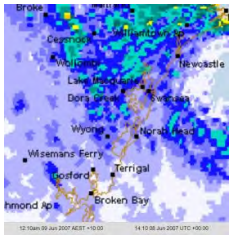
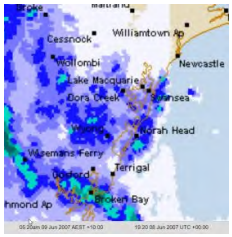
To further validate the observed depths and temporal patterns recorded at the remaining continuous rainfall gauge locations, radar data available from the Newcastle radar station, located approximately 80 km to the north-east, was acquired for interrogation. A selection of these radar images is presented and discussed in **Table 6.5.**

Table 6.5 Selected Newcastle radar imagery during the June 2007 calibration event

Description	Radar image	Description	Radar image
4:30am 8 June 2007 Widespread rainfall across catchment		10:40am 8 June 2007: Band of moderate intensity rainfall crosses the catchment from north-east to south-west	
1:50pm 8 June 2007: Band of high intensity rainfall crosses the catchment from north to south		3:10pm 8 June 2007: Band of high intensity rainfall continues to impact catchment, with an extended period of intensity focused around the Wyong area	
5:40pm 8 June 2007: Band of high intensity rainfall degenerates into a wider band of moderate intensity and slowly migrating to the west and north		12:10am 9 June 2007: Widespread, moderate intensity rainfall spreads across the entire catchment, growing from north to south	
2:10am 9 June 2007: An intense band of rainfall passes through the catchment from east to west. The centre of the 'East Coast Low' pressure system can be oberved passing inland, and is centered on Cessnock at this time		5:20am 9 June 2007: A cluster of moderate intensity rainfall rolls through the catchment from east to west, followed by clear conditions	

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Description	Radar image	Description	Radar image
3:00pm 9 June 2007: After a few dry hours, a final pulse of moderate intensity rainfall rolls through the catchment from south-east to north-west			

6.3.3.2 Antecedent conditions

Inspection of the rainfall data preceding the June 2007 event at a representative gauge location as shown in **Figure 6.19** revealed that the early months of 2007 saw average to below-average rainfall. In particular, the month of May immediately preceding the event saw a total rainfall of only 49.0 mm (37.0mm of which fell on 10 May 2007) and below the long-term average for May of 82.9 mm. The three weeks preceding the event saw a total of only approximately 10 mm.

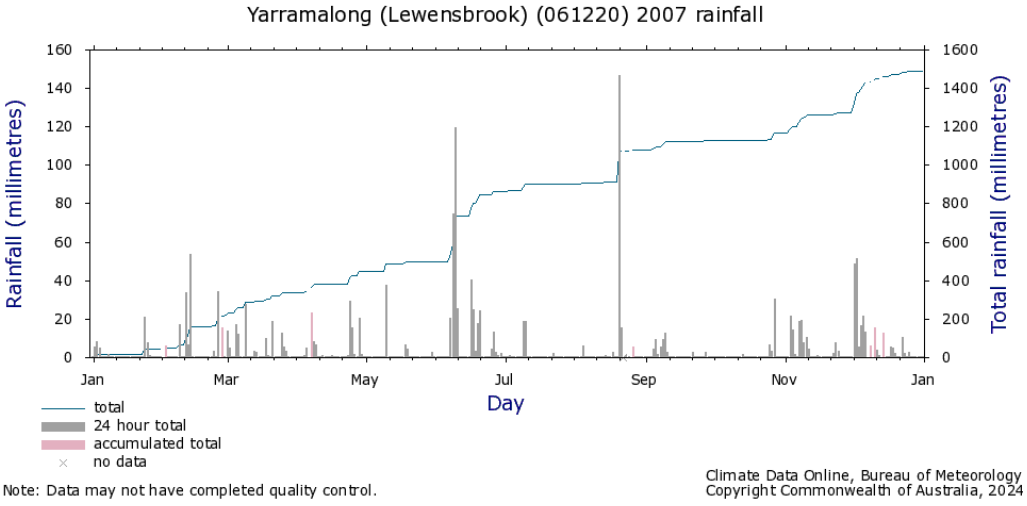

Figure 6.19 2007 daily rainfall at Yarramalong (61220)

It is anticipated that the consistent rainfall amounts seen in the early months of 2007 would bring about typical soil moistures Tuggerah Lakes catchment. Although, the period of below-average rainfall immediately prior to the event may have had the result of reducing soil moisture, particularly at the soil surface. These antecedent moisture and soil conditions were considered further throughout the model calibration process.

6.3.3.3 Model parameter adjustment

Model parameters adopted for the July 2022 event were initially retained for the June 2007 validation event without modification. However, further testing of the effect of initial loss, considering the drier antecedent conditions prior to this event, necessitated an increase in IL to 80 mm to achieve optimal results. As was discussed in **Section 2.4**, while the Wyong Flood Study adopted an initial loss of 35 mm for all events, this study commences the event at 9am

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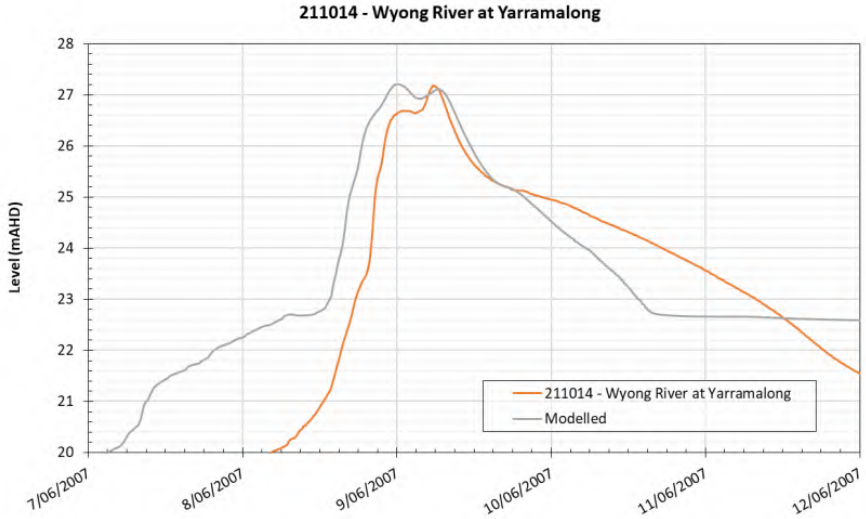
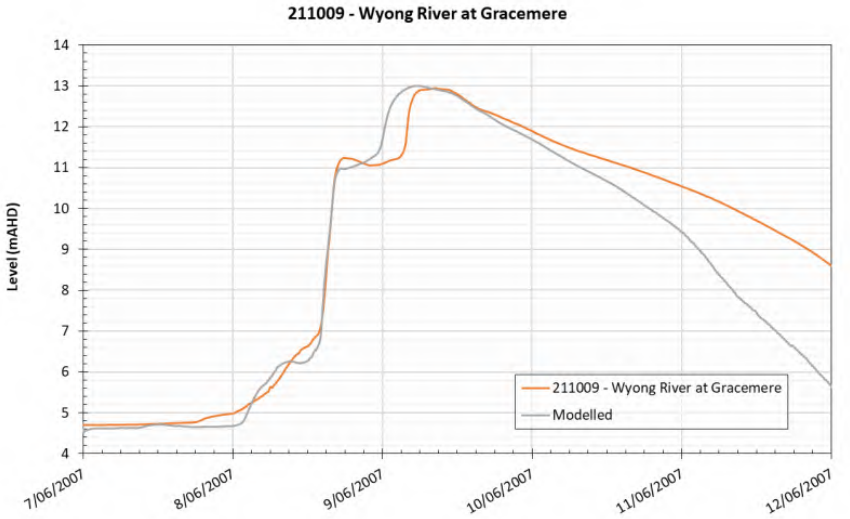
on 7 June 2007, after a burst of rainfall averaging approximately 30 mm across the catchment had already fallen over the preceding nine hours, and therefore the effective initial loss was higher. Furthermore, this study adopted a higher rate of continuous loss of 2.5 mm/h as was recommended by the current version of ARR at the time, which also acted to increase effective losses. Therefore, in the light of the consideration of this extra preceding rainfall and a lower CL value, a higher IL parameter was considered in alignment with the findings of the previous study.

6.3.3.4 Observed and simulated flood behaviour

Comparison of the hydrologic model results to available measured level and flow data, where appropriate, for the June 2007 calibration event are presented in **Figure 6.20** and **Figure 6.21**.





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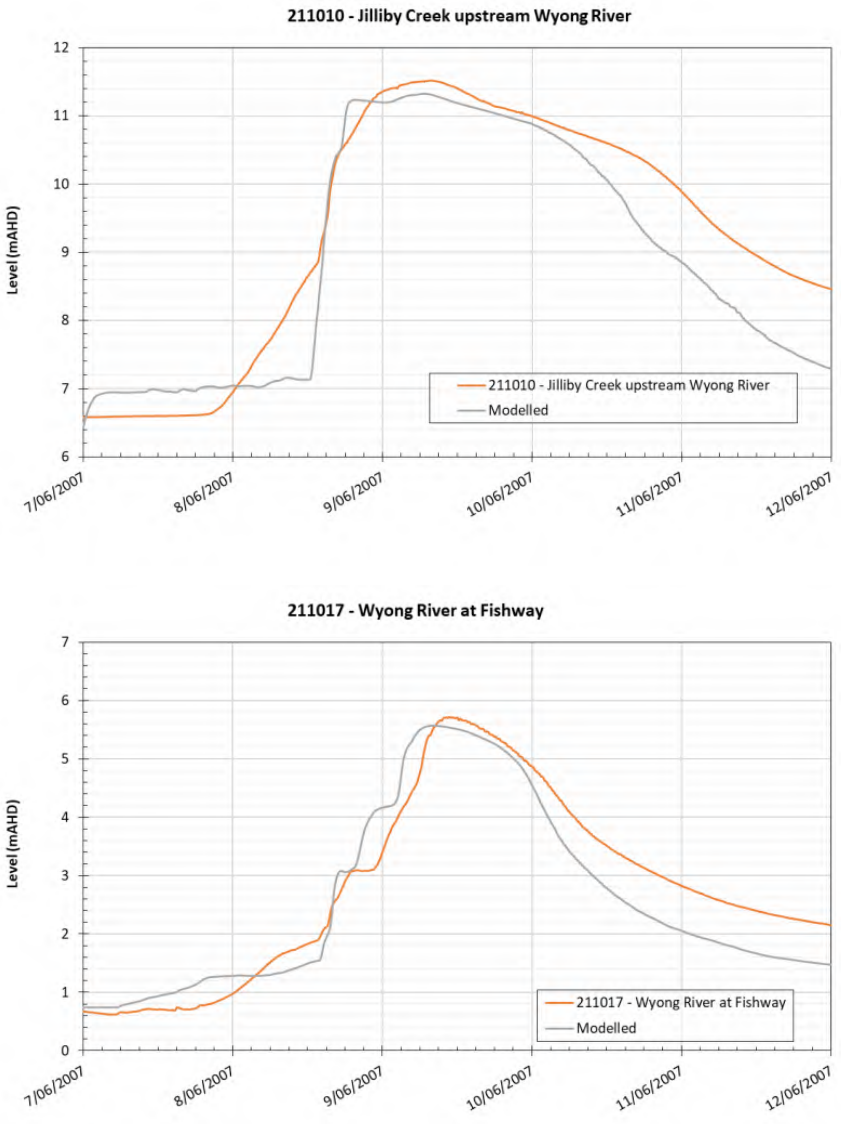

Figure 6.20 Comparison of simulated and observed water level data on the Wyong River for the June 2007 calibration event

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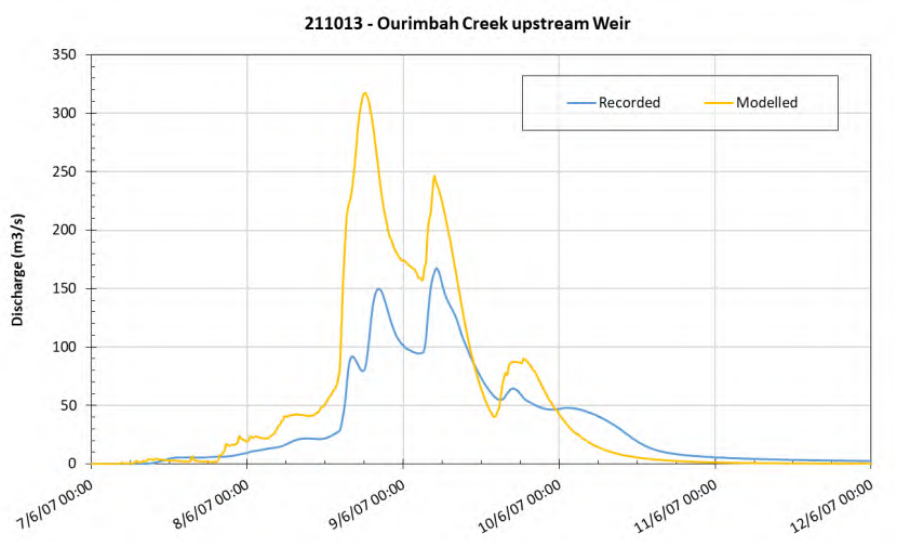

Figure 6.21 Comparison of simulated and observed flow data at Ourimbah Creek upstream Weir (211013) for the June 2007 calibration event

For the June 2007 calibration event on the Wyong River, the modelled results provide a reasonable representation of the recorded hydrographs at all locations.

As discussed for the July 2022 calibration event, the Wyong River at Yarramalong gauge is the least susceptible to hydraulic effects. Noting this, it is observed that the result at this location shows fair agreement with that recorded in terms of both timing and magnitude, particularly at the flood peak. While the discrepancy between modelled and observed water level present across 7 June and the early hours of 8 June appear significant, it is noted that actual flows modelled at this location during this phase of the event are exceedingly small. Quantitatively, modelled flows at Yarramalong before noon on 8 June are no higher than 10 m^3/s, and are in fact less than 1 m^3/s prior to 6:30am on 8 June. Furthermore, it is suspected that a causeway or structure not properly represented in the model immediately downstream of this gauge location is causing pooling at lows flows which causes the steady increase in levels despite the low modelled flow. It is recommended that the Wyong Flood Study model be reviewed to ensure that this causeway does not significantly impact flood levels.

Results at Gracemere are well-represented in the rising limb and peak flood phases, however, do tend to be underestimated in the falling limb and lack some resolution in distinguishing the initial and peak rises in flood level. On Jilliby Jilliby Creek, the Jilliby Creek upstream Wyong River gauge result is reasonably replicated, however but the arrival of flows tends to be slightly late and sharp. This is considered to be due to flood waters being held behind features at low levels higher on this reach.

In the lower reaches of the Wyong River at Wyong Fishway, the model can be seen to provide a good match between simulated and recorded hydrographs at these locations, accurately capturing the timing and general shape of the event. Key features such as the rising limb, flood peak, and recession phase are well represented in terms of their relative timing and magnitude. Minor discrepancies are noted, including a very slight underestimation in peak level and a

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tendency towards underestimation of the falling limb of the level hydrograph. These effects are suspected to be due to a range of factors, including the fact that bathymetry at these locations is estimated, the relatively coarse grid size of the hydraulic model acting to reduce modelled conveyance, backwater effects from the nearby lake, and potential floodplain and storage losses within the hydraulic model upstream of these locations.

It is considered that the model reliably reproduces the key flood dynamics observed in this calibration event for the Wyong River, particularly in terms of volume and timing, which are of direct relevance to the present study.

On Ourimbah Creek, a poor relationship is observed between recorded and modelled flows at the Ourimbah Creek upstream Weir (211013) gauge. While rated flows are subject to significant uncertainties, they can nevertheless be used to evaluate the timing of the discharge hydrograph, which is seen to be well replicated by the hydrologic model.

6.3.4 March 2021 validation

6.3.4.1 Rainfall data and event summary

The March 2021 flooding event was associated with persistent, heavy rain which fell from March 16 to March 23 across central and northern NSW. The event was caused by a blocking high in the Tasman Sea that directed a strong, low-pressure trough towards the NSW coast. The trough caused life-threatening flooding, hazardous surf, gusty conditions, and widespread damage across the Greater Sydney, Central Coast and north coast regions.

A high-level review of the rainfall records indicates that an average of over 400 mm of rain fell over an eight-day period between 16 and 24 March 2021.

The distribution of rainfall gauge locations within the Tuggerah Lakes catchment are exhibited in **Figure 3.1**, with their respective periods of record shown in **Table 3.1**. A comprehensive coverage of continuous rainfall data was available across the catchment in the March 2021 event from both the BoM and MHL.

First, a comparison was performed between these continuous gauges in terms of the rainfall depth and temporal pattern across the event. A summary of cumulative precipitation at all relevant continuous gauges in the region plot is shown in **Figure 6.22**.

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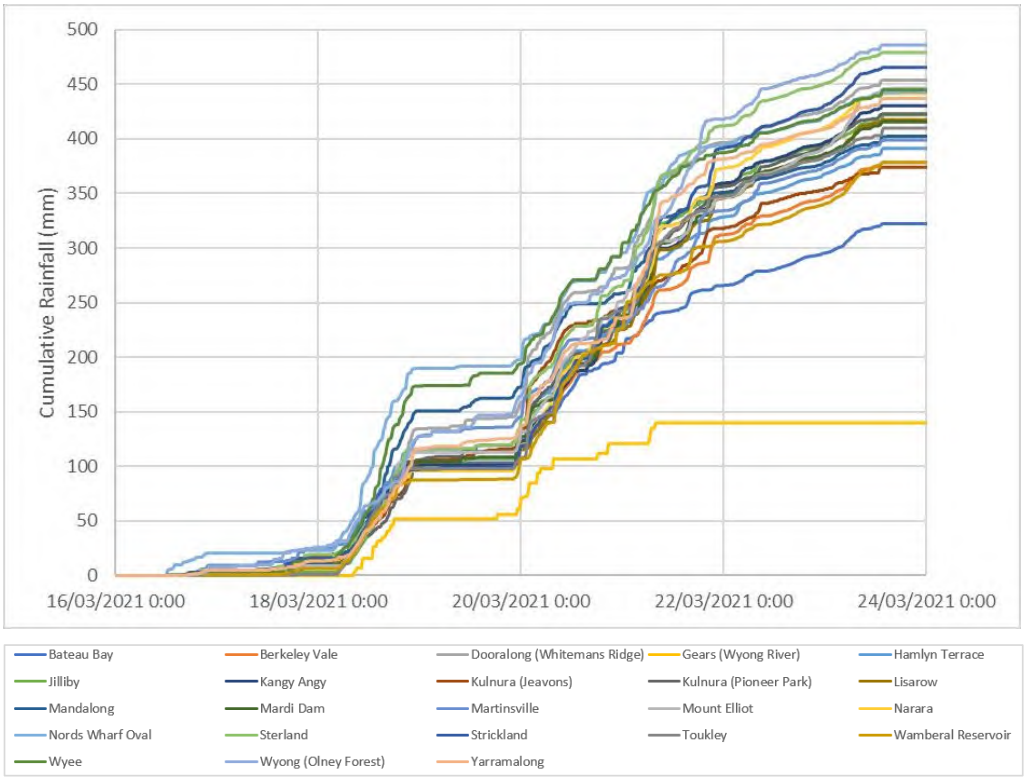

Figure 6.22 Cumulative recorded rainfall depths during the March 2021 calibration event

One site appears as a distinct lower outlier, being that at Gears. It is suspected that the data from Gears site was subjected to losses either in transmission or recording, with dropouts also apparent in the accompanying water level data from this site giving further confirmation to this. Subsequently, data from this site was excluded. As can be seen, little variability in rainfall depth and temporal pattern was observed across the catchment during this event. **Figure 6.23** presents the spatial coverage of the available continuous rainfall data across the catchment and is overlaid with recorded rainfall isohyets derived from the observed data at these points. The relative uniformity of total rainfall across the catchment area spatially is again apparent. It is noted that rainfall depths and temporal patterns from each gauge location are applied according to the WBNM Theissen polygon approach. The zones of influence of each gauge under this approach are also shown in **Figure 6.24**.

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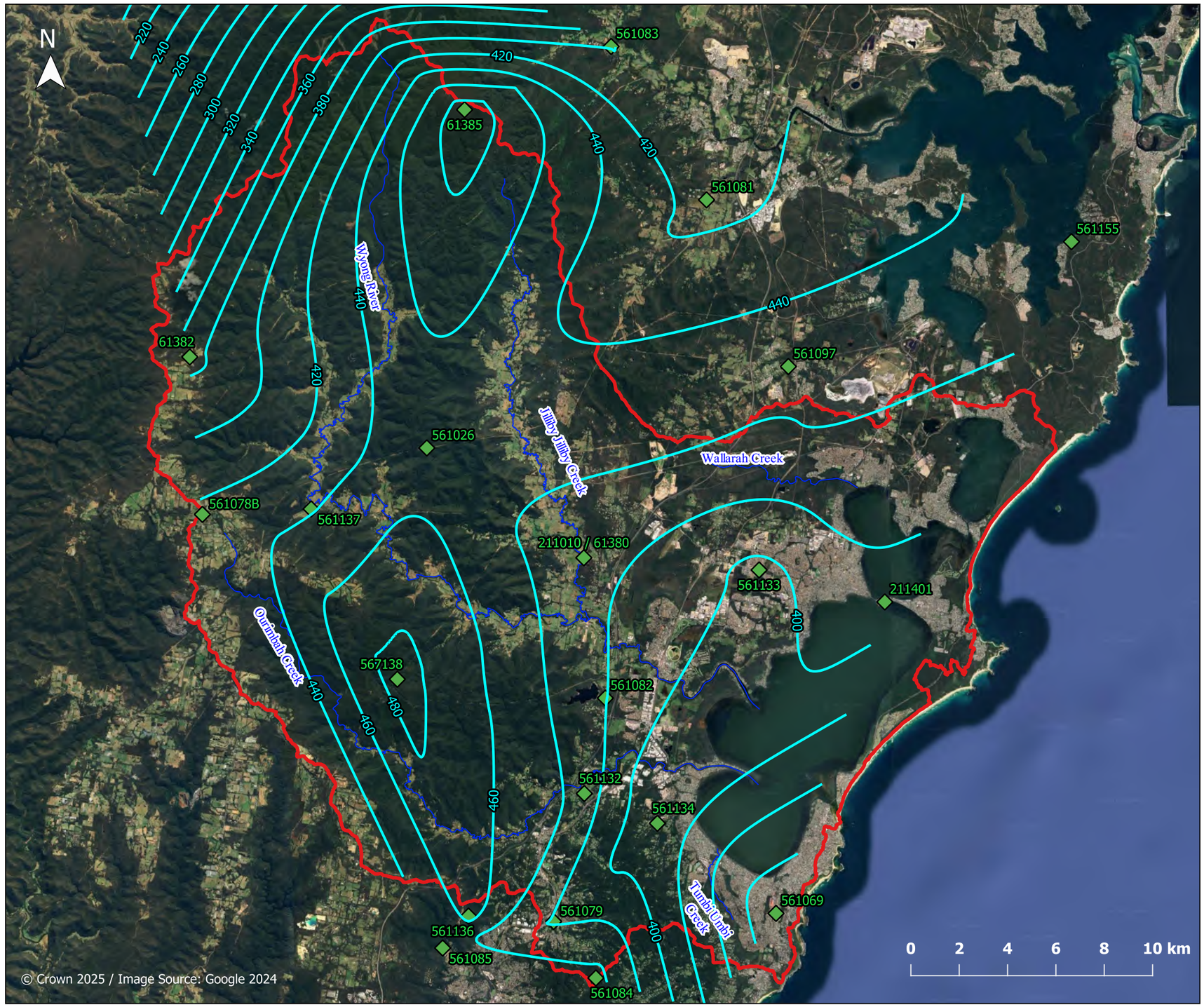

Figure 6.23

March 2021 validation event - recorded rainfall distribution

Legend

- Catchment boundary
- Primary tributaries
- Rainfall stations
- 16-26 March 2021 Rainfall Depth Contour (mm)

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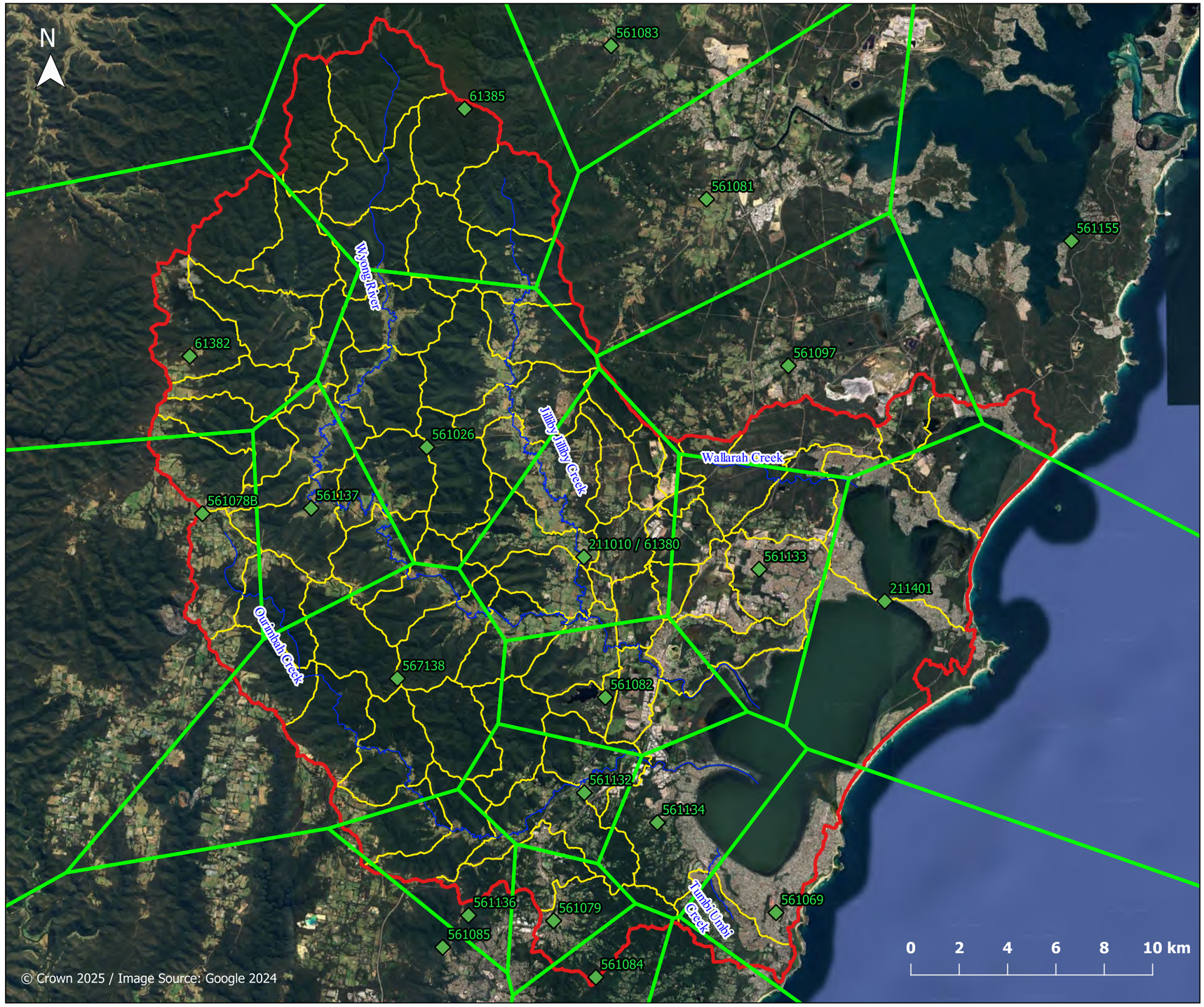

Figure 6.24

March 2021 validation event - rain gauge zones of influence

Legend

- Catchment boundary
- Primary tributaries
- Hydrologic model sub-catchment
- Rainfall stations
- Station zone of influence

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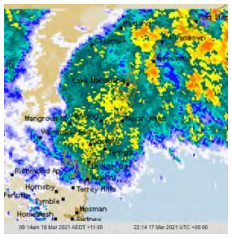
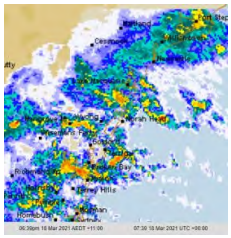
To further validate the observed depths and temporal patterns recorded at the remaining continuous rainfall gauge locations, radar data available from the Sydney (Terry Hills) radar station, located approximately 50 km to the south, was acquired for interrogation. A selection of these radar images is presented and discussed in **Table 6.6**.

Table 6.6 Selected Sydney (Terry Hills) radar imagery during the March 2021 validation event

Description	Radar image	Description	Radar image
5:19am 18 March 2021 The event begins in the early morning of 18 March with a broad band of moderate intensity rainfall crossing the catchment from north to south		9:14am 18 March 2021 Later that morning, a broad area of consistent, intense rainfall moves over the entire catchment from the north-east	
3:14pm 18 March 2021 By mid-afternoon, these conditions have not abated, and are still widespread across the catchment		6:39pm 18 March 2021 Later in the evening, conditions become more cellular, with cores of intense rainfall moving across the catchment from the north-east	
11:24pm 18 March 2021 Cellular conditions persist well into the night, eventually retracting inland from the coast by midnight		11:04pm 19 March 2021 On the night of the 19th, and after 24 hours of relative calm, another broad swathe of moderate intensity rainfall covers the catchment from the north-east	
12:44am 20 March 2021 Soon after, within this broad area of moderate intensity rainfall, three bands of embedded high intensity rainfall pass across the catchment from the north-east		2:54am 20 March 2021 The third band of intense rainfall passes through the catchment	

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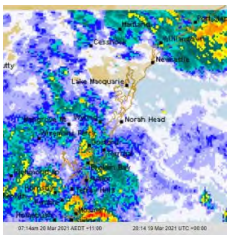
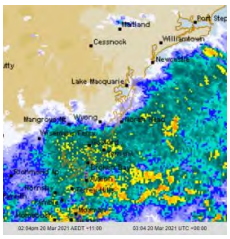
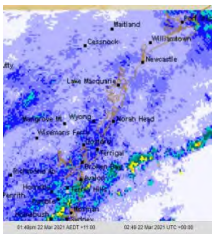
Description	Radar image	Description	Radar image
7:14am 20 March 2021 A gap in rainfall conditions passes over the catchment from the north-east		10:14am 20 March 2021 Broad, moderate to high intensity rainfall falls across the catchment	
2:04pm 20 March 2021 Rainfall clears across the catchment from the north-west		2:09am 20 March 2021 A series of large cells cross the catchment from the north-east	
1:49pm 20 March 2021 These cells become progressively larger, forming a large area of low to moderate intensity rainfall across the catchment, which eventually clears to the east by the morning of 23 March			

6.3.4.2 Antecedent conditions

Inspection of the rainfall data preceding the March 2021 event at a representative gauge location as shown in **Figure 6.25** revealed that the early months of 2021 saw average rainfall conditions.

It is anticipated that the consistent rainfall amounts seen in the late months of 2020 and into early-2021 would bring about moderate soil moistures to Tuggerah Lakes catchment. However, the period of below-average rainfall immediately prior to the event may have had the result of moderating soil moisture, particularly at the soil surface. These antecedent moisture and soil conditions were considered further throughout the model calibration process.

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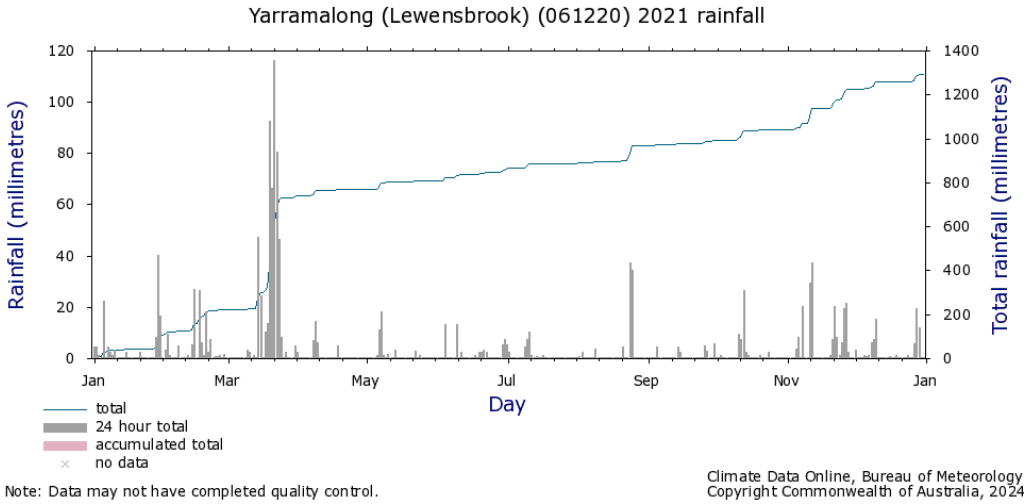


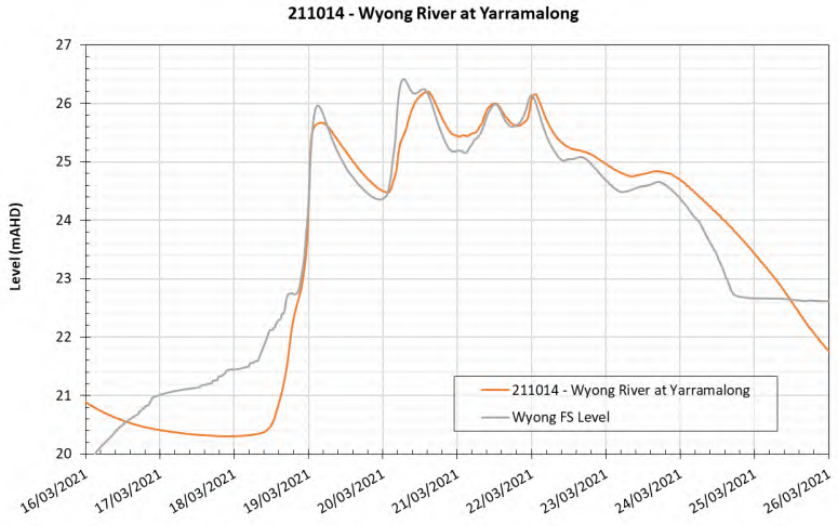
Figure 6.25 2021 daily rainfall at Yarramalong (61220)

6.3.4.3 Model parameter adjustment

Model parameters adopted for the 2022 calibration event were retained for the March 2021 validation event without modification.

6.3.4.4 Observed and simulated flood behaviour

Comparison of hydrologic model results to available measured level and flow data, where appropriate, for the March 2021 validation event are presented in **Figure 6.26** and **Figure 6.27.**



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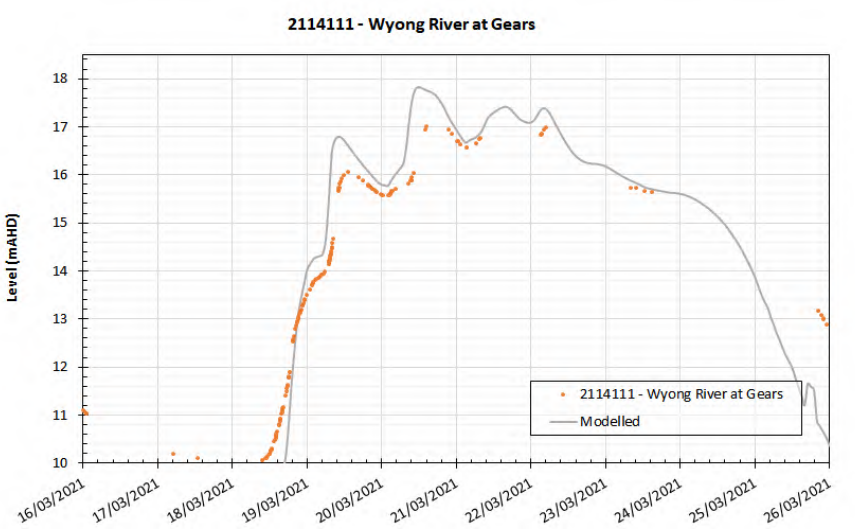
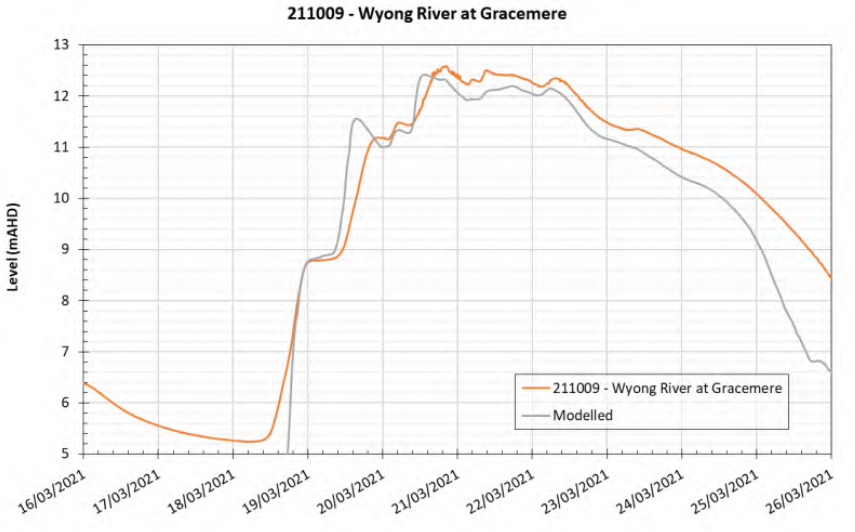


Note: point data have been used for that figure to highlight extensive gaps in available recorded data



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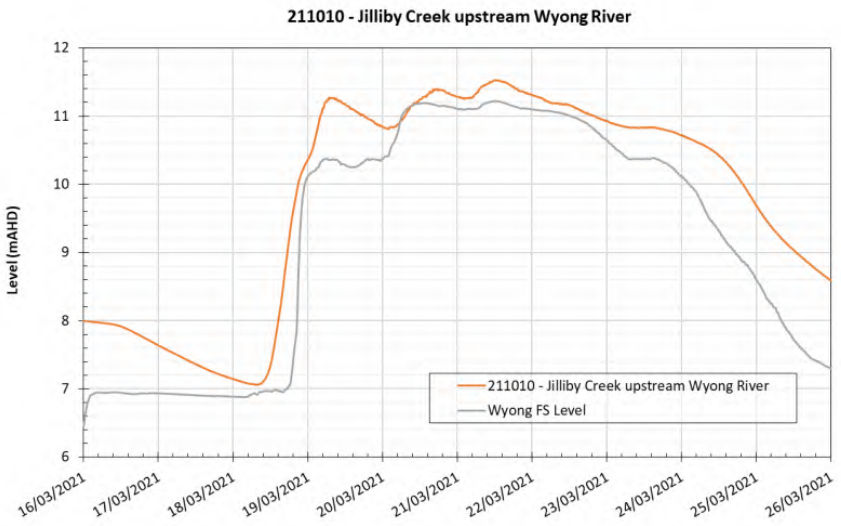
211010 - Jilliby Creek upstream Wyong River
Level (mAHD)
12
11
10
9
8
7
6
211010 - Jilliby Creek upstream Wyong River
Wyong FS Level
16/03/2021
17/03/2021
18/03/2021
19/03/2021
20/03/2021
21/03/2021
22/03/2021
23/03/2021
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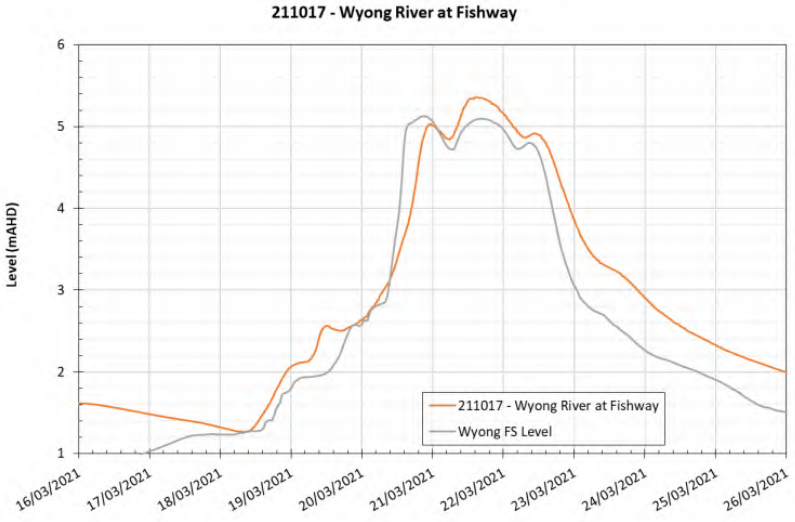
25/03/2021
26/03/2021


211017 - Wyong River at Fishway
Level (mAHD)
6
5
4
3
2
1
211017 - Wyong River at Fishway
Wyong FS Level
16/03/2021
17/03/2021
18/03/2021
19/03/2021
20/03/2021
21/03/2021
22/03/2021
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24/03/2021
25/03/2021
26/03/2021

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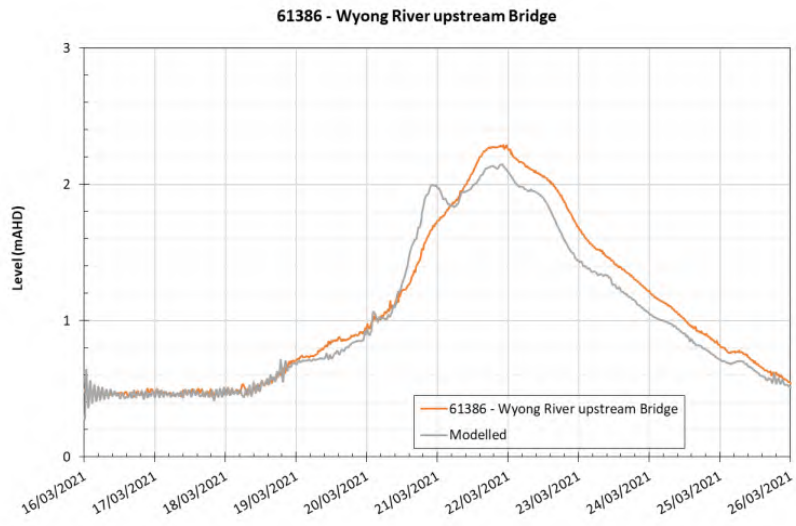

Figure 6.26 Comparison of simulated and observed water level data on the Wyong River for the March 2021 validation event

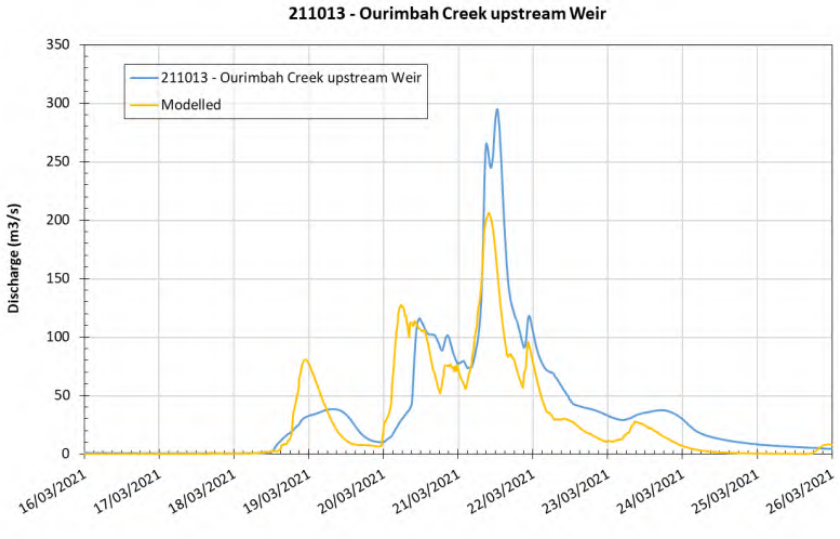

Figure 6.27 Comparison of simulated and observed flow data at Ourimbah Creek upstream Weir (211013) for the March 2021 validation event

For the March 2021 validation event on the Wyong River, the modelled results provide a reasonable representation of the recorded hydrographs at all locations.

The Wyong River at Yarramalong gauge results show close agreement with that recorded in terms of both timing and magnitude.

Results at Gears can be seen to be in general accordance with those recorded, however it is noted that the record at this location is intermittent as a result of data losses during

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communication. Results at Gracemere are also good in the rising limb and peak flood phases, however, do tend to be underestimated in the falling limb.

On Jilliby Jilliby Creek, some discrepancy is noted at the Jilliby Creek upstream Wyong River gauge, with an underestimated representation of the initial peak at this location in the early hours of 19 March 2021. The rainfall record indicates that this discrepancy is likely caused by a lower amount of rainfall being recorded by the gauges with influence over the sub-catchments upstream of this location. This results in a higher effective initial loss in these sub-catchments, which acts to significantly moderate the initial peak on Jilliby Creek. The explanation of this discrepancy being driven by the granularity in rainfall data capture is validated by the fact that the underestimation of this peak is contrasted with an overestimation of the equivalent peak on the Wyong River at Gracemere at a similar time. The replication of flood behaviour at this location is otherwise reasonable.

In the lower reaches of the Wyong River at Wyong Fishway, the model can be seen to provide a fair match between simulated and recorded hydrographs at these locations, accurately capturing the timing and general shape of the event. Key features such as the rising limb, flood peak, and recession phase are well represented in terms of their relative timing and magnitude. Minor discrepancies are noted, including a very slight underestimation in peak level and a tendency towards underestimation of level falling limb of the hydrograph. These effects are suspected to be due to a range of factors, including the fact that bathymetry at these locations is estimated, the relatively coarse grid size of the hydraulic model acting to locally reduce/increase modelled conveyance, backwater effects from the nearby lake, and potential floodplain and storage losses within the hydraulic model upstream of these locations.

It is considered that the model reliably reproduces the key flood dynamics observed in this calibration event for the Wyong River, particularly in terms of volume and timing, which are of most relevance to the present study.

On Ourimbah Creek, a fair representation of the timing and magnitude of recorded flows at the Ourimbah Creek upstream Weir (211013) is demonstrated. The flood peak is underestimated; however, it is noted that flows derived from this portion of the rating relationship are highly unreliable.

6.3.5 Summary

The hydrologic model generally provided a good match with the recorded information for the calibration and validation events across the Wyong River and Ourimbah Creek catchments which contribute about 80% of the flow into the Tuggerah Lakes system. Levels of accuracy obtained as part of this study are consistent with the results obtained in the Wyong River Catchment Flood Study. The model was therefore considered appropriately calibrated for the definition of input hydrographs for the hydraulic model. **Table 6.7** summarises the key model parameters used for the calibration/validation events.

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Table 6.7 Summary of the model parameters for flood calibration/validation events.

Event	July 2022	June 2007	March 2021
Initial loss (mm)	58	80	58
Impervious initial loss (mm)	0.0	0.0	0.0
Continuing loss (mm/hr)	1.0	1.0	1.0
Lag parameter	1.3	1.3	1.3
Impervious lag parameter	0.1	0.1	0.1
Stream lag factor	1.0	1.0	1.0

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7 Hydraulic analysis

Hydraulic modelling consists of understanding the physical properties of the flood water such as depth and velocity. This can be completed in various ways including:

- One-dimensional (1D) modelling, which consists of representing a creek or river with flood information provided at regular interval cross-sections along a stream as well as pipe systems and drainage networks.
- Two-dimensional (2D) modelling, which consists of representing a floodplain as a grid with flood information provided at each cell of the grid allowing the model to define flowpaths.
- 1D/2D modelling that consists of a combination of the above.

7.1 Model selection

A 1D/2D TUFLOW Heavily Parallelised Compute (HPC) model with Quadtree features was used to simulate flood behaviour across the study area. TUFLOW is a robust and widely accepted unsteady-state flood simulation software with combined 1D and 2D capabilities. The use of a TUFLOW model allows integrated investigation of local overland flow flooding, mainstream creek flooding, foreshore flooding and tidal influences, and the inclusion of storm-water drainage infrastructure.

Furthermore, TUFLOW HPC offers faster run times using parallel processing capabilities, which are advantageous for large-scale or detailed models. The use of a Quadtree mesh also allows for variable grid resolution, concentrating detail in areas of interest (e.g., around structures or channels, etc.) while keeping computational costs low in less critical or topographically variable areas. This feature is especially useful in regions with complex topography or variable land uses, where different levels of detail are needed, as is the case in the Tuggerah Lakes area.

The GIS data layers, and control files utilised to drive the model can be easily modified for use in any future options assessment, including modelling the impact of mitigation measures, or assessment of development applications. MHL flood modelling processes follow guidance provided in ARR 2019.

The dynamically linked 1D/2D model requires a number of GIS data to represent the study area. These include:

- 1D Domain
  - Pits and headwalls GIS layer;
  - Pipe network GIS layer;
  - Culvert GIS layer;
- 2D Domain
  - 2D grid / digital elevation model (DEM);
  - Topographic modifications and break lines (e.g., to incorporate embankments);
  - Materials layer (specifies surface roughness and infiltration);

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- Layered flow constrictions layer for 2D bridges; and
- Initial water level polygons.

The latest version of TUFLOW at the time of the model construction has been used for modelling (TUFLOW 2023-03-AE).

7.2 Model setup

The following considerations were required to set up the TUFLOW model.

7.2.1 Model extent and grid size

To reduce model run time without compromising the quality of model outputs, a grid resolution of 96 m × 96 m was adopted to represent the waterbodies of the Tuggerah Lakes. A finer resolution grid of 6 m × 6 m was used to define the entrance channel, and around structures, the shoreline of the lakes and areas outside of the lake waterbodies. The sub-grid sampling (SGS) capability of the TUFLOW model was also targeted to a size of 1 m (i.e., the resolution of the available DEM). The SGS capability allows for the use of sub-grid-scale elevation data to enhance the hydraulic accuracy of the model by providing an improved representation of flows in and out of each cell and the definition of the volume within each cell, while keeping reasonable run times.

7.2.2 Modelling approach

The following modelling approach was applied to the development of a detailed and reliable 1D/2D TUFLOW hydraulic model for the study area:

- Extent of the study area and 2D hydraulic model was determined based on the available elevation data;
- Boundary conditions consist of rainfall runoff inflows from the previously discussed hydrologic modelling, and the tidal water levels of the Tasman Sea quantified using recorded water levels at Sydney (213470). Further discussion of these elements is made in **Section 7.2.5**;
- Information from previous studies were incorporated using 2D topographic modifications and 1D elements as appropriate;
- Hydraulic roughness: a materials layer was delineated based on consideration of the NSW Environmental Planning Instrument (EPI) - Land Zoning data set, LiDAR point cloud classifications and Council's building footprint, cadastre, zoning and aerial photography data, supplemented with site observations where necessary. Initial material categories and associated depth-varying Manning's roughness coefficients were adopted from similar studies;
- Buildings: a layer of the building footprints was delineated from LiDAR point cloud classifications and Council's building footprint, cadastre, zoning and aerial photography data, and this was applied as a layer with an appropriately higher roughness;
- Undertake thorough model calibration, validation and verification using alternative methods, and quality assurance checks.

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7.2.3 Hydraulic roughness

Hydraulic roughness coefficients (Manning's n) are used to represent the resistance to flow of different surface materials. Hydraulic roughness has a major influence on flow behaviour and is one of the primary parameters in hydraulic model calibration.

Spatial variation in hydraulic roughness was represented in TUFLOW by delineating the catchment into zones of similar hydraulic properties. The hydraulic roughness zones adopted in this study have been delineated based on consideration of the NSW Environmental Planning Instrument (EPI) - Land Zoning data set, LiDAR point cloud classifications and Council's building footprint, cadastre, zoning and aerial photography data, supplemented with site observations where necessary. Factors affecting resistance to flow were of primary importance including surface material, vegetation type and density, and the presence and density of flow obstructions such as buildings, fences and gross pollutant traps (GPTs). Manning's 'n' values assigned to each zone were determined based on land type with reference to standard values recommended by Chow (1959). Land areas with light vegetation were assigned a Manning's value of 0.04, while those areas with thick vegetation assigned a value of 0.1.

A significant portion of the hydraulic model extent consists of lake and other water bodies, whereby vegetation coverage is limited, and water velocities are low, reducing the influence of the Manning's value. In these areas, a relatively smooth value of 0.013 was deemed appropriate. As for the dynamic portion of the entrance, the Manning's value becomes highly influential owing to the higher velocities and shallower depths experienced in this zone. As such, several values for Manning's roughness were trialled for the region downstream of The Entrance bridge to the ocean, which consists of a mix of bare beach sand and rocky outcrops. Roughness values adopted for TUFLOW models of ICOLL entrance zones elsewhere on the NSW coast, for example at Lake Conjola and Burrill Lake, ranged between 0.025-0.030. Various roughness values of this order were trialled, with a value of 0.035 being found to provide the best match to the data across the historical flood events. This slightly elevated value when compared to similar studies can be justified because of the exposure of the rock shelf at the southern end of the beach during flooding events likely yielding a rougher overall surface in this zone.

Figure 7.1 and **Table 7.1** further summarise the detailed Manning's n values used in the hydraulic model.

Table 7.1 Adopted Manning's n hydraulic roughness coefficients

Material	Manning's n
Water (i.e., watercourses, rivers, creeks, lakes, reservoirs, dams, pools)	0.013
Pipes and culverts	0.015
Roadways, railways and pavement	0.025
Bare earth / entrance channel	0.035
Low density vegetation (i.e., cropping, pasture and grassland)	0.040
Medium density vegetation (i.e., shrubs)	0.070

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Material	Manning's n
High density vegetation (i.e., nature conservation, plantation forests, woody cover, incl. shadowed areas due to canopy cover)	0.100
Built-up area	0.100
Building footprint	0.300

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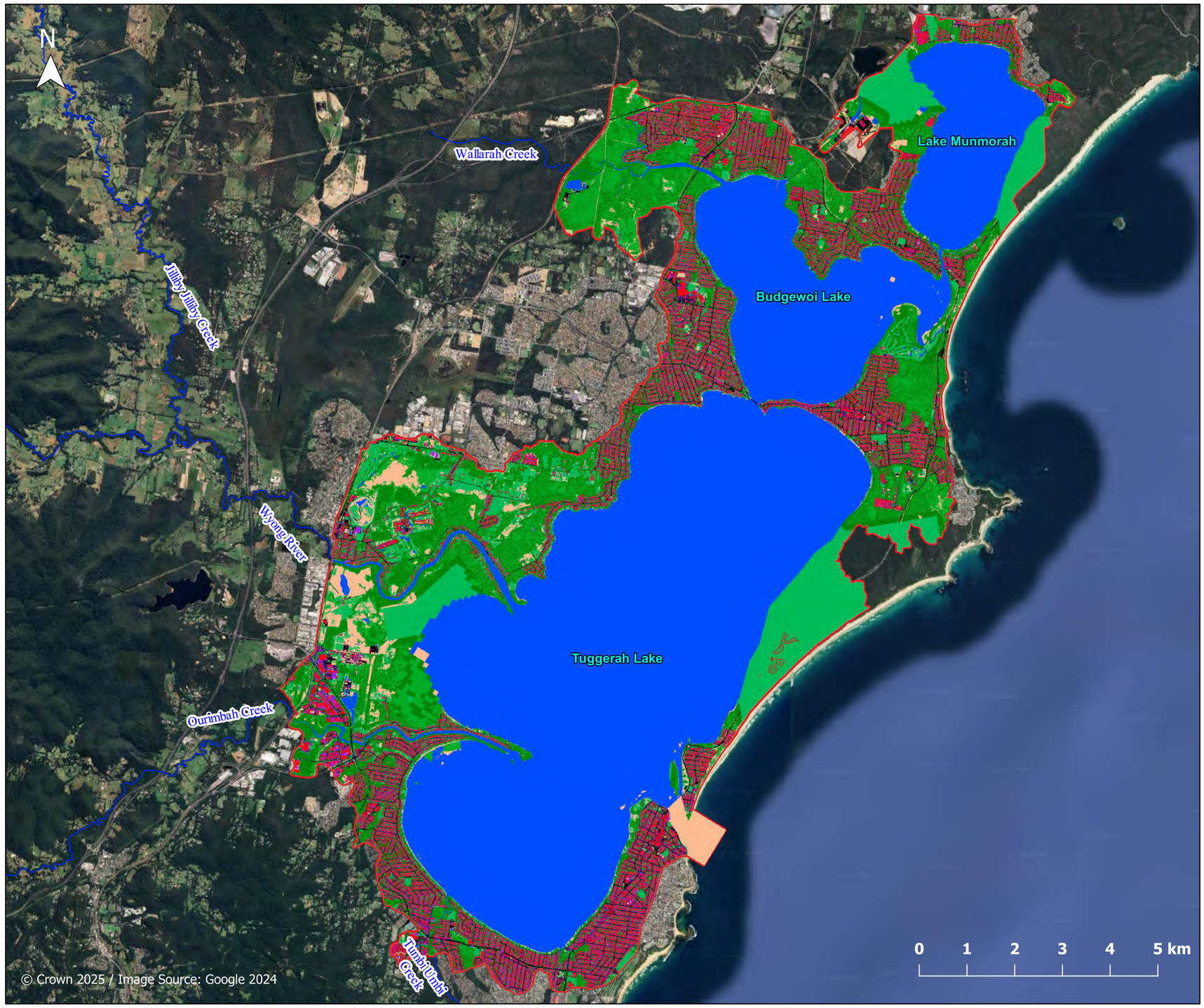

Figure 7.1

TUFLOW model Manning's n

Legend

- Model domain
- Primary tributaries

Material

- Water
- Road/rail/ pavement
- Bare earth / entrance channel
- Low vegetation
- Medium vegetation
- High vegetation
- Built-up area
- Building

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7.2.4 Structures

Most structures were adopted from previous TUFLOW models to ensure consistency with the adjoining overland studies. A total of 53 culverts and pipes were included as 1D elements to maintain flood connectivity and storage, where appropriate. The following structures were modelled as 2D elements within the hydraulic model, as shown in **Figure 7.2**:

- Wyong Road Bridge over Tumbi Umbi Creek
- A footbridge over Tumbi Umbi Creek
- Wyong Road Bridge over Ourimbah Creek
- Pacific Highway Bridge over Wallarah Creek
- Motorway Link Bridge over Spring Creek
- Central Coast Highway over Budgewoi Creek
- Budgewoi Foot Bridge over Budgewoi Creek
- Main Road Bridge
- The Entrance Bridge over the Tuggerah Lake entrance channel

Other structures, such as road embankments and levees, are expected to be adequately represented by the grid of the model or are incorporated through the use of breaklines where required. There are no weirs within the hydraulic model.

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Figure 7.2

TUFLOW model bridges and embankments

Legend

- Model domain
- Primary tributaries
- Bridges
- Levees
- Road embankments

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7.2.5 Boundary conditions

7.2.5.1 Inflow

The inflow hydrographs for each calibration and validation event were produced using the calibrated and validated WBNM model and were integrated into the hydraulic model at relative locations (**Figure 7.3**), downstream of or at an appropriate location within the catchment.

The inflows incorporated into the hydraulic model include:

- Runoff generated by the Wyong River catchment, assigned at the edge of the model extent downstream of the railway bridge at Wyong as a flow-time (QT) boundary.
- Runoff generated by the Ourimbah Creek catchment, assigned at the edge of the model extent upstream of Wyong Road and downstream of the railway bridge as a flow-time (QT) boundary.
- Runoff generated by the Tumbi Umbi Creek catchment, assigned upstream of Wyong Road as a source area (SA) boundary.
- Runoff generated by the Wallarah Creek catchment, assigned downstream of the railway bridge source area (SA) boundary.
- Runoff generated by local catchments within the bounds of the TUFLOW hydraulic model domain were assigned at relative locations source area (SA) boundary. These local catchments included Glenning Valley, Long Jetty, Northern Lakes, Colongra Wetland, the Tuggerah Lakes themselves, and others.

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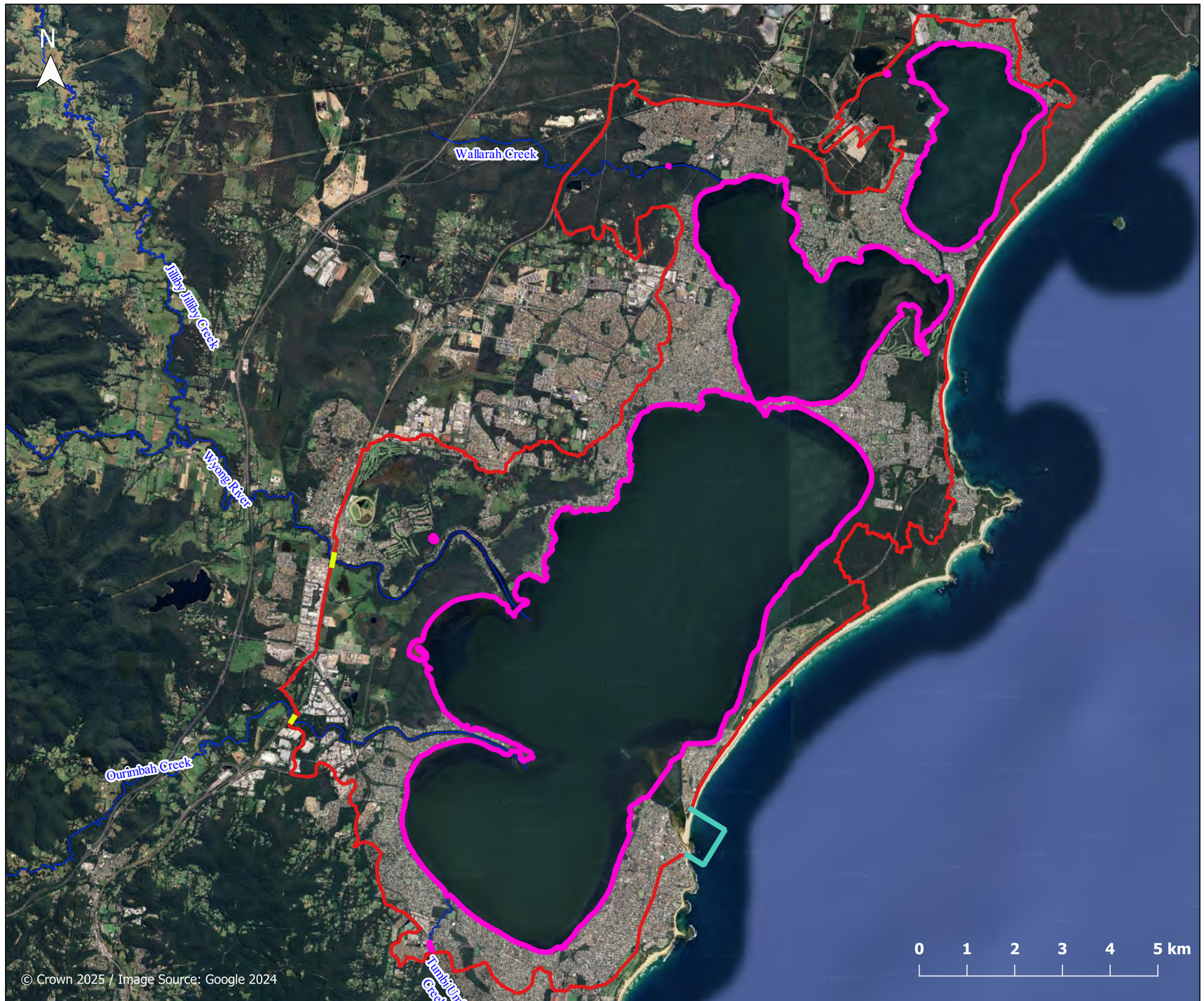

Figure 7.3

TUFLOW model boundary conditions

Legend

- Model domain

Boundary conditions

- HT
- QT
- SA

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7.2.5.2 Outflow

The sole outflow location within the model is defined by the oceanic water levels of the Tasman Sea. The Tasman Sea is represented within the model as a stage-time (HT) boundary offshore and surrounding The Entrance opening, as shown in **Figure 7.3**. This boundary is positioned an appropriate distance offshore within the model to enhance the stability of the boundary condition. The data interrogated and ultimately adopted to define the behaviour of this boundary condition are described in the following sections.

Patonga

Data from the ocean tide gauge nearest to The Entrance approximately 30 km to the south at Patonga (212440) was assessed for its suitability for use as the downstream boundary condition baseline. However, this gauge is known to be subject to high tidal anomaly associated with the riverine flooding of the Hawkesbury River. This location has also been known to see the effects of seiche during certain wave conditions because of the geometry of Broken Bay.

The observed and predicted ocean level at Patonga, and the associated tidal anomalies during the two calibration and the validation events are presented in **Figure 7.4**, **Figure 7.5**, and **Figure 7.6**, respectively.

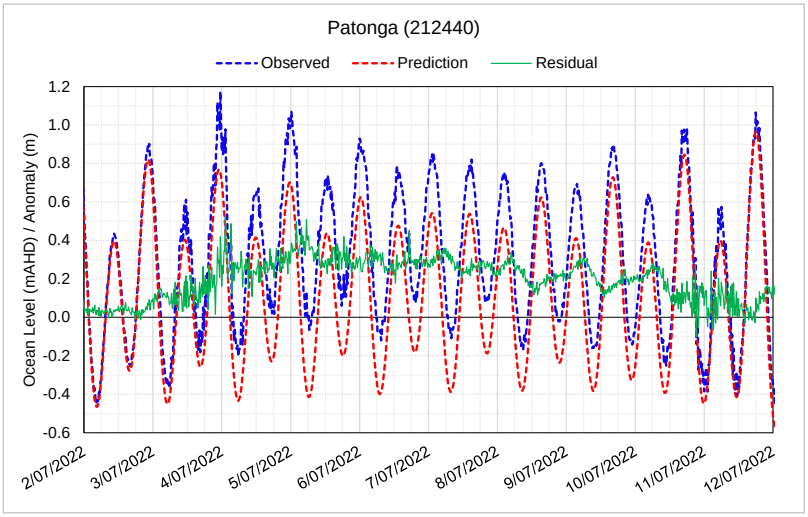

Figure 7.4 July 2022 calibration event – observed water level and anomaly at Patonga

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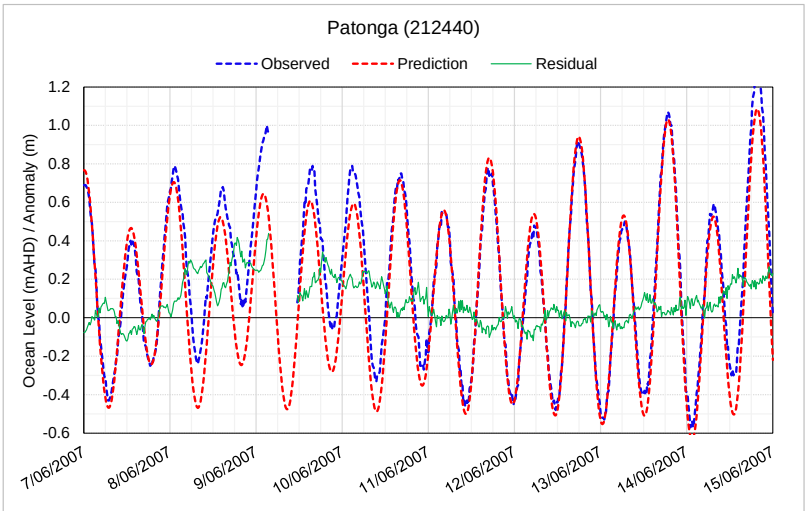

Figure 7.5 June 2007 calibration event – observed water level and anomaly at Patonga

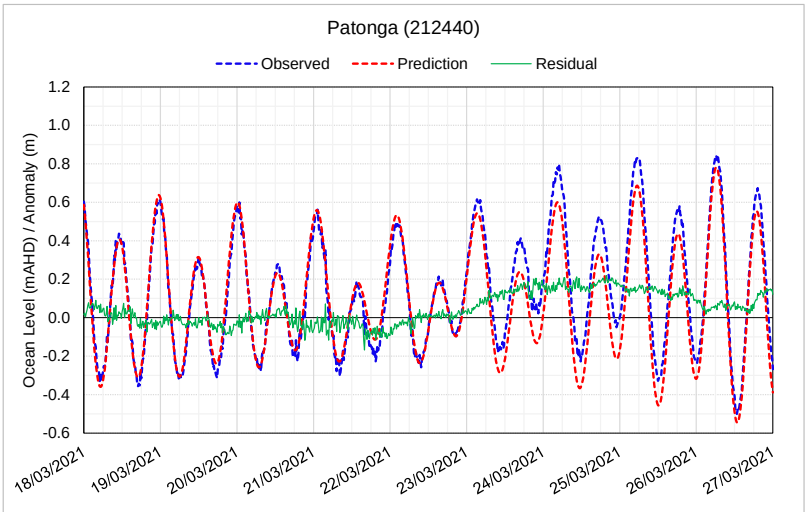

Figure 7.6 March 2021 validation event – observed water level and anomaly at Patonga

The tidal anomaly, being the difference between the predicted and the observed tidal levels, ranged between approximately 0.0 and +0.5 m during the July 2022 calibration event, with the largest anomaly observed on 5 July. Similarly for the June 2007 calibration event, anomalies ranged between approximately -0.1 and +0.5 m, with the largest anomaly observed on 9 June, immediately prior to a period of data loss lasting about eight hours. These anomalies are high and are considered to stem from a combination of complex factors, including widespread barometric forcing, as well as more localised effects such as high runoff from the Hawkesbury system and possible seiche in Broken Bay. Contrastingly, anomalies observed during the March 2021 validation event are near zero until 23 March, when a consistent anomaly of approximately +0.2 m emerges. This anomaly is likely driven by high volumes of runoff from the Hawkesbury system, and less so as a result of barometric forcing.

It was determined that the measured tidal anomalies at Patonga for each event were either

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generally unacceptably high or unrepresentative of the anomalies likely to be present near The Entrance during the respective calibration and validation events. Furthermore, data at Patonga during a portion of the June 2007 calibration event was not available.

Consequently, recorded ocean levels at Sydney (213470) were instead assessed for their suitability for use as the baseline downstream boundary condition.

Sydney

Figure 7.7, **Figure 7.8**, and **Figure 7.9** depict the observed and predicted ocean level at Sydney, as well as the associated tidal anomaly, during each of the two calibration and the validation events.

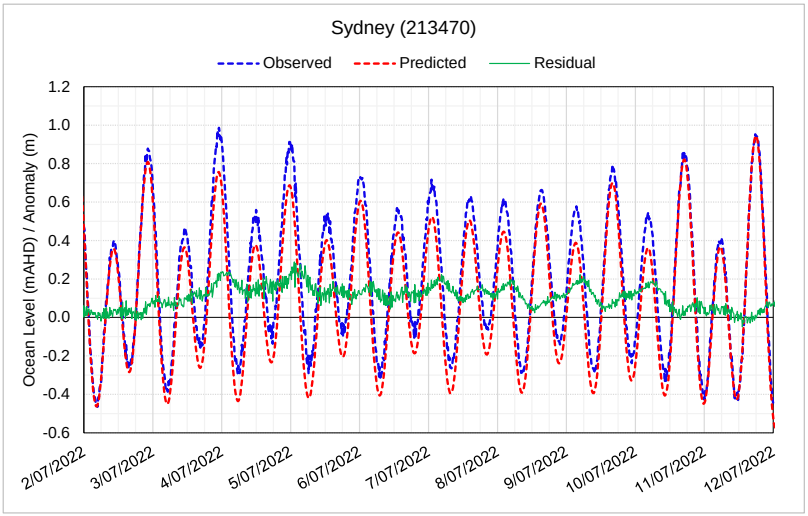

Figure 7.7 July 2022 calibration event – observed water level and anomaly at Sydney

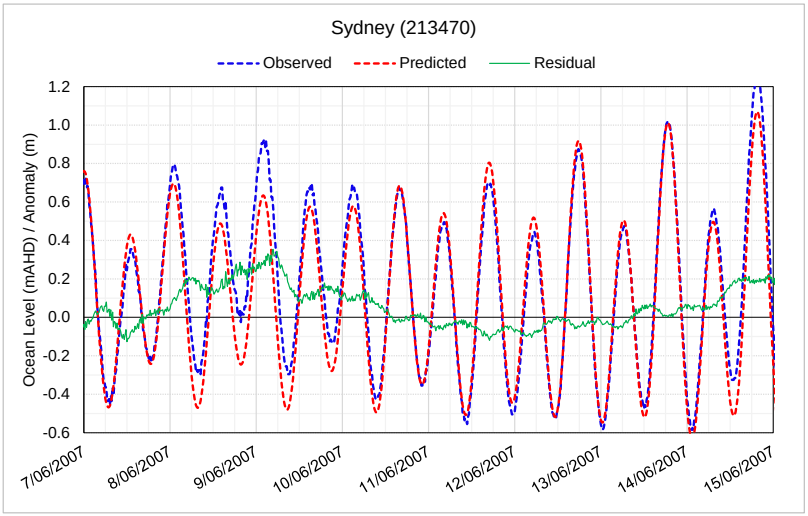

Figure 7.8 June 2007 calibration event – observed water level and anomaly at Sydney

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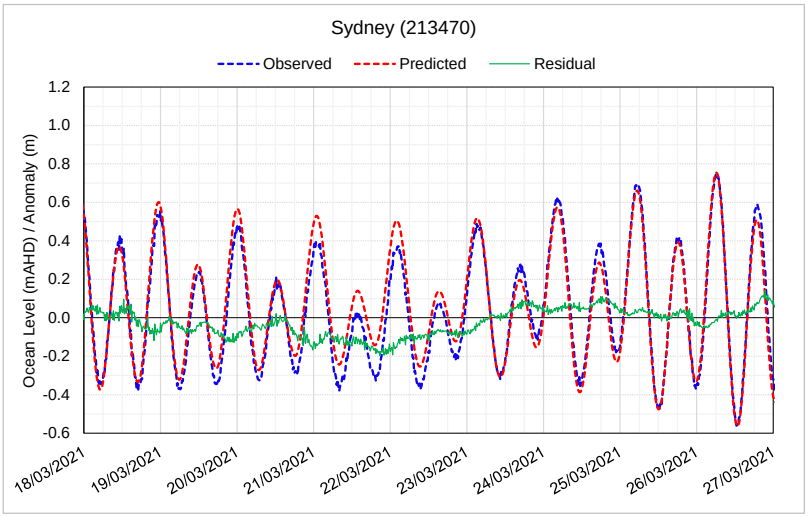

Figure 7.9 March 2021 validation event – observed water level and anomaly at Sydney

The tidal anomaly ranged between approximately 0.0 m and +0.3 m during the July 2022 calibration event, with the largest anomaly observed on 5 July. Similarly for the June 2007 calibration event, anomalies ranged between approximately -0.1 m and +0.3 m, with the largest anomaly observed on 9 June. These anomalies are likely driven by widespread barometric forcing associated with the strong low-pressure systems driving these events. Contrastingly, anomalies observed during the March 2021 validation event lie within an approximate range between -0.2 mAHD and +0.1 mAHD.

It was determined that these anomalies were likely to be more representative of tidal anomalies near The Entrance during the respective calibration and validation events, being primarily driven by widespread barometric effects.

Inspection of these data also reveals variations in tidal behaviour across the selected calibration and validation events. For instance, during the calibration event in July 2022, high tidal levels ranged from 0.5 mAHD to 0.9 mAHD. For the June 2007 event, the high end of this range was similarly around 0.9 mAHD, but had more diurnal variation, with the smaller daily high tide reaching around 0.3-0.4 mAHD.

Wave setup

Wave conditions can have an influence on the dynamics of the berm and channel scour, as well as on lake levels through wave setup. Wave setup comprises the increase in mean water level due to the presence of breaking waves. When a wave breaks, significant energy dissipation occurs. As such, and in order to conserve momentum, the still water level increases in the shoreward direction. Prevailing oceanic wave parameters, such as wave height, period and spectral character, as well as the bathymetry and shape of a coastline, can influence the degree to which wave setup is able to emerge.

The Tuggerah Lakes Flood Study (Lawson & Treloar, 1994) noted that the wave setup effect *"[at] river and lagoon entrances… becomes more complicated because waves often have not broken completely by the time they propagate to the entrance*" and that "*the waves themselves are affected by flood flows against the direction of wave propagation*". As a result of the large

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volume of storage in the Tuggerah Lakes and since a significant volume of water would need to flow into the lake system in order to develop the full wave setup level, the 1994 study concluded that "*wave setup impacts will be relatively small at The Entrance under normal opening conditions*". Furthermore, sensitivity testing undertaken as part of the model calibration process indicated that the imposition of a wave setup effect on the tailwater condition negatively impacted modelled results, even in the pre-flood condition. As such, wave setup effects were not considered as part of the model calibration process. This is likely due to the wide-open final entrance configurations seen for each of the historical events and the reasoning outlined in the 1994 study, being that for a wide-open entrance elevated outflows and channel deepening reduce the breaking of waves in the vicinity of the entrance, which in turn minimises wave setup. Despite their exclusion from consideration at this stage, wave setup effects will nevertheless be considered in subsequent sections in terms of sensitivity and design scenarios to account for the uncertainties of the entrance configuration and nearshore wave dynamics in synthetic events.

Wave conditions

Observed offshore wave conditions for each calibration event are documented below, for completeness.

Deepwater wave conditions along the NSW coastline are continuously recorded by a network of seven Waverider buoys managed by MHL. Within this network, the buoys located nearest to The Entrance are located at Sydney, approximately 50 km to the south and Crowdy Head, approximately 200 km to the north. Significant wave heights (mean wave height of the highest third of waves measured) recorded at both locations are presented during the two calibration and the validation periods in **Figure 7.10**, **Figure 7.11** and **Figure 7.12**, respectively.

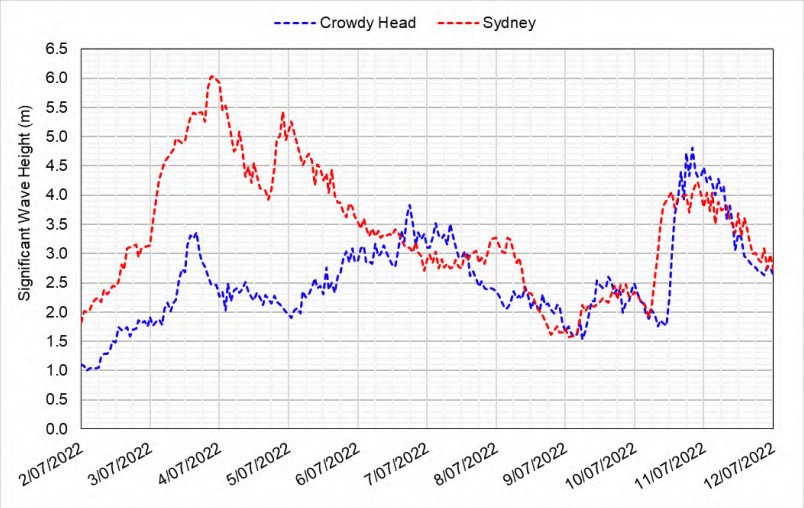

Figure 7.10 July 2022 calibration event – observed significant wave height

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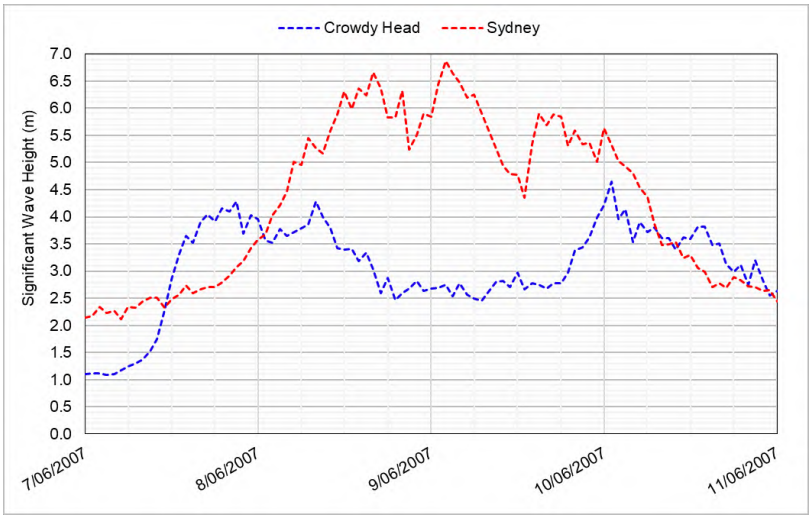

Figure 7.11 June 2007 calibration event – observed significant wave height

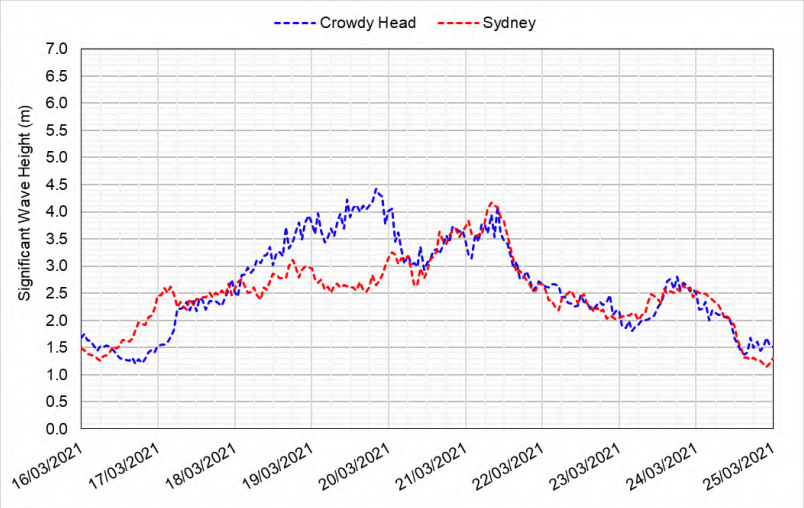

Figure 7.12 March 2021 calibration event – observed significant wave height

Summary statistics of the significant wave height, peak wave periods and wave directions were also produced from these data and are presented in **Table 7.2**.

Table 7.2 Calibration and validation events recorded peak ocean wave conditions at Sydney

Event	Time of Peak	H_S (m)	Period (s)	Direction (°)
July 2022	3/7/2022 21:00	6.02	11.5	120 (SE)
June 2007	9/6/2007 2:00	6.87	10.8	135 (SE)
March 2021	21/3/2021 8:00	4.18	10.8	85 (E)

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The following observations were noted:

- Sydney is the buoy closest to The Entrance and is expected to be the most representative of the local conditions at the entrance,
- Conditions at Crowdy Head were more moderate during the majority of all three events, indicating conditions at The Entrance would likely be more moderate than those recorded at Sydney,
- The July 2022 and June 2007 events saw large, powerful seas of a similar scale and character predominantly from a south-easterly direction at both Crowdy Head and Sydney during the time in which the entrance was scouring,
- The March 2021 event saw smaller seas, more predominantly from the east.

7.2.6 Entrance configuration and behaviour

The Tuggerah Lakes system is connected to the ocean via a single tidal channel through the barrier dune at the southern end of North Entrance Beach, called The Entrance. The condition of The Entrance, where flows exchange to and from the ocean, is highly dynamic and subject to cyclical sediment infilling and scour processes. The lakes system is classified as an Intermittently Closed and Open Lake and Lagoon (ICOLL). As such, the entrance configuration preceding and during flooding events can have an effect on lake flood levels.

Historically, evidence shows that the estuary entrance typically develops near the southern end of North Entrance Beach, partially in response to an underlying bedrock formation and broader sediment transport processes. During more severe flood events, and depending on the berm elevation, flows have been observed to break over the sand barrier to the north of the typical channel. Inspection of historical imagery also indicates that the entrance comprises a dynamic braided shoal system which extends upstream to the vicinity of The Entrance Bridge, approximately 500 m from the ocean.

As a result of the identified influence of the entrance configuration preceding and during lake flooding events, a broad variety of information sources were used to characterise the behaviour of the entrance during the calibration and validation events. This characterisation of entrance behaviour included locating and sizing the entrance outlet and channel throughout the event in terms of width, shape and depth, as well as quantifying the timing and rate of scouring throughout the events.

The sections below detail the key pieces of information utilised.

7.2.6.1 Theory and previous experience

The behaviour of The Entrance has been developed considering:

- Previous modelling studies at the entrance (e.g., Lawson & Treloar,1994; Cardno, 2013; 2015)
- Council's experience and knowledge of entrance scour, and
- Insight from the scour behaviour at other NSW ICOLL entrances (e.g., Gordon, 1990; AWACS, 1994). Entrance scour behaviour was considered in the context of other neighbouring lagoons (e.g., Wamberal, Terrigal, Cockrone and Avoca), though a number of key differences exist in comparison, including longer critical durations in the

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order of 20 h (Lawson & Treloar, 1994), a larger catchment size, a long entrance with extensive shoaling and prolonged flood discharges.

Theoretically, Gordon (1990) discusses the fact that a typical coastal lagoon entrance opens in three stages. These three stages are illustrated in **Figure 7.13** and include:

- Stage 1 – Initiation channel stage: this stage represents the original breakout stage during which berm overtopping commences as thin sheet of water. The scour is low, and a pilot channel slowly develops. At the end of this stage, depths of 0.20-0.25 m are typically observed.
- Stage 2 – Weir/hydraulic jump stage: this stage develops rapidly, and flows become supercritical on the crest of the berm and accelerate generating significant scour and widening of the berm.
- Stage 3 – River flow stage: this stage occurs once the berm has been scoured sufficiently wide to reduce flows and allow supercritical flows to stop. Scour then reduces rate and entrance stabilises.

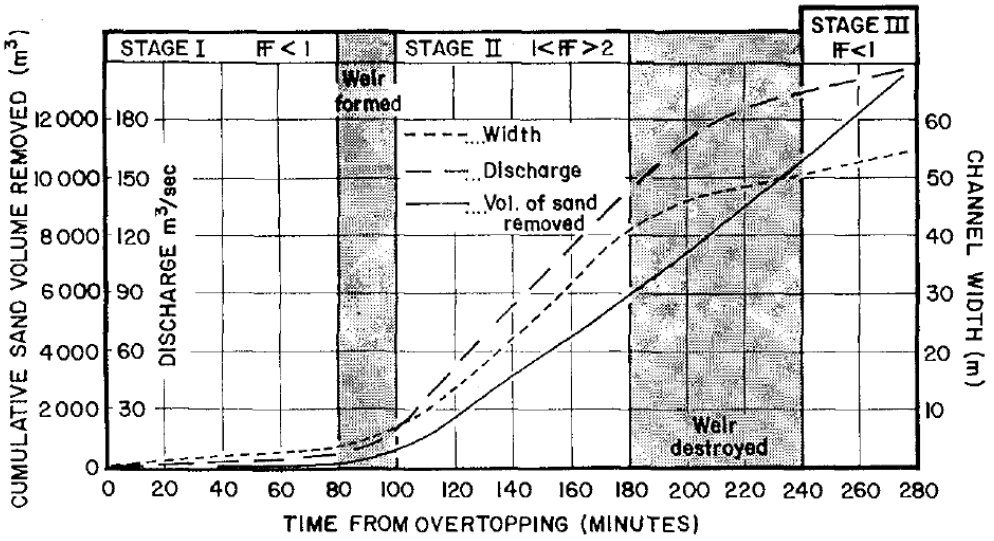

Figure 7.13 Three stages of breakout (Gordon, 1990)

In the case of The Entrance, its configuration rarely allows for a complete progression through these stages as it is rarely fully closed. Furthermore, it is unlikely that the supercritical flow element of the second stage occurs in this entrance, due to the difference in water level between the Tuggerah Lakes system and the ocean not being large enough and the length of the entrance channel (Lawson & Treloar, 1994). An implication of this is that ocean conditions are likely to have some impact on lake flood levels, even during flood events (Lawson & Treloar, 1994).

7.2.6.2 Water levels

The ocean level can have a significant impact on the configuration and amount of scour at the entrance channel. Water level data is available from a network of gauges along the NSW coast, and in the Tuggerah Lakes catchment, with the gauge closest to the entrance itself being

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located at Tuggerah Lakes Entrance at The Entrance Bridge (ERTS561001). A full discussion on the estimation of ocean water levels at this location is provided in **Section 7.2.5.2**.

7.2.6.3 Berm elevation

Entrance berm levels have been recorded sporadically from the 1940s, and are publicly available as part of the NSW Beach Profile Database (developed by the UNSW Water Research Laboratory on behalf of the NSW Department of Climate Change, Energy, the Environment and Water - www.nswbpd.wrl.unsw.edu.au). These berm elevation data are based on direct survey, photogrammetry and LiDAR measurements of the entrance region. The available beach profile locations at the entrance are shown in **Figure 7.14**.

Figure 7.14 Beach profile locations of berm entrance

These beach profiles were able to be interpolated into 2D elevation grids, which were able to be incorporated into the hydraulic model, where deemed appropriate. These data also provided an insight to the berm characteristics over time, as detailed further in Tuggerah Lakes Entrance Management Study (MHL, 2022). A summary of the relevant pre- and post-event berm elevation surveys available from this source are summarised in **Table 7.3**.

Table 7.3 Relevant berm surveys for calibration and validation events

	June 2007	March 2021	July 2022
Pre-event	N/A	N/A	4 April 2022
Post-event	N/A	13 April 2021	28 September 2022

7.2.6.4 Entrance bathymetry

A comprehensive bathymetric survey of the entire entrance, between the lake body and the ocean, was completed in September 2011 and provided by Central Coast Council.

Inspection of NearMap imagery captured in in August 2011 revealed that the entrance was in a very typical configuration prior to many large events, with a moderately constricted opening to the ocean positioned at the southern end of the beach and developed shoals upstream of this. This imagery also showed that the large rock shelf defining the southern edge of the entrance alignment at the time was likely exposed at the time of the survey, and it was therefore noted that levels observed in this area should not be lowered throughout any scouring process. As a result of these factors, the 2011 entrance survey formed the bulk of the underlying bathymetry as a base on which more event-specific features were added. A range of entrance

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surveys were also collected in the period 2018 - 2021 by Central Coast Council of the entrance channel and marina. These survey data were interrogated with respect to their time of collection and the corresponding configuration status of the entrance at that time. This informed a general understanding of the entrance channel, berm and shoal development and evolution throughout the dynamic and cyclical processes of scouring and rebuilding prior to, during and after the flood events captured within these data. The surveys with direct relevance to the simulated historical events are tabulated in **Table 7.4**.

Table 7.4 Relevant entrance surveys for calibration and validation events

	June 2007	March 2021	July 2022
Pre-event	Nil	N/A	March 2022
Post-event	Nil	May 2021	July 2022

From these data, the post-event entrance survey of July 2022 offered the greatest insight into the typical scoured configuration of the entrance. This data was particularly useful with respect to detailing the shoals further back from the entrance throat itself, which become more influential after the initial berm scour has occurred during the peak and falling limb flood phase as the cross-sectional area where the shoals are located becomes more constrictive than the cross-sectional area at the scoured entrance berm.

The representative pre- and post-scour entrance surveys were captured in September 2011 and July 2022 respectively. The following general observations were made from these surveys:

Pre-event (September 2011), (Figure 7.15)

- The entrance opening is typically in the south, with a berm level of up to 3.0 mAHD stretching across the entrance compartment and possible lower berm extensions in the extreme south as the entrance becomes more constrained
- Exposed bedrock at the time of the survey lies along the southern shore of the opening, sitting at levels ranging between -0.0 and -1.0 mAHD
- A remnant channel of varying depth may exist, with chains of pools with a level down to around -1.0 mAHD, interspersed by raised areas up to -0.5 mAHD
- A broad area of shoals between the opening and The Entrance Bridge typically forms an undulating and relatively elevated platform, ranging in level between -0.5 mAHD and 0.3 mAHD

Post-event (July 2022) (Figure 7.16)

- The entrance opening was not able to be surveyed due to swash, however it can be inferred that, the exposed bedrock on the southern side of the entrance does not scour beyond the levels mentioned above (-0.0 mAHD to -1.0 mAHD)
- The bed level to the north of the bedrock is in sand and can scour to -2.0 mAHD and beyond. This deeper channel can extend from the ocean upstream through the dynamic shoal zone until joining the more stable channels near The Entrance Bridge.
- There appears to be more stable shoals against the western shore of The Entrance with a smooth transition to the deeper channel.

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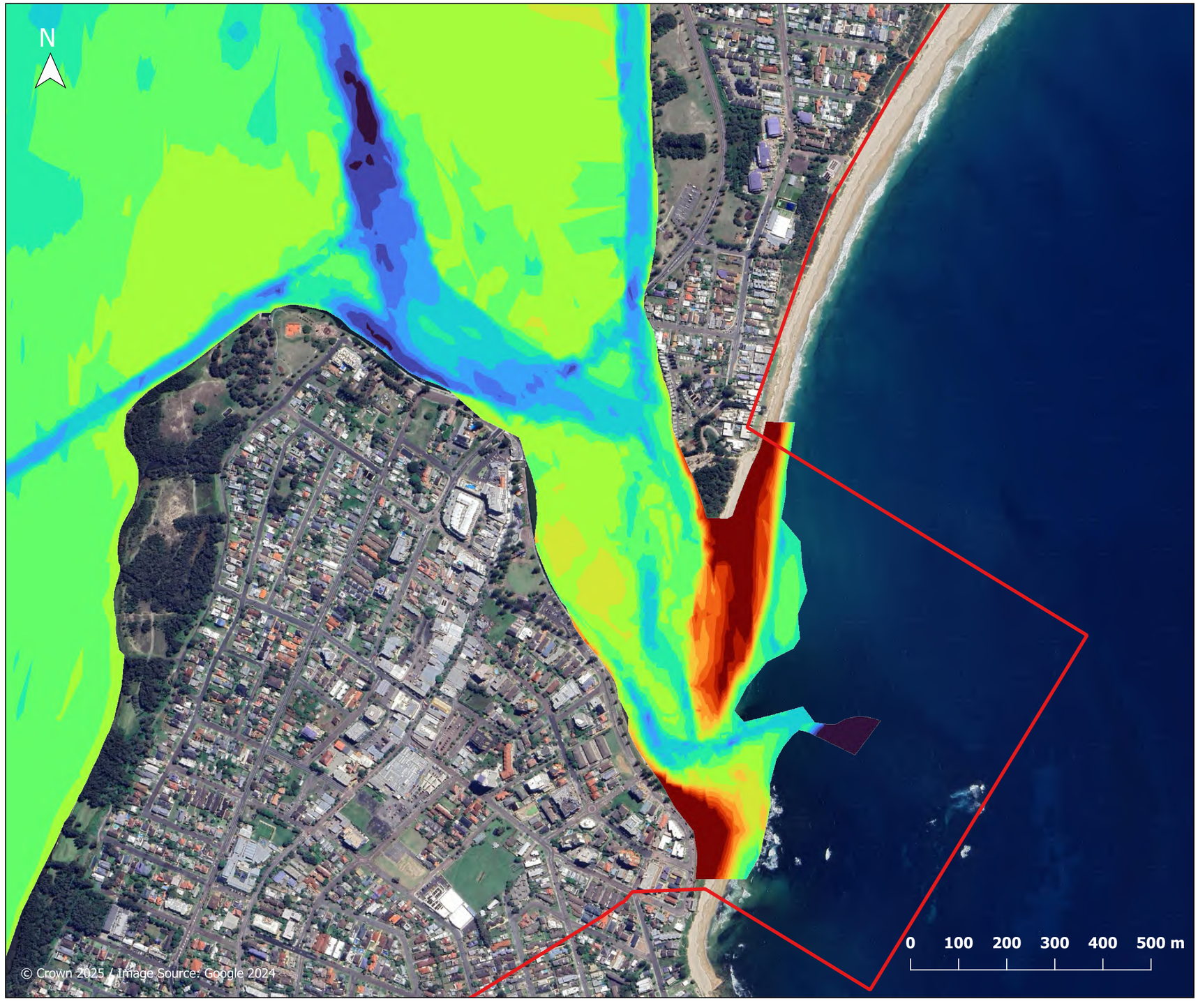

Figure 7.15

Representative base bathymetry - pre-scour (September 2011)

Legend

Model boundary

2011 bathymetry (m AHD)

- <= -2.60
- -2.60 - -2.20
- -2.20 - -1.80
- -1.80 - -1.40
- -1.40 - -1.00
- -1.00 - -0.60
- -0.60 - -0.20
- -0.20 - 0.20
- 0.20 - 0.60
- 0.60 - 1.00
- 1.00 - 1.40
- 1.40 - 1.80
- 1.80 - 2.20
- 2.20 - 2.60
- > 2.60

Report MHL2929

Tuggerah Lakes Flood Study Review

NSW GOVERNMENT Manly Hydraulics Laboratory

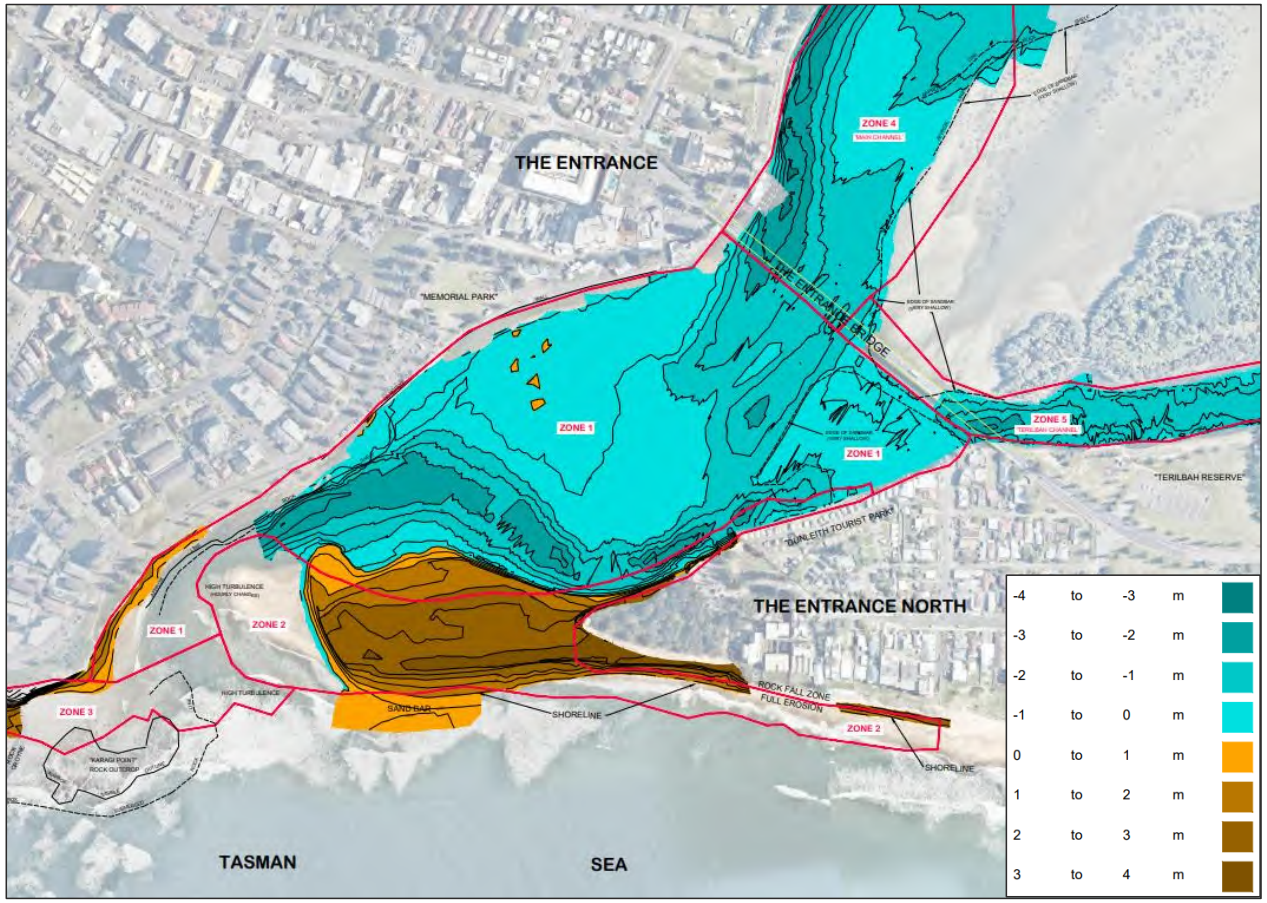

Figure 7.16 Representative base bathymetry - post-scour (July 2022) (TSS, 2022)

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7.2.6.5 Satellite imagery

Satellite images were used to estimate the pre- and post-event entrance channel configuration and scour rates, where available. Relevant satellite imagery was also collected on dates as close as possible to the collection date of the bathymetric and berm surveys discussed above. For these purposes, images were collated from all publicly available sources, including Nearmap, GoogleEarth, Landsat, Sentinel, and PlanetLab.

A summary of key satellite images captured prior to, during and after the selected historical flooding events is presented in **Table 7.5**.

For the recent events in July 2022 and March 2021, it was found that PlanetLab images offered the best coverage during events. As the exact time of capture of these images was known, an estimation of the width of the channel was able to be made by cross-referencing the observed water levels at the Tuggerah Lakes Entrance and Patonga gauges. Using this approach, these images were used to supplement the derivation of the indicative pre- and post-event entrance configurations.

For the June 2007 event, a high-resolution GoogleEarth image from January 2007 was available. This image showed a similar berm, channel and shoal configuration to that observed ahead of the July 2022 event, and as such justified a similar setup and scour approach to this event. Landsat5 images were available nearer the occurrence of the event. However, their lower resolution prevented their use in determining the precise scour characteristics during the event, other than to reinforce the occurrence of a similar mechanism as was seen in July 2022.

For the March 2021 event, it can be observed that the entrance opening behaviour was significantly different from the July 2022 and the June 2007 events, with the entrance opening at the centre of the berm rather than the southern side and significant changes in berm shape occur.

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Table 7.5 Satellite imagery showing the configuration of the entrance channel

Before	During	After
July 2022 calibration event, peak Tuggerah Lake at Long Jetty level occurred at 9:30pm 6 July 2022 AEST		
Captured: 9:21am 27 June 2022 AEST Source: Planet Channel width: 60 m (at 0.29 mAHD) 	Captured: 9:52am 8 July 2022 AEST Source: Planet Channel width: 130 m (at 1.38 mAHD) 	Captured: 9:36am 13 July 2021 AEST Source: Planet Channel width: 120 m (at 0.51 mAHD)

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Before	During	After
June 2007 calibration event, peak Tuggerah Lake at Long Jetty level occurred at 4:15am 10 June 2007 AEST		
Captured: 9:38am 13 May 2007 AEST Source: Landsat5	Captured: 9:34am 22 June 2007 AEST Source: Landsat7	Captured: 9:37am 30 June 2007 AEST Source: Landsat5

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Before	During	After
March 2021 validation event, peak Tuggerah Lake at Long Jetty level occurred at 4:45am 22 March 2021 AEST		
Captured: 10:11am 13 March 2021 AEST Source: Planet Channel width: 70 m (at 0.37 mAHD) 	No available imagery	Captured: 9:10am 25 March 2021 AEST Source: Planet Channel width: 200 m (at 0.50 mAHD)

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7.2.6.6 Entrance photography

A series of oblique photographs of the entrance channel were collected by WRL from an elevated position on the southern side of the entrance. While it was deemed unrealistic to accurately estimate the width of the channel using this photography, these data were predominately utilised to develop an understanding of the configuration of the entrance channel during the more recent historic flood events that occurred during the time of operation of the camera, particularly in respect to timing. **Table 7.6** exhibits a selection of photographs of key phases of the respective scour processes, including the time of image capture as indicated by the red vertical line, and water levels as recorded at Tuggerah Lakes Entrance in orange, and Sydney in blue. It is noted that these photographs are typically captured at 30-minute intervals during daylight hours, however sometimes this capture frequency is not achieved due to outages, which have been noted where relevant.

Additional images of the July 2022 event were also provided by Council which assisted in the determination of appropriate scour trigger times and rates for that event. One such image is presented below in **Figure 7.17**. This image also reaffirmed that despite the heavy sea conditions, breaking waves were not observed at the channel of the entrance itself, as discussed in **Section 7.2.5.2**.

Figure 7.17 Photograph looking north across The Entrance, taken on the afternoon of 7 July 2022, courtesy of Central Coast Council

No continuous entrance imagery was able to be sourced for the June 2007 calibration event. An aerial photograph was sourced from the existing Tuggerah Floodplain Risk Management Study (2014) and is presented in **Figure 7.18**. The image shows The Entrance in a typical configuration at the southern end of the beach.

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Figure 7.18 Aerial photograph of The Entrance during the June 2007 calibration event – looking west (Tuggerah Floodplain Risk Management Study, 2014)

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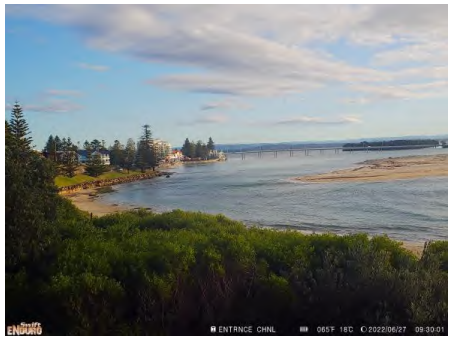
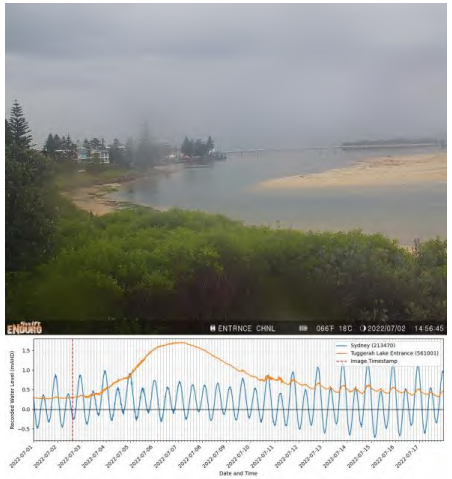
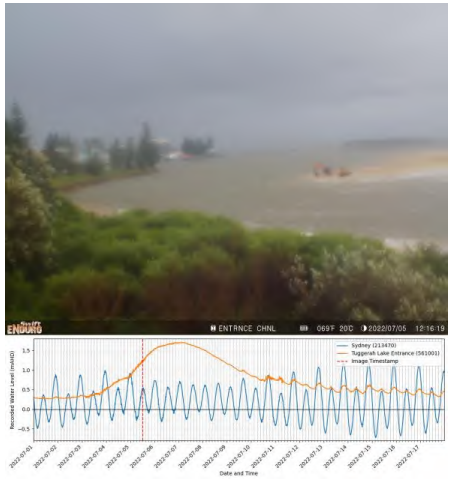
Table 7.6 WRL photographs showing the configuration and scour of the entrance channel

July 2022 calibration event		
27 June 2022 9:30 am Coincident with final pre-event satellite image	2 July 2022 2:57pm Rain event commences	5 July 2022 12:16pm Council commences berm scraping
		

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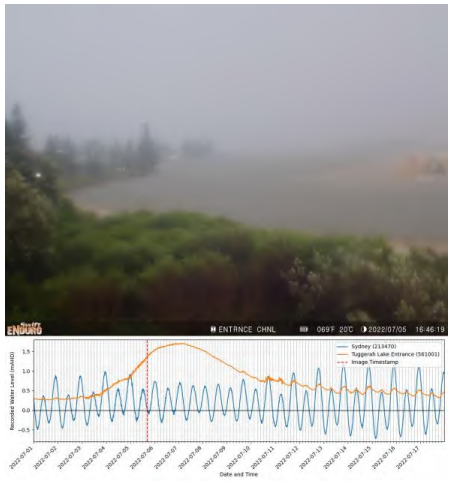
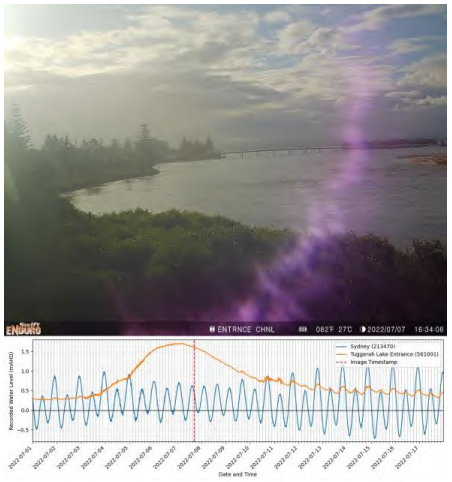
5 July 2022 4:46pm Council berm scraping ongoing at sunset	7 July 2022 12:34pm Next available image, post-peak	7 July 2022 12:34pm Final available image
		

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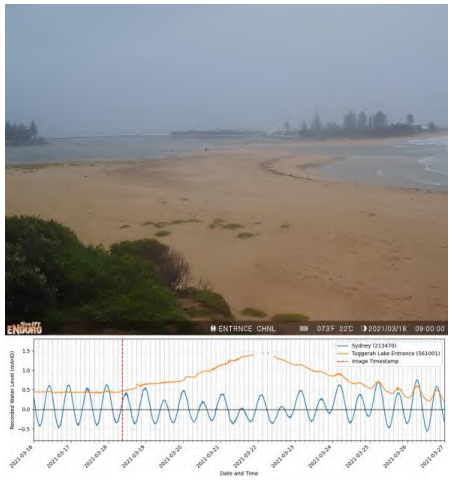
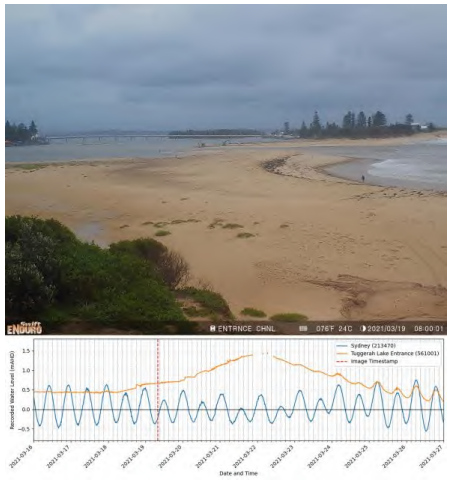
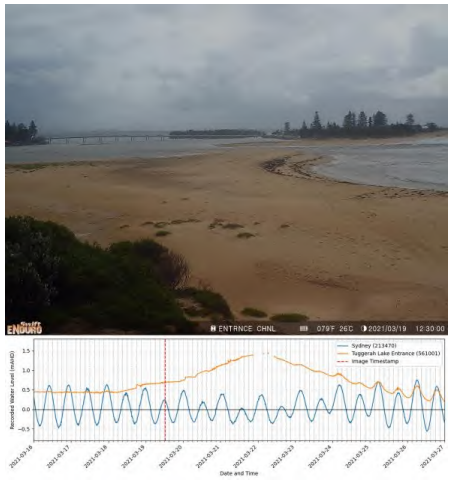
March 2021 calibration event		
18 March 2021 9:00am Rainfall event commences	19 March 2021 8:00am Council commences initial berm scraping	19 March 2021 12:30pm Initial Council berm scraping concludes
		

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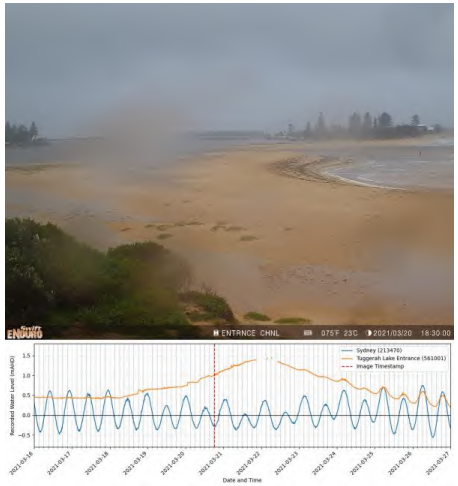
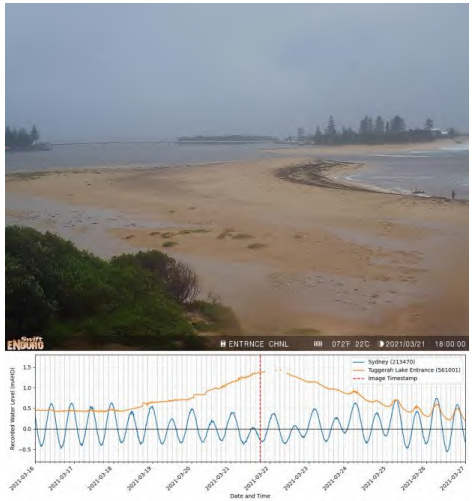
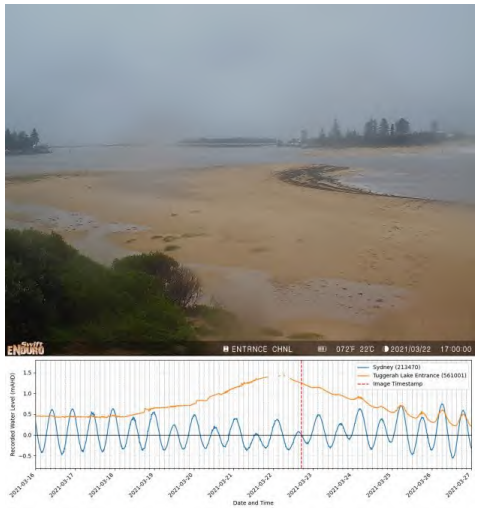
20 March 2021 6:30pm Final picture before visual evidence erosion of northern berm overnight, ongoing erosion of southern berm suspected 	21 March 2021 6:00pm Northern berm continues to slowly erode 	22 March 2022 5:00pm Northern berm undergoes faster erosion through peak 

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7.2.6.7 Central Coast Council Manly Hydraulics Laboratory Flood Intelligence Tool (CCC MHLFIT)

The CCC MHLFIT was developed by MHL and is used by Council to monitor the conditions of Tuggerah Lakes and other coastal lagoons, guiding Council intervention, when necessary, with the aim of mitigating the risk of flooding. The MHLFIT tool, which was developed as part of the Tuggerah Lakes Entrance Management Study, comprises a simplified representation of the Tuggerah catchment hydrology and lake inflows using a WBNM hydrologic model combined with a one-dimensional hydraulic representation of entrance flows to provide real-time forecasting of lake levels under a range of likely and hypothetical scenarios. Data and assumptions from these models were utilised in the development of the representative entrance configuration for the historical event replication as part of this study.

Furthermore, as part of the ongoing operation of this tool, the width of the entrance can be updated by Council officers. This estimate is typically derived through estimation using recently captured satellite imagery or visual observations. **Table 7.7** lists these estimated widths as recorded in the MHLFIT system during the calibration and validation events. It is noted that these estimates are intended to be of the channel width at 0 mAHD but are often made when water levels are above this, meaning these estimates are inherently approximate.

Table 7.7 Tuggerah entrance channel width estimated by MHLFIT during historic floods

Event	Time	Estimated entrance channel width at 0 mAHD (m)	Recorded lake level (mAHD)
June 2007	2007-06-05	40	~0.24
March 2021	2021-03-16	70	~0.45
June 2022	2022-06-26	50	~0.28
	2022-07-06 15:30	60	1.66
	2022-07-07 16:30	70	1.60
	2022-09-09 09:00	60	0.23

7.2.6.8 Water balance analysis

A simplified model was also developed to obtain an estimate of the water balance in the Tuggerah Lakes system. Hypsometric curves developed using the available bathymetric elevation data were defined to determine the volume of water in the lake for various water levels.

An example is provided for the July 2022 event in **Figure 7.19**. A 2-hour average lake level timeseries was created to remove the noise in water level generated by wind and small waves and is illustrated as a blue line. This timeseries was assessed to determine the difference in level between each timestep and hence, the difference in volume in the lake between each timestep. This lake volume change over time was converted into a flow and is illustrated as a green line. The total inflow into the lake obtained from the hydrologic modelling completed as part of the present study is illustrated as a red line, while the ocean water level is represented as a yellow dashed line. When assessing the change in volume in the lake, the following can

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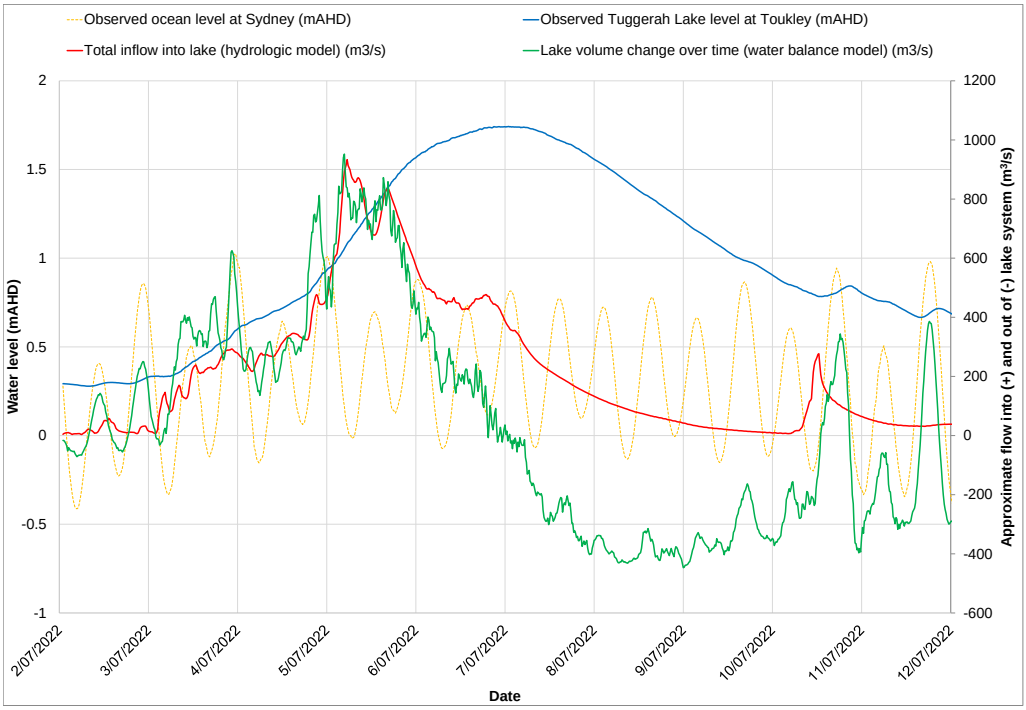
be noted:

- The comparison of the total inflow from the hydrologic model with the estimated lake volume change over time highlights a strong correlation in shape which provides additional confidence in the results from the hydrologic model.
- The total inflow and the lake volume change over time commence to diverge when the lake reach a level of approximately 1.3-1.4 mAHD. It is expected that the scour would have commenced a little earlier (e.g., when the lake reaches 1.2-1.3 mAHD) but only becomes large enough to impact the levels from that time.
- The difference between the total inflow and the lake volume change over time on 6-10 July represents the estimated outflow generated by the entrance scour and when the hydrologic model inflow stops on 8 July 2022, the change in volume appears to stabilise around approximately -350 to -400 m^3/s. This is the expected outflow at the lake entrance when no inflow occurs.

Despite its simplified nature, this approach provided an estimate of the expected outflow through the entrance following the peak of the flood as well as additional confidence in the outputs of the hydrologic model during the rising limb of the event when significant scour is yet to occur.



Note: all values displayed are 2-hour averages

Figure 7.19 July 2022 calibration event – Tuggerah Lakes system water balance analysis

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7.2.6.9 Conceptual entrance scour

Based on the analysis of the various information datasets described above, a conceptual model of the entrance has been developed and is presented in **Table 7.8**. The conceptual entrance model is largely based on a mix of data, but predominantly reflects the entrance behaviour of the July 2022 event. This event was chosen due to the relatively large availability of relevant data, its typical configuration and the large size of the flood event.

The starting configuration of the entrance is shown as the first entry in **Table 7.8**. This configuration is based upon the September 2011 bathymetric survey, overlaid with the April 2022 berm photogrammetry survey. These data were then supplemented with timestamped satellite and oblique imagery to closely reproduce the observed starting configuration as closely as possible. An essential part of this configuration is that the starting width of the channel is customisable.

This starting configuration then evolves over a given timeframe into a final scoured configuration. The scoured configuration is an idealised trapezoidal channel, with a customisable width and depth of the main channel, and the eroded configuration of the shoals being based on the post-event bathymetric survey of July 2022.

7.2.6.10 Summary

Based on the above listed information as well as other secondary information (e.g., expert opinions from similar studies, findings from other studies, observations from the local community and Council), behaviour of the entrance channel was modelled for each historic flood event. For this purpose, the entrance breakout was modelled using a time-varying topography level in the TUFLOW model. This allows for a dynamic change in ground and bed geometry from an initial elevation value to a scoured value over a set period of time.

As precise bathymetric data was not available immediately prior to any of the selected historic events and owing to the morphologically dynamic nature of the area, a representative entrance configuration had to be gleaned from a variety of sources and iteratively modified to define an appropriate initial channel configuration that could replicate the recorded hydrograph of each event.

As for defining the progression of scour during the event and the final configurations of the entrance, the availability of post-event surveys in May 2021 and July 2022 allowed for the development of a generalised post-scour configuration, although it is noted that the entrance would have undergone significant recovery between the end of the respective events and the capture of these data.

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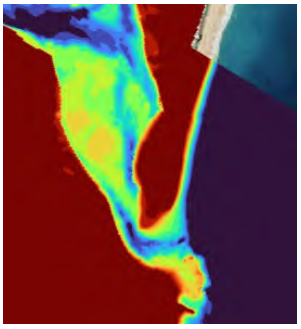
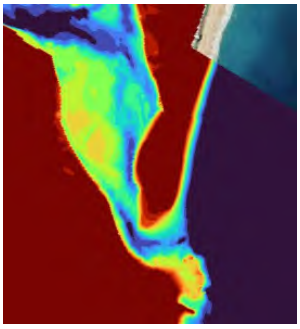
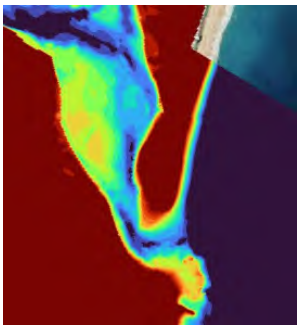
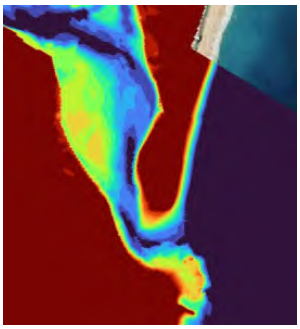
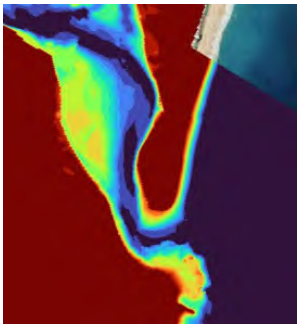
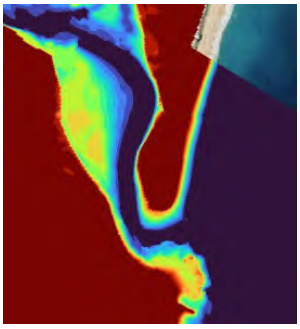
Table 7.8 Example of conceptual entrance opening for July 2022 calibration event

% scour	Elevation	% scour	Elevation
0		20	
40		60	
80		100	

To summarise, the entrance configurations before, during and after each of the simulated historical events were constructed so as to be based on a standardised configuration, whereby further specific optimisations to the initial condition of the channel, trigger points of scour, duration of scour, location and length of the scour, and the final condition of the channel were able to be made appropriately within this standardised approach.

Investigations into the impact of the entrance configuration revealed that the channel width has an influence on outflows and hence, the peak flood level in the lake. The channel depth and the associated configuration of the shoals were also found to have an impact on lake levels, particularly during the tailing limb of an event. These findings are generally in agreement with those of the Tuggerah Lakes Entrance Management Study (2022). The channel configurations that produced the best outcomes are documented in **Table 7.9**, with results presented in

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Section 7.3.

The hydraulic model further indicated that for any of the selected historic events, the trigger point of initial scour was between 1.1 mAHD and 1.4 mAHD of the lake water level. This is consistent with the Tuggerah Lakes Entrance Management Study, which found that a lake level of 1.3m AHD is needed to successfully maintain the channel in an open state and allow the entrance to widen. Scour occurred over a period of 48-70 hours. The longer duration of scour for the July 2022 event could be a combination of several factors, including the severity of catchment flooding, higher lake levels, tidal behaviour, and the initial configuration of the entrance channel. The generally lower trigger and shorter duration of the March 2021 event is anticipated to be as a result of the significantly different entrance configuration, being more towards the north, with a straighter channel between the bridge and ocean allowing for higher velocities and erosion on both sides.

Table 7.9 Summary of entrance configuration and scour parameters for calibration and validation events

Flood Phase	Parameter	Historic Event		
		July 2022	June 2007	March 2021
Pre-scour	Channel width (m at 0 mAHD)	50 m	50 m	70 m
Scour	Trigger	1.40 mAHD	1.40 mAHD	1.10 mAHD
	Duration	70 hours	50 hours	40 hours
Post-scour	Channel width (m at 0 mAHD)	90 m	90 m	180 m

7.2.7 Model limitations and assumptions

The flood model is subject to the following limitations and assumptions:

- The selected 6 m by 6 m resolution of the model is adequate for representing flood behaviour but would have a limited representation of details smaller than the resolution.
- Buildings have been modelled as areas of high roughness. This approach can lead to observed flooding on the maps where buildings exist. These occurrences are anticipated to have only limited impact on modelled flooding behaviours but should be considered at the time of encoding flood affected properties as such.
- Wind and wave setup effects both for ocean levels and within the lake itself are not considered.
- A lack of timely bathymetric entrance surveys pre- and post-event means entrance opening conditions are largely assumed but based on alternative evidence available.
- The flood extent outside the lake area is indicative only; the actual extent should be obtained from an existing relevant overland or catchment flood study. Levels of upstream tributaries will not be included in the final model results to minimise potential confusion about flood planning levels as compared to other relevant plans.

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7.3 Model calibration and validation

The hydraulic model was calibrated and validated for the same events as described in **Section 6.3**, namely, July 2022 and June 2007 for calibration, and March 2021 for validation. The findings of the hydraulic model calibration and validation are included in the sections below.

7.3.1 July 2022 calibration

The July 2022 flooding event saw intense rainfall which broke numerous longstanding records across much of the NSW east coast. A summary of the rainfall conditions that caused the event is provided in **Section 6.3.2**. The adopted entrance configuration for the July 2022 which best replicated the observations and data was described in **Section 7.2.6**.

It is important to analyse the data against which the model is to be calibrated. Foremostly, the purpose of the model is to appropriately replicate observed water levels within the Tuggerah Lakes. In accordance with this, water levels recorded at the Toukley, Long Jetty and Tuggerah Entrance Bridge gauges were compared as presented in **Figure 7.20**.

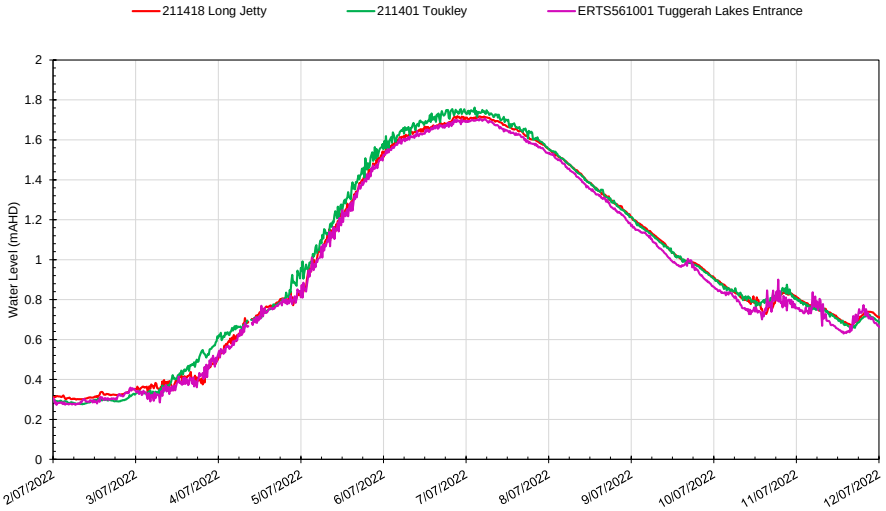

Figure 7.20 July 2022 calibration event – observed water levels in Tuggerah Lakes

The water level recorded at Tuggerah Lakes Entrance is generally similar to that at Long Jetty but tends to be slightly lower. This is in accordance with its relatively close proximity and similar overall positioning within the lake, but also subject to the beginning of the hydraulic gradient between the lake and the ocean.

Less expectedly, it is noted that the recorded water levels at Toukley and Long Jetty vary in comparison to each other during this event. This was hypothesised to likely be because of wind setup across the open lake. To verify this, wind data as recorded at the closest nearby automated weather station at Norah Head were obtained from *theweatherchaser.com* and are presented in **Figure 7.21**.

The difference in water levels observed at Toukley and Long Jetty are presented in **Figure 7.22**, for comparison. In keeping with the Tuggerah Lakes Flood Study (Lawson & Treloar, 1994), the convention for a 'positive' setup was defined to mean that water level at Toukley in the north was higher than that at Long Jetty in the south.

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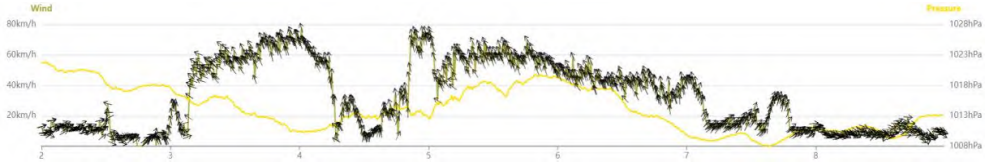

Figure 7.21 July 2022 calibration event – recorded windspeed and direction at Norah Head (61366)

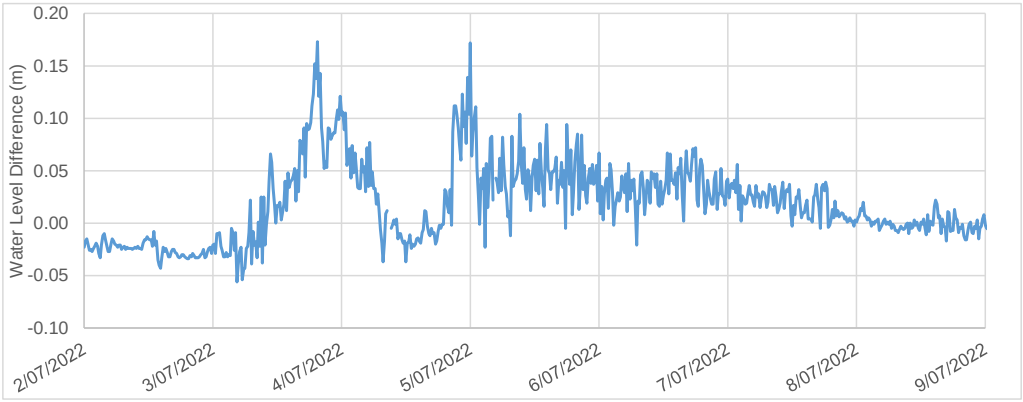

Figure 7.22 July 2022 calibration event – difference in recorded water levels between Toukley and Long Jetty

As can be seen in **Figure 7.21**, strong south and south-easterly winds were observed at Norah Head across most of 3 July and into the early hours of 4 July, with sustained windspeeds of approximately 60 km/h. Throughout the day on 4 July, these winds eased, before re-intensifying in the evening and early hours of 5 July to an average of 70 km/h. These winds then slowly subsided over the coming days, before abating significantly on 7 July. The relative speed and consistency in direction of these winds produces a clear response in lake setup, as can be seen in **Figure 7.22**, with the persistent southerly winds causing a significant difference between the two water level gauges due to the lake level expected to have a gradient and the level increase in the direction of the wind (i.e., southerly wind would result in a lower lake level in the south and a higher lake level in the north). This offset abates with the wind throughout the day on 4 July, but strongly re-emerges in the evening before moderating over the following days.

The comparison performed above demonstrates that the divergence in observed water levels between the two distant sites within Tuggerah Lake is largely driven by wind setup effects during the July 2022 event. As a result, and since the modelled results do not consider these effects, the model was deemed to be most appropriately calibrated when the modelled lake level was between the levels recorded at the two distant lake gauges, particularly during periods of high wind.

Noting the above, a comparison between recorded water levels at the Toukley and Long Jetty and simulated water levels within Tuggerah Lake at Long Jetty is presented in **Figure 7.23**. Simulated water levels at Long Jetty were found to be effectively identical to those at Toukley and across Tuggerah Lake for this event. The figure shows the modelled results with an entrance that remains in its initial configuration throughout the event (dot dark blue line), and

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one with the adopted scour behaviour (solid dark blue line), as detailed in **Section 7.2.6**. A strong correlation between the simulated and recorded water levels within Tuggerah Lake can be observed, with the un-scoured scenario seeing a close correlation in the early phases of the event. This result demonstrates that the starting configuration of the entrance and hydrology represent the observations well.

A divergence between the unscoured and scour scenarios can be seen to emerge around the early hours of 6 July, which corresponds to the commencement of the scouring within the model and the commencement of mechanical berm scraping by Council and associated scour. Ultimately, modelled peak lake levels remain between the two lake gauge sites through the peak of the event, with a comparison in final peak level and timing exhibited in **Table 7.10**. An excellent match is seen in the falling limb, through to the re-emergence of tidal influences.

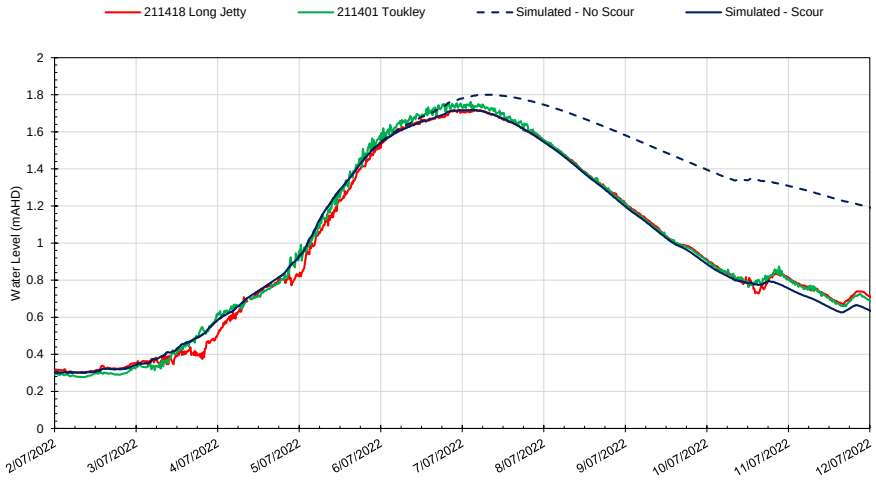

Figure 7.23 July 2022 calibration event – Tuggerah Lake water level (Long Jetty and Toukley)

Similar agreements can be seen at the Tuggerah Lakes Entrance water level gauge, as shown in **Figure 7.24**.

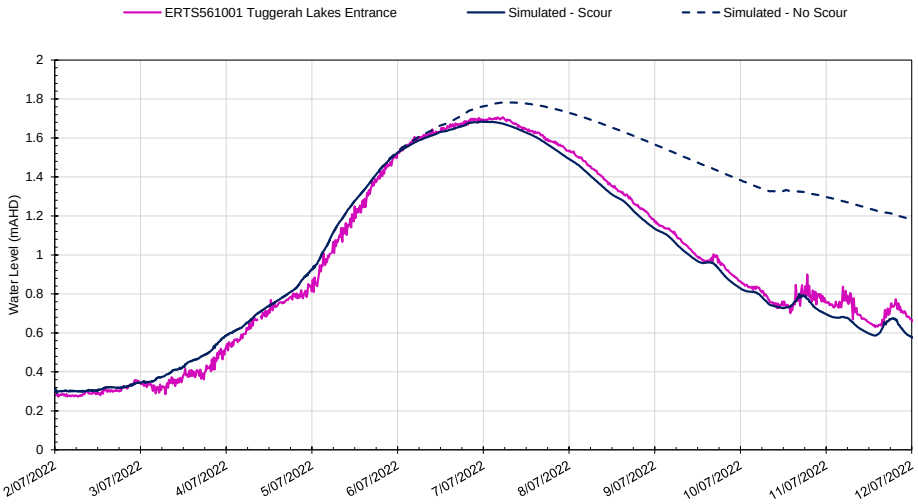

Figure 7.24 July 2022 calibration event – Tuggerah Lakes Entrance water level

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Table 7.10 July 2022 calibration event peak summary

Gauge location	Observed		Simulated		Difference
	Level (mAHD)	Time (AEST)	Level (mAHD)	Time (AEST)	
Toukley	1.762	02:30 7 Jul	1.727	03:00 7 Jul	-0.035
Long Jetty	1.719	21:30 6 Jul			+0.008
Tuggerah Lakes Entrance	1.707	05:30 7 Jul	1.693	23:15 6 Jul	-0.014

7.3.2 June 2007 calibration

The June 2007 flooding event was associated with an East Coast Low that formed off the coast of NSW, just north of Newcastle. A summary of the rainfall conditions that caused the event is provided in **Section 6.3.3**. The adopted entrance configuration for the June 2007 which best replicated the observations and data was described in **Section 7.2.6**.

As mentioned in the previous section, the main objective of the model is to accurately replicate the observed water levels in the Tuggerah Lakes and water levels recorded at the Toukley and Long Jetty gauges were compared in **Figure 7.25**.

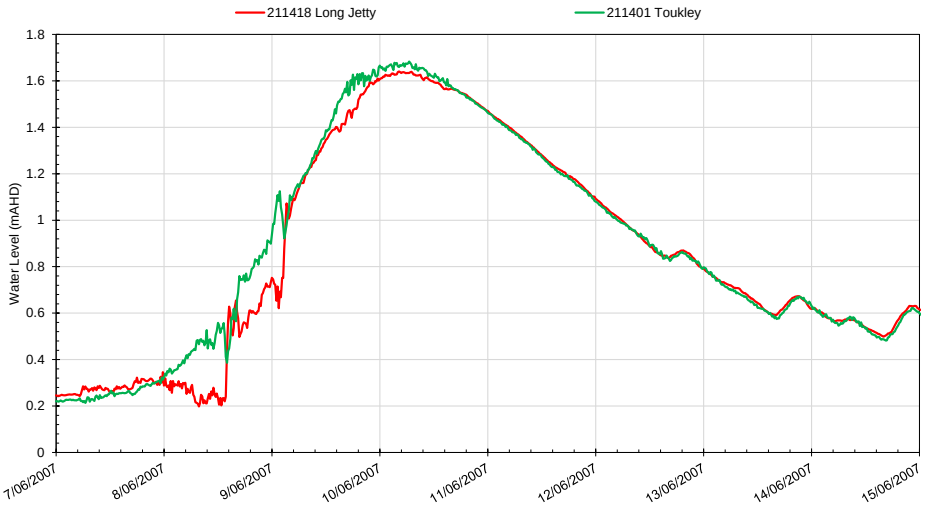

Figure 7.25 June 2007 calibration event – observed water levels in Tuggerah Lakes

The recorded water levels at Toukley and Long Jetty vary in comparison to each other during this event. As was the case during the July 2022 event, this was hypothesised to likely be because of wind setup across the open lake. To verify this, wind data as recorded at the closest nearby automated weather station at Norah Head were obtained from a BoM research report (Mills, et al., 2010) and are presented in **Figure 7.26**.

The difference in water levels observed at Toukley and Long Jetty are presented in **Figure 7.27**, for comparison.

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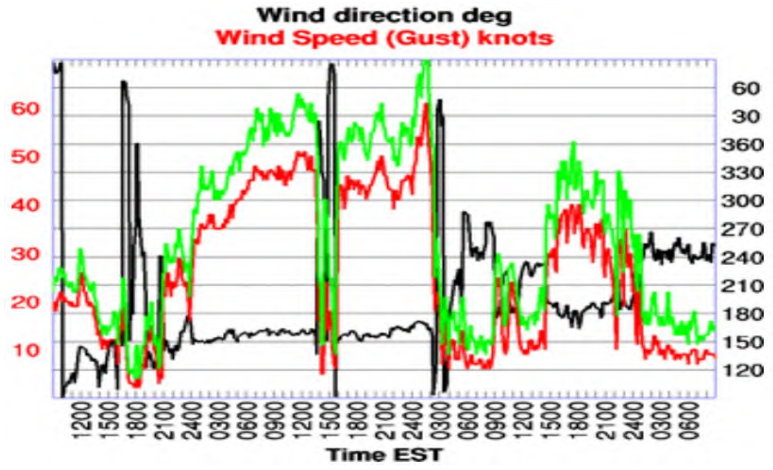

Figure 7.26 June 2007 calibration event – recorded wind direction (black), and mean (red) and gust (green) wind speed at Norah Head (61366), starting 0900 7 June 2007

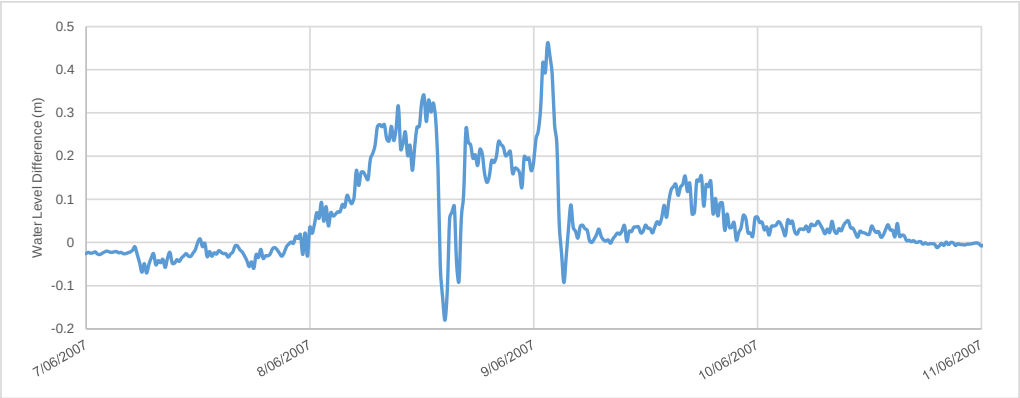

Figure 7.27 June 2007 calibration event – difference in recorded water levels between Toukley and Long Jetty

As can be seen in **Figure 7.26**, strong south and south-easterly winds were observed at Norah Head across most of 8 July and into the early hours of 9 July, with sustained windspeeds of up to 80 km/h. A lapse and reversal in wind direction in the afternoon of 8 July is also followed by a response in water level difference, before a general wind from the south is re-established later that day. The relative speed and consistency in direction of these winds produce a clear response in lake setup, as can be seen in **Figure 7.27**, with the persistent southerly winds causing two significant instances of lake levels increasing in a northward direction resulting in the large difference in water level between Toukley and Long Jetty recorded levels.

The comparison performed above demonstrates that the divergence in observed water levels between the two distant sites within Tuggerah Lake can be largely driven by wind setup effects during the June 2007 event. As a result, and since the modelled results do not consider these effects, the model was deemed to be most appropriately calibrated when the modelled lake level was between the levels recorded at the two distant lake gauges, particularly during periods of high wind.

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Noting the above, a comparison between recorded water levels at the Toukley and Long Jetty and simulated water levels within Tuggerah Lake at Long Jetty is presented in **Figure 7.28**. Simulated water levels at Long Jetty were found to be effectively identical to those at Toukley and across Tuggerah Lake for this event. The figure shows the modelled results with an entrance that remains in its initial configuration throughout the event (dotted dark blue line), and one with the adopted scour behaviour (solid dark blue line), as detailed in **Section 7.2.6**. A strong correlation between the simulated and recorded water levels within Tuggerah Lake can be observed, with the un-scoured scenario seeing a close correlation in the early phases of the event. This result demonstrates that the starting configuration of the entrance and hydrology represent the observations well.

A divergence between the unscoured and scour scenarios can be seen to emerge around the night of 9 June, which corresponds to the commencement of the scouring within the model.

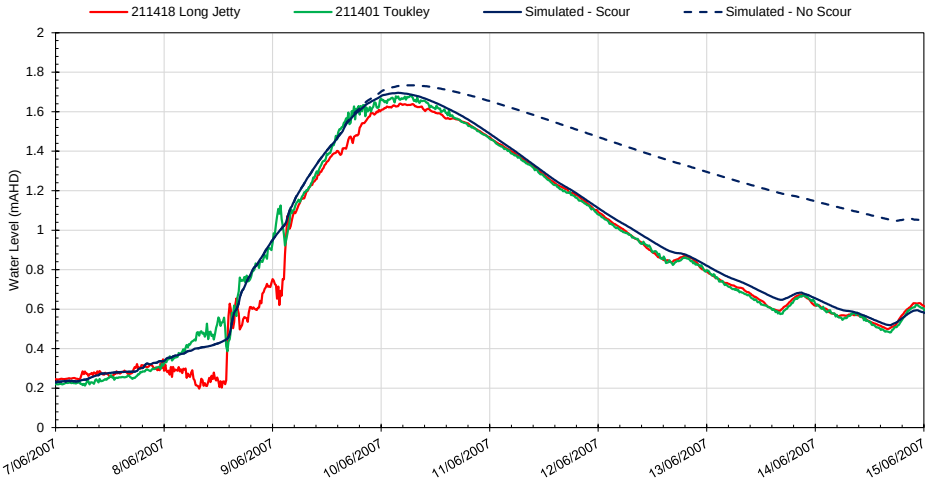

Figure 7.28 June 2007 calibration event – Tuggerah Lake water level (Long Jetty and Toukley)

Ultimately, modelled peak lake levels are slightly higher than recorded at the two lake gauge sites through the peak of the event, with a comparison in final peak level and timing exhibited in **Table 7.11**. An excellent match is seen in the falling limb through to the re-emergence of tidal influences.

Table 7.11 June 2007 calibration event – peak summary

Gauge location	Observed		Simulated		Difference
	Level (mAHD)	Time (AEST)	Level (mAHD)	Time (AEST)	
Toukley	1.683	06:30 10 Jun	1.696	03:45 10 Jun	+0.013
Long Jetty	1.641	04:15 10 Jun			+0.055

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7.3.3 March 2021 validation

The March 2021 flooding event was associated with persistent, heavy rain which fell from March 16 to March 23 across central and northern NSW. A summary of the rainfall conditions that caused the event is provided in **Section 6.3.4**. The adopted entrance configuration for the March 2021 which best replicated the observations and data was described in **Section 7.2.6**.

As per the calibration events, water levels recorded at the Toukley and Long Jetty gauges were compared as presented in **Figure 7.29**. Data from the Tuggerah Entrance Bridge gauge was excluded due to periods of poor quality and missing data during this event.

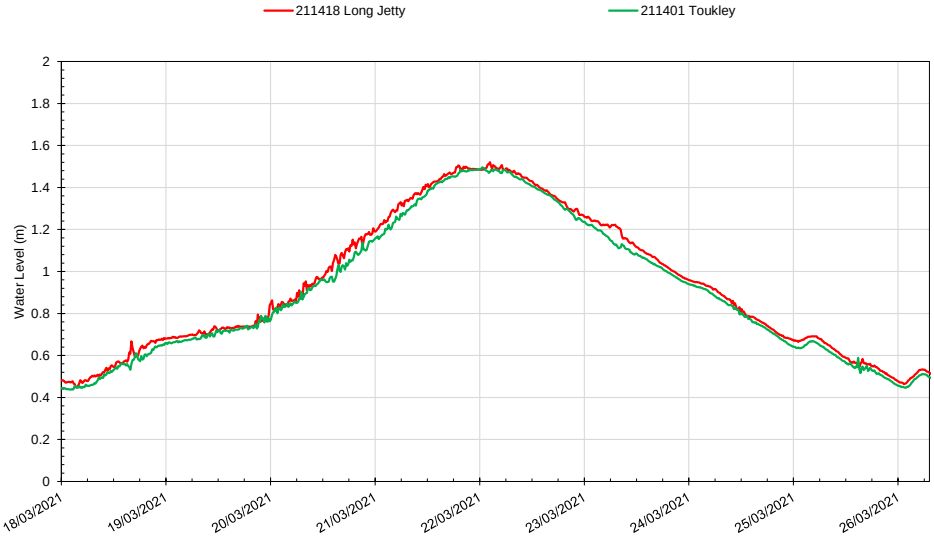

Figure 7.29 March 2021 validation event – observed water levels in Tuggerah Lakes

The water level recorded at the three lake sites are generally similar prior to the event. During the rising limb and peak, the Tuggerah Lakes Entrance site was subjected to periodic losses of data, and as such is not considered for comparison during this phase. The sites at Toukley and Long Jetty continue to closely represent each other throughout the event, in contrast to the other historical events considered above. This is likely due to the lack of strong winds from a predominant direction over significant periods of time associated with this event. A strong tidal signal can be seen to emerge at the Tuggerah Lakes Entrance site from 22 March onwards highlighting that the entrance scoured significantly by this time.

Noting the above, a comparison between recorded water levels at the Toukley and Long Jetty monitoring sites, and simulated water levels within Tuggerah Lake at Long Jetty is presented in **Figure 7.30**. Simulated water levels at Long Jetty were found to be effectively identical to those at Toukley and across Tuggerah Lake for this event. The figure shows the modelled results with an entrance that remains in its initial configuration throughout the event (dotted dark blue line), and one with the adopted scour behaviour (solid dark blue line), as detailed in **Section 7.2.6**. A good correlation between the simulated and recorded water levels within Tuggerah Lake can be observed, with the un-scoured scenario seeing a fair correlation in the early phases of the event until 20 March. A less accurate representation of the rising limb for this event on 20-21 March is considered to be attributable to the fact that the initial configuration and scour mechanism were represented using an idealised southern entrance opening which

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is significantly different to the actual configuration observed during this event, where the entrance was located towards the centre of the berm.

A divergence between the unscoured and scour scenarios can be seen to emerge during the day on 20 March, which corresponds to the commencement of the scouring within the model and the commencement of mechanical berm scraping by Council and associated scour.

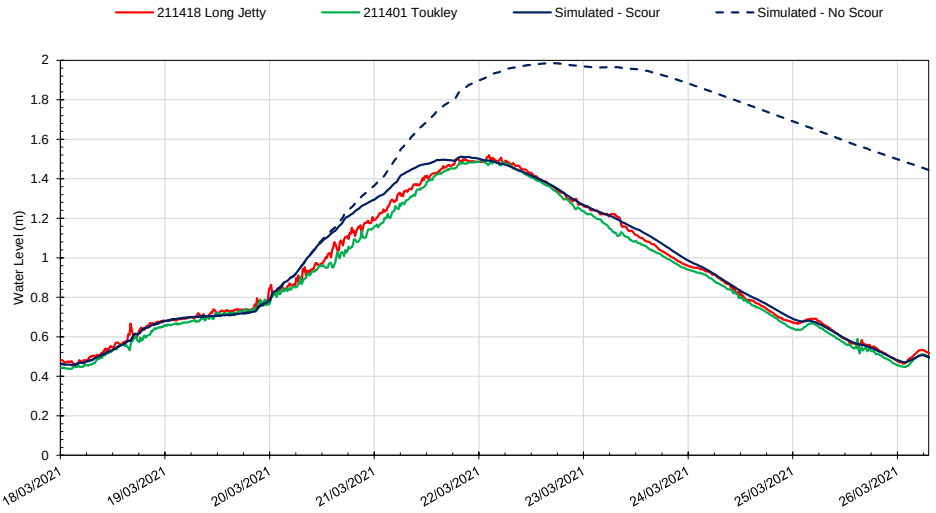

Figure 7.30 March 2021 validation event – Tuggerah Lake water level (Long Jetty and Toukley)

Ultimately, modelled peak lake level was between the two lake level monitoring sites albeit with a slightly earlier timing, with a comparison in final peak level and timing exhibited in **Table 7.12**. This demonstrates the applicability of an idealised entrance configuration across a variety of events with differing entrance configurations in representing peak lake flood levels. An excellent match is seen in the falling limb through re-emergence of tidal influences, highlighting that the final configuration of the entrance is appropriately modelled.

Table 7.12 March 2021 validation event – peak summary

Gauge location	Observed		Simulated		Difference
	Level (mAHD)	Time (AEST)	Level (mAHD)	Time (AEST)	
Toukley	1.496	03:00 22 Mar	1.511	22:15 21 Mar	+0.015
Long Jetty	1.520	04:45 22 Mar			-0.009

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7.3.4 Discussion of model calibration and validation

The hydraulic model was calibrated using the July 2022 and June 2007 flood events and validated against the March 2021 flood event. The model successfully simulated the historic flood behaviour of Tuggerah Lakes, as depicted in **Figure 7.23**, **Figure 7.28** and **Figure 7.30**. Flood extent maps for the calibration and validation events are presented in **Figure 7.31**, **Figure 7.32** and **Figure 7.33**. It should be noted that the flood extent over the lower reaches of the main tributaries to the lakes system (e.g. Wyong River, Ourimbah Creek, Tumbi Umbi, Wallarah Creek) and over the various overland areas is indicative only. Given the focus of this study is on the inundation level of the lakes, the most important factor is the replication of an appropriate volume into the lake over time. Inflows into the lakes system are located along the tributaries downstream reaches and have been lumped into source areas for overland areas. Therefore, for planning purposes, the actual extent in areas with elevated grounds not directly impacted by lake levels should be obtained from the existing relevant flood study or floodplain risk management study and plan.

The main purpose of the calibration and validation process was to provide some confidence in replicating the general behaviour of the lake entrance during a flood event and the model showed generally good agreement during the rising and falling limbs of the events.

Based on these results, this study suggests that the calibrated and validated hydraulic model is suitable for its intended purpose and ready to be used for design flood simulation. The calibration also highlighted the range of variation in entrance behaviour and the necessity for entrance configuration sensitivity assessment when defining the design flood event scenarios.

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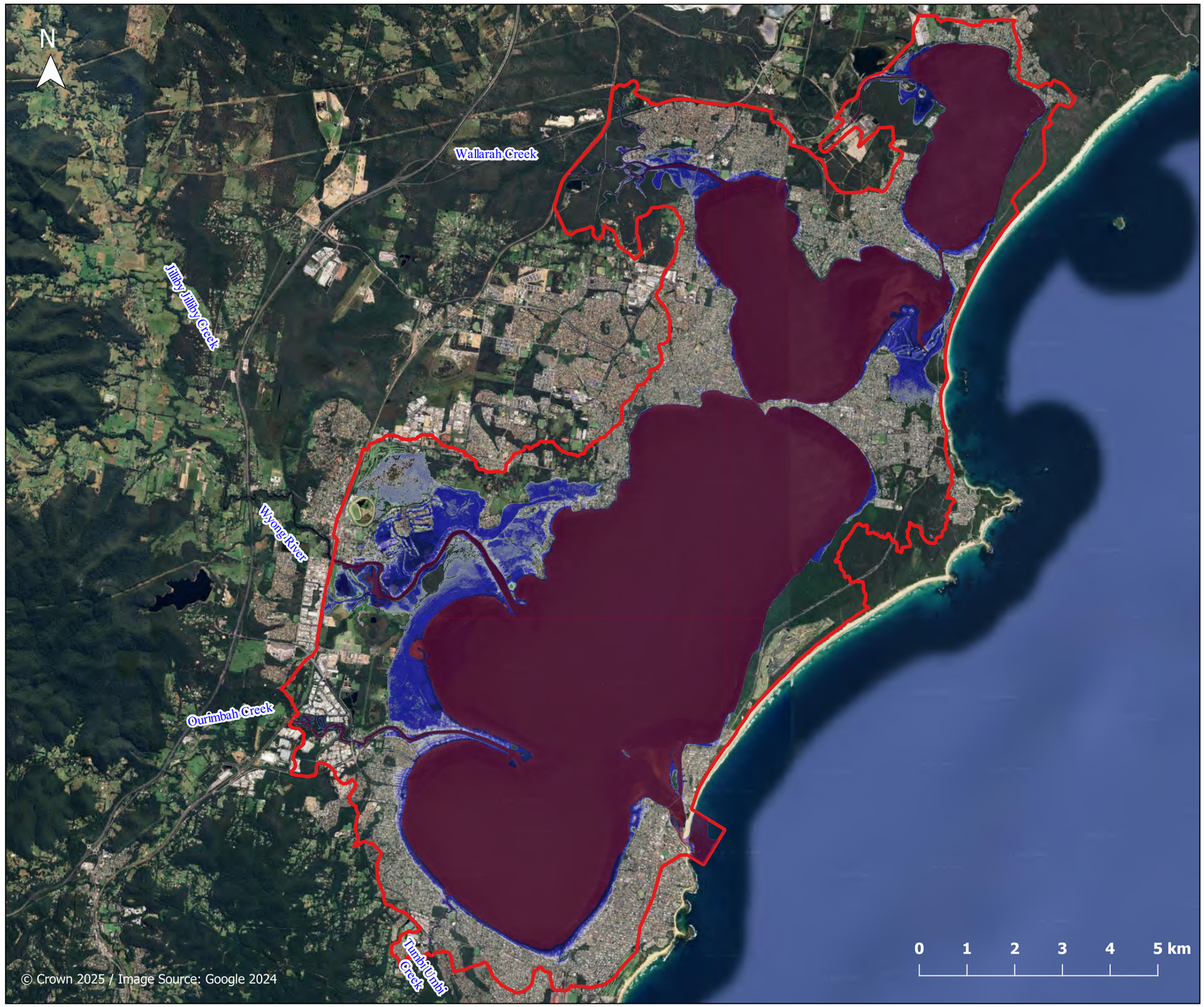

Figure 7.31

July 2022 calibration event - peak flood depth

Legend

- Model domain

Peak depth (m)

- < 0.15
- 0.15-0.30
- 0.30-0.50
- 0.50-1.00
- 1.00-1.50
- > 1.50

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Tuggerah Lakes Flood Study Review

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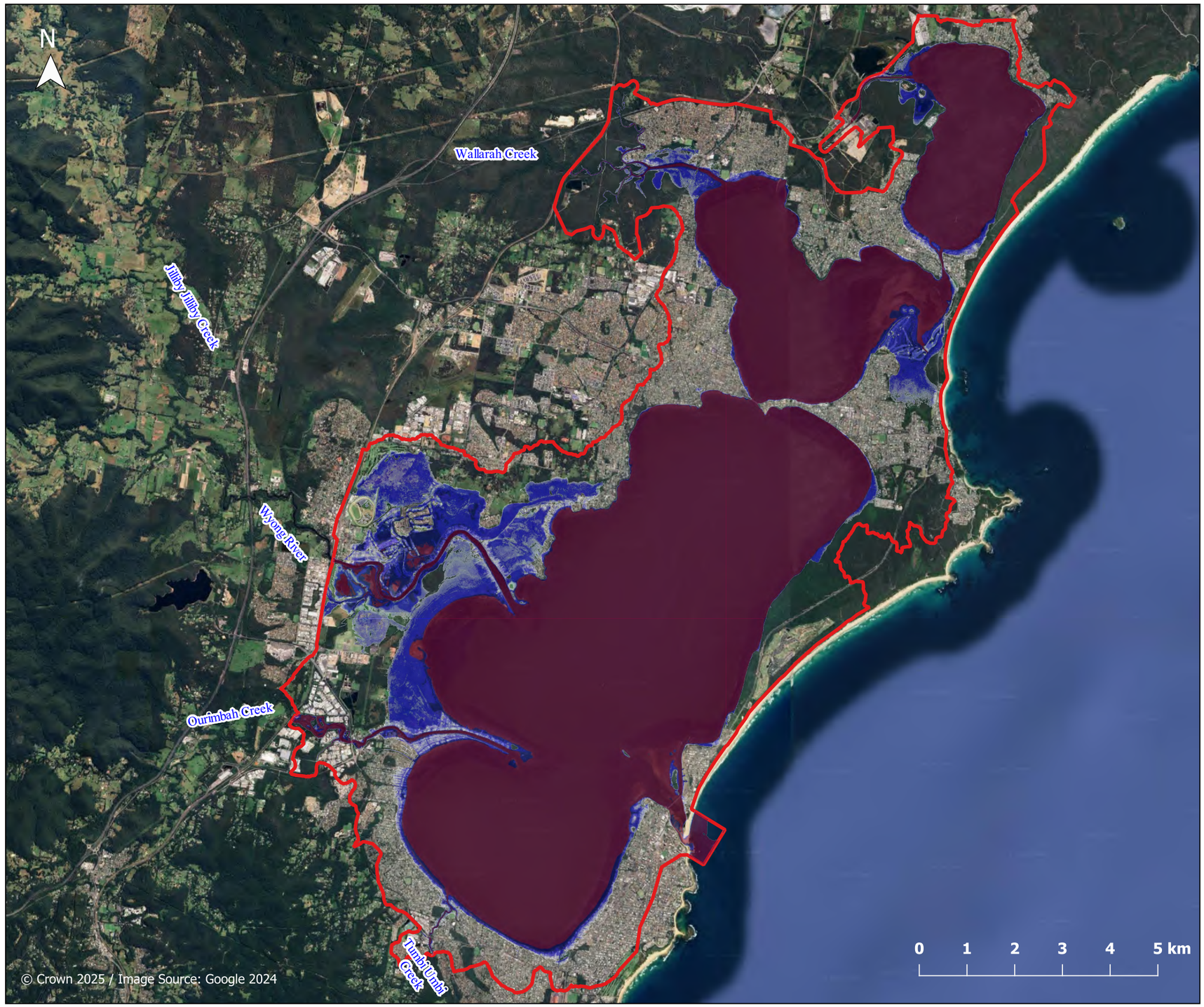

Figure 7.32

June 2007 calibration event - peak flood depth

Legend

- Model domain

Peak depth (m)

- < 0.15
- 0.15-0.30
- 0.30-0.50
- 0.50-1.00
- 1.00-1.50
- > 1.50

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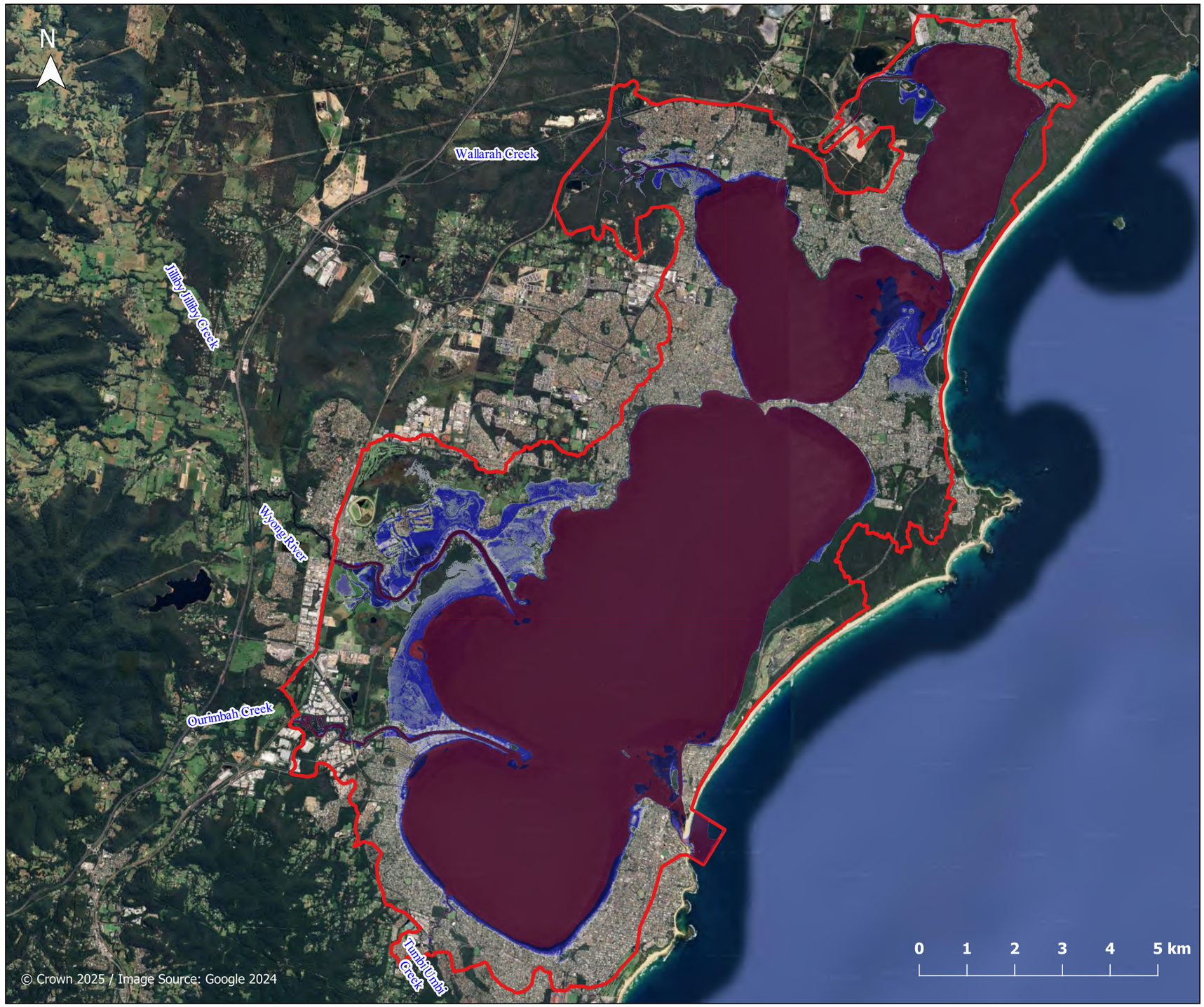

Figure 7.33

March 2021 validation event - peak flood depth

Legend

- Model domain

Peak depth (m)

- < 0.15
- 0.15-0.30
- 0.30-0.50
- 0.50-1.00
- 1.00-1.50
- > 1.50

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8 Model sensitivity

Model sensitivity testing is an essential procedure in hydraulic modelling that evaluates how changes in input parameters influence model outputs. By altering key input factors, it becomes possible to identify and quantify the variables that have the most significant effect on the modelled results. This testing is vital for predicting system behaviour under varying conditions and for addressing risks linked to uncertainties in input data. Gaining insights into a model's sensitivity aids in decision-making and strengthens the overall reliability of hydraulic analyses.

Several factors were subjected to a sensitivity analysis prior to progressing with the design runs. These factors included:

- hydrological parameters, including:
  - losses: no losses and doubling the adopted design base case ARR 2019 losses;
  - catchment lag: ±10% from the adopted design base case WBNM catchment lag factor;
- roughness: ±20% from the adopted design base case roughness coefficient;
- initial lake water level: elevated (0.5 mAHD) and reduced (0.2 mAHD) from the adopted design base case (0.36 mAHD);
- tailwater level:
  - peak tailwater level: Type A, Type B and Type C waterway entrances (see **Section 9.3**);
  - timing of tailwater peak: ±6 hours from the adopted design base case peak tailwater timing, which was aligned with the catchment-driven peak
- entrance configuration and behaviour parameters, including:
  - initial berm level: +0.3m from the adopted design base case initial berm level, with corresponding scaling in the scour duration
  - initial channel width: ±20m from the adopted design base case initial channel width, with corresponding scaling in the scour duration
  - scour trigger: ±0.2m from the adopted design base case scour trigger lake level
  - scour duration: ±20 hours from the adopted design base case scour duration
  - final channel level: +0.5m and -1m from the adopted design base case scour trigger lake level
  - shoals and ebb channel configuration: a scenario with a pre-dredged channel

Sensitivity results are provided and discussed further in the following sections.

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8.1 Hydrologic

8.1.1 Rainfall losses

To analyse the influence of losses on the flood behaviour, the following scenarios were modelled:

- No loss scenario with neither continuing losses nor initial losses in the pervious areas for the 1% AEP flood event.
- Double the calibrated losses, with 2.0 mm/hr continuing losses and 116 mm initial losses in the pervious areas for the 1% AEP flood event.

It is important to note that an initial loss of 58 mm and continuing loss of 1.0 mm/hr were adopted for the baseline 1% AEP event. These scenarios were modelled for the adopted critical duration and temporal pattern under otherwise standard design conditions, with the results shown as compared to the baseline run in **Figure 8.1** and **Table 8.1**.

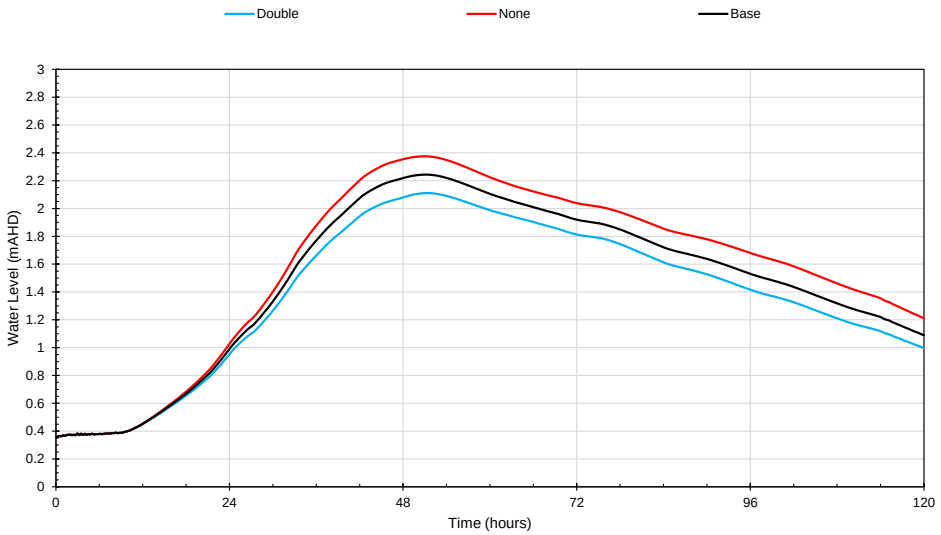

Figure 8.1 Rainfall loss sensitivity – Tuggerah Lakes water level

Table 8.1 Rainfall loss sensitivity – Tuggerah Lakes peak water level

Difference (m)	Peak water level (mAHD)			Difference (m)
Double rainfall losses		Baseline	No rainfall losses	
-0.13	2.11	2.24	2.38	+0.14

In the no loss scenario, the peak flood level is higher compared to the baseline, and the water level recedes more slowly. This is because the lack of rainfall loss results in a larger volume of runoff entering the system, leading to a higher flood peak and a prolonged recession. In contrast, the double loss scenario results in a lower peak flood level and a faster recession of the flood, due to the increased rainfall loss, which reduces the total volume of runoff entering the system. It is noted that the timing of the peak flood level does not significantly vary between the no loss scenario, the double loss scenario, and the baseline conditions.

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8.1.2 Catchment lag

To analyse the influence of catchment lag on the flood behaviour, the following scenarios were modelled:

- 90% catchment lag scenario, with a WBNM C-factor of 1.44 for the 1% AEP flood event.
- 110% catchment lag scenario, with a WBNM C-factor of 1.76 for the 1% AEP flood event.

It is important to note that a WBNM C-factor of 1.60 was adopted for the baseline 1% AEP event. These scenarios were modelled for the adopted critical duration and temporal pattern under otherwise standard design conditions, with the results shown as compared to the baseline run in **Figure 8.2** and **Table 8.2.**

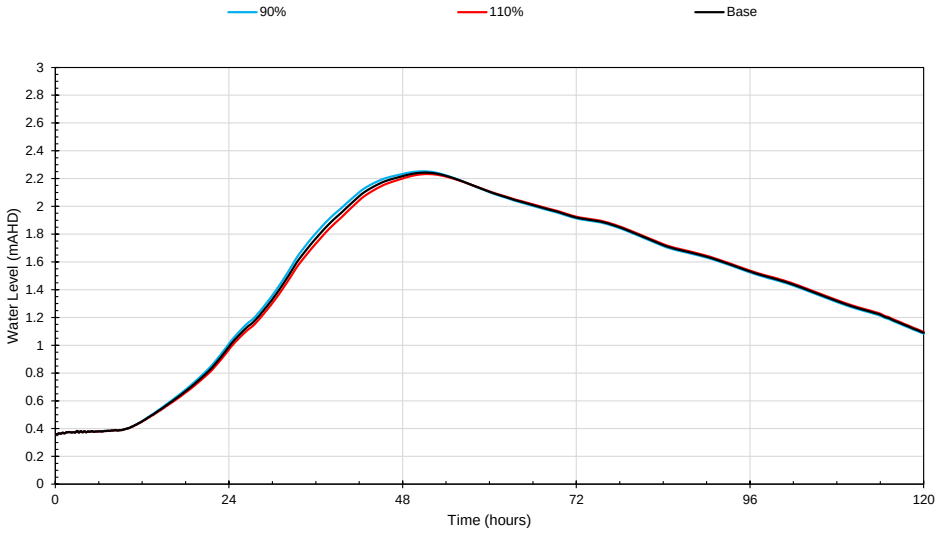

Figure 8.2 Catchment lag sensitivity – Tuggerah Lakes water level

Table 8.2 Catchment lag sensitivity – Tuggerah Lakes peak water level

Difference (m)	Peak water level (mAHD)			Difference (m)
90% catchment lag		Baseline	110% catchment lag	
+0.01	2.25	2.24	2.23	-0.01

In the low lag scenario, the peak flood level is higher compared to the baseline, with a steeper rising limb. This is because the reduced catchment lag leads to the earlier and more sudden arrival of inflows from the tributary catchments. In contrast, the high lag scenario results in a slightly lower peak flood level and a flatter rising limb, due to the delayed arrival of catchment inflows. After the peak and the falling limb, the results of both lag scenarios tend towards that of the baseline, as the net volume of runoff entering the lakes is unaffected by the catchment lag.

In summary, results indicate that catchment lag has a minor effect on both the flood peak level and the hydrograph shape during the rising limb. This is primarily due to the effect that the catchment lag has on the timing of inflows from the lake tributaries.

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8.2 Roughness

To analyse the influence of material hydraulic roughness on the flood behaviour, the following scenarios were modelled:

- Low roughness scenario with roughness reduced by 20% for the 1% AEP flood event.
- High roughness scenario with roughness increased by 20% for the 1% AEP flood event.

These scenarios were modelled for the adopted critical duration and temporal pattern under otherwise standard design conditions, with the results shown as compared to the baseline run in **Figure 8.3** and **Table 8.3.**

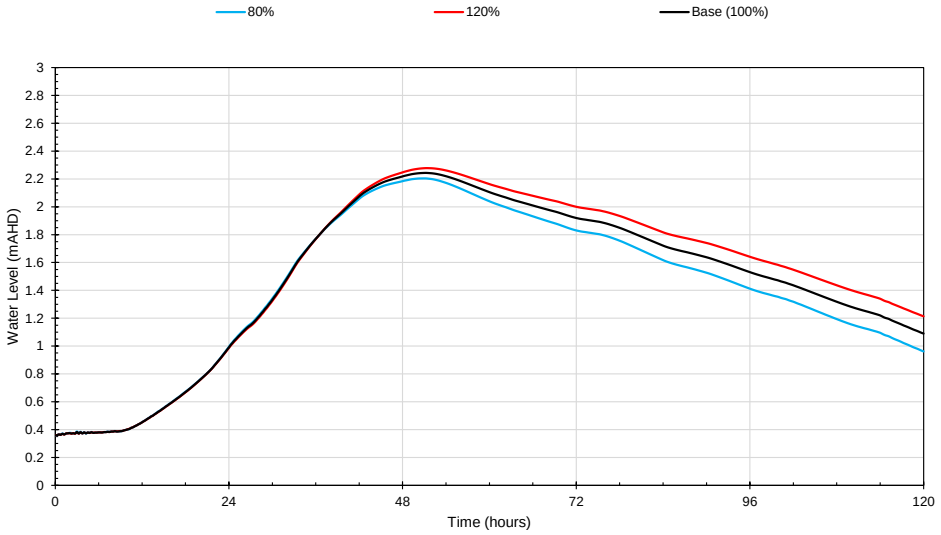

Figure 8.3 Roughness sensitivity – Tuggerah Lakes water level

Table 8.3 Roughness sensitivity – Tuggerah Lakes peak water level

Difference (m)	Peak water level (mAHD)			Difference (m)
80% roughness		Baseline	120% roughness	
-0.04	2.20	2.24	2.28	+0.04

In the low roughness scenario, the peak flood level is lower compared to the baseline, and the water level recedes more quickly. This is because the reduced roughness leads to higher hydraulic efficiency at the entrance. In contrast, the high roughness scenario results in a higher peak flood level and a slower recession of the flood, due to the associated decrease in hydraulic efficiency at the entrance. It is noted that the timing of the peak flood level does not significantly vary between the two roughness scenarios and the baseline conditions.

In summary, the results indicate that hydraulic roughness influences both the flood peak level and the hydrograph shape during the falling limb. This is primarily due to the shallow depth and high velocities at the entrance when the lake levels are elevated during the peak and falling limb phases of the flood event.

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8.3 Initial lake water level

To analyse the influence of the initial lake water level on the flood behaviour, the following scenarios were modelled:

- Depressed initial lake water level scenario of 0.2 mAHD, reduced by 160mm for the 1% AEP flood event;
- Elevated initial lake water level scenario of 0.5 mAHD, increased by 140mm for the 1% AEP flood event.

It is important to note that an initial lake water level of 0.36 mAHD was adopted for the baseline 1% AEP event. These scenarios were modelled for the adopted critical duration and temporal pattern under otherwise standard design conditions, with the results shown as compared to the baseline run in **Figure 8.4** and **Table 8.4**.

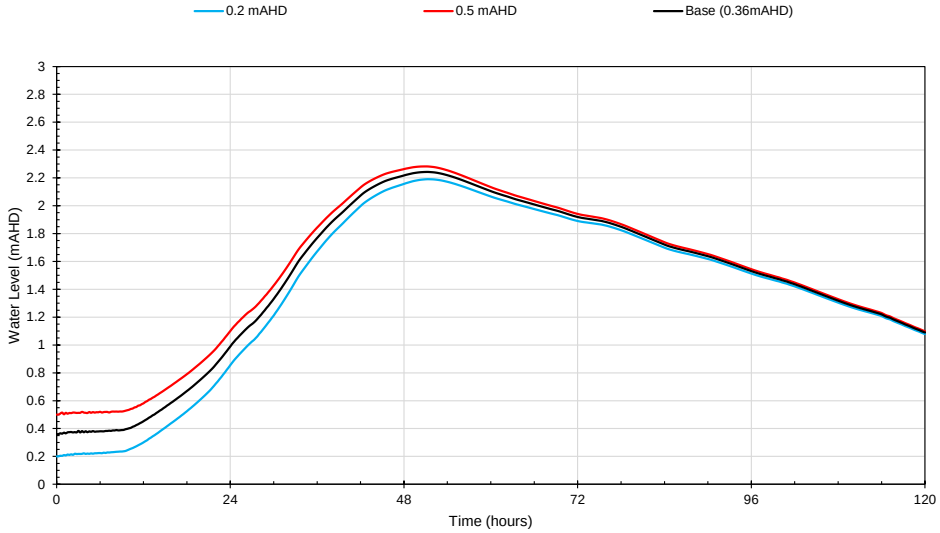

Figure 8.4 Initial lake water level sensitivity – Tuggerah Lakes water level

Table 8.4 Initial lake water level sensitivity – Tuggerah Lakes peak water level

Difference (m)	Peak water level (mAHD)			Difference (m)
0.2 mAHD		Baseline	0.5 mAHD	
-0.05	2.19	2.24	2.28	+0.04

In the elevated initial lake water level scenario, the peak flood level is higher compared to the baseline, but with water levels rising at a reduced rate. In contrast, the depressed initial lake water level scenario results in a lower peak flood level, but a faster rise in the hydrograph. In other words, the difference in modelled peak water levels is less than the difference in initial water level.

Further to this, it is noted that the differences between the elevated and depressed initial water level scenarios and the baseline become less pronounced as the flood event progresses. By the tailing limb, both scenarios tend to converge towards the baseline conditions, with the recession rates becoming similar across all scenarios.

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8.4 Tailwater level

8.4.1 Peak level

In order to analyse the influence of the tailwater level on the flood behaviour, the following scenarios were modelled:

- 5% AEP water level for a Type A waterway entrance in the Tasman Sea (peaking at 1.40 mAHD);
- 5% AEP water level for a Type A waterway entrance with an assumed wave setup of 0.07 m (as per the 1994 study) in the Tasman Sea (peaking at 1.47 m AHD);
- 5% AEP water level for a Type C waterway entrance in the Tasman Sea (peaking at 2.35 mAHD).

It is important to note that a 5% AEP water level for a Type B waterway entrance in the Tasman Sea (peaking at 1.90 mAHD) was adopted for the baseline 1% AEP event. These scenarios were modelled for the adopted critical duration and temporal pattern under otherwise standard design conditions, with the results shown as compared to the baseline run in **Figure 8.5** and **Table 8.5**.

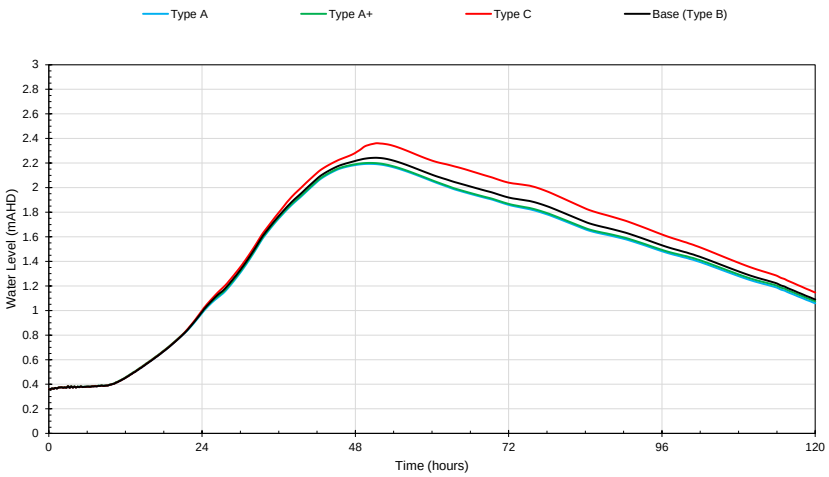

Figure 8.5 Tailwater level sensitivity – Tuggerah Lakes water level

Table 8.5 Tailwater level sensitivity – Tuggerah Lakes peak water level

Difference (m)	Peak water level (mAHD)			Difference (m)
Type A		Baseline	Type C	
-0.05	2.19	2.24	2.36	+0.12

It was observed that changes in tailwater conditions closely corresponded with variations in peak lake levels, particularly during the peak and descending limbs of the hydrograph. However, it is important to note that the peak water level in the Type C tailwater exceeds the 1% AEP lake level. Under these circumstances, inflows can be driven into the lake from the ocean, rather than the usual outflow to the ocean typically seen during peak catchment flood conditions. This tidal inflow effect is evident in the Type C hydrograph, where the peaks of the

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tidal cycles further raise lake water levels, independently of the catchment inflow behaviour. As shown in **Figure 8.5**, both Type A tailwater conditions (with and without the 0.07 m wave setup increase) are nearly identical, and as such **Table 8.5** exhibits these scenarios as a combined result only.

8.4.2 Timing

In order to analyse the influence of the tailwater timing on the flood behaviour, the following scenarios were modelled:

- 5% AEP water level for a Type B waterway entrance in the Tasman Sea (peaking at 1.90 mAHD) brought forward 6 hours from concurrent runoff-driven and tailwater peaks;
- 5% AEP water level for a Type B waterway entrance in the Tasman Sea (peaking at 1.90 mAHD) pushed back 6 hours from concurrent runoff-driven and tailwater peaks.

It is important to note that a 5% AEP water level for a Type B waterway entrance in the Tasman Sea (peaking at 1.90 mAHD) with concurrent runoff-driven and tailwater peaks was adopted for the baseline 1% AEP event. These scenarios were modelled for the adopted critical duration and temporal pattern under otherwise standard design conditions, with the results shown as compared to the baseline run in **Figure 8.6** and **Table 8.6**.

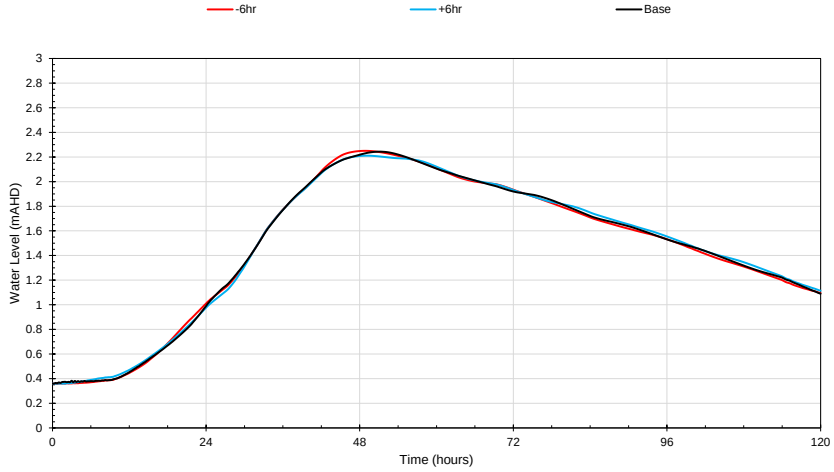

Figure 8.6 Tailwater timing sensitivity – Tuggerah Lakes water level

Table 8.6 Tailwater timing sensitivity – Tuggerah Lakes peak water level

Difference (m)	Peak water level (mAHD)			Difference (m)
-6 hours		Baseline	+6 hours	
+0.01	2.25	2.24	2.21	-0.03

A minor variance was observed between the sensitivity and baseline scenarios in this case, with a slightly higher peak water level noted when the peak timing of the tailwater conditions was brought forward. This indicates that the tailwater timing has a limited effect on the overall flood behaviour in this scenario when within the 12-hour window aligning with the peak runoff-driven conditions.

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8.5 Entrance configuration and behaviour

8.5.1 Initial berm level

In order to analyse the influence of the initial berm level on flood behaviour, a scenario with an initial berm level with a height increased by 0.3 m was run.

It is important to note that an initial channel configuration identical to that of the July 2022 calibration event (see **Section 7.2.6**) was adopted for the baseline 1% AEP event. This scenario was modelled for the adopted critical duration and temporal pattern under otherwise standard design conditions, with the results shown as compared to the baseline run in **Figure 8.7** and **Table 8.7**.

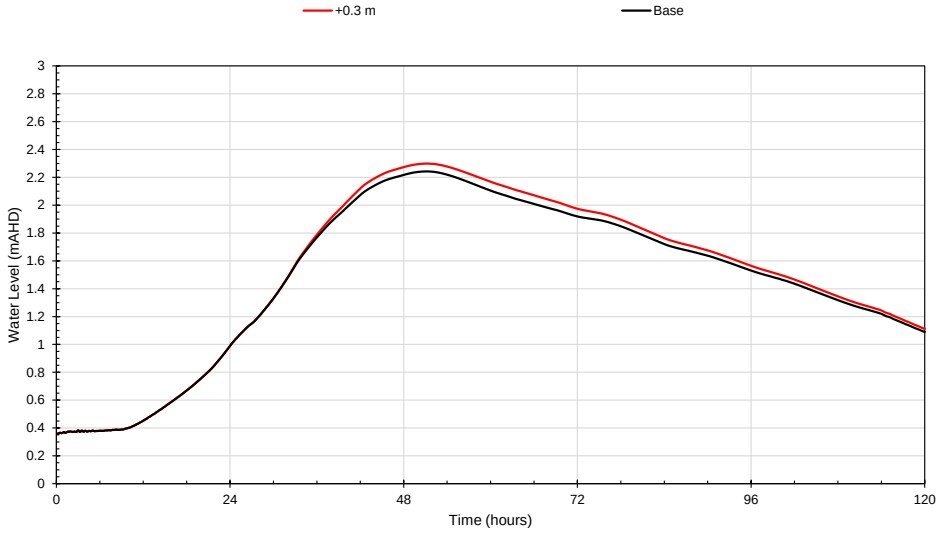

Figure 8.7 Initial berm level sensitivity – Tuggerah Lakes water level

Table 8.7 Initial berm level sensitivity – Tuggerah Lakes peak water level

Peak water level (mAHD)		Difference (m)
Baseline	+0.3 m initial berm level	
2.24	2.30	+0.06

The peak flood level with a higher initial berm level had a higher peak level compared to the baseline scenario. This effect diminishes in the tailing limb of the flood hydrograph.

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8.5.2 Initial channel width

In order to analyse the influence of the initial channel width on the flood behaviour, the following scenarios were modelled:

- A narrower channel, with an initial width of 30 m at 0 mAHD;
- A wider channel, with an initial width of 70 m at 0 mAHD.

It is important to note that an initial channel configuration identical to that of the July 2022 calibration event, which had an initial width of 50 m at 0 mAHD (see **Section 7.2.6**), was adopted for the baseline 1% AEP event. These scenarios were modelled for the adopted critical duration and temporal pattern under otherwise standard design conditions, with the results shown as compared to the baseline run in **Figure 8.8** and **Table 8.8**.

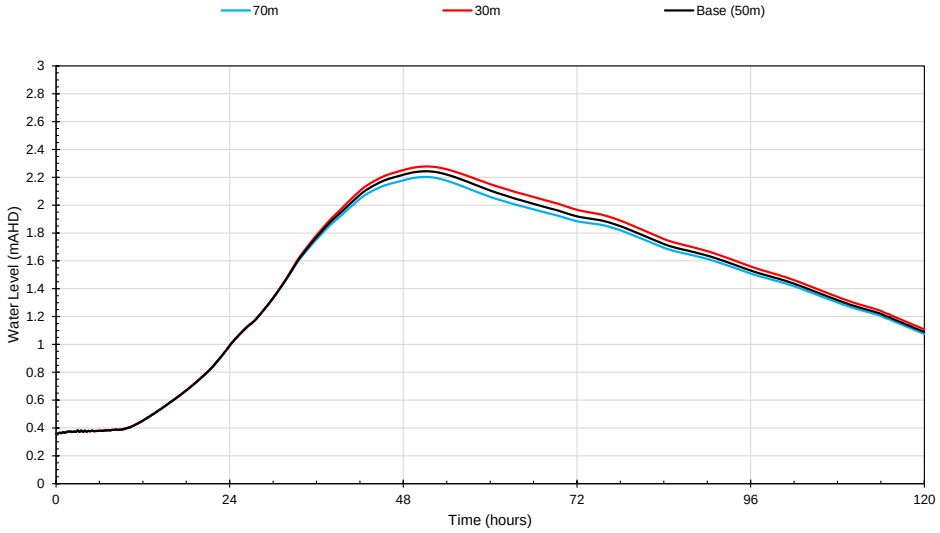

Figure 8.8 Initial channel width sensitivity – Tuggerah Lakes water level

Table 8.8 Initial channel width sensitivity – Tuggerah Lakes peak water level

Difference (m)	Initial channel width (mAHD)			Difference (m)
70 m		Baseline	30 m	
-0.04	2.20	2.24	2.28	+0.04

A narrower initial channel width results in a slightly higher peak, while the wider initial channel width leads to a slightly lower peak compared to the baseline. The results indicate a small effect on the peak water level. It is noted that the rising limb remains largely consistent across all scenarios, showing no significant variation, and that the largest deviation between scenarios occurs at the flood peak. This is likely since the primary effect of this parameter is on the behaviour of the distribution of the scour transition within the TUFLOW scouring framework. In contrast, the tailing limbs of the hydrographs tend to converge with the baseline case, since the final entrance configurations are identical.

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8.5.3 Scour trigger

In order to analyse the influence of the scour trigger on the flood behaviour, the following scenarios were modelled:

- An earlier trigger, set as 1.1 mAHD in Tuggerah Lake;
- A later trigger, set as 1.5 mAHD in Tuggerah Lake.

It is important to note that a scour trigger of 1.3 mAHD in Tuggerah Lake was adopted for the baseline 1% AEP event. These scenarios were modelled for the adopted critical duration and temporal pattern under otherwise standard design conditions, with the results shown as compared to the baseline run in **Figure 8.9** and **Table 8.9**.

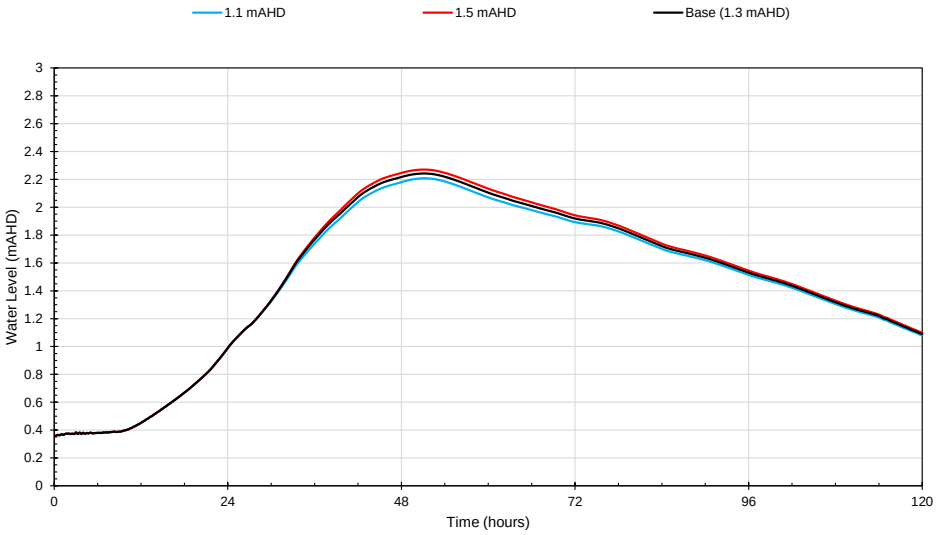

Figure 8.9 Scour trigger sensitivity – Tuggerah Lakes water level

Table 8.9 Scour trigger sensitivity – Tuggerah Lakes peak water level

Difference (m)	Peak water level (mAHD)			Difference (m)
1.1 mAHD		Baseline	1.5 mAHD	
-0.03	2.21	2.24	2.27	+0.03

The later trigger results in a slightly higher peak, while the earlier trigger leads to a slightly lower peak compared to the baseline. The results indicate a small effect on the peak water level. The rising limb, occurring before the scour trigger, remains consistent across all scenarios, showing no significant change. In contrast, the tailing limb of the hydrograph tends to align more closely with the baseline case after the trigger event, regardless of the trigger timing.

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8.5.4 Scour duration

In order to analyse the influence of the scour duration on the flood behaviour, the following scenarios were modelled:

- A faster scour duration, with a total duration of 10 hours;
- A slower scour duration, with a total duration of 70 hours.

It is important to note that a three-phase, 30-hour scour duration was adopted for the baseline 1% AEP event. These scenarios were modelled for the adopted critical duration and temporal pattern under otherwise standard design conditions, with the results shown as compared to the baseline run in **Figure 8.10** and **Table 8.10**.

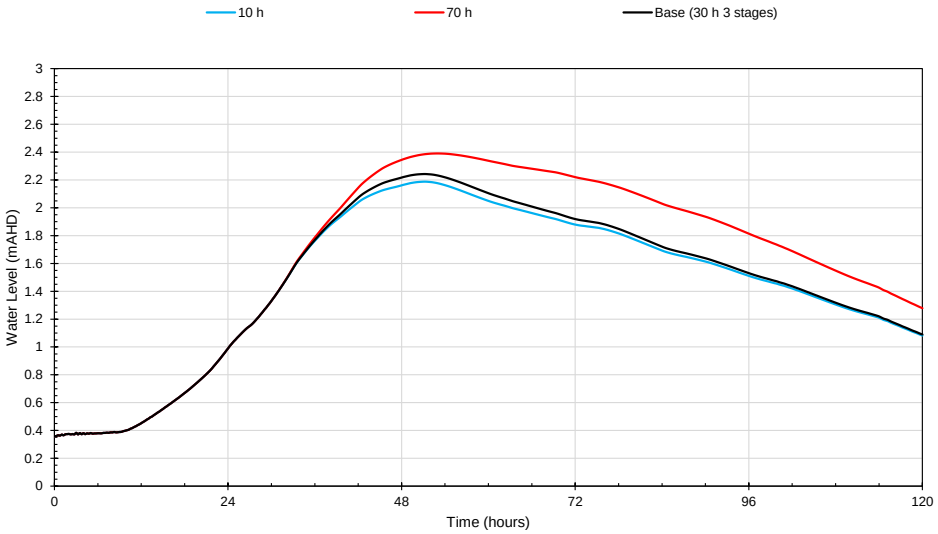

Figure 8.10 Scour duration sensitivity – Tuggerah Lakes water level

Table 8.10 Scour duration sensitivity – Tuggerah Lakes peak water level

Difference (m)	Peak water level (mAHD)			Difference (m)
10 hours		Baseline	70 hours	
-0.05	2.19	2.24	2.39	+0.15

The results indicate that a slower scour duration results in a higher peak, while the faster scour duration leads to a slightly lower peak compared to the baseline. The rising limb, occurring largely before the scour occurs, remains consistent across all scenarios, showing no significant change. In contrast, the tailing limb of the hydrograph remains quite diverged, particularly with the longer scour duration resulting in elevated lake levels for a longer period.

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8.5.5 Final channel level

In order to analyse the influence of the final channel level on flood behaviour, the following scenarios were modelled:

- A deeper final channel level of -3.0 mAHD;
- A shallower final channel level of -1.5 mAHD.

It is important to note that a -2.0 mAHD final channel level was adopted for the baseline 1% AEP event. These scenarios were modelled for the adopted critical duration and temporal pattern under otherwise standard design conditions, with the results shown as compared to the baseline run in **Figure 8.11** and **Table 8.11**.

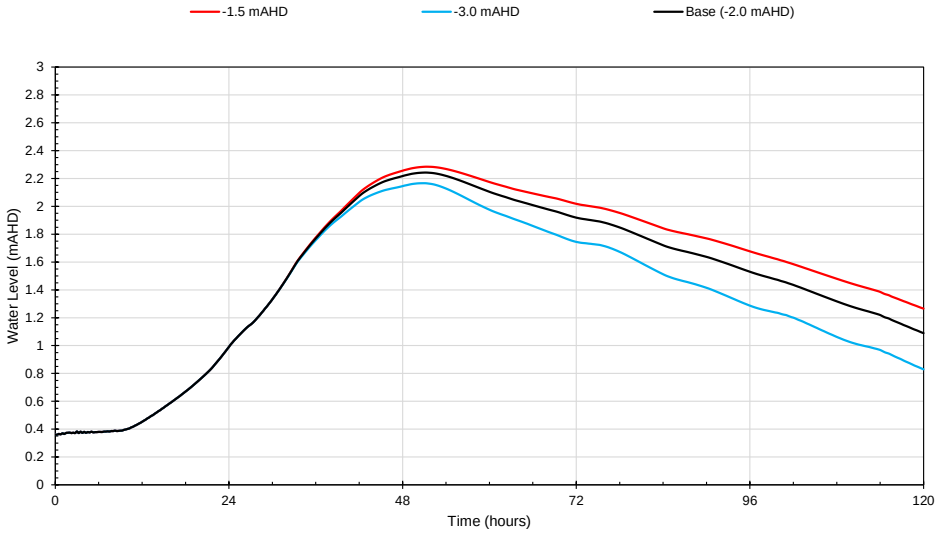

Figure 8.11 Final channel level sensitivity – Tuggerah Lakes water level

Table 8.11 Final channel level sensitivity – Tuggerah Lakes peak water level

Difference (m)	Peak water level (mAHD)			Difference (m)
-3.0 mAHD		Baseline	-1.5 mAHD	
-0.07	2.17	2.24	2.28	+0.04

The peak flood level showed moderate variation compared to the baseline scenario, with a deeper final channel level leading to a reduced peak water level and a shallower final channel level resulting in a higher peak water level. This effect becomes especially pronounced in the tailing limb of the flood hydrograph. As water levels recede, the availability of additional cross-sectional area at lower levels in the case of a deeper channel amplifies the difference in water levels during the tailing limb. Conversely, for the shallower channel, the opposite effect occurs, leading higher water levels for longer in the tailing limb.

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8.5.6 Shoals and ebb channel configuration

In order to analyse the influence of shoal and ebb channel configuration on flood behaviour, a scenario with an initial configuration dredged in accordance with the post-dredge entrance survey conducted in January 2019, which captured the dredging activity performed by Central Coast Council across December 2018 (see **Figure 8.13**). This configuration was also slightly modified to include deepened section connecting the entrance channel and the northern Tuggerah Lakes channel, as illustrated in the *Tuggerah Lakes Entrance Management Study* (see **Figure 8.14**).

It is important to note that an initial channel configuration identical to that of the July 2022 calibration event (see **Section 7.2.6**) was adopted for the baseline 1% AEP event. This scenario was modelled for the adopted critical duration and temporal pattern under otherwise standard design conditions, with the results shown as compared to the baseline run in **Figure 8.12** and **Table 8.12**.

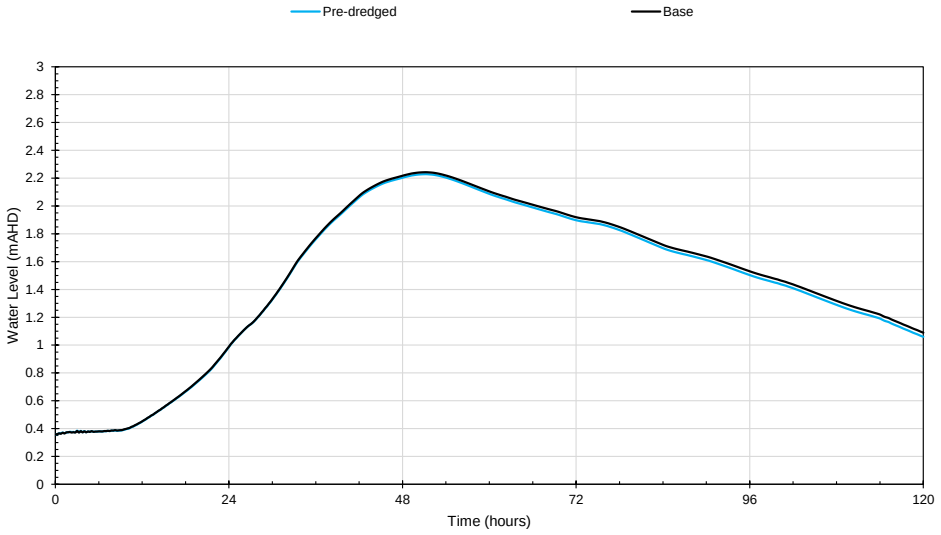

Figure 8.12 Shoal and ebb channel configuration sensitivity – Tuggerah Lakes water level

Table 8.12 Shoal and ebb channel configuration sensitivity – Tuggerah Lakes peak water level

Peak water level (mAHD)		Difference (m)
Baseline	**Pre-dredged entrance**	
2.24	2.23	-0.01

The peak flood level with a pre-dredged channel configuration showed a negligible variation compared to the baseline scenario. This effect becomes slightly more pronounced in the tailing limb of the flood hydrograph, which may be since the dredging is more extensive than the scour area, so as lake levels fall, the discrepancy in conveyance between the dredged and un-dredged post-scour shoals becomes greater.

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Figure 8.13

Satellite imagery of dredged entrance (December 2018)

Legend

Model boundary

Report MHL2929

Tuggerah Lakes Flood Study Review

NSW GOVERNMENT
Manly Hydraulics Laboratory

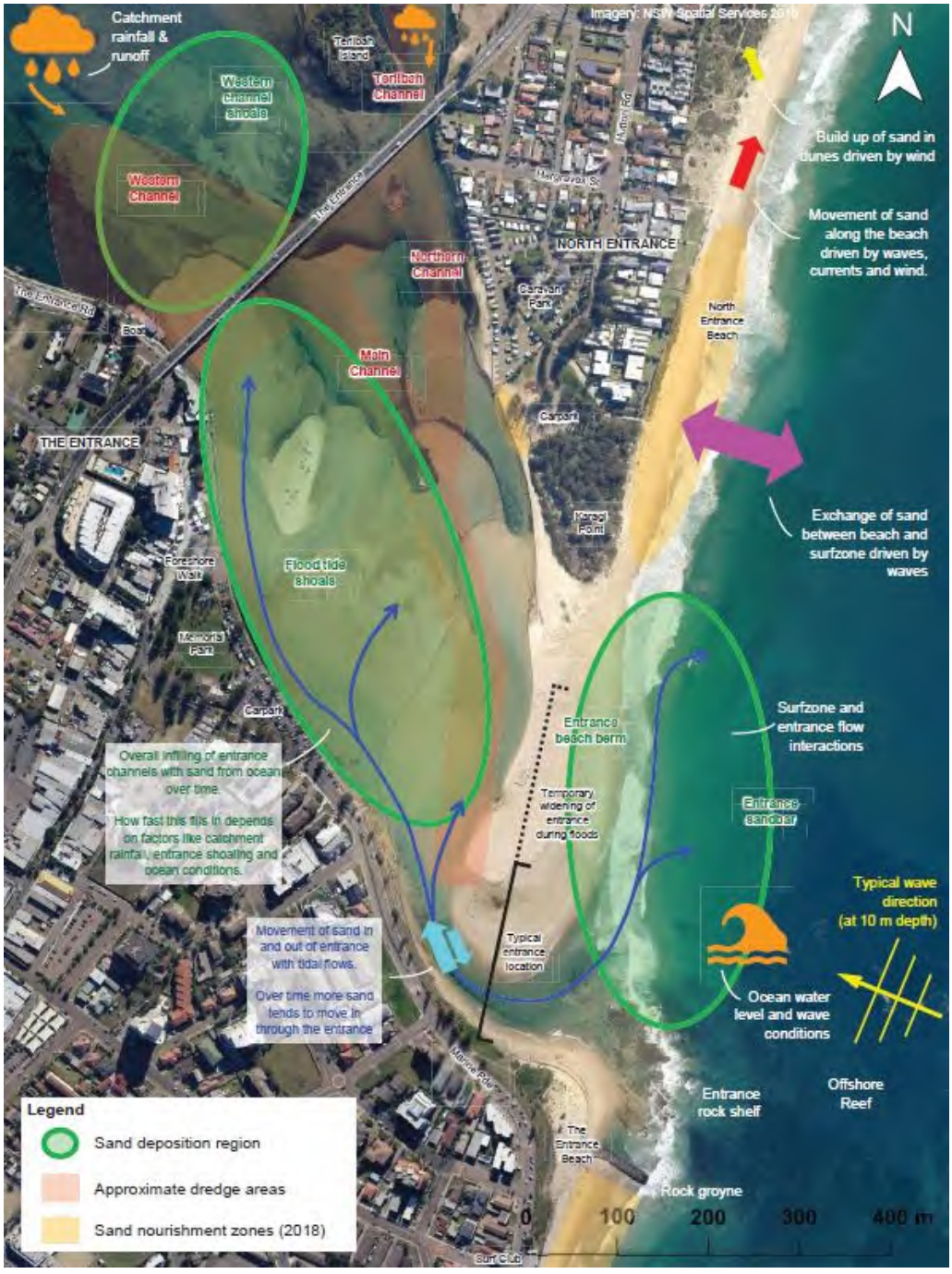

Figure 8.14 Overview of processes at Tuggerah Lakes Entrance (Figure 2.8, Tuggerah Entrance Management Study, 2022), with dredge target area shaded in red

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8.5.7 Entrance under elevated oceanic conditions

In order to analyse the influence of the entrance configuration on tidally driven flood behaviour (i.e., no catchment inflows), the following scenarios were modelled:

- the pre-July 2022 event configuration, which was adopted as the typical 'constricted' configuration of the entrance prior to scouring associated with the runoff related events;
- the post-1% AEP event configuration

It is important to note that the post-July 2022 event configuration, was adopted as the typical 'open' configuration. Each of these entrance scenarios was subjected to the 1% AEP tailwater condition associated with Type C entrances, and minimal catchment inflows, with the results shown as compared to the baseline run in **Figure 8.15** and **Table 8.13**.

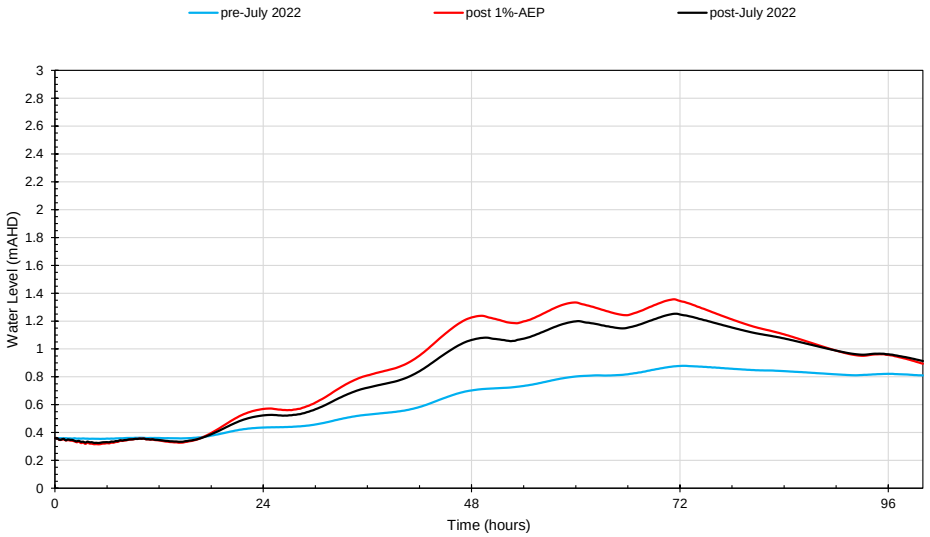

Figure 8.15 Oceanic inundation entrance sensitivity – Tuggerah Lakes water level

Table 8.13 Oceanic inundation entrance sensitivity – Tuggerah Lakes peak water level

Difference (m)	Peak water level (mAHD)			Difference (m)
pre-July 2022		Baseline	post-1% AEP	
-0.37	0.88	1.25	1.36	+0.11

As expected, wider and more open entrance configurations exhibited more responsiveness to elevated ocean levels than the more constricted case. It is noted that the post-July 2022 and post 1%-AEP configurations were more similar than the pre-July 2022 case, indicating that the post-July 2022 configuration substantially accounts for the behaviour of an open entrance.

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9 Design flood conditions

Design floods are hypothetical floods used for planning purposes and floodplain risk management investigations. They are broadly based on having a probability of exceedance, typically specified either as:

- Annual Exceedance Probability (AEP), expressed as a percentage chance of exceedance in any given year; or
- Average Recurrence Interval (ARI), expressed in years.

Design floods are developed using representative model inputs for progressively rarer scenarios. This report uses the recurrence frequency terminology as per current best practice as it highlights the fact that a significant event may occur in any single year, while the ARI terminology may give the wrong impression that they are occurring at a set interval of time. **Figure 9.1** provides a comparison of the various recurrence frequency terminologies and their preferred usage, including the different design floods considered as part of this study, as highlighted in red.

Frequency Descriptor	EY	AEP (%)	AEP (1 in x)	ARI
Very Frequent	12			
	6	99.75	1.002	0.17
	4	98.17	1.02	0.25
	3	95.02	1.05	0.33
	2	86.47	1.16	0.5
	1	63.21	1.58	1
Frequent	0.69	50	2	1.44
	0.5	39.35	2.54	2
	0.22	20	5	4.48
	0.2	18.13	5.52	5
Rare	0.11	10	10	9.49
	0.05	5	20	19.5
	0.02	2	50	49.5
Very Rare	0.01	1	100	99.5
	0.005	0.5	200	199.5
	0.002	0.2	500	499.5
	0.001	0.1	1000	999.5
Extreme	0.0005	0.05	2000	1999.5
	0.0002	0.02	5000	4999.5
			↓	
			PMP/ PMP Flood	

Figure 9.1 Comparison of recurrence frequency terminologies and preferred usage

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9.1 Rainfall and runoff

9.1.1 ARR 2019

The methodology governing the derivation of design rainfall parameters is sourced from Chapter 3 of *Australian Rainfall and Runoff 2019* guidelines (Ball, et al., 2019). ARR (2019) defines statistical rainfall parameters covering Australia in its entirety based on historical observations. These parameters are extracted for the location of interest, in this case across the Tuggerah Lakes catchment, and used to produce design rainfall intensities for a variety of return frequencies and durations.

9.1.1.1 IFD data

The Australian Rainfall and Runoff (ARR) guidelines were updated in 2016, and revised in 2019, due to the availability of numerous technological developments, a significantly larger dataset since the previous edition (1987) and the development of updated methodologies. A key input to the process is information derived from rainfall gauges, and the dataset now includes a larger number of rainfall gauges, which continuously recorded rainfall (pluviometers), and a long record of storms, including additional rainfall data recorded between 1983 and 2012.

ARR 2019 recommended implementing the following features:

- Intensity, Frequency and Duration (IFD) rainfall data, pre-burst, and initial and continuing loss values across Australia;
- Critical duration derived from an ensemble assessment of 10 temporal patterns for each storm duration. The temporal pattern producing the mean level within each duration is selected. The critical duration is the duration for which the selected temporal pattern produces the maximum flood level;
- The inclusion of Areal Reduction Factors (ARFs) based on Australian data for short duration (12 hours and less), long duration (larger than 24 hours), and durations between 12 and 24 hours.

In the present study, the methodologies provided in ARR 2019 were implemented for design flood modelling, as these methodologies represent the best practice and would increase the longevity of the outputs of the Study.

Design rainfalls (ARR 2019 IFDs) were obtained from the Bureau of Meteorology (BoM) for specific AEP and duration combinations across the catchment. The Data Hub metadata is presented in **Appendix B**.

9.1.1.2 Temporal patterns

Temporal patterns describe how rain falls over time and form a component of storm hydrograph estimation. ARR 2019 has adopted a regionally specific ensemble of ten different temporal patterns for a particular design rainfall event. Given the rainfall-runoff response is catchment specific, using an ensemble of temporal patterns attempts to produce the median catchment response.

The ARR 2019 method provides patterns for 12 climatic regions across Australia, with Tuggerah Lakes catchment falling within the Southern Semi-arid region. ARR 2019 provides regional temporal patterns for each duration which are sub-divided into temporal pattern bins

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based on the frequency of the events. **Figure 9.2** shows the temporal pattern ranges (frequent, intermediate, rare, and very rare) for corresponding AEP ranges. In the area of overlap between the "rare" and "very rare" ranges, the "rare" patterns were adopted up to and including the 1% AEP event, and the "very rare" patterns were applied for the 1 in 200 and 1 in 500 AEP events. There are ten temporal patterns for each AEP/duration in ARR 2019 that have been utilised in this study for the 20% event to 1 in 500 AEP events.

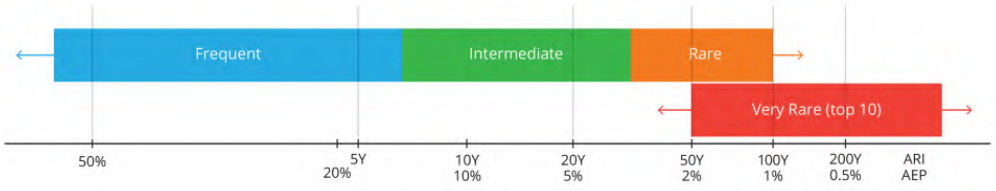

Figure 9.2 Temporal pattern ranges

Temporal patterns for this study were obtained from the ARR 2019 Data Hub (http://data.arr-software.org/). A summary of the data hub information at the catchment centroid is presented in **Appendix B**. The method employed to estimate the PMP utilises a single temporal pattern (Bureau of Meteorology, 2003), as is consistent with ARR 2019.

9.1.2 Areal temporal patterns

ARR 2019 recommends that Areal Temporal Patterns (ATP) should be considered in catchments larger than 75 km^2 to account for the spatial smoothing of rainfall that occurs over larger catchments. The Tuggerah Lakes catchment covers an area of 780 km^2 which is above the threshold of considering ATPs. ATPs are applicable for storm durations including and greater than 12 hours. Hence, ATPs were applied when assessing durations above or equal to this threshold in the hydrologic model.

9.1.3 Areal reduction factors

ARFs are defined as an estimate of how the intensity of a design rainfall event varies over a catchment. The main assumption in this estimate is that large catchments will not have a uniform depth of rainfall over the entire catchment. The ARFs were derived from the ARR 2019 Data Hub and applied in the WBNM models for all investigated design storm events. The ARF varies with AEP and duration, and the resulting set of ARFs for the design storms are provided in **Appendix B**. The ARF for the PMF has been set as 1 as per ARR 2019 recommendations.

9.1.4 Rainfall losses

The design rainfall losses applied in the hydrologic model were modified to match the calibrated parameters as summarised in **Section 6.3.5**, as per the hierarchy of preferred approaches in NSW outlined in ARR 2019 (Ball, et al., 2019). The adopted initial and continuing losses are specified below, with the initial loss rate being lower than that suggested by ARR 2019, but conversely with the initial loss being higher:

- Initial loss: 58 mm,
- Continuing loss: 1.0 mm/h.

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9.1.5 Design events

The design events modelled in this study include:

- Frequent events – 20% AEP
- Rare events – 5% AEP and 1% AEP
- Very rare events – 1 in 200 AEP and 1 in 500 AEP
- Extreme event – Probable Maximum Flood (PMF).

The terminology of these events is defined as per the ARR 2019 guidelines presented in **Figure 9.1**. All events (except the PMF) use spatial and temporal patterns provided by the ARR 2019 Data Hub. The PMF uses a combination of other temporal and areal patterns as described in the following section.

9.1.6 Probable Maximum Flood event

The Probable Maximum Flood (PMF) is the largest flood event resulting from the Probable Maximum Precipitation (PMP). The PMP rainfall depth has been estimated using the ARR 2019 guidelines.

The AEP of a PMP/PMF event ranges between 10^{-5} % and 10^{-7} % AEP for a catchment the size of Tuggerah Lakes, as shown in **Figure 9.3**. This extremely rare probability is beyond the "credible limit of extrapolation". That is, it is not possible to use rainfall depths determined for the more frequent events, discussed in **Section 9.1.5**, to extrapolate to the PMF.

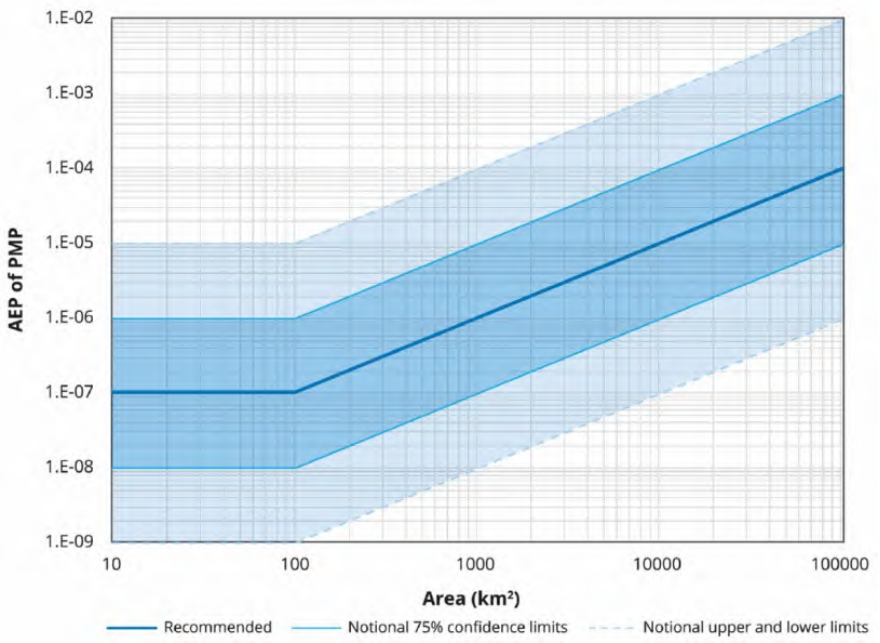

Figure 9.3 Recommended regional estimates for the AEP of PMP (Ball, 2019)

According to the PMP method zones diagram (Bureau of Meteorology, 2003), the Tuggerah Lakes catchment falls within the GSAM-GTSMR Coastal Transition Zone. Therefore, durations of up to 6-hours have been considered for the PMP in accordance with the Generalised Short

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Duration Method (GSDM) derived by the Bureau of Meteorology (BoM) (Bureau of Meteorology, 2003) and durations of 24 hours or longer have been estimated using both the Generalised Southeast Australia Method (GSAM) (BoM, 2006) and the Generalised Tropical Storm Method (GTSMR) (BoM, 2005). Intermediary durations (i.e. 9 hr, 12 hr and 18 hr) have been estimated using all three methods and the maximum has been used for the PMF. A summary of the GSDM, GSAM and GTSMR results were provided in **Table 9.7**, **Table 9.8** and **Table 9.10**, respectively.

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Table 9.1 GSDM summary for Tuggerah Lakes catchment

LOCATION INFORMATION					
Catchment Name:	Tuggerah Lakes		State:	NSW	
Duration Limit:	6.0 hrs	(3 – 6) hours	Area:	797.15 km^2	
Approx. Centroid	Easting		Northing		
Portion of Area Considered:					
Smooth, **S:**	0.00	(0.0 – 1.0)	Rough, **R:**	1.00	(0.0 – 1.0)
ELEVATION ADJUSTMENT FACTOR (EAF)					
Mean Elevation:	118 m	required if greater than 1500 m			
Adjustment for Elevation (- 0.05 per 300 m above 1500 m)		0.00			
EAF:	1.00	(0.85 – 1.00)			
GSDM MOISTURE ADJUSTMENT FACTOR (MAF)					
GSDM MAF:	0.72	(0.46 – 1.19)			

PMP Values (mm)

Duration (hours)	Initial Depth - Smooth (D_S)	Initial Depth - Rough (D_R)	PMP Estimate = (D_S×S+D_R×R)×MAF×EAF	Final PMP Estimate (from envelope)
0.25	-	110.52	80	80
0.5	-	163.86	118	120
0.75	-	211.32	152	150
1	-	254.18	183	180
1.5	-	339.68	245	240
2		399.79	288	290
2.5	-	447.22	322	320
3	-	484.48	349	350
4	-	549.84	396	400
5	-	585.94	422	420
6	-	623.66	449	450

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Table 9.2 GSAM summary for Tuggerah Lakes catchment

LOCATION INFORMATION					
Catchment Name: Tuggerah Lakes			State: NSW		
GSAM Zone: Coastal			Area: 797.15 km^2		
CATCHMENT FACTORS					
Topographical Adjustment Factor			**TAF:** 1.46 (1.0 – 2.0)		
Annual Moisture Adjustment Factor			**MAF = EPW $_{\text{seasonal catchment average}}$ / EPW $_{\text{seasonal standard}}$**		
Season	**EPW $_{\text{seasonal catchment average}}$**	**EPW $_{\text{seasonal standard}}$**	**MAF**		
Summer (Annual)	74.44	80.80	0.92 (0.60 – 1.05)		
Autumn	61.42	71.00	0.87 (0.56 – 0.91)		
Summer PMP values (mm)			**Autumn PMP values (mm)**		
Duration (hours)	**Initial Depth (D_{summer})**	**PMP Estimate (D_s×TAF×MAF_s)**	**Duration (hours)**	**Initial Depth (D_{autumn})**	**PMP Estimate (D_a×TAF×MAF_a)**
24	665.12	893.71	**24**	495.88	625.64
36	750.56	1008.51	**36**	622.11	784.90
48	798.83	1073.37	**48**	738.39	931.61
72	858.86	1154.03	**72**	920.18	1160.97
96	909.05	1221.48	**96**	989.77	1248.77
Final GSAM PMP Estimates					
Duration (hours)	**Maximum of the Seasonal Depths**	**Preliminary PMP Estimate (nearest 10 mm)**	**Final PMP Estimate (from envelope)**		
1	Where applicable, calculate GSDM depths (Bureau of Meteorology, 2003)	180	180		
2		290	290		
3		350	350		
4		400	400		
5		420	420		
6		450	450		
9	(no preliminary estimates available)		570		
12	(no preliminary estimates available)		680		
18	(no preliminary estimates available)		800		
24	894	890	890		
36	1009	1010	1010		
48	1073	1070	1070		
72	1161	1160	1160		
96	1249	1250	1250		

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Table 9.3 GTSMR summary for Tuggerah Lakes catchment

LOCATION INFORMATION				
Catchment Name:	Tuggerah Lakes		State:	NSW
GTSMR Zone:	Coastal			
CATCHMENT FACTORS				
Topographical Adjustment Factor		**TAF:**	1.45	(1.0 – 2.0)
Decay Amplitude Factor		**DAF:**	0.80	(0.7 – 1.0)
Annual Moisture Adjustment Factor	$MAF_a = EPW_{catchment} / 120.00$			
$EPW_{catchment}$:	74.4	**MAF_a :**	0.62	(0.4 – 1.1)
Winter Moisture Adjustment Factor (where applicable)	$MAFw = EPW_{catchment_winter} / 82.30$			
$EPW_{catchment-river}$:	N/A	**MAF_w :**	N/A	(0.4 – 1.1)

PMP Values (mm) – Annual

Duration (hours)	Initial Depth (D_a)	PMP Estimate = $D_a \times TAF \times DAF \times MAF_a$	Preliminary PMP Estimate (nearest 10 mm)	Final PMP Estimate (from envelope)
1	Where applicable, calculate GSDM depths (Bureau of Meteorology, 2003)		180	180
2			290	290
3			350	350
4			400	400
5			420	420
6			450	450
9	(no preliminary estimates available)			570
12	(no preliminary estimates available)			670
18	(no preliminary estimates available)			810
24	1251.27	901.96	900	900
36	1489.82	1073.91	1070	1070
48	1713.40	1235.07	1240	1240
72	2105.41	1517.65	1520	1520
96	2373.03	1710.56	1710	1710
120	2502.93	1804.19	1800	1800

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The temporal patterns used to derive the probable maximum flood (PMF) should be selected from an ensemble of patterns appropriate for use with the Probable Maximum Precipitation (PMP).

At present, the best source of ensemble temporal patterns for use with short duration PMF events are those derived by Jordan et al (2005) for durations up to 6 hours. The procedure to derive the design temporal patterns of the GSAM and GTSMR approaches for durations of 24 hours or longer uses the Average Variability Method of Pilgrim et al. (1969) (BoM, 2005, 2006). The GSDM, GSAM and GTSMR patterns were used for intermediary durations (i.e. 9 hr, 12 hr and 18 hr). The Jordan et al. (2005) patterns were derived specifically from storms associated with thunderstorm or deeply convective events while the GSDM, GSAM and GTSMR patterns are defined in the associated guidelines. The ellipse approach from the GSDM was applied to define the areal pattern for the shorter duration events.

These patterns were therefore adopted in this study and applied to the calculated PMP rainfall depth. The critical pattern was determined as per the typical ARR 2019 guidelines applied to the other design events.

9.1.7 Critical storm duration

For each design AEP event, 11 different durations were modelled ranging from 12 hours to 168 hours, except for the PMF which had twenty durations ranging from 15 minutes to 120 hours. Within each duration, 10 specific rainfall events were modelled (as recommended in ARR 2019) which varied the rainfall temporal pattern, though not the magnitude, over that period. This led to 110 individually modelled rainfall events per design event which were then analysed to pick the one event to use as design rainfall.

Critical durations were selected based on the methodology described in ARR 2019. This methodology consists of selecting, for each duration, the rainfall temporal pattern that is the closest to (and larger than) the average flow obtained from the 10 specific patterns provided in the ARR 2019 database. This provides an automated approach that can then be adjusted for consistency in durations between the various events.

The location that was used to determine the critical duration of the Tuggerah Lakes was determined to be the outflow of the lakes to the ocean, which acted as a proxy for the water level in the lake. However, this location, and therefore the critical duration of the water level in the lakes, is dependent on the entrance configuration. Intuitively, a more constricted entrance would lead to longer critical durations, while a more open entrance state would result in shorter critical durations. A complication of this dependency is the fact that WBNM can only adequately model a static entrance state without the use of its weir scouring capabilities, which were deemed to be inappropriate to adequately represent the scouring mechanisms of the present study. This shortcoming is problematic, as the entrance state of the Tuggerah Lakes is inherently dynamic.

To resolve this, various static outflow rating curves were applied to the final lake catchment to perform a form of sensitivity analysis on the effect of entrance configuration on the critical duration of lake water levels. These rating curves were derived from the hydraulic model, ran using a variety of static entrance configurations, and displayed in **Figure 9.4**. While varying natural conditions led to some noise in these rating curves, the basic effect and behaviour of the entrance was considered adequately represented by the respective curves of best fit, as

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shown on the same plot as dotted lines.

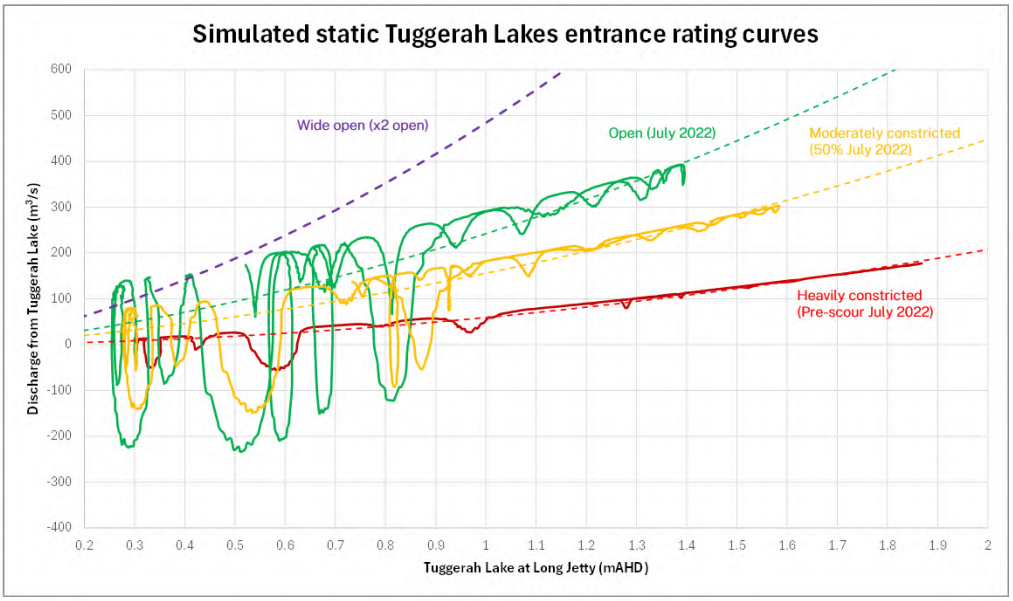

Figure 9.4 Simulated and adopted idealised static Tuggerah Lakes entrance rating curves

Using these representative static entrances in the hydrologic model, the extreme bounds of likely critical durations was defined, as summarised in **Table 9.4**. Durations within these extreme bounds were then taken forth for use in the hydraulic model, with a dynamic entrance configuration, to converge on the most appropriate critical duration. It is noted that the design storm for each AEP is the rainfall event which results in the median flow for the critical duration.

Table 9.4 Likely critical duration range limits from hydrological modelling (with static entrance configuration)

Event	Critical duration (hr) – static entrance configuration	
	Heavily constricted	Open
20% AEP	144	72
10% AEP	120	72
5% AEP	120	72
2% AEP	96	72
1% AEP	96	72
1 in 200 AEP	72	72
1 in 500 AEP	72	48
PMF	120	72

Figure 9.5 presents boxplots for the Tuggerah Lake outflows under the static heavily constricted and wide-open entrance conditions for the critical duration of the various design events. **Figure 9.6** shows boxplots for the Tuggerah Lake outflows under the static heavily constricted and wide-open entrance conditions for the 1% AEP event for all modelled durations, with **Figure 9.7** showing the accompanying hydrographs of all the temporal patterns for the respective critical duration.

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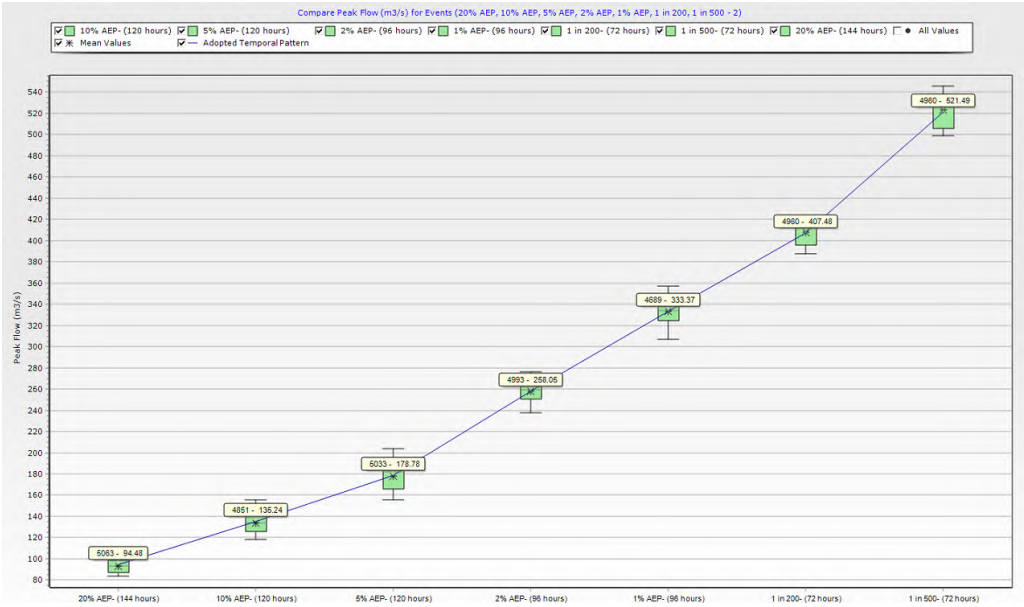

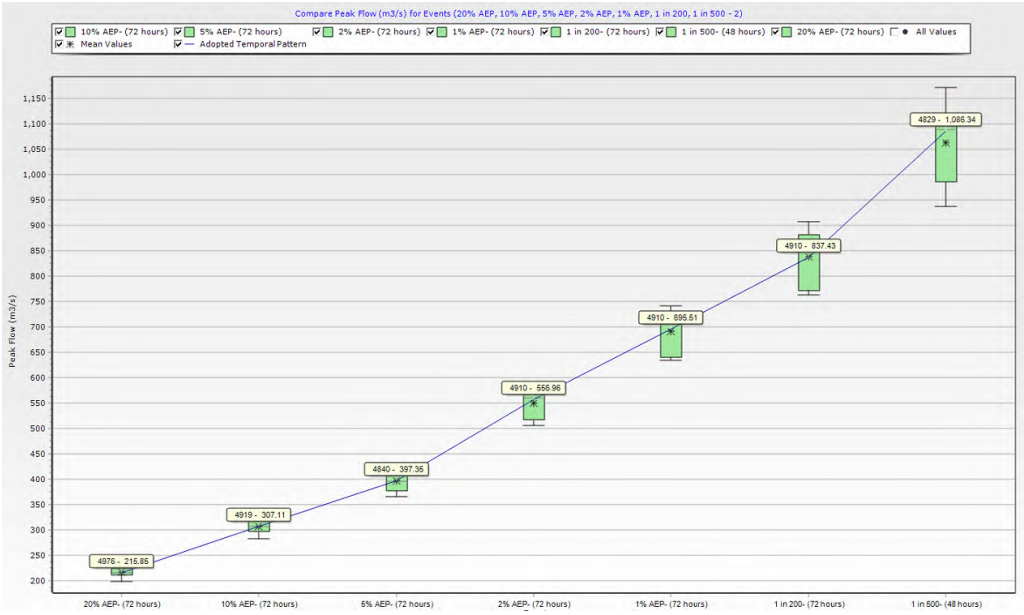

Figure 9.5 Heavily constricted (top) and open (bottom) peak entrance discharge for all IFD design events

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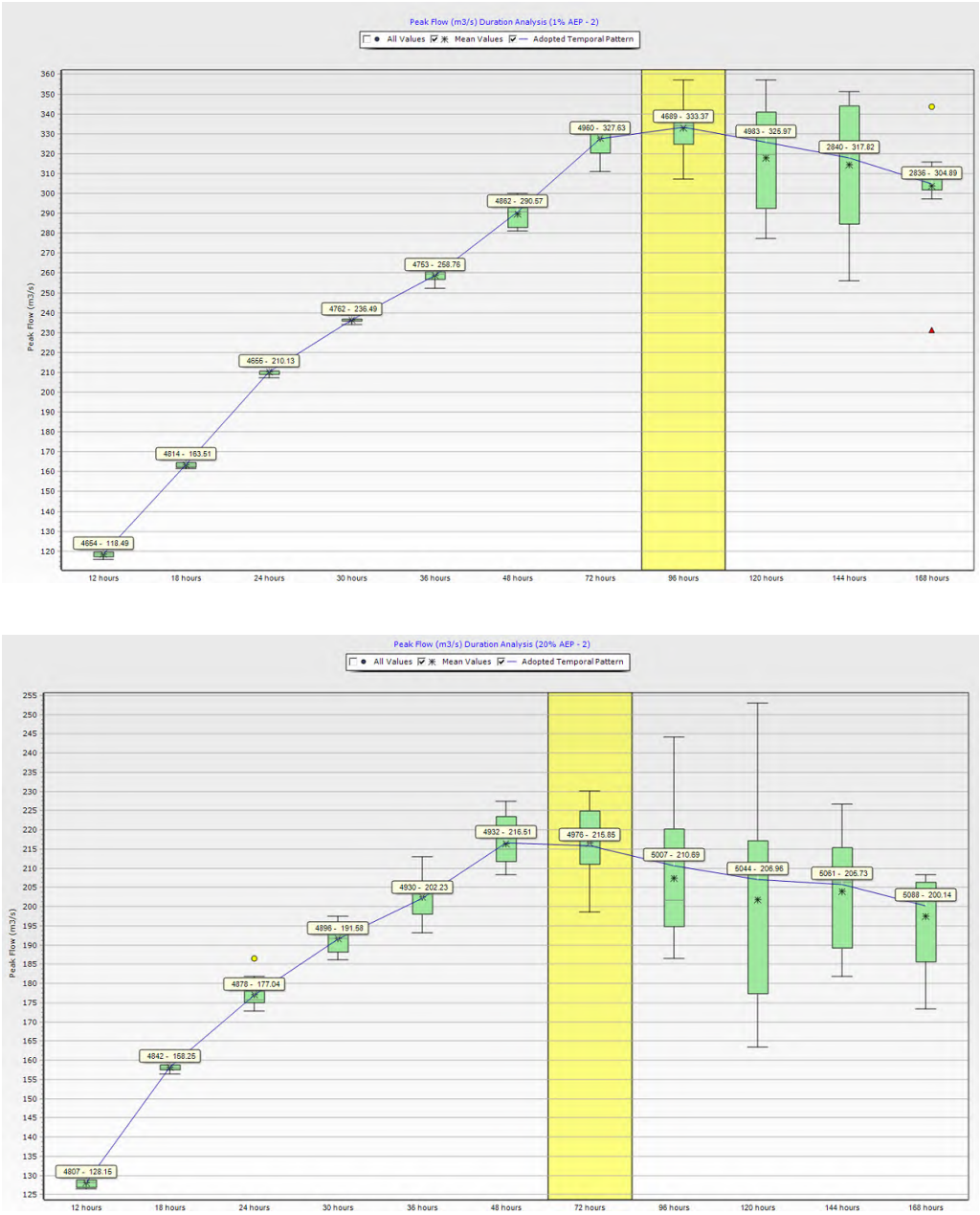

Figure 9.6 Heavily constricted (top) and open (bottom) critical duration analysis for the 1% AEP design event

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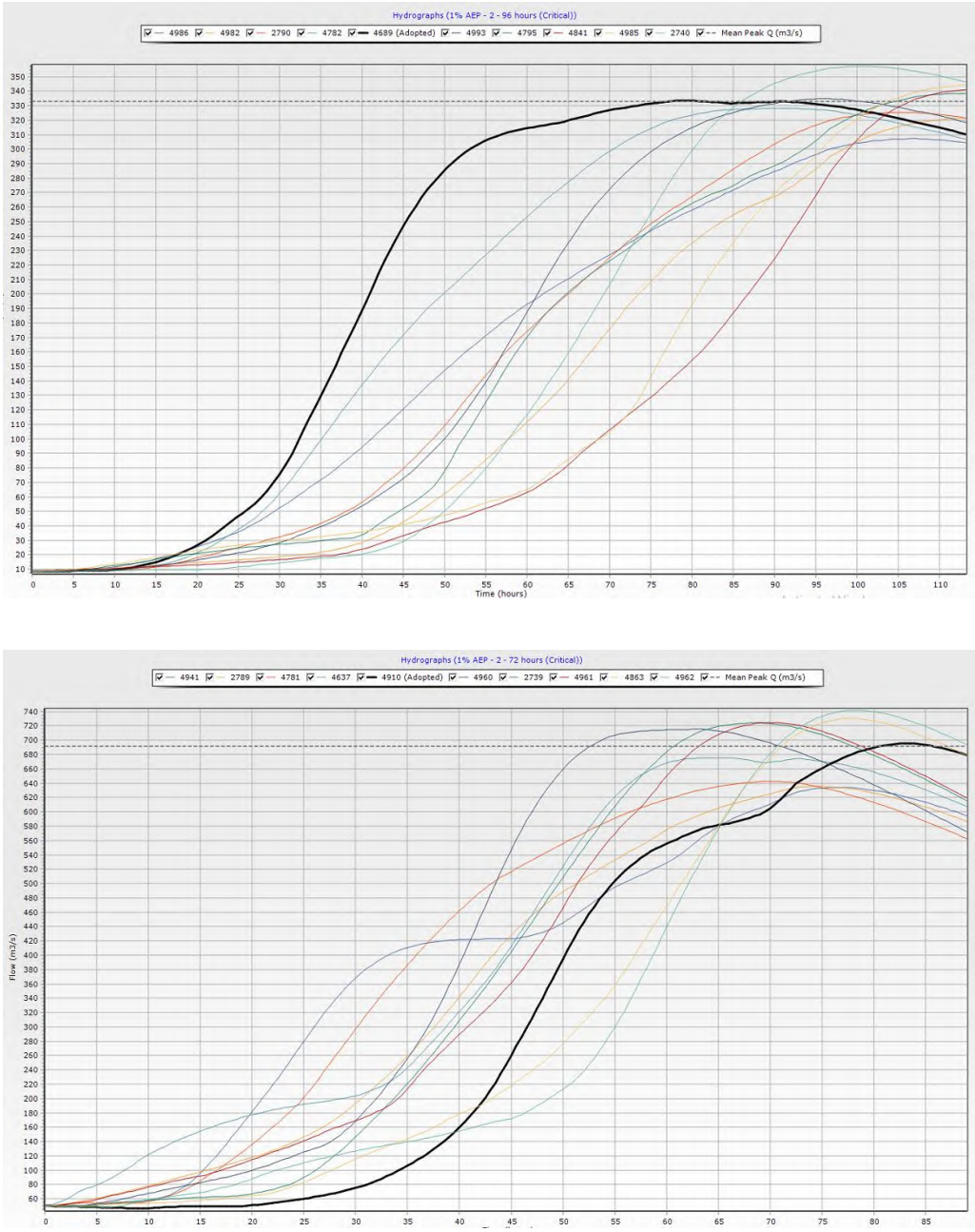

Figure 9.7 Heavily constricted (top) and open (bottom) temporal pattern hydrograph comparison for the critical duration 1% AEP design event

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The selection of the ultimate critical duration under more the more realistic dynamic entrance conditions was based on sensitivity testing in the hydraulic model performed across the range of critical durations identified by the hydrologic model and presented in **Table 9.4**. The adopted critical duration and the associated temporal pattern (from ARR 2019 Data Hub) for each event determined by this approach are presented in **Table 9.5**. As expected, critical durations are longer for smaller events, and shorter for larger events.

Table 9.5 Critical durations for each design event

Event	Adopted critical duration (hr)	Adopted temporal pattern (ARR 2019 Data Hub)
20% AEP	120	5041
10% AEP	120	4851
5% AEP	96	4643
2% AEP	96	4993
1% AEP	96	4689
1 in 200 AEP	72	4960
1 in 500 AEP	48	4829
PMF	72	GTSMR Coastal AVM

9.2 Entrance configuration and behaviour

The Tuggerah Lakes entrance channel is influenced by geomorphological changes due to regular tidal movements and episodic freshwater runoff from the catchment. The *Floodplain Risk Management Guide: Modelling the Interaction of Catchment Flooding and Oceanic Inundation in Coastal Waterways*, published by the former OEH in 2015, offers guidance on the modelling of these entrance morphology aspects.

The appropriate guidance from this document is contingent upon the type of waterway entrance under investigation. As can be seen in *Table 2.1* of the document, the Tuggerah Lakes catchment is classified as a Type C simplified waterway entrance, being an ICOLL.

Table 2.1 – Simplified Waterway Entrance Types

Type A	Type B	Type C
all ***Group 1*** open oceanic embayment all ***Group 2*** tide dominated estuaries ***Group 3*** estuaries: • draining directly to the ocean which have trained entrances and are maintained as navigable ports (e.g. Newcastle Harbour), excludes entrances maintained for small boat craft. • with trained entrances which drain to bays including the Brisbane Water, Tilligerry Creek and Cullendulla Creek. These entrance types result in little ocean tide attenuation and negligible wave set-up.	***Group 3*** estuaries with fully (both sides of entrance) trained entrances which are not maintained as navigable ports. These entrances result in little ocean tide attenuation but have some potential for wave setup	***Group 4*** Intermittently Closed Estuaries or ICOLLS ***Group 3*** estuaries with untrained or partially trained entrances which are likely to have very shallow flow depths across the entrance or may fully close from time to time. In these cases discharge to the ocean will be controlled by outlet berm characteristics (height, width and breadth). Design flood assessment for this classification needs to take into account the berm history and any entrance berm management strategy. The ocean boundary condition determined for the entrance type and approach (see Section 5) should be used as a downstream boundary for modelling, which should start at an appropriate location downstream of the controlling berm

The guidelines outline three broad modelling frameworks: simplistic, general, and detailed, each tailored to specific investigation purposes. Given the broad and important objectives of

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this flood study, a detailed approach was deemed most suitable, as any unnecessary conservatism from an unrealistic level of geomorphological constriction at the entrance would be unacceptable. Accordingly, an *unsteady state (dynamic) entrance conditions* approach was adopted, accurately simulating flood events. This approach allows for the representation of entrance behaviour across its likely dynamic range throughout flood events, effectively accommodating the impacts of varying shoaling and scouring effects. This approach is less conservative than using steady state entrance conditions but is more reflective of actual conditions that can be expected.

Within this approach, initial and final entrance geometry conditions were based on an understanding of non-flood entrance dynamics, physical limits (such as headlands, marine structures, rock shelfs, reefs, etc.) and historical data, especially with respect to the calibration and validation events. As part of this approach, multiple sensitivity simulations were also performed to capture the complexities of entrance behaviour.

The guidelines also observe that where entrances are managed, interventions under an entrance management policy are typically proposed to facilitate berm opening before a flood occurs or before the berm can contribute to elevated water levels in the waterway. In the case of Tuggerah Lakes, only an unadopted interim Entrance Management Procedure exists, serving only as a guide until formalised procedures are formally adopted. Consequently, it was determined that including the effects of any hypothetical interventions as the baseline case would be inappropriate at this stage. This acted to simplify the modelling by considering only natural processes. However, this assumption introduces a degree of conservatism, as it does not account for any favourable outcomes resulting from potential interventions.

In any case, in determining design flood conditions, consideration is given to critical, but reasonable, entrance conditions and behaviour. Furthermore, an envelope of the highest computed water levels between the catchment and oceanic design flood scenarios is adopted to represent the maximum design flood conditions.

9.2.1 Catchment flooding

In order to determine the design conditions for the catchment flooding design event, it was first necessary to define an initial bed level in the entrance channel prior to the erosion induced by the flood. The pre-event configuration of the July 2022 event was adopted as initial channel conditions (see **Section 7.2.6**). The reasoning for this was that this configuration, with broad shoaling in the mid-channel and an approximate entrance throat width of approximately 50m at 0 mAHD, lies between the conceptualised definitions of the Moderately Constricted and Moderately Open entrance states, as defined in the Tuggerah Entrance Management Study, which were found to be the two most common states of the channel. Consequently, while the adopted channel conditions are not representative of the maximum possible degree of shoaling within the entrance as suggested by the guidelines, they do represent the most common configuration prior to the occurrence of a catchment flooding event under modern conditions, which was determined to be the most appropriate and relevant condition in this circumstance. This approach is also consistent with the ‘detailed approach’ framework, as outlined in the aforementioned 2015 guidelines. Sensitivity testing on the initial channel configuration was also performed to inform and quantify any uncertainty associated with the adopted approach. As a result of this reasoning, these conditions were adopted as the initial conditions for all design catchment flood simulations.

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For smaller and more moderate return period flood events (up to the 5% AEP event), the entrance configuration used in the hydraulic model was based on the entrance behaviour observed during the model calibration events. These smaller events are typically long in duration but spend only a brief period above the scour initiation threshold. Therefore, applying the final entrance configuration from the calibration events was considered a conservative yet practical representation for these scenarios.

In contrast, for extreme flood events exceeding the 5% AEP threshold, there were no direct observations or empirical data to inform an appropriate schematisation of entrance behaviour. Consequently, a separate methodology was developed to estimate the extent of scour and the final entrance configuration for these larger events. This approach involved analysing the historical behaviour of the entrance in the wake of observed flood events. A volumetric analysis of tidal exchange through the entrance was conducted using observed lake water levels. Tidal exchange volumes were averaged over a 14-day period to account for variations due to the neap-spring tidal cycle, which could otherwise distort results from shorter sampling periods. These volumes were estimated by converting changes in lake level to volume using the hypsometric curve of the lake bathymetry. To ensure the reliability of this analysis, strict criteria were applied for the selection of appropriate reference events, namely that:

- the reference event exceeded at least 1.0 mAHD;
- the reference event featured a single distinct flood peak;
- the entrance was not significantly open prior to the reference event;
- the entrance position and morphology were generally representative of the design configuration;
- there were no significant inflows from tributary catchments during the tidal exchange sampling period; and
- no major artificial entrance modification or dredging occurred prior to the reference event.

Despite the usefulness of this method, some limitations were acknowledged, including that:

- a limited number of historical events met the selection criteria, reducing the sample size; and
- appropriate tidal exchange volume sampling periods were sometimes well after flood peaks, during which time entrance morphology could have changed due to wave activity or deposition, and as such, the entrance state used for the analysis may not accurately represent that which is relevant.

Noting the results of the EVA, the scour configuration resulting from the July 2022 baseline event was assumed to represent a typical 5% AEP event. Similarly, some of the events analysed as part of the tidal prism analysis were found to resemble a 20% AEP event. To connect observed and modelled entrance behaviours, the modelled entrance configurations representing these equivalent 5% AEP (July 2022) and 20% AEP (unscoured) events were subjected to a 14-day spring-neap tidal cycle without catchment inflows using the TUFLOW model. The tidal exchange volumes simulated closely matched those from historical observations, validating the modelled entrance configurations for these return periods.

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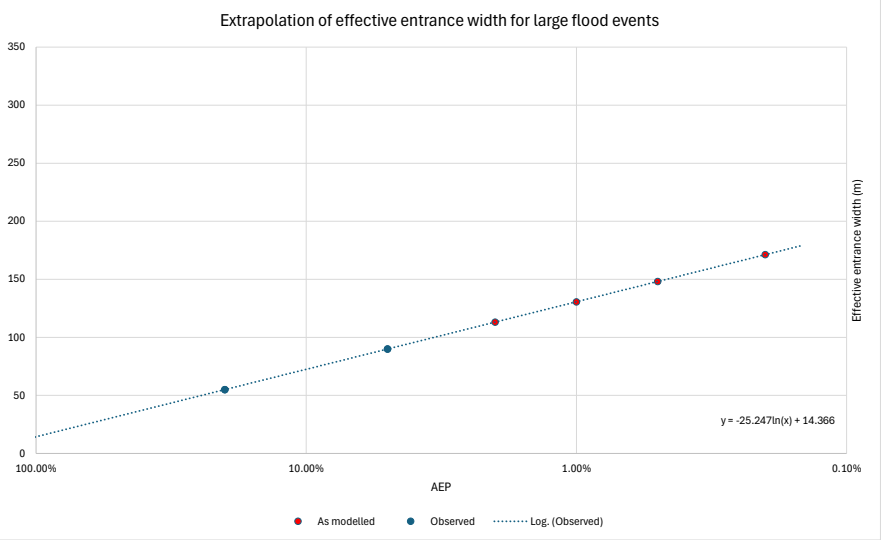

Figure 9.8 Extrapolation of effective entrance width for larger (< 5% AEP) flood events

Next, a logarithmic equation relating the AEP of a given event to its effective entrance width as represented by the design entrance configuration was derived using the effective entrance widths of the observed equivalent 20% and 5% AEP events and is exhibited in **Figure 9.8**. This equation was then used to extrapolate the effective entrance width appropriate to be used for the larger events, with a summary of the adopted effective model entrance widths for these events exhibited in **Table 9.6**.

Table 9.6 Summary of scaling for larger event effective model entrance widths

Event	AEP	Effective model entrance width (at 0 mAHD)
20% AEP	0.20	55
5% AEP	0.05	90
2% AEP	0.02	113*
1% AEP	0.01	131*
1 in 200 AEP	0.005	148*
1 in 500 AEP	0.002	171*

*extrapolated (see **Figure 9.8**)

Finally, as the PMF lies beyond the reasonable limit of extrapolation using this approach, a maximum erosion configuration had to be determined to be adopted for the PMF event. The maximum erosion configuration was the practical limit of erosion which could occur in a timeframe consistent with the duration of the most extreme flooding event in the lakes. Historical geotechnical data was provided by Central Coast Council on behalf of Transport for NSW showing the geotechnical character of the channel in the vicinity of The Entrance Bridge, an extract of which is exhibited in **Figure 9.9**.

By inspection of the data gathered as part of these bore tests, it could be concluded that the entrance channel consists of fine to coarse loose grey and white sands from the surface down to an average rectified depth of approximately 2-3 mAHD. This sand is then underlain with a similar but more compacted sand to depths ranging between 5-7 mAHD. Finally, below this, a stiffer clay layer appears to have been encountered.

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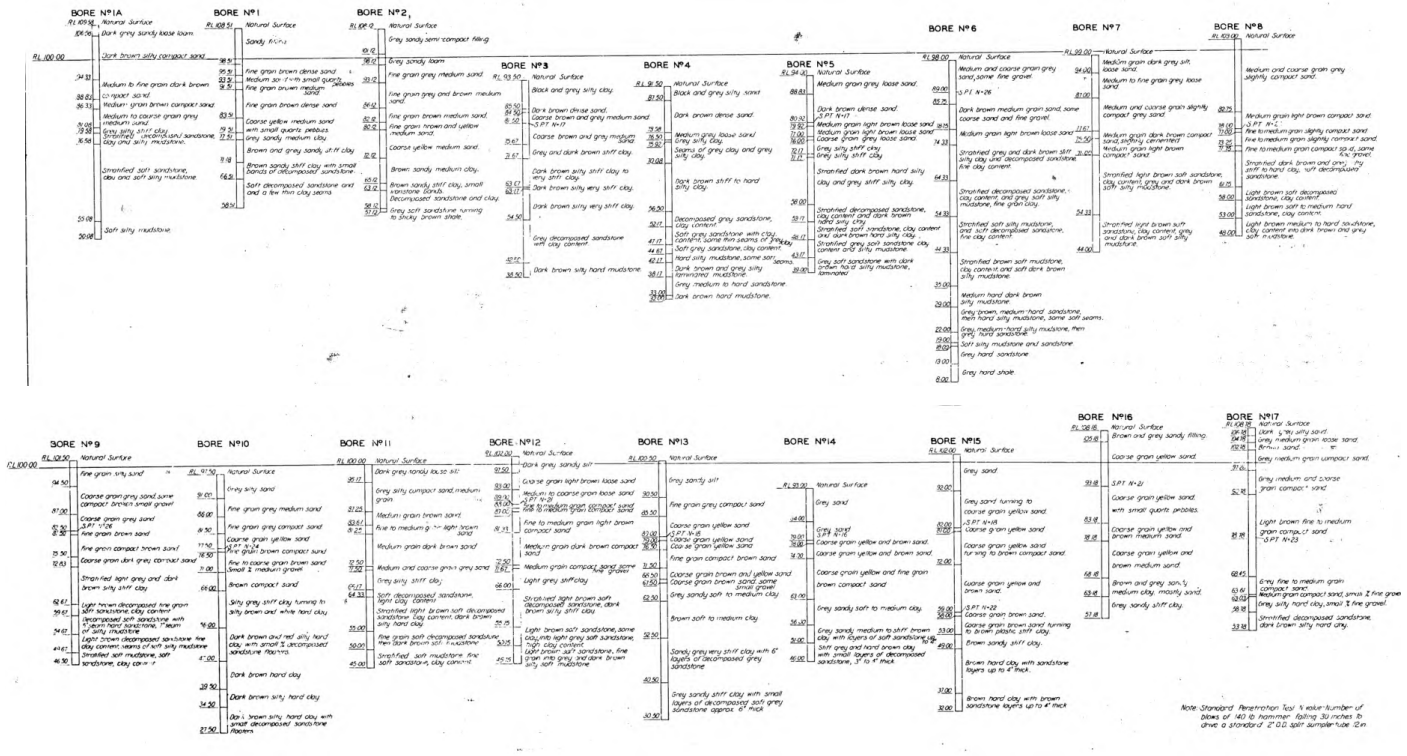

Figure 9.9 Geotechnical (bore hole) data as extracted from the engineering drawings for The Entrance Bridge (TfNSW, 1967)

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As such, and consistent with previous dredging exercises, post-event survey data and other observations within the channel, it was considered that the first layer of relatively loose sands would easily shift in the moderate to rare flood events, while only in the largest event would disturb the underlying and more compacted sandy layers. Finally, it was considered a valid assumption that the underlying stuff clay layers would not significantly erode on the timescales of the PMF event.

Lastly, the regime by which the dynamic model evolved from the initial to the final state had to be defined. The trigger conditions for the entrance scouring processes were defined by reference to the lake level in the Tuggerah Lakes, and with reference to the findings of the calibration and validation processes (see **Section 7.2.6**) and the Tuggerah Lakes Entrance Management study, which found that an approximate level of 1.3 mAHD was critical in this respect.

An identical scouring approach and duration as adopted for the July 2022 baseline calibration event was deemed appropriate for use in the smaller design events. For events exceeding the 5% AEP threshold, the effective scour width became progressively wider. As such, and to address limitations of the scouring regime of the TUFLOW software, longitudinal scour zones were introduced which specifically defined the scour to occur as a progressive entrance widening, rather than a broad progressive lowering of bed levels. This additional measure enabled improved control over the spatial distribution of scour within the defined scour period.

Furthermore, for events larger than the 5% AEP, the scour duration was conceptually expected to be shorter due to the higher rate of scour associated with a larger head differential between the lake and the ocean. Consequently, the overall scour duration was shortened with respect to that of the calibration events to align more closely with the magnitude of larger events, with an adjustment to the scour finalisation duration to 30 hours determined to be appropriate for the 1% AEP event. This adjustment was primarily informed by scour duration sensitivity testing (see **Section 8.5.4**), an analysis of the hydrographs from the calibration and validation events, insights gained from the 2023 Lake Conjola Flood Summary Report model, and the EVA results. Additionally, for the 1% AEP event, the scour durations and final dimensions were found to be generally consistent with the approach adopted in the 1994 flood study.

Ultimately, the approach detailed above regarding the quantification and modelling of scour dynamics has embedded uncertainties. Consequently, conservatism was always favoured, with the EVA detailed in **Section 5** and the sensitivity analysis detailed in **Section 8** vitally important in quantifying these uncertainties, enabling a deeper understanding of the behaviour of the system, and ensuring the validity of the overall results garnered through this approach.

9.2.2 Ocean flooding

Sensitivity testing of the entrance configuration on the 1% AEP tailwater oceanic flooding was performed, comparing the base entrance condition to the pre-July 2022 and post-1% AEP catchment flood estimated entrance configurations, the results of which are presented in **Section 8.5.7**. A static, representatively ‘open’ entrance configuration was determined to be appropriate for the purposes of the tidally driven flooding scenarios. The geometry of the entrance channel immediately after the July 2022 event (see **Section 7.2.6** for further details) was adopted for this purpose, due to the moderate size of the causative event, availability of imagery and survey data, and the categorisation of the entrance as being in the commonly occurring ‘Moderately Constricted’ configuration at that time.

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9.3 Ocean tailwater

9.3.1 Catchment flooding

Similarly to the design entrance channel geometry, the *Floodplain Risk Management Guide: Modelling the Interaction of Catchment Flooding and Oceanic Inundation in Coastal Waterways*, published by the former OEH in 2015, offers guidance on the derivation of appropriate ocean water level boundary condition relevant to the entrance type and location for each design event. For this particular purpose, the guidelines again outline three broad modelling frameworks each tailored to specific investigation purposes.

In this case, the simplistic approach is based on a static and conservative elevated water level at the ocean boundary derived from a still water extreme value analysis performed on long-term data recorded at Fort Denison in Sydney. The *guidelines* note that tidal water levels increase from south to north along the NSW coastline, with Crowdy Head defined as the transition point for defining still water levels. The Tuggerah Lakes entrance lies south of Crowdy Head, and thus falls into the southern zone for this purpose. A summary of peak design ocean water levels for the southern zone is exhibited in **Table 9.7**.

Table 9.7 Summary of peak design ocean water levels for various entrance categories (South of Crowdy Head)

Waterway Entrance Type	Peak design ocean water level (m AHD)	
	South of Crowdy Head	
	1% AEP	5% AEP
A	1.45	1.40
B	2.00	1.90
C	2.55	2.35

This approach was considered too conservative in this case, and therefore the generalised approach was favoured. For this, the guidelines provide indicative time series of dynamic ocean water levels for adoption as oceanic tailwater boundary conditions. These time series have been based on observations of the hallmark May 1974 storm as recorded at Fort Denison in Sydney, factored slightly to peak at the design still water levels mentioned above. These time series for the various entrance configurations are shown for the HHWS(SS), 5% AEP and 1% AEP ocean tailwater conditions in **Figure 9.10**, **Figure 9.11**, and **Figure 9.12**, respectively.

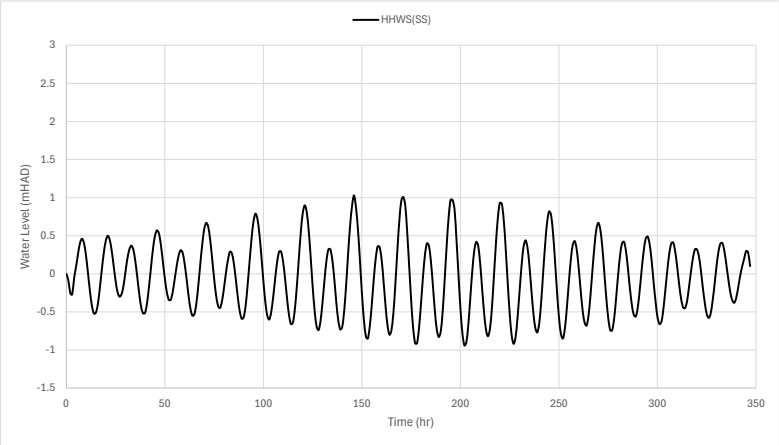

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Figure 9.10 HHWS(SS) ocean water levels (South of Crowdy Head) (mAHD)

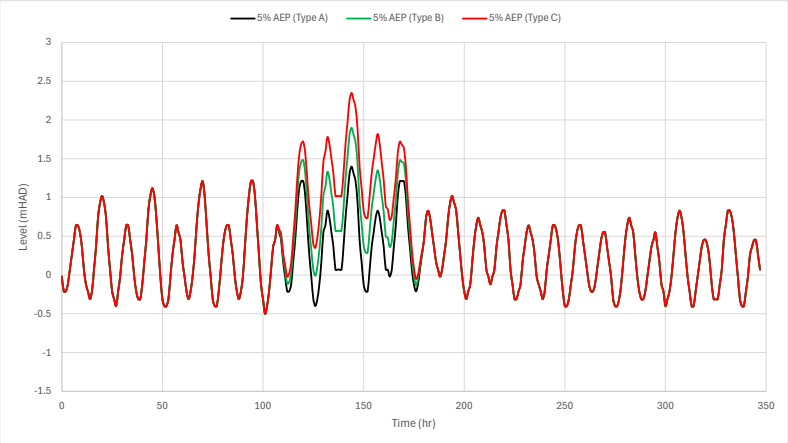

Figure 9.11 5% AEP ocean water levels for various entrance categories (South of Crowdy Head) (mAHD)

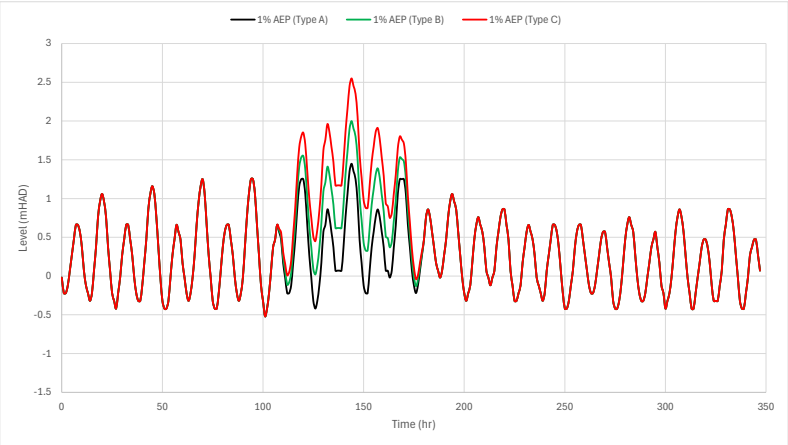

Figure 9.12 1% AEP ocean water levels for various entrance categories (South of Crowdy Head) (mAHD)

Although the Tuggerah Lakes system is classified as a Type C entrance per the 2015 OEH guidelines, the Type B tailwater approach was deemed more appropriate for this case. Several key factors make the Type B condition better suited to the Tuggerah Lakes. Notably, extreme wave setup, the primary driver of tailwater elevation above the Type A baseline, is less likely to occur in the Tuggerah Lakes compared to smaller ICOLL catchments. This is due to the relatively longer critical duration of the Tuggerah Lakes system. For a typical ICOLL with short critical duration, the wave setup may build up along the beach berm that may break quickly during the event and hence the flood water would be slowed down by this elevated ocean level. For an ICOLL with a long duration event such as Tuggerah Lakes, the berm will open over several hours or even days and hence the wave setup would dissipate while entering the lake prior to the lake level peak. Once the lake flood level peak would occur, the ocean would not be as elevated anymore and a Type C entrance would therefore be largely conservative. As such, the Type B classification provides a more realistic representation of the tailwater

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conditions.

The Type B approach was also chosen for its conservatism, as compared to the detailed analysis performed as part of the 1994 study, including joint probability and wave setup modelling. That study estimated a 0.07 m wave setup in conjunction with 1% AEP design catchment runoff conditions, based on offshore waves with a significant height of 4.5 m, which was the most likely scenario deemed to coincide with events of this magnitude.

In conclusion, using the Type B tailwater condition better reflects the actual risks to the Tuggerah Lakes system, without assuming the worst-case wave setup of Type C conditions, while still being more conservative than previous detailed modelling and following the recommendations from the 2015 OEH guidelines. This balanced approach provides a more appropriate and realistic solution for the unique characteristics of the Tuggerah Lakes entrance.

The relevant combinations of catchment flooding and oceanic tailwater scenarios recommended in *Table 8.1* of the 2015 OEH guidelines are tabulated in **Table 9.8**.

Table 9.8 Recommended combinations of catchment flooding and oceanic inundation scenarios for various design AEPs

Design AEP	Catchment scenario	Ocean tailwater
20%	20% AEP	HHWS(SS)
10%	10% AEP	HHWS(SS)
5%	5% AEP	HHWS(SS)
2%	2% AEP	5% AEP
1% (Level)	5% AEP	1% AEP
	1% AEP	5% AEP
1% (Velocity)	1% AEP	ISLW
0.5%	0.5% AEP	1% AEP
0.2%	0.2% AEP	1% AEP
PMF	PMF	1% AEP

For each scenario, the peak of the catchment flooding in the lakes, independent from the oceanic tailwater, was ensured to coincide with the peak of the respective oceanic tailwater condition.

9.3.2 Ocean flooding

The non-flood, ocean-driven flooding scenarios exhibited in **Table 9.9** were also analysed to assess the impact of elevated ocean levels on the entrance under various conditions. The purpose of this exercise was to examine how changes in oceanic tailwater during higher tidal or storm surge events, would affect the lake water levels, even in the absence of catchment-induced flooding conditions. As there was no probabilistic constraint to align the presence of any potential wave setup with the catchment flooding scenario, and for conservatism, it was determined that the Type C setup was to be used for this analysis. This is despite the fact that it is likely that, for the reasoning outlined in **Section 9.3.1**, wave setup effects may be even more diminished in this scenario as a result of the comparatively wider entrance configuration.

Furthermore, the analysis assessed the baseline case for the present year (i.e., 2025, immediate planning horizon), 2040, 2070, and 2120, using the median values for the

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SSP2-4.5 climate change scenario (see **Section 9.5**), to understand the potential future impacts of climate-induced sea level rise on tidally-driven inundation over time.

Table 9.9 Oceanic inundation scenarios

Scenario	Catchment scenario	Sea level rise planning horizon	Oceanic tailwater
1	Non-flood	Present: 2025	MHWS
2			HHWS(SS)
3			5% AEP
4			1% AEP
5		20 year: SSP2-4.5 2040	MHWS
6			HHWS(SS)
7			5% AEP
8			1% AEP
9		50 year: SSP2-4.5 2070	MHWS
10			HHWS(SS)
11			5% AEP
12			1% AEP
13		100 year: SSP2-4.5 2120	MHWS
14			HHWS(SS)
15			5% AEP
16			1% AEP

9.4 Initial water level

For the dynamic modelling of estuaries, the initial water level in the waterway also needs to be established. In the case of ICOLLs, the 2015 OEH guidelines note that initial water levels are often independent of ocean levels, and as such that they can be determined using the following approaches:

1. Considering estuary management strategies, which often include a maximum water level in the ICOLL as a trigger for management response, such as berm opening.
2. Recorded water levels in the estuary, where sufficient record exists.
3. The maximum historic height of the berm, noting that this approach is likely to be conservative.

Owing to the significant history of record in the Tuggerah Lakes recorded at both Toukley and Long Jetty, the long-term median and most frequent water levels as recorded in the lake at these locations was first determined. The results of this process are shown in **Figure 9.13** and **Figure 9.14**, respectively and tabulated in **Table 9.10**.

With reference to these results, for simplicity, and to maintain conservatism, an initial lake water level of 0.36 mAHD was adopted for the base case design runs. Sensitivity testing regarding the effects of the initial lake water level on the 1% AEP event was performed and is presented in **Section 8.3**.

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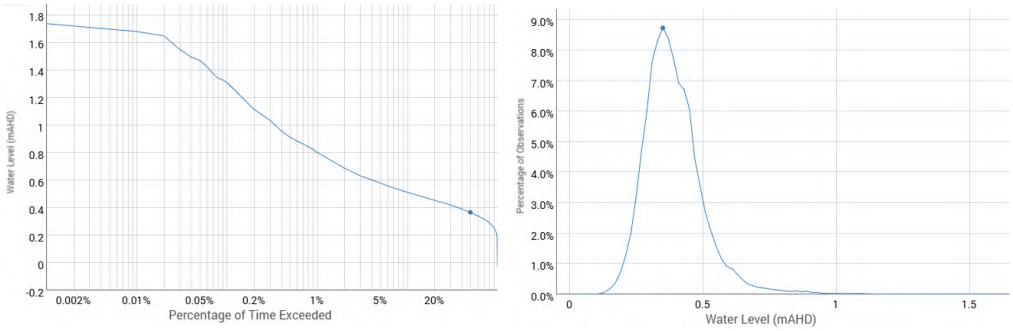

Figure 9.13 Tuggerah Lake water level exceedance curve and frequency distribution at Long Jetty (211418) (DCCEEW, 2025)

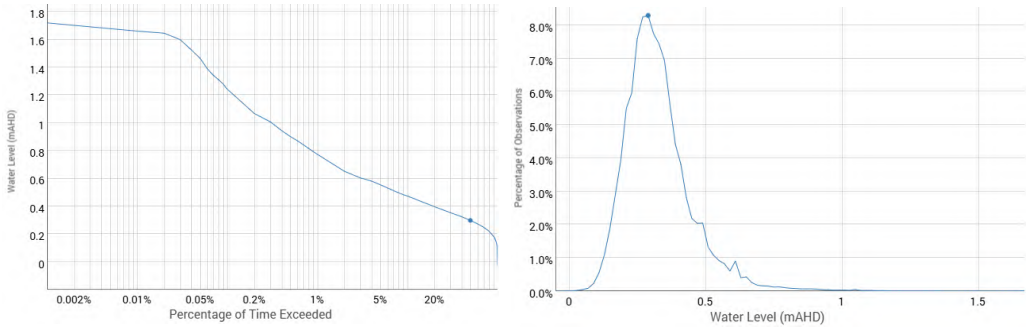

Figure 9.14 Tuggerah Lake water level exceedance curve and frequency distribution at Toukley (211418) (DCCEEW, 2025)

Table 9.10 Tuggerah Lake long-term median and most frequent water levels at Long Jetty (211418) and Toukley (211418)

Station	Water level (m AHD)	
	Median	Most frequent
Long Jetty 211418	0.366	0.35
Toukley 211401	0.299	0.29

9.5 Climate change

An account of the impacts of climate change and its consequent impacts on climate-related factors, such as rainfall, runoff patterns, and sea level rise, is crucial in any contemporary flood risk assessment. Changes in extreme rainfall are likely to represent the primary mechanism for increases in flood risk across most Australian catchments. This section details the revised design rainfall estimates as well as temporal patterns, loss parameters, and sea level rises adopted to quantify the effects of climate change on the flooding behaviour of the Tuggerah Lakes over the next century.

9.5.1 Planning horizons and climate projections

In order to perform an appropriate climate change assessment, the future years and climate change projection scenario of interest must first be established.

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In terms of selecting appropriate future planning horizons for climate change purposes, reference was made to the Open Coast and Coastal Lagoons Coastal Hazard Assessment 2024 commissioned by Central Coast Council. This study assessed SLR for periods of 20, 50, and 100 years into the future from a reference time of 2020, namely in 2040, 2070, and 2120. In order to maintain consistency with this existing study, both the regular catchment flood study climate change assessment and oceanic inundation scenarios performed as part of this study were also performed using the same future years.

Shared Socioeconomic Pathways (SSPs) are a set of scenarios developed by the scientific community to explore different possible futures based on varying levels of socioeconomic development, population growth, and technological advancements. SSPs are used to examine the interactions between climate change and societal factors, helping researchers assess the potential impacts of climate change under different global development pathways. These scenarios are a key tool in climate modelling and help inform policy decisions aimed at reducing climate risks and preparing for future challenges. A summary of the key assumptions underlying each SSP is provided in **Table 9.11**.

Table 9.11 Summary of key assumptions underlying the SSP scenarios

SSP scenario	Description
SSP1-1.9	Holds warming to approximately 1.5°C above 1850-1900 in 2100 after slight overshoot (median) and implies net zero CO2 emissions around the middle of the century.
SSP1-2.6	Stays below 2.0°C warming relative to 1850-1900 (median) with implied net zero emissions in the second half of the century.
SSP2-4.5	Approximately in line with the upper end of aggregate Nationally Determined Contribution (NDC) emission levels by 2030. SR1.5 assessed temperature projections for NDCs to be between 2.7 and 3.4°C by 2100, corresponding to the upper half of projected warming under SSP2-4.5. New or updated NDCs by the end of 2020 did not significantly change the emissions projections up to 2030, although more countries adopted 2050 net zero targets in line with SSP1-1.9 or SSP1-2.6. The SSP2-4.5 scenario deviates mildly from a 'no-additional- climate-policy' reference scenario, resulting in a best-estimate warming around 2.7°C by the end of the 21st century relative to 1850-1900.
SSP3-7.0	A medium to high reference scenario resulting from no additional climate policy under the SSP3 socioeconomic development narrative. SSP3-7.0 has particularly high non-CO2 emissions, including high aerosols emissions.
SSP5-8.5	A high reference scenario with no additional climate policy. Emission levels as high as SSP5-8.5 are not obtained by Integrated Assessment Models (IAMs) under any of the SSPs other than the fossil fuelled SSP5 socioeconomic development pathway.

The relevant SSP scenario adopted as part of the Central Coast Council Draft Flood Policy is yet to be finalised, however the median values for SSP1-2.6 or SSP2-4.5 are favoured at this stage. Noting this, and at the directive of Council in the meantime, all modelling has assumed that the SSP2-4.5 scenario will be adopted. As summarised in ARR 2019 and shown in **Figure 9.15**, this scenario will see a continuation in the trend of rising temperatures since the baseline period (1961-1990) beyond the end of the century, with projected temperature increases for

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the future years of interest summarised in **Table 9.13** in **Section 9.5.5**.

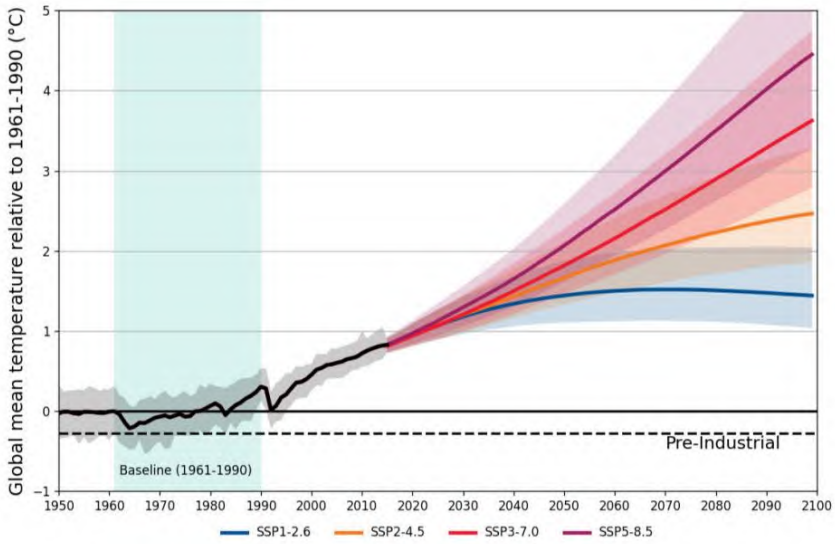

Figure 9.15 Projected temperature increases associated with AR6 socioeconomic pathways relative to 1961-1990 and their associated uncertainty (Ball, et al., 2019)

9.5.2 Rainfall and runoff

The IFD curves, and thus the relevant rainfall depths as provided by the ARR 2019 IFD portal, are based upon data largely collected during the baseline period. This is also the case for the initial losses and continuing losses. ARR 2019 recommends that these design rainfall depths, as well as estimates of the PMP and initial and continuing loss values, should be adjusted using the below equation:

$$I_p = I \times \left(1 + \frac{\alpha}{100}\right)^{\Delta T}$$

In this equation, I_P is the adjusted parameter, I is the original parameter, α is the relevant rate of change, and ΔT is the relevant temperature increase from the baseline period relating to the SSP and future year in question. **Table 9.12** presents the relevant rates of change for each relevant parameter that was used in this equation, as provided by ARR 2019, and the assumption underlying the adoption of each.

Table 9.12 Recommended rates of change (α) for rainfall depth, initial and continuing loss escalations associated with future climate change (Ball, et al., 2019)

Parameter	Rate of change α (% per °C)	Assumption
Rainfall	8.0	Central (median) estimate, >24hr duration
Initial loss	2.0	Central (median) estimate, East Coast South region
Continuing loss	3.8	

A summary of the calculated factors for the three abovementioned parameters is presented in **Table 9.13**.

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9.5.3 Temporal patterns

Currently there is no published methodology for quantifying the effect of changing temporal patterns on design flood estimates, nor published literature on the implications or their impacts on design flood estimates (Ball, et al., 2019). Although there is some evidence that climate change will influence spatial patterns of extreme rainfall, there are considerable uncertainties around such changes for localised regions (Ball, et al., 2019). As such, there is insufficient justification for amending spatial patterns or areal reduction factors in this case.

9.5.4 Sea level rise

Sea level rise is expected to have significant long-term implications on the flooding behaviour of the Tuggerah Lakes. According to the median confidence sea level rise projections under the SSP2-4.5 scenario, shown in **Figure 9.16**, sea levels are anticipated to increase steadily throughout the 21st century. As such, the oceanic tailwater conditions for each relevant future year were raised by this amount, with a summary of these levels provided in **Table 9.13**.

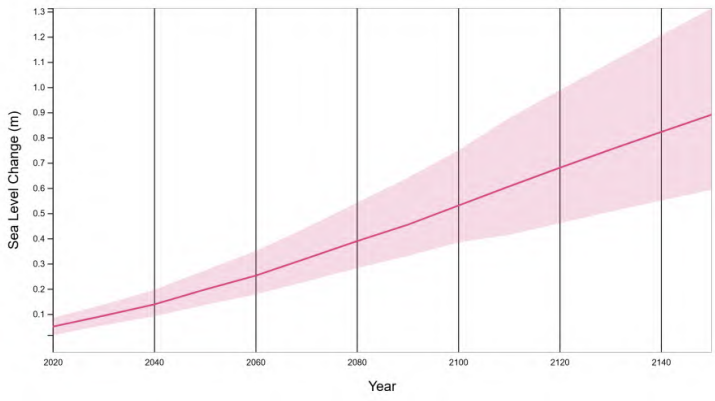

Figure 9.16 Projected sea level rise under the median confidence SSP2-4.5 scenario at Sydney (Fort Denison), with shaded uncertainty envelopes

9.5.5 Other factors

Sea level rise is anticipated to have other long-term impacts on factors that may affect the flooding behaviour of the Tuggerah Lakes. For example, an increase to the baseline sea level is anticipated to increase the average non-flood level of the Tuggerah Lakes and also increase the height to which the entrance berm is built over time due to elevated oceanic water levels and therefore sand deposition. It is noted that these processes are highly complex and therefore a precise quantification of the potential effects of sea level rise on these parameters is not presently feasible.

Nevertheless, and for simplicity, it was determined that a simple way to account for these effects would be to raise both the initial water level of the lake and initial berm heights directly by the relevant sea level rise increase, presented in **Table 9.13**. The raising of the berm level by this amount also resulted in an extension of the scour duration timing, to account for the additional sand volume anticipated to be required to be scoured during entrance opening.

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9.5.6 Summary

Table 9.13 presents a summary of the modelled and calculated climate change factors for the relevant parameters relating to flooding in the Tuggerah Lakes, in accordance with ARR 2019 and the Central Coast Council Draft Flood Policy.

Table 9.13 Summary of projected temperatures and sea level rises, and rainfall and runoff loss increase factors associated with climate change in the relevant future years

Year	Rainfall and runoff				SLR (m)
	Temperature change (°C)	Rainfall factor	Initial Loss factor	Continuing Loss factor	
2040	+1.4	1.11	1.03	1.05	+0.138
2070	+2.1	1.18	1.04	1.08	+0.320
2120	+2.7*	1.23	1.05	1.11	+0.680
Source	(ARR 2019, Section 6.4) (Ball, et al., 2019)				(NASA, IPCC, 2025)

*extrapolated, as ARR 2019 temperature increase projections do not go beyond 2100

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10 Design flood results

10.1 Flood summary

10.1.1 Design floods and PMF

10.1.1.1 Present

The TUFLOW hydraulic model was run for eight (8) flood events including the 20%, 10%, 5%, 2%, 1%, 1 in 200 AEP, 1 in 500 AEP and PMF flood events. The results of these runs are presented in **Figure 10.1**, **Figure 10.2**, and **Table 10.1**.

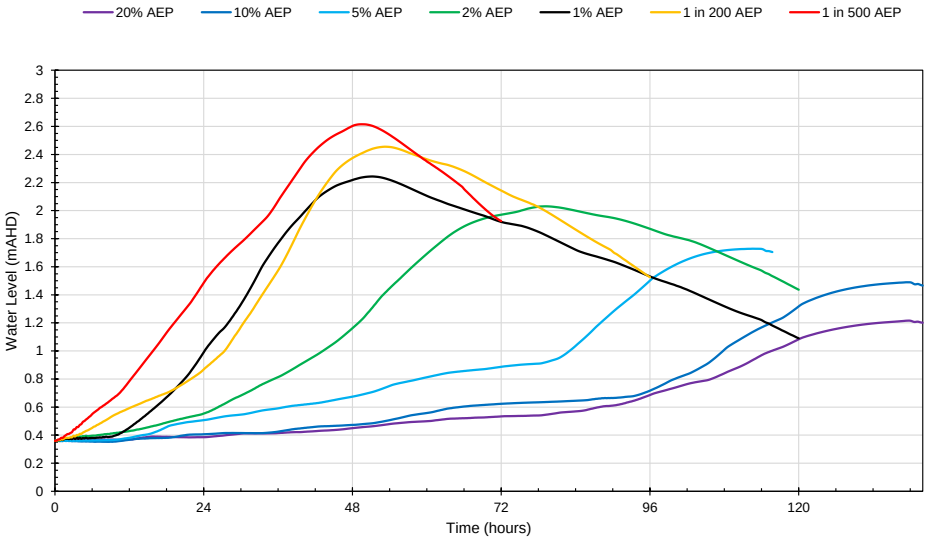

Figure 10.1 Tuggerah Lakes design hydrographs (20% AEP to 1 in 500 AEP)

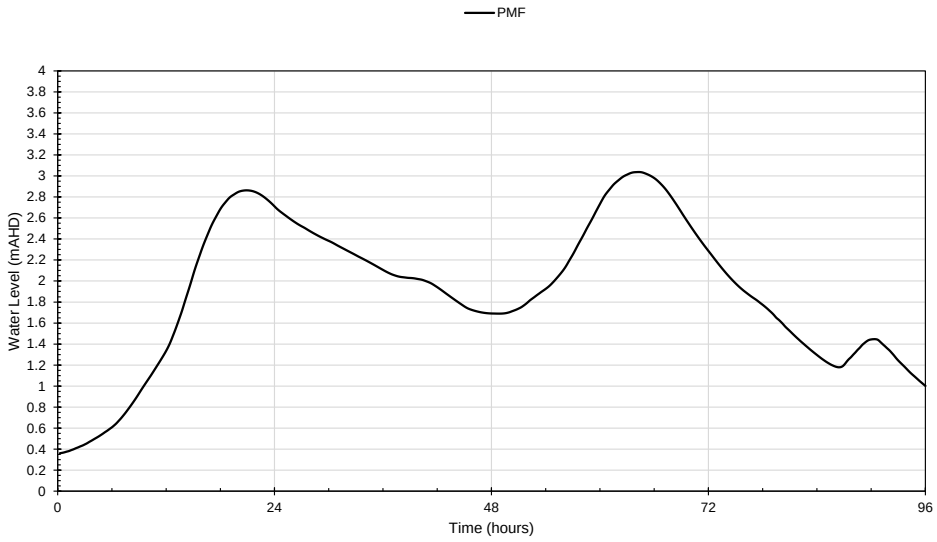

Figure 10.2 Tuggerah Lakes PMF design hydrograph

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Table 10.1 Tuggerah Lakes peak design level summary and comparison with previous study and EVA results

Event	Peak Tuggerah Lakes flood level (mAHD)			
	1994 study	Present study		
		Annual Maximum Series Extreme Value Analysis	Peak-Over-Threshold Extreme Value Analysis	Hydrologic and hydraulic modelling
PMF	2.70			3.04
1 in 500 AEP		2.35 – 2.45		2.62
1 in 200 AEP		2.25 – 2.33		2.46
1% AEP	2.23	2.13 – 2.21		2.24
2% AEP		1.98 – 2.06		2.03
5% AEP	1.80	1.73 – 1.78		1.73
10% AEP		1.50 – 1.53		1.49
20% AEP	1.36		1.07	1.22
50% AEP	0.91		0.76	

Table 10.1 presents a comparison of peak flood levels at Tuggerah Lakes from the 1994 study, the Annual Maximum Series (AMS) and Peak-Over-Threshold (POT) Extreme Value Analyses (see **Section 5**), and the hydrologic and hydraulic modelling of the present study.

The comparison shows varying flood levels across the various AEPs, with the present study generally reporting higher peak flood levels than the 1994 study for events larger than the 2% AEP event, especially for more extreme events like the Probable Maximum Flood (PMF) and the 1 in 500 AEP, where the levels are significantly elevated.

For the more frequent events, both approaches of the present study show a noticeable decrease in peak flood levels compared to the 1994 study.

The 1% AEP in the 1994 study reported a peak of 2.23 mAHD, and while the EVA analysis suggests a slightly lower range of 2.13 to 2.21 mAHD, the present study hydrologic and hydraulic modelling provides a level of 2.24 mAHD.

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10.1.1.2 Climate change (1% AEP)

The TUFLOW hydraulic model was run for three future climate change scenarios for the 1% AEP flood event as discussed in **Section 9.5**. The results of these runs are summarised in **Figure 10.8** and **Table 10.2**.

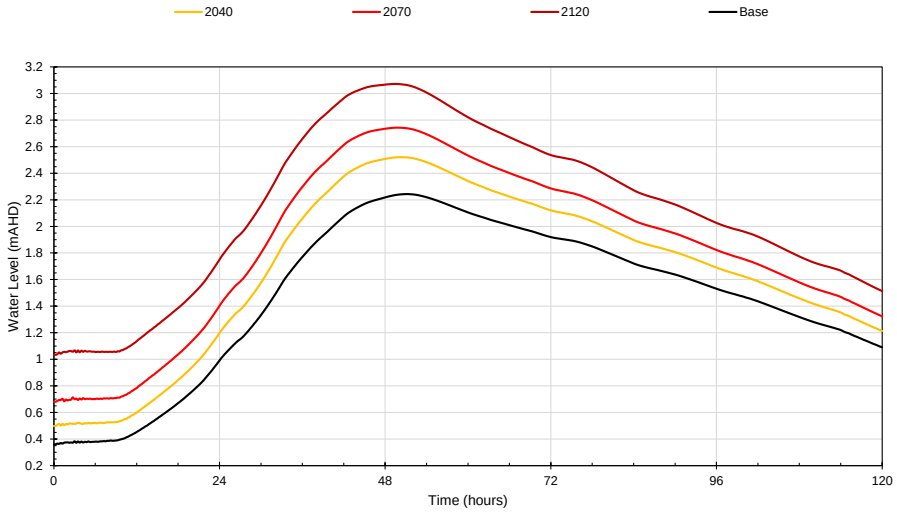

Figure 10.3 Tuggerah Lakes design hydrographs (1% AEP with future climate change)

Table 10.2 Tuggerah Lakes peak flood level summary (1% AEP future climate change)

Event	Peak Tuggerah Lakes flood level (mAHD)			
	Present	2040	2070	2120
1% AEP	2.24	2.52	2.74	3.07
Difference	0	+0.28	+0.50	+0.83

The climate change results shown above exhibit a general increase above the baseline, present-day case. These increases are to be expected as a combined result of the elevation of the tailwater levels associated with sea level rise, and the net increase in catchment runoff. It is worth noting that the 1% AEP may exceed the present day PMF level by 2120.

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10.1.2 Ocean flooding

Results for the oceanic inundation scenarios in the present and future climate change scenarios are presented in **Figure 10.4** to **Figure 10.7**, and summarised in **Table 10.3**.

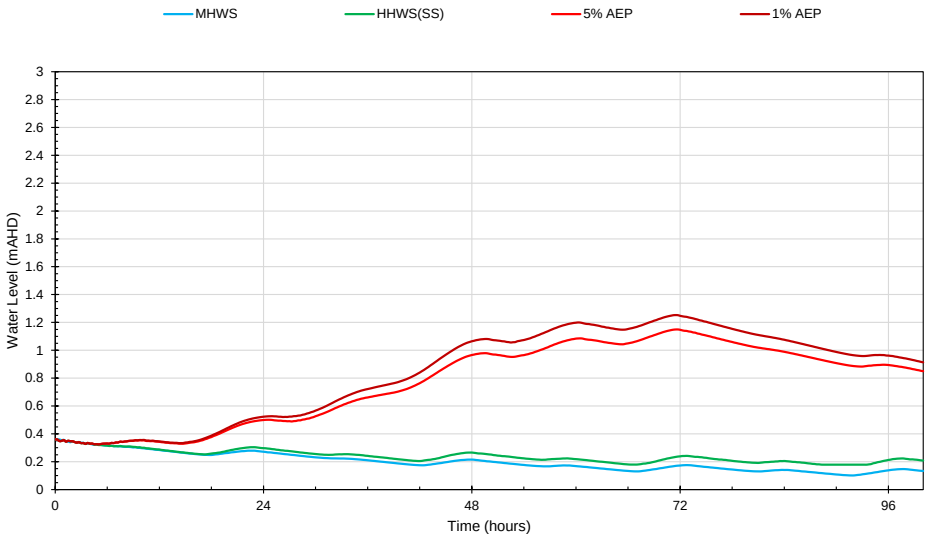

Figure 10.4 Tuggerah Lakes oceanic inundation hydrographs (present conditions)

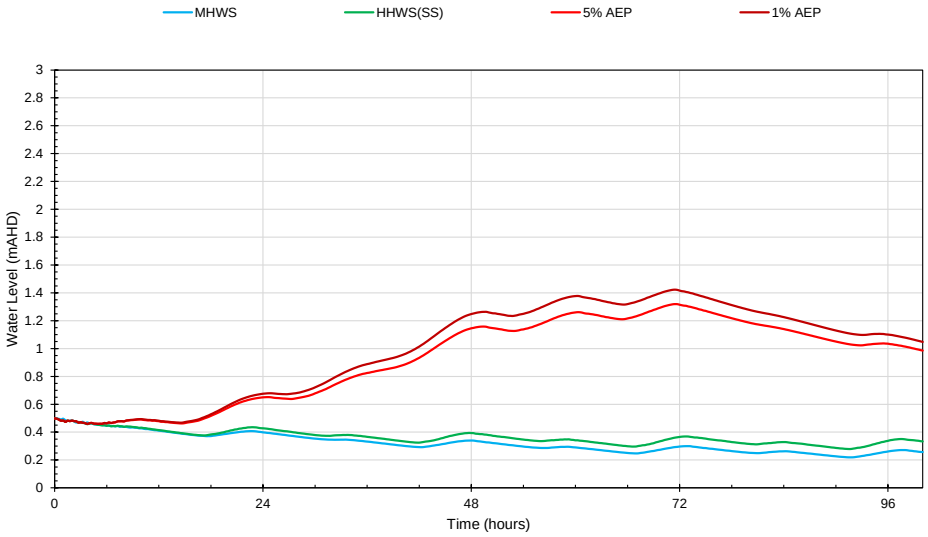

Figure 10.5 Tuggerah Lakes oceanic inundation hydrographs (2040 conditions)

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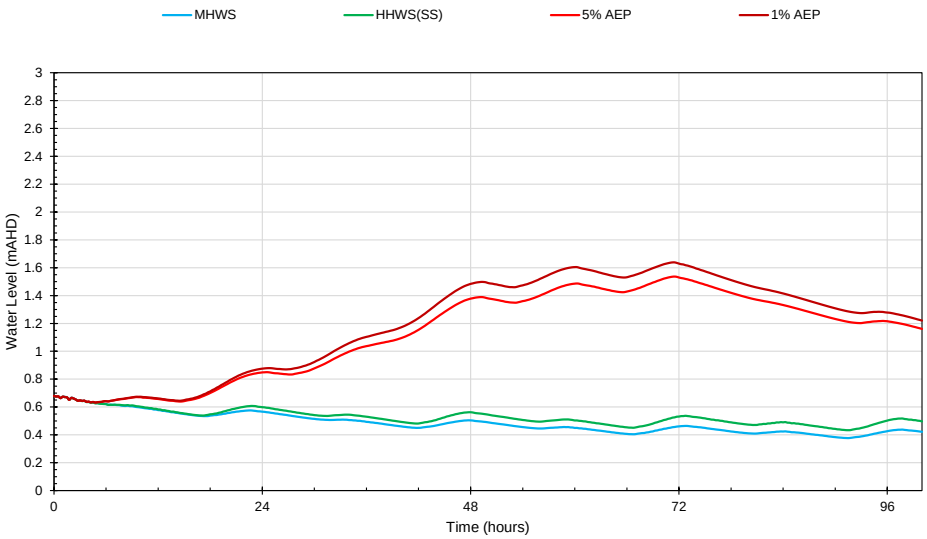

Figure 10.6 Tuggerah Lakes oceanic inundation hydrographs (2070 conditions)

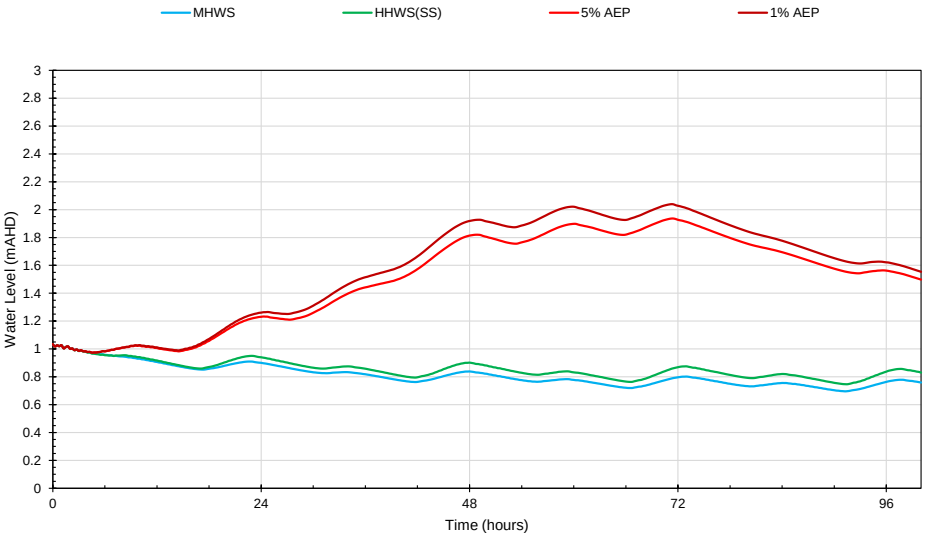

Figure 10.7 Tuggerah Lakes oceanic inundation hydrographs (2120 conditions)

Table 10.3 Tuggerah Lakes peak flood level summary (1% AEP future climate change)

No Flood Event	Peak Tuggerah Lakes flood level (mAHD)			
	Present	2040	2070	2120
MHWS	*	*	*	*
HHWS(SS)	*	*	*	*
5 % AEP	1.15	1.32	1.54	1.94
1% AEP	1.25	1.42	1.64	2.04

*peak did not surpass initial lake water level

All oceanic inundation scenarios with the non-storm MHWS and HHWS(SS) tailwaters saw a

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tendency for the lake levels to fall from the initial lake water level. This may be due to the fact that the long-term median lake level that was adopted as the baseline tailwater condition is likely resulting from an entrance configuration that is substantially more constricted than that adopted in these scenarios.

For the climate change scenarios, the results can be seen to uniformly rise in line with sea level rise. This is to be expected due to the relatively long duration of the elevated ocean water level events allowing flows to enter the lake at a similar rate across the future climate change scenarios. The shape of the response in water level during the respective climate change scenarios is nearly identical.

10.2 Flood mapping

10.2.1 Peak water levels and depths

Flood mapping presenting the peak flood level, depth and velocity of each event is provided in **Section 10.1** is provided in **Appendix C**.

Once the flood mapping was completed for these primary parameters, it became possible to determine the flood function, preliminary flood hazard and preliminary flood emergency response classifications resulting from these data. Development of such categorisations is described in subsequent sections.

10.2.2 Flood hazard

A starting point for the assessment of Flood Life Hazard categories is to better understand the flood hazard. The Flood Hazard (FB03) guideline (2023) of the Flood Risk Management Manual refers to the set of hazard vulnerability curves presented by the Australian Disaster resilience Handbook, shown in **Figure 10.8**. This diagram shows how combinations of various flood depth and velocity conditions affect the stability of vehicles, pedestrians and buildings.

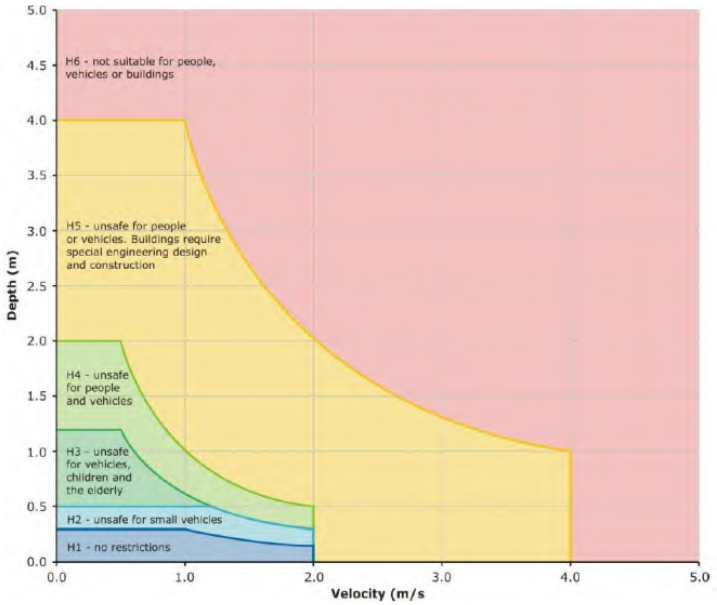

Figure 10.8 General flood hazard vulnerability curves (AIDR, 2017)

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The above hazard vulnerability categories have been mapped for the 20%, 10%, 5%, 2%, 1%, 1 in 200 and 1 in 500 AEP and PMF events across the study area and are presented in **Appendix D**. It is noted that the mapping of flood hazard was focussed on flooding associated with the Tuggerah Lakes and areas solely affected by tributary catchment and overland flooding were not assessed.

It is noted that the vast majority of the areas affected by lake inundation have a very low to zero flow velocities, and as such their hazard categorisation is predominantly dependent on the depth of the floodwater. In other words, the hazard categorisation as defined in **Figure 10.8** can be simply defined through a reading of the y-axis alone. Key exceptions to this generality include the channels between the Tuggerah Lakes, the Entrance channel, and tributary channels, where velocities are higher.

During a 1% AEP flood event, the extent of hazard conditions between H3 and H6 are typically concentrated within and along the Tuggerah Lakes, the entrance channel, tributaries and drainage channels, with most of the lake foreshore areas ranging from H4 to H1 as depths decrease. Particular pockets of note along the foreshore area affected by hazard categorisations that hinder access (>H2) include the low-lying areas around the Saltwater Creek in Killarney Vale, Chittaway Point, Tacoma South, Tuggerawong, and The Entrance North.

The PMF flood event sees the incursion of higher hazard ratings into those areas identified along the lake foreshore identified above, with the corresponding increase in depths resulting in a consummate increase in flood hazard and extent of affected areas. New areas of significant hazard include Budgewoi, Tuggerawong, Rocky Point, Killarney Vale and Tumbi Umbi.

10.2.3 Preliminary flood function

Flood function categorisation is a useful tool in assessing the suitability of land use and development in flood-prone areas. The Flood Function (FB02) guideline (2023) of the Flood Risk Management Manual refers describes the following three hydraulic categories of flood-prone land:

- **Floodway** – generally areas which convey a significant portion of water during floods and are particularly sensitive to changes that impact flow conveyance. They often align with naturally defined channels.
- **Flood Storage** – generally areas, outside of floodways, that store a significant proportion of the volume of water and where flood behaviour is sensitive to changes that impact on the storage of water during a flood.
- **Flood Fringe** – areas within the extent of flooding for the event but which are outside floodways and flood storage areas. Flood fringe areas are not sensitive to changes in either flow conveyance or storage.

These qualitative descriptions do not prescribe specific thresholds for determining the hydraulic categories in terms of model outputs, and such definitions may vary between floodplains depending on flood behaviour and associated impacts.

For the purposes of the Tuggerah Lakes Flood Study Review, hydraulic categories have been defined as per the criteria in **Table 10.4**. The floodway criterion has been selected as it

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provides satisfactory continuity of flow along the various key flow paths into, between and out of the Tuggerah Lakes.

In order to determine an appropriate depth threshold between areas to be designated as flood storage and flood fringe, further analysis was performed to quantify the storage loss and associated lake level rise at the 1% AEP flood level, for various flood storage/fringe depth thresholds.

A worst-case, and therefore conservative, scenario was assumed, being that all areas with depths of less than the chosen threshold (i.e., all flood fringe areas) were to be filled in and assessed the impact of this total volume of filling on the lake level.

This analysis yielded the relationship presented in **Figure 10.9**. The x-axis shows the flood storage to fringe depth threshold and the y-axis shows the associated increase in flood level above the 1% AEP level, in centimetres.

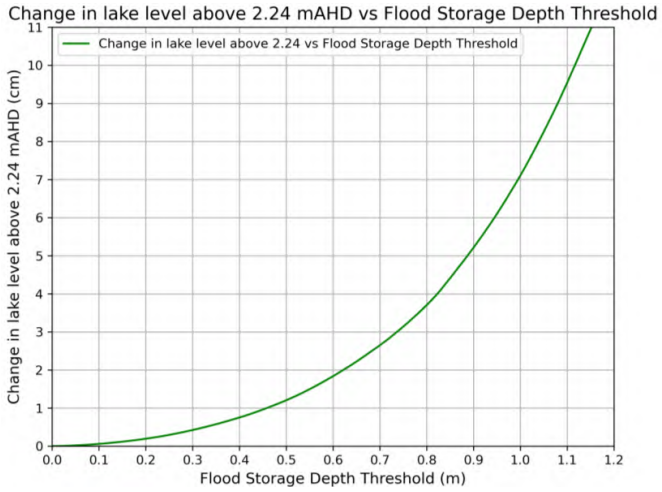

Figure 10.9 Increase in 1% AEP lake level for various flood fringe/storage depth thresholds

It was found that a depth threshold of 0.5 m would result in an approximate 1.3 cm rise in lake levels at the 1% AEP level (2.24 mAHD) and therefore is appropriate to use as a threshold.

Table 10.4 Flood function criteria

Flood function	Criteria	Description
Floodway	Velocity x Depth ≥ 0.25 m^2/s	Flow paths and channels where a significant proportion of flood flows are conveyed
Flood Storage	Depth ≥ 0.5 m Not Floodway	Areas that temporarily store floodwaters and attenuate flood flows
Flood Fringe	Depth ≤ 0.5 m, Not Floodway or Flood Storage	Generally shallow, low velocity areas within the floodplain that have little influence on flood behaviour

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It is also noted that these criteria are generally similar to those used in various recent studies around NSW, including other similar catchments on the Central Coast such as the Coastal Lagoons Catchments Overland Flood Study.

Flood function mapping for the 1% AEP and PMF design events is presented in **Appendix E**. It is noted that the mapping of flood function was focussed on flooding associated with the Tuggerah Lakes and areas solely affected by tributary catchment and overland flooding were not assessed.

During a 1% AEP flood event, the floodways typically remain within the lakes, the channels between the lakes, the entrance channel, the main lake tributaries and drainage channels. The most significant exceptions to this include breakout areas along the Wyong River at Tuggerah Nature Reserve, and from Ourimbah Creek at Hanalei Avenue and Henry Street. Many properties along the lake foreshore are located within the flood storage area. Most of the inundated area behind Wilfred Barrett Drive in The Entrance North and in Budgewoi is classified as flood fringe, with some pockets of flood storage. Most of the area of the lakes is classified as flood storage.

During a PMF event, the areas designated as floodway are much more substantial, with the majority of the lake bodies lying generally between the tributaries, lake channels and The Entrance Channel designated as floodway. Significant areas of floodway breakout areas are observed from the Wyong River and Ourimbah Creek, forming a broad, almost contiguous floodway area from these tributaries stretching from Tuggerawong to Berkeley Vale. Many properties along the lake foreshore are located within the flood storage area. Most of the inundated area behind Wilfred Barrett Drive in The Entrance North and in Budgewoi is classified as flood storage, with some pockets of flood fringe. Floodway areas are also noted along roadways in The Entrance North.

10.2.4 Preliminary flood emergency response classifications

In order to assist in the planning and implementation of response strategies, DCCEEW developed the support for emergency management planning guideline (EM01) to classify communities according to the ease of evacuation (DPE, 2023d). The guideline classifies communities as presented in **Figure 10.10**.

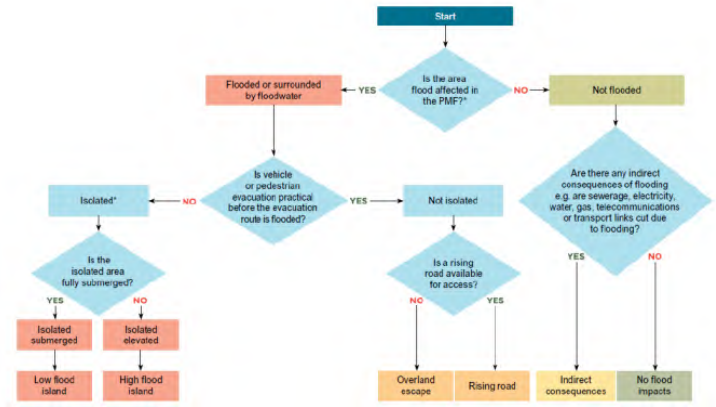

Figure 10.10 Flow chart for determining flood emergency response classifications (DPE, 2023d)

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Flood Emergency Response Classifications (FERCs) can be based upon a variety of design events, in this case being the 20% AEP, 1% AEP and PMF event. Some consideration has been given to building locations on a block affected by flooding, but no consideration has been given to building styles.

Isolated areas may also be known as flood islands, where areas are isolated solely by flood waters. Where flood islands are completely submerged in a particular event, these may be called low-flood islands. Where flood islands have elevated areas above the particular event, they may be called high-flood islands. Properties classified as high-flood islands (Isolated elevated) indicate that the buildings remain dry (no flood above the floor level); however, access to the properties is cut off by flood water.

Mapping FERCs is to a degree a subjective exercise. Nevertheless, it serves to highlight areas most at risk in the event of severe flooding where people fail to evacuate early or shelter in houses is unsuitable for that purpose.

For the purposes of this study, the FERCs were determined using the hazard mapping as discussed in **Section 10.2.2**. These results were geometrically compared computationally to assess whether a viable escape route was available either on foot (<H3) or using a vehicle (<H2). This process does not assess the practical viability or safety of these escape routes and solely determines the escape viability from the geometric properties of the hazard categorisation data. Subsequently, a manual process was undertaken to further categorise areas where practical road access may have been cut.

A further key assumption of the above approach was that during key flooding events, lake levels could rise from harmless to peak flood conditions in less than the typical 8–10-hour overnight sleep period. Consequently, individuals located in areas classified as low flood islands, typically due to their high peak hazard rating, could feasibly remain unaware of the escalating danger and be unable to evacuate without warning or intervention during the overnight sleep period. Therefore, these areas were conservatively retained within the low flood island classification.

This exercise was completed for the 20%, 5% and 1% AEP, and the PMF, using the modelled flood results detailed above. The summary of the Flood Emergency Response Classification is presented in **Appendix F**. It is noted that the mapping of Emergency Response Classifications was focussed on flooding associated with the Tuggerah Lakes and areas solely affected by tributary catchment and overland flooding were not assessed.

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11 Preliminary analysis of flood consequences on the community

The impact of flooding on the community is described in this section. The first step of understanding the impact of flooding on the community is to determine the flood behaviour within the catchment and identify key problem areas. Preliminary flood impact and road closure assessments can then be made, with more details provided in this section. It is noted that further detailed assessments, including flood damages, are anticipated to be completed at a subsequent Flood Risk Management Study and Plan stage.

11.1 Flood behaviour

Flooding in the Tuggerah Lakes is of long duration in nature, with flood levels rising relatively slowly in response to extended periods of rainfall of fair intensity. This is confirmed by the critical duration ranging between 72 and 144 hours as shown in **Table 9.5**.

While there is some potential for rapid inundation of some properties and some roads in response to short durations of rainfall during rare events, the main flooding type in the study area is the flooding resulting from the lakes. This flooding is slower and provides additional time to disseminate flood warnings. Flood waters generally recede within the hours and sometimes days after such events. Key issue areas potentially subject to deep flooding from the lakes include all low-lying lake foreshore areas, but most significantly at:

- Chittaway Point;
- Tacoma and Tacoma South;
- Tuggerawong; and
- The Entrance North behind Wilfred Barrett Drive in events including and greater than the 1% AEP.

Further to the above discussion, **Table 11.1** summarises the number of lots modelled to be inundated at least partially by the respective catchment flooding events.

Table 11.1 Number of lots affected by flooding events

Event	Lots affected
Total number of lots in study area	34,170
PMF	8,964
1 in 500 AEP	7,814
1 in 200 AEP	7,313
1% AEP	6,581
2% AEP	5,624
5% AEP	4,526
10% AEP	3,654
20% AEP	2,398

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11.2 Key infrastructure assets

There are two main types of key infrastructure assets as presented below:

- The first type includes facilities that are occupied by emergency responders such as police stations, fire stations or SES Centres.
- The second type includes facilities with particularly vulnerable residents such as schools, childcare centres, aged care facilities and hospitals.

The locations of these key assets have been sourced from publicly available information (e.g., Google Maps). A list of these facilities is provided in **Table 11.2** along with a brief description of the flood affectation of each asset.

Table 11.2 Summary of flood risk of key infrastructure assets

Location	Comments on Flood Risk
Police and Fire Stations	
Tuggerah Rural Fire Station	Not affected by Tuggerah Lakes flooding. However, it is noted that flooding from Ourimbah Creek may have an impact at this location (refer to Ourimbah Creek FRMSP).
Berkeley Vale Fire Station	Not affected by Tuggerah Lakes flooding. However, it is noted that flooding from Ourimbah Creek may have an impact at this location (refer to Ourimbah Creek FRMSP).
SES Centres	
SES Wyong	Not flood affected.
Hospital and Ambulance Stations	
N/A	No Hospitals or Ambulance Stations were noted as affected by Tuggerah Lakes flooding.
Schools	
Chittaway Bay Public School	Not affected by Tuggerah Lakes flooding. However, it is noted that flooding from Ourimbah Creek may have an impact at this location (refer to Ourimbah Creek FRMSP).
Tacoma Public School	The school property is not affected by Tuggerah Lakes flooding, however road access to the school would be cut during the 1% AEP event. It is noted that flooding from the Wyong River may also have an impact at this location (refer to Wyong River FRMSP).
Tuggerawong Public School	A small section of the school property may be flood impacted during a PMF event; however, access is not impacted.
Glenvale School	The school is within the 1% AEP extent. Road access to the school would also be cut during the 1% AEP event.
St Cecilia's Primary School,	The school property is affected by the 5% AEP extent; however, access is not impacted. It is noted that flooding from the Wyong

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Location	Comments on Flood Risk
Wyong	River may also have an impact at this location (refer to Wyong River FRMSP).
HopeTown School	The school property is affected by the 5% AEP extent. Access is maintained until the 2% AEP event. It is noted that flooding from the Wyong River may also have an impact at this location (refer to Wyong River FRMSP).
Childcare Facilities and Preschools	
Killarney Vale Preschool	A small section of the school property is affected by a PMF event. It is noted that local tributary flooding may also have an impact at this location (refer to Tuggerah Lakes Southern Catchments FRMSP).
Budgewoi Preschool	The preschool is within the PMF extent. A small section of the preschool property may be impacted by flood during a 1 in 500 AEP event, but access is maintained.
Little Souls Early Leaning Centre Long Jetty	The preschool is within the PMF extent. A small section of the preschool property may be impacted by flood during a 1 in 200 AEP event. Access is not flood affected.
Coast Community Preschool	The school property is not affected by Tuggerah Lakes flooding, however road access to the school would be cut during the PMF event. It is noted that local tributary flooding may also have an impact at this location (refer to Tuggerah Lakes Southern Catchments FRMSP).
Wyong Preschool Kindergarten	Not affected by Tuggerah Lakes flooding. However, it is noted that flooding from the Wyong River may have an impact at this location (refer to Wyong River FRMSP).
Spotted Frog Kindergarten	The preschool is within the 5% AEP extent, with access also affected. A small section of the preschool property may be impacted by flood during a 10% AEP event.
Aged Care Facilities and Retirement Villages	
Killarney Vale Care Community	The aged care facility is located within the PMF extent. Access to the nursing home may be affected in the 1 in 200 AEP event.
Don Small Retirement Village	The aged care facility is located within the 5% AEP extent. Access to the nursing home may be affected in the 10% AEP event. It is noted that flooding from the Wyong River may also have an impact at this location (refer to Wyong River FRMSP).
Meander Village	A small section of the aged care facility property may be flood affected during a 10% AEP. Significant inundation occurs across the property in the 5% AEP event. Access from the site is affected in the 1% AEP event. It is noted that flooding from the Wyong

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Location	Comments on Flood Risk
	River may also have an impact at this location (refer to Wyong River FRMSP).
Alino Living Killarney Court	A small section of the aged care facility property may be flood affected during a PMF event. Access to the nursing home may also become difficult in the PMF event. It is noted that local tributary flooding may also have an impact at this location (refer to Tuggerah Lakes Southern Catchments FRMSP).

11.3 Road closure

Driving through floodwaters is one of the main causes of death during flood events. Therefore, an assessment of the frequency and hazard of road inundation is important for understanding the risk of vehicles becoming unstable, posing a risk to life for their drivers and passengers. It is also important for understanding evacuation risks, informing the classification of communities according to flood emergency response planning considerations. Measures to increase the flood immunity of critical roads may be considered as a result of this assessment as part of a subsequent Flood Risk Management Study and Plan.

The various maps exhibited in **Appendix G** depict the peak inundation depth, and anticipated time until and duration of inundation which would result in a road closure for each modelled flood event. A road closure depth of water over road threshold was determined following discussion with the SES. While it is understood that SES does not recommend driving through **any** floodwaters, a value of 0.15 m was found to be a practical limit for the purpose of road closure determination.

Some minor sections of road that were observed to become sufficiently inundated during a 20% AEP event to necessitate road closure included:

- Lucinda Avenue in Killarney Vale,
- Aloha Drive, Geoffrey Road, Kalua Drive and Henry Street in Chittaway Point,
- Tuggerah Parade in The Entrance,
- some local access roads within Budgewoi Holiday Park.

During a 1% AEP flood, a significant number of additional roads become inundated at various locations around the lakes, including:

- a number of roads leading to the key frontage roads mentioned as part of the 20% AEP closures,
- Tuggerah Parade and joining roads in Long Jetty,
- Lakedge Avenue and Kerry Crescent in Tumbi Umbi and Berkeley Vale,
- Most lake frontage and joining roads in Chittaway Point and Berkeley Vale,
- local roads in in Rocky Point,
- Tuggerawong Road,
- Natuna Avenue, Cudgegong Street, Weemala Street and Lake Street in Budgewoi.

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During a probable maximum flood event, numerous roads become cut around the lakes and some major roads become inundated including the Central Coast Highway at Budgewoi, The Entrance North and The Entrance, and the Pacific Highway at Wallarah Creek.

11.4 Preliminary flood planning area

The flood planning area (FPA) for a given design flood event is defined by the adopted design flood level associated with that event, plus a freeboard. The section below details the determination of a preliminary FPA, and it is noted that any proposed FPA will be finalised as part of a future FRMSP stage.

The purpose of a freeboard is to provide a factor of safety against the inherent uncertainties and practical limitations associated with hydrological and hydraulic modelling processes. Historically, a 0.5 m freeboard was considered appropriate for the purposes of flood planning, to account for the inherent uncertainties associated with hydrological and hydraulic modelling. However, in order to remain effective in its purpose, a freeboard should be based on the flood risk specific to the catchment in question.

As such, the sources of uncertainty that would govern the magnitude of an appropriate freeboard in the given 1% AEP event for the Tuggerah Lakes are quantified in **Table 11.3**.

Table 11.3 Sources and quantification of modelling uncertainties

Type	Source	Uncertainty (m)	Comment
Inflow	Hydrology	0.1	Catchment losses and lag, see **Section 8.1**
Lake and entrance	Hydraulics	0.1	Model schematisation (e.g., material roughness), see **Section 8.2**
	Initial lake water level	0.1	See **Section 8.3**
	DEM and bathymetry	0.3	Primary DEM has a vertical accuracy of 0.3 m to 95% confidence, see **Section 3.2**
	Entrance configuration and dynamics	0.2	See **Section 8.5**
	Lake wave setup	0.2	Assuming sustained 20 m/s (~70 km/h) winds from a single direction across the longest lake fetch length, which would be unlikely and thus conservative noting the regional wind climate, and a 15% wave height-setup factor
	Lake wind setup	0.2	Assuming sustained 20 m/s (~70 km/h) winds from a single direction, which would be unlikely and thus conservative noting the regional wind climate, see *Tuggerah Flood Study (1994)*
Tailwater	Level and timing	0.1	Timing and magnitude of wave setup, tidal anomaly, storm surge, etc., see **Section 8.4**

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Based on the above, it was concluded that the uncertainties in this study are additional to those encountered in a typical flood study. These additional uncertainties primarily stem from the variability and limited data concerning the entrance configuration during the largest flood events. This model is not a morphological model, and as such sand movement has not been directly assessed. Rather, berm and entrance channel configurations and dynamics have been specified directly, based on historical observations and simplified assumptions around entrance behaviour in large events.

Further to this, the potential impacts of wind and wave setup effects within the lakes causing a deviation from the average still water level were considered and determined as part of the modelling undertaken in this study.

Table 11.4 exhibits a comparison between the present 1% AEP result and the results of the future climate change 1% AEP and PMF events to assess the scale in which an appropriate freeboard may feasibly sit. It is noted that the 2070 1% AEP event was 0.50 m higher than the present day 1% AEP event, which is equivalent to the typically adopted freeboard value, while the PMF and 2120 climate change results were modelled to reach similar levels at an approximate 0.80 m above the present 1% AEP event.

Table 11.4 Comparison of present and future 1% AEP and PMF peak Tuggerah Lakes flood levels

Event	1% AEP	PMF	2070 1% AEP	2120 1% AEP
Peak Tuggerah Lakes flood level (mAHD)	2.24	3.04	2.74	3.07
Difference (m)		+0.80	+0.50	+0.83

As such and noting the increased uncertainties inherent in the present study it was determined that a 0.8 m freeboard value was justified in this instance. The flood planning area was therefore determined to be set by the 1% AEP event plus a freeboard of 0.80 m, which was determined to be functionally equivalent to the PMF extent presented in **Appendix C**.

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Glossary

Annual Exceedance Probability (AEP)	The chance of a flood of a given or larger size occurring in any one year, usually expressed as a percentage. Eg, if a peak flood discharge of 500 m3/s has an AEP of 5%, it means that there is a 5% chance (that is one-in-20 chance) of a 500 m3/s or larger events occurring in any one year (see ARI).
Australian Height Datum (AHD)	A common national surface level datum approximately corresponding to mean sea level.
Average Annual Damage (AAD)	Depending on its size (or severity), each flood will cause a different amount of flood damage to a flood prone area. AAD is the average damage per year that would occur in a nominated development situation from flooding over a very long period of time.
Average Recurrence Interval (ARI)	The long-term average number of years between the occurrence of a flood as big as or larger than the selected event. For example, floods with a discharge as great as or greater than the 20-year ARI flood event will occur on average once every 20 years. ARI is another way of expressing the likelihood of occurrence of a flood event.
Berm Level/Berm Height	Level of the sand at the entrance of a waterbody
Design Blockage	Blockage is an obstruction which makes movement of flood water or flow through a drainage system difficult or impossible. Design blockage is the blockage obtained following the Australian Rainfall and Runoff 2019 recommendations. Blockage is defined as a percentage of reduction in flow capacity through a drainage structure (e.g. pit, pipe, culvert, bridge, etc.)
Double Design Blockage	Minimum of double of the design blockage or 100% blockage (i.e. fully blocked)
Catchment	The land area draining through the main stream, as well as tributary streams, to a particular site. It always relates to an area above a specific location.
Computer Models	The mathematical representation of the physical processes involved in runoff generation and stream flow. These models are often run on computers due to the complexity of the mathematical relationships between runoff, stream flow and the distribution of flows across the floodplain.
Consent Authority	The council, government agency or person having the function to determine a development application for land use under the EP&A Act. The consent authority is most often the council, however legislation or an EPI may specify a Minister or public authority (other than a council), or the Director General of OEH, as having the function to determine an application.
Defined flood event (DFE)	The flood event selected for the management of flood hazard for the location of specific development as determined by the appropriate authority.

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Defined flood level (DFL)	The flood level associated with a defined flood event (DFE) relative to a specified datum. The DFL plus the freeboard determines the extent of the flood hazard area.
Development	"Is defined in Part 4 of the Environmental Planning and Assessment Act (EP&A Act). Infill Development: refers to development of vacant blocks of land that are generally surrounded by developed properties and is permissible under the current zoning of the land. Conditions such as minimum floor levels may be imposed on infill development. New Development: refers to development of a completely different nature to that associated with the former land use. For example, the urban subdivision of an area previously used for rural purposes. New developments involve rezoning and typically require major extensions of existing urban services, such as roads, water supply, sewerage and electric power. Redevelopment: refers to rebuilding in an area. For example, as urban areas age, it may become necessary to demolish and reconstruct buildings on a relatively large scale. Redevelopment generally does not require either rezoning or major extensions to urban services."
Disaster Plan (DISPLAN)	A step by step sequence of previously agreed roles, responsibilities, functions, actions and management arrangements for the conduct of a single or series of connected emergency operations, with the object of ensuring the coordinated response by all agencies having responsibilities and functions in emergencies.
Discharge	The rate of flow of water measured in terms of volume per unit time, for example, cubic metres per second (m3/s). Discharge is different from the speed or velocity of flow, which is a measure of how fast the water is moving for example, metres per second (m/s).
Effective Warning Time	The time available after receiving advice of an impending flood and before floodwaters prevent appropriate flood response actions being undertaken. The effective warning time is typically used to move farm equipment, move stock, raise furniture, evacuate people and transport their possessions.
Emergency Management	A range of measures to manage risks to communities and the environment. In the flood context it may include measures to prevent, prepare for, respond to and recover from flooding.
ESD	Using, conserving and enhancing natural resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be maintained or increased. A more detailed definition is included in the Local Government Act, 1993. The use of sustainability and sustainable in this manual relate to ESD.
Finished floor level	The uppermost surface of the finished floor, not including any floor covering such as carpet, tiles and the like.
Flash Flooding	Flooding which is sudden and unexpected. It is often caused by sudden local or nearby heavy rainfall. Often defined as flooding which peaks within six hours of the causative rain.

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Flood Awareness	Awareness is an appreciation of the likely effects of flooding and a knowledge of the relevant flood warning, response and evacuation procedures.
Flood Control Lot	Property (or Lot) located within the flood planning area and subject to flood-related development controls.
Flood Education	Flood education seeks to provide information to raise awareness of the flood problem so as to enable individuals to understand how to manage themselves and their property in response to flood warnings and in a flood event. It invokes a state of flood readiness.
Flood Fringe Areas	The remaining area of flood prone land after floodway and flood storage areas have been defined.
Flood Hazard Area (FHA)	the area (whether or not mapped) encompassing land lower than the flood hazard level (FHL) which has been determined by the appropriate authority. The area relates to that part of the allotment on which a building stands or is to be erected.
Flood Hazard Level (FHL)	The flood level used to determine the height of floors in a building and represents the defined flood level (DFL) plus the freeboard.
Flood Liable Land	Is synonymous with flood prone land, i.e., land susceptible to flooding by the PMF event. Note that the term flood liable land covers the whole floodplain, not just that part below the FPL (see flood planning area).
Flood Planning Area	Area that defines when a property is classified as a flood control lot.
Flood Planning Levels (FPLs)	Are the combinations of flood levels (derived from significant historical flood events or floods of specific AEPs) and freeboards selected for floodplain risk management purposes, as determined in management studies and incorporated in management plans.
Flood Prone Land	Land susceptible to flooding by the PMF event. Flood prone land is synonymous with flood liable land.
Flood Proofing	A combination of measures incorporated in the design, construction and alteration of individual buildings or structures subject to flooding, to reduce or eliminate flood damages.
Flood Readiness	Readiness is an ability to react within the effective warning time.
Flood Risk	Potential danger to personal safety and potential damage to property resulting from flooding. The degree of risk varies with circumstances across the full range of floods. Flood risk in this manual is divided into 3 types, existing, future and continuing risks. They are described below. Existing Flood Risk: the risk a community is exposed to as a result of its location on the floodplain. Future Flood Risk: the risk a community may be exposed to as a result of new development on the floodplain. Continuing Flood Risk: the risk a community is exposed to after floodplain risk management measures have been implemented. For a town protected by levees, the continuing flood risk is the consequences of the levees being overtopped. For an area without any floodplain risk management measures, the continuing flood risk is simply the existence of its flood exposure.

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Flood Storage Areas	Those parts of the floodplain that are important for the temporary storage of floodwaters during the passage of a flood. The extent and behaviour of flood storage areas may change with flood severity, and loss of flood storage can increase the severity of flood impacts by reducing natural flood attenuation. Hence, it is necessary to investigate a range of flood sizes before defining flood storage areas.
Flood Study	Is a technical investigation of flood behaviour in the study area. It describes the extent, depth and velocity of flood waters as well as the variation in flood hazard during a range of historical as well as hypothetical 'design' floods. The 'design' floods are based on statistical analysis of flooding that has occurred in the past.
Floodplain	Area of land which is subject to inundation by floods up to and including the probable maximum flood event, that is, flood prone land.
Floodplain Risk Management Options	The measures that might be feasible for the management of a particular area of the floodplain. Preparation of a floodplain risk management plan requires a detailed evaluation of floodplain risk management options.
Floodplain Risk Management Plan	A management plan developed in accordance with the principles and guidelines in this manual. Usually includes both written and diagrammatic information describing how particular areas of flood prone land are to be used and managed to achieve defined objectives.
Floodway Areas	Those areas of the floodplain where a significant discharge of water occurs during floods. They are often aligned with naturally defined channels. Floodways are areas that, even if only partially blocked, would cause a significant redistribution of flood flow, or a significant increase in flood levels.
Freeboard	Provides reasonable certainty that the risk exposure selected in deciding on a particular flood chosen as the basis for the FPL is actually provided. It is a factor of safety typically used in relation to the setting of floor levels, levee crest levels, etc. Freeboard is included in the flood planning level.
Hazard	A source of potential harm or a situation with a potential to cause loss. In relation to this study the hazard is flooding which has the potential to cause damage to the community.
Heavily Parallelised Compute (HPC)	In the context of the TUFLOW software, HPC is a solver which allows for the parallelisation of the hydraulic calculations within a single model. This allows a single model to run across numerous computational cores in parallel, which can significantly reduce model run times.
Historical Flood	A flood which has actually occurred.
Hydraulics	Term given to the study of water flow in waterways; in particular, the evaluation of flow parameters such as water level and velocity.
Hydrograph	A graph which shows how the discharge or stage/flood level at any particular location varies with time during a flood.

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Hydrology	Term given to the study of the rainfall and runoff process; in particular, the evaluation of peak flows, flow volumes and the derivation of hydrographs for a range of floods.
Impervious lag factor	The impervious lag factor is a coefficient used in WBNM to reduce the lag parameter for impervious surfaces to consider the fact that impervious surfaces allow for faster response in flow than pervious surfaces.
Lag Parameter	The lag parameter C in the runoff routing model WBNM has been derived from recorded storms on 54 catchments in Queensland, NSW, Victoria and South Australia. Parameter C was found to be independent of flood size, catchment area, stream slope, and various storm and catchment characteristics.
Local Drainage	Smaller scale problems in urban areas. They are outside the definition of major drainage in this glossary.
Local Overland Flooding	Inundation by local runoff rather than overbank discharge from a stream, river, estuary, lake or dam.
Mainstream Flooding	Inundation of normally dry land occurring when water overflows the natural or artificial banks of a stream, river, estuary, lake or dam.
Major Drainage	"Councils have discretion in determining whether urban drainage problems are associated with major or local drainage. For the purposes of this manual major drainage involves: The floodplains of original watercourses (which may now be piped, channelised or diverted), or sloping areas where overland flows develop along alternative paths once system capacity is exceeded; and/or Water depths generally in excess of 0.3m (in the major system design storm as defined in the current version of Australian Rainfall and Runoff). These conditions may result in danger to personal safety and property damage to both premises and vehicles; and/or Major overland flowpaths through developed areas outside of defined drainage reserves; and/or The potential to affect a number of buildings along the major flow path."
Managed Berm Level	Level at which the sand berm is managed by Council to prevent continuous build up to levels that may exacerbate flood risk to residents around the lagoon.
Minimum Floor Level (MFL)	Minimum floor level at which a building should be constructed. Also named Flood Hazard Level (FHL).
Minor, Moderate and Major Flooding	Both the State Emergency Service and the Bureau of Meteorology use the following definitions in flood warnings to give a general indication of the types of problems expected with a flood. Minor flooding: Causes inconvenience such as closing of minor roads and the submergence of low level bridges. The lower limit of this class of flooding on the reference gauge is the initial flood level at which landholders and townspeople begin to be flooded. Moderate flooding: Low lying areas are inundated requiring removal of stock and/or evacuation of some houses. Main traffic routes may be covered. Major flooding: Appreciable urban areas are flooded and/or extensive

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	rural areas are flooded. Properties, villages and towns can be isolated.
Modification Measures	Measures that modify either the flood, the property or the response to flooding.
Peak Discharge	The maximum discharge occurring during a flood event.
Probability	A statistical measure of the expected chance of flooding (see annual exceedance probability).
Probable Maximum Flood (PMF)	The PMF is the largest flood that could conceivably occur at a particular location, usually estimated from probable maximum precipitation, and where applicable, snow melt, coupled with the worst flood producing catchment conditions. Generally, it is not physically or economically possible to provide complete protection against this event. The PMF defines the extent of flood prone land, that is, the floodplain. The extent, nature and potential consequences of flooding associated with a range of events rarer than the flood used for designing mitigation works and controlling development, up to and including the PMF event should be addressed in a floodplain risk management study.
Probable Maximum Precipitation (PMP)	The PMP is the greatest depth of precipitation for a given duration meteorologically possible over a given size storm area at a particular location at a particular time of the year, with no allowance made for long-term climatic trends (World Meteorological Organisation, 1986). It is the primary input to PMF estimation.
Quadtree	In the context of the TUFLOW software, Quadtree allows for the fixed grid mesh underlying the model to vary in cell size, enabling higher resolutions where more refined hydraulic calculations are needed, and lower resolutions where there is little variation in topography or less detail is required.
Risk	Chance of something happening that will have an impact. It is measured in terms of consequences and likelihood. In the context of the manual, it is the likelihood of consequences arising from the interaction of floods, communities and the environment.
Runoff	The amount of rainfall which actually ends up as streamflow, also known as rainfall excess.
Seiche	A temporary disturbance or oscillation in the water level of a lake or partially enclosed body of water, often caused by changes in atmospheric pressure or wave energy
Stage	Equivalent to water level (both measured with reference to a specified datum).
Stage Hydrograph	A graph that shows how the water level at a particular location changes with time during a flood. It must be referenced to a particular datum.
Survey Plan	A plan prepared by a registered surveyor.
TUFLOW	A 1-dimensional and 2-dimensional flood simulation software. It simulates the complex movement of floodwaters across a particular area of interest using mathematical approximations to derive information on floodwater depths, velocities and levels.

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Velocity	The speed or rate of motion (distance per unit of time, e.g., metres per second) in a specific direction at which the flood waters are moving.
Water Surface Profile	A graph showing the flood stage at any given location along a watercourse at a particular time.
WBNM	Watershed Bounded Network Model. The WBNM is a conceptual, event-based, model developed for simulation of flood hydrographs and estimation of design floods

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Manly Hydraulics Laboratory
110B King Street
Manly Vale NSW 2093

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Appendix A Community Questionnaire

A.1 Community newsletter

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<NAME>
<BUSINESS NAME>
<STREET ADDRESS>
<SUBURB> <STATE> <POSTCODE>

Central Coast Council

Dear <LETTERNAME>,

Tuggerah Lakes Flood Study Review Community Questionnaire

Council periodically updates Flood Studies and Floodplain Risk Management Plans for all creeks, lakes, lagoons, and estuaries on the Central Coast. With respect to Tuggerah Lakes, Council adopted the Floodplain Risk Management Plan in 2015, which itself was based on computer modelling data from the Flood Study from 1994. Council has initiated a review of these documents, starting with the Flood Study.

Council has engaged Manly Hydraulics Laboratory (MHL) to prepare a review of the Tuggerah Lakes Flood Study. The study is being undertaken by Council with funding assistance from the NSW Department of Planning and Environment and will be managed in accordance with the NSW Government's Flood Prone Land Policy.

This Flood Study represents an important step in the floodplain risk management process, whereby Council will gain a comprehensive technical understanding of the nature of flooding around Tuggerah Lakes using advanced computer modelling software. Following this study, Council will review the Floodplain Risk Management Plan, which uses the results of the Flood Study as the foundations for developing and reviewing floodplain management initiatives that are designed to help mitigate the effects of flooding.

The aim of the study is to:

- Update the previous flood study using the most current information and technologies
- Help better understand local flooding problems along the lake foreshore
- Build community resilience by informing better planning of development, emergency management and community awareness
- Develop information to assist in future floodplain management activities to reduce flood impacts on the community and risk to life.

How can I contribute?

Community involvement is essential to the success of the floodplain risk management process. It enables the community to:

- Contribute local knowledge of flood behaviour
- Directly influence the calibration of flood models

Please take a few minutes to complete the questionnaire by **Saturday 17 December 2022** at https://www.surveymonkey.com/r/JTSJNKP or using the QR code provided in the bottom right corner of this page. All survey information is confidential and will be used only for floodplain risk management purposes.

Wyong Office: 2 Hely St / PO Box 20 Wyong NSW 2259 I **P** 02 4306 7900
E ask@centralcoast.nsw.gov.au I **W** www.centralcoast.nsw.gov.au I ABN 73 149 644 003

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A.2 Community questionnaire

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Tuggerah Lakes Flood Study Review

Community Questionnaire

Central Coast Council have engaged consultant Manly Hydraulics Laboratory (MHL) to prepare a review of the Tuggerah Lakes Flood Study that was originally completed in 1994.
The study is being undertaken by Council with funding assistance from the NSW Department of Planning and Environment which aims to build community resilience towards flooding through informing better planning of development, emergency management and community awareness. Council has established a Floodplain Risk Management Committee which is comprised of relevant council members, state government agencies and community representatives. This Flood Study Review is an important step in the floodplain risk management process for this area and will be managed by Council according to the NSW Government's Flood Prone Lands Policy.
The aim of the study is to:
- update the previous flood study using the most current information and technologies
- help understand local flooding problems along the lake foreshore
- develop information to assist in future floodplain management activities to reduce flood impacts on the community and risk to life.

1. CONTACT INFORMATION (This information will only be used to complete the Flood Study Review.)

Address of your property in Tuggerah Lakes catchment:

Your address (if different from the address above) (optional):

Name (optional):

Telephone (optional):

Email (optional):

2. I wish to receive information for the duration of the study:

- [ ] Yes
- [ ] No

3. What is the type of property?

- ◯ Residential
- ◯ Vacant land
- ◯ Industrial
- ◯ Commercial
- ◯ Farming/Rural
- ◯ Other

Please specify

4. What is the status of the property?

- ◯ Owner-occupied
- ◯ Leased to rental tenants
- ◯ Other

Please specify

5. How long have you lived or operated a business at this address?

- ◯ 0-5 years
- ◯ 6-10 years
- ◯ 10-20 years
- ◯ More than 20 years

6. As far as you are aware, has the property (i.e. any building and/or part of the overall lot) ever been affected by flooding?

- ◯ Yes
- ◯ No

Tuggerah Lakes Flood Study Review

7. Please provide the dates for up to 4 flood events originating from the lakes that you may have information for (If you have information for more than 4 events please provide an email address)

Event 1

Event 2

Event 3

Event 4

8. What part(s) of your property were affected by flooding (select more than one if appropriate)

	Ground	Garage/Shed	Building	Other (please specify)
Event 1	☐	☐	☐	☐
Event 2	☐	☐	☐	☐
Event 3	☐	☐	☐	☐
Event 4	☐	☐	☐	☐

Please provide any additional details here:

9. What was the depth of flooding (cm)?

Event 1

Event 2

Event 3

Event 4

Please provide any additional details here:

10. Duration of flooding (approximate number of hours/days)

Event 1

Event 2

Event 3

Event 4

Please provide any additional details here:

11. Do you have, or know of any photographs or records of these flood events?

◯ Yes

◯ No

If Yes, would it be possible for Council or MHL to make copies of this data to contribute to the Flood Study Review? If so, please upload pictures using upload links below. If you have more than 5 pictures or hard copy photographs please add a comment below and make sure you have provided an email address.

12. Please upload a photo if available (optional)

Choose File Choose File No file chosen

13. Please upload a photo if available (optional)

Choose File Choose File No file chosen

14. Please upload a photo if available (optional)

Choose File Choose File No file chosen

15. Please upload a photo if available (optional)

Choose File Choose File No file chosen

16. Please upload a photo if available (optional)

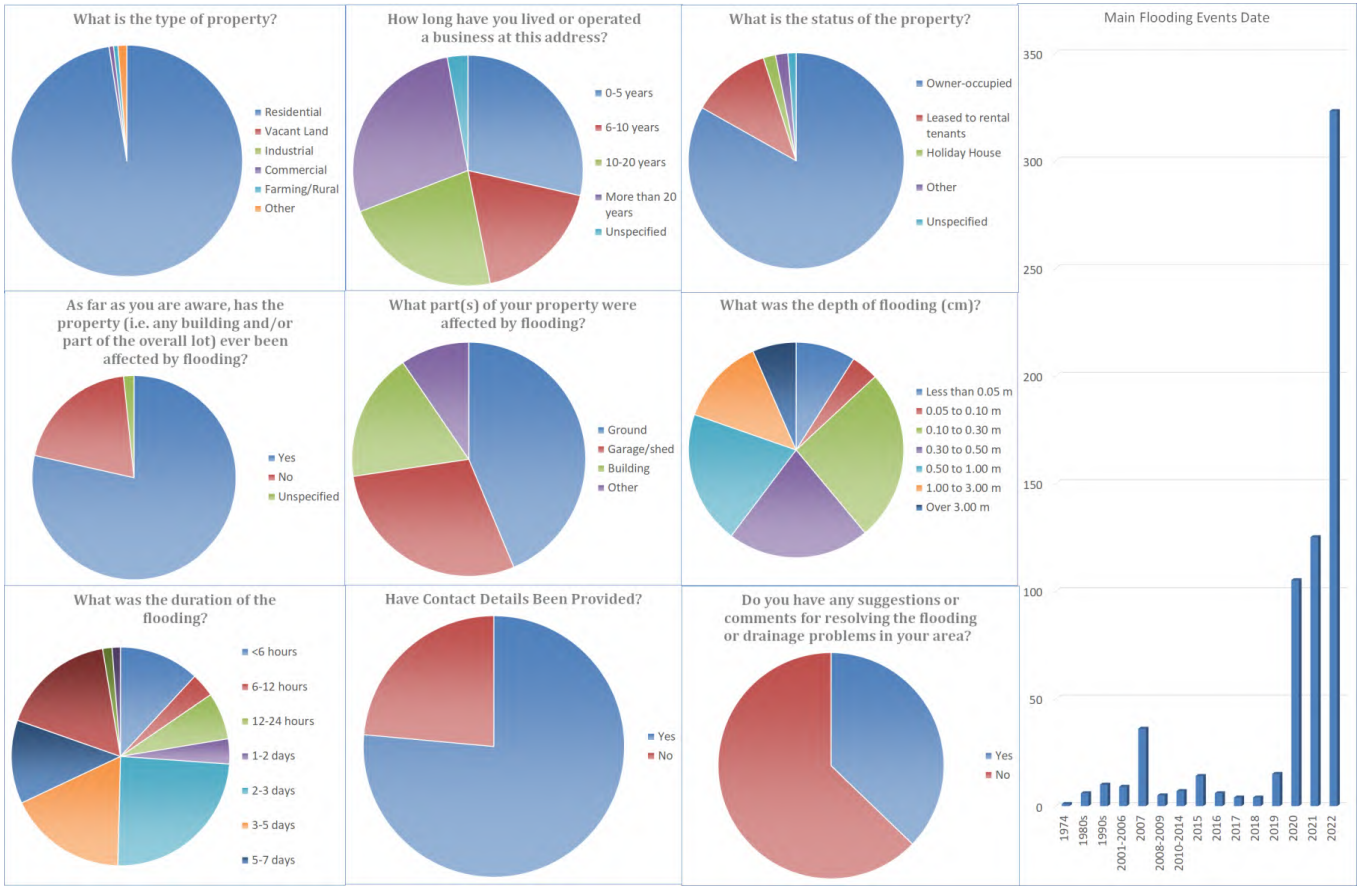
Choose File Choose File No file chosen

Tuggerah Lakes Flood Study Review

Thank you

Thank you for completing this community questionnaire. Your input is much appreciated and will be considered in the Tuggerah Lakes Flood Study Review as appropriate.

A.3 Community questionnaire results



MHL2929- A-8

Classification: Public

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Appendix B ARR 2019 Data Hub Outputs

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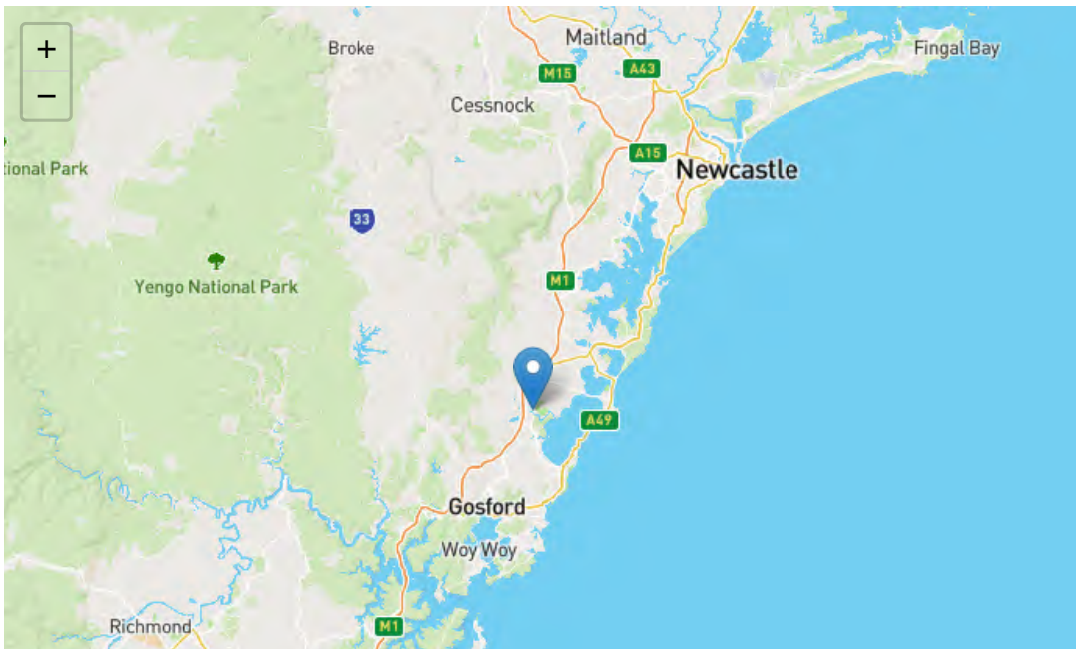
Australian Rainfall & Runoff Data Hub - Results

Input Data

Longitude	151.422
Latitude	-33.282
Selected Regions (clear)	
River Region	show
ARF Parameters	show
Storm Losses	show
Temporal Patterns	show
Areal Temporal Patterns	show
BOM IFDs	show
Median Preburst Depths and Ratios	show
10% Preburst Depths	show
25% Preburst Depths	show
75% Preburst Depths	show
90% Preburst Depths	show
Climate Change Factors	show
Probability Neutral Burst Initial Loss (./nsw_specific)	show



Data

River Region

Division	South East Coast (NSW)
River Number	11
River Name	Macquarie-Tuggerah Lakes

Layer Info

Time Accessed	20 May 2025 11:43AM
Version	2016_v1

ARF Parameters

$$ARF = Min\left\{1, \left[1 - a\left(Area^{b} - c\log_{10}Duration\right)Duration^{-d} + eArea^{f}Duration^{g}\left(0.3 + \log_{10}AEP\right) + h10^{iArea\frac{Duration}{1440}}\left(0.3 + \log_{10}AEP\right)\right]\right\}$$

Zone	a	b	c	d	e	f	g	h	i
SE Coast	0.06	0.361	0.0	0.317	8.11e-05	0.651	0.0	0.0	0.0

Short Duration ARF

$$ARF = Min\left[1, 1 - 0.287\left(Area^{0.265} - 0.439\log_{10}(Duration)\right).Duration^{-0.36} + 2.26\ \text{x}\ 10^{-3}\ \text{x}\ Area^{0.226}.Duration^{0.125}\left(0.3 + \log_{10}(AEP)\right) + 0.0141\ \text{x}\ Area^{0.213}\ \text{x}\ 10^{-0.021\frac{(Duration-180)^{2}}{1440}}\left(0.3 + \log_{10}(AEP)\right)\right]$$

Layer Info

Time Accessed	20 May 2025 11:43AM
Version	2016_v1

Storm Losses

Note: Burst Loss = Storm Loss - Preburst

Note: These losses are only for rural use and are **NOT FOR DIRECT USE** in urban areas

Note: As this point is in NSW the advice provided on losses and pre-burst on the NSW Specific Tab of the ARR Data Hub (./nsw_specific) is to be considered. In NSW losses are derived considering a hierarchy of approaches depending on the available loss information. The continuing storm loss information from the ARR Datahub provided below should only be used where relevant under the loss hierarchy (level 5) and where used is to be multiplied by the factor of 0.4.

ID	23564.0
Storm Initial Losses (mm)	49.0
Storm Continuing Losses (mm/h)	3.0

Layer Info

Time Accessed	20 May 2025 11:43AM
Version	2016_v1

Temporal Patterns | Download (.zip) (static/temporal_patterns/TP/ECsouth.zip)

code	ECsouth
Label	East Coast South

Layer Info

Time Accessed	20 May 2025 11:43AM
Version	2016_v2

Areal Temporal Patterns | Download (.zip) (./static/temporal_patterns/Areal/Areal_ECsouth.zip)

code	ECsouth
arealabel	East Coast South

Layer Info

Time Accessed	20 May 2025 11:43AM
Version	2016_v2

BOM IFDs

Click here (http://www.bom.gov.au/water/designRainfalls/revised-ifd/?year=2016&coordinate_type=dd&latitude=-33.282&longitude=151.422&sdmin=true&sdhr=true&sdday=true&user_label=) to obtain the IFD depths for catchment centroid from the BoM website

Layer Info

Time Accessed	20 May 2025 11:43AM

Median Preburst Depths and Ratios

Values are of the format depth (ratio) with depth in mm

min (h)\AEP(%)	50	20	10	5	2	1
60 (1.0)	6.0 (0.191)	6.7 (0.148)	7.1 (0.128)	7.5 (0.113)	3.2 (0.039)	0.0 (0.000)
90 (1.5)	8.1 (0.222)	7.3 (0.139)	6.7 (0.104)	6.2 (0.080)	2.9 (0.030)	0.5 (0.004)
120 (2.0)	10.7 (0.263)	8.9 (0.153)	7.8 (0.108)	6.6 (0.077)	3.2 (0.030)	0.6 (0.005)
180 (3.0)	6.4 (0.134)	7.1 (0.105)	7.6 (0.091)	8.0 (0.081)	7.7 (0.063)	7.5 (0.052)
360 (6.0)	11.4 (0.182)	20.5 (0.233)	26.5 (0.247)	32.3 (0.253)	24.1 (0.154)	18.0 (0.099)
720 (12.0)	4.0 (0.048)	11.0 (0.096)	15.7 (0.112)	20.2 (0.122)	28.6 (0.141)	35.0 (0.150)
1080 (18.0)	5.0 (0.052)	9.9 (0.073)	13.2 (0.080)	16.3 (0.084)	26.8 (0.113)	34.7 (0.128)
1440 (24.0)	1.1 (0.010)	5.6 (0.037)	8.6 (0.047)	11.5 (0.053)	20.9 (0.079)	27.9 (0.092)
2160 (36.0)	0.3 (0.002)	3.0 (0.017)	4.8 (0.022)	6.5 (0.026)	7.8 (0.025)	8.8 (0.025)
2880 (48.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	1.3 (0.004)	2.2 (0.006)
4320 (72.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.5 (0.001)	1.0 (0.002)

Layer Info

Time Accessed	20 May 2025 11:43AM
Version	2018_v1
Note	Preburst interpolation methods for catchment wide preburst has been slightly altered. Point values remain unchanged.

10% Preburst Depths

Values are of the format depth (ratio) with depth in mm

min (h)\AEP(%)	50	20	10	5	2	1
60 (1.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
90 (1.5)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
120 (2.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
180 (3.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
360 (6.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
720 (12.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
1080 (18.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
1440 (24.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
2160 (36.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
2880 (48.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
4320 (72.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)

Layer Info

Time Accessed	20 May 2025 11:43AM
Version	2018_v1
Note	Preburst interpolation methods for catchment wide preburst has been slightly altered. Point values remain unchanged.

25% Preburst Depths

Values are of the format depth (ratio) with depth in mm

min (h)\AEP(%)	50	20	10	5	2	1
60 (1.0)	0.5 (0.015)	0.3 (0.006)	0.1 (0.002)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
90 (1.5)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
120 (2.0)	0.2 (0.005)	0.1 (0.002)	0.1 (0.001)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
180 (3.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
360 (6.0)	0.1 (0.002)	0.9 (0.010)	1.3 (0.013)	1.8 (0.014)	0.8 (0.005)	0.0 (0.000)
720 (12.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.5 (0.003)	0.9 (0.004)
1080 (18.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	2.3 (0.010)	4.1 (0.015)
1440 (24.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.2 (0.001)	0.3 (0.001)
2160 (36.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
2880 (48.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
4320 (72.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)

Layer Info

Time Accessed	20 May 2025 11:43AM
Version	2018_v1
Note	Preburst interpolation methods for catchment wide preburst has been slightly altered. Point values remain unchanged.

75% Preburst Depths

Values are of the format depth (ratio) with depth in mm

min (h)\AEP(%)	50	20	10	5	2	1
60 (1.0)	27.4 (0.876)	32.7 (0.727)	36.2 (0.653)	39.5 (0.594)	28.0 (0.337)	19.4 (0.200)
90 (1.5)	33.7 (0.921)	34.7 (0.662)	35.3 (0.548)	36.0 (0.464)	34.8 (0.361)	34.0 (0.302)
120 (2.0)	36.5 (0.895)	41.5 (0.711)	44.7 (0.624)	47.9 (0.557)	48.4 (0.453)	48.8 (0.392)
180 (3.0)	49.6 (1.041)	53.0 (0.782)	55.3 (0.666)	57.5 (0.579)	76.1 (0.618)	90.1 (0.630)
360 (6.0)	43.9 (0.703)	66.7 (0.758)	81.8 (0.763)	96.2 (0.755)	110.1 (0.702)	120.5 (0.663)
720 (12.0)	29.9 (0.363)	44.6 (0.386)	54.3 (0.388)	63.7 (0.385)	82.1 (0.406)	96.0 (0.411)
1080 (18.0)	30.4 (0.314)	43.6 (0.322)	52.3 (0.319)	60.7 (0.313)	75.0 (0.317)	85.6 (0.315)
1440 (24.0)	14.3 (0.133)	30.5 (0.202)	41.2 (0.225)	51.5 (0.238)	66.4 (0.251)	77.6 (0.255)
2160 (36.0)	10.8 (0.087)	23.7 (0.135)	32.2 (0.151)	40.3 (0.159)	43.9 (0.142)	46.6 (0.132)
2880 (48.0)	2.3 (0.017)	7.3 (0.038)	10.6 (0.045)	13.8 (0.049)	26.0 (0.076)	35.2 (0.090)
4320 (72.0)	0.0 (0.000)	1.8 (0.008)	2.9 (0.011)	4.0 (0.013)	19.0 (0.049)	30.2 (0.068)

Layer Info

Time Accessed	20 May 2025 11:43AM
Version	2018_v1
Note	Preburst interpolation methods for catchment wide preburst has been slightly altered. Point values remain unchanged.

90% Preburst Depths

Values are of the format depth (ratio) with depth in mm

min (h)\AEP(%)	50	20	10	5	2	1
60 (1.0)	66.0 (2.105)	106.1 (2.360)	132.6 (2.396)	158.1 (2.375)	130.9 (1.577)	110.5 (1.141)
90 (1.5)	67.1 (1.835)	83.1 (1.585)	93.6 (1.451)	103.8 (1.339)	136.3 (1.412)	160.7 (1.429)
120 (2.0)	73.5 (1.801)	101.6 (1.741)	120.1 (1.676)	138.0 (1.604)	142.6 (1.334)	146.1 (1.175)
180 (3.0)	92.2 (1.936)	122.2 (1.803)	142.1 (1.711)	161.2 (1.622)	189.6 (1.541)	211.0 (1.475)
360 (6.0)	77.1 (1.234)	107.5 (1.221)	127.7 (1.190)	147.0 (1.153)	189.2 (1.206)	220.8 (1.216)
720 (12.0)	63.3 (0.768)	83.1 (0.721)	96.3 (0.689)	108.9 (0.658)	154.4 (0.763)	188.5 (0.807)
1080 (18.0)	66.3 (0.686)	89.4 (0.661)	104.8 (0.639)	119.4 (0.616)	143.3 (0.605)	161.1 (0.592)
1440 (24.0)	44.5 (0.413)	70.6 (0.467)	87.8 (0.479)	104.4 (0.481)	121.3 (0.458)	134.0 (0.441)
2160 (36.0)	36.9 (0.297)	59.5 (0.339)	74.5 (0.348)	88.8 (0.351)	99.3 (0.321)	107.1 (0.303)
2880 (48.0)	18.2 (0.133)	41.5 (0.214)	56.9 (0.241)	71.7 (0.255)	89.2 (0.260)	102.3 (0.261)
4320 (72.0)	7.8 (0.051)	22.8 (0.104)	32.8 (0.122)	42.3 (0.132)	64.7 (0.166)	81.4 (0.183)

Layer Info

Time Accessed	20 May 2025 11:43AM
Version	2018_v1
Note	Preburst interpolation methods for catchment wide preburst has been slightly altered. Point values remain unchanged.

Climate Change Factors

Rainfall Factors

SSP1-2.6

Year	<1 hour	1.5 Hours	2 Hours	3 Hours	4.5 Hours	6 Hours	9 Hours	12 Hours	18 Hours	>24 Hours
2030	**1.18**	**1.17**	**1.16**	**1.14**	**1.13**	**1.12**	**1.12**	**1.11**	**1.1**	**1.1**
2040	1.21	1.19	1.17	1.16	1.15	1.14	1.13	1.12	1.11	1.11
2050	**1.22**	**1.2**	**1.18**	**1.17**	**1.15**	**1.15**	**1.14**	**1.13**	**1.12**	**1.11**
2060	1.23	1.21	1.2	1.18	1.17	1.16	1.15	1.14	1.13	1.12
2070	1.24	1.22	1.2	1.18	1.17	1.16	1.15	1.14	1.13	1.12
2080	1.23	1.21	1.2	1.18	1.17	1.16	1.15	1.14	1.13	1.12
2090	**1.23**	**1.21**	**1.2**	**1.18**	**1.17**	**1.16**	**1.15**	**1.14**	**1.13**	**1.12**
2100	1.22	1.2	1.19	1.17	1.16	1.15	1.14	1.13	1.12	1.12

SSP2-4.5

Year	<1 hour	1.5 Hours	2 Hours	3 Hours	4.5 Hours	6 Hours	9 Hours	12 Hours	18 Hours	>24 Hours
2030	**1.18**	**1.17**	**1.16**	**1.14**	**1.13**	**1.12**	**1.12**	**1.11**	**1.1**	**1.1**
2040	1.22	1.2	1.19	1.17	1.16	1.15	1.14	1.13	1.12	1.12
2050	**1.27**	**1.24**	**1.23**	**1.21**	**1.19**	**1.18**	**1.17**	**1.16**	**1.15**	**1.14**
2060	1.3	1.27	1.25	1.23	1.21	1.2	1.19	1.18	1.16	1.16
2070	1.33	1.3	1.28	1.26	1.24	1.22	1.21	1.19	1.18	1.17
2080	1.37	1.33	1.31	1.28	1.26	1.24	1.22	1.21	1.2	1.19
2090	**1.4**	**1.36**	**1.34**	**1.31**	**1.28**	**1.26**	**1.24**	**1.23**	**1.21**	**1.2**
2100	1.41	1.37	1.35	1.32	1.29	1.27	1.25	1.24	1.22	1.21

SSP3-7.0

Year	<1 hour	1.5 Hours	2 Hours	3 Hours	4.5 Hours	6 Hours	9 Hours	12 Hours	18 Hours	>24 Hours
2030	**1.18**	**1.17**	**1.16**	**1.14**	**1.13**	**1.12**	**1.12**	**1.11**	**1.1**	**1.1**
2040	1.23	1.21	1.2	1.18	1.17	1.16	1.15	1.14	1.13	1.12
2050	**1.29**	**1.26**	**1.24**	**1.22**	**1.2**	**1.19**	**1.18**	**1.17**	**1.16**	**1.15**
2060	1.35	1.32	1.3	1.27	1.25	1.23	1.22	1.2	1.19	1.18
2070	1.42	1.38	1.35	1.32	1.29	1.28	1.26	1.24	1.22	1.21

Year	<1 hour	1.5 Hours	2 Hours	3 Hours	4.5 Hours	6 Hours	9 Hours	12 Hours	18 Hours	>24 Hours
2080	1.5	1.45	1.42	1.38	1.35	1.33	1.3	1.28	1.26	1.25
2090	**1.59**	**1.53**	**1.49**	**1.44**	**1.4**	**1.38**	**1.35**	**1.33**	**1.3**	**1.29**
2100	1.66	1.59	1.55	1.5	1.45	1.42	1.39	1.37	1.34	1.32

SSP5-8.5

Year	<1 hour	1.5 Hours	2 Hours	3 Hours	4.5 Hours	6 Hours	9 Hours	12 Hours	18 Hours	>24 Hours
2030	**1.2**	**1.18**	**1.17**	**1.16**	**1.14**	**1.13**	**1.13**	**1.12**	**1.11**	**1.11**
2040	1.26	1.24	1.22	1.2	1.18	1.17	1.16	1.15	1.14	1.14
2050	**1.34**	**1.31**	**1.29**	**1.26**	**1.24**	**1.23**	**1.21**	**1.2**	**1.18**	**1.18**
2060	1.42	1.38	1.35	1.32	1.29	1.28	1.26	1.24	1.22	1.21
2070	1.52	1.47	1.43	1.4	1.36	1.34	1.31	1.29	1.27	1.26
2080	1.63	1.57	1.52	1.48	1.43	1.4	1.37	1.35	1.33	1.31
2090	**1.77**	**1.69**	**1.64**	**1.58**	**1.52**	**1.49**	**1.45**	**1.42**	**1.39**	**1.37**
2100	1.86	1.77	1.71	1.64	1.58	1.54	1.5	1.47	1.43	1.41

Loss Factors

Initial Loss (Adjustment Factors)

	Losses SSP1-2.6	Losses SSP2-4.5	Losses SSP3-7.0	Losses SSP5-8.5
2030	**1.02**	**1.02**	**1.02**	**1.03**
2040	1.03	1.03	1.03	1.03
2050	**1.03**	**1.03**	**1.04**	**1.04**
2060	1.03	1.04	1.04	1.05
2070	1.03	1.04	1.05	1.06
2080	1.03	1.05	1.06	1.07
2090	**1.03**	**1.05**	**1.07**	**1.08**
2100	1.03	1.05	1.07	1.09

Continuing Loss (Adjustment Factors)

	Losses SSP1-2.6	Losses SSP2-4.5	Losses SSP3-7.0	Losses SSP5-8.5
2030	**1.04**	**1.05**	**1.05**	**1.05**
2040	1.05	1.05	1.06	1.06

	Losses SSP1-2.6	Losses SSP2-4.5	Losses SSP3-7.0	Losses SSP5-8.5
2050	**1.06**	**1.06**	**1.07**	**1.08**
2060	1.06	1.07	1.08	1.1
2070	1.06	1.08	1.1	1.12
2080	1.06	1.09	1.11	1.14
2090	**1.06**	**1.09**	**1.13**	**1.16**
2100	1.06	1.1	1.14	1.18

Temperature Changes (Degrees, Relative to 1961-1990 Baseline)

Year	SSP1-2.6	SSP2-4.5	SSP3-7.0	SSP5-8.5
2030	**1.2**	**1.2**	**1.2**	**1.3**
2040	1.3	1.4	1.5	1.6
2050	**1.4**	**1.7**	**1.8**	**2.1**
2060	1.5	1.9	2.2	2.5
2070	1.5	2.1	2.5	3
2080	1.5	2.2	2.9	3.5
2090	**1.5**	**2.4**	**3.3**	**4.1**
2100	1.4	2.5	3.6	4.5

Layer Info

Time Accessed	20 May 2025 11:43AM
Version	2024_v1
Note	Updated climate change factors for IFD Initial loss and continuing loss based on IPCC AR6 temperature increases from the updated Climate Change Considerations (Book 1: Chapter 6) in ARR (Version 4.2). ARR recomends the use of Current and near-term (2030 midpoint). Medium-term (2050 midpoint) and Long-term (2090 midpoint)

Probability Neutral Burst Initial Loss

min (h)\AEP(%)	50.0	20.0	10.0	5.0	2.0	1.0
60 (1.0)	31.3	16.5	15.5	16.2	17.1	17.5
90 (1.5)	31.2	18.1	17.4	18.9	17.7	15.2
120 (2.0)	29.4	17.7	17.1	18.1	17.5	14.2
180 (3.0)	26.6	18.0	17.5	18.0	16.8	10.8
360 (6.0)	26.2	17.5	16.9	14.9	14.8	8.3
720 (12.0)	33.1	23.6	22.2	19.9	18.6	9.0
1080 (18.0)	33.7	25.0	24.2	22.5	21.4	9.6
1440 (24.0)	39.5	29.6	28.0	25.3	25.8	11.3
2160 (36.0)	42.7	32.6	32.5	30.0	29.6	12.9
2880 (48.0)	48.3	38.9	38.7	38.4	32.7	19.2
4320 (72.0)	51.3	43.4	42.3	47.6	38.0	22.2

Layer Info

Time Accessed	20 May 2025 11:43AM
Version	2018_v1
Note	As this point is in NSW the advice provided on losses and pre-burst on the NSW Specific Tab of the ARR Data Hub (./nsw_specific) is to be considered. In NSW losses are derived considering a hierarchy of approaches depending on the available loss information. Probability neutral burst initial loss values for NSW are to be used in place of the standard initial loss and pre-burst as per the losses hierarchy.

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Download JSON (downloads/c08d8bc2-b779-4965-b7fc-bc256334ea7e.json)

Generating PDF... (downloads/54539f50-c8a2-434a-a6a3-21e9c8066b7a.pdf)

Appendix C Flood maps

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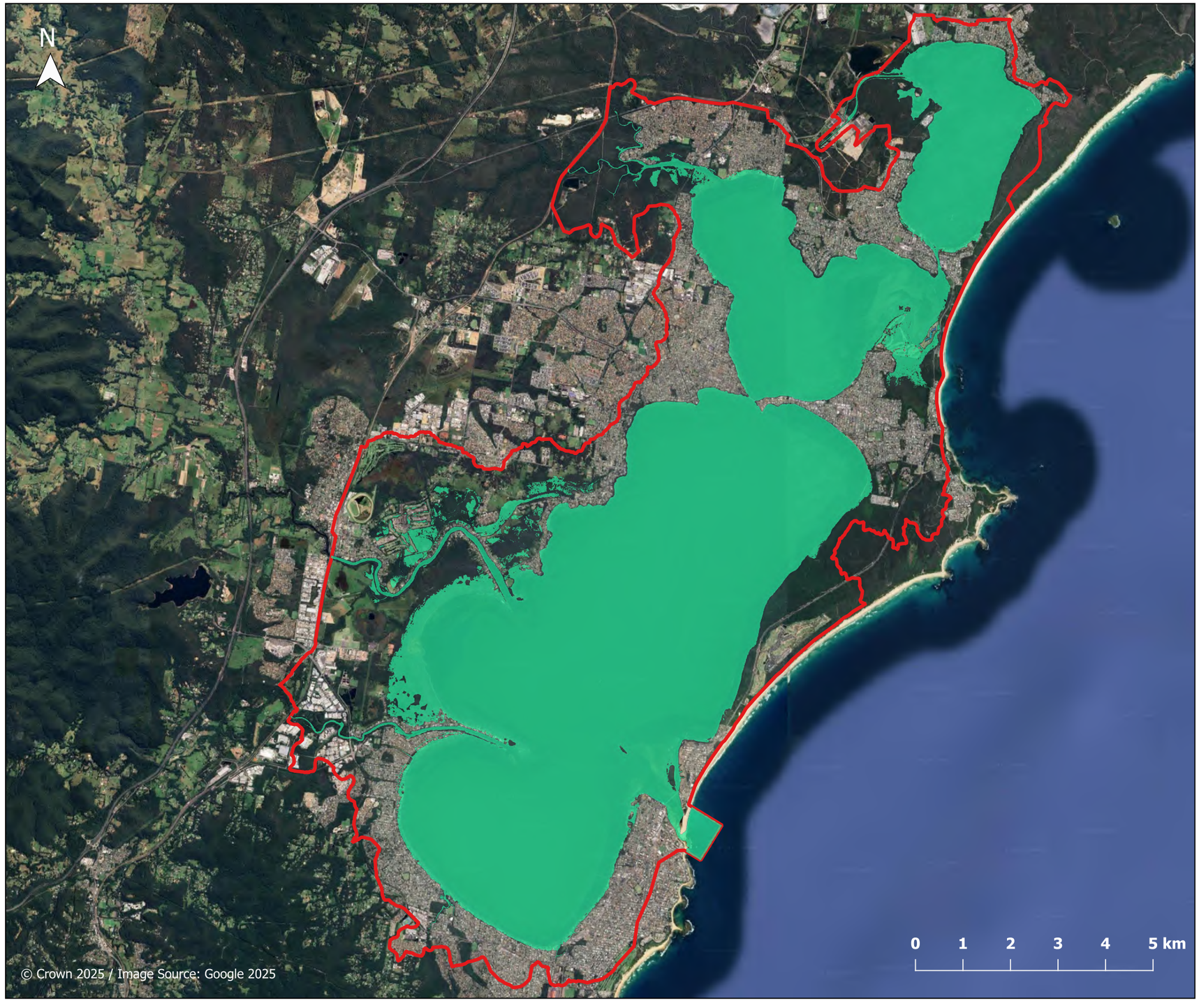

Figure C.1.1

20% AEP flood event - peak water level

Legend

- Model boundary

Peak water level (mAHD)

- <= 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00
- 2.00 - 2.25
- 2.25 - 2.50
- 2.50 - 2.75
- > 2.75

Disclaimer:
1. The flood levels presented have been capped to the maximum level of flooding in the Tuggerah Lakes waterbody.
2. Flood levels relating to tributary catchments should be obtained from the respective tributary catchment studies.

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Tuggerah Lakes Flood Study Review

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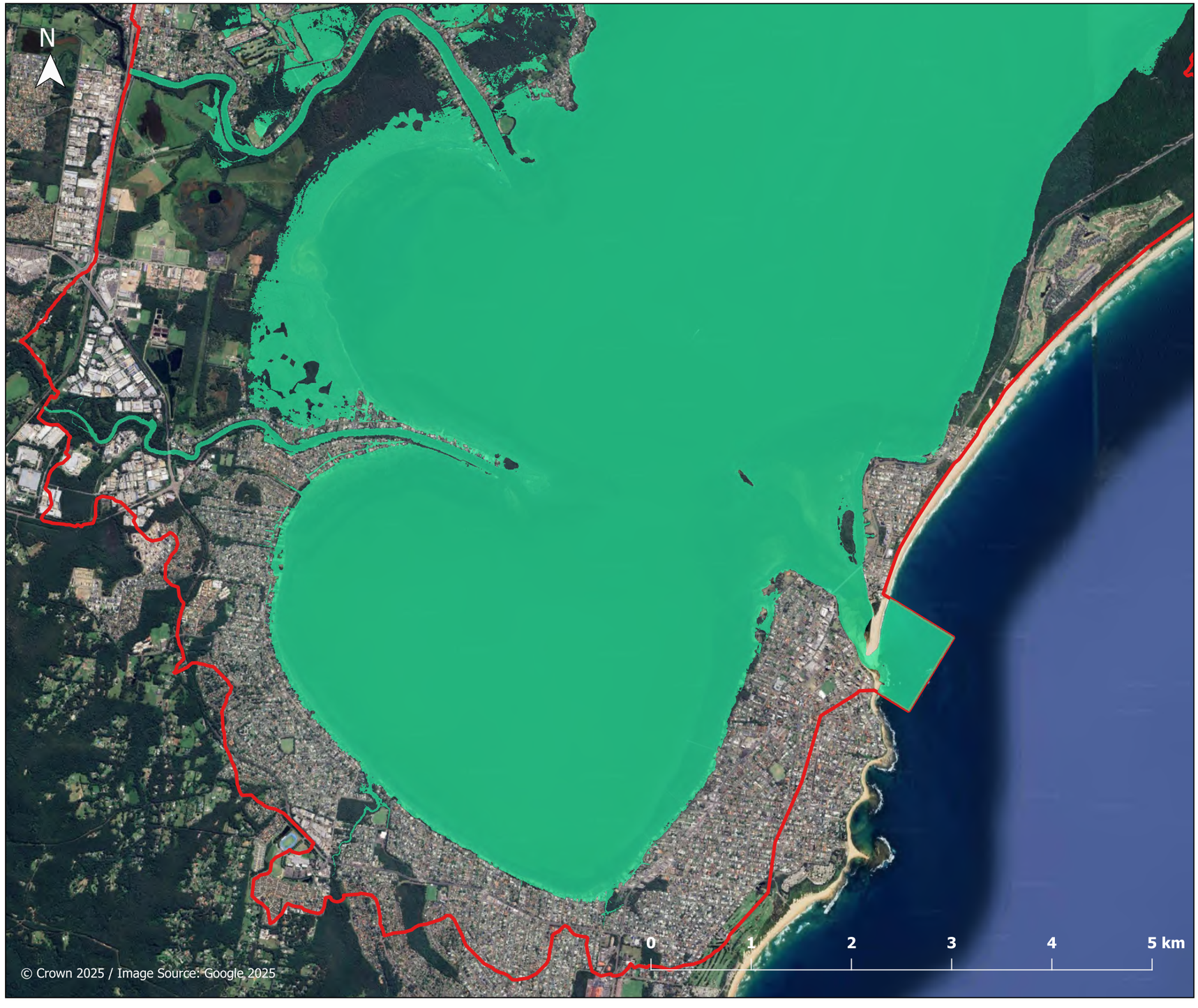

Figure C.1.1.A

20% AEP flood event - peak water level

Legend

- Model boundary

Peak water level (mAHD)

- <= 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00
- 2.00 - 2.25
- 2.25 - 2.50
- 2.50 - 2.75
- > 2.75

Disclaimer:
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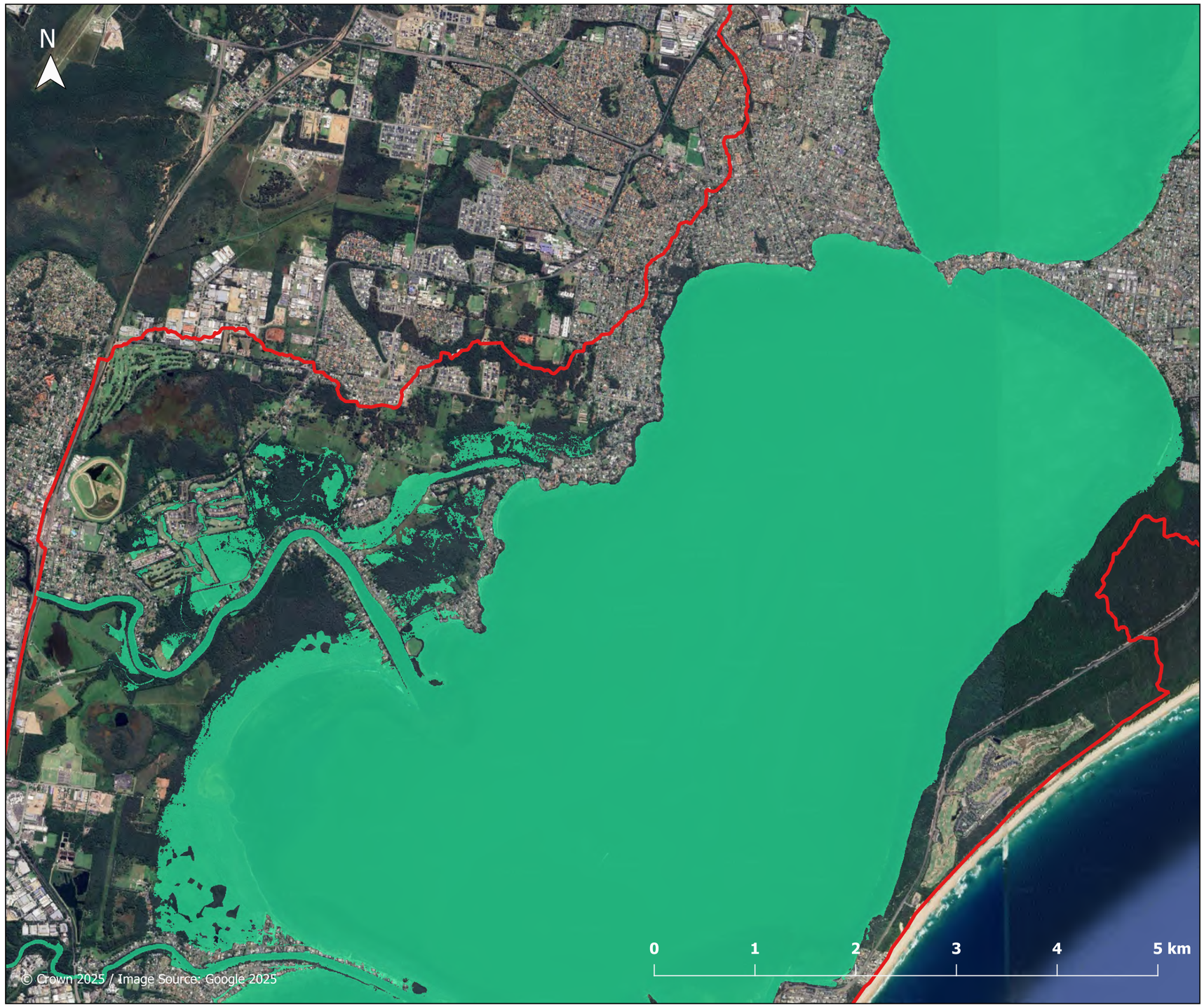

Figure C.1.1.B

20% AEP flood event - peak water level

Legend

- Model boundary

Peak water level (mAHD)

- <= 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00
- 2.00 - 2.25
- 2.25 - 2.50
- 2.50 - 2.75
- > 2.75

Disclaimer:
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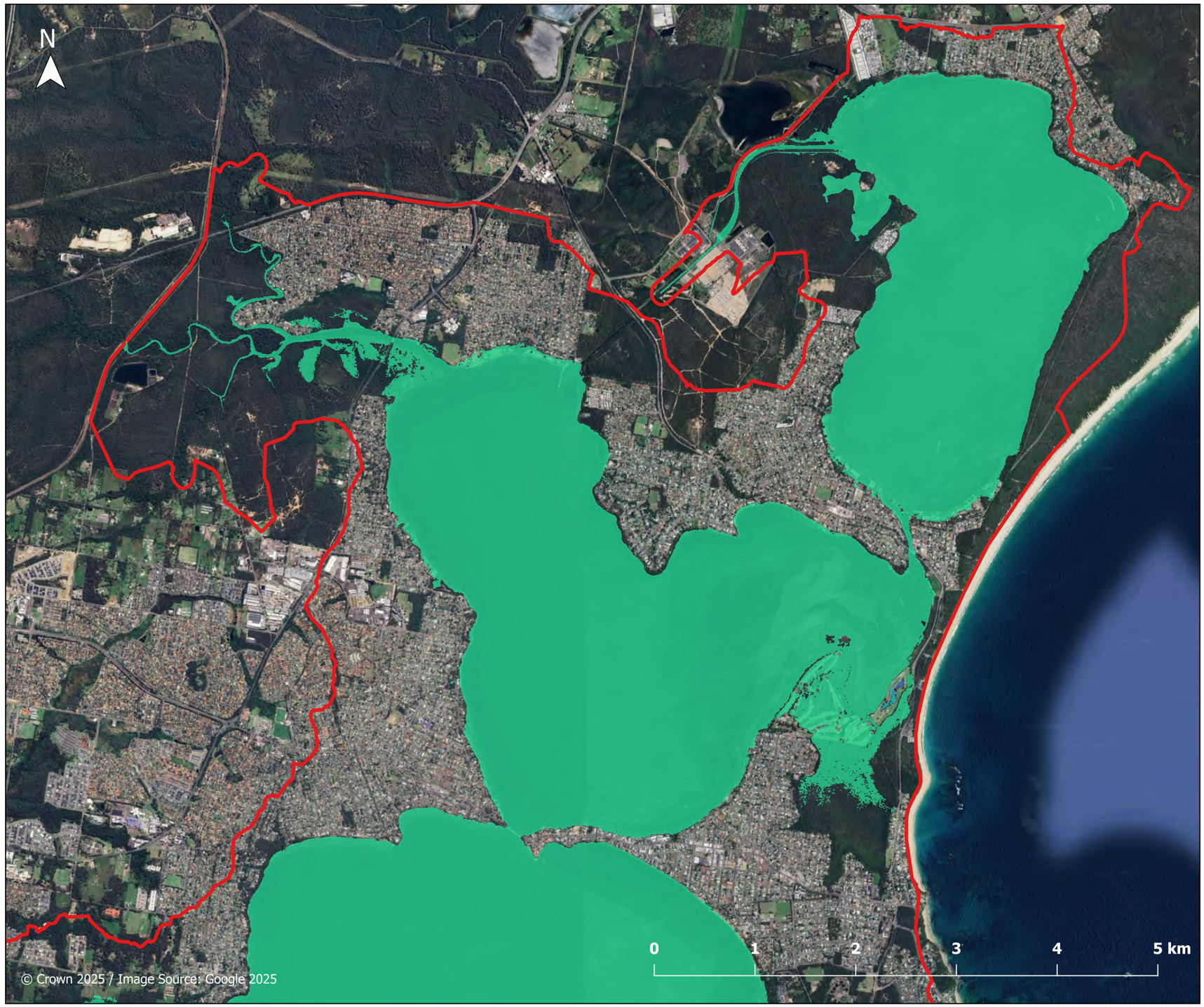

Figure C.1.1.C

20% AEP flood event - peak water level

Legend

- Model boundary

Peak water level (mAHD)

- <= 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00
- 2.00 - 2.25
- 2.25 - 2.50
- 2.50 - 2.75
- > 2.75

Disclaimer:
1. The flood levels presented have been capped to the maximum level of flooding in the Tuggerah Lakes waterbody.
2. Flood levels relating to tributary catchments should be obtained from the respective tributary catchment studies.

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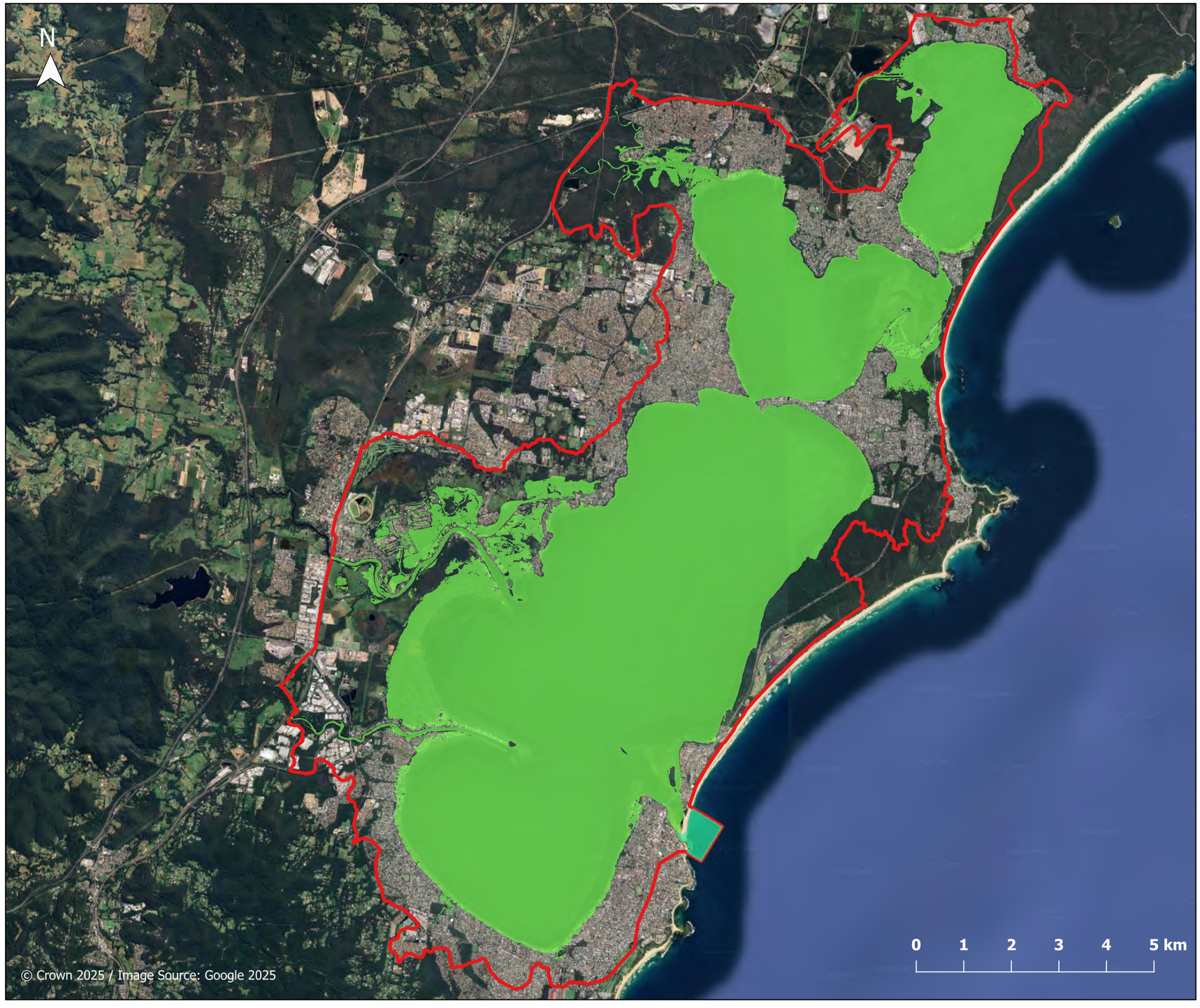

Figure C.1.2

10% AEP flood event - peak water level

Legend

- Model boundary

Peak water level (mAHD)

- <= 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00
- 2.00 - 2.25
- 2.25 - 2.50
- 2.50 - 2.75
- > 2.75

Disclaimer:
1. The flood levels presented have been capped to the maximum level of flooding in the Tuggerah Lakes waterbody.
2. Flood levels relating to tributary catchments should be obtained from the respective tributary catchment studies.

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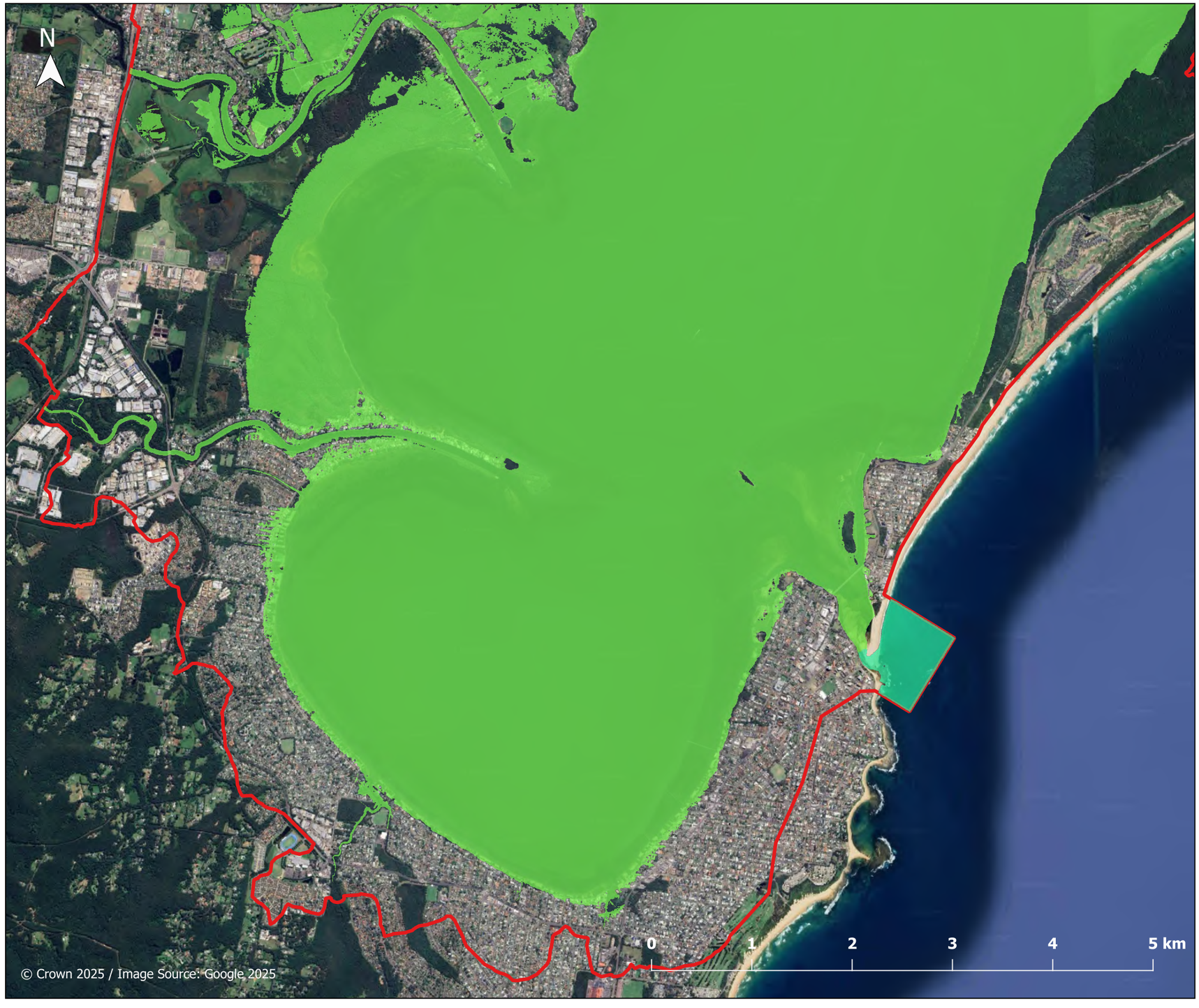

Figure C.1.2.A

10% AEP flood event - peak water level

Legend

Model boundary

Peak water level (mAHD)

- <= 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00
- 2.00 - 2.25
- 2.25 - 2.50
- 2.50 - 2.75
- > 2.75

Disclaimer:
1. The flood levels presented have been capped to the maximum level of flooding in the Tuggerah Lakes waterbody.
2. Flood levels relating to tributary catchments should be obtained from the respective tributary catchment studies.

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Tuggerah Lakes Flood Study Review

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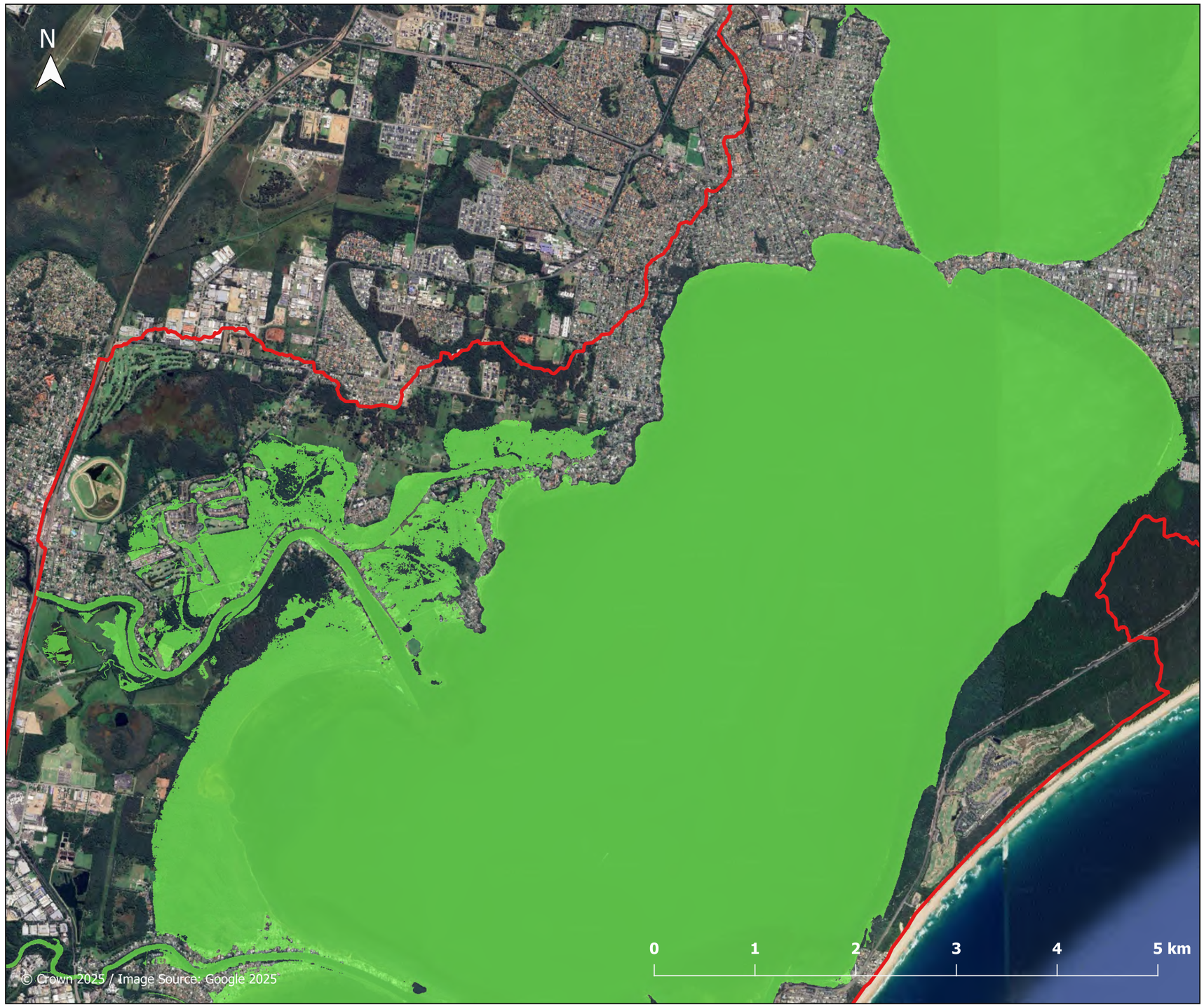

Figure C.1.2.B

10% AEP flood event - peak water level

Legend

Model boundary

Peak water level (mAHD)

- <= 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00
- 2.00 - 2.25
- 2.25 - 2.50
- 2.50 - 2.75
- > 2.75

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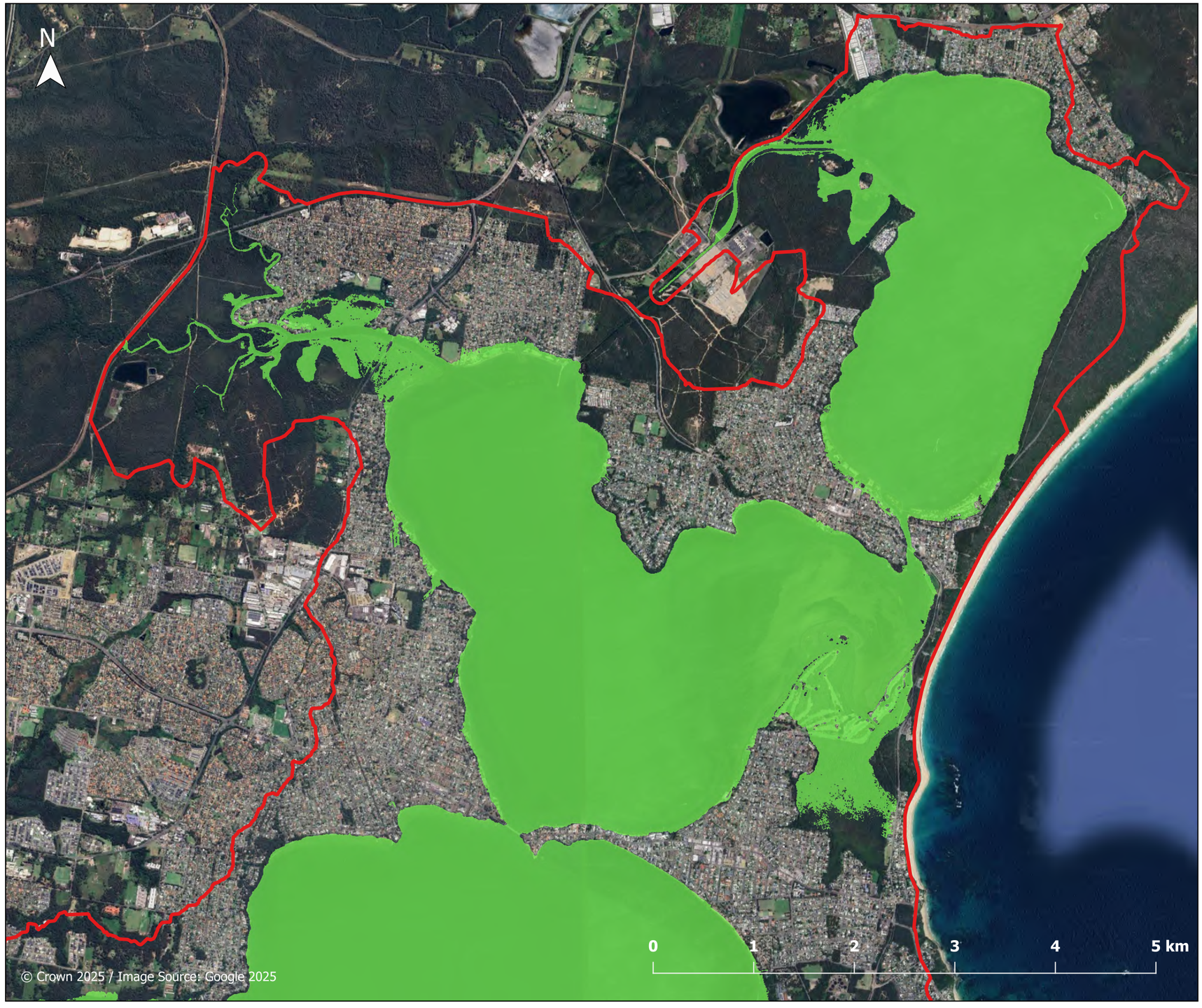

Figure C.1.2.C

10% AEP flood event - peak water level

Legend

Model boundary

Peak water level (mAHD)

- <= 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00
- 2.00 - 2.25
- 2.25 - 2.50
- 2.50 - 2.75
- > 2.75

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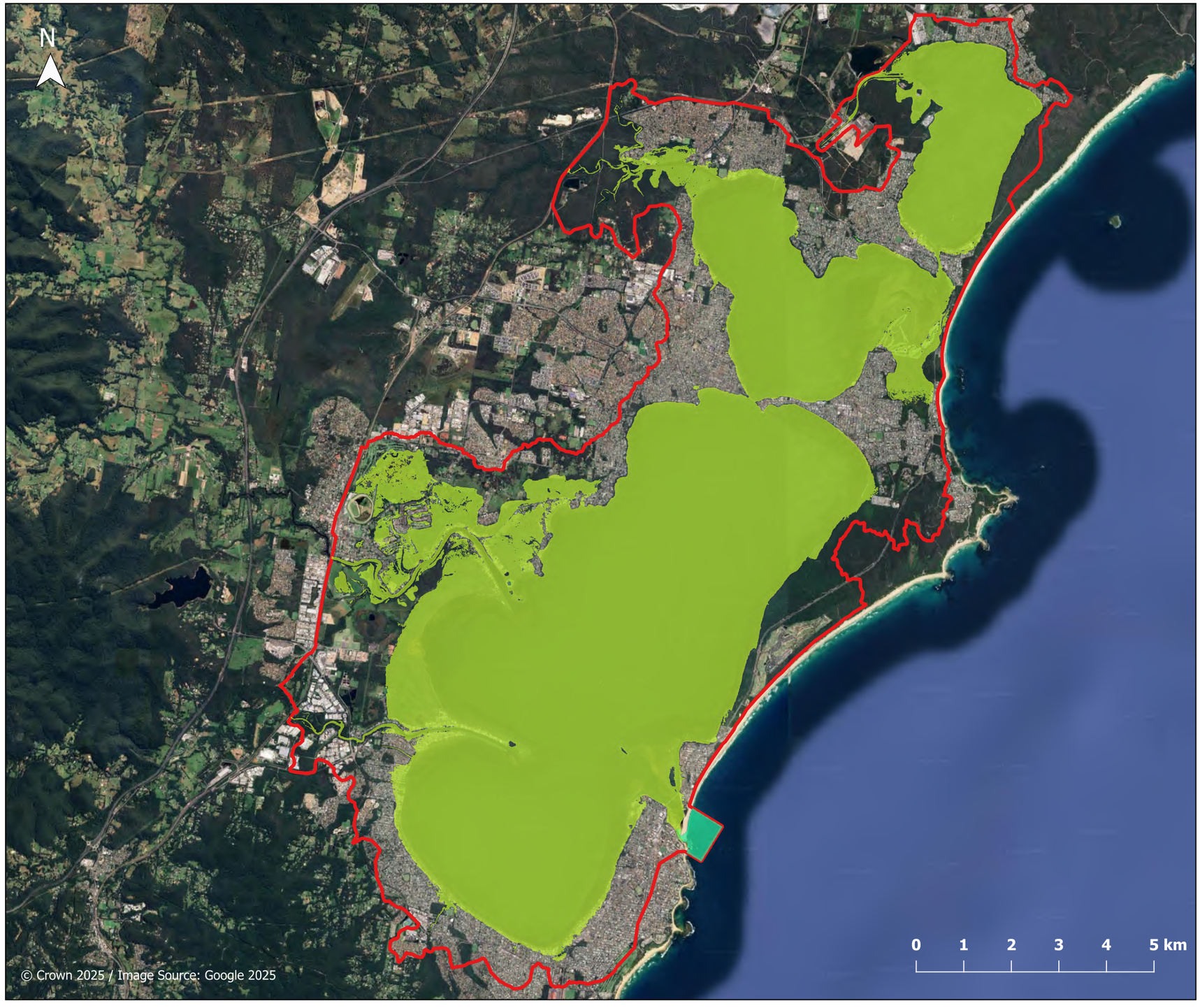

Figure C.1.3

5% AEP flood event - peak water level

Legend

- Model boundary

Peak water level (mAHD)

- <= 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00
- 2.00 - 2.25
- 2.25 - 2.50
- 2.50 - 2.75
- > 2.75

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Figure C.1.3.A

5% AEP flood event - peak water level

Legend

Model boundary

Peak water level (mAHD)

- <= 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00
- 2.00 - 2.25
- 2.25 - 2.50
- 2.50 - 2.75
- > 2.75

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Figure C.1.3.B

5% AEP flood event - peak water level

Legend

Model boundary

Peak water level (mAHD)

- <= 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00
- 2.00 - 2.25
- 2.25 - 2.50
- 2.50 - 2.75
- > 2.75

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Figure C.1.3.C

5% AEP flood event - peak water level

Legend

- Model boundary

Peak water level (mAHD)

- <= 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00
- 2.00 - 2.25
- 2.25 - 2.50
- 2.50 - 2.75
- > 2.75

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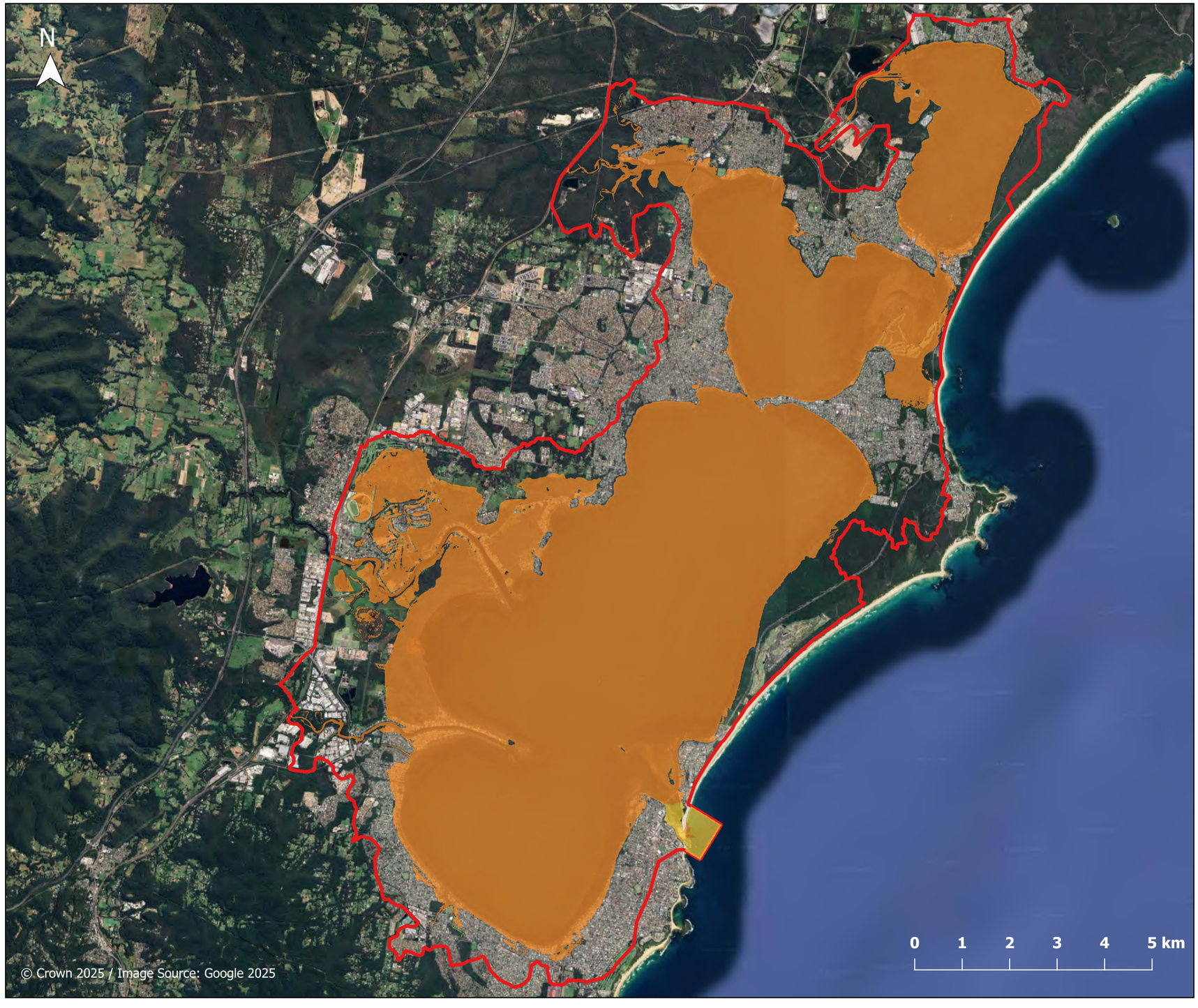

Figure C.1.4

2% AEP flood event - peak water level

Legend

- Model boundary

Peak water level (mAHD)

- <= 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00
- 2.00 - 2.25
- 2.25 - 2.50
- 2.50 - 2.75
- > 2.75

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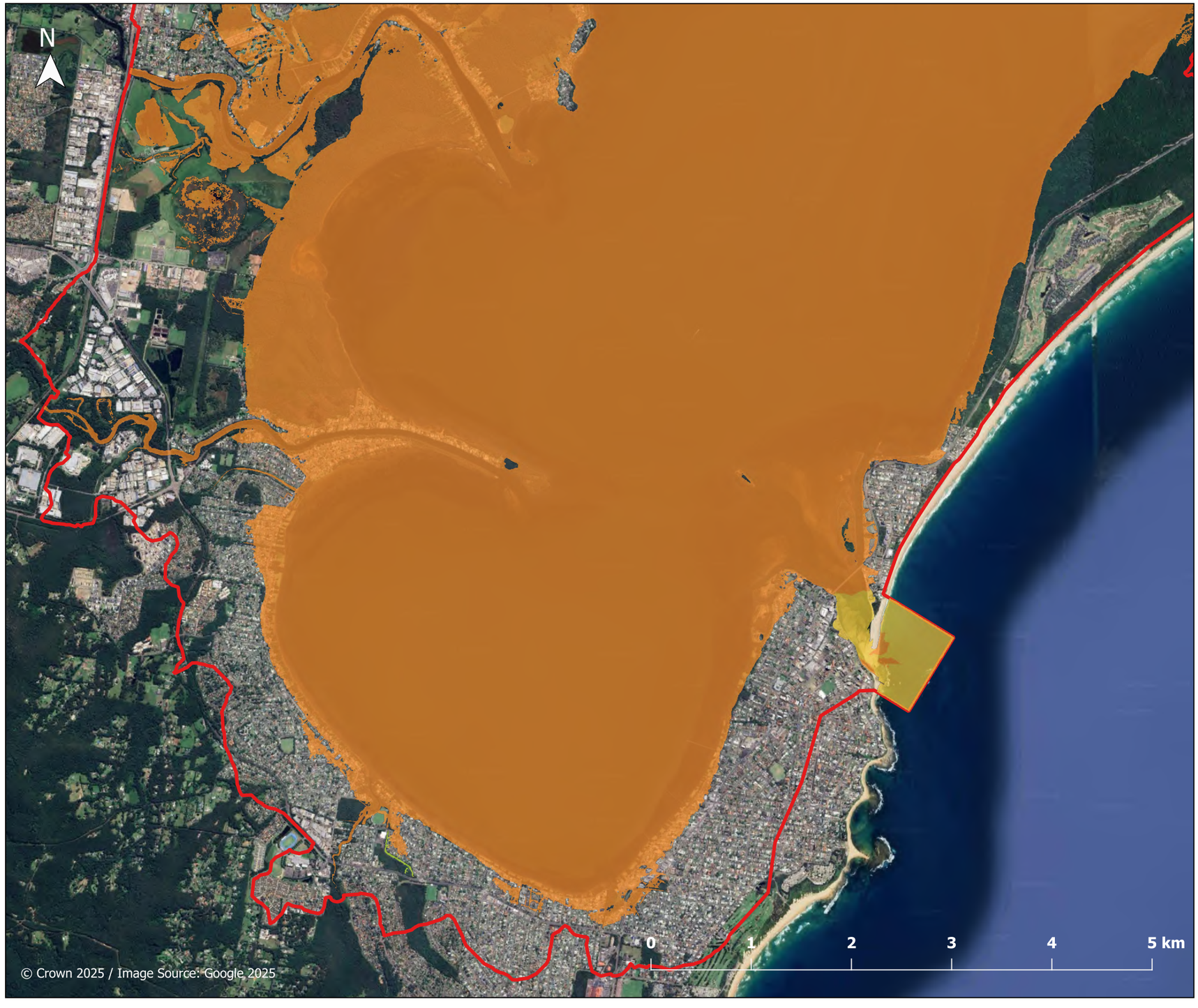

Figure C.1.4.A

2% AEP flood event - peak water level

Legend

Model boundary

Peak water level (mAHD)

- <= 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00
- 2.00 - 2.25
- 2.25 - 2.50
- 2.50 - 2.75
- > 2.75

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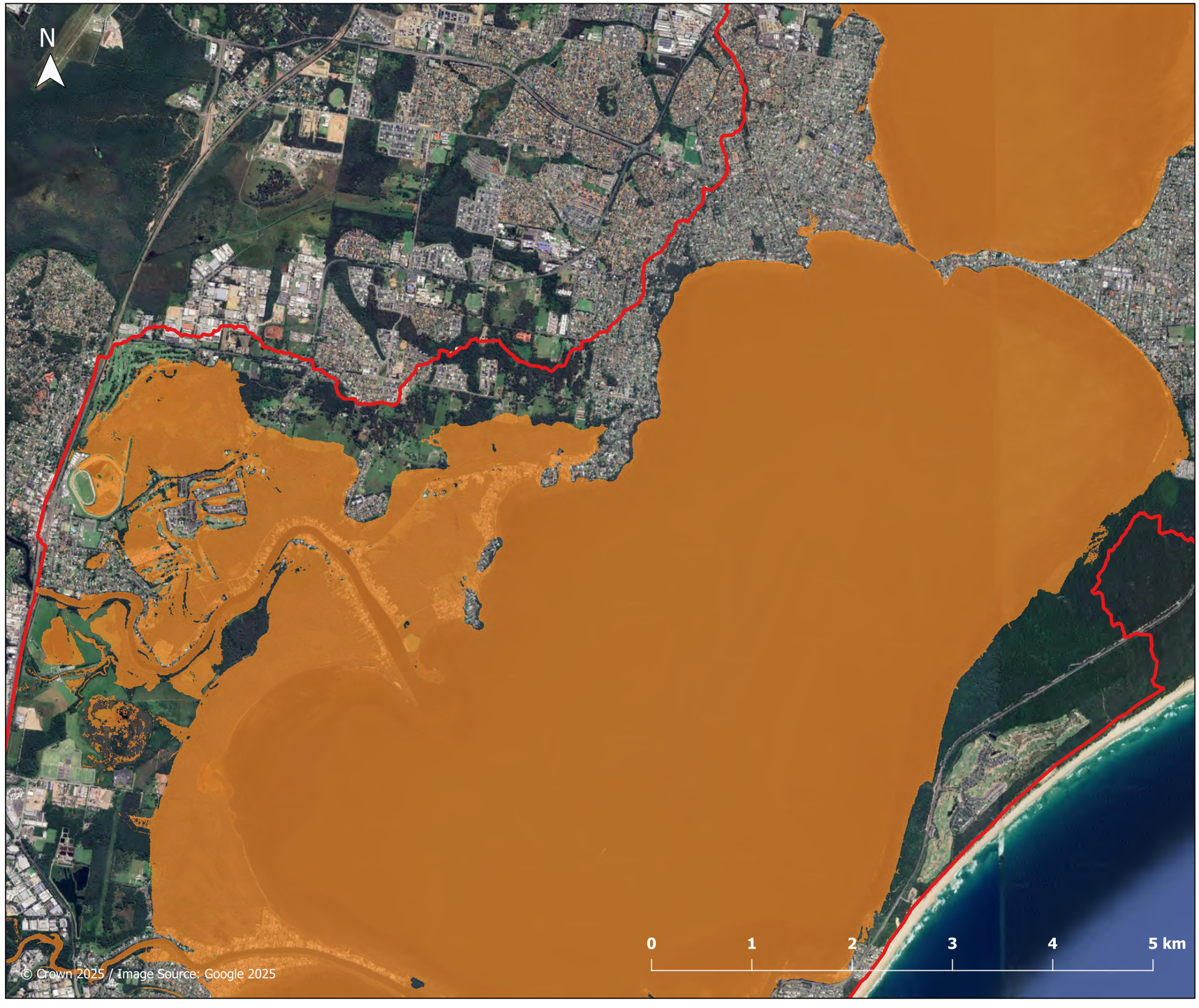

Figure C.1.4.B

2% AEP flood event - peak water level

Legend

Model boundary

Peak water level (mAHD)

- <= 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00
- 2.00 - 2.25
- 2.25 - 2.50
- 2.50 - 2.75
- > 2.75

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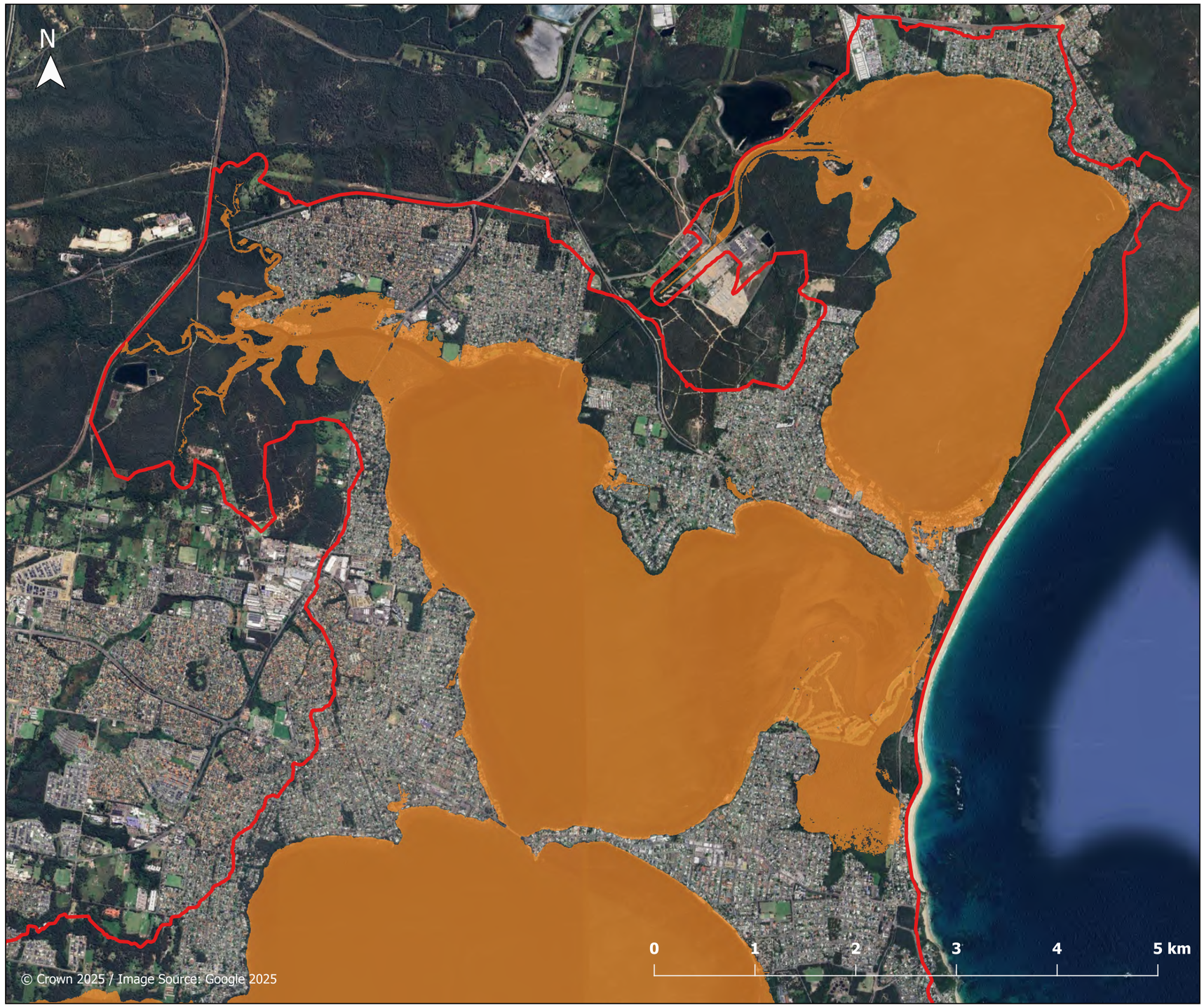

Figure C.1.4.C

2% AEP flood event - peak water level

Legend

- Model boundary

Peak water level (mAHD)

- <= 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00
- 2.00 - 2.25
- 2.25 - 2.50
- 2.50 - 2.75
- > 2.75

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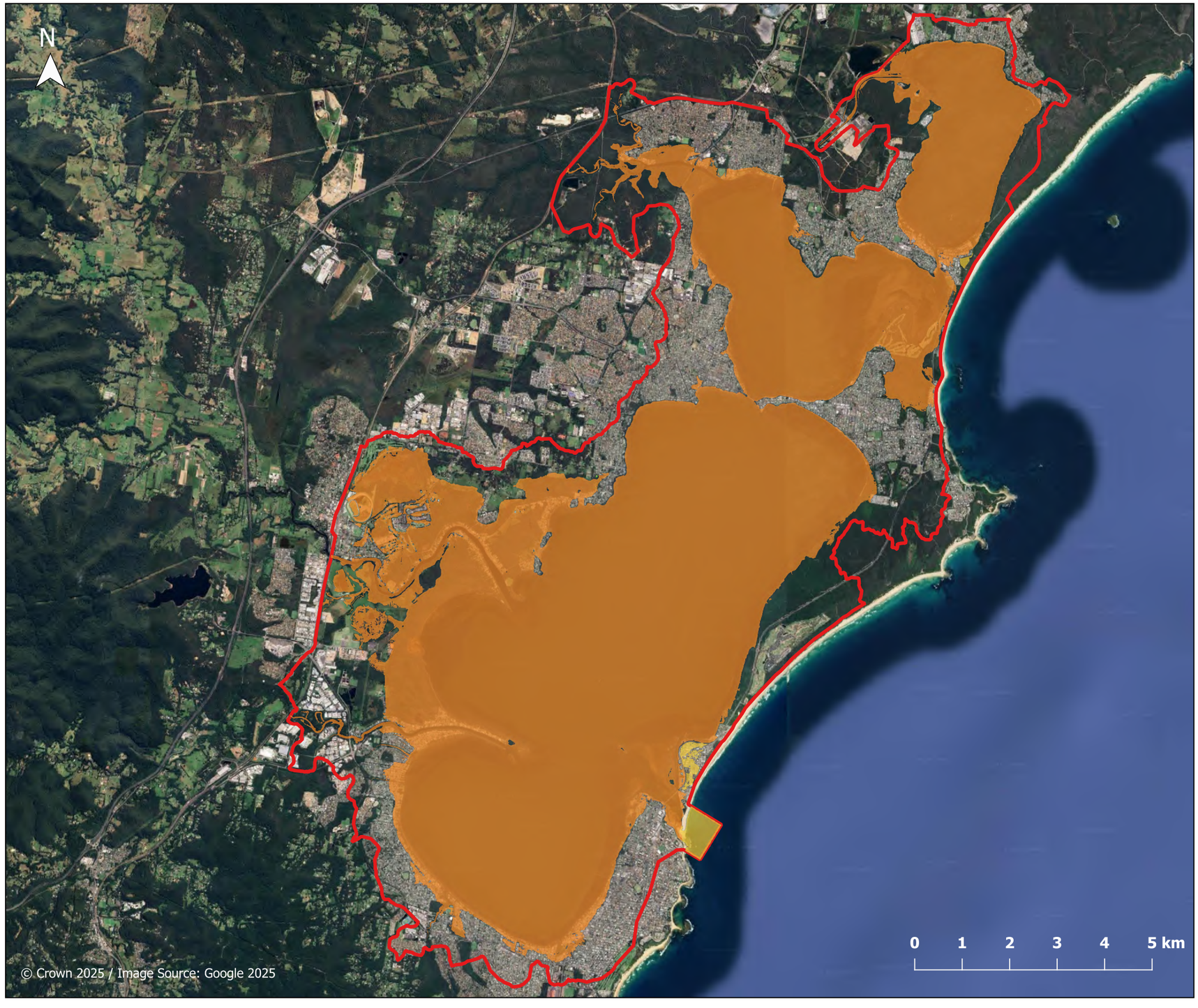

Figure C.1.5

1% AEP flood event - peak water level

Legend

- Model boundary

Peak water level (mAHD)

- <= 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00
- 2.00 - 2.25
- 2.25 - 2.50
- 2.50 - 2.75
- > 2.75

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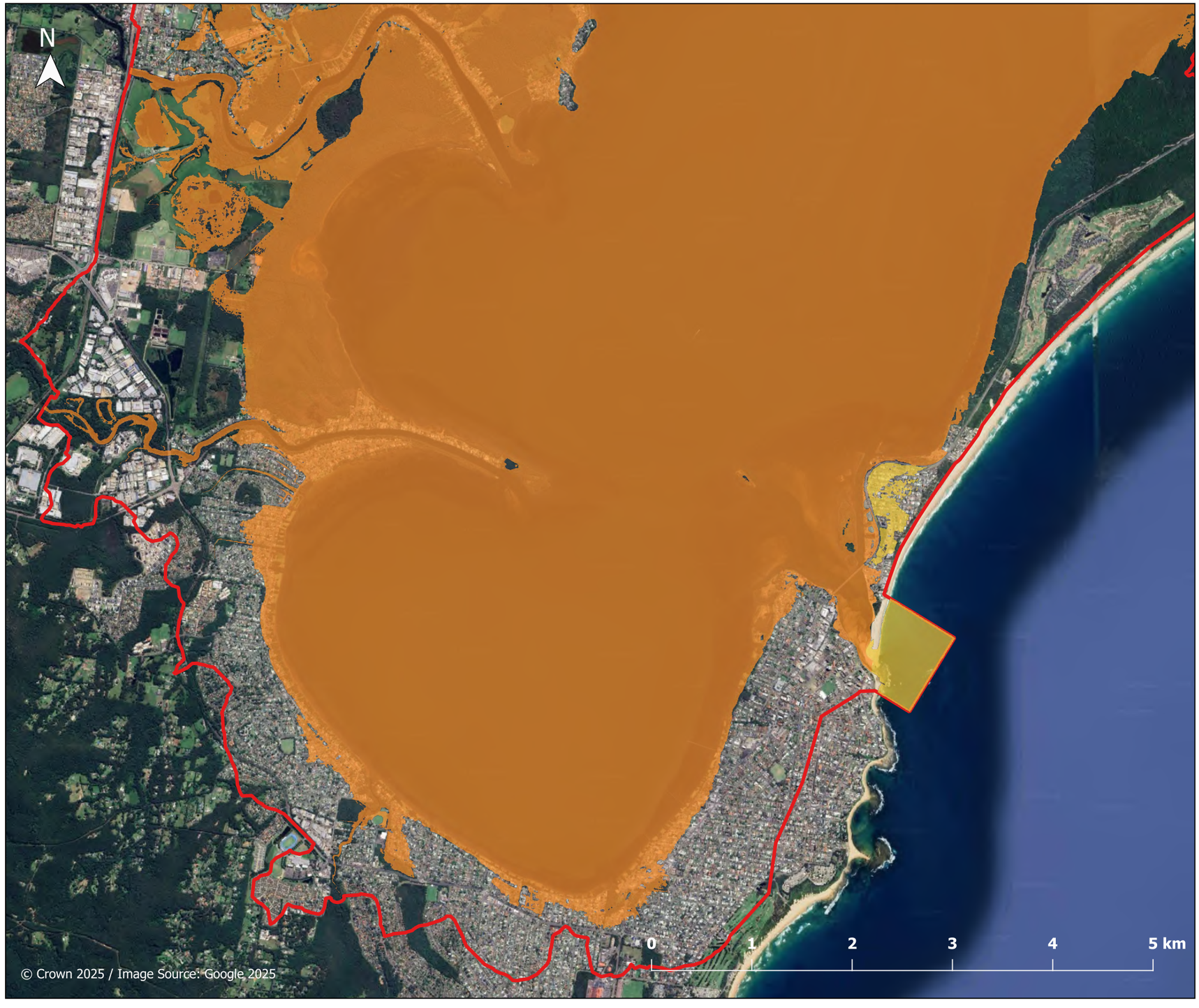

Figure C.1.5.A

1% AEP flood event - peak water level

Legend

Model boundary

Peak water level (mAHD)

- <= 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00
- 2.00 - 2.25
- 2.25 - 2.50
- 2.50 - 2.75
- > 2.75

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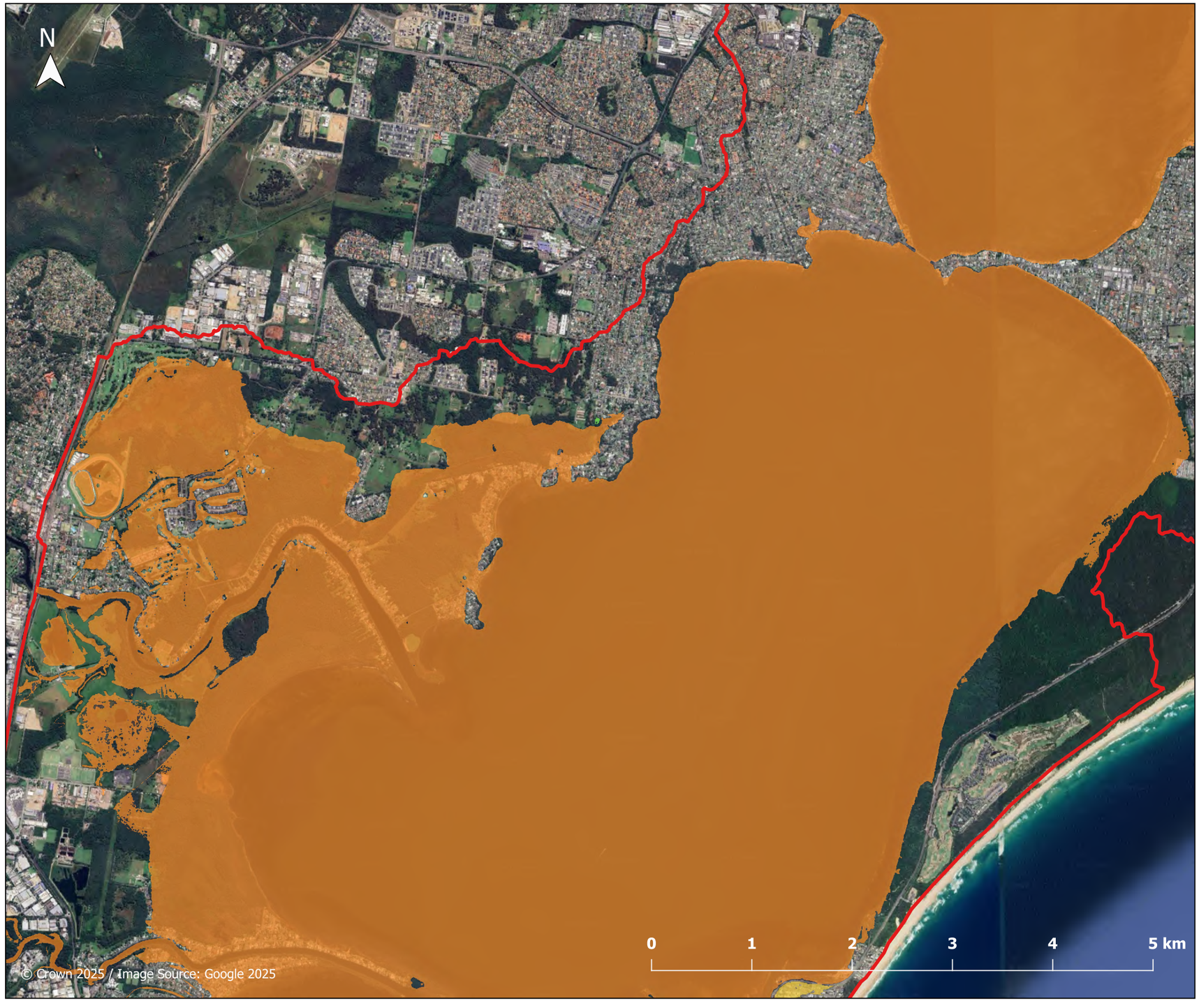

Figure C.1.5.B

1% AEP flood event - peak water level

Legend

Model boundary

Peak water level (mAHD)

- <= 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00
- 2.00 - 2.25
- 2.25 - 2.50
- 2.50 - 2.75
- > 2.75

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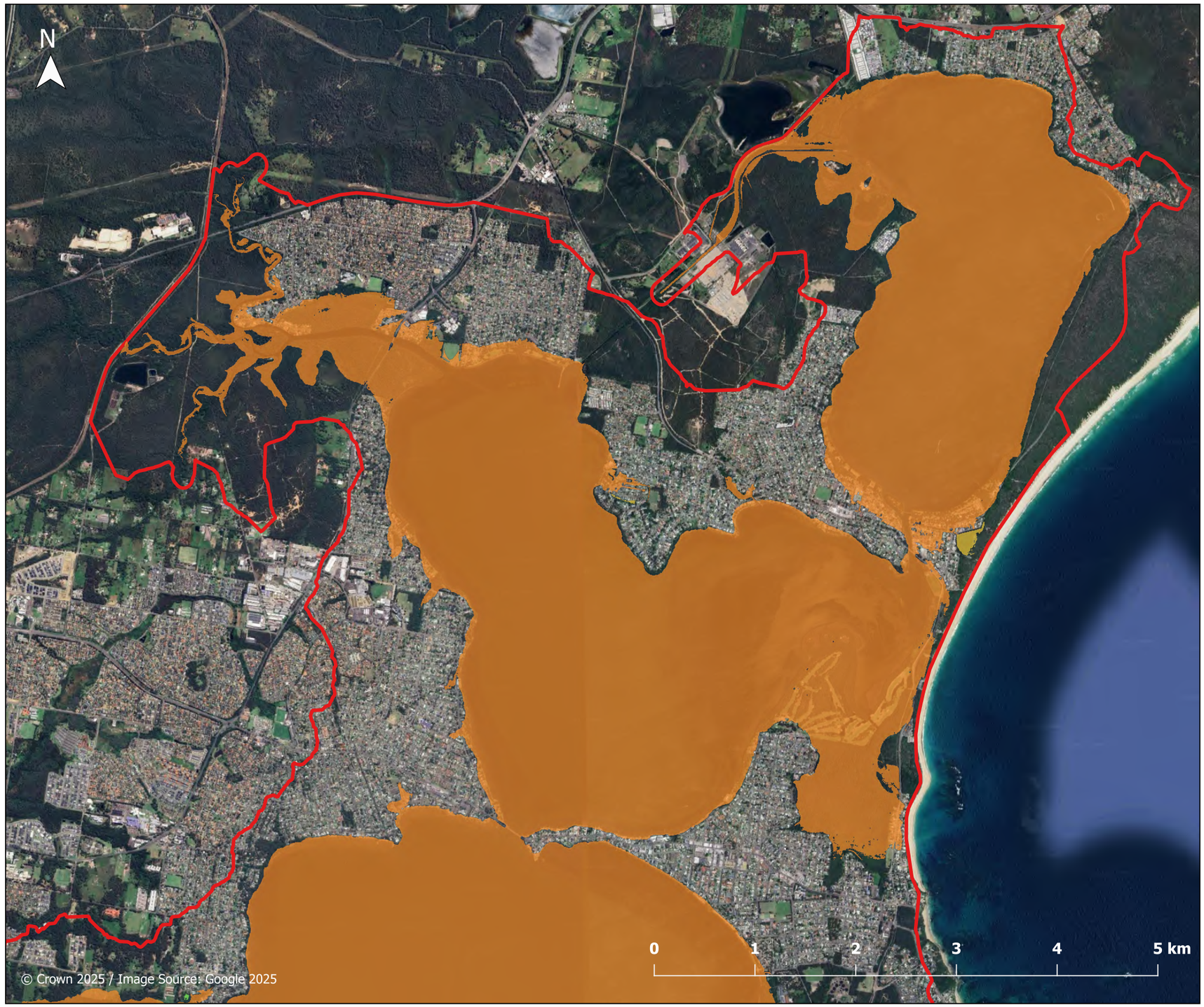

Figure C.1.5.C

1% AEP flood event - peak water level

Legend

- Model boundary

Peak water level (mAHD)

- <= 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00
- 2.00 - 2.25
- 2.25 - 2.50
- 2.50 - 2.75
- > 2.75

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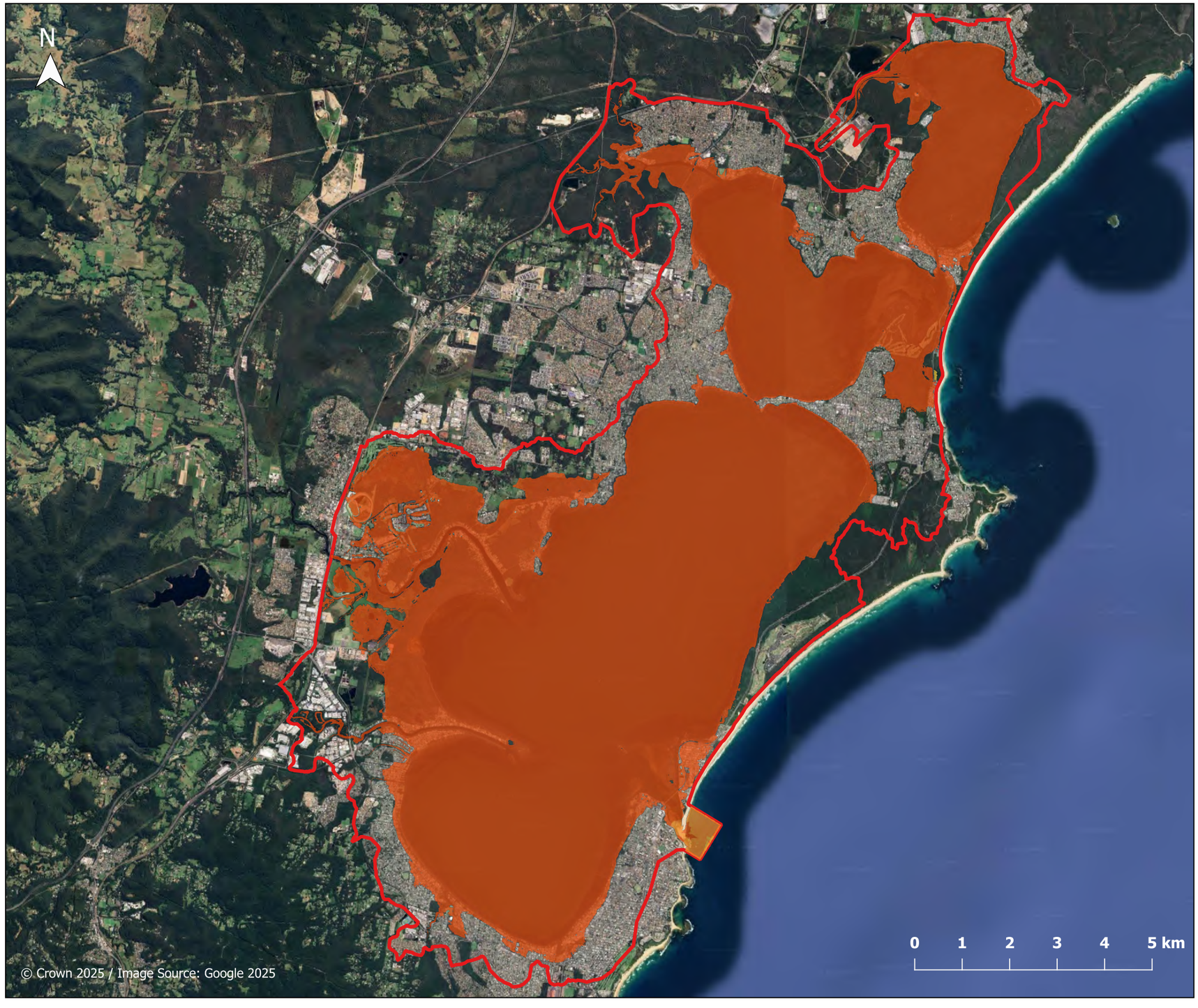

Figure C.1.6

1 in 200 AEP flood event - peak water level

Legend

- Model boundary

Peak water level (mAHD)

- <= 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00
- 2.00 - 2.25
- 2.25 - 2.50
- 2.50 - 2.75
- > 2.75

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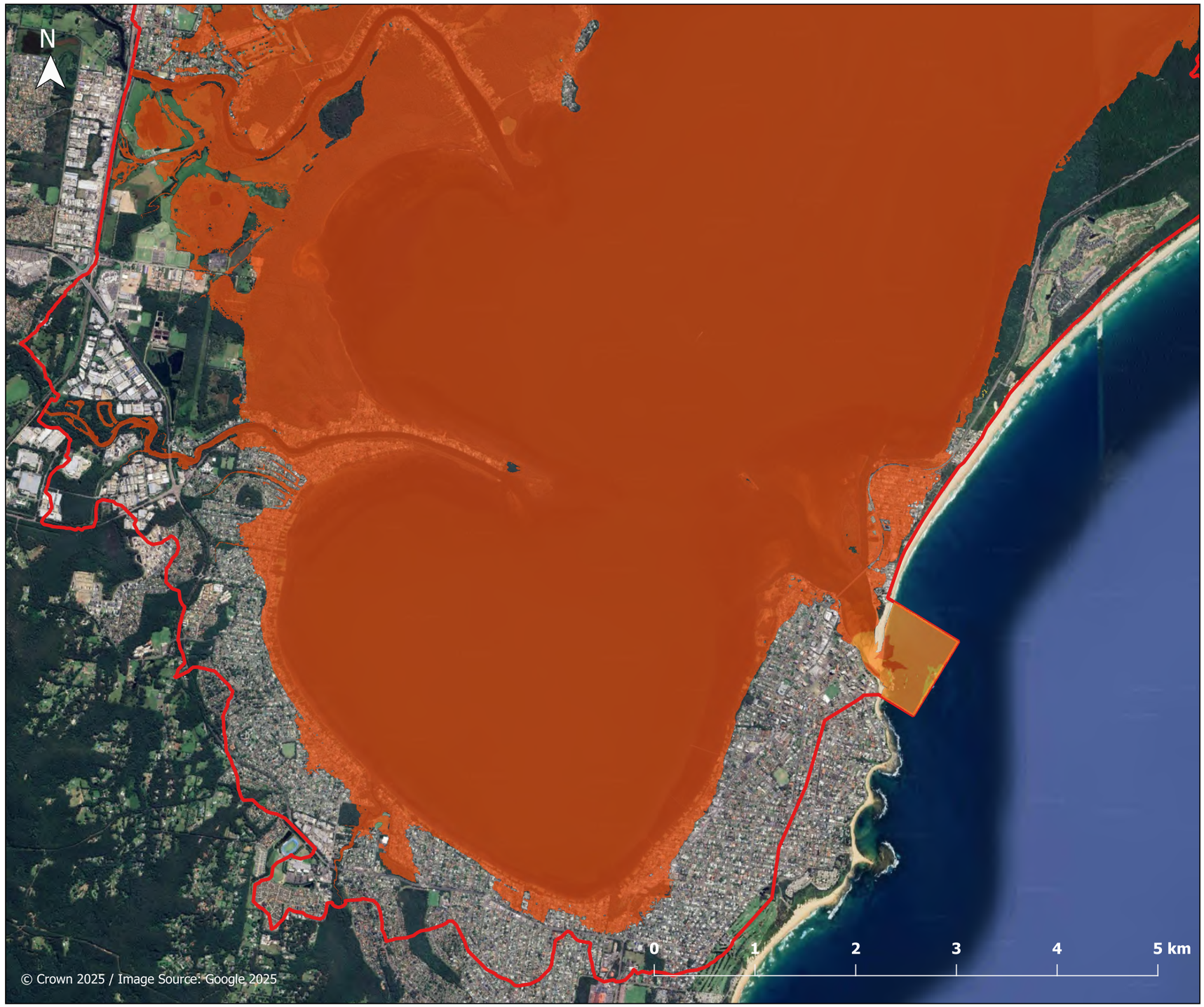

Figure C.1.6.A

1 in 200 AEP flood event - peak water level

Legend

Model boundary

Peak water level (mAHD)

- <= 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00
- 2.00 - 2.25
- 2.25 - 2.50
- 2.50 - 2.75
- > 2.75

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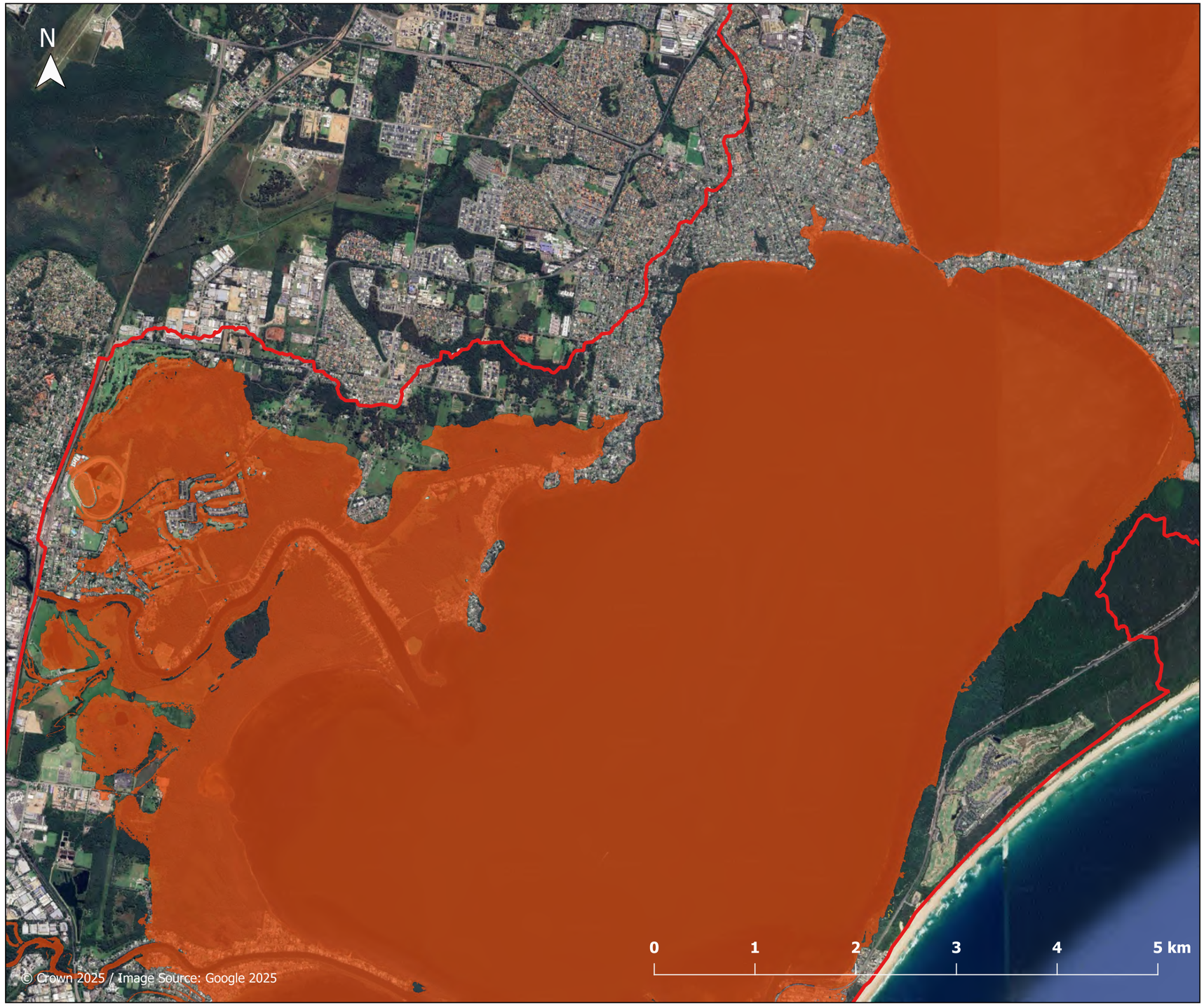

Figure C.1.6.B

1 in 200 AEP flood event - peak water level

Legend

- Model boundary

Peak water level (mAHD)

- <= 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00
- 2.00 - 2.25
- 2.25 - 2.50
- 2.50 - 2.75
- > 2.75

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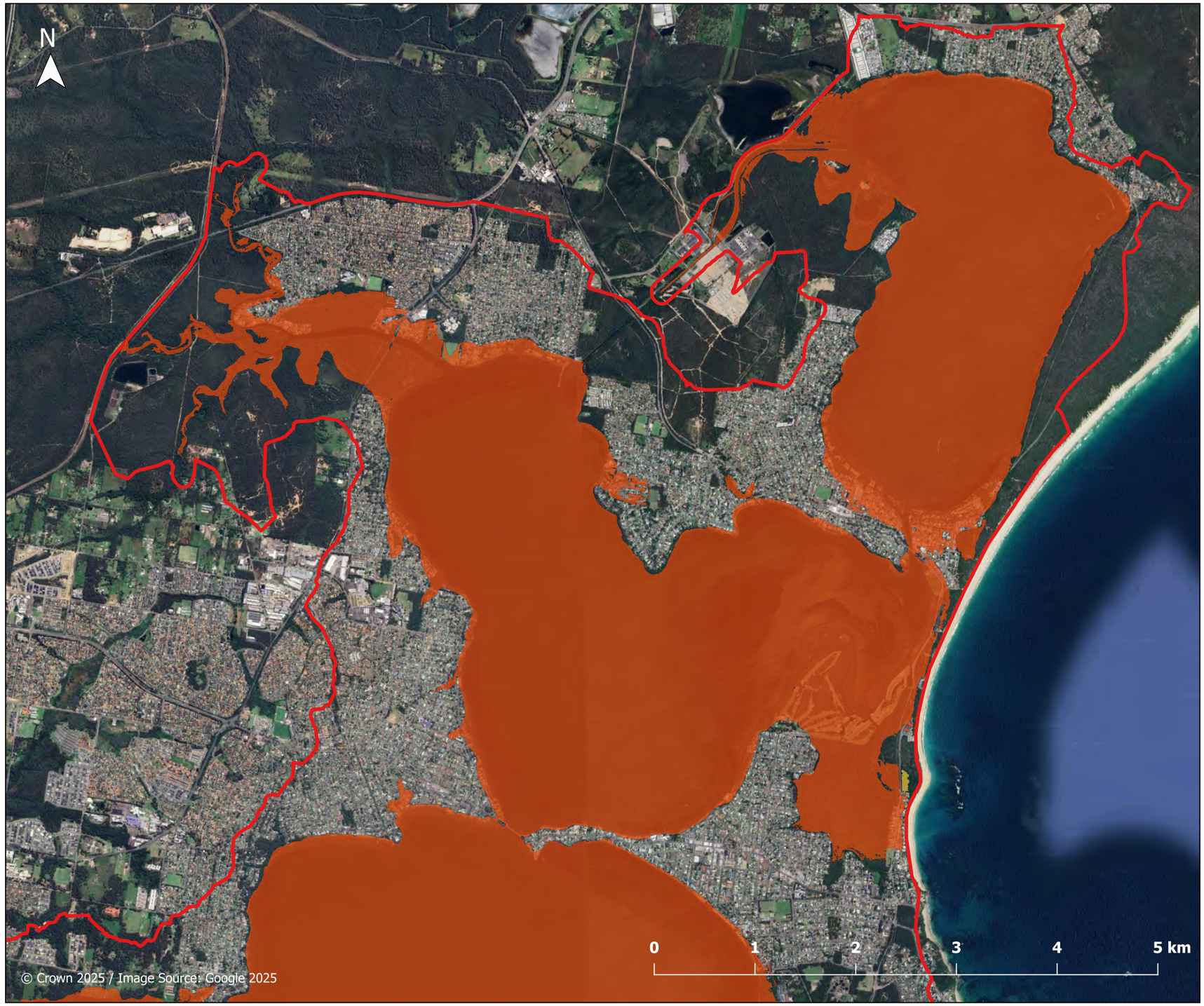

Figure C.1.6.C

1 in 200 AEP flood event - peak water level

Legend

- Model boundary

Peak water level (mAHD)

- <= 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00
- 2.00 - 2.25
- 2.25 - 2.50
- 2.50 - 2.75
- > 2.75

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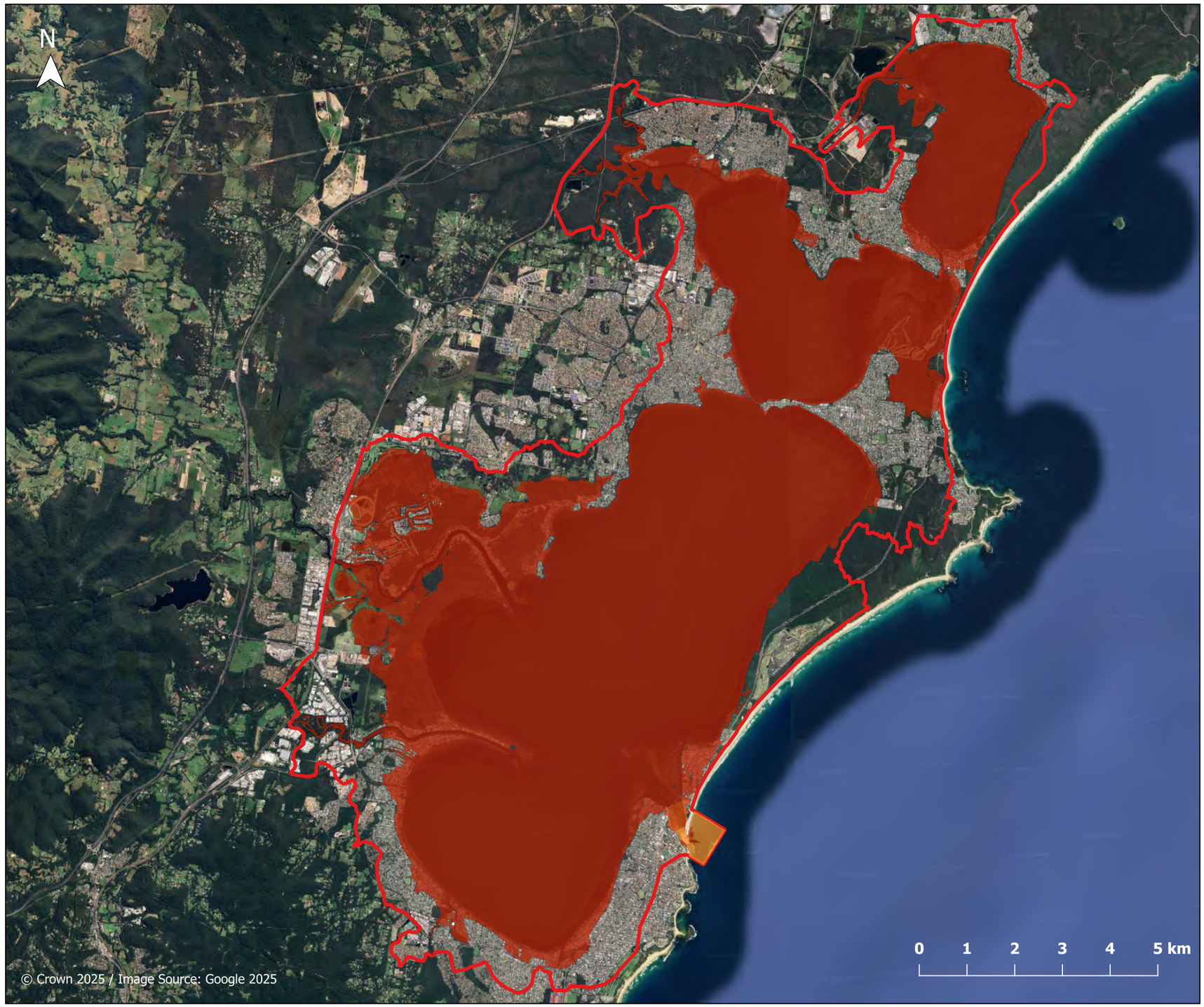

Figure C.1.7

1 in 500 AEP flood event - peak water level

Legend

- Model boundary

Peak water level (mAHD)

- <= 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00
- 2.00 - 2.25
- 2.25 - 2.50
- 2.50 - 2.75
- > 2.75

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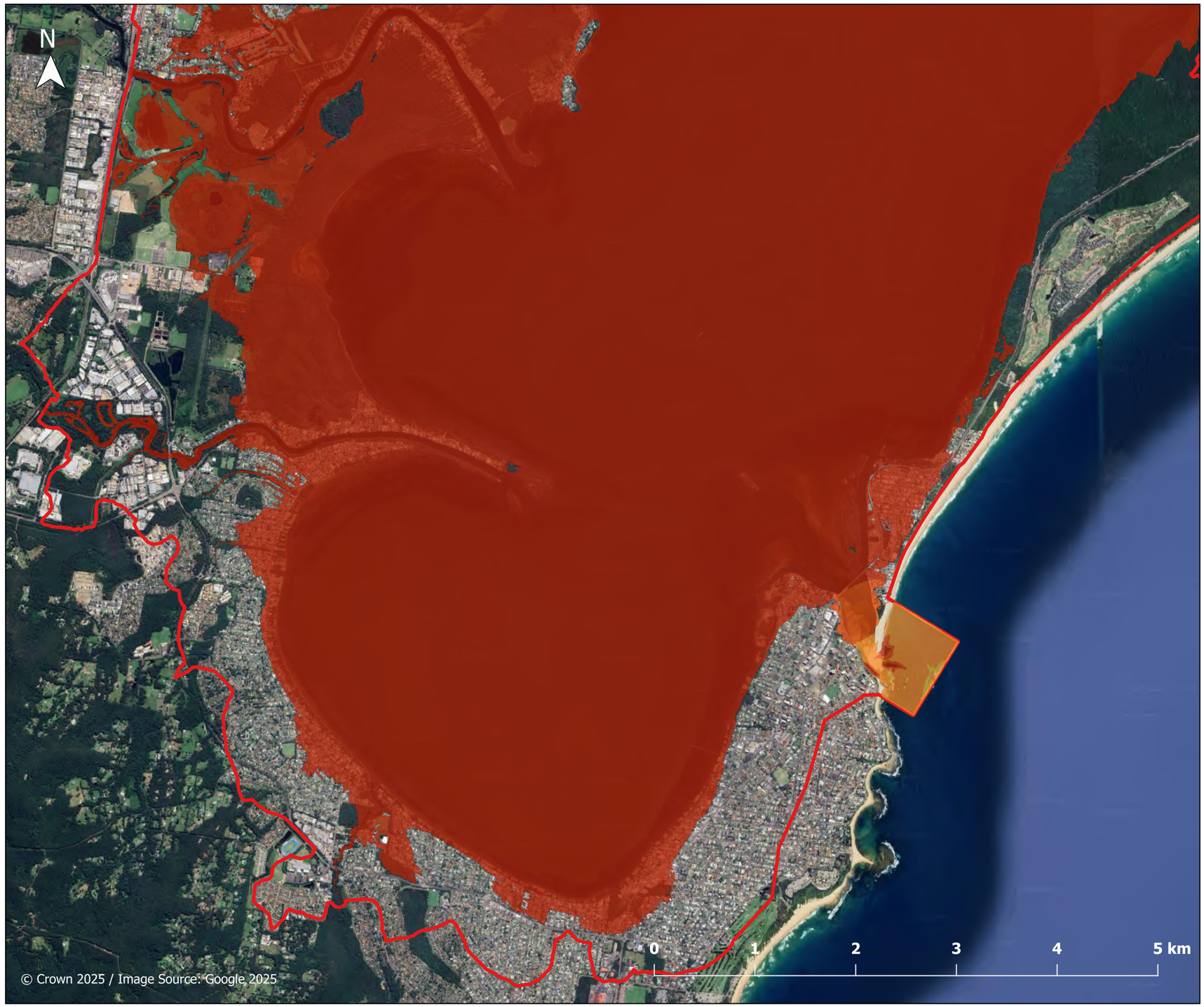

Figure C.1.7.A

1 in 500 AEP flood event - peak water level

Legend

Model boundary

Peak water level (mAHD)

- <= 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00
- 2.00 - 2.25
- 2.25 - 2.50
- 2.50 - 2.75
- > 2.75

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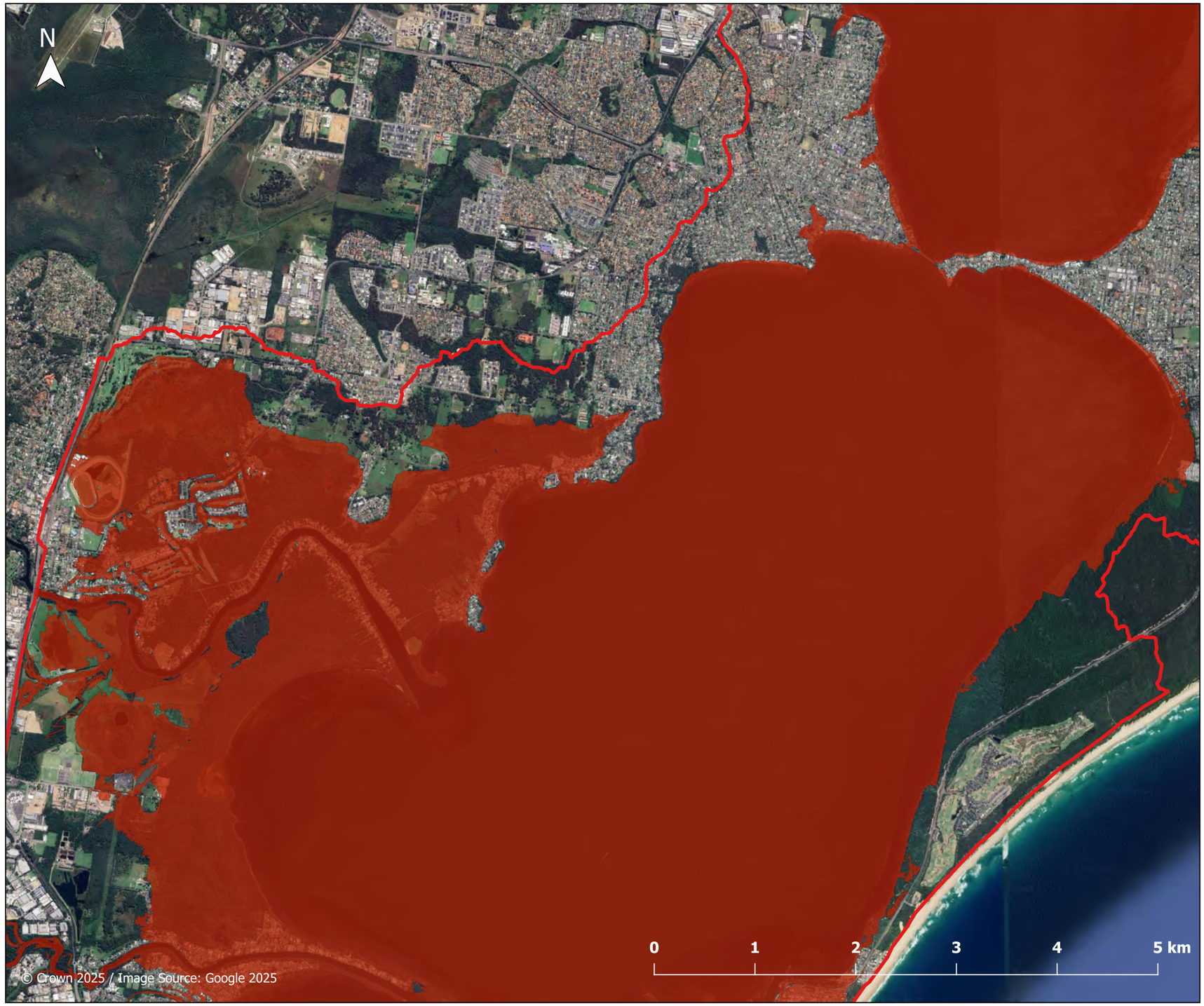

Figure C.1.7.B

1 in 500 AEP flood event - peak water level

Legend

- Model boundary

Peak water level (mAHD)

- <= 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00
- 2.00 - 2.25
- 2.25 - 2.50
- 2.50 - 2.75
- > 2.75

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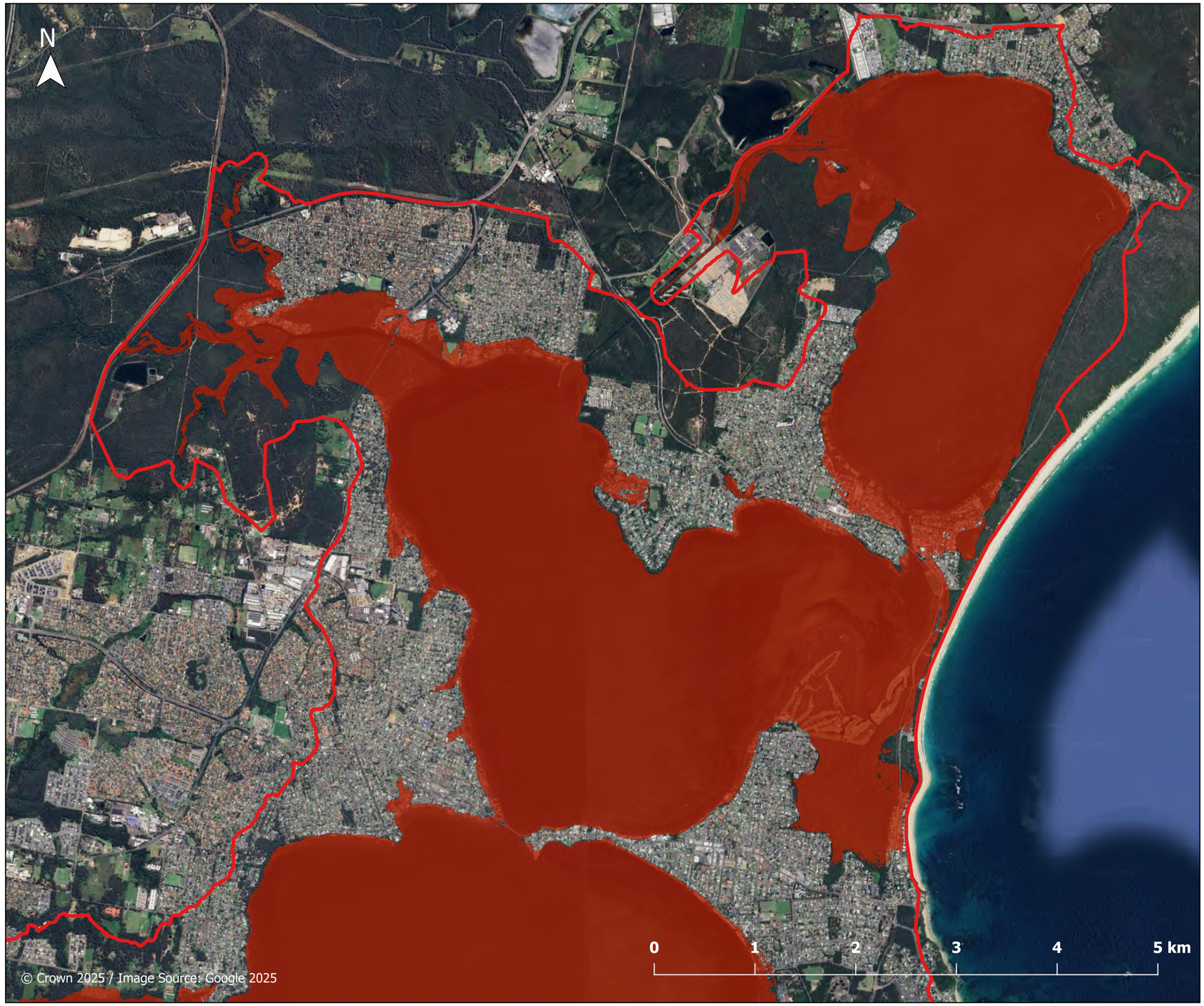

Figure C.1.7.C

1 in 500 AEP flood event - peak water level

Legend

Model boundary

Peak water level (mAHD)

- <= 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00
- 2.00 - 2.25
- 2.25 - 2.50
- 2.50 - 2.75
- > 2.75

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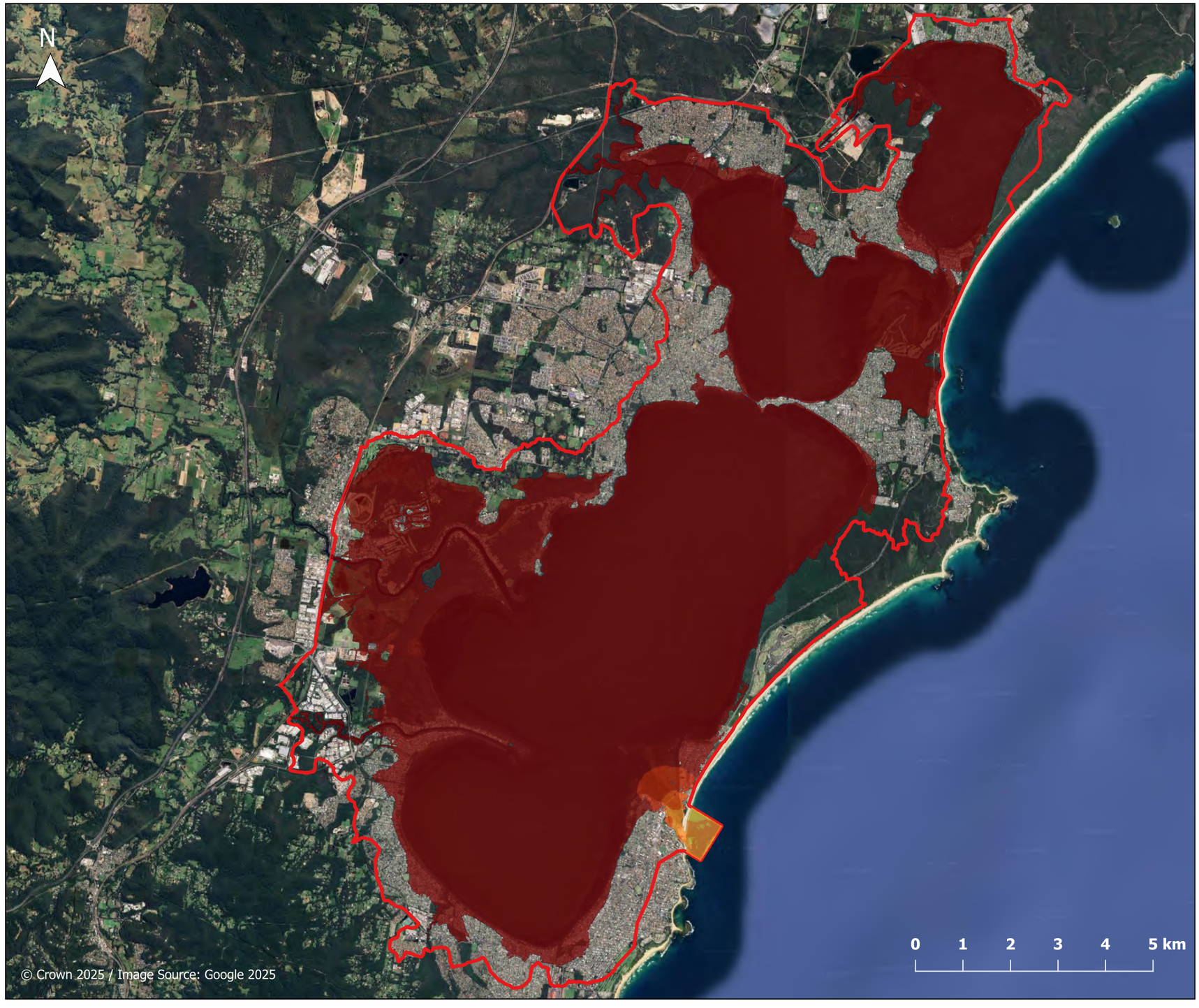

Figure C.1.8

PMF flood event - peak water level

Legend

- Model boundary

Peak water level (mAHD)

- <= 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00
- 2.00 - 2.25
- 2.25 - 2.50
- 2.50 - 2.75
- > 2.75

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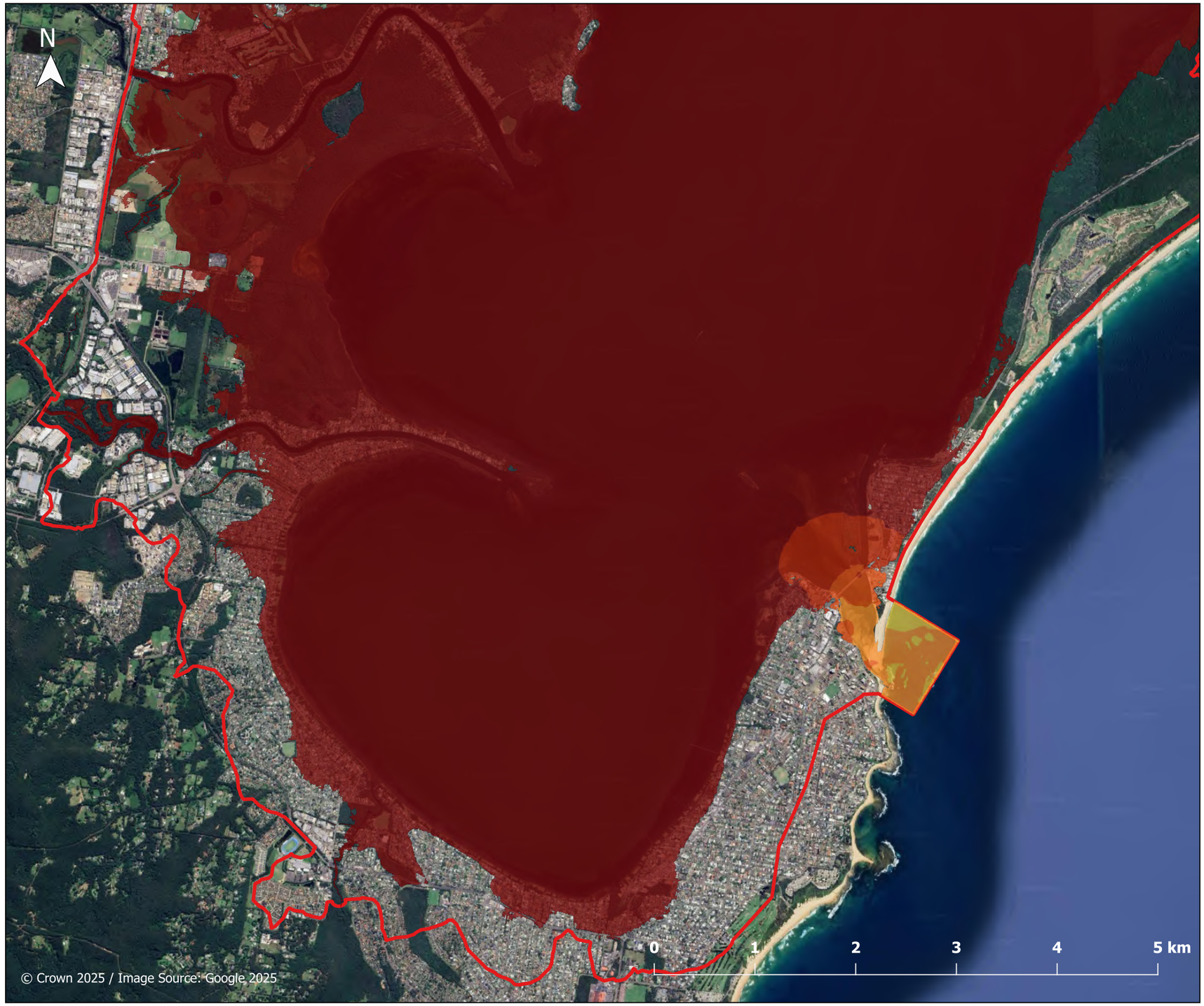

Figure C.1.8.A

PMF flood event - peak water level

Legend

Model boundary

Peak water level (mAHD)

- <= 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00
- 2.00 - 2.25
- 2.25 - 2.50
- 2.50 - 2.75
- > 2.75

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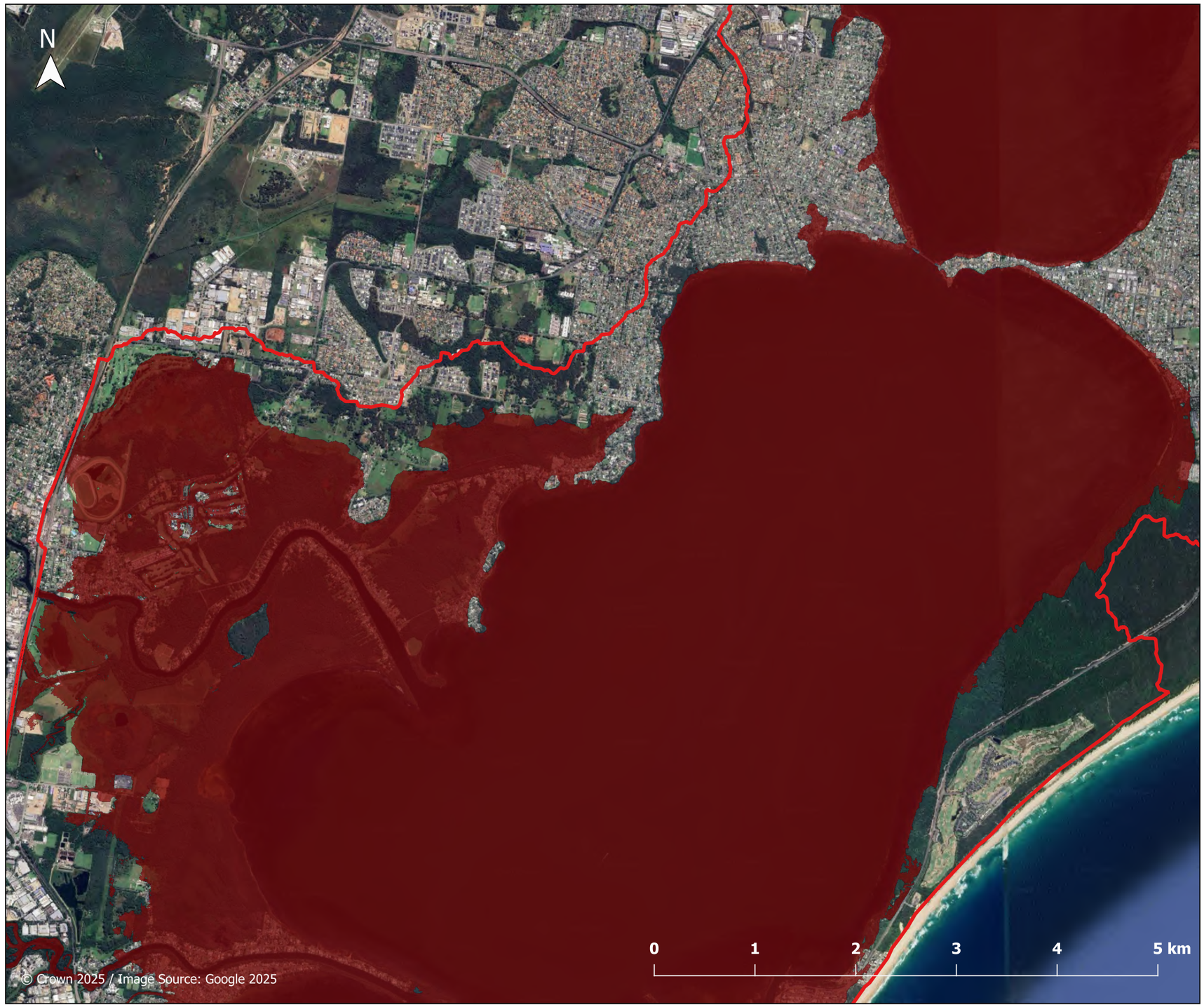

Figure C.1.8.B

PMF flood event - peak water level

Legend

Model boundary

Peak water level (mAHD)

- <= 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00
- 2.00 - 2.25
- 2.25 - 2.50
- 2.50 - 2.75
- > 2.75

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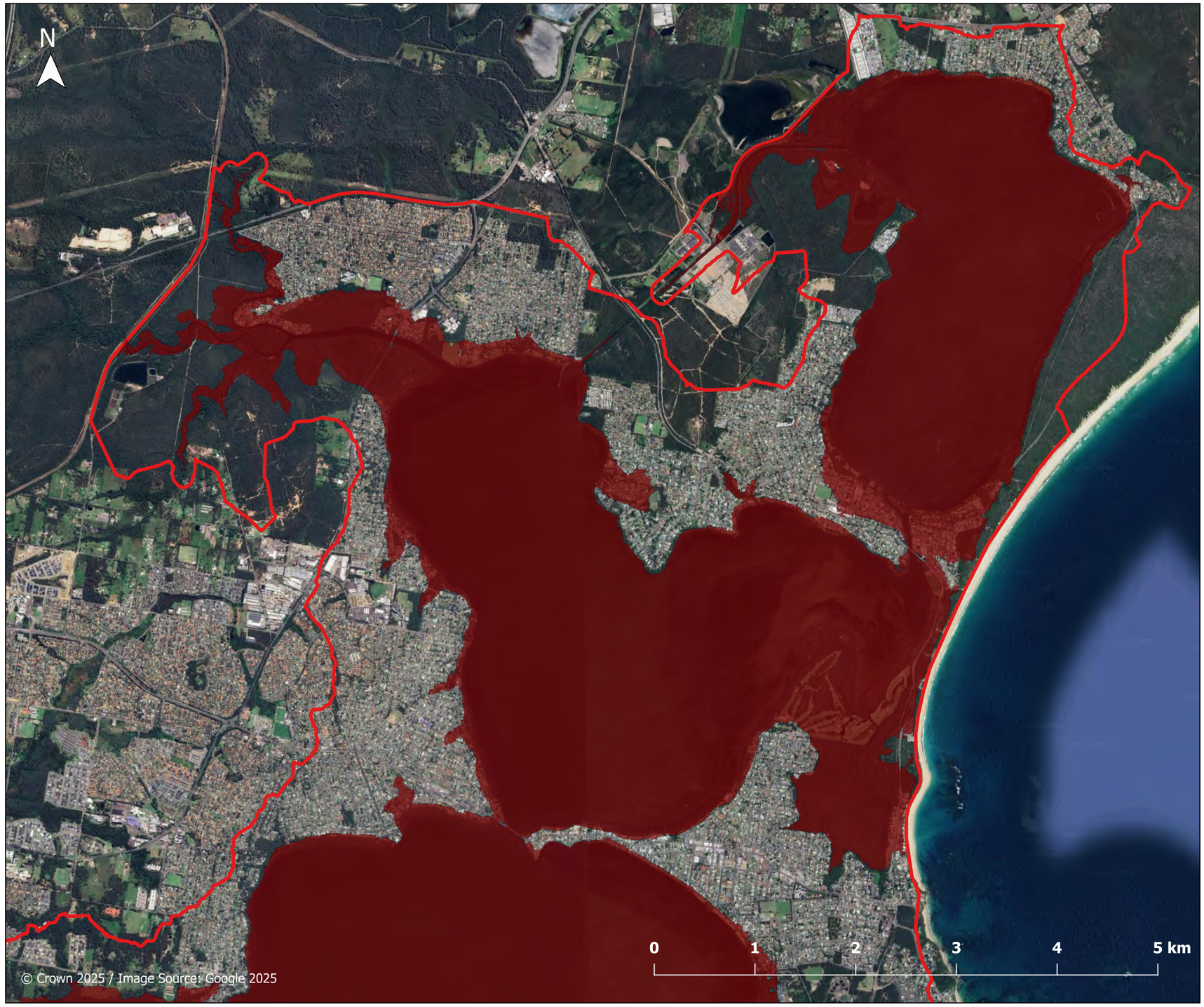

Figure C.1.8.C

PMF flood event - peak water level

Legend

- Model boundary

Peak water level (mAHD)

- <= 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- 1.50 - 1.75
- 1.75 - 2.00
- 2.00 - 2.25
- 2.25 - 2.50
- 2.50 - 2.75
- > 2.75

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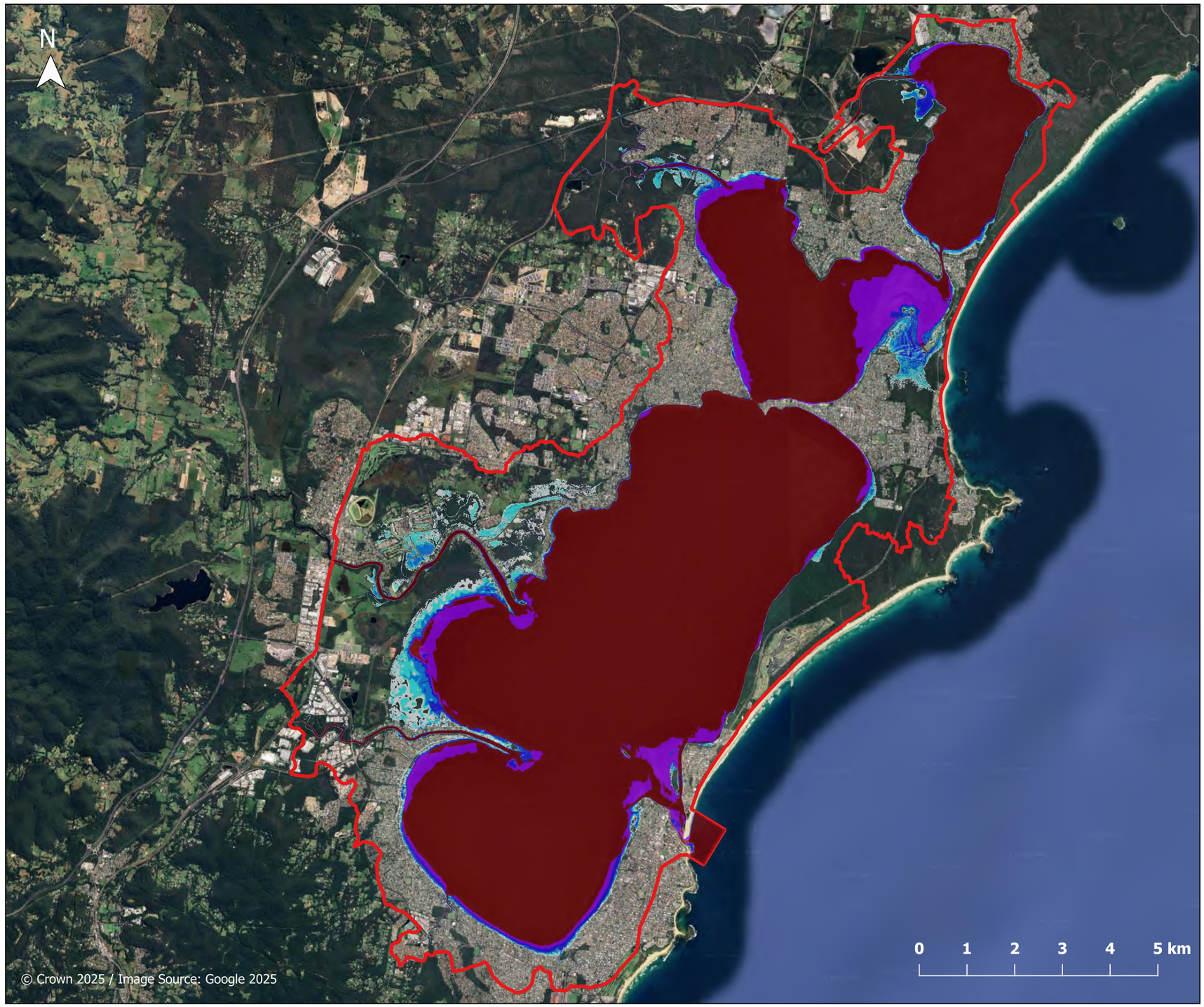

Figure C.2.1

20% AEP flood event - peak depth

Legend

- Model domain

Depth (m)

- 0.05-0.15
- 0.15-0.30
- 0.30-0.50
- 0.50-1.00
- 1.00-1.50
- > 1.50

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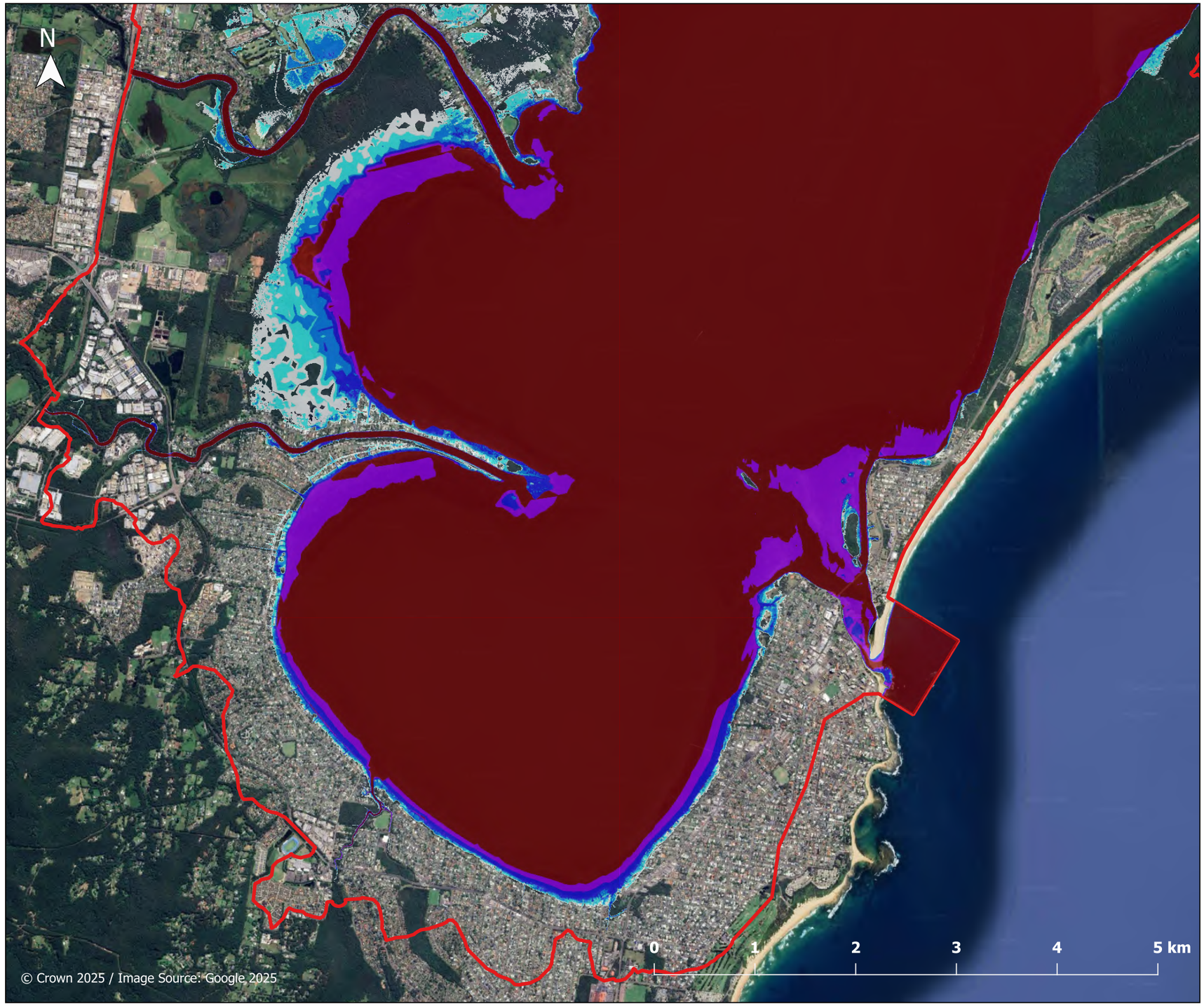

Figure C.2.1.A

20% AEP flood event - peak depth

Legend

- Model domain

Depth (m)

- 0.05-0.15
- 0.15-0.30
- 0.30-0.50
- 0.50-1.00
- 1.00-1.50
- > 1.50

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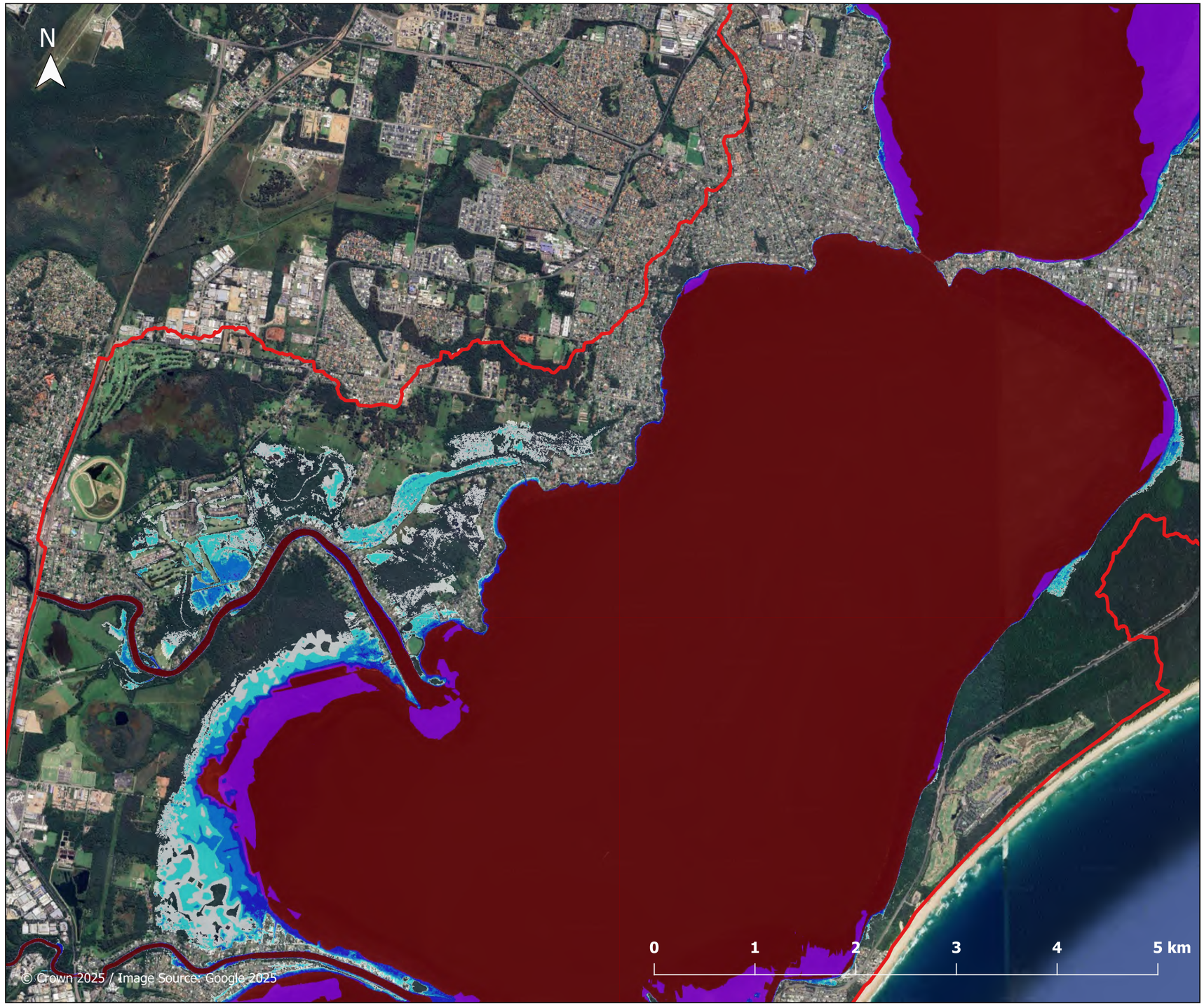

Figure C.2.1.B

20% AEP flood event - peak depth

Legend

- Model domain

Depth (m)

- 0.05-0.15
- 0.15-0.30
- 0.30-0.50
- 0.50-1.00
- 1.00-1.50
- > 1.50

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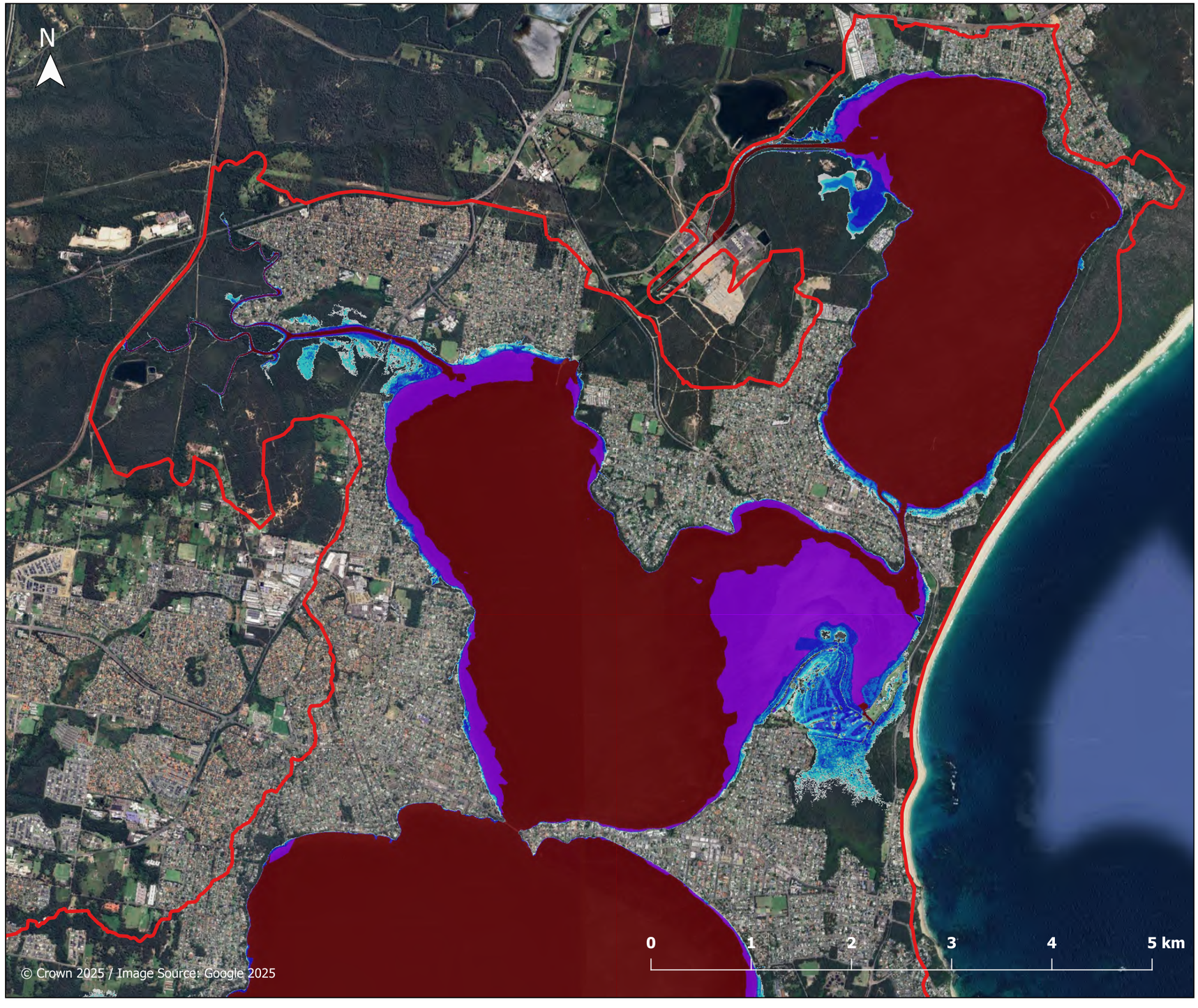

Figure C.2.1.C

20% AEP flood event - peak depth

Legend

- Model domain

Depth (m)

- 0.05-0.15
- 0.15-0.30
- 0.30-0.50
- 0.50-1.00
- 1.00-1.50
- > 1.50

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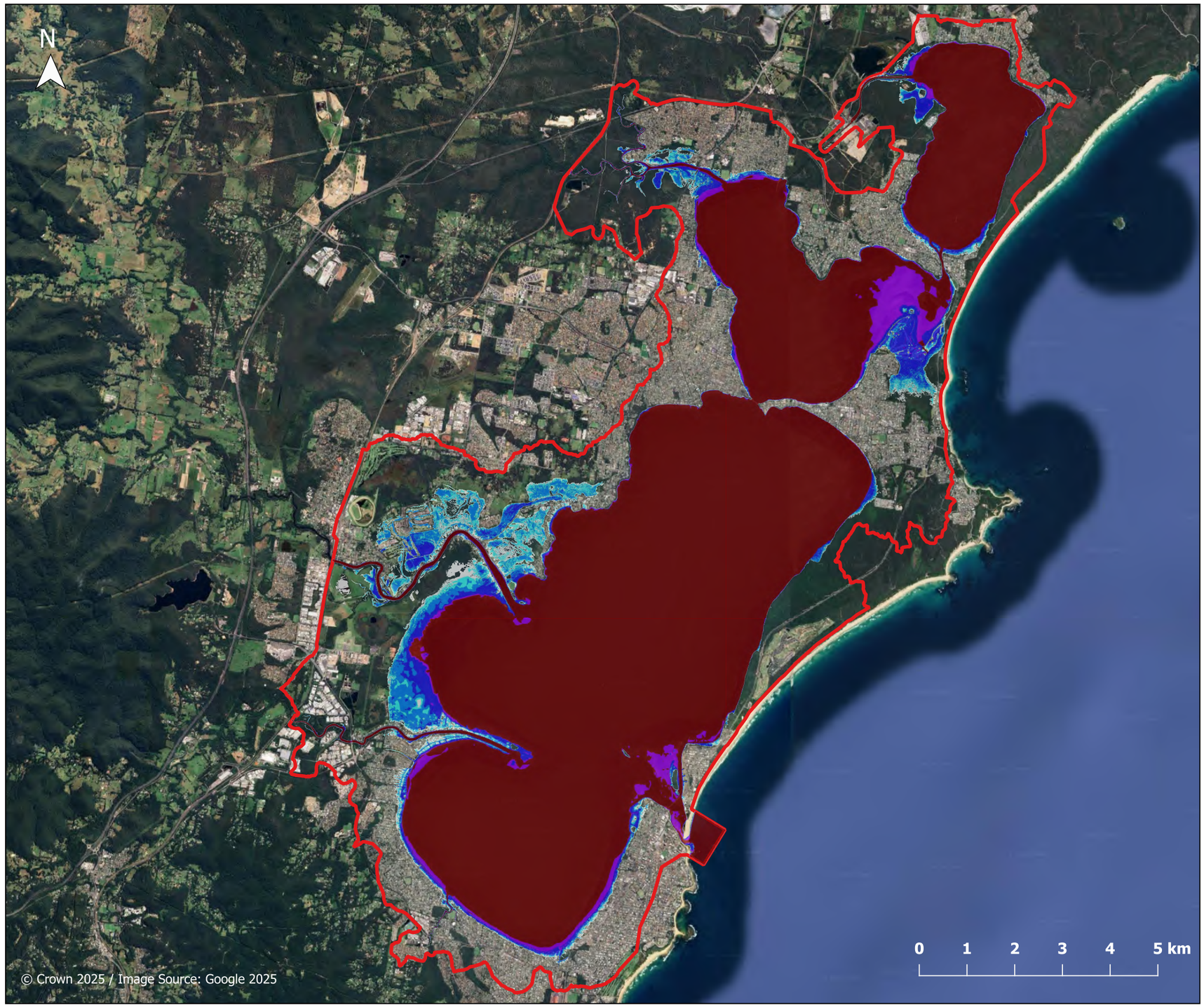

Figure C.2.2

10% AEP flood event - peak depth

Legend

- Model domain

Depth (m)

- 0.05-0.15
- 0.15-0.30
- 0.30-0.50
- 0.50-1.00
- 1.00-1.50
- > 1.50

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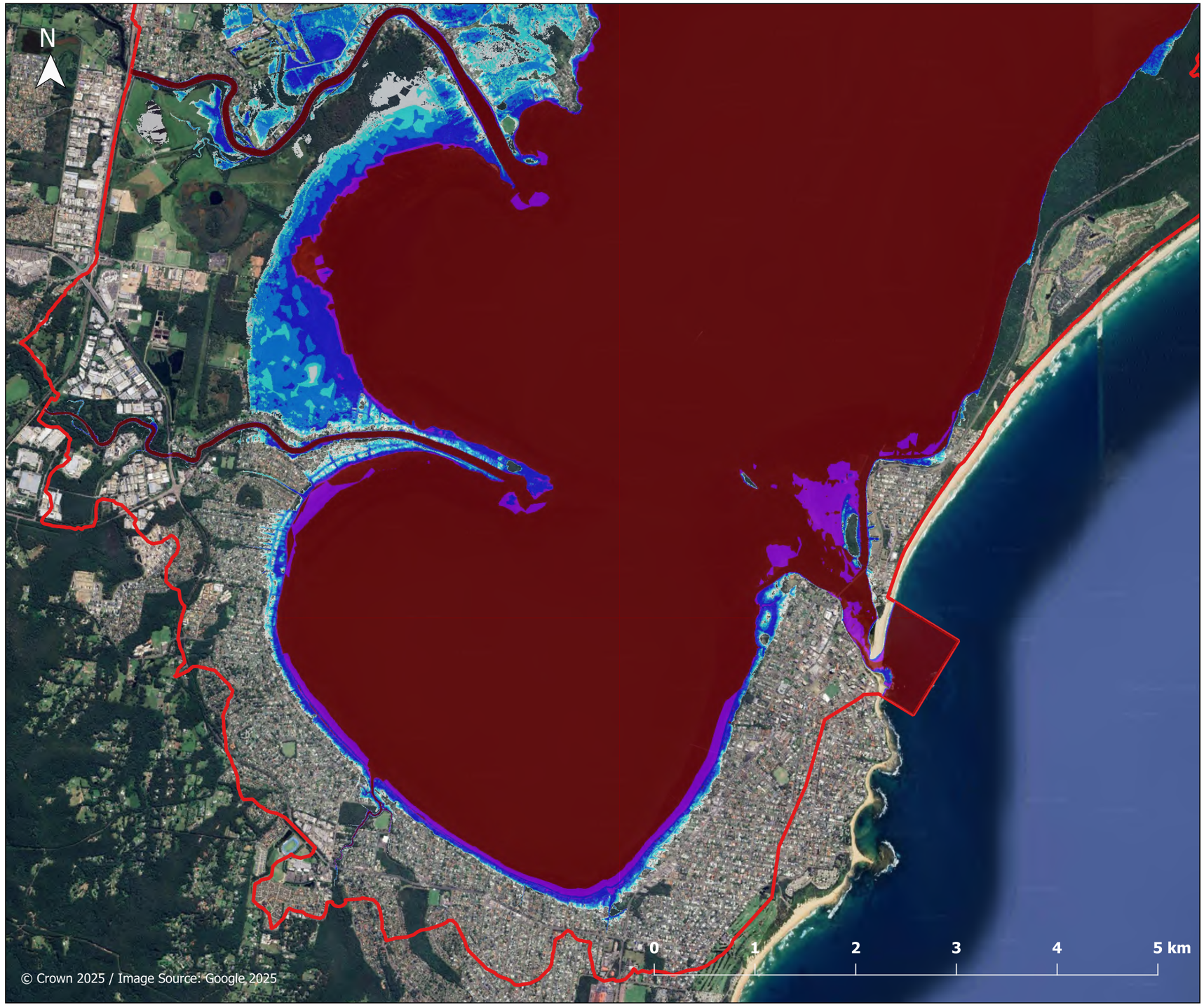

Figure C.2.2.A

10% AEP flood event - peak depth

Legend

- Model domain

Depth (m)

- 0.05-0.15
- 0.15-0.30
- 0.30-0.50
- 0.50-1.00
- 1.00-1.50
- > 1.50

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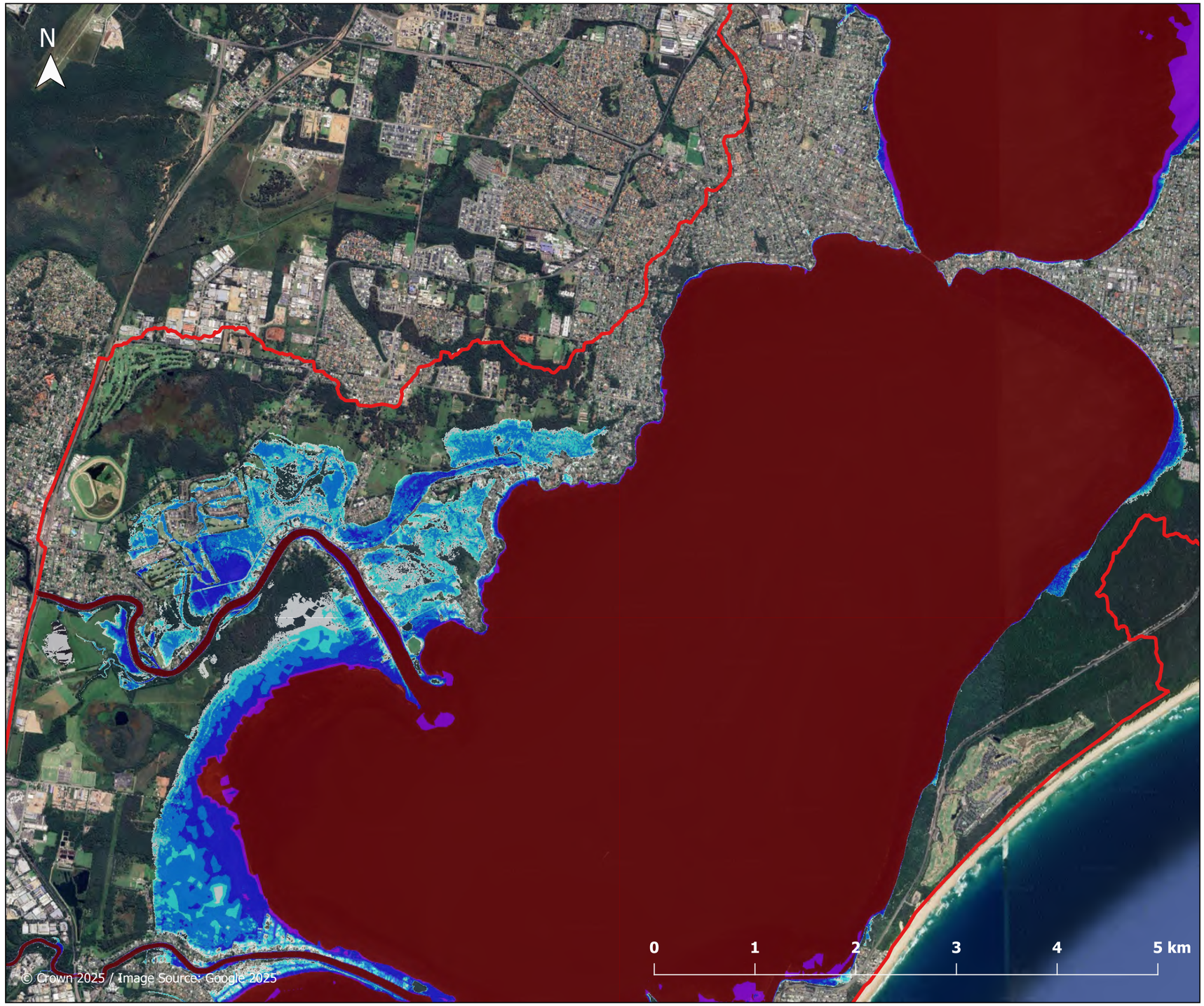

Figure C.2.2.B

10% AEP flood event - peak depth

Legend

- Model domain

Depth (m)

- 0.05-0.15
- 0.15-0.30
- 0.30-0.50
- 0.50-1.00
- 1.00-1.50
- > 1.50

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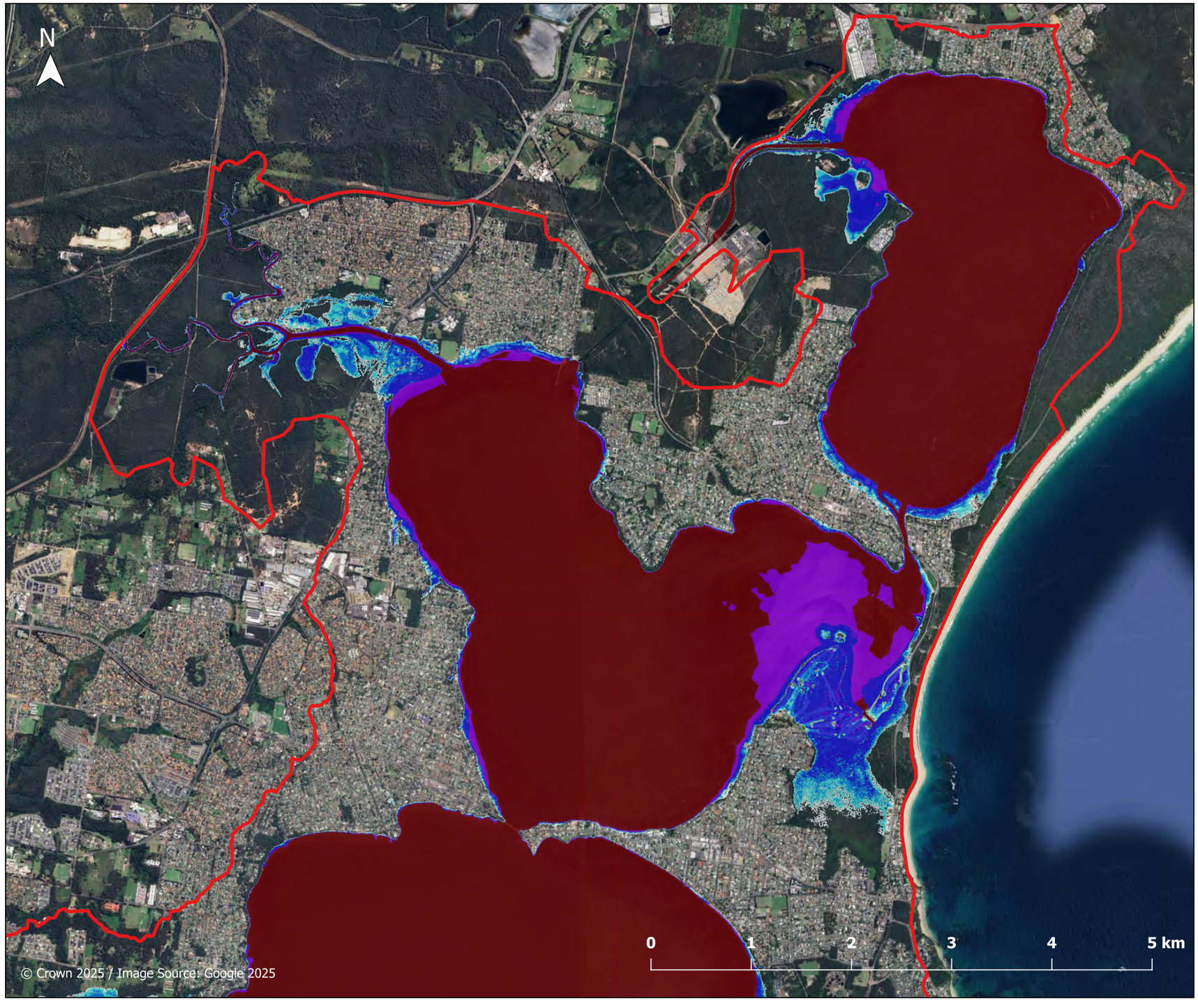

Figure C.2.2.C

10% AEP flood event - peak depth

Legend

- Model domain

Depth (m)

- 0.05-0.15
- 0.15-0.30
- 0.30-0.50
- 0.50-1.00
- 1.00-1.50
- > 1.50

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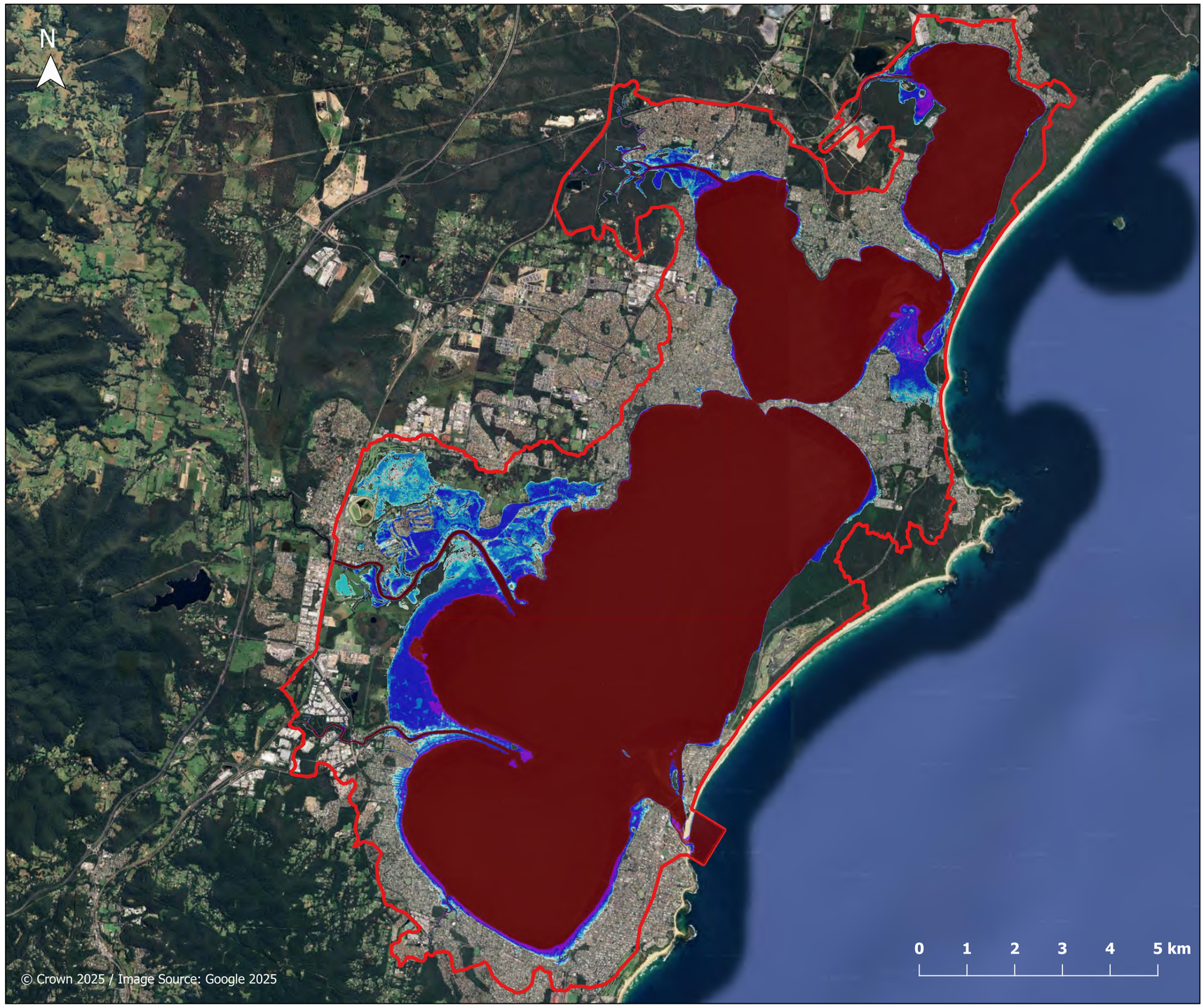

Figure C.2.3

5% AEP flood event - peak depth

Legend

- Model domain

Depth (m)

- 0.05-0.15
- 0.15-0.30
- 0.30-0.50
- 0.50-1.00
- 1.00-1.50
- > 1.50

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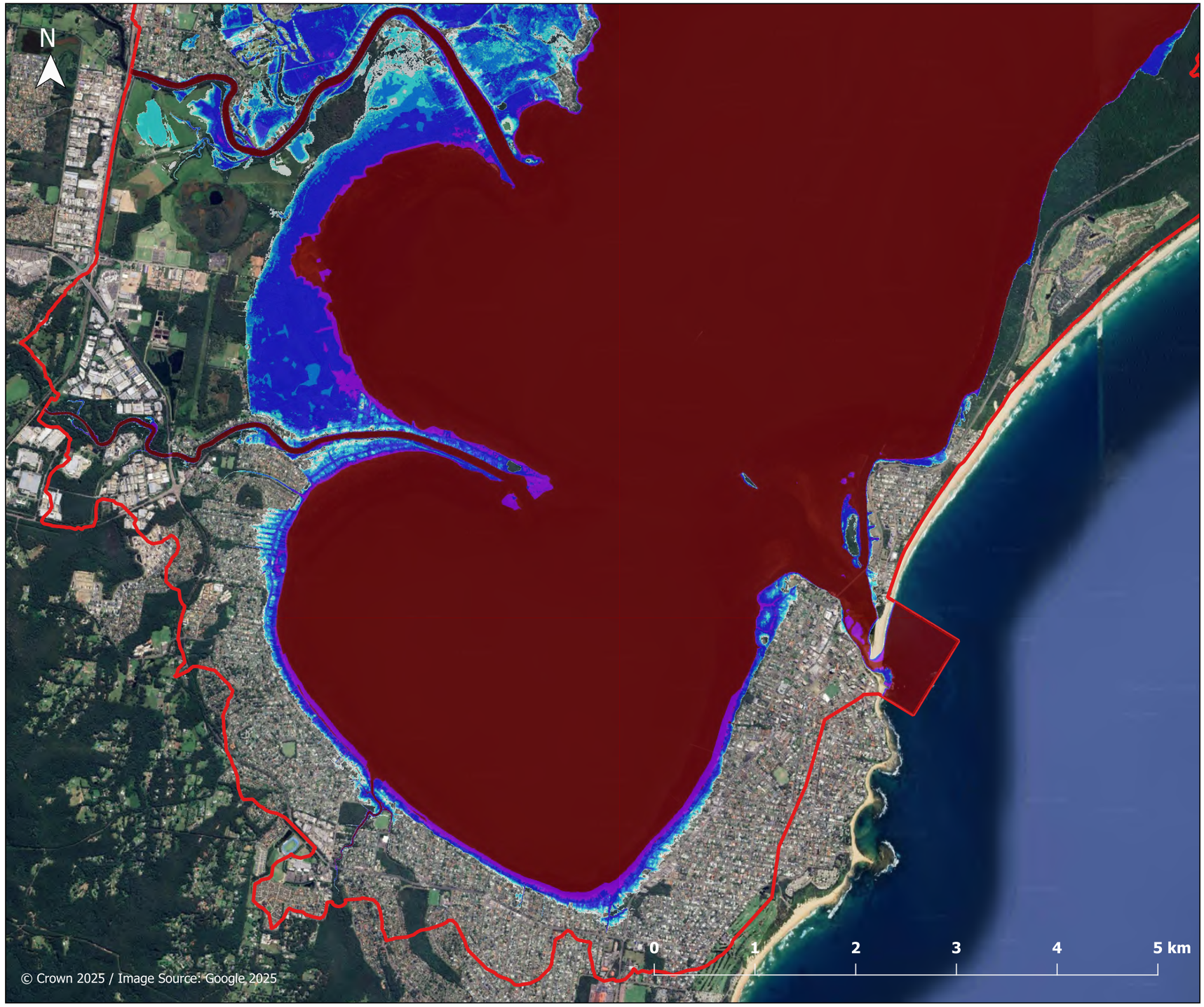

Figure C.2.3.A

5% AEP flood event - peak depth

Legend

- Model domain

Depth (m)

- 0.05-0.15
- 0.15-0.30
- 0.30-0.50
- 0.50-1.00
- 1.00-1.50
- > 1.50

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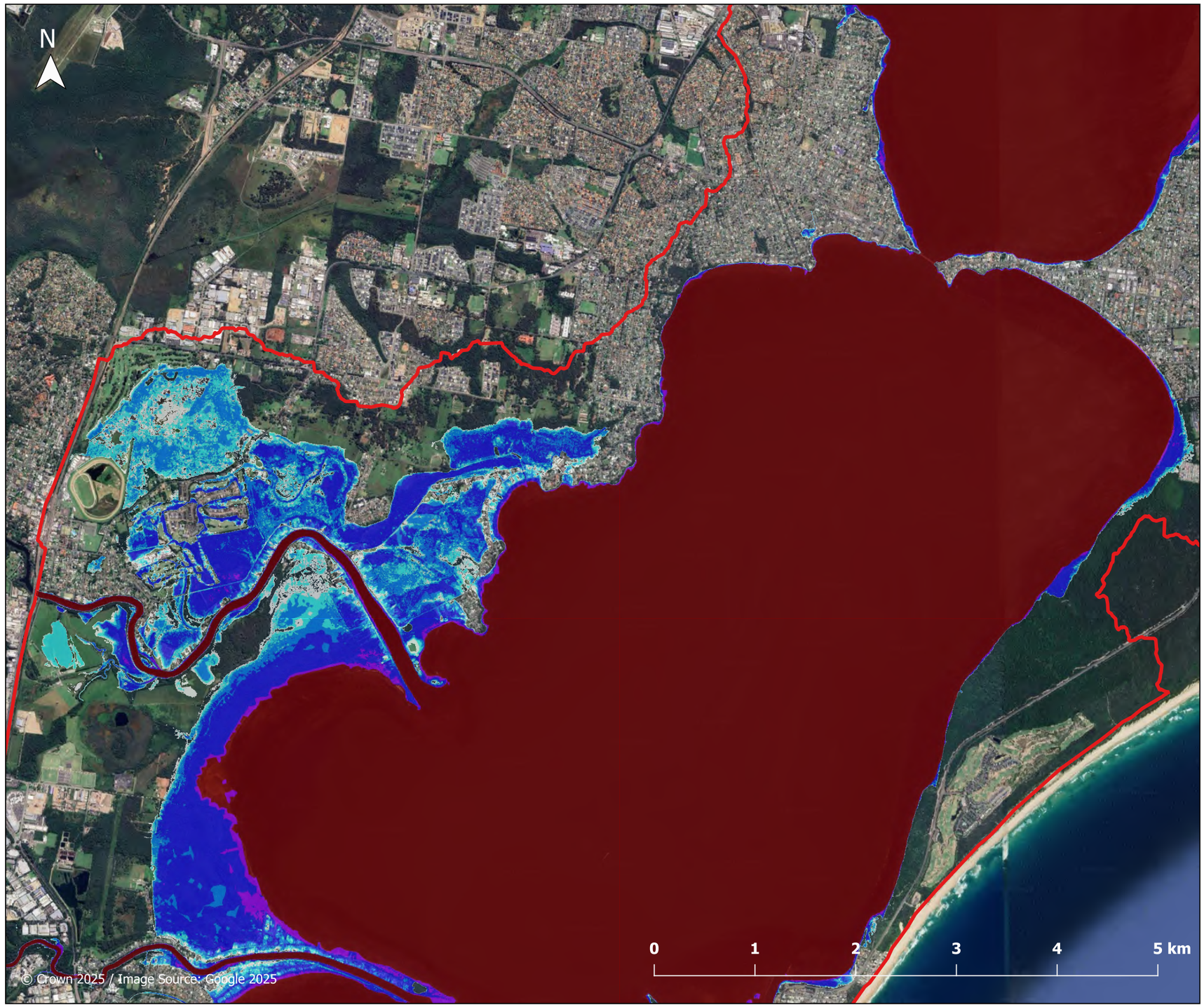

Figure C.2.3.B

5% AEP flood event - peak depth

Legend

Model domain

Depth (m)

- 0.05-0.15
- 0.15-0.30
- 0.30-0.50
- 0.50-1.00
- 1.00-1.50
- > 1.50

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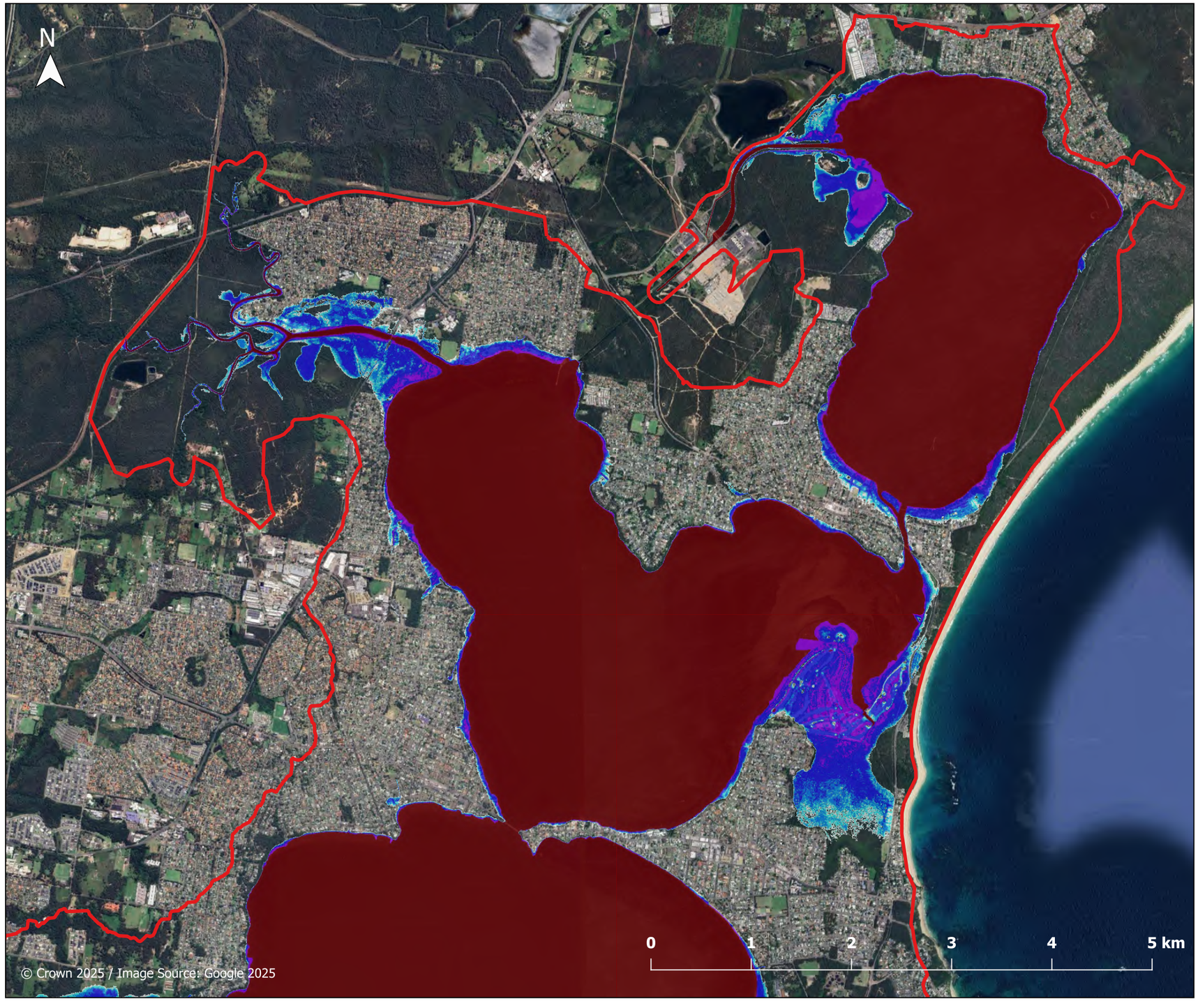

Figure C.2.3.C

5% AEP flood event - peak depth

Legend

- Model domain

Depth (m)

- 0.05-0.15
- 0.15-0.30
- 0.30-0.50
- 0.50-1.00
- 1.00-1.50
- > 1.50

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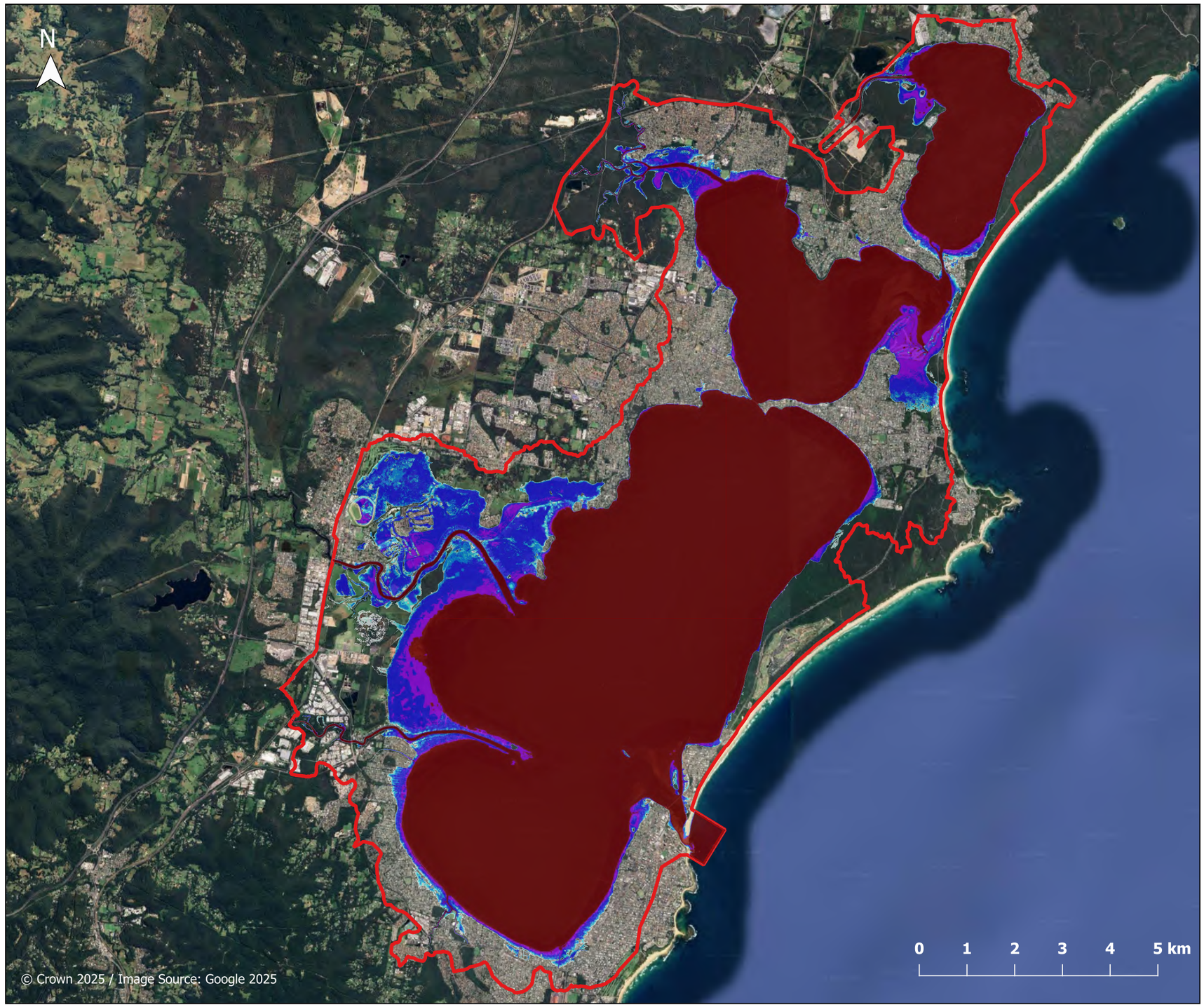

Figure C.2.4

2% AEP flood event - peak depth

Legend

- Model domain

Depth (m)

- 0.05-0.15
- 0.15-0.30
- 0.30-0.50
- 0.50-1.00
- 1.00-1.50
- > 1.50

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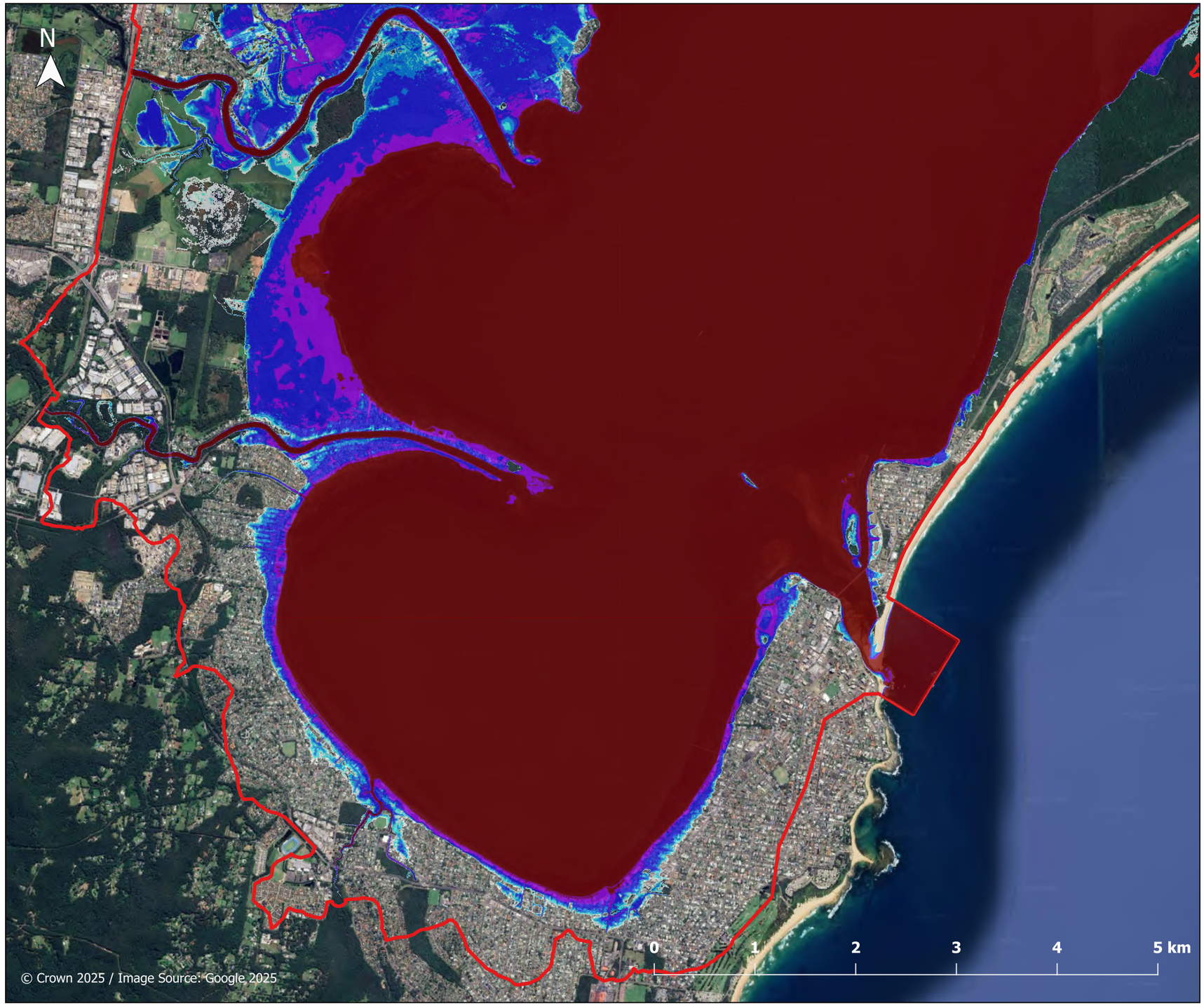

Figure C.2.4.A

2% AEP flood event - peak depth

Legend

Model domain

Depth (m)

- 0.05-0.15
- 0.15-0.30
- 0.30-0.50
- 0.50-1.00
- 1.00-1.50
- > 1.50

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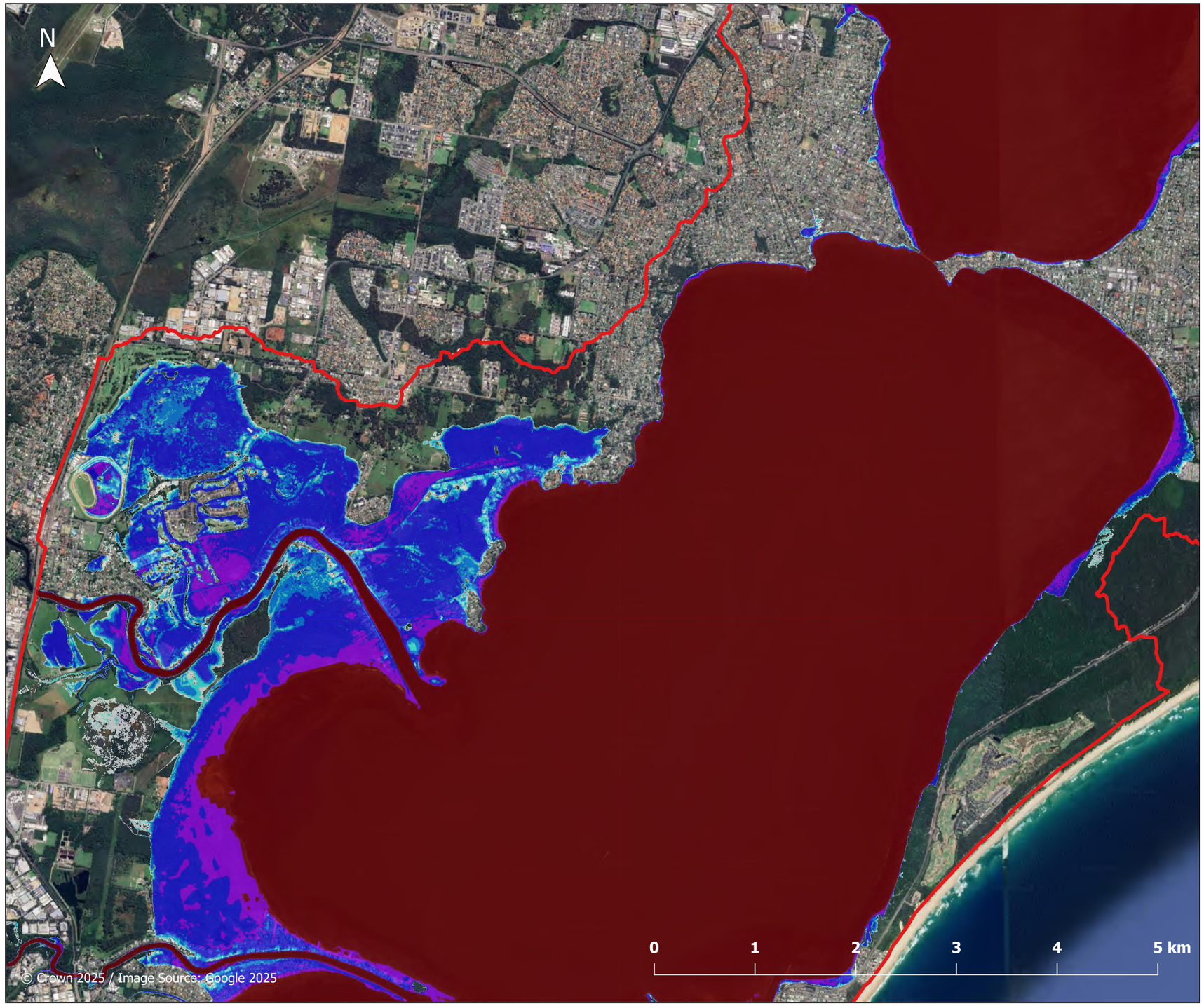

Figure C.2.4.B

2% AEP flood event - peak depth

Legend

- Model domain

Depth (m)

- 0.05-0.15
- 0.15-0.30
- 0.30-0.50
- 0.50-1.00
- 1.00-1.50
- > 1.50

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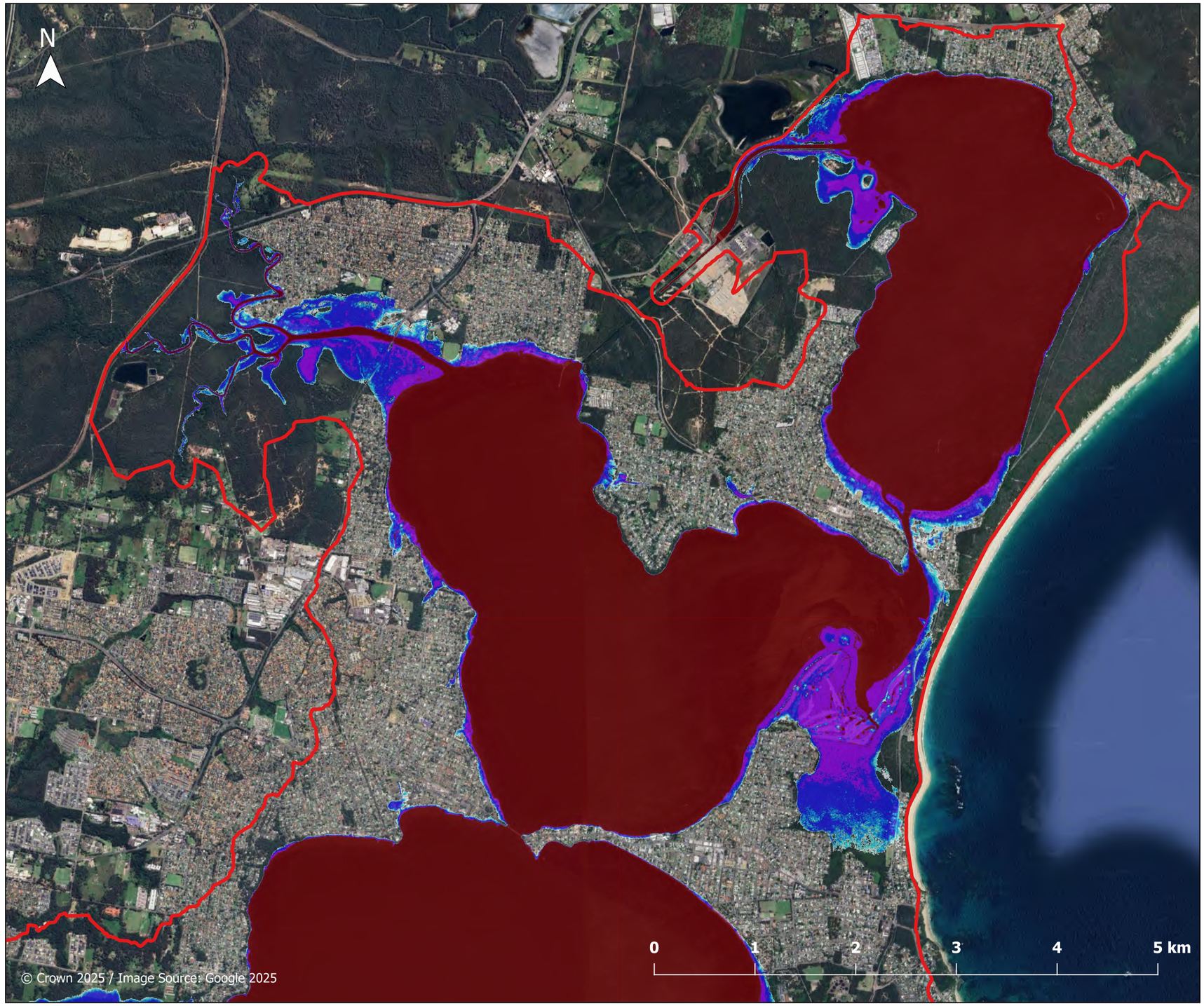

Figure C.2.4.C

2% AEP flood event - peak depth

Legend

Model domain

Depth (m)

- 0.05-0.15
- 0.15-0.30
- 0.30-0.50
- 0.50-1.00
- 1.00-1.50
- > 1.50

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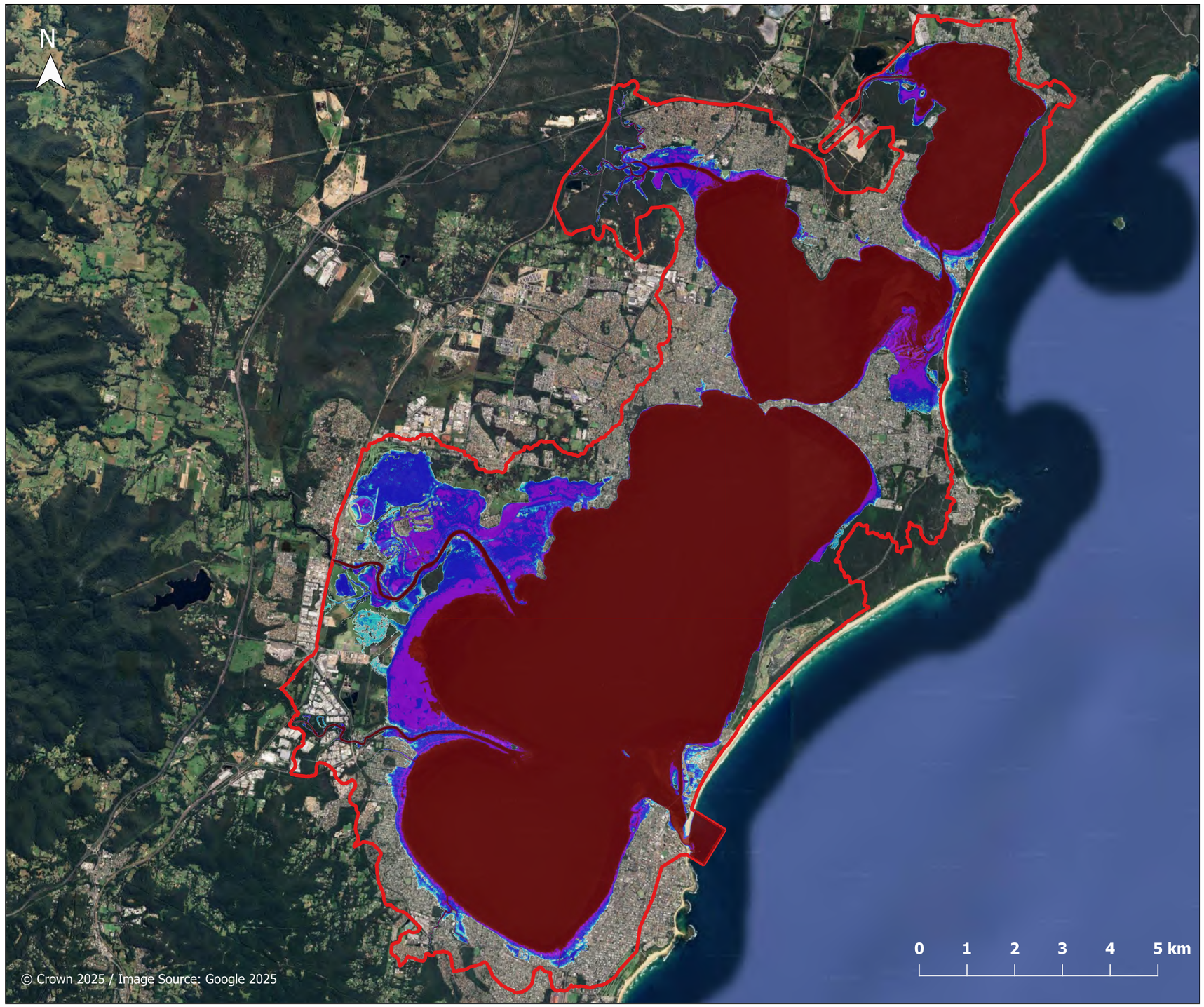

Figure C.2.5

1% AEP flood event - peak depth

Legend

- Model domain

Depth (m)

- 0.05-0.15
- 0.15-0.30
- 0.30-0.50
- 0.50-1.00
- 1.00-1.50
- > 1.50

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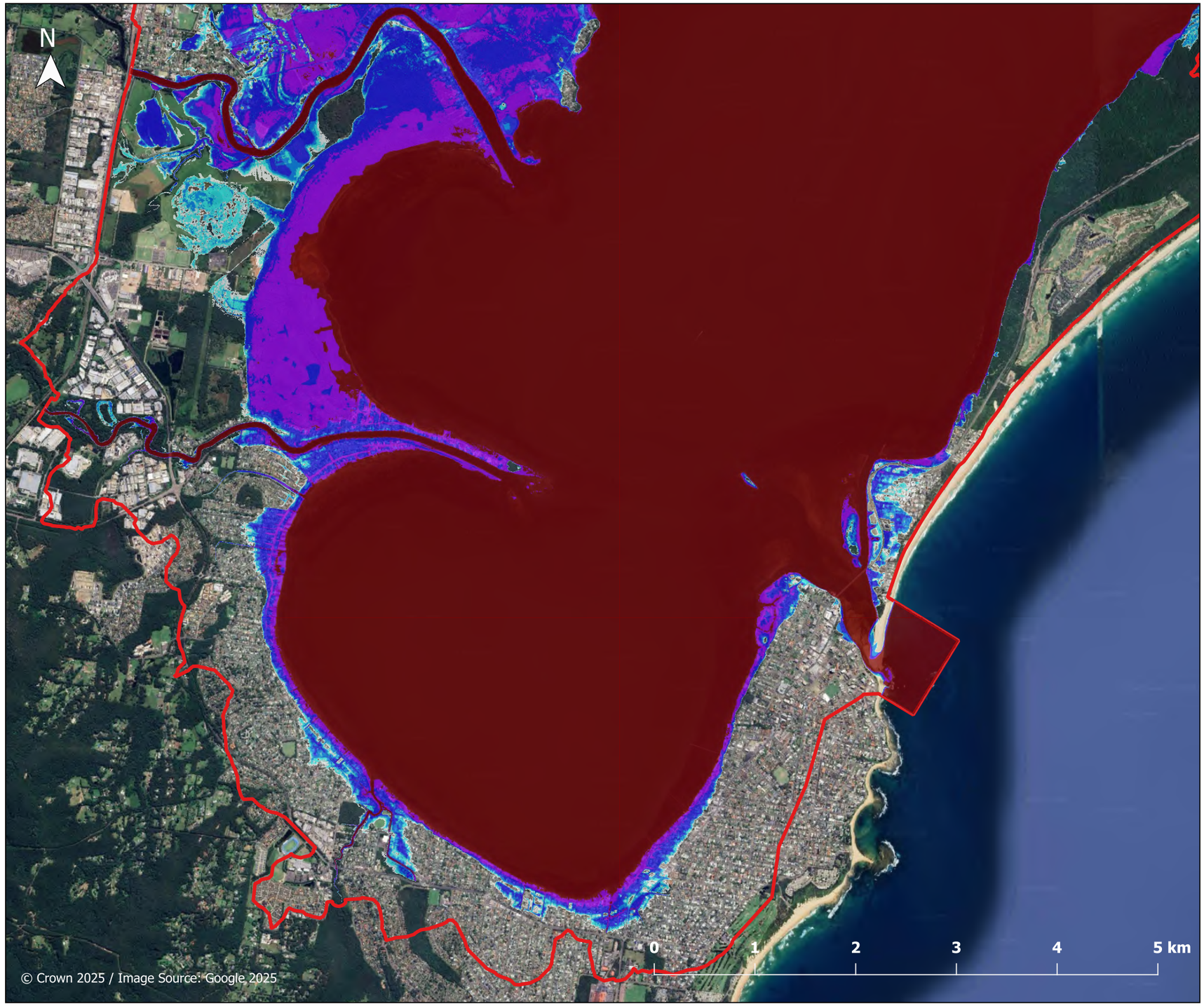

Figure C.2.5.A

1% AEP flood event - peak depth

Legend

- Model domain

Depth (m)

- 0.05-0.15
- 0.15-0.30
- 0.30-0.50
- 0.50-1.00
- 1.00-1.50
- > 1.50

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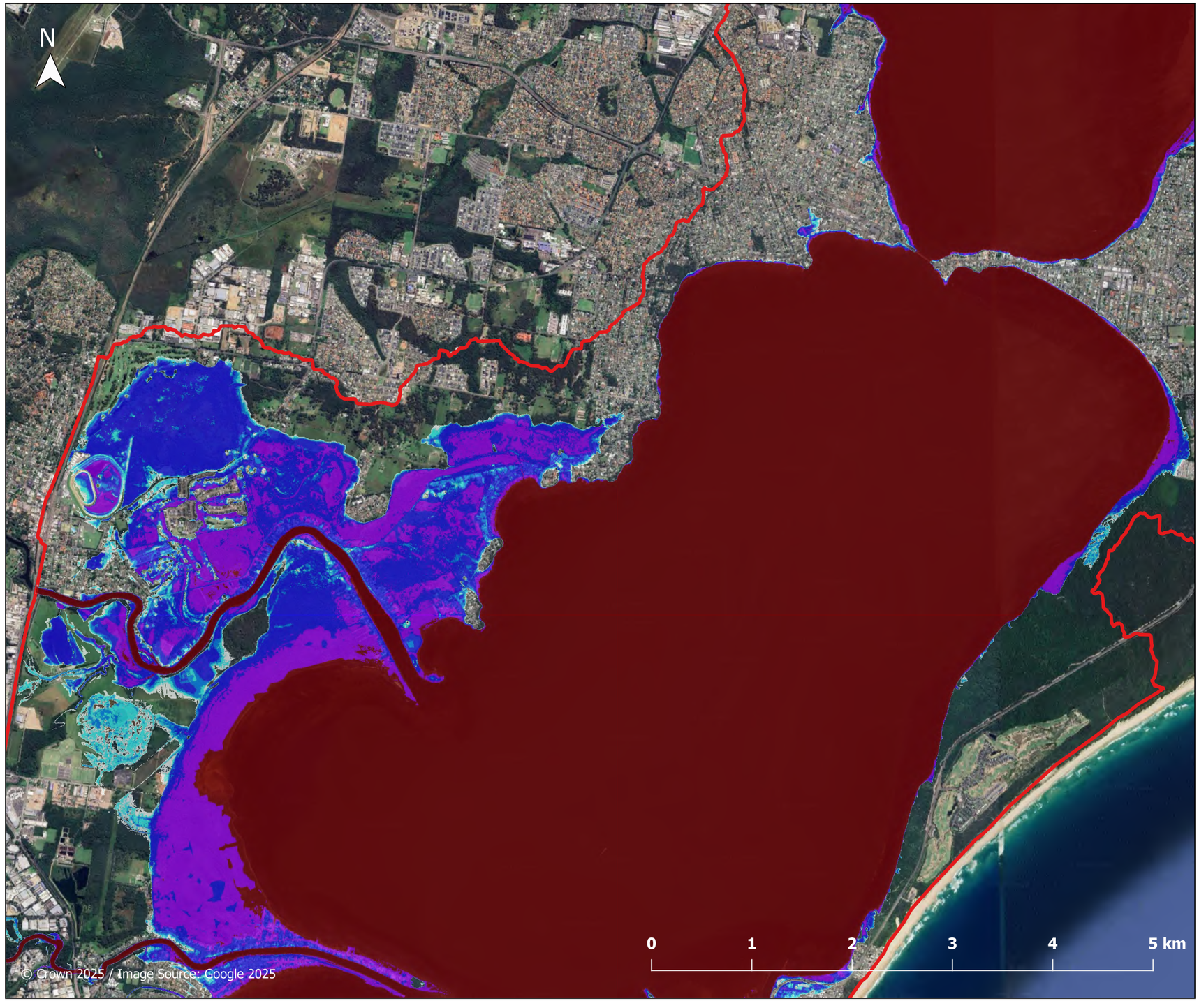

Figure C.2.5.B

1% AEP flood event - peak depth

Legend

Model domain

Depth (m)

- 0.05-0.15
- 0.15-0.30
- 0.30-0.50
- 0.50-1.00
- 1.00-1.50
- > 1.50

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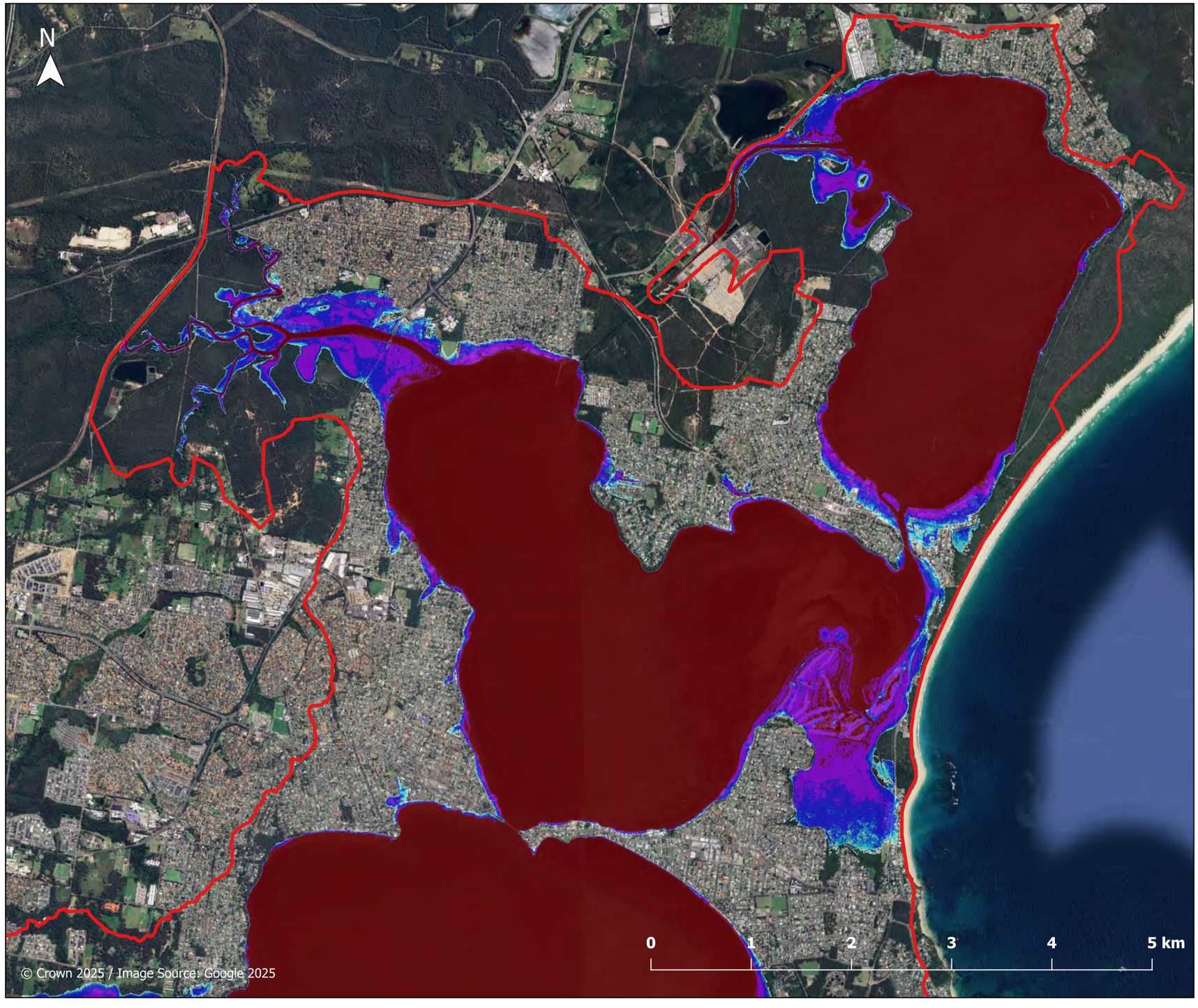

Figure C.2.5.C

1% AEP flood event - peak depth

Legend

- Model domain

Depth (m)

- 0.05-0.15
- 0.15-0.30
- 0.30-0.50
- 0.50-1.00
- 1.00-1.50
- > 1.50

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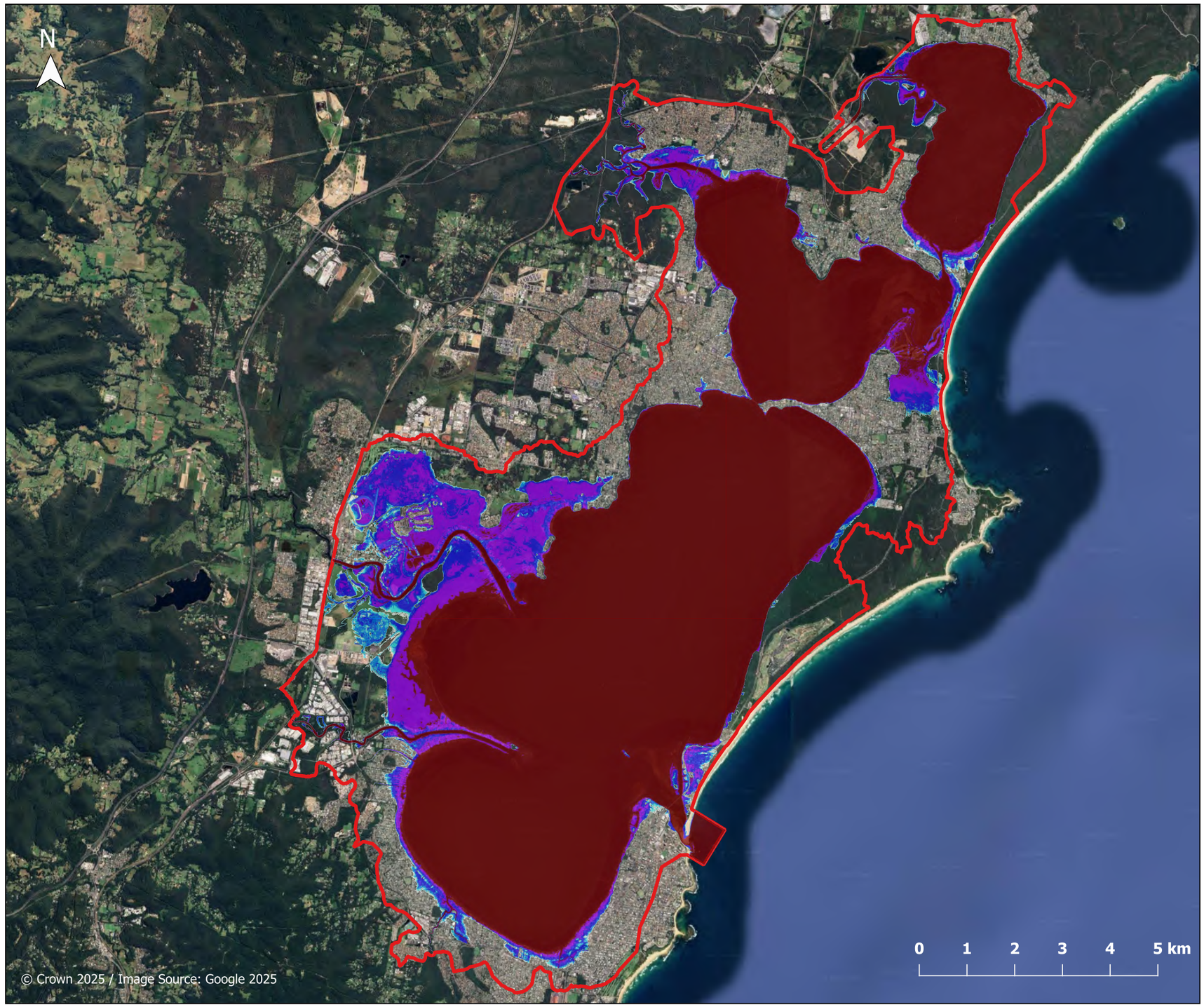

Figure C.2.6

1 in 200 AEP flood event - peak depth

Legend

- Model domain

Depth (m)

- 0.05-0.15
- 0.15-0.30
- 0.30-0.50
- 0.50-1.00
- 1.00-1.50
- > 1.50

Disclaimer:
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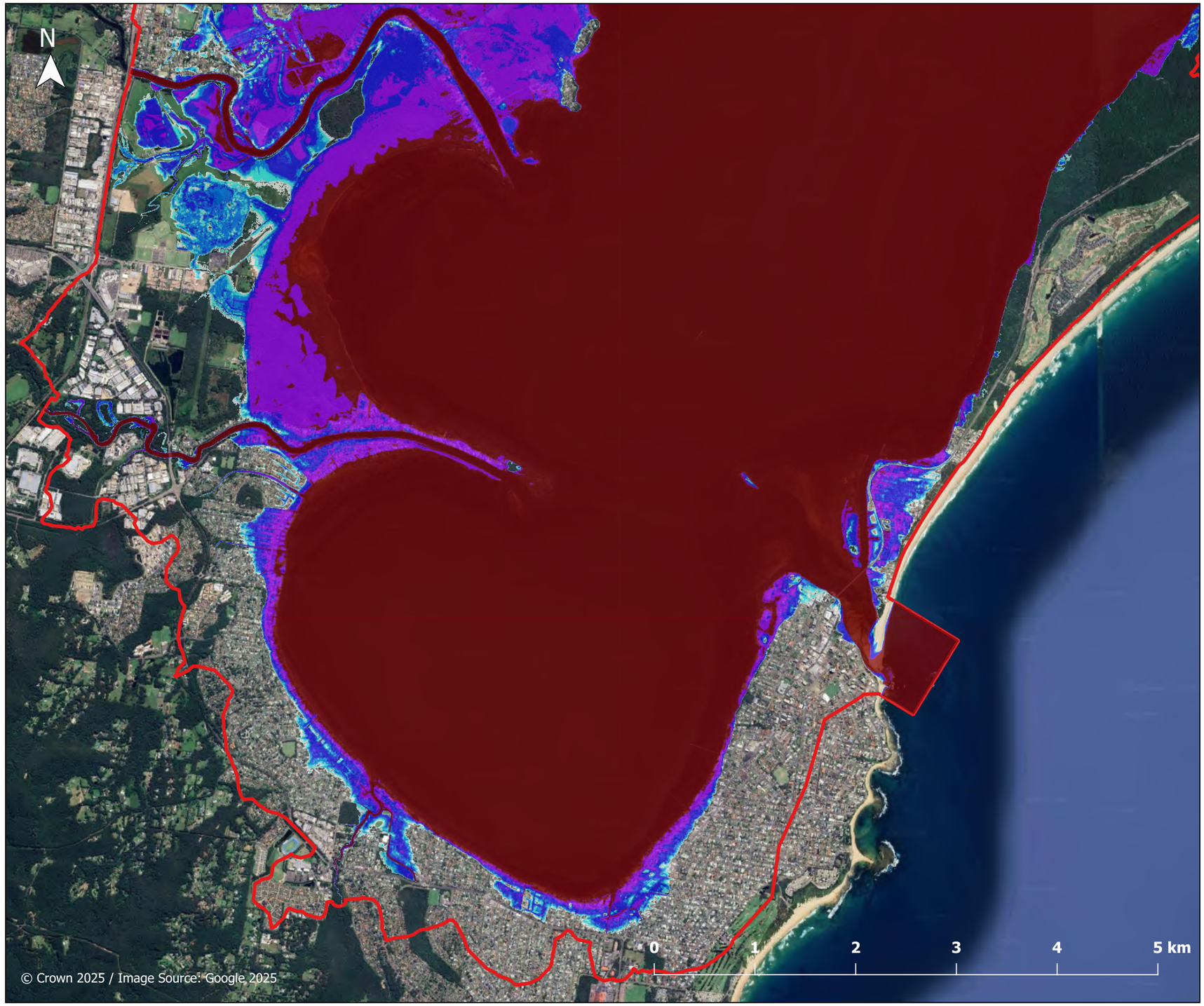

Figure C.2.6.A

1 in 200 AEP flood event - peak depth

Legend

- Model domain

Depth (m)

- 0.05-0.15
- 0.15-0.30
- 0.30-0.50
- 0.50-1.00
- 1.00-1.50
- > 1.50

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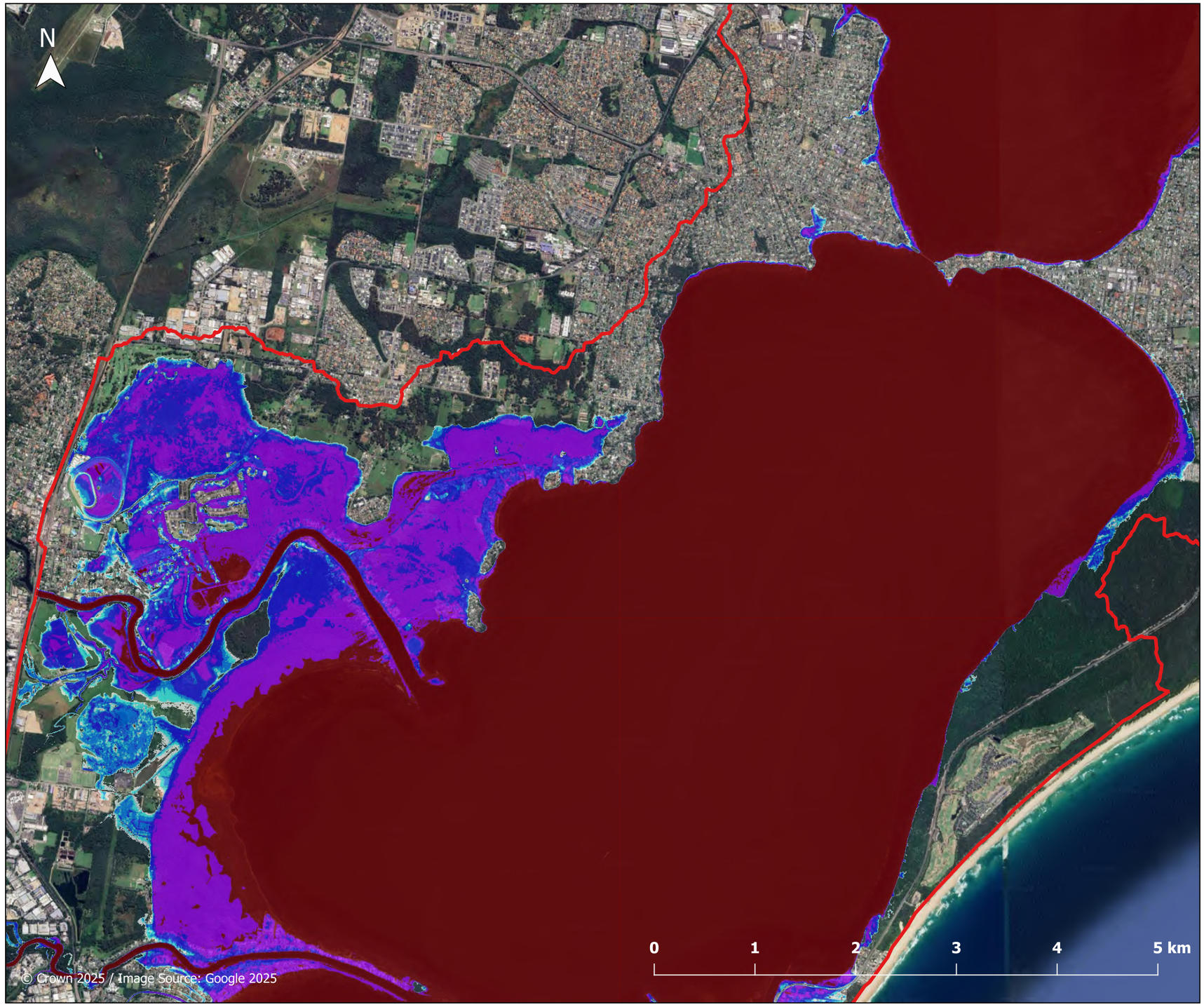

Figure C.2.6.B

1 in 200 AEP flood event - peak depth

Legend

- Model domain

Depth (m)

- 0.05-0.15
- 0.15-0.30
- 0.30-0.50
- 0.50-1.00
- 1.00-1.50
- > 1.50

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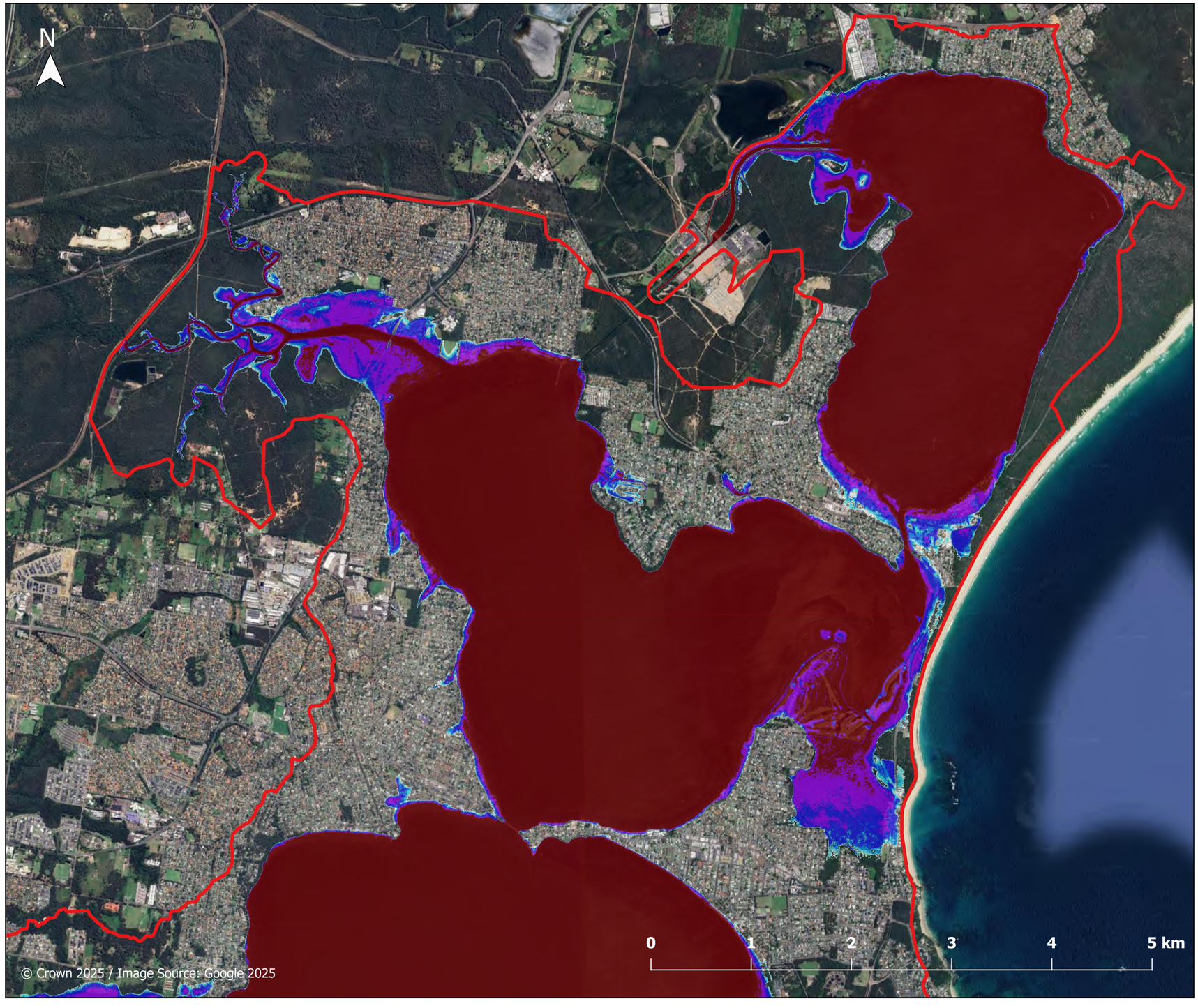

Figure C.2.6.C

1 in 200 AEP flood event - peak depth

Legend

- Model domain

Depth (m)

- 0.05-0.15
- 0.15-0.30
- 0.30-0.50
- 0.50-1.00
- 1.00-1.50
- > 1.50

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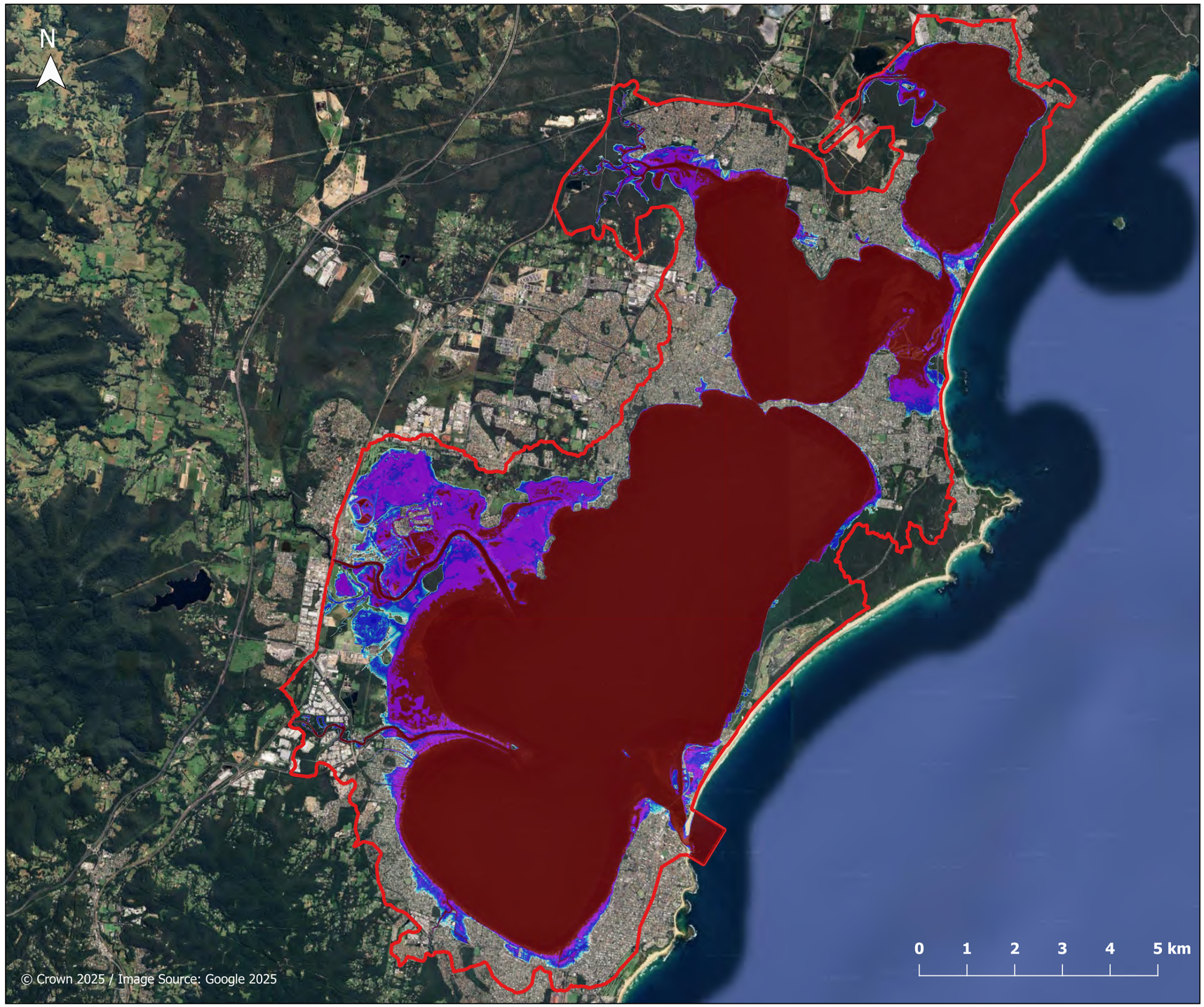

Figure C.2.7

1 in 500 AEP flood event - peak depth

Legend

- Model domain

Depth (m)

- 0.05-0.15
- 0.15-0.30
- 0.30-0.50
- 0.50-1.00
- 1.00-1.50
- > 1.50

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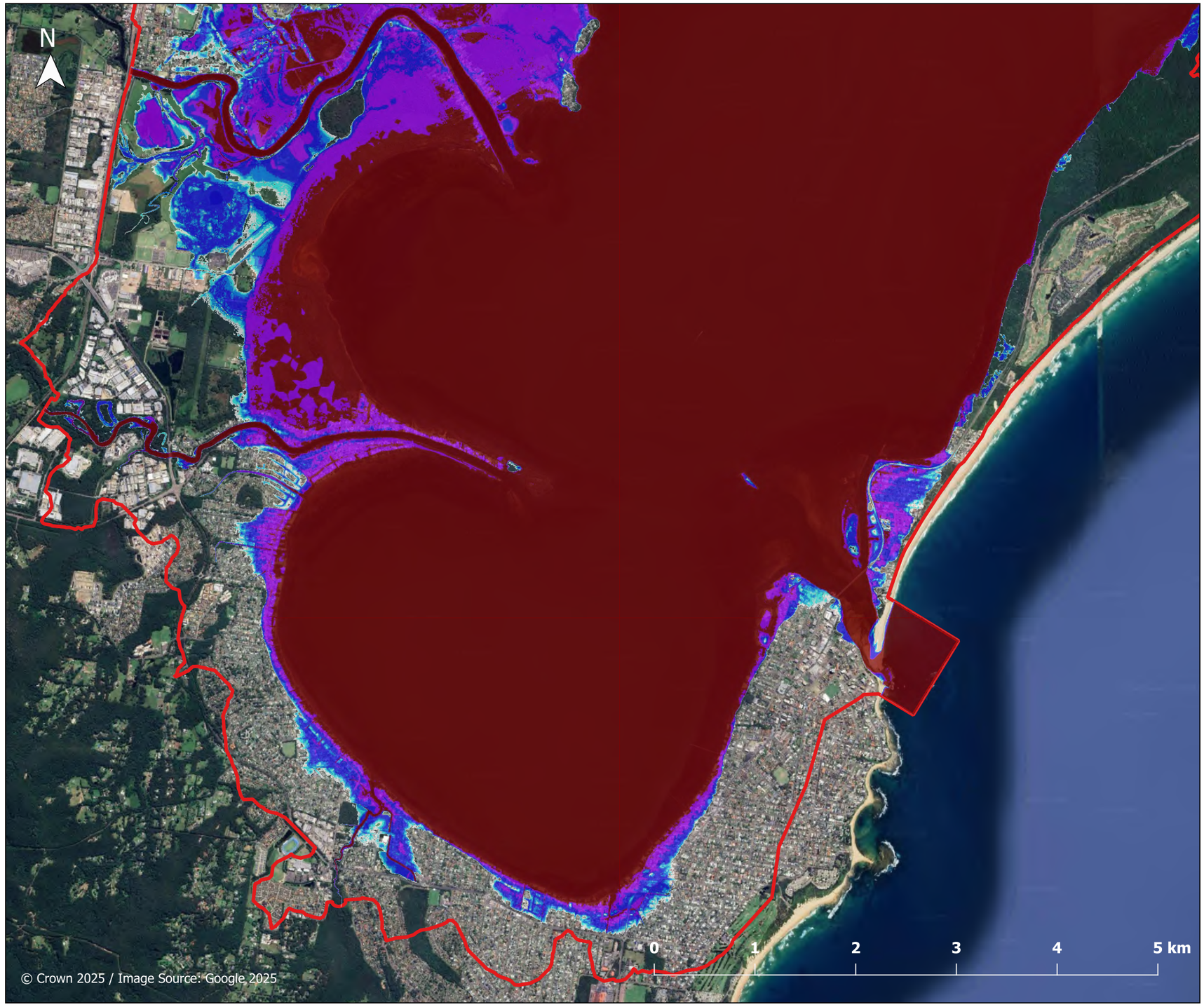

Figure C.2.7.A

1 in 500 AEP flood event - peak depth

Legend

- Model domain

Depth (m)

- 0.05-0.15
- 0.15-0.30
- 0.30-0.50
- 0.50-1.00
- 1.00-1.50
- > 1.50

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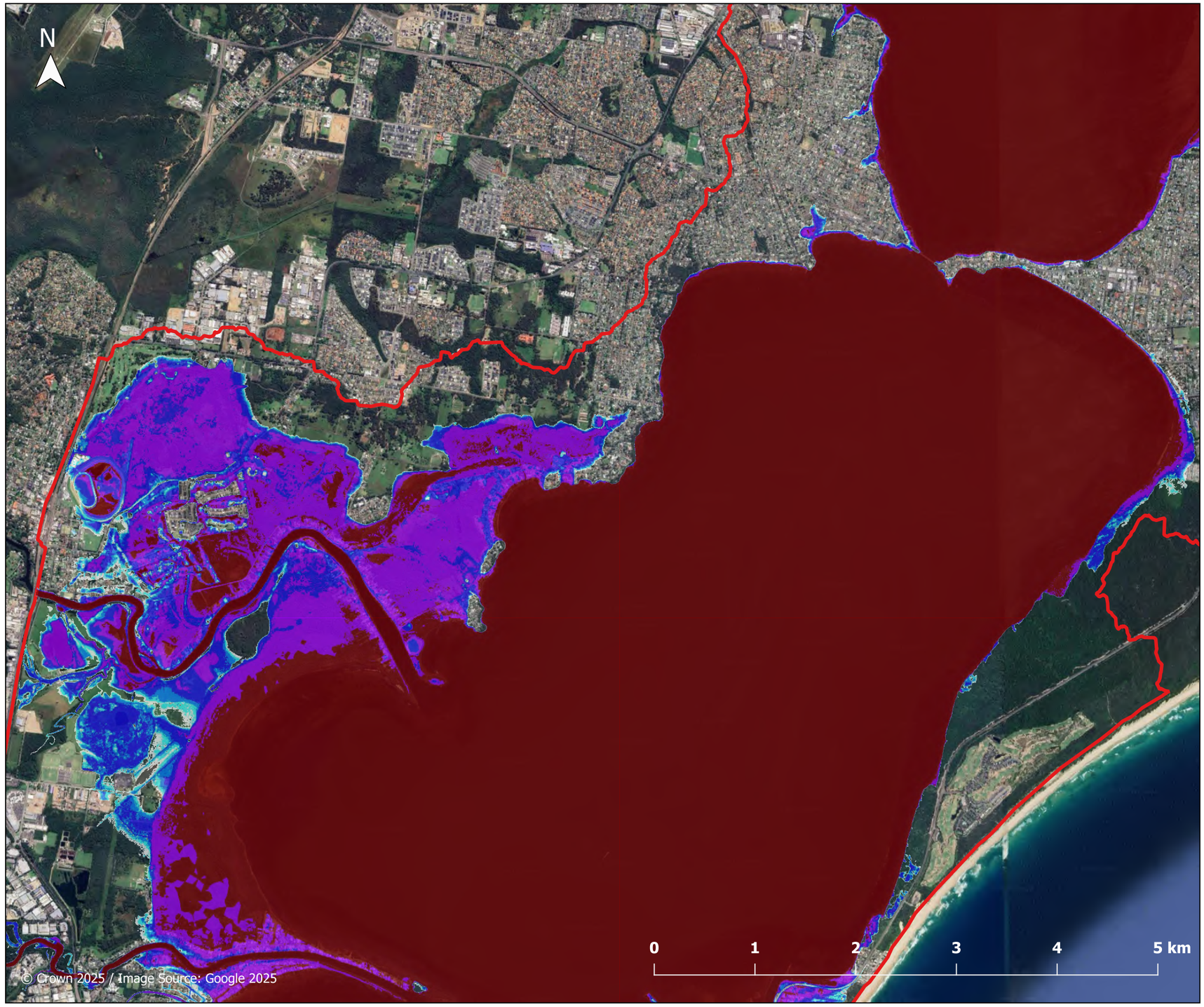

Figure C.2.7.B

1 in 500 AEP flood event - peak depth

Legend

- Model domain

Depth (m)

- 0.05-0.15
- 0.15-0.30
- 0.30-0.50
- 0.50-1.00
- 1.00-1.50
- > 1.50

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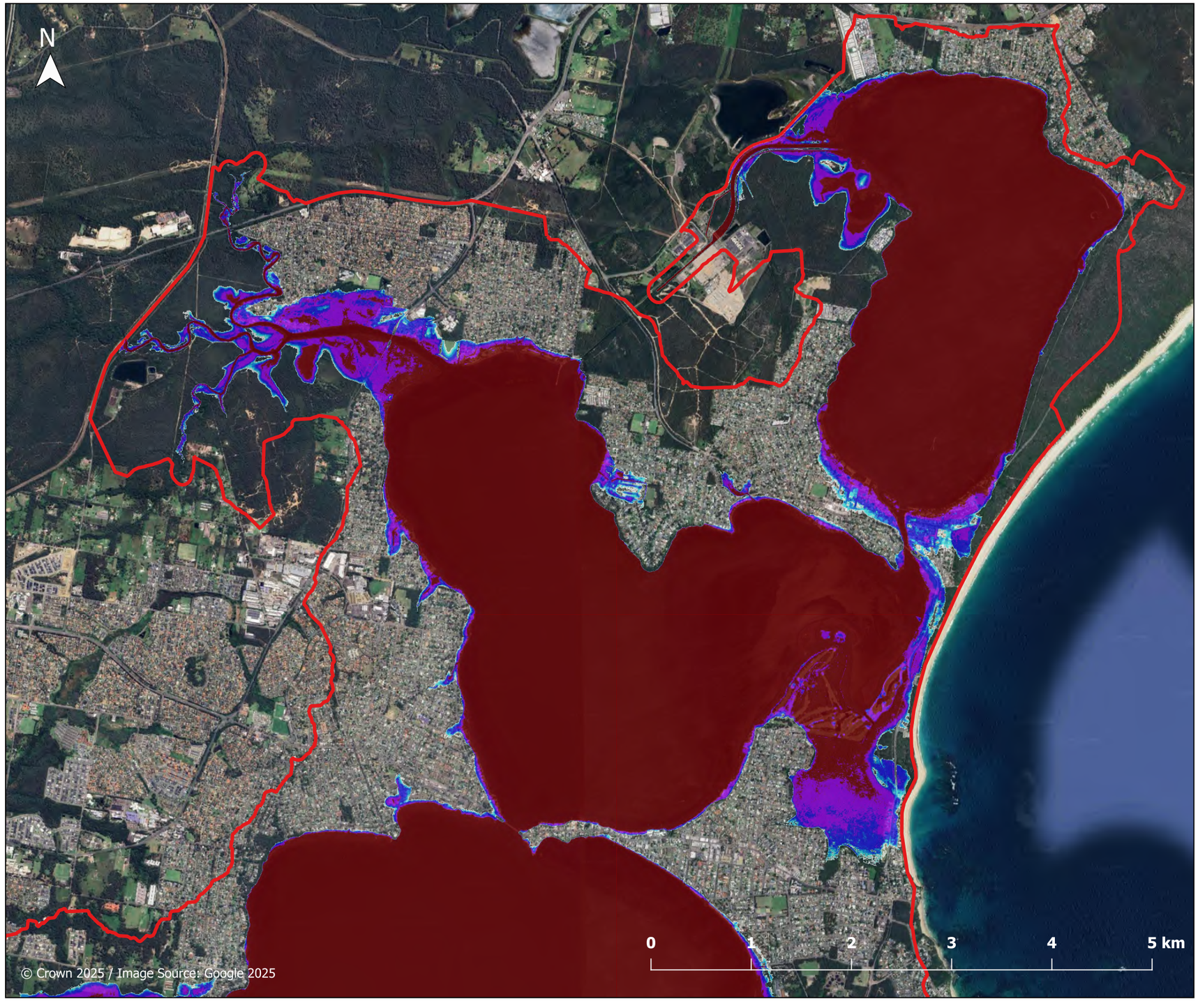

Figure C.2.7.C

1 in 500 AEP flood event - peak depth

Legend

- Model domain

Depth (m)

- 0.05-0.15
- 0.15-0.30
- 0.30-0.50
- 0.50-1.00
- 1.00-1.50
- > 1.50

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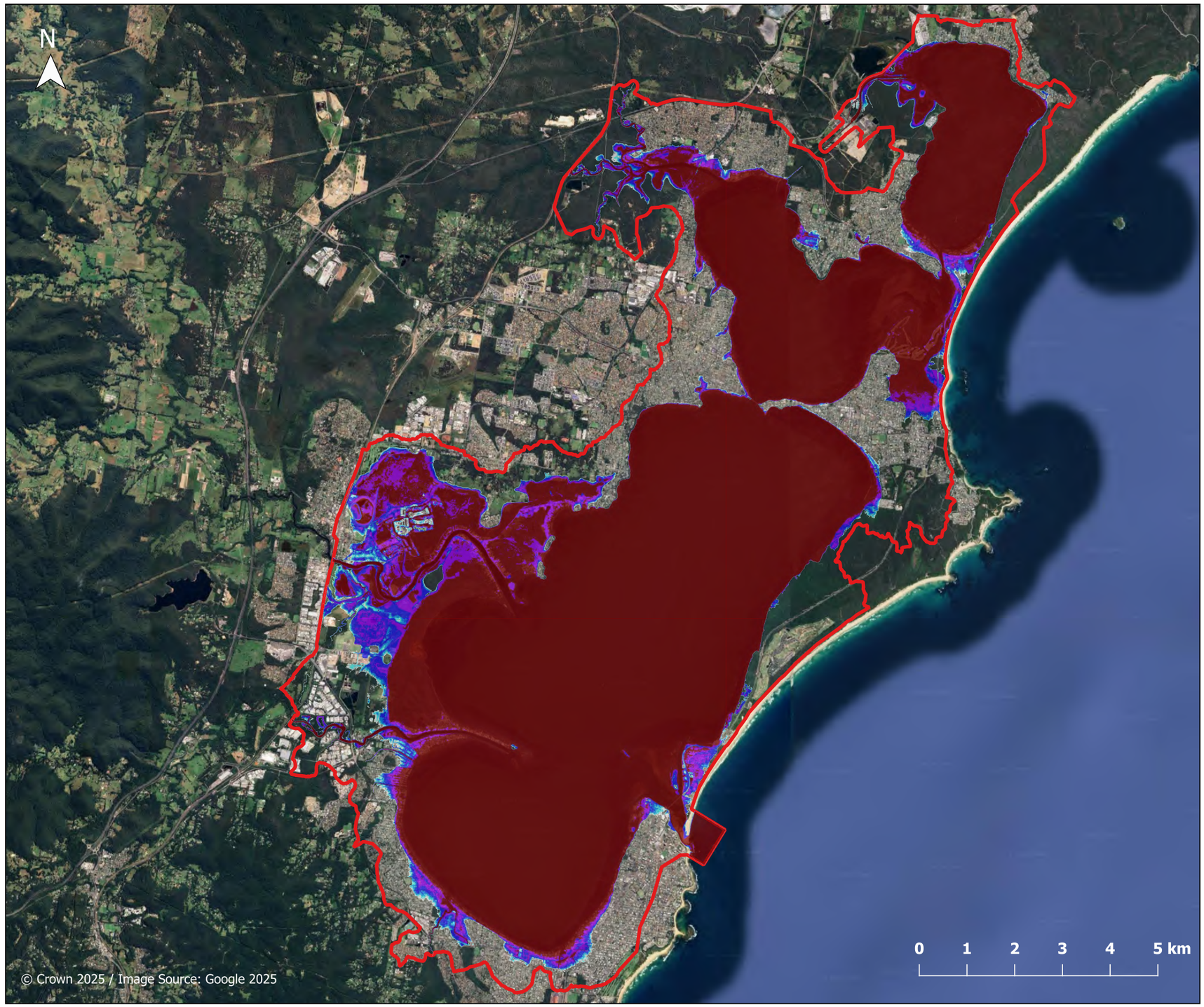

Figure C.2.8

PMF flood event - peak depth

Legend

- Model domain

Depth (m)

- 0.05-0.15
- 0.15-0.30
- 0.30-0.50
- 0.50-1.00
- 1.00-1.50
- > 1.50

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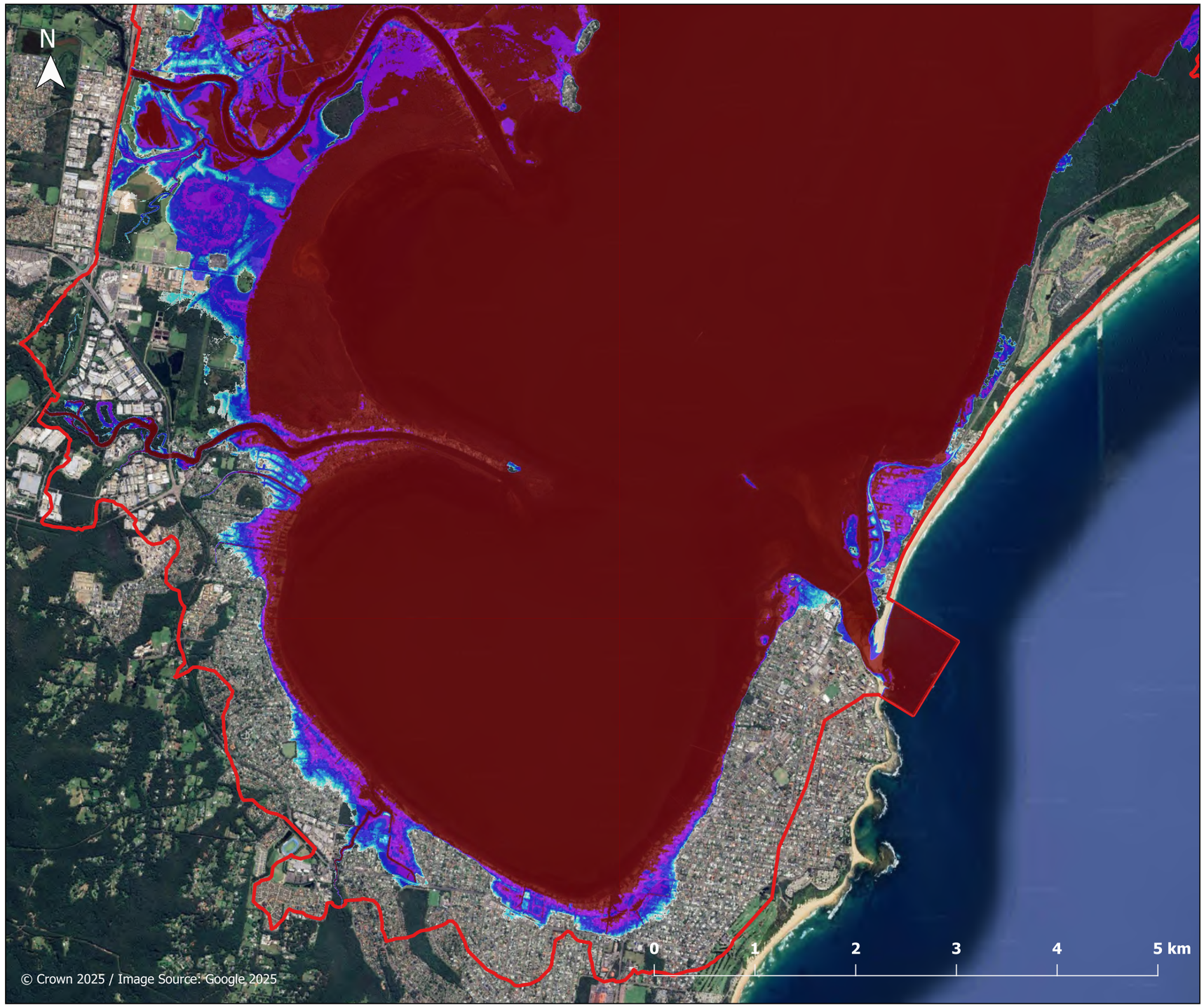

Figure C.2.8.A

PMF flood event - peak depth

Legend

- Model domain

Depth (m)

- 0.05-0.15
- 0.15-0.30
- 0.30-0.50
- 0.50-1.00
- 1.00-1.50
- > 1.50

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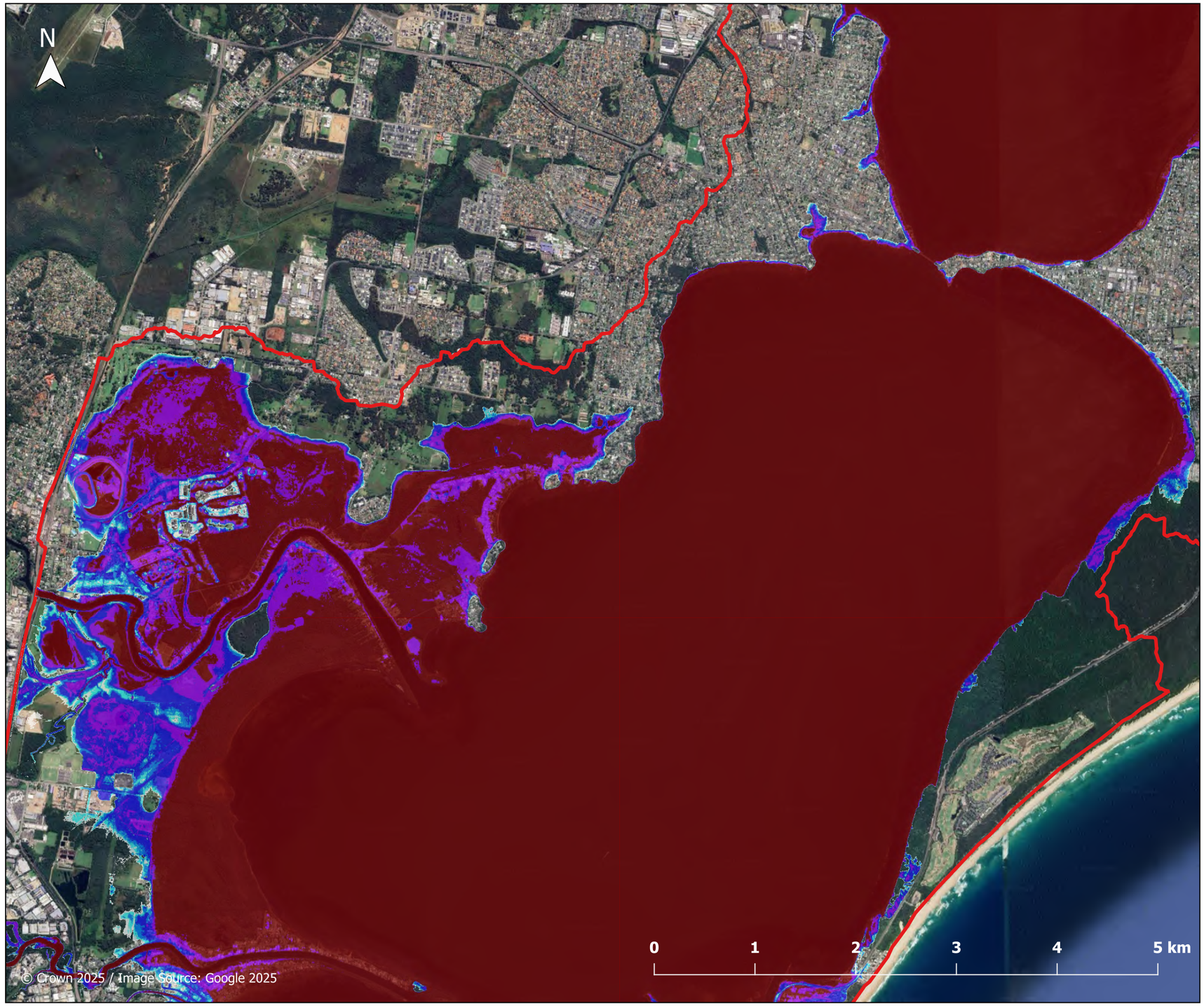

Figure C.2.8.B

PMF flood event - peak depth

Legend

Model domain

Depth (m)

- 0.05-0.15
- 0.15-0.30
- 0.30-0.50
- 0.50-1.00
- 1.00-1.50
- > 1.50

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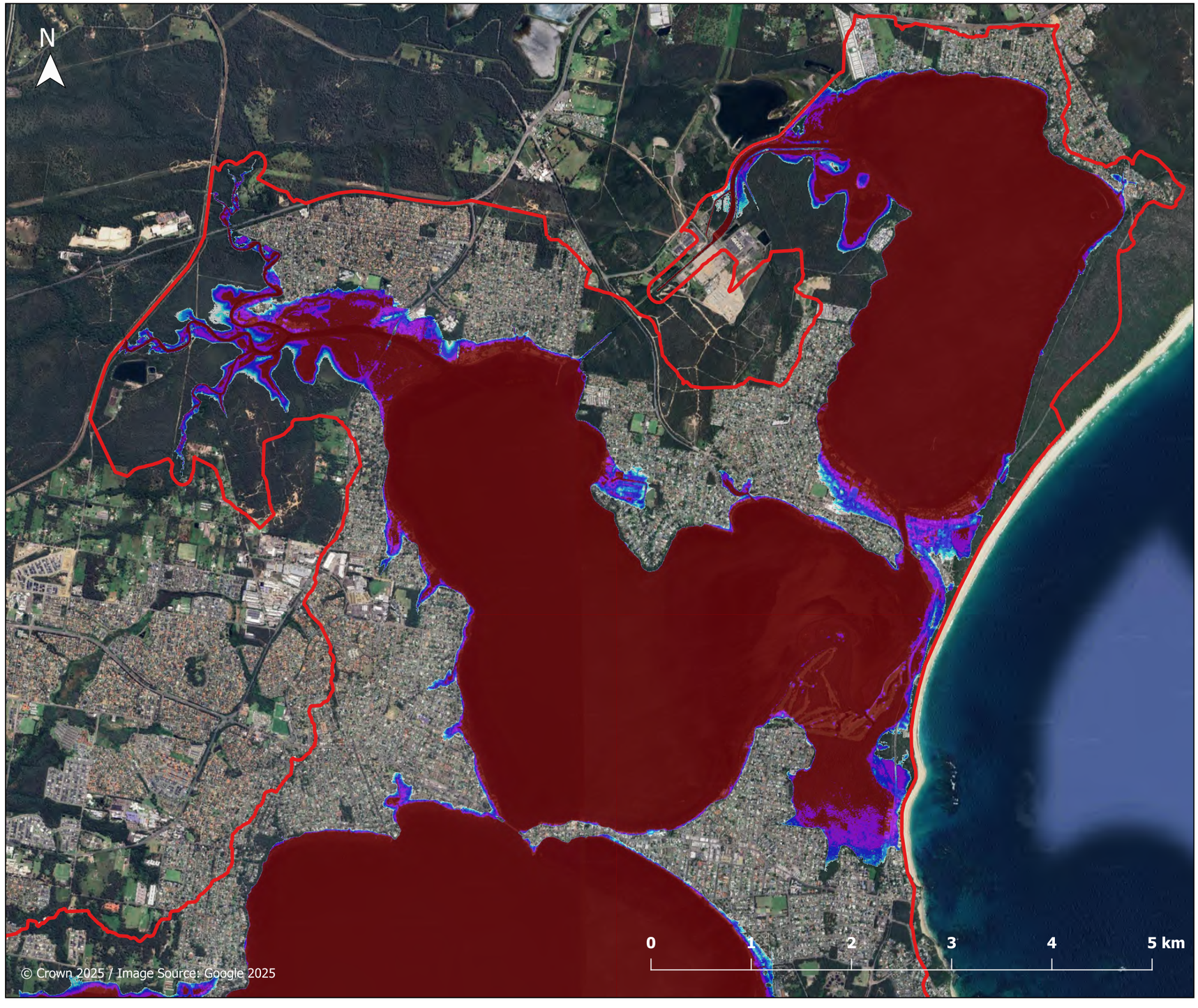

Figure C.2.8.C

PMF flood event - peak depth

Legend

- Model domain

Depth (m)

- 0.05-0.15
- 0.15-0.30
- 0.30-0.50
- 0.50-1.00
- 1.00-1.50
- > 1.50

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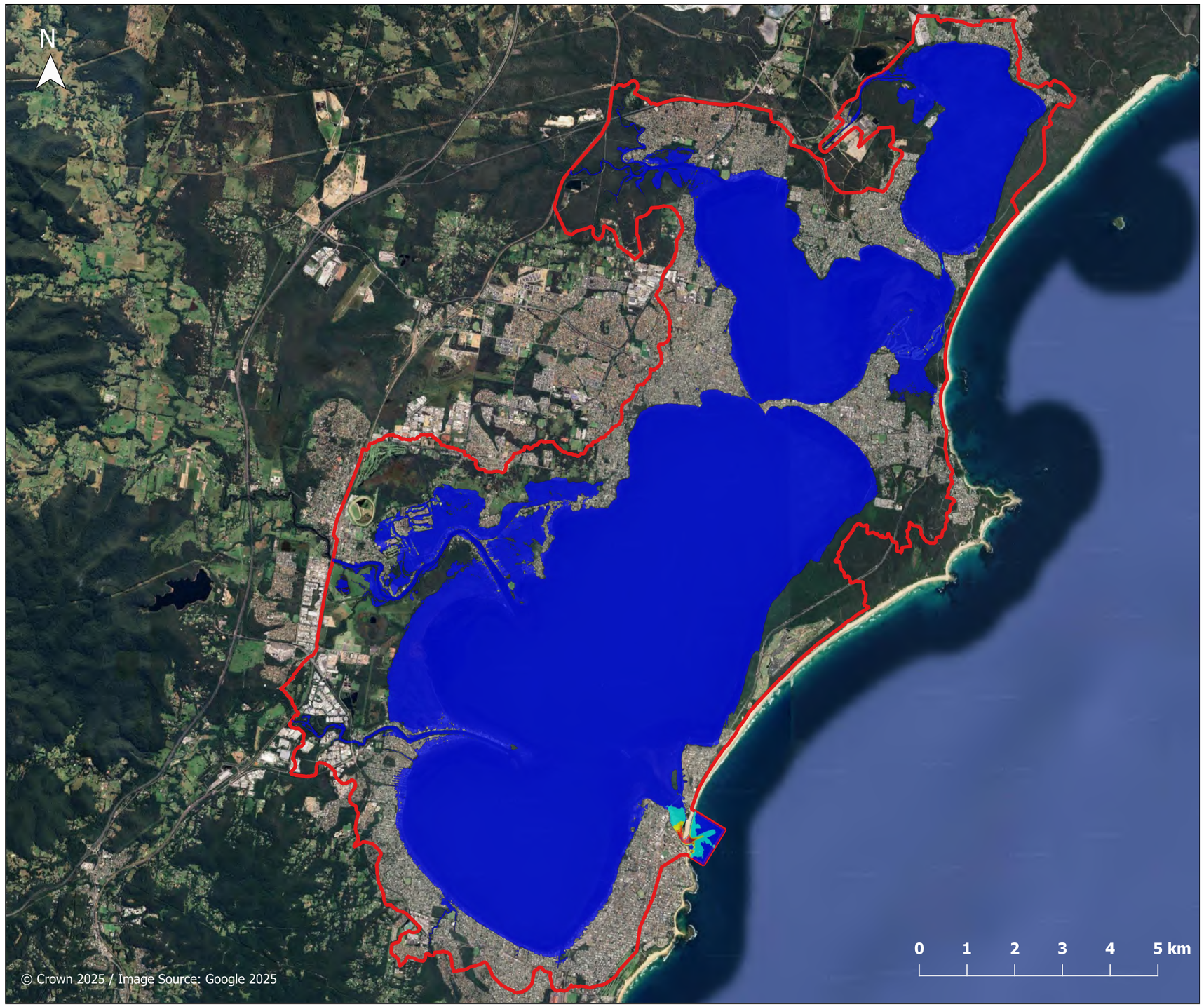

Figure C.2.1

20% AEP flood event - peak velocity

Legend

Model domain

Velocity (m/s)

- 0.00-0.25
- 0.25-0.50
- 0.50-0.75
- 0.75-1.00
- 1.00-1.50
- >1.50

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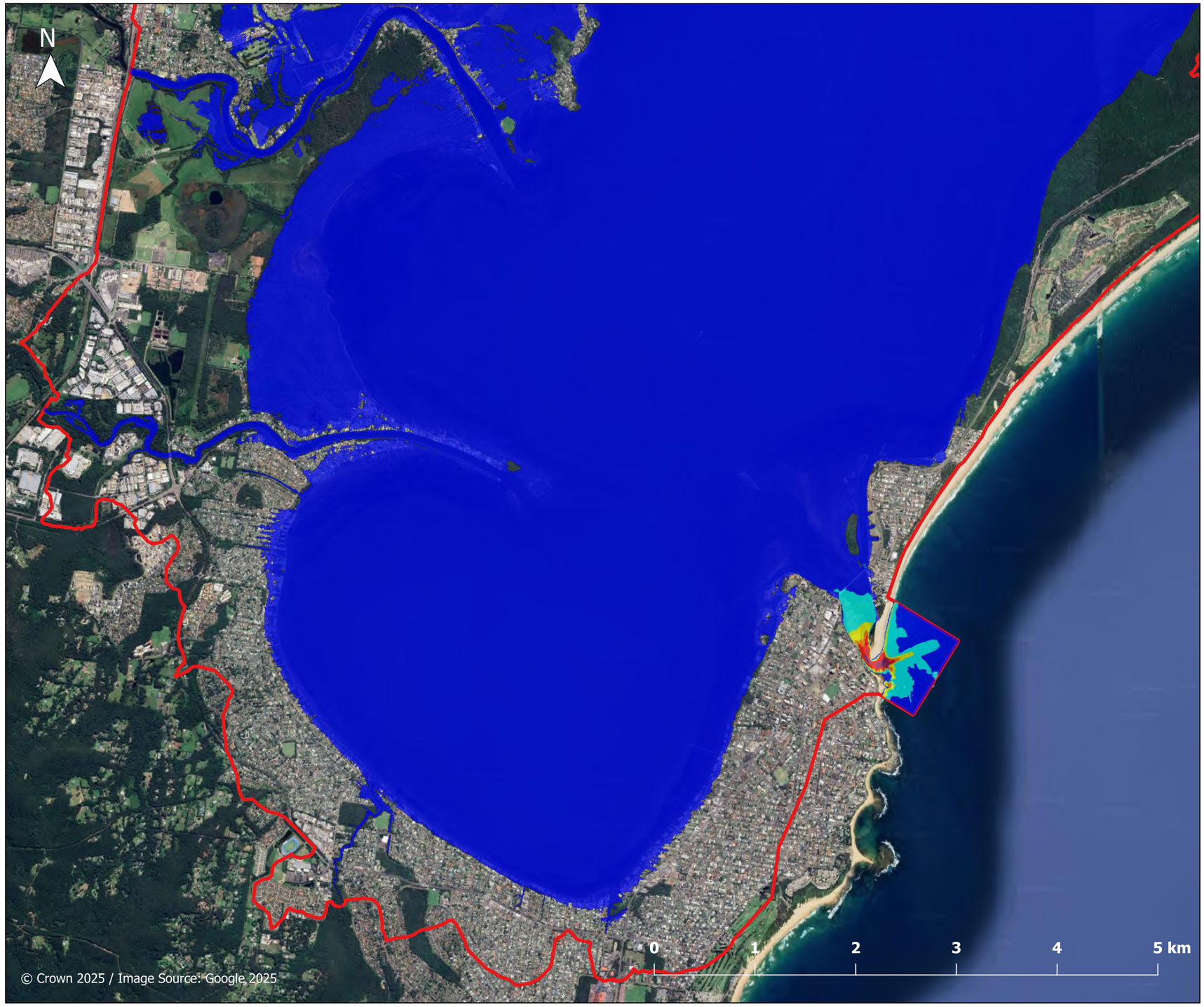

Figure C.2.1.A

20% AEP flood event - peak velocity

Legend

Model domain

Velocity (m/s)

- 0.00-0.25
- 0.25-0.50
- 0.50-0.75
- 0.75-1.00
- 1.00-1.50
- >1.50

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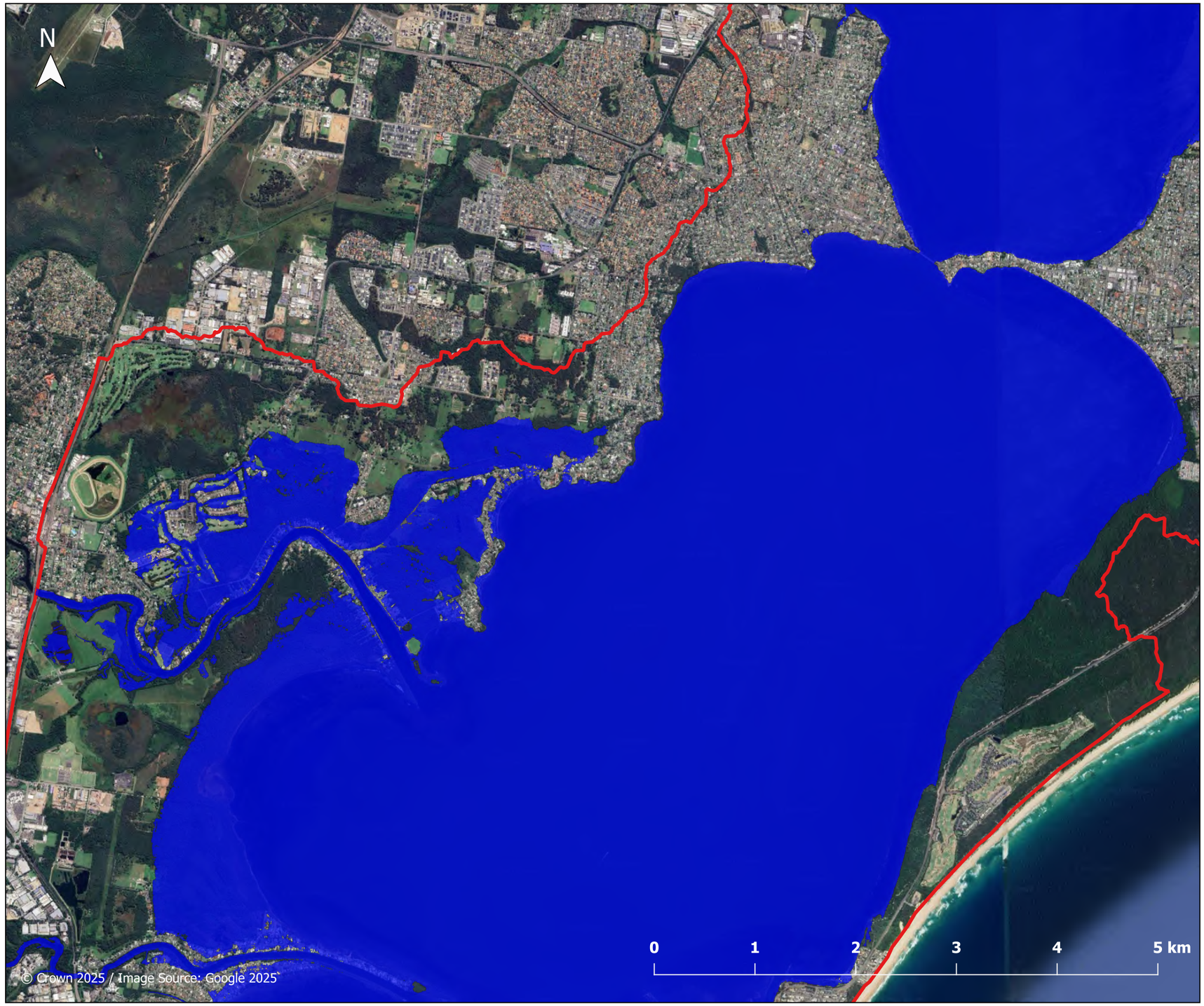

Figure C.2.1.B

20% AEP flood event - peak velocity

Legend

- Model domain

Velocity (m/s)

- 0.00-0.25
- 0.25-0.50
- 0.50-0.75
- 0.75-1.00
- 1.00-1.50
- >1.50

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Figure C.2.1.C

20% AEP flood event - peak velocity

Legend

Model domain

Velocity (m/s)

- 0.00-0.25
- 0.25-0.50
- 0.50-0.75
- 0.75-1.00
- 1.00-1.50
- >1.50

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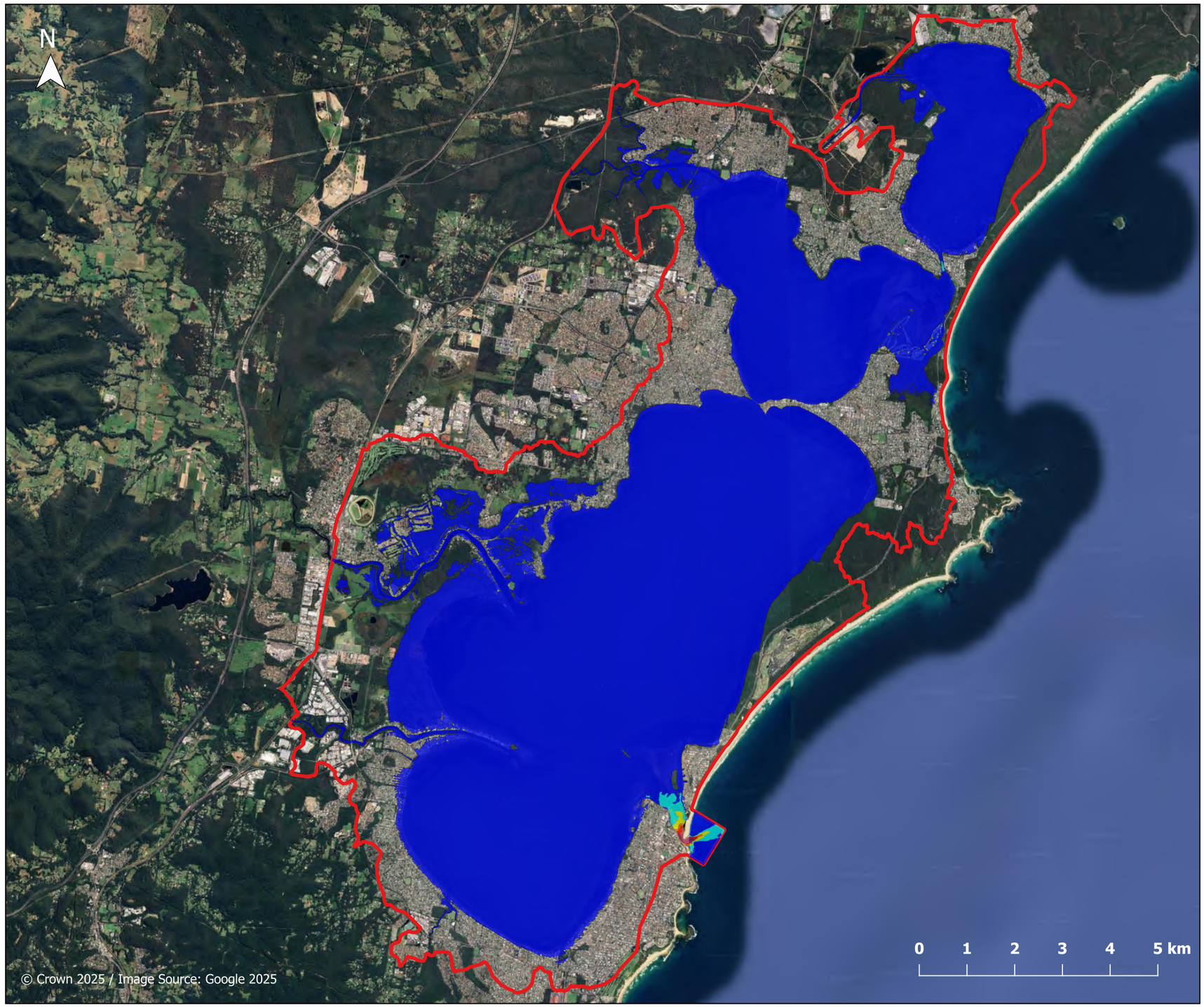

Figure C.2.2

10% AEP flood event - peak velocity

Legend

Model domain

Velocity (m/s)

- 0.00-0.25
- 0.25-0.50
- 0.50-0.75
- 0.75-1.00
- 1.00-1.50
- >1.50

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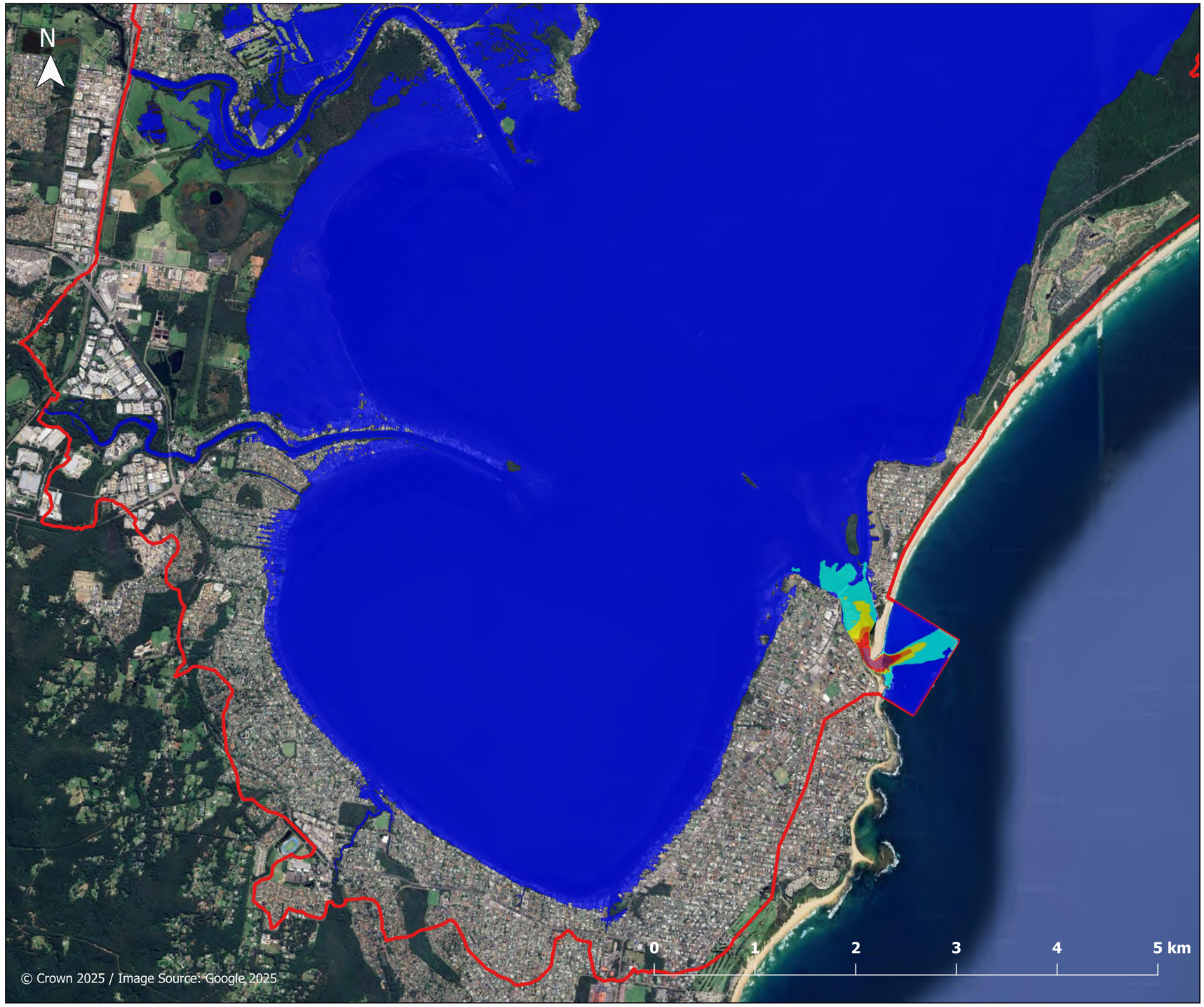

Figure C.2.2.A

10% AEP flood event - peak velocity

Legend

Model domain

Velocity (m/s)

- 0.00-0.25
- 0.25-0.50
- 0.50-0.75
- 0.75-1.00
- 1.00-1.50
- >1.50

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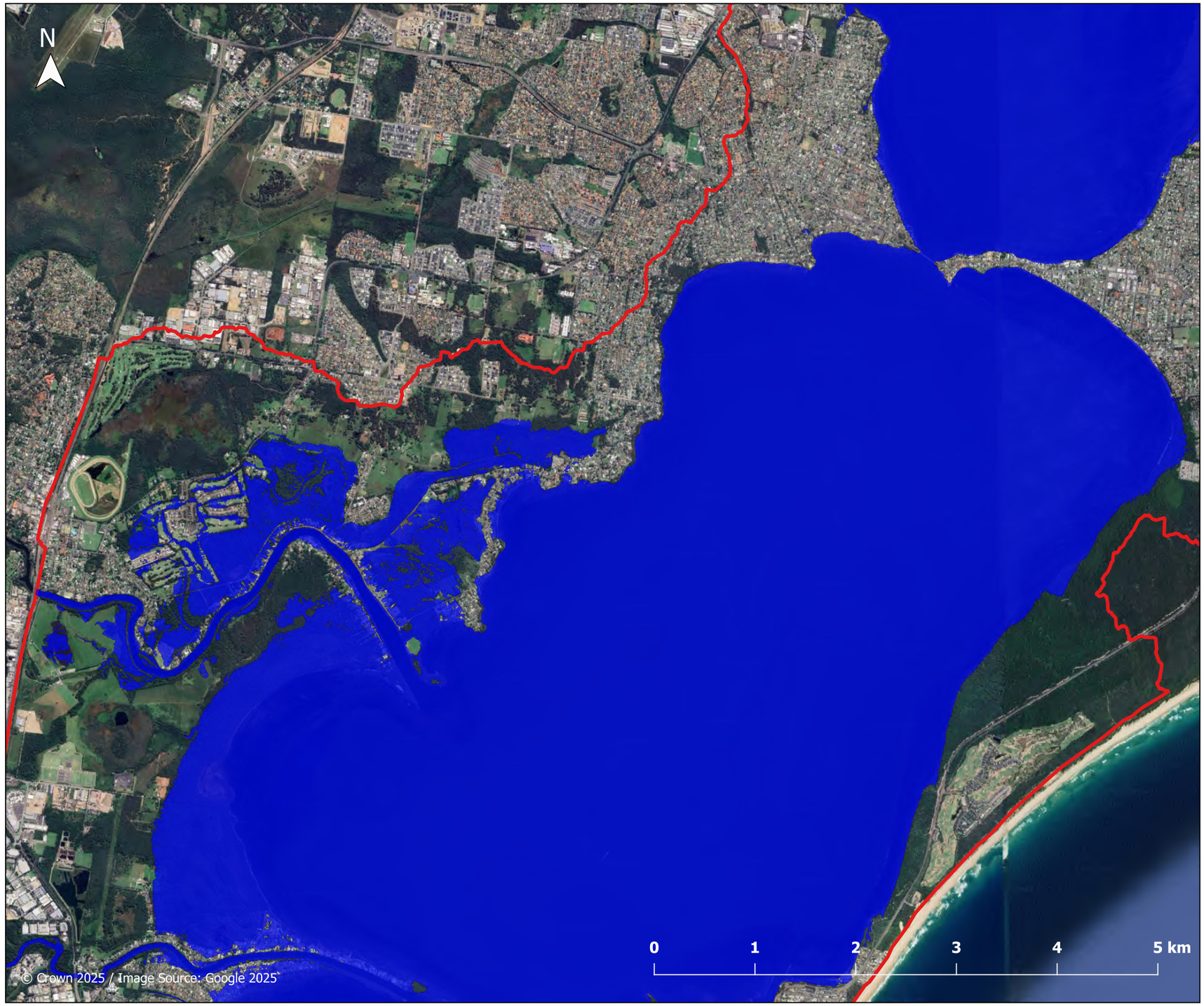

Figure C.2.2.B

10% AEP flood event - peak velocity

Legend

- Model domain

Velocity (m/s)

- 0.00-0.25
- 0.25-0.50
- 0.50-0.75
- 0.75-1.00
- 1.00-1.50
- >1.50

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Figure C.2.2.C

10% AEP flood event - peak velocity

Legend

Model domain

Velocity (m/s)

- 0.00-0.25
- 0.25-0.50
- 0.50-0.75
- 0.75-1.00
- 1.00-1.50
- >1.50

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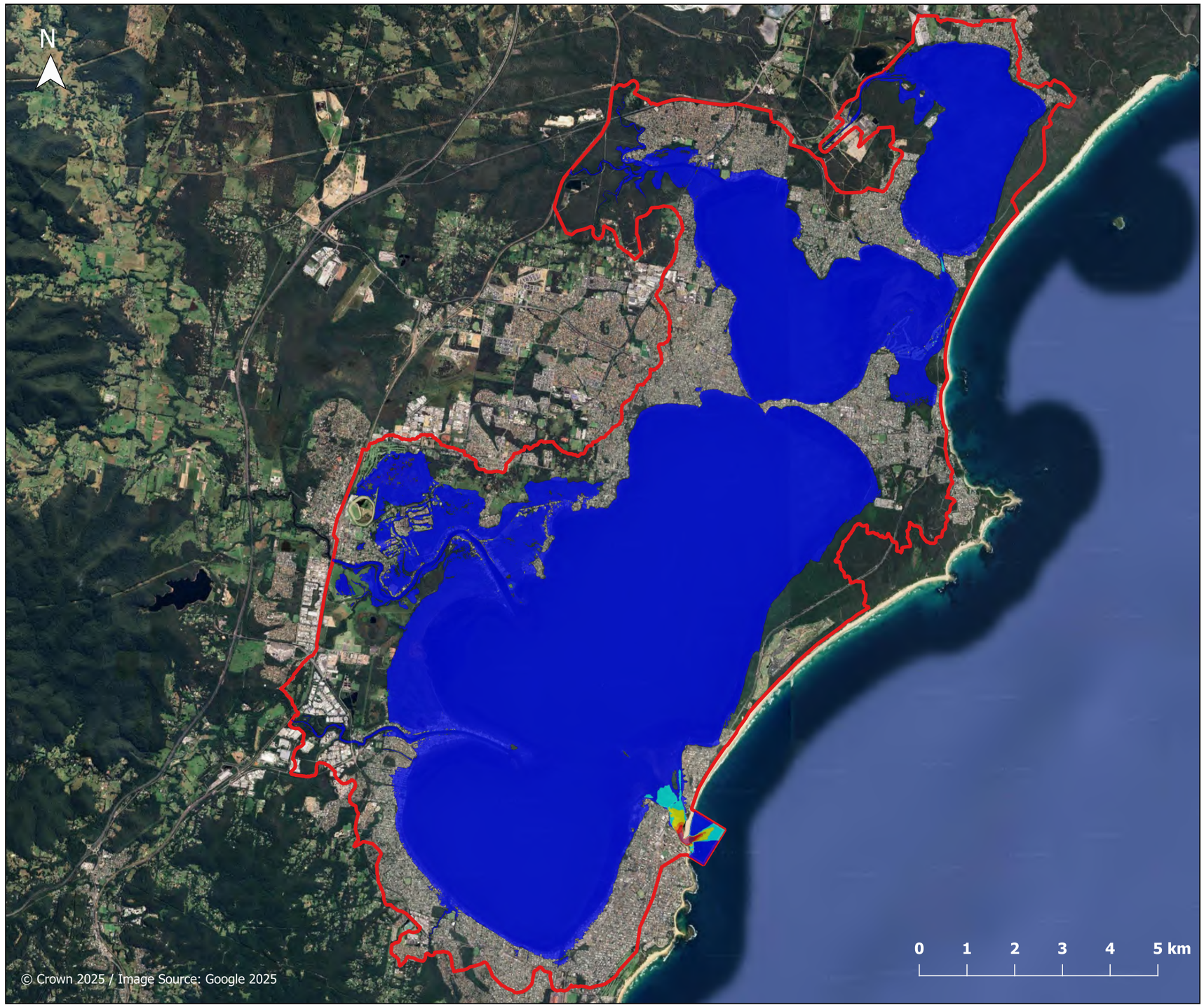

Figure C.2.3

5% AEP flood event - peak velocity

Legend

Model domain

Velocity (m/s)

- 0.00-0.25
- 0.25-0.50
- 0.50-0.75
- 0.75-1.00
- 1.00-1.50
- >1.50

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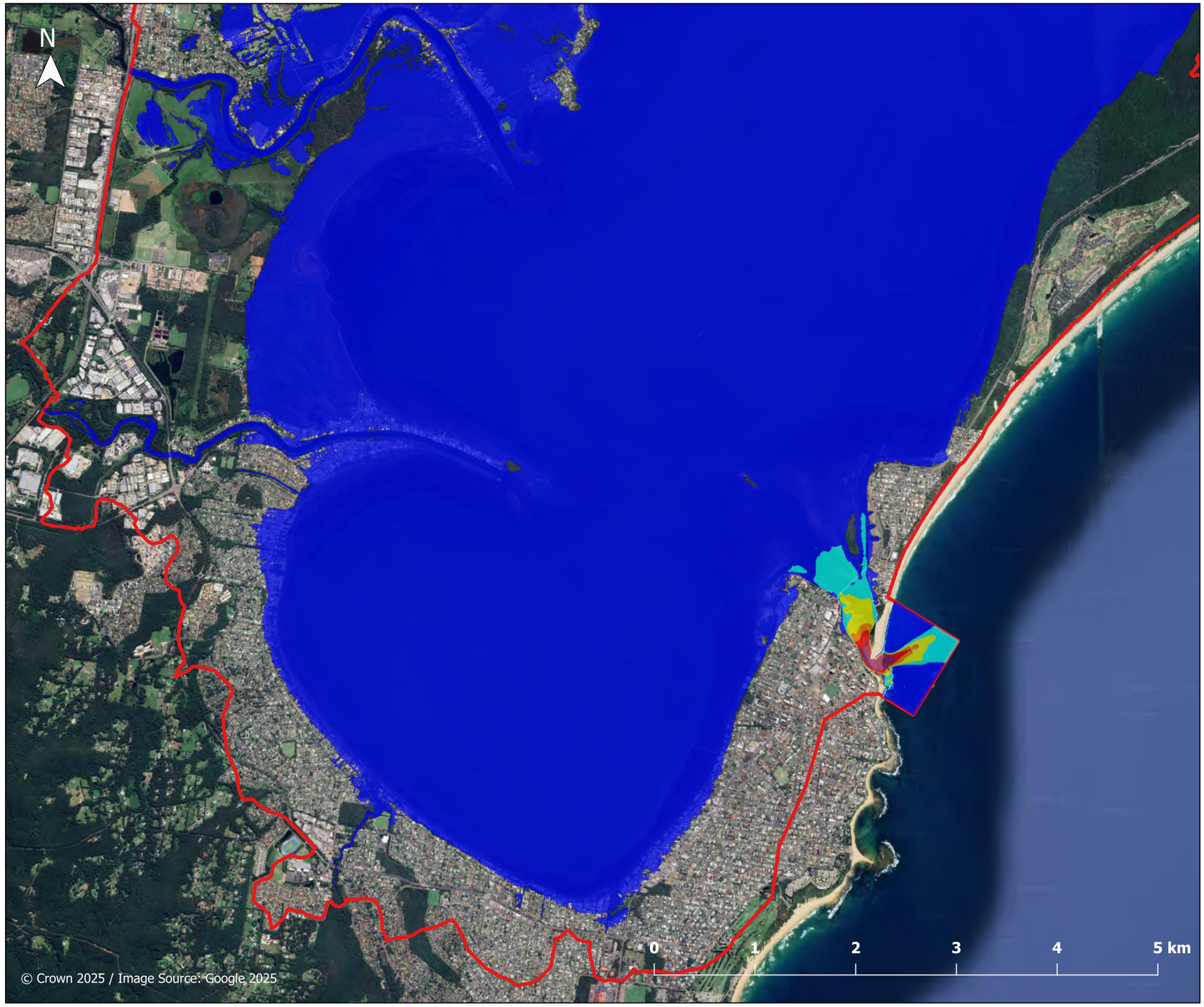

Figure C.2.3.A

5% AEP flood event - peak velocity

Legend

Model domain

Velocity (m/s)

- 0.00-0.25
- 0.25-0.50
- 0.50-0.75
- 0.75-1.00
- 1.00-1.50
- >1.50

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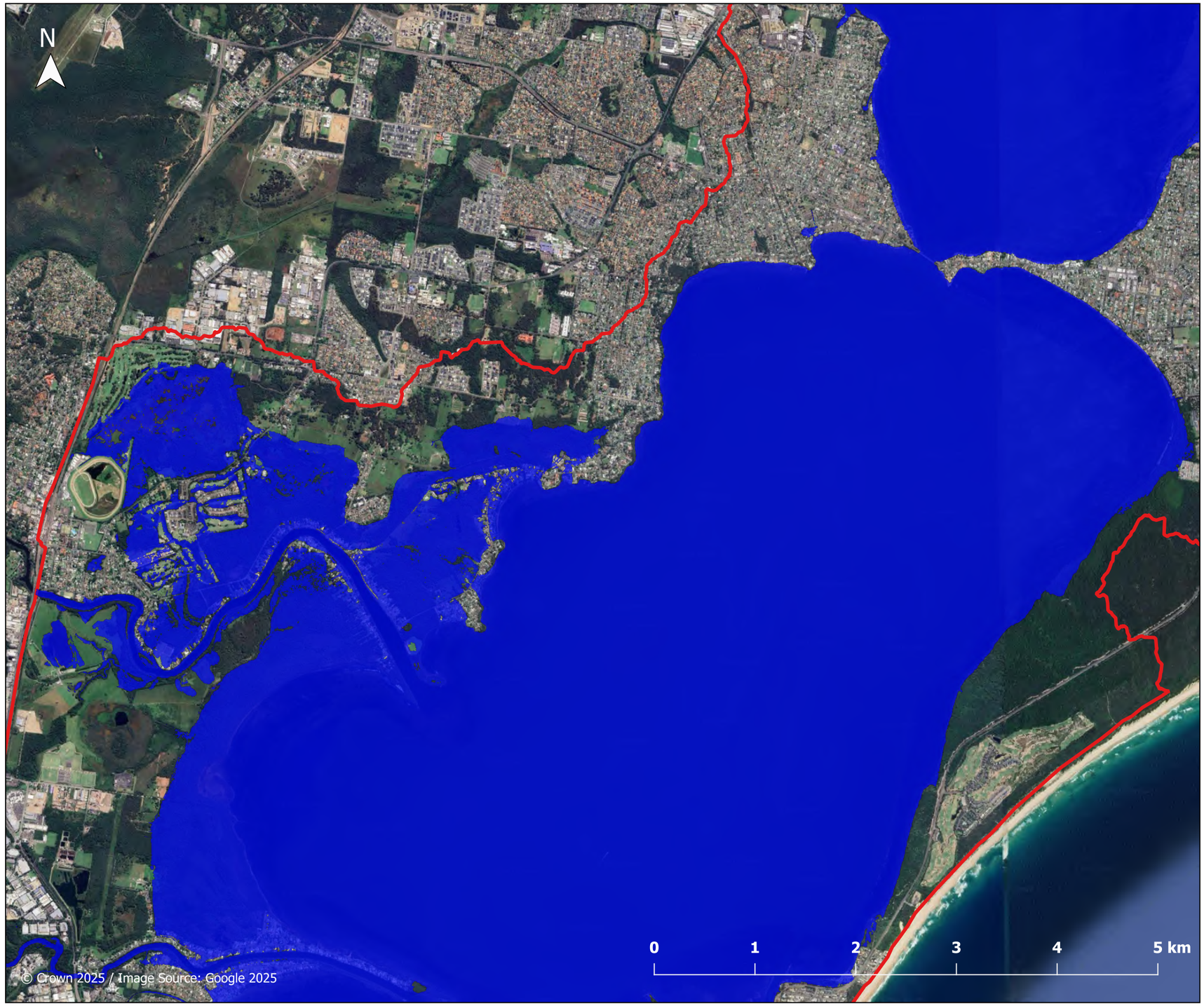

Figure C.2.3.B

5% AEP flood event - peak velocity

Legend

- Model domain

Velocity (m/s)

- 0.00-0.25
- 0.25-0.50
- 0.50-0.75
- 0.75-1.00
- 1.00-1.50
- >1.50

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Figure C.2.3.C

5% AEP flood event - peak velocity

Legend

Model domain

Velocity (m/s)

- 0.00-0.25
- 0.25-0.50
- 0.50-0.75
- 0.75-1.00
- 1.00-1.50
- >1.50

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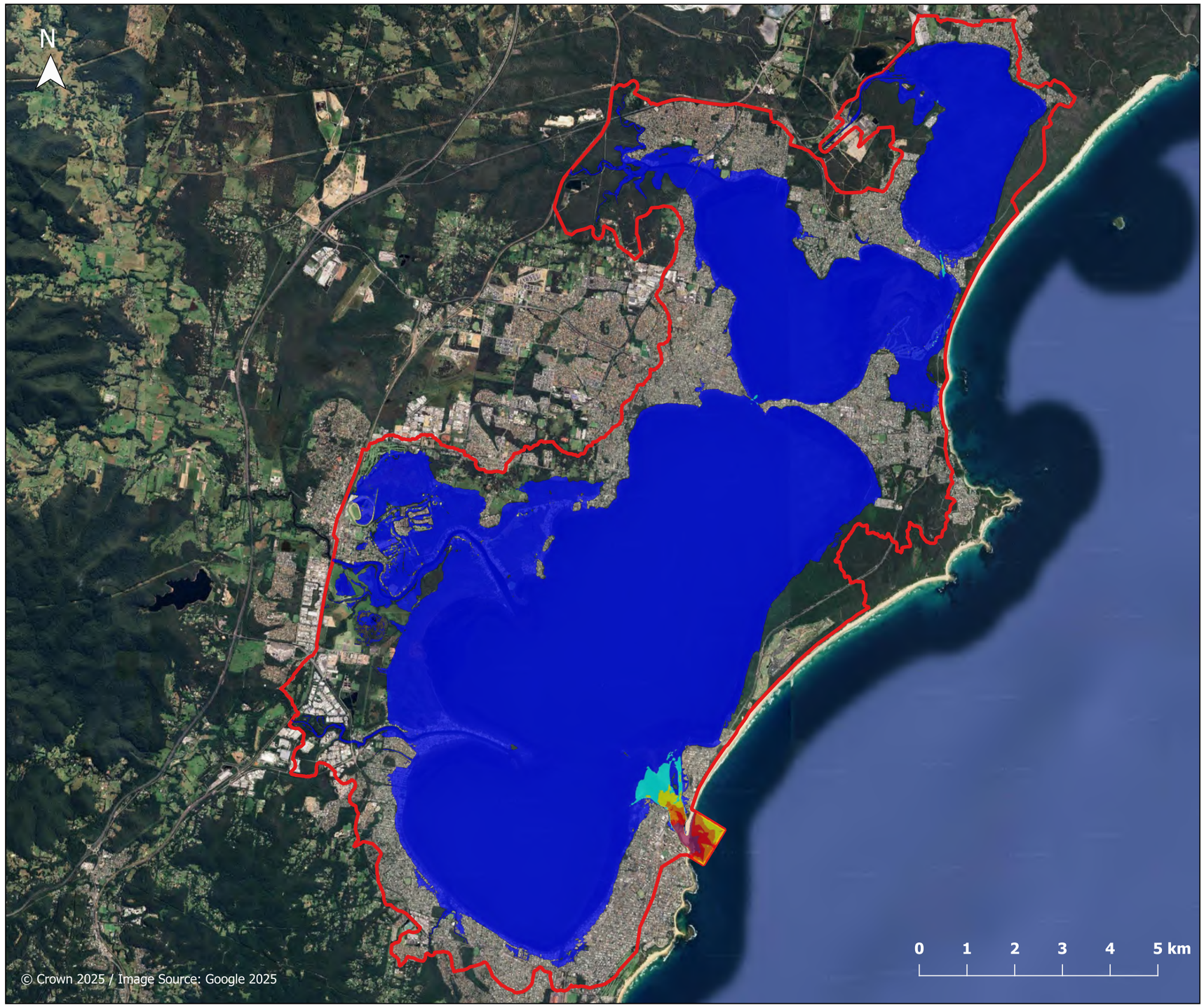

Figure C.2.4

2% AEP flood event - peak velocity

Legend

- Model domain

Velocity (m/s)

- 0.00-0.25
- 0.25-0.50
- 0.50-0.75
- 0.75-1.00
- 1.00-1.50
- >1.50

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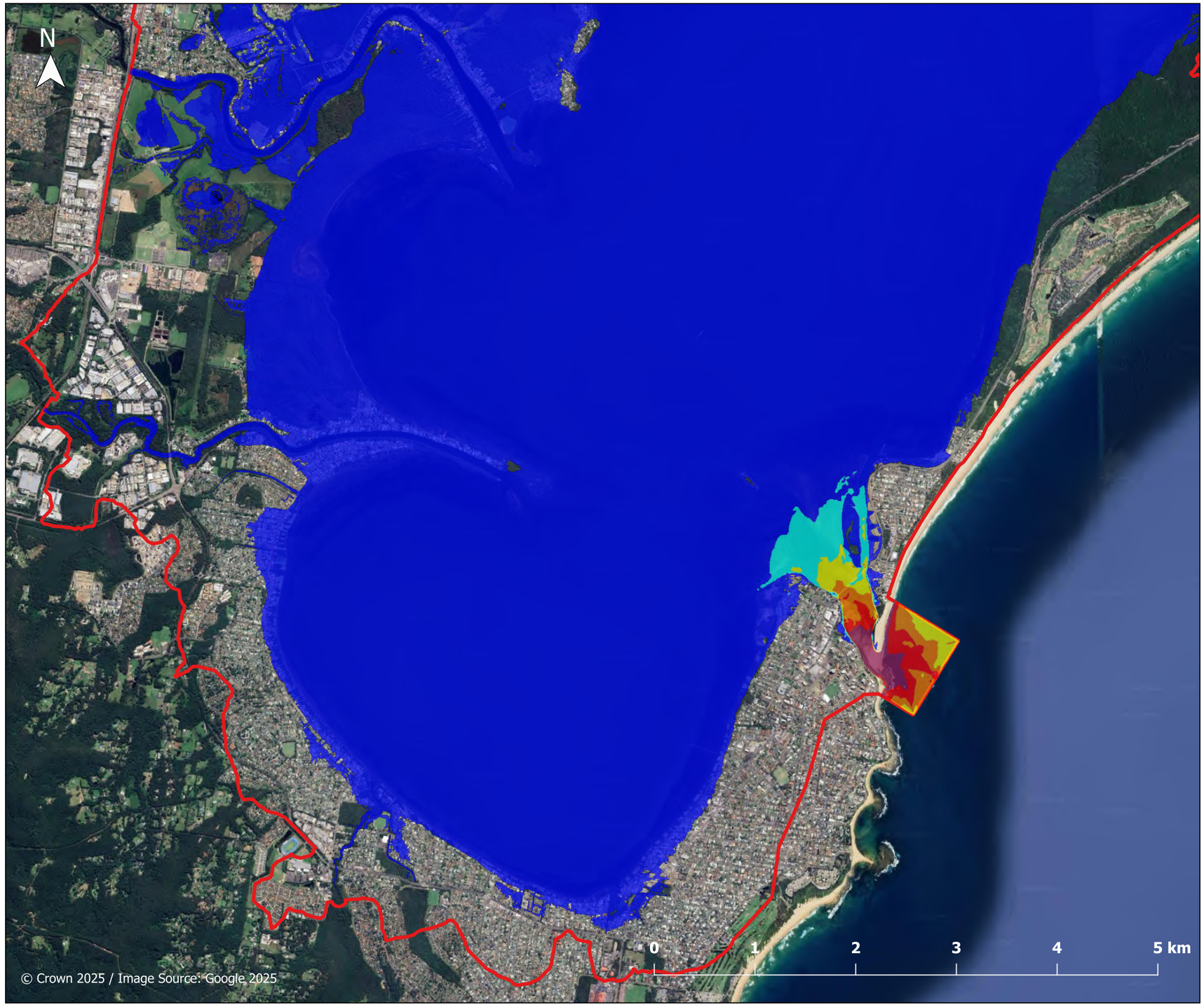

Figure C.2.4.A

2% AEP flood event - peak velocity

Legend

Model domain

Velocity (m/s)

- 0.00-0.25
- 0.25-0.50
- 0.50-0.75
- 0.75-1.00
- 1.00-1.50
- >1.50

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Figure C.2.4.B

2% AEP flood event - peak velocity

Legend

- Model domain

Velocity (m/s)

- 0.00-0.25
- 0.25-0.50
- 0.50-0.75
- 0.75-1.00
- 1.00-1.50
- >1.50

Disclaimer:
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Figure C.2.4.C

2% AEP flood event - peak velocity

Legend

- Model domain

Velocity (m/s)

- 0.00-0.25
- 0.25-0.50
- 0.50-0.75
- 0.75-1.00
- 1.00-1.50
- >1.50

Disclaimer:
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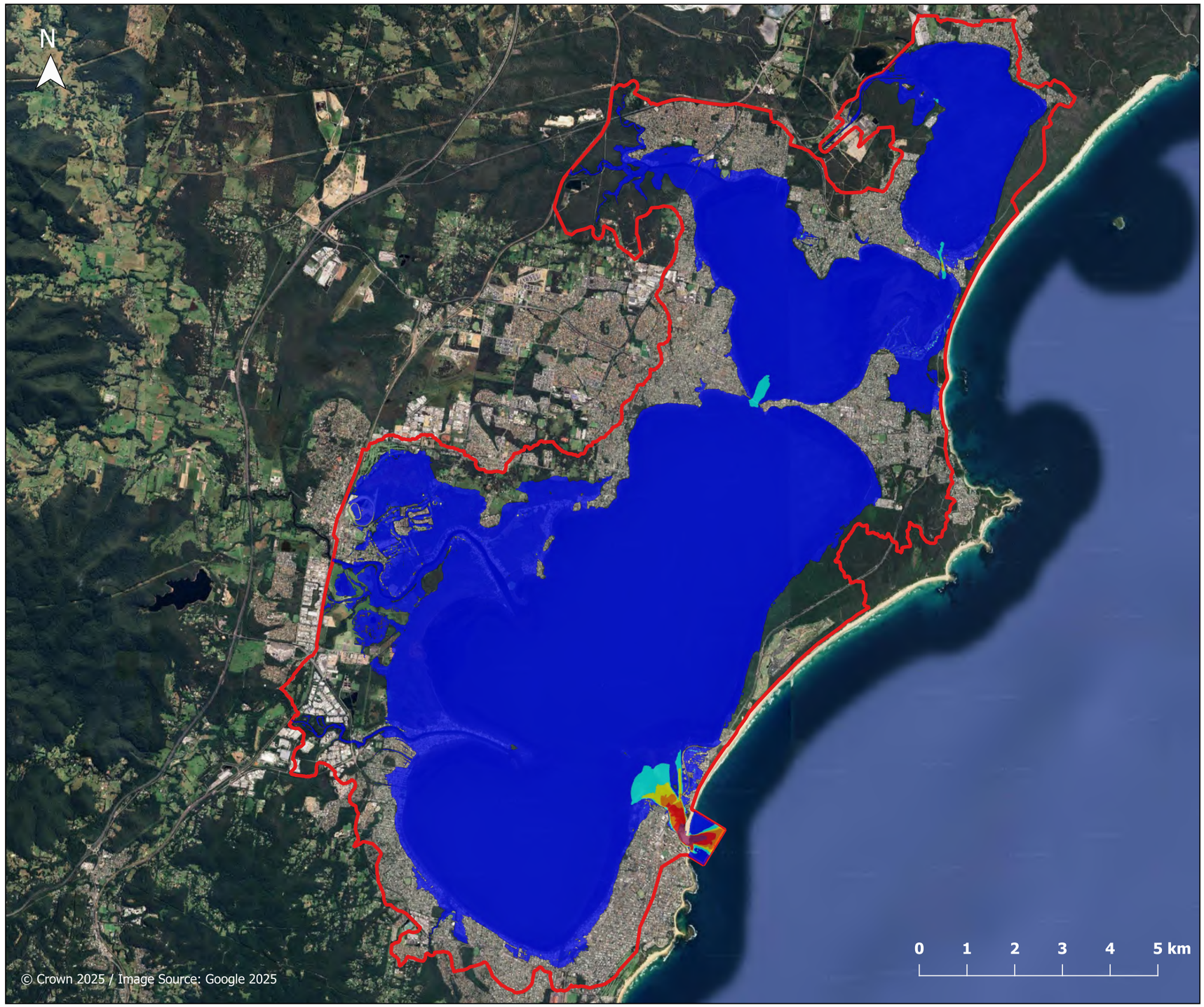

Figure C.2.5

1% AEP flood event - peak velocity

Legend

Model domain

Velocity (m/s)

- 0.00-0.25
- 0.25-0.50
- 0.50-0.75
- 0.75-1.00
- 1.00-1.50
- >1.50

Disclaimer:
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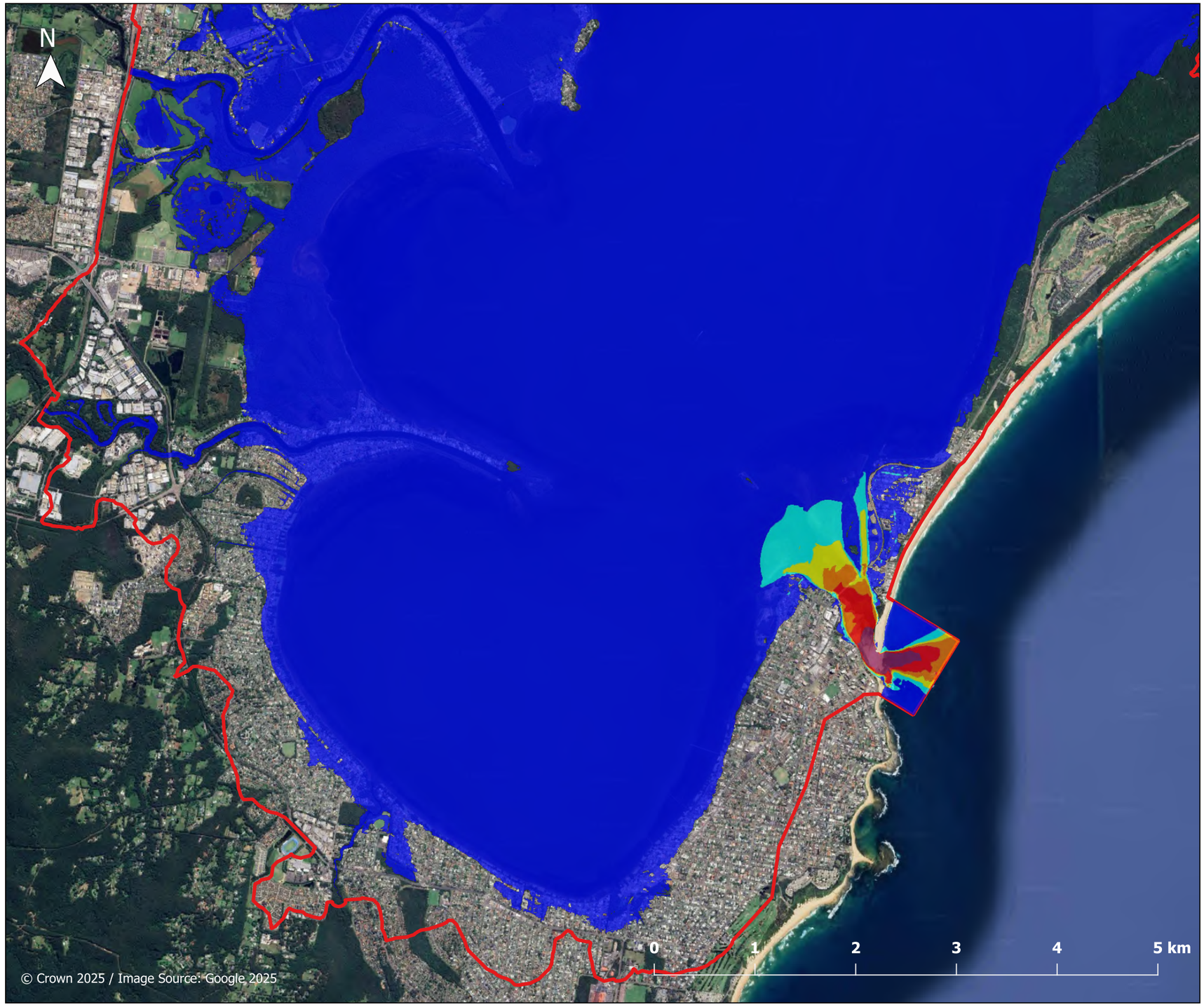

Figure C.2.5.A

1% AEP flood event - peak velocity

Legend

Model domain

Velocity (m/s)

- 0.00-0.25
- 0.25-0.50
- 0.50-0.75
- 0.75-1.00
- 1.00-1.50
- >1.50

Disclaimer:
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Figure C.2.5.B

1% AEP flood event - peak velocity

Legend

- Model domain

Velocity (m/s)

- 0.00-0.25
- 0.25-0.50
- 0.50-0.75
- 0.75-1.00
- 1.00-1.50
- >1.50

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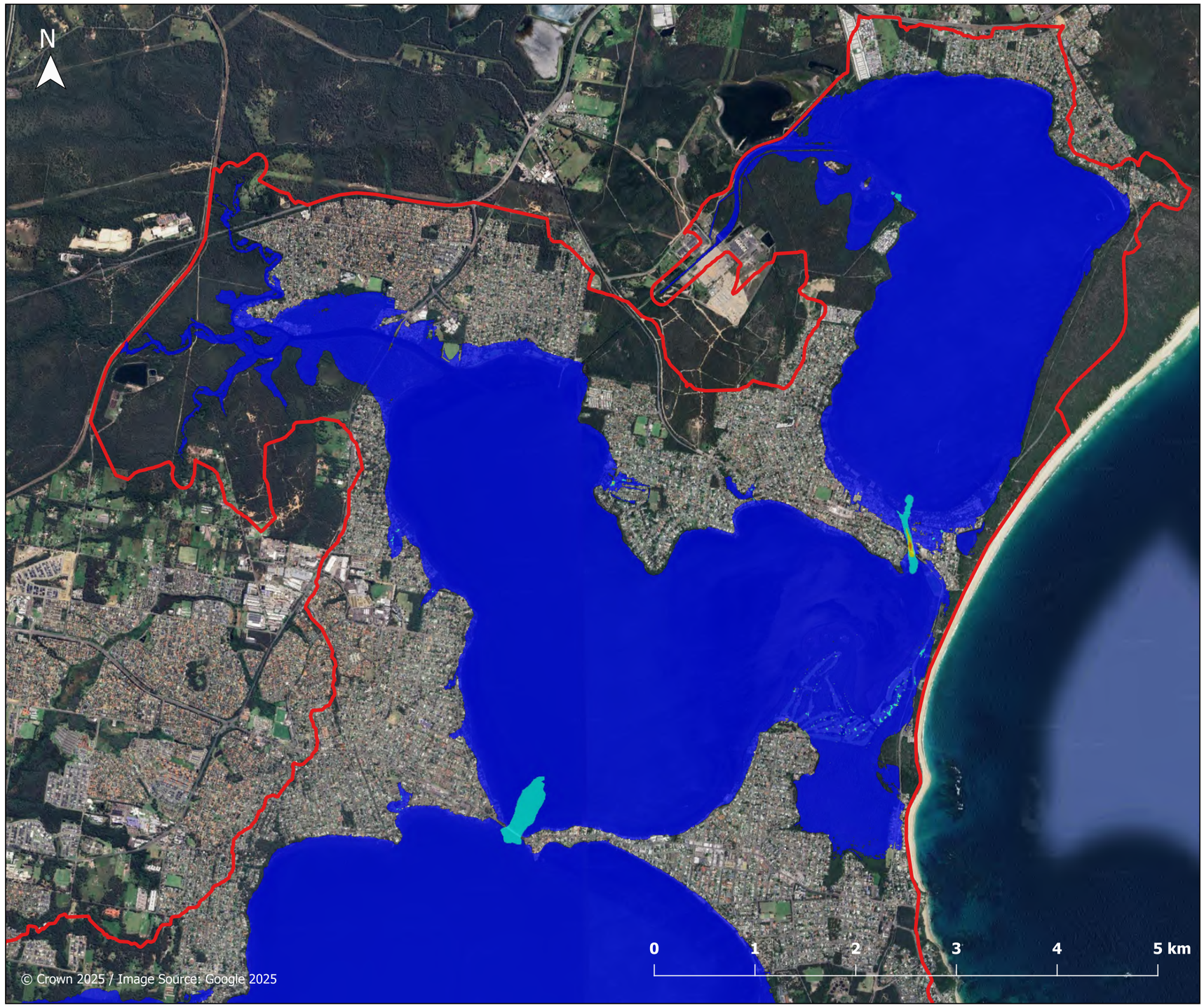

Figure C.2.5.C

1% AEP flood event - peak velocity

Legend

Model domain

Velocity (m/s)

- 0.00-0.25
- 0.25-0.50
- 0.50-0.75
- 0.75-1.00
- 1.00-1.50
- >1.50

Disclaimer:
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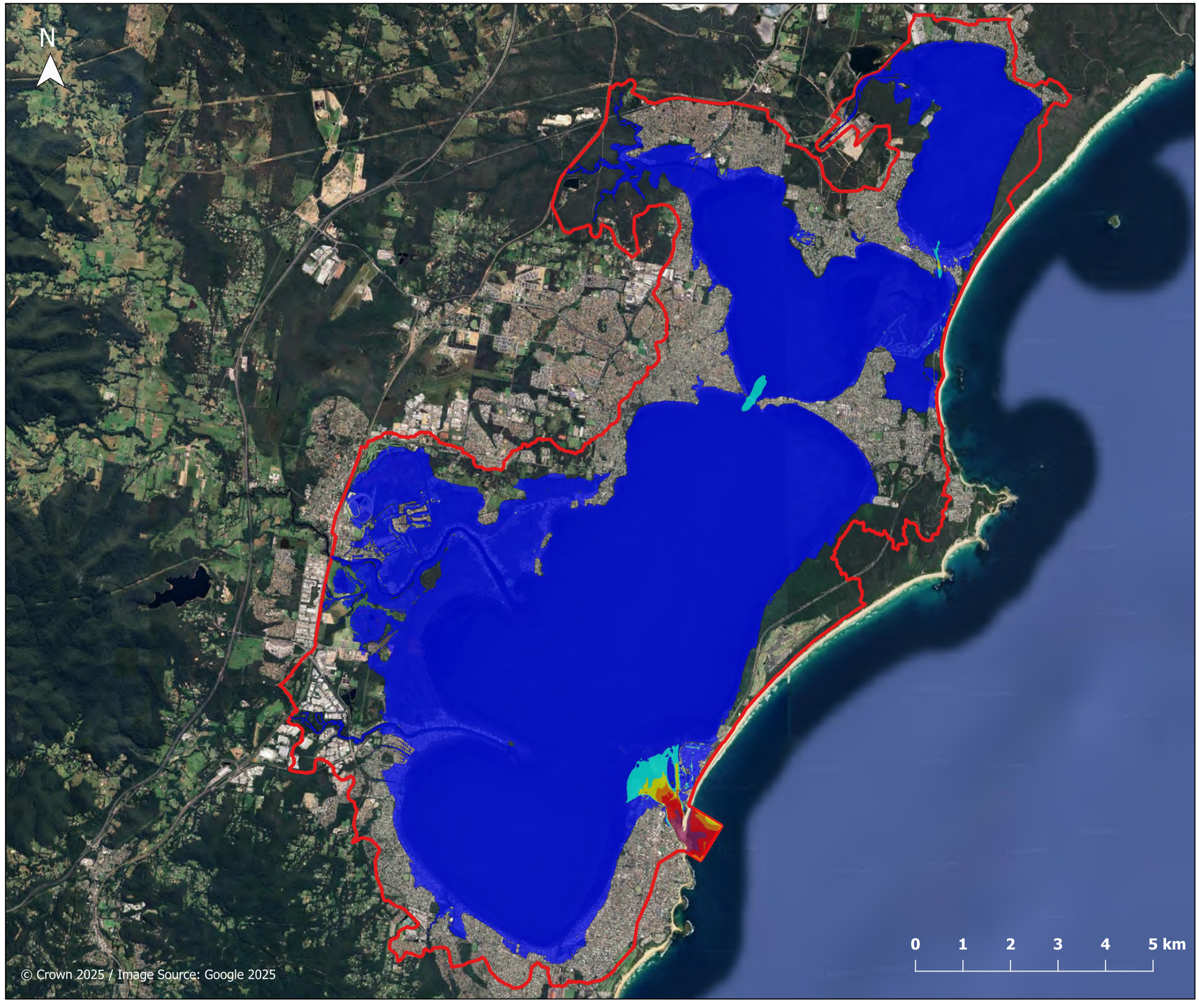

Figure C.2.6

1 in 200 AEP flood event - peak velocity

Legend

- Model domain

Velocity (m/s)

- 0.00-0.25
- 0.25-0.50
- 0.50-0.75
- 0.75-1.00
- 1.00-1.50
- >1.50

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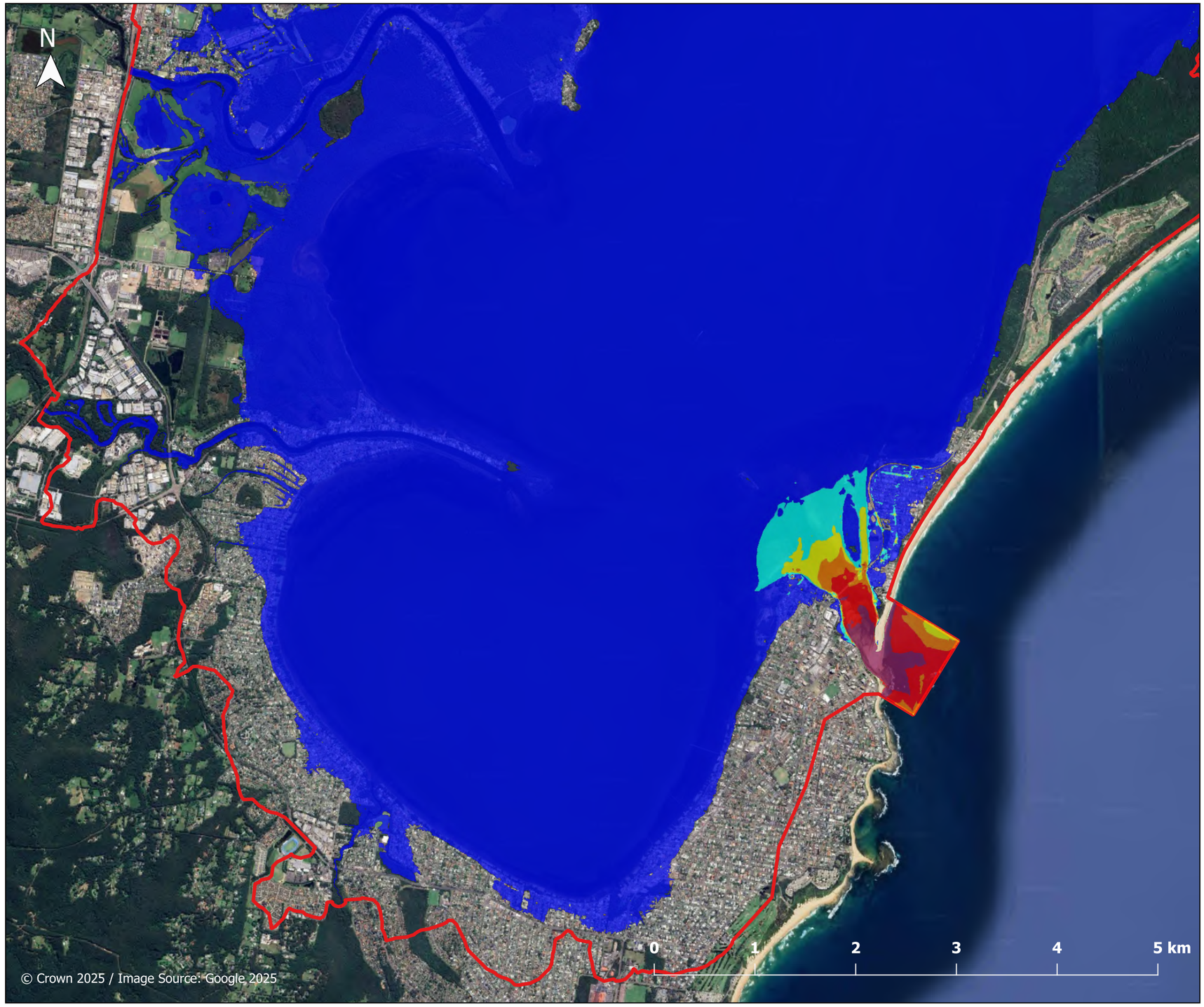

Figure C.2.6.A

1 in 200 AEP flood event - peak velocity

Legend

- Model domain

Velocity (m/s)

- 0.00-0.25
- 0.25-0.50
- 0.50-0.75
- 0.75-1.00
- 1.00-1.50
- >1.50

Disclaimer:
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Figure C.2.6.B

1 in 200 AEP flood event - peak velocity

Legend

- Model domain

Velocity (m/s)

- 0.00-0.25
- 0.25-0.50
- 0.50-0.75
- 0.75-1.00
- 1.00-1.50
- >1.50

Disclaimer:
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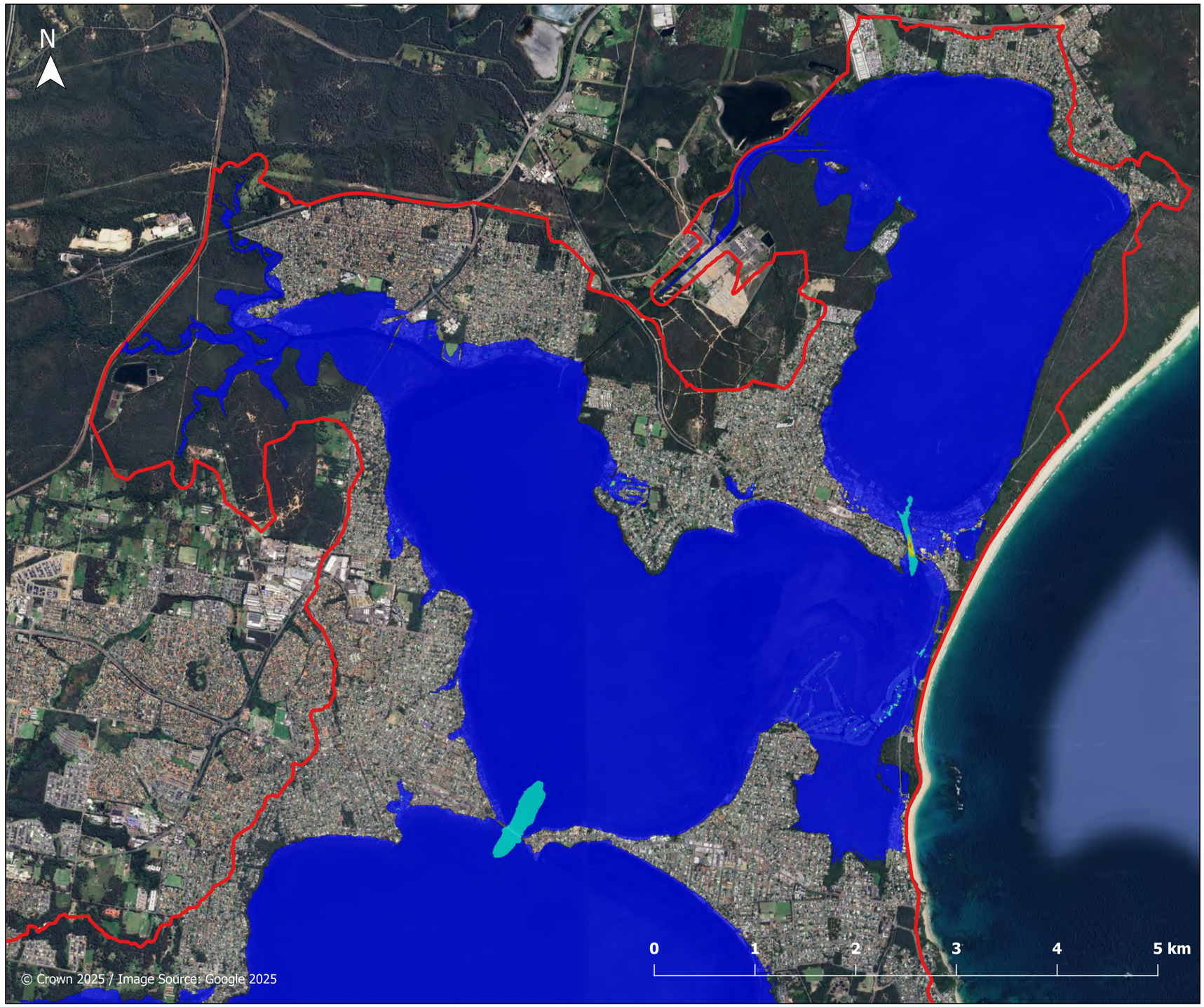

Figure C.2.6.C

1 in 200 AEP flood event - peak velocity

Legend

- Model domain

Velocity (m/s)

- 0.00-0.25
- 0.25-0.50
- 0.50-0.75
- 0.75-1.00
- 1.00-1.50
- >1.50

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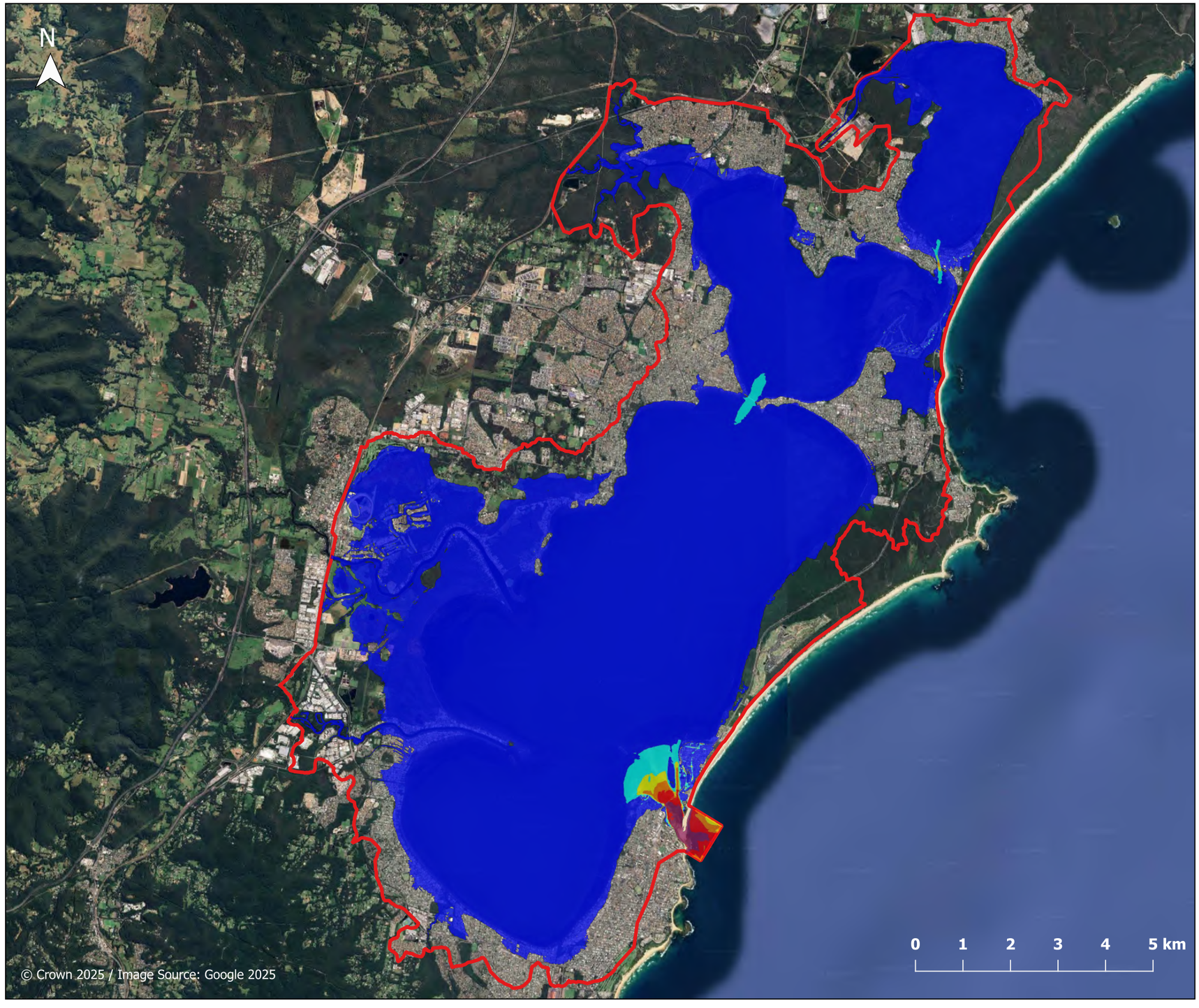

Figure C.2.7

1 in 500 AEP flood event - peak velocity

Legend

- Model domain

Velocity (m/s)

- 0.00-0.25
- 0.25-0.50
- 0.50-0.75
- 0.75-1.00
- 1.00-1.50
- >1.50

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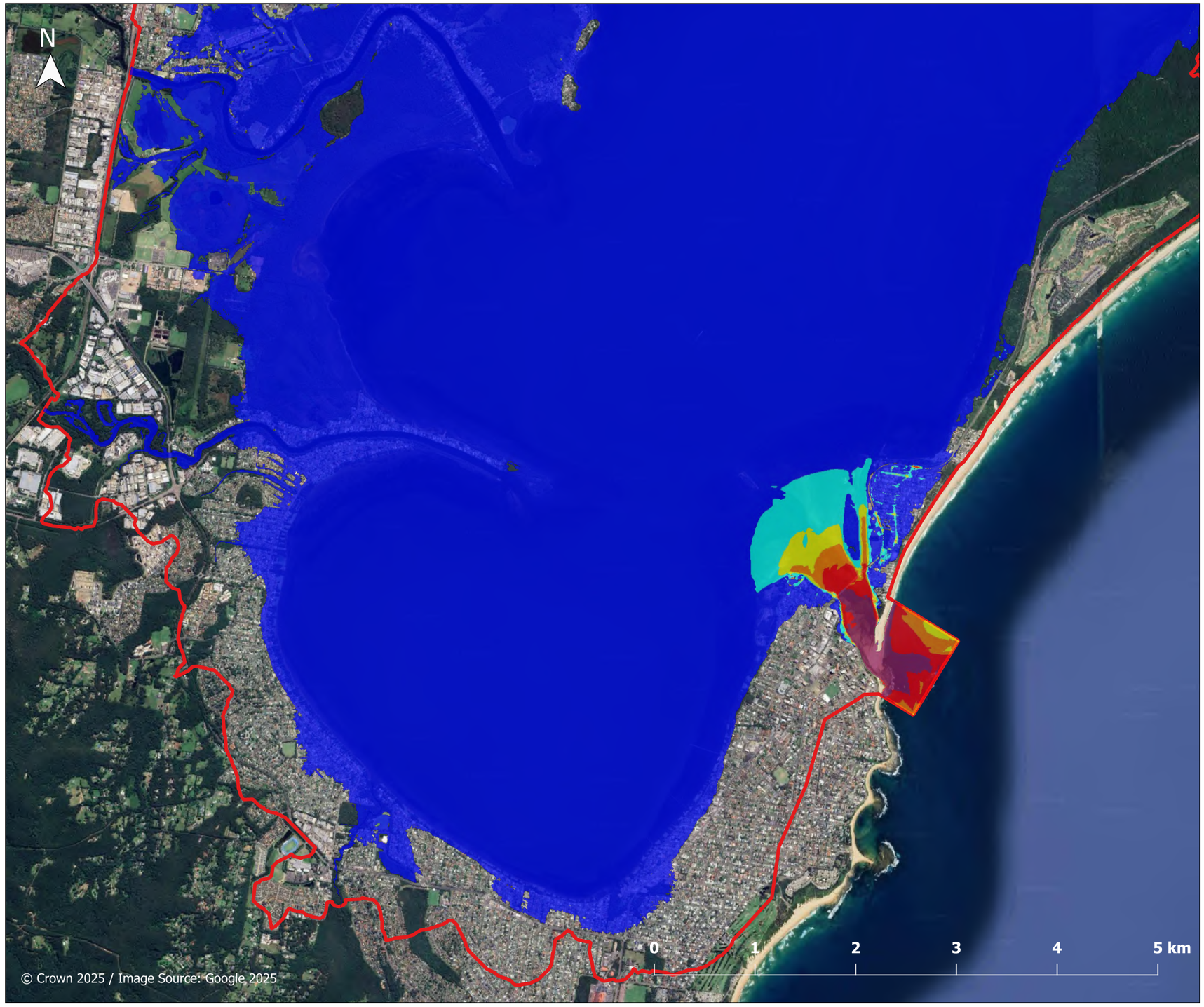

Figure C.2.7.A

1 in 500 AEP flood event - peak velocity

Legend

Model domain

Velocity (m/s)

- 0.00-0.25
- 0.25-0.50
- 0.50-0.75
- 0.75-1.00
- 1.00-1.50
- >1.50

Disclaimer:
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Figure C.2.7.B

1 in 500 AEP flood event - peak velocity

Legend

- Model domain

Velocity (m/s)

- 0.00-0.25
- 0.25-0.50
- 0.50-0.75
- 0.75-1.00
- 1.00-1.50
- >1.50

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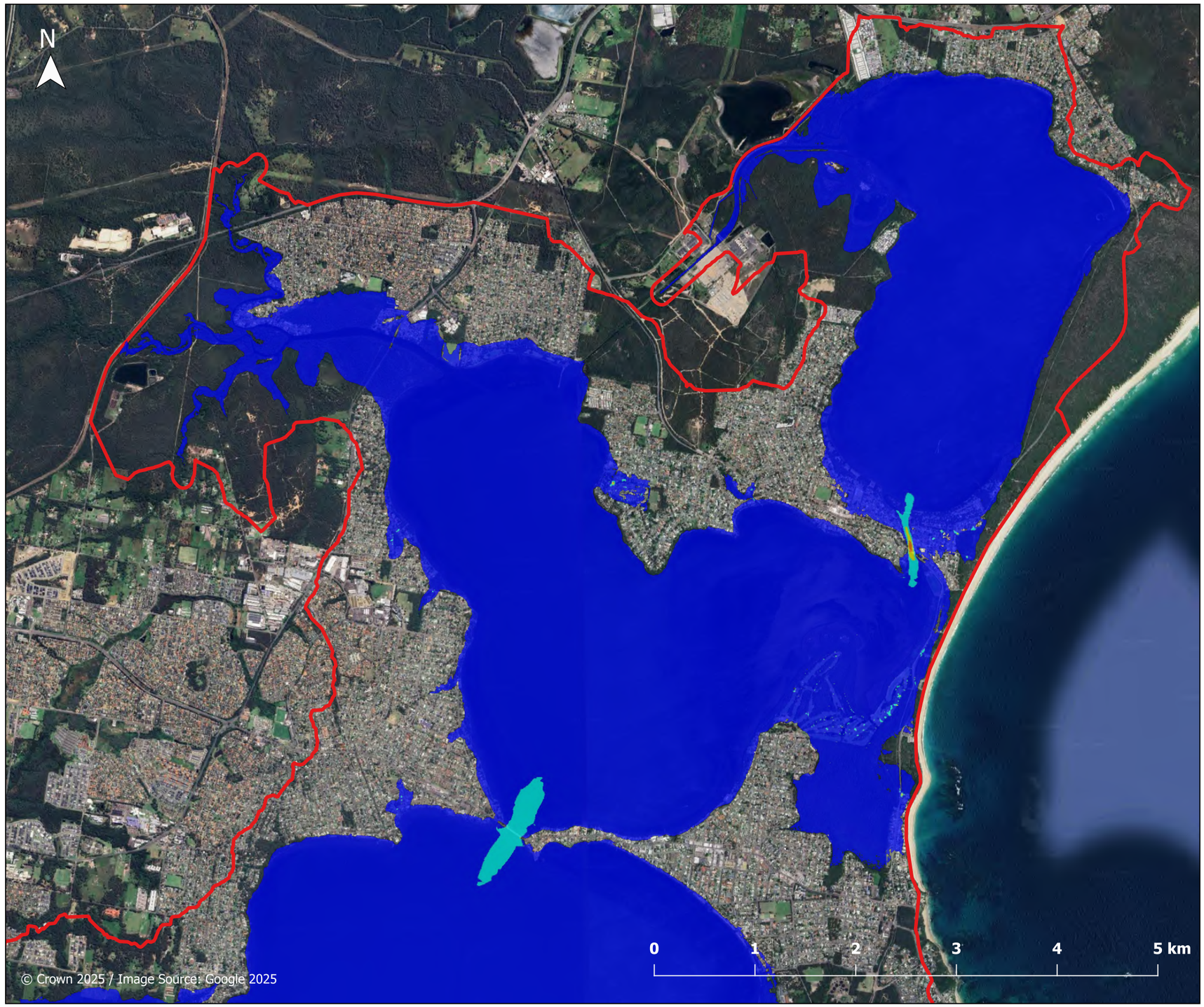

Figure C.2.7.C

1 in 500 AEP flood event - peak velocity

Legend

- Model domain

Velocity (m/s)

- 0.00-0.25
- 0.25-0.50
- 0.50-0.75
- 0.75-1.00
- 1.00-1.50
- >1.50

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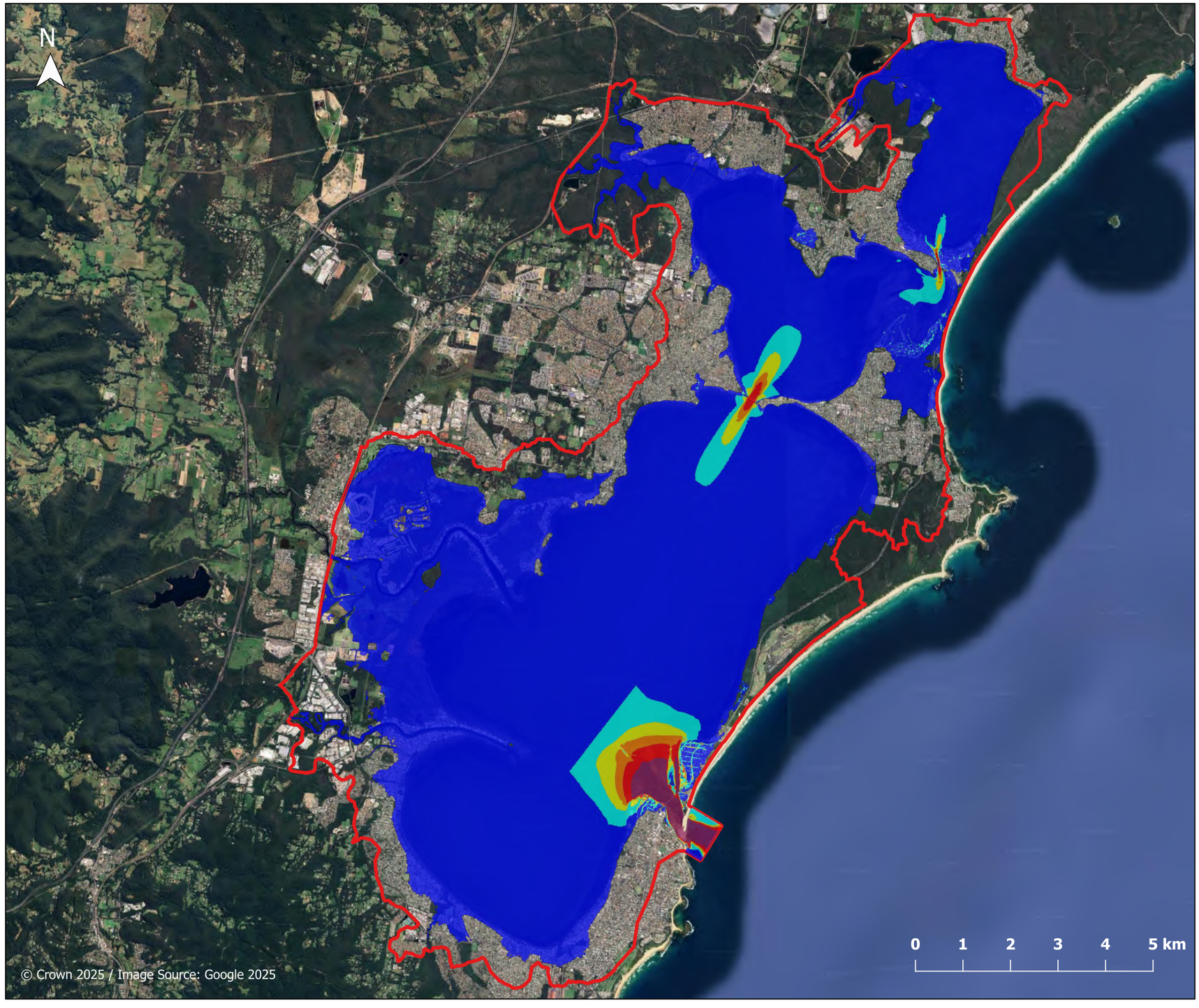

Figure C.2.8

PMF flood event - peak velocity

Legend

- Model domain

Velocity (m/s)

- 0.00-0.25
- 0.25-0.50
- 0.50-0.75
- 0.75-1.00
- 1.00-1.50
- >1.50

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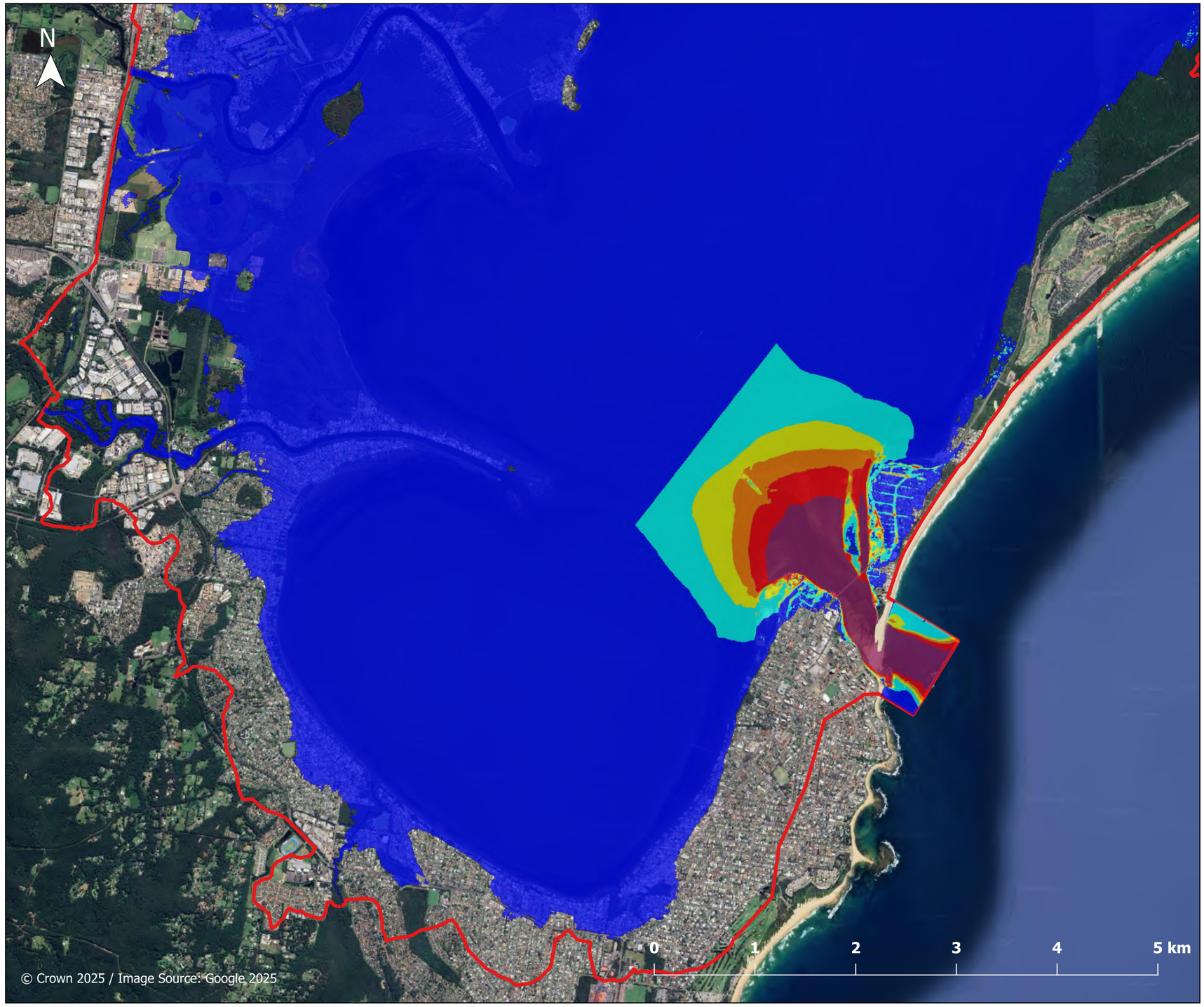

Figure C.2.8.A

PMF flood event - peak velocity

Legend

Model domain

Velocity (m/s)

- 0.00-0.25
- 0.25-0.50
- 0.50-0.75
- 0.75-1.00
- 1.00-1.50
- >1.50

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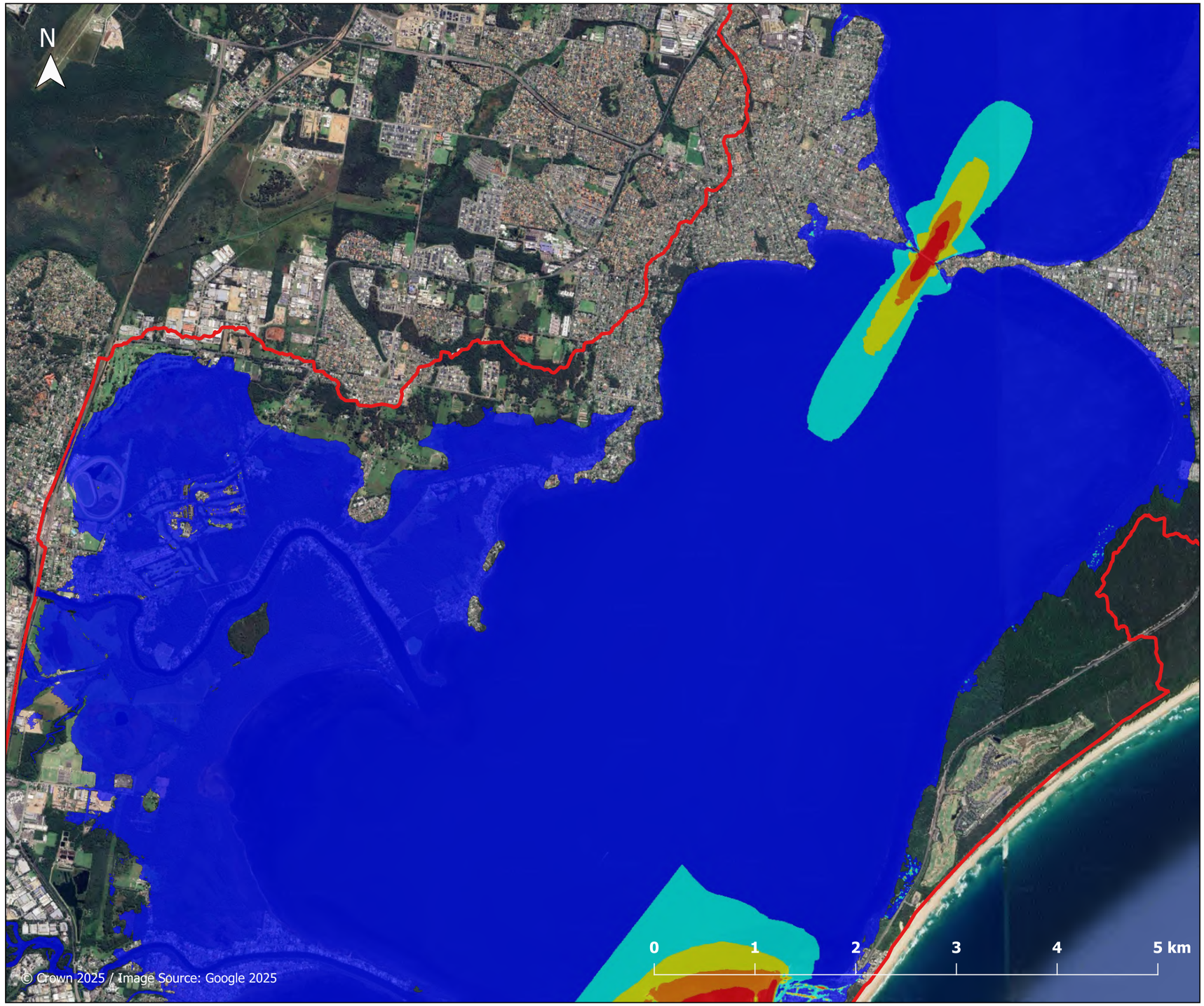

Figure C.2.8.B

PMF flood event - peak velocity

Legend

Model domain

Velocity (m/s)

- 0.00-0.25
- 0.25-0.50
- 0.50-0.75
- 0.75-1.00
- 1.00-1.50
- >1.50

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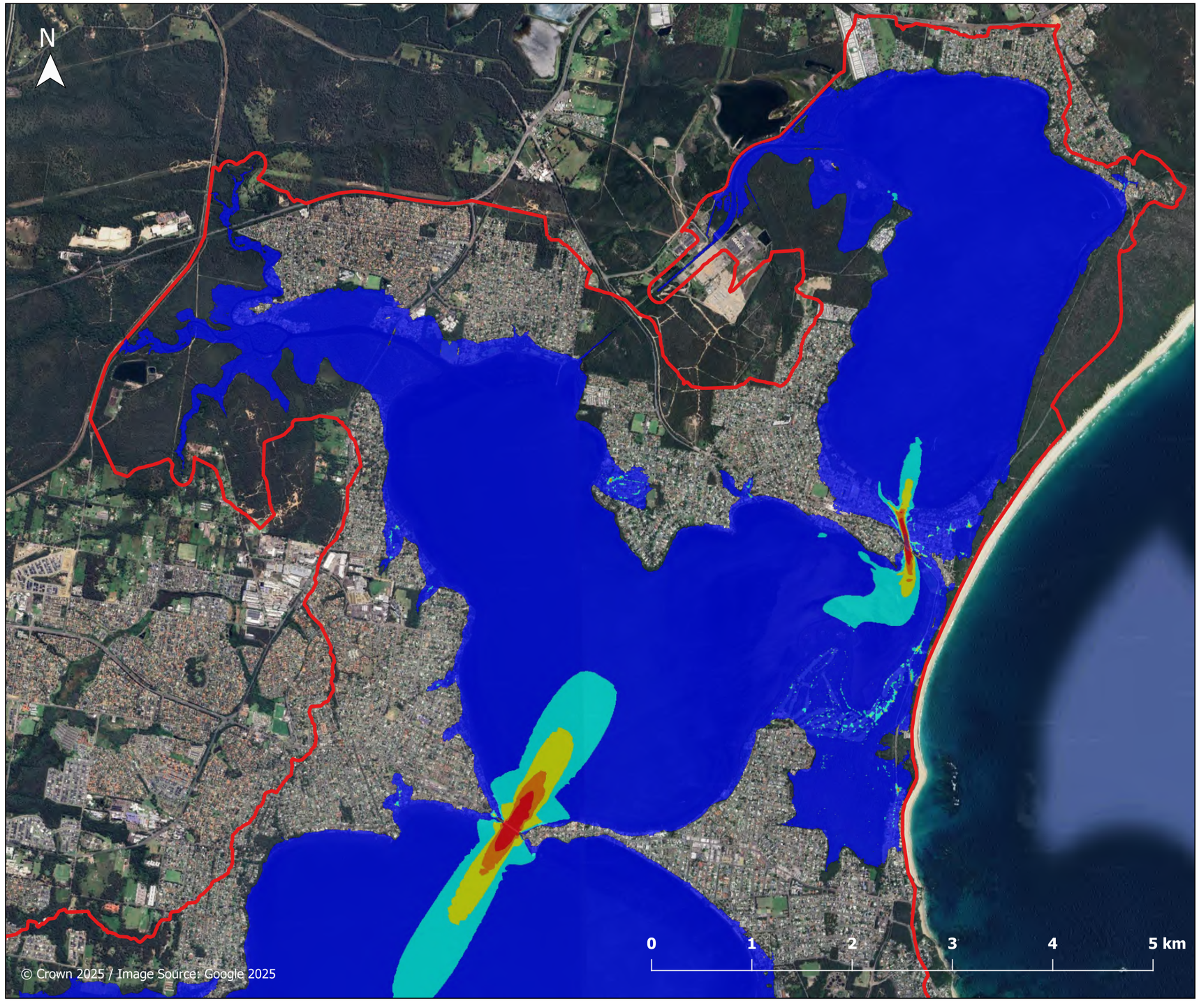

Figure C.2.8.C

PMF flood event - peak velocity

Legend

Model domain

Velocity (m/s)

- 0.00-0.25
- 0.25-0.50
- 0.50-0.75
- 0.75-1.00
- 1.00-1.50
- >1.50

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Appendix D Flood hazard maps

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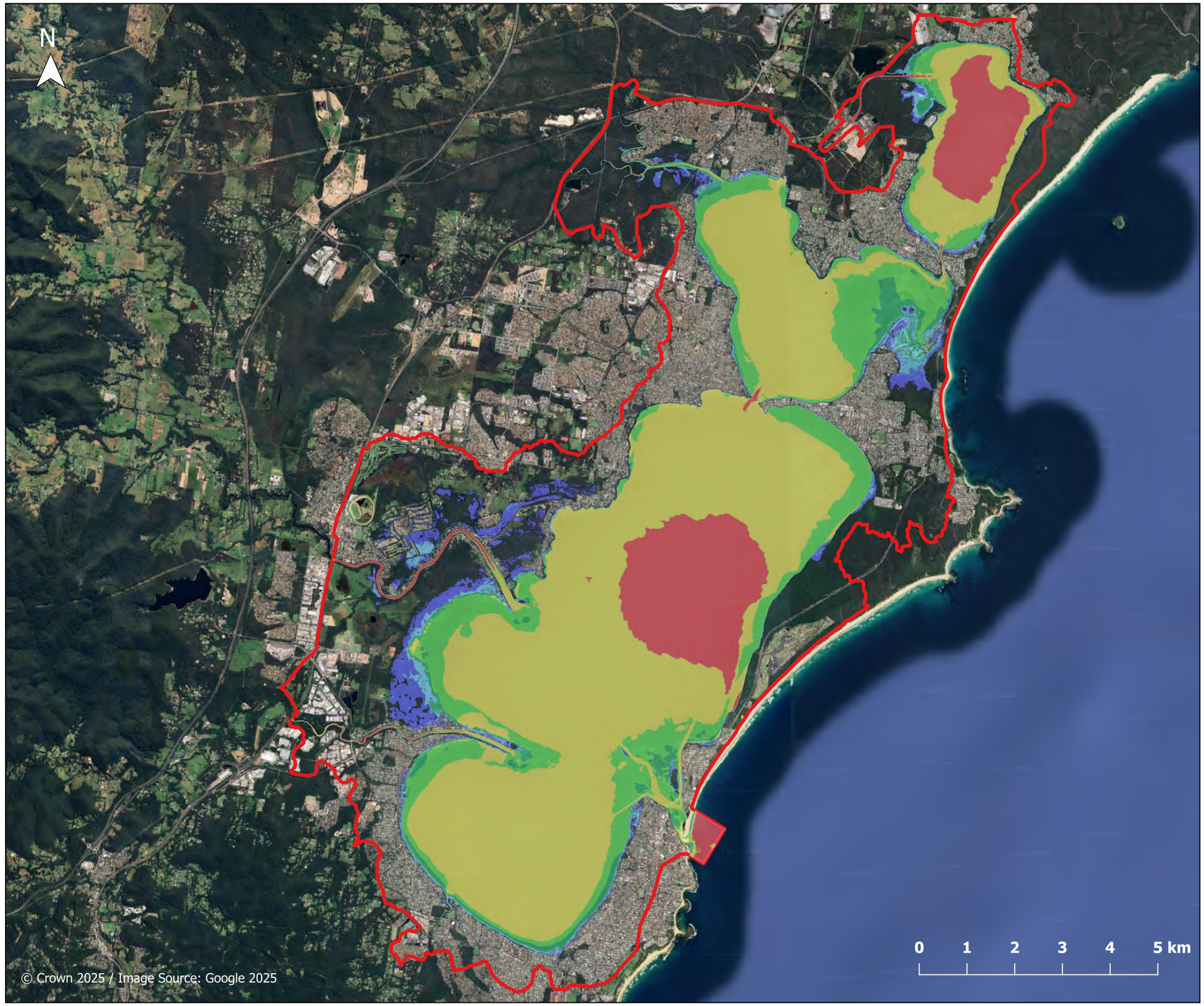

Figure D.1

20% AEP flood event - flood hazard

Legend

- Model domain

Flood hazard

- H1 - Generally safe for people, vehicles and buildings
- H2 - Unsage for small vehicles
- H3 - Unsafe for vehicles, children and elderly
- H4 - Unsafe for people and vehicles
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure

Disclaimer:
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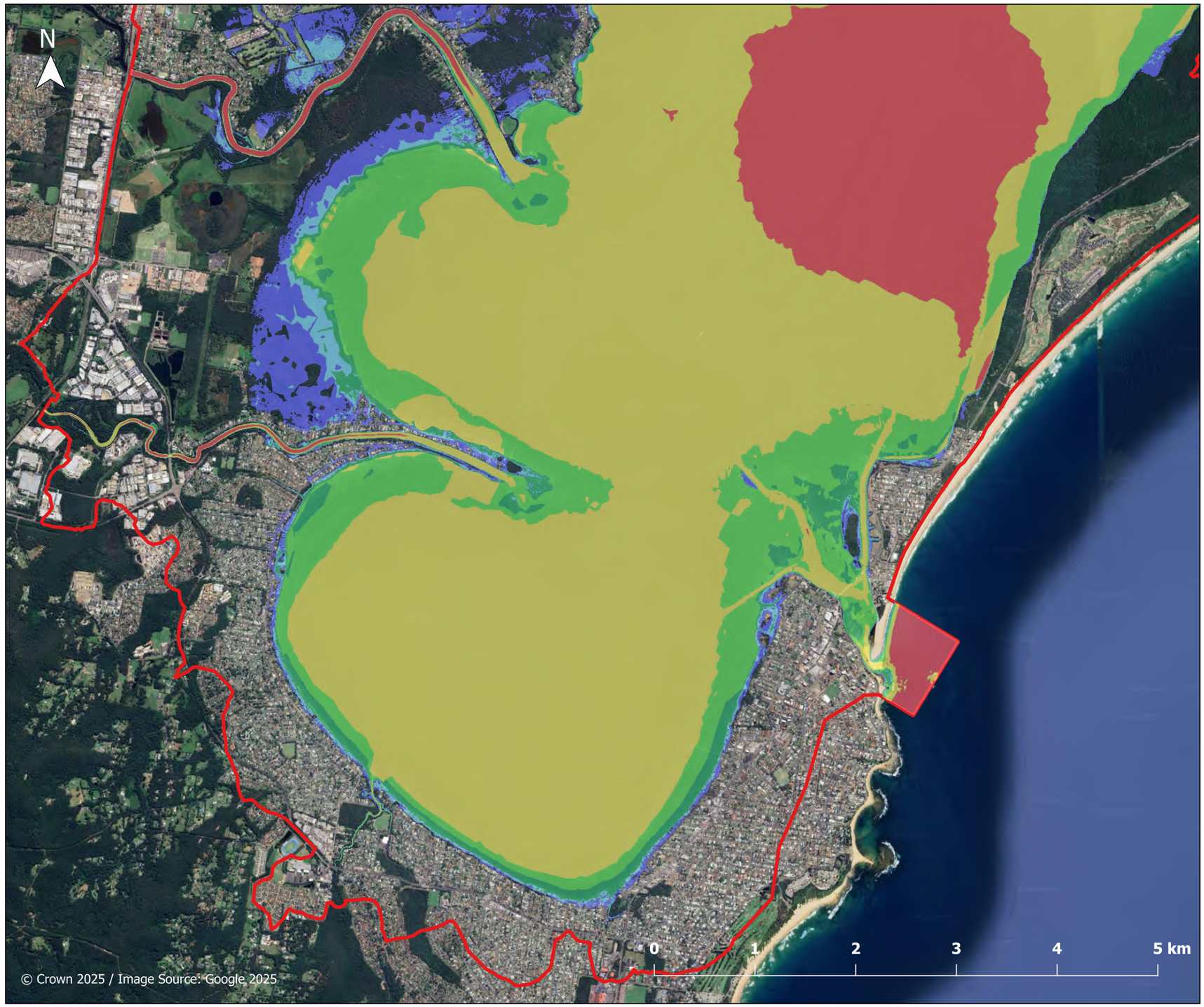

Figure D.1.A

20% AEP flood event - flood hazard

Legend

- Model domain

Flood hazard

- H1 - Generally safe for people, vehicles and buildings
- H2 - Unsage for small vehicles
- H3 - Unsafe for vehicles, children and elderly
- H4 - Unsafe for people and vehicles
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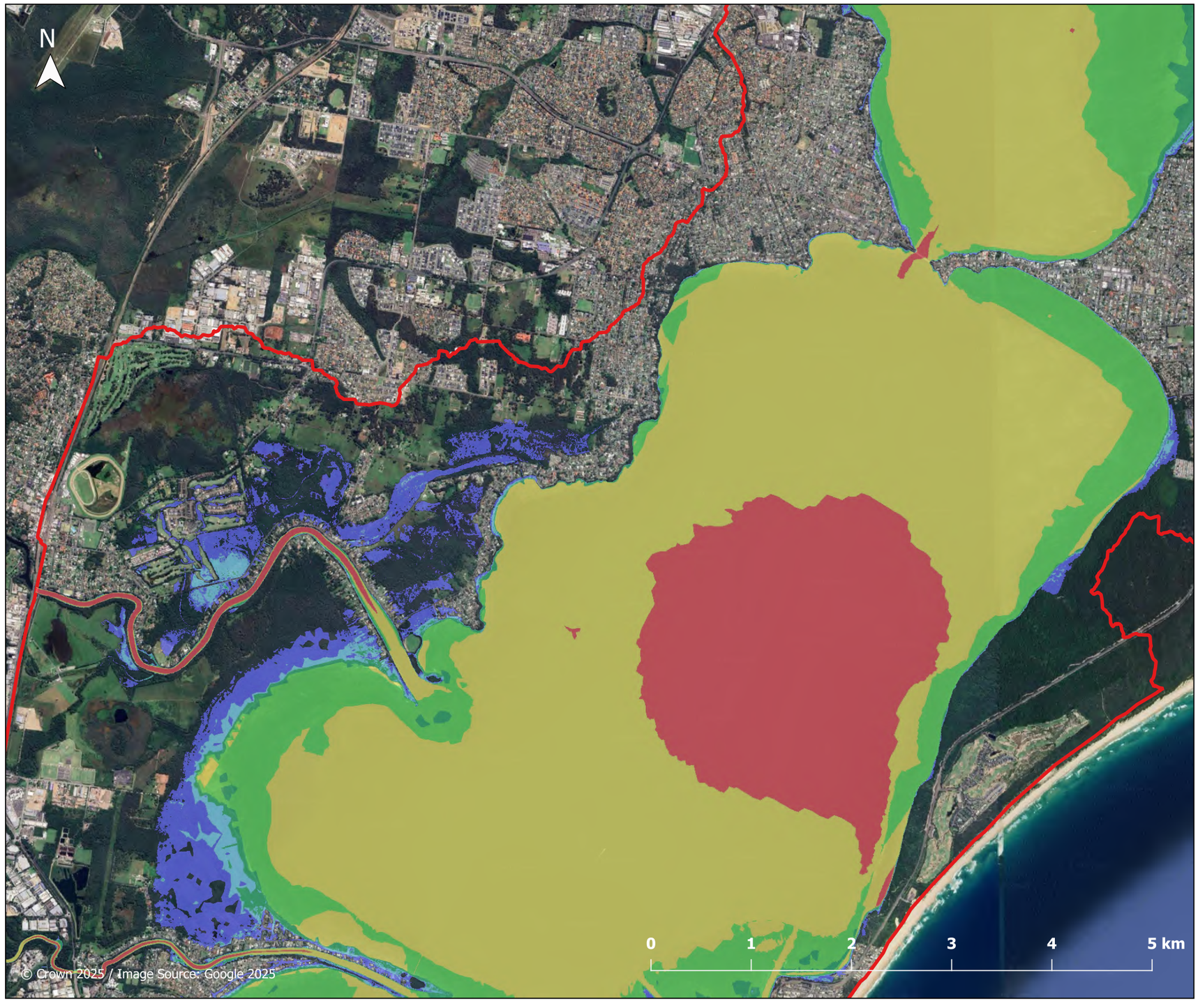

Figure D.1.B

20% AEP flood event - flood hazard

Legend

- Model domain

Flood hazard

- H1 - Generally safe for people, vehicles and buildings
- H2 - Unsage for small vehicles
- H3 - Unsafe for vehicles, children and elderly
- H4 - Unsafe for people and vehicles
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage
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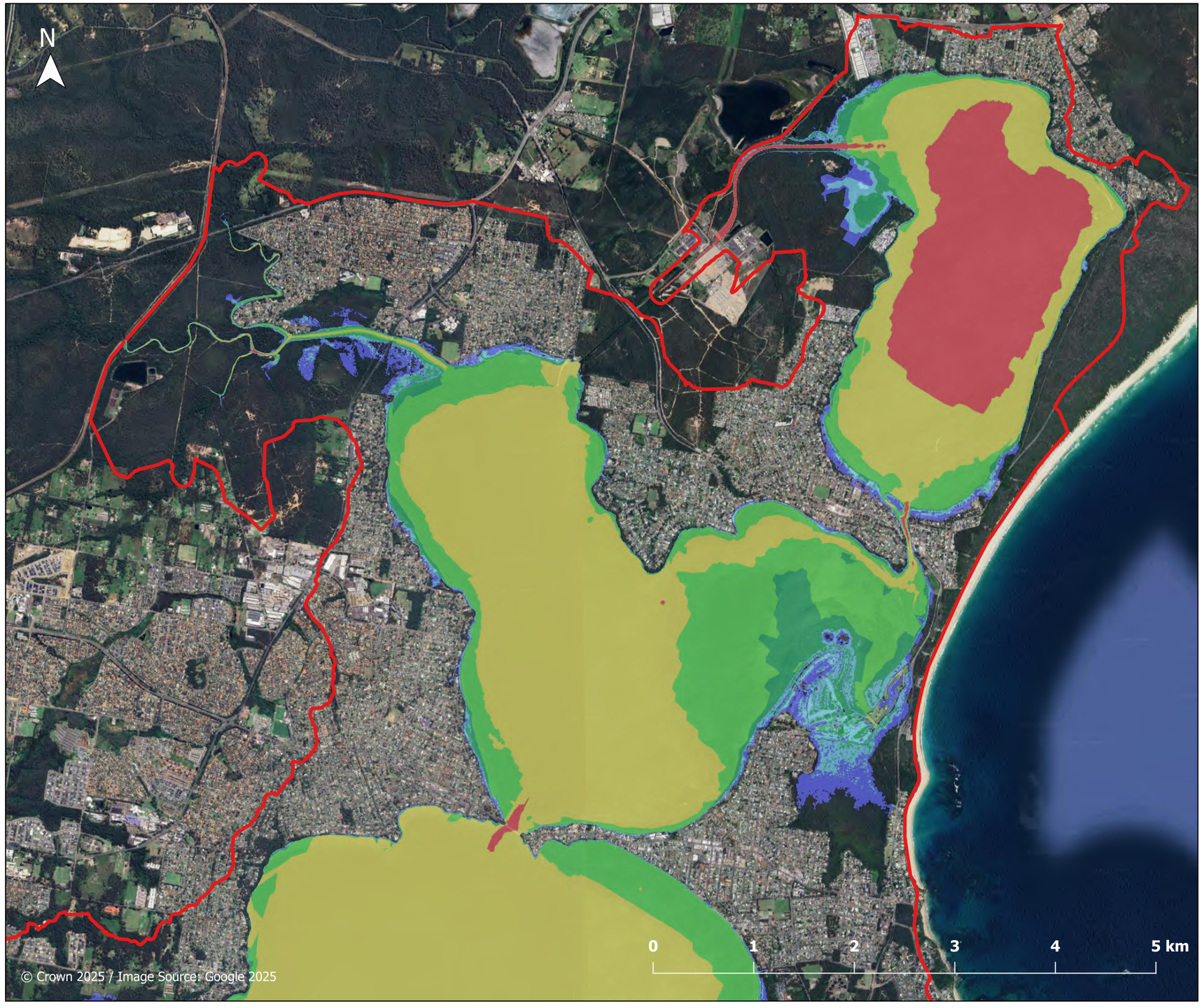

Figure D.1.C

20% AEP flood event - flood hazard

Legend

- Model domain

Flood hazard

- H1 - Generally safe for people, vehicles and buildings
- H2 - Unsage for small vehicles
- H3 - Unsafe for vehicles, children and elderly
- H4 - Unsafe for people and vehicles
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage
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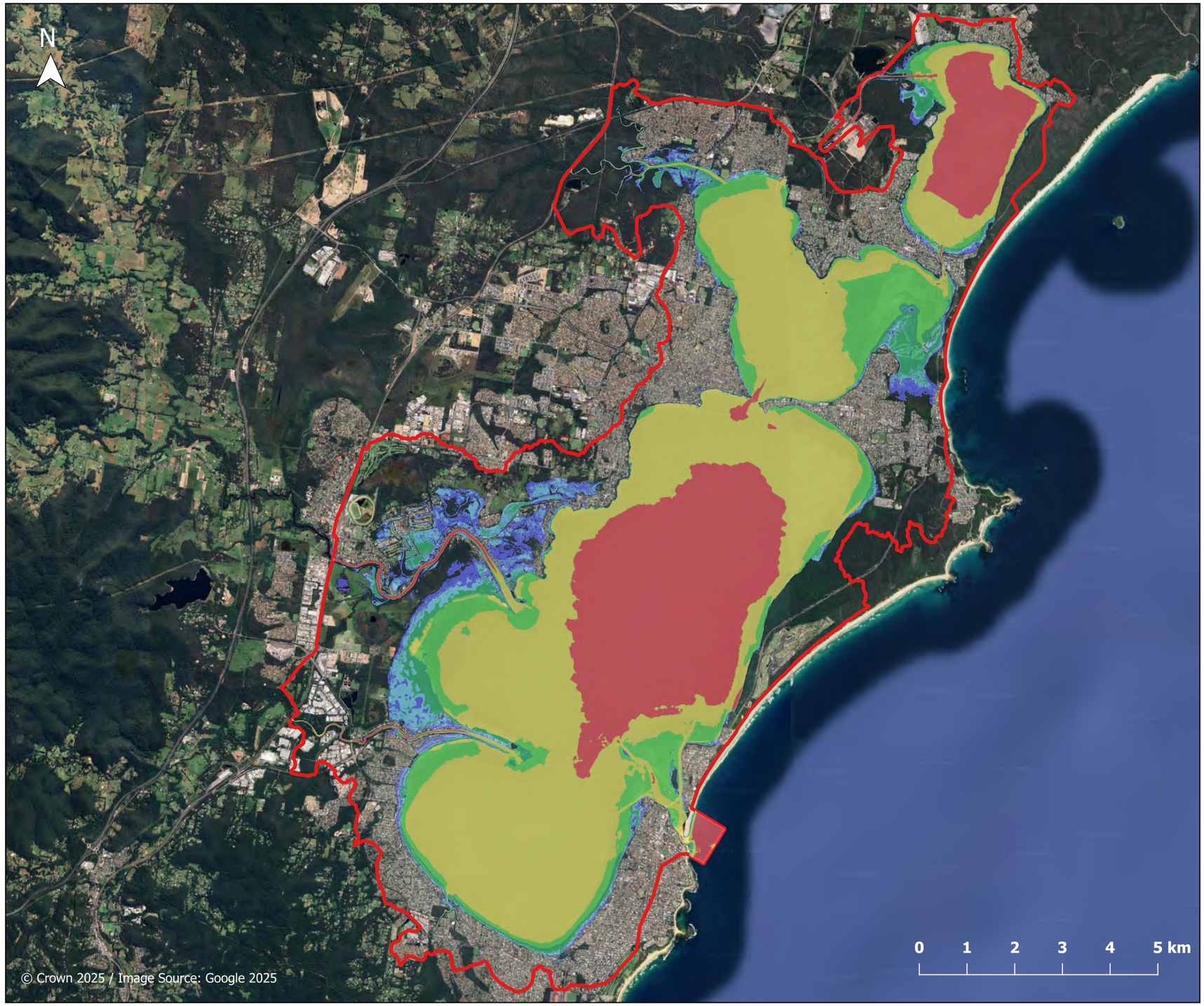

Figure D.2

10% AEP flood event - flood hazard

Legend

- Model domain

Flood hazard

- H1 - Generally safe for people, vehicles and buildings
- H2 - Unsage for small vehicles
- H3 - Unsafe for vehicles, children and elderly
- H4 - Unsafe for people and vehicles
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage
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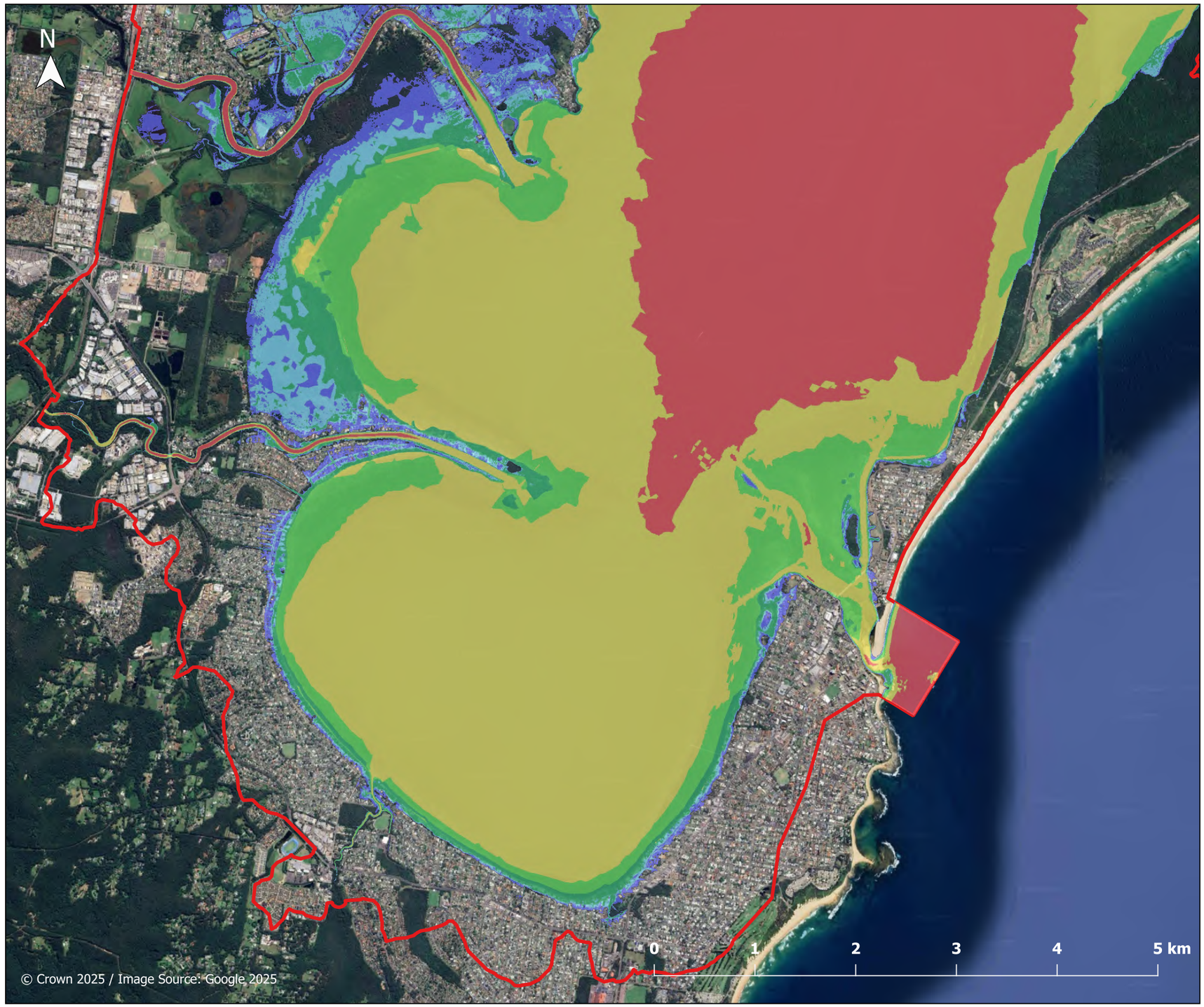

Figure D.2.A

10% AEP flood event - flood hazard

Legend

- Model domain

Flood hazard

- H1 - Generally safe for people, vehicles and buildings
- H2 - Unsage for small vehicles
- H3 - Unsafe for vehicles, children and elderly
- H4 - Unsafe for people and vehicles
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage
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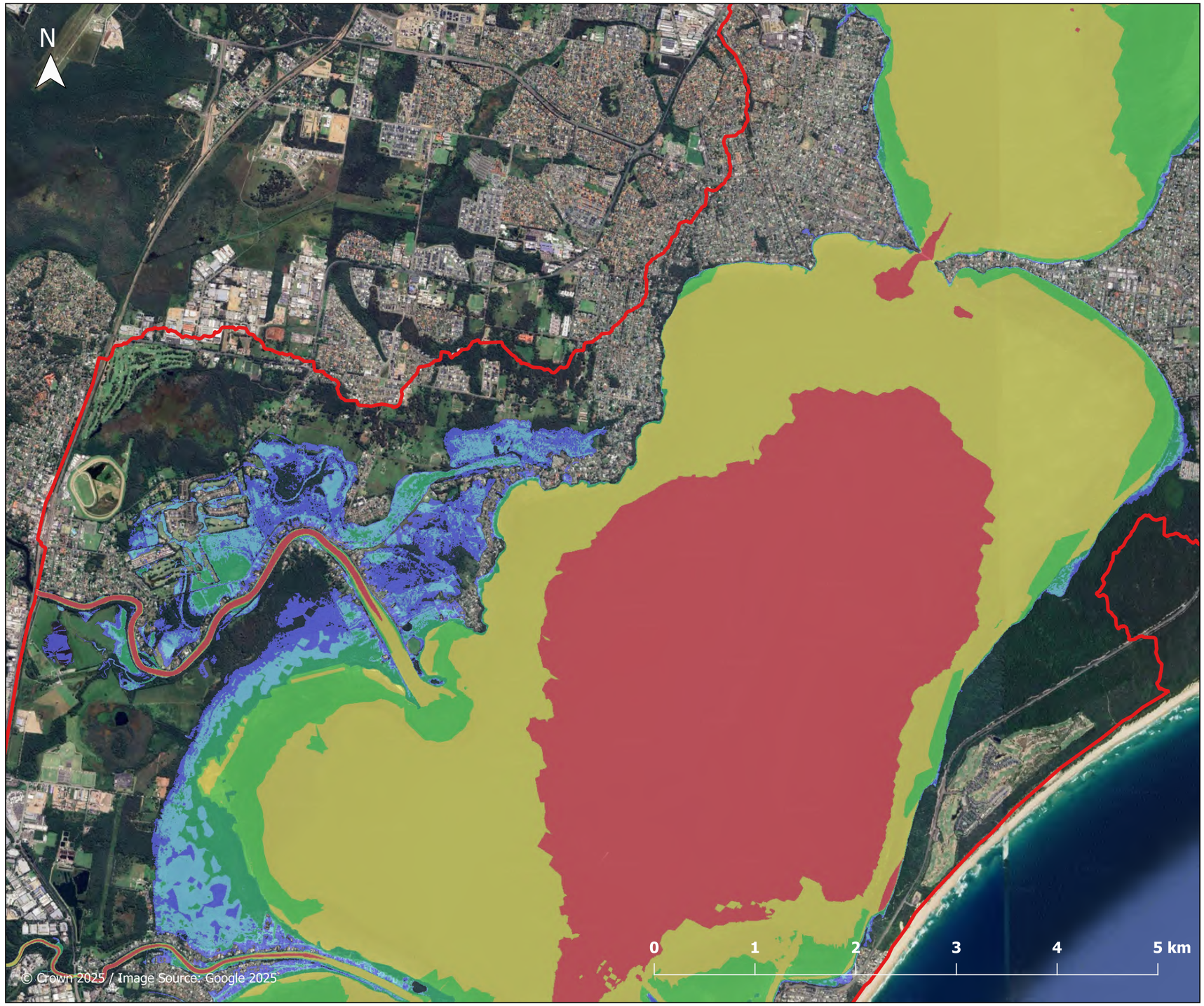

Figure D.2.B

10% AEP flood event - flood hazard

Legend

- Model domain

Flood hazard

- H1 - Generally safe for people, vehicles and buildings
- H2 - Unsage for small vehicles
- H3 - Unsafe for vehicles, children and elderly
- H4 - Unsafe for people and vehicles
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage
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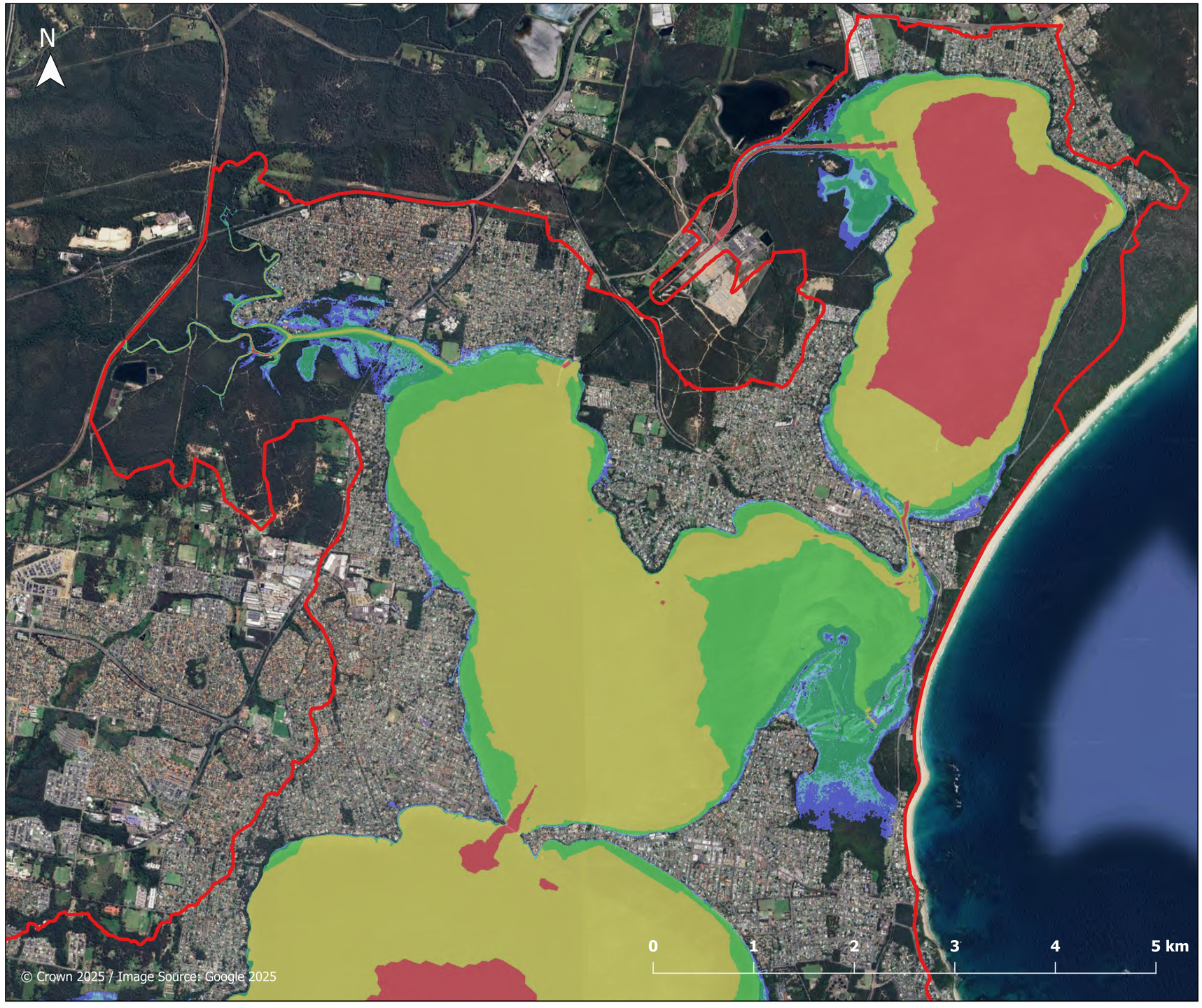

Figure D.2.C

10% AEP flood event - flood hazard

Legend

- Model domain

Flood hazard

- H1 - Generally safe for people, vehicles and buildings
- H2 - Unsage for small vehicles
- H3 - Unsafe for vehicles, children and elderly
- H4 - Unsafe for people and vehicles
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage
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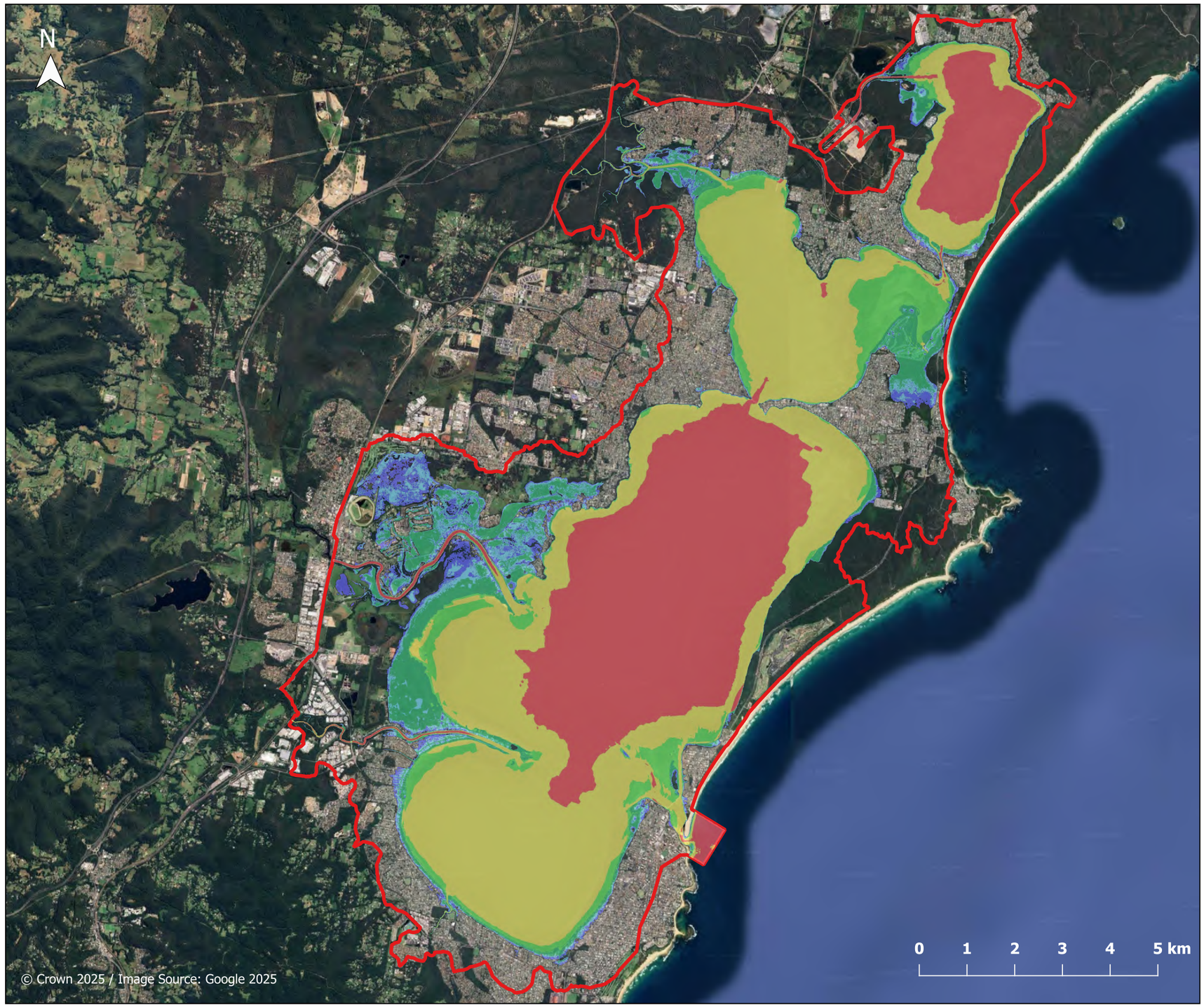

Figure D.3

5% AEP flood event - flood hazard

Legend

- Model domain

Flood hazard

- H1 - Generally safe for people, vehicles and buildings
- H2 - Unsage for small vehicles
- H3 - Unsafe for vehicles, children and elderly
- H4 - Unsafe for people and vehicles
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure

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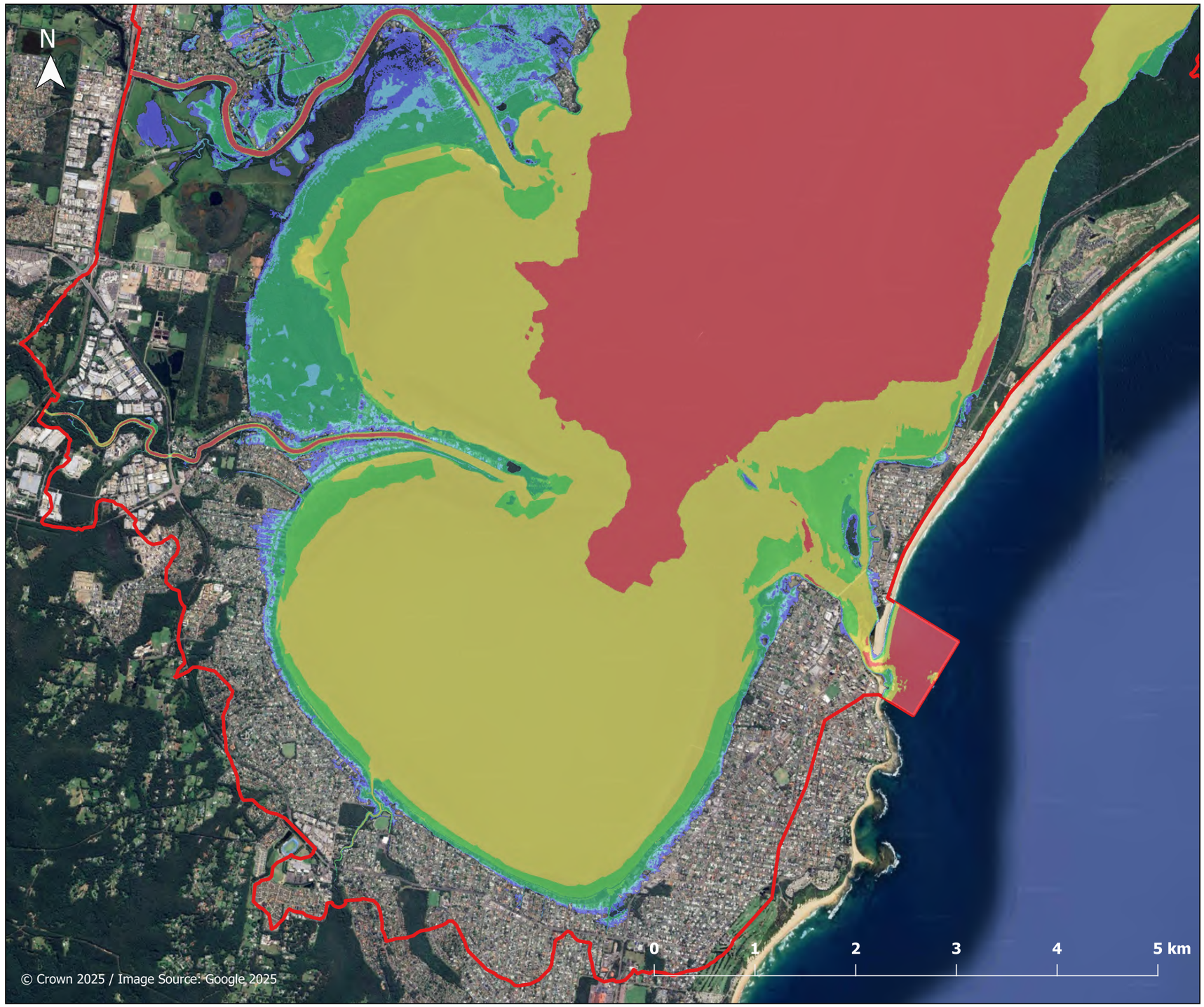

Figure D.3.A

5% AEP flood event - flood hazard

Legend

- Model domain

Flood hazard

- H1 - Generally safe for people, vehicles and buildings
- H2 - Unsage for small vehicles
- H3 - Unsafe for vehicles, children and elderly
- H4 - Unsafe for people and vehicles
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage
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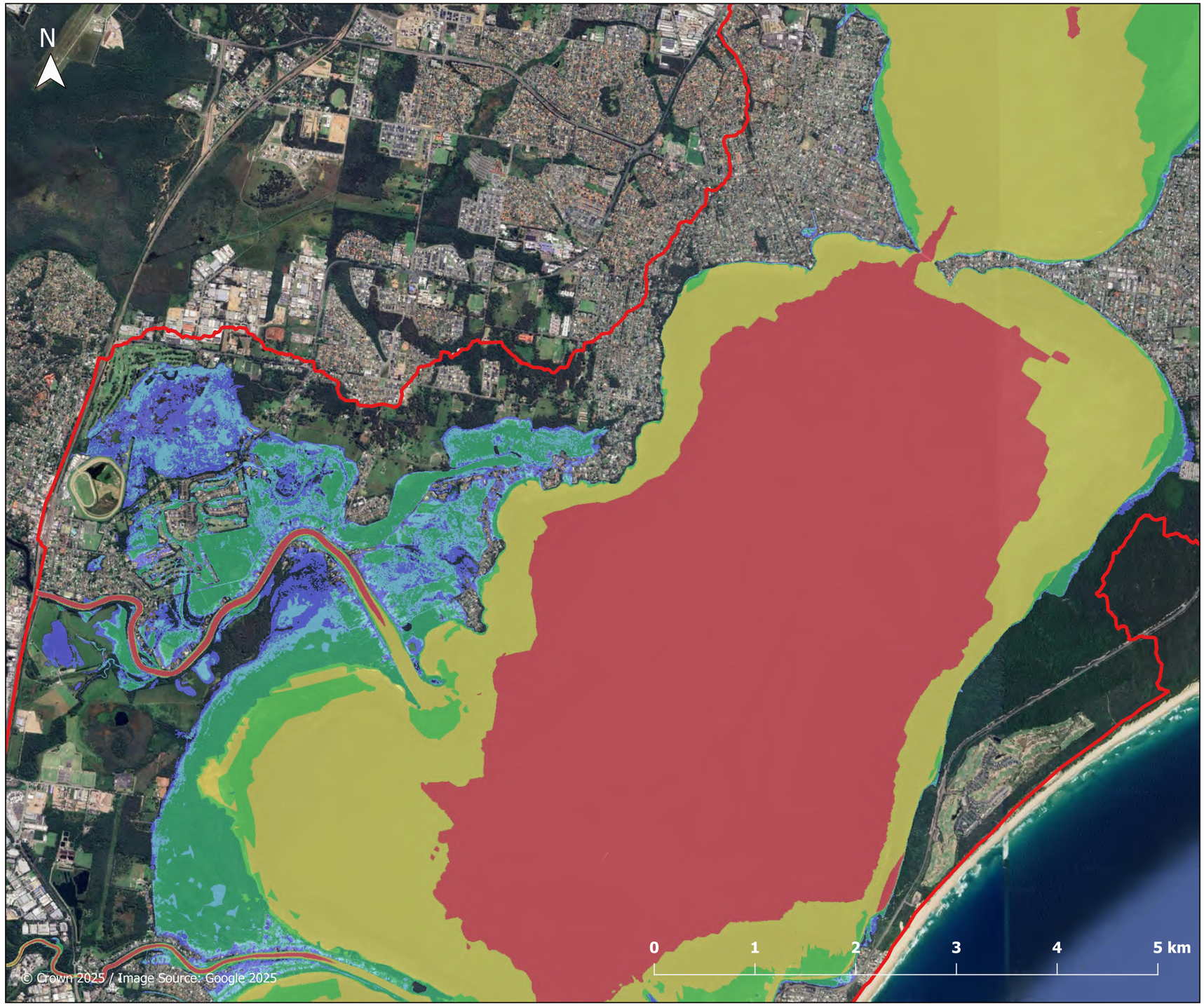

Figure D.3.B

5% AEP flood event - flood hazard

Legend

- Model domain

Flood hazard

- H1 - Generally safe for people, vehicles and buildings
- H2 - Unsage for small vehicles
- H3 - Unsafe for vehicles, children and elderly
- H4 - Unsafe for people and vehicles
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure

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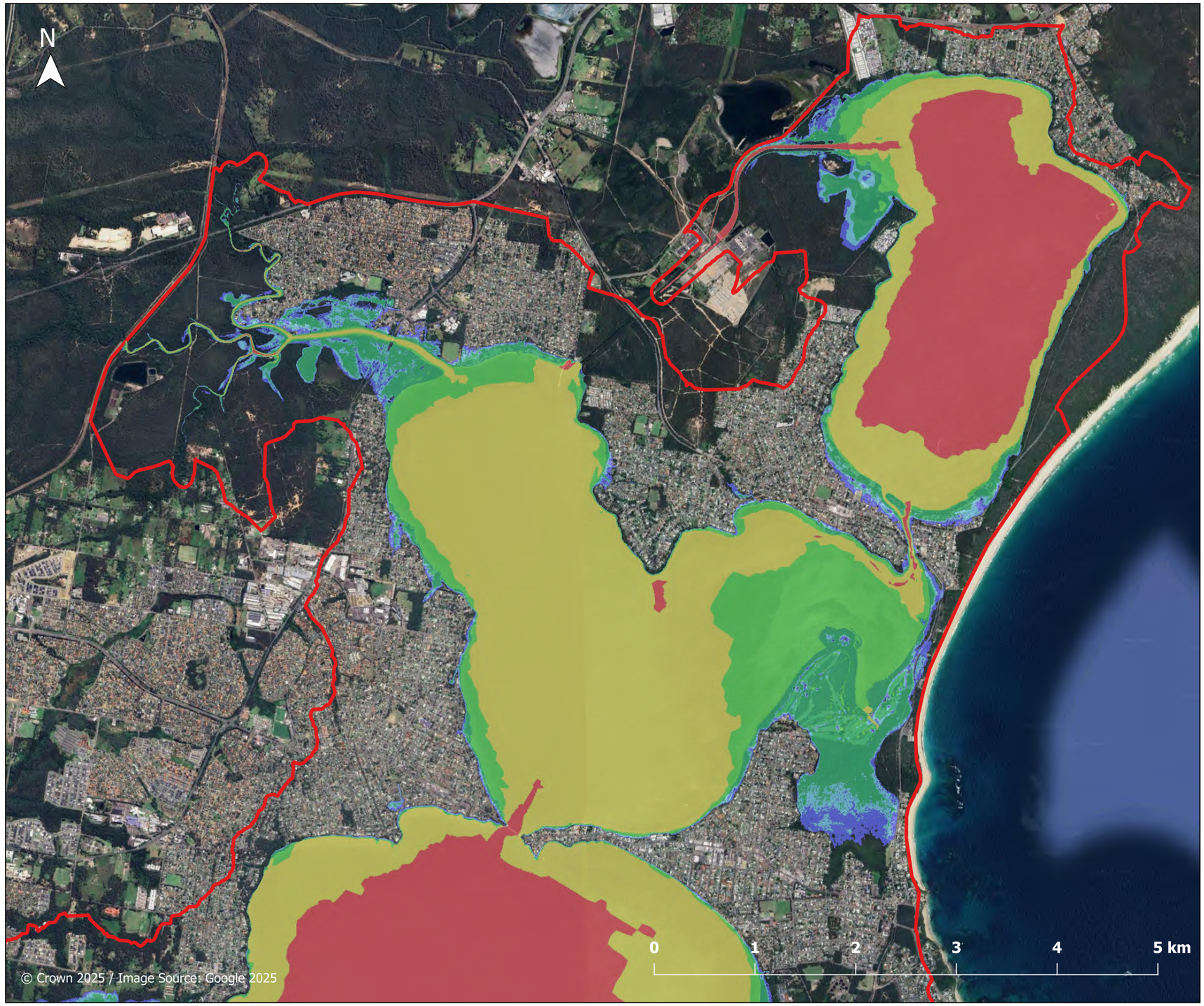

Figure D.3.C

5% AEP flood event - flood hazard

Legend

- Model domain

Flood hazard

- H1 - Generally safe for people, vehicles and buildings
- H2 - Unsage for small vehicles
- H3 - Unsafe for vehicles, children and elderly
- H4 - Unsafe for people and vehicles
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage
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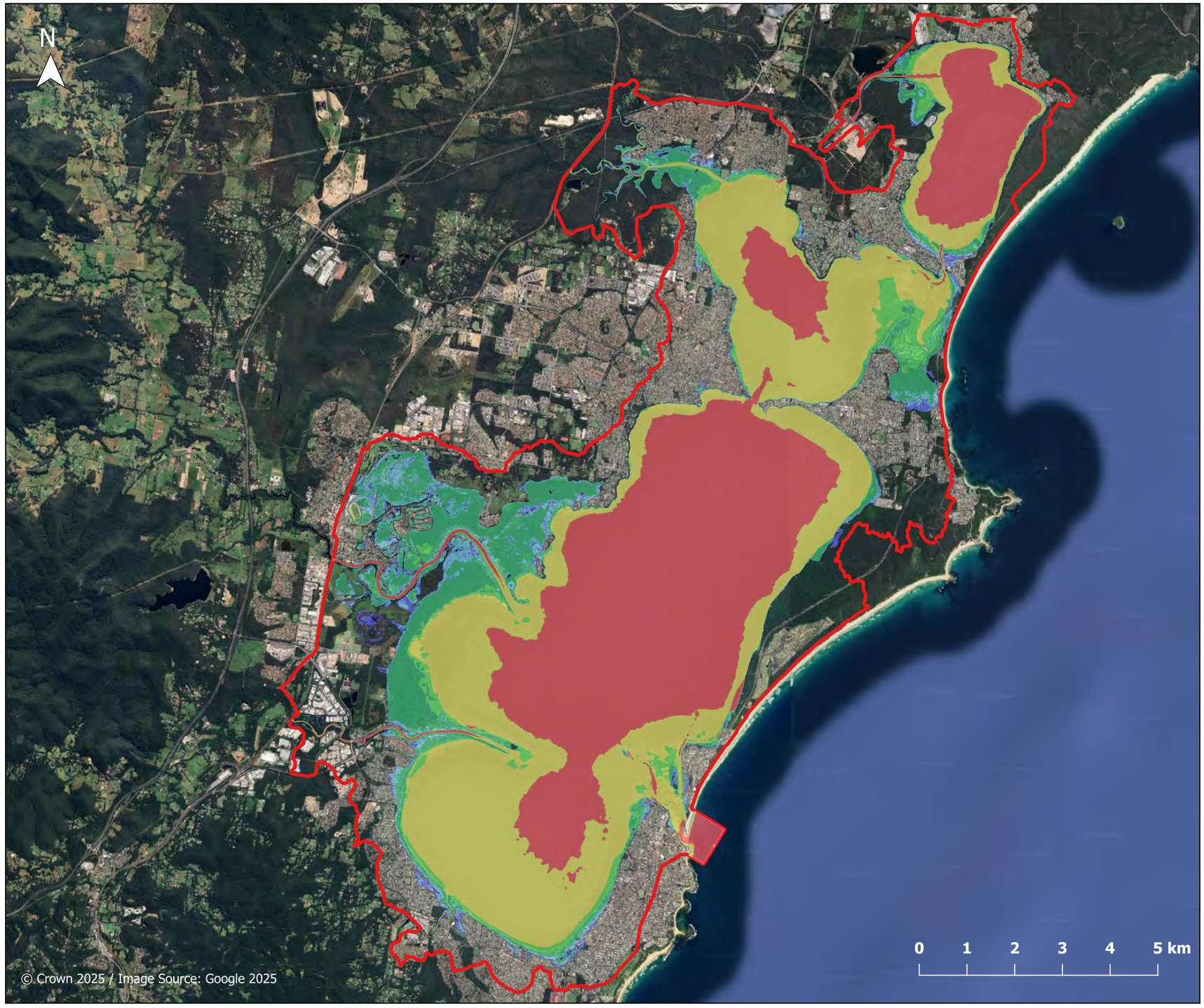

Figure D.4

2% AEP flood event - flood hazard

Legend

- Model domain

Flood hazard

- H1 - Generally safe for people, vehicles and buildings
- H2 - Unsage for small vehicles
- H3 - Unsafe for vehicles, children and elderly
- H4 - Unsafe for people and vehicles
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage
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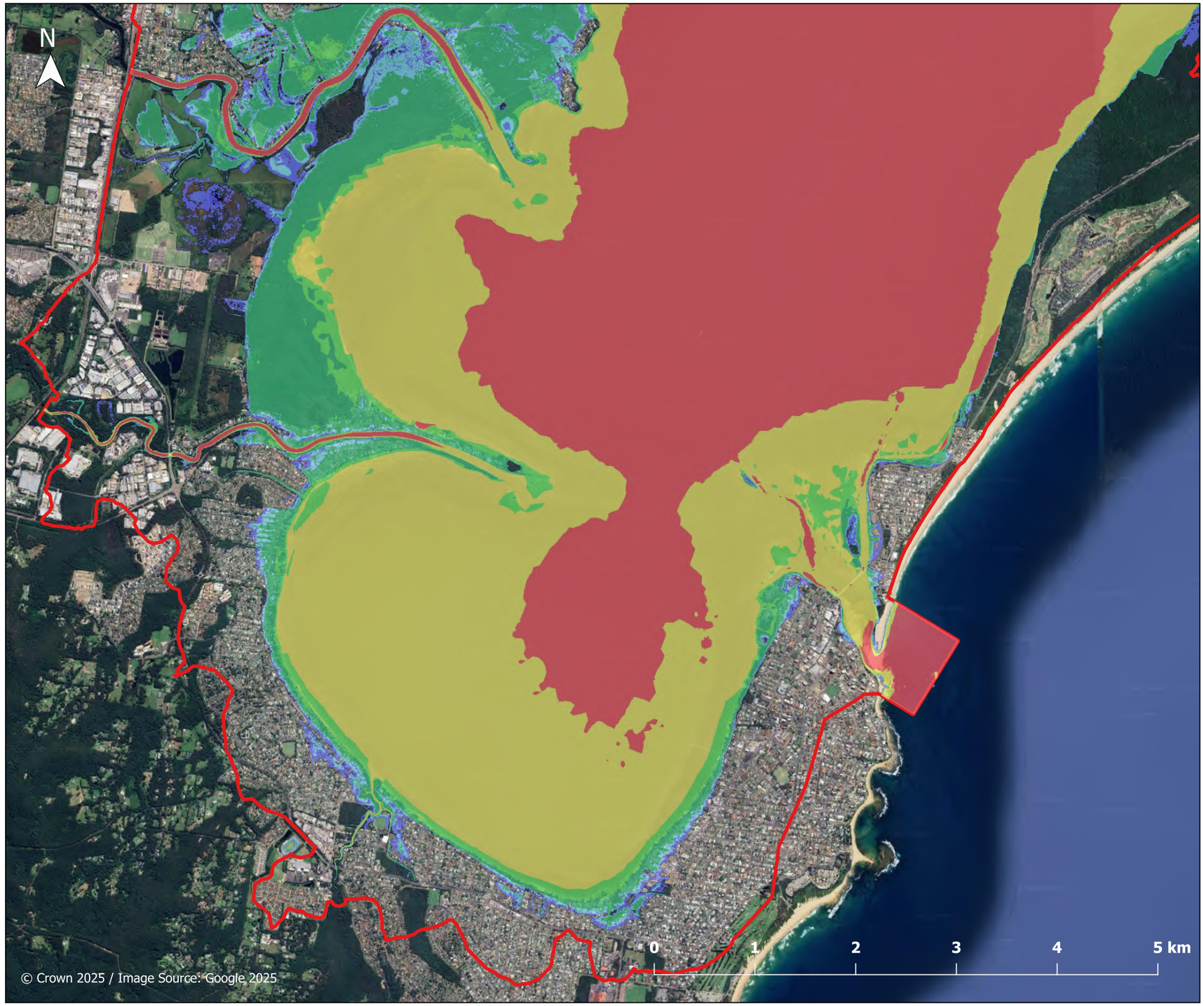

Figure D.4.A

2% AEP flood event - flood hazard

Legend

- Model domain

Flood hazard

- H1 - Generally safe for people, vehicles and buildings
- H2 - Unsage for small vehicles
- H3 - Unsafe for vehicles, children and elderly
- H4 - Unsafe for people and vehicles
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage
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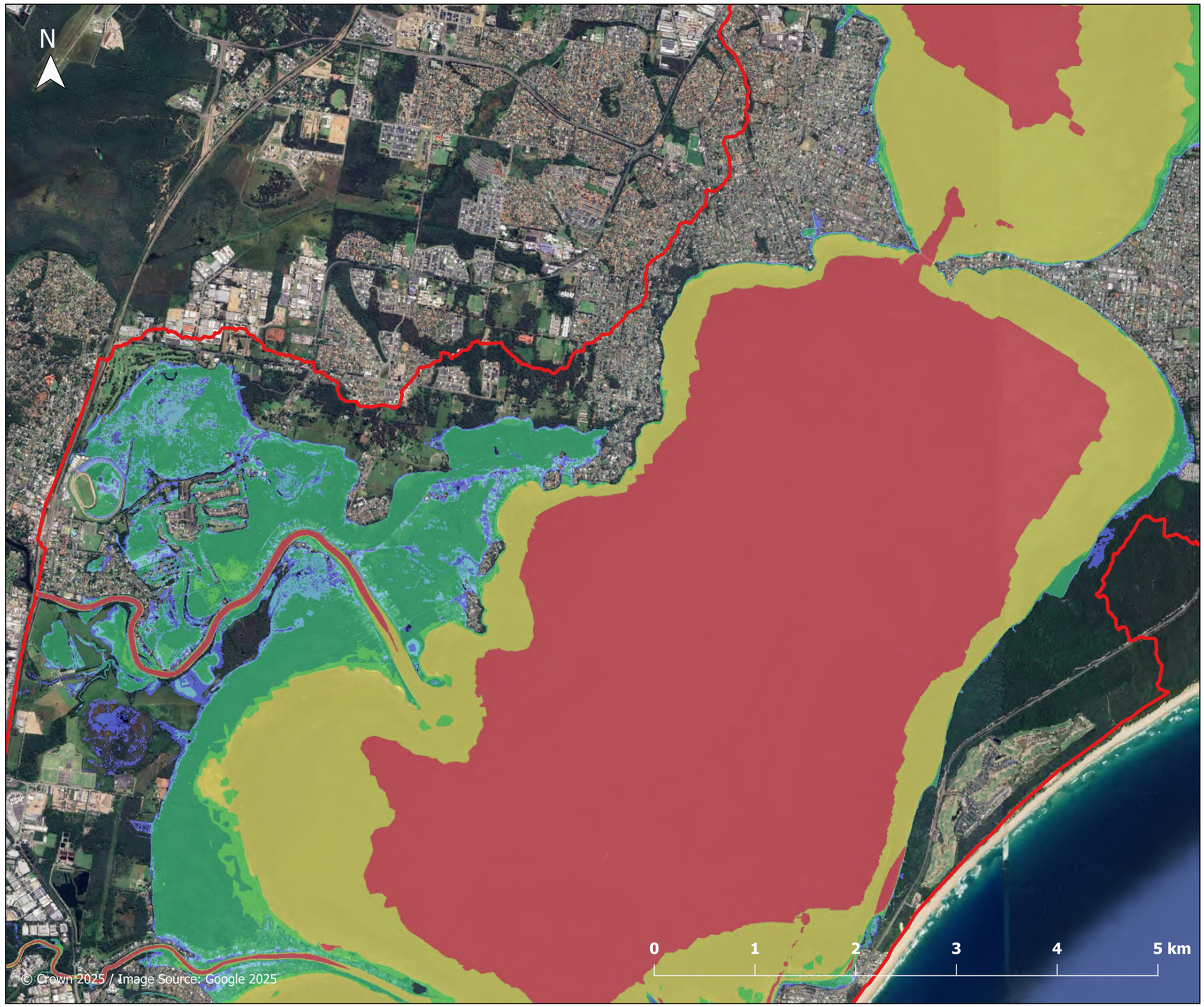

Figure D.4.B

2% AEP flood event - flood hazard

Legend

- Model domain

Flood hazard

- H1 - Generally safe for people, vehicles and buildings
- H2 - Unsage for small vehicles
- H3 - Unsafe for vehicles, children and elderly
- H4 - Unsafe for people and vehicles
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage
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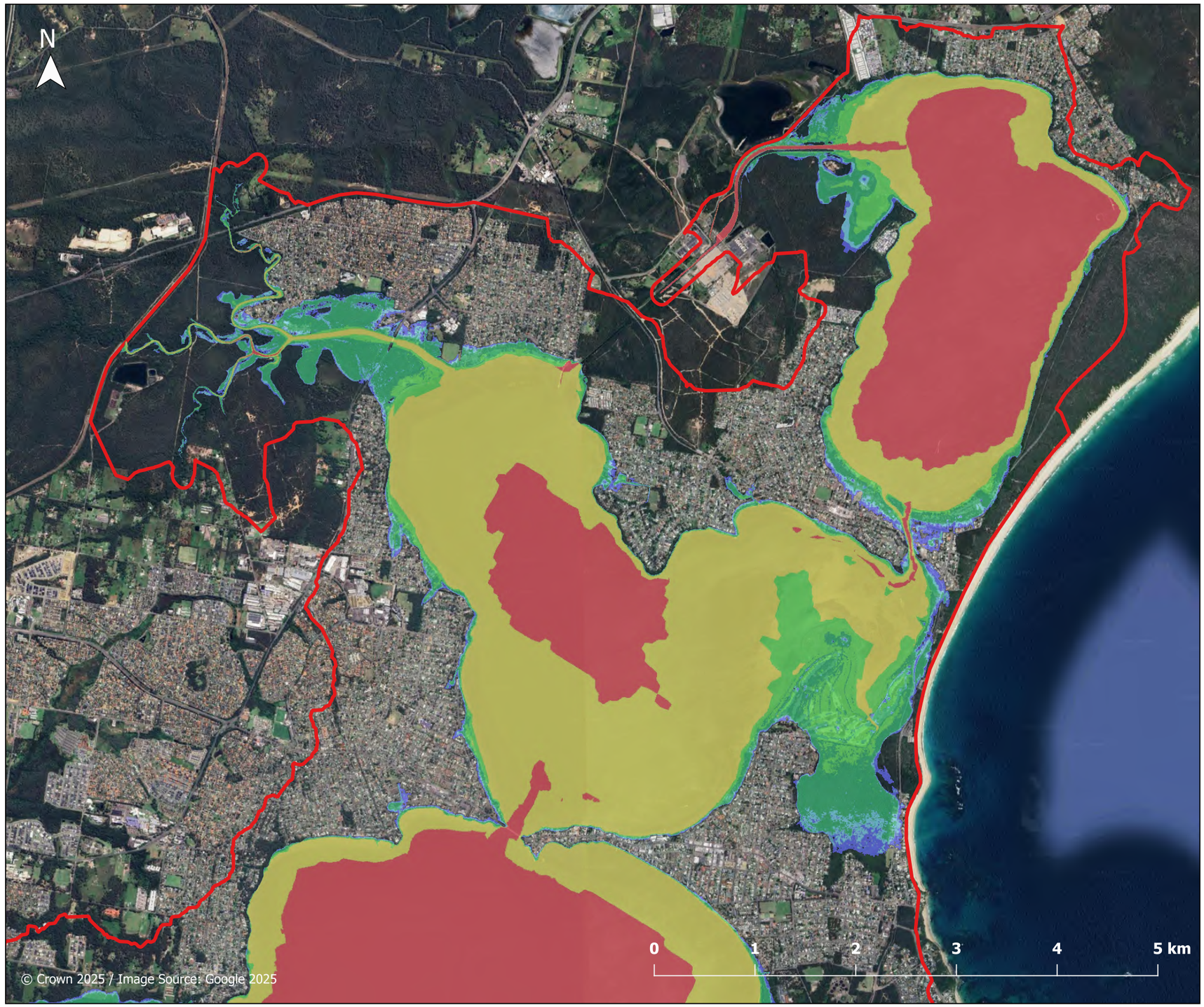

Figure D.4.C

2% AEP flood event - flood hazard

Legend

- Model domain

Flood hazard

- H1 - Generally safe for people, vehicles and buildings
- H2 - Unsage for small vehicles
- H3 - Unsafe for vehicles, children and elderly
- H4 - Unsafe for people and vehicles
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage
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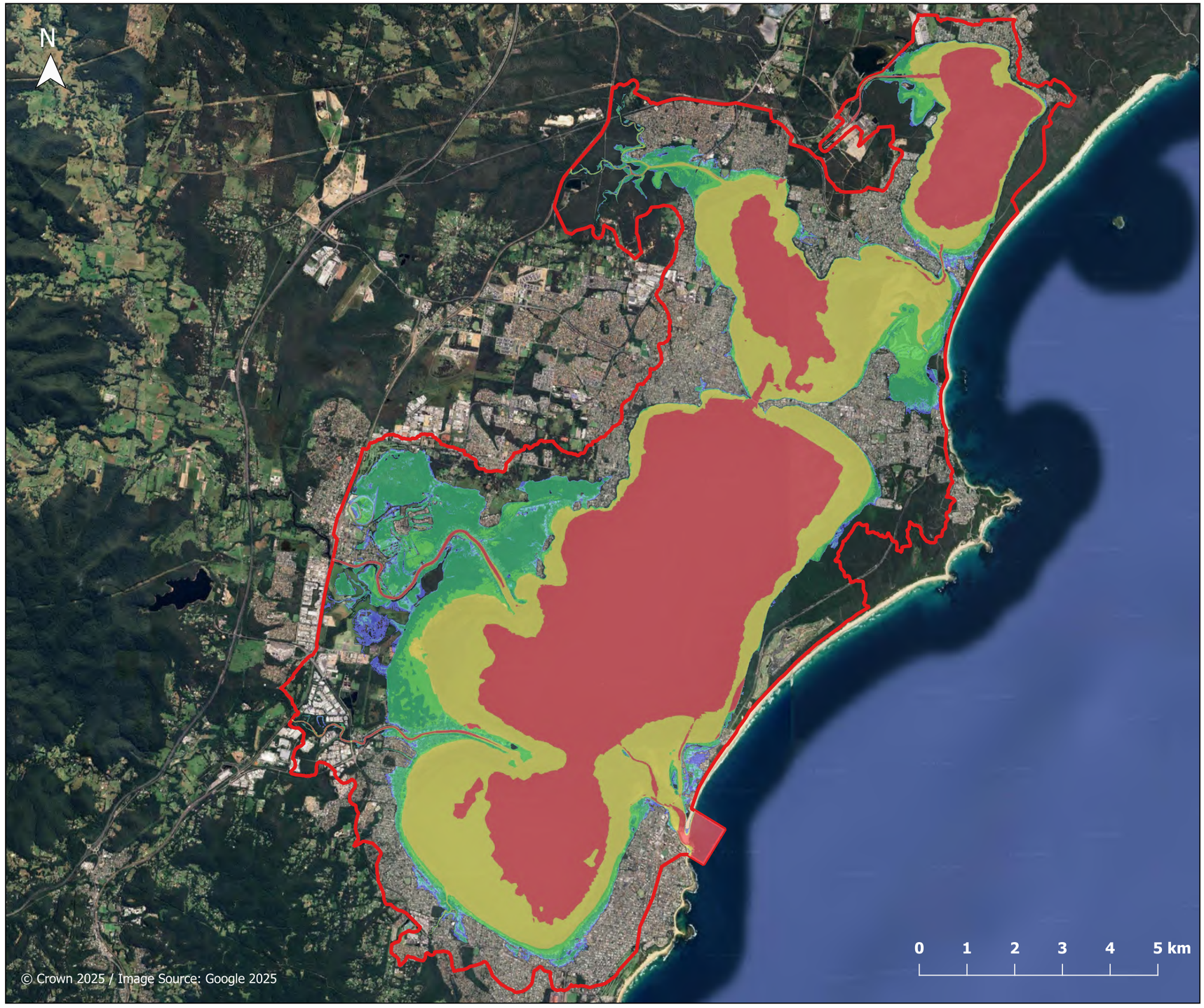

Figure D.5

1% AEP flood event - flood hazard

Legend

- Model domain

Flood hazard

- H1 - Generally safe for people, vehicles and buildings
- H2 - Unsage for small vehicles
- H3 - Unsafe for vehicles, children and elderly
- H4 - Unsafe for people and vehicles
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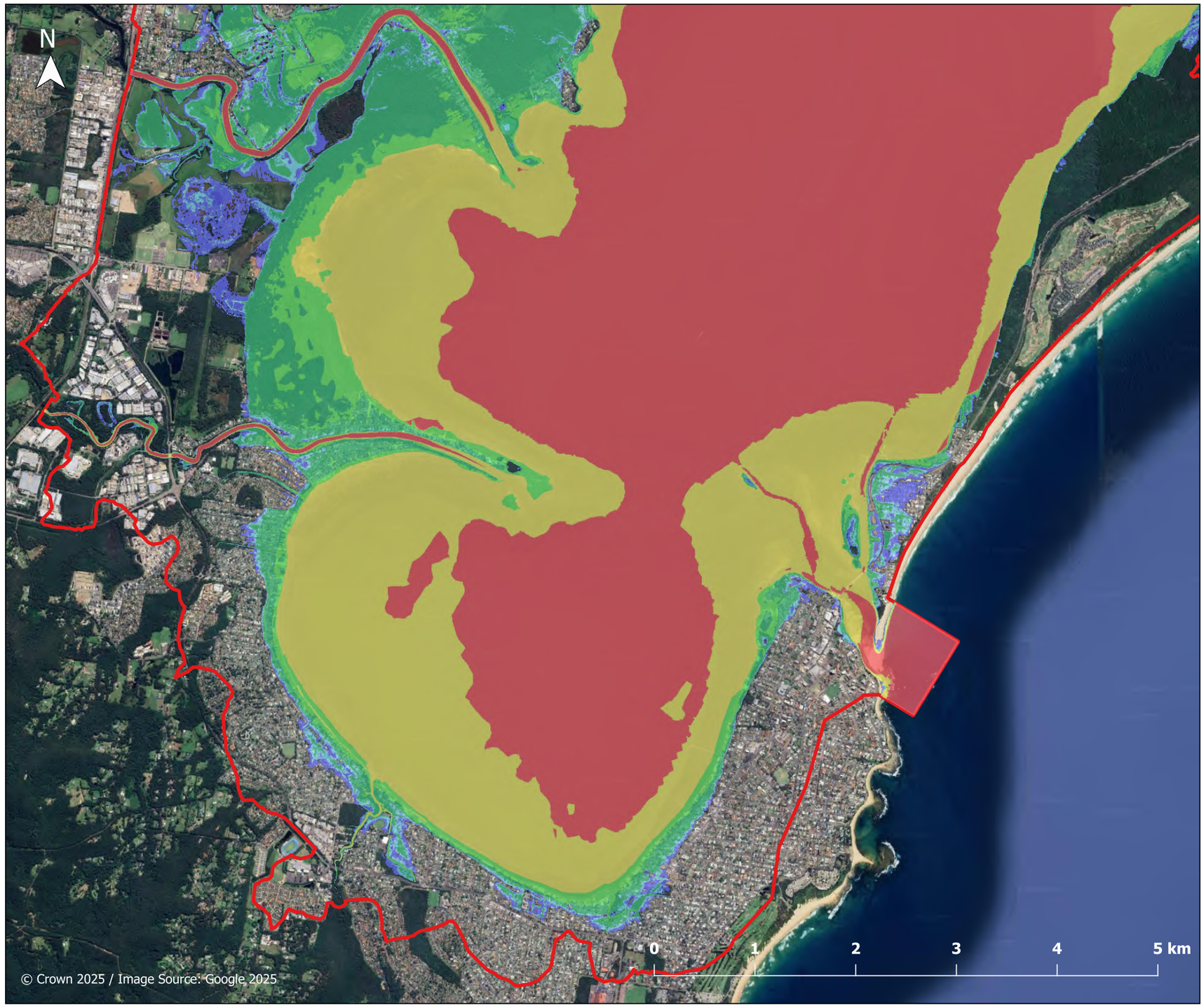

Figure D.5.A

1% AEP flood event - flood hazard

Legend

- Model domain

Flood hazard

- H1 - Generally safe for people, vehicles and buildings
- H2 - Unsage for small vehicles
- H3 - Unsafe for vehicles, children and elderly
- H4 - Unsafe for people and vehicles
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage
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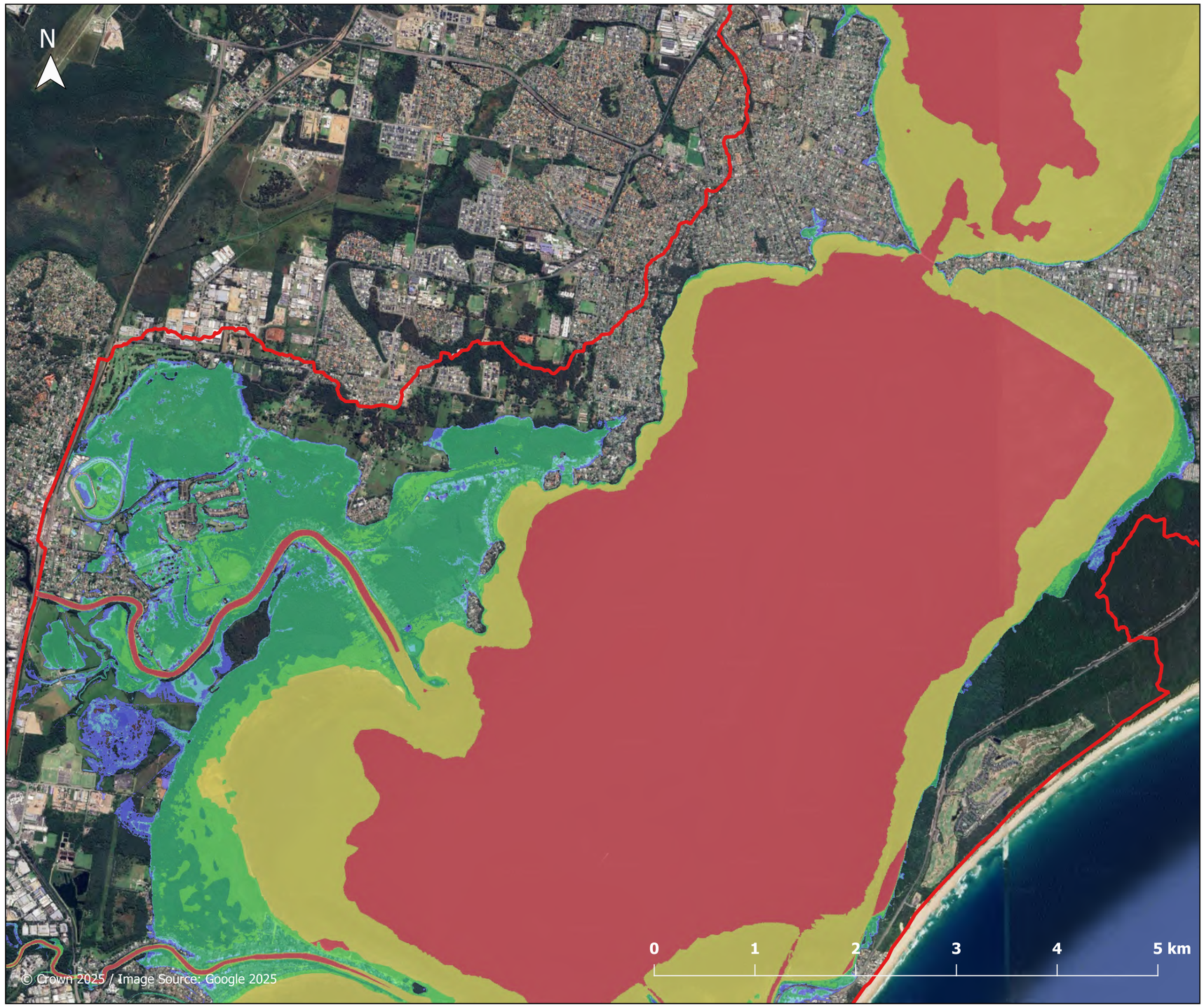

Figure D.5.B

1% AEP flood event - flood hazard

Legend

- Model domain

Flood hazard

- H1 - Generally safe for people, vehicles and buildings
- H2 - Unsage for small vehicles
- H3 - Unsafe for vehicles, children and elderly
- H4 - Unsafe for people and vehicles
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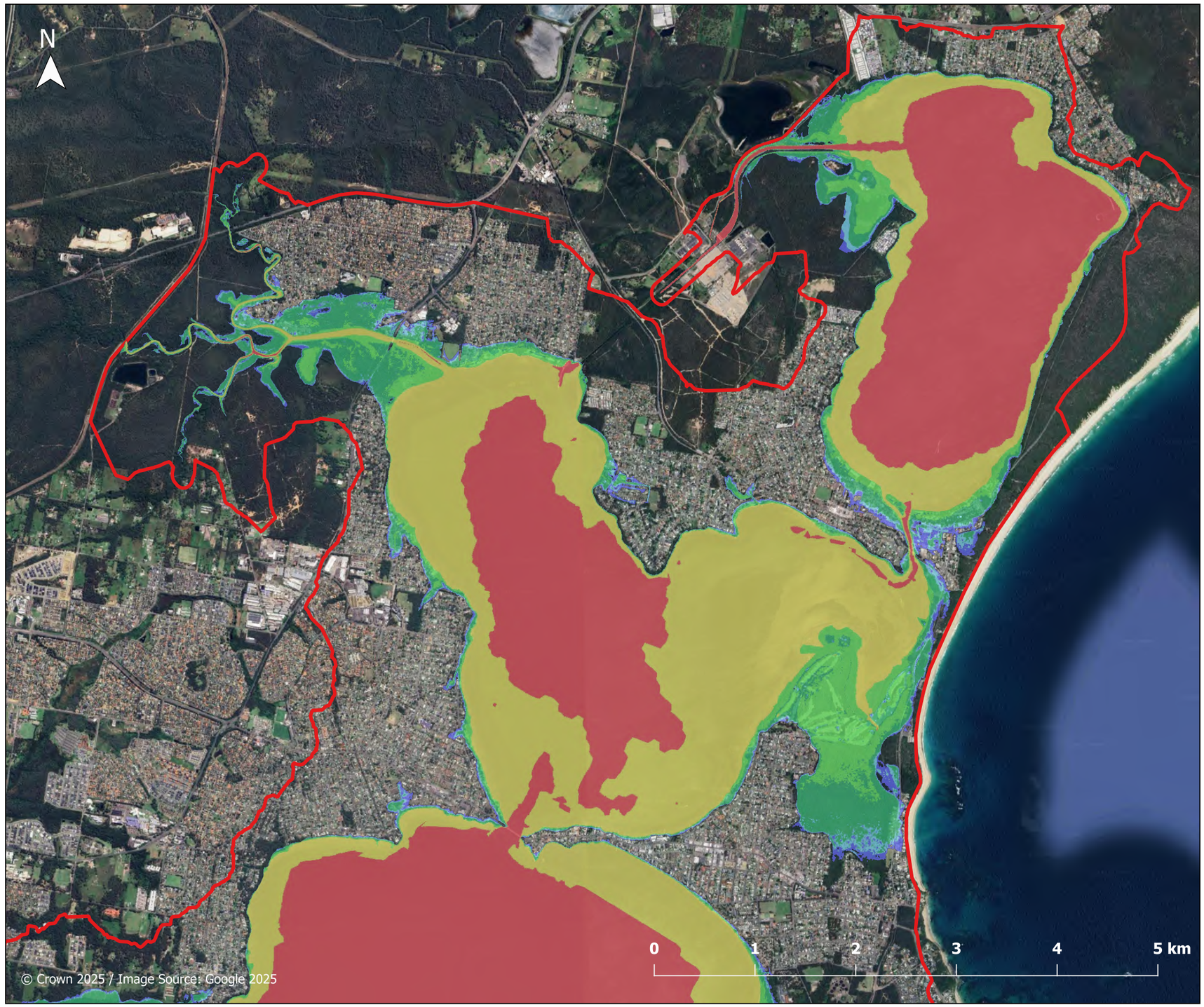

Figure D.5.C

1% AEP flood event - flood hazard

Legend

- Model domain

Flood hazard

- H1 - Generally safe for people, vehicles and buildings
- H2 - Unsage for small vehicles
- H3 - Unsafe for vehicles, children and elderly
- H4 - Unsafe for people and vehicles
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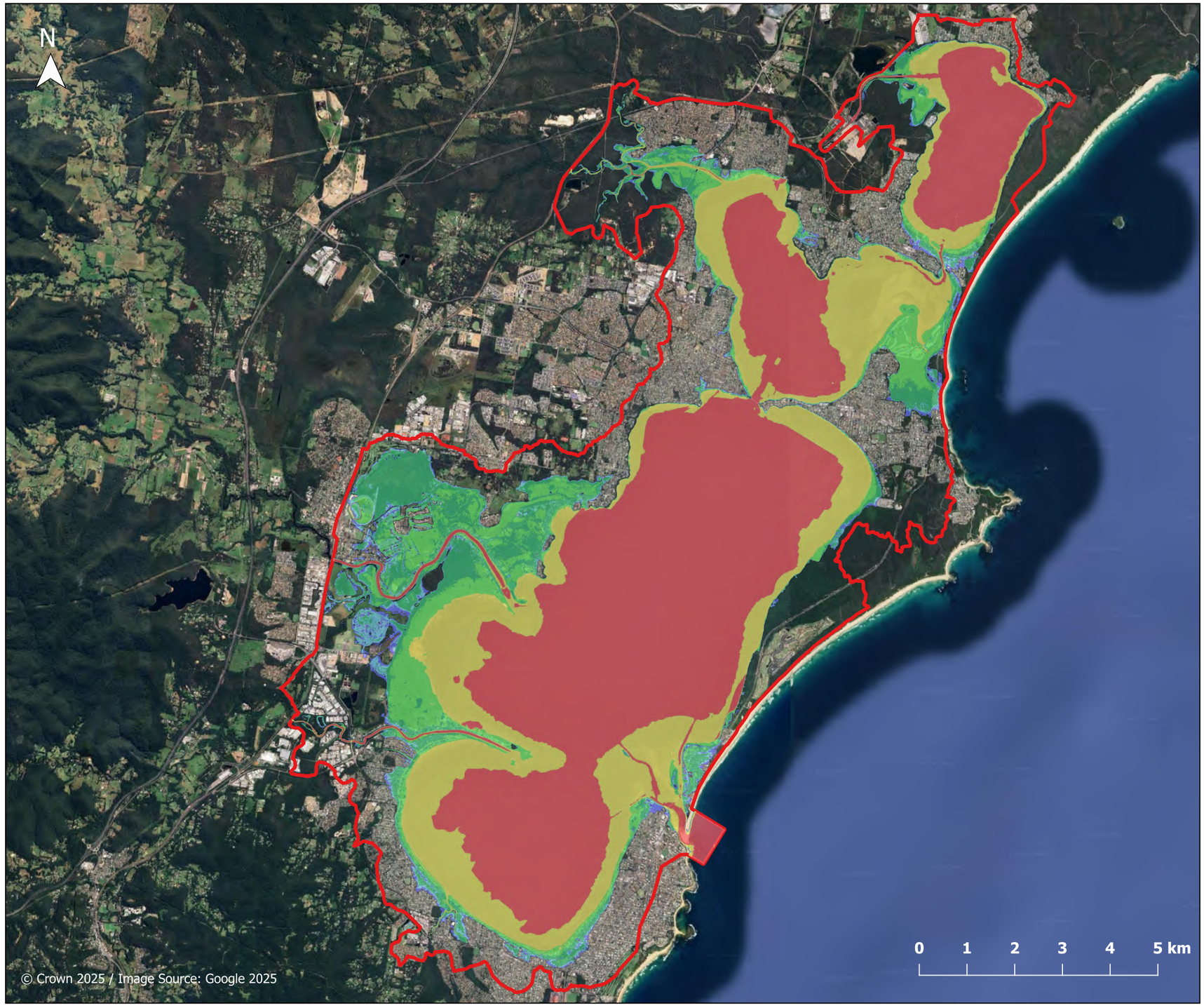

Figure D.6

1 in 200 AEP flood event - flood hazard

Legend

- Model domain

Flood hazard

- H1 - Generally safe for people, vehicles and buildings
- H2 - Unsage for small vehicles
- H3 - Unsafe for vehicles, children and elderly
- H4 - Unsafe for people and vehicles
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage
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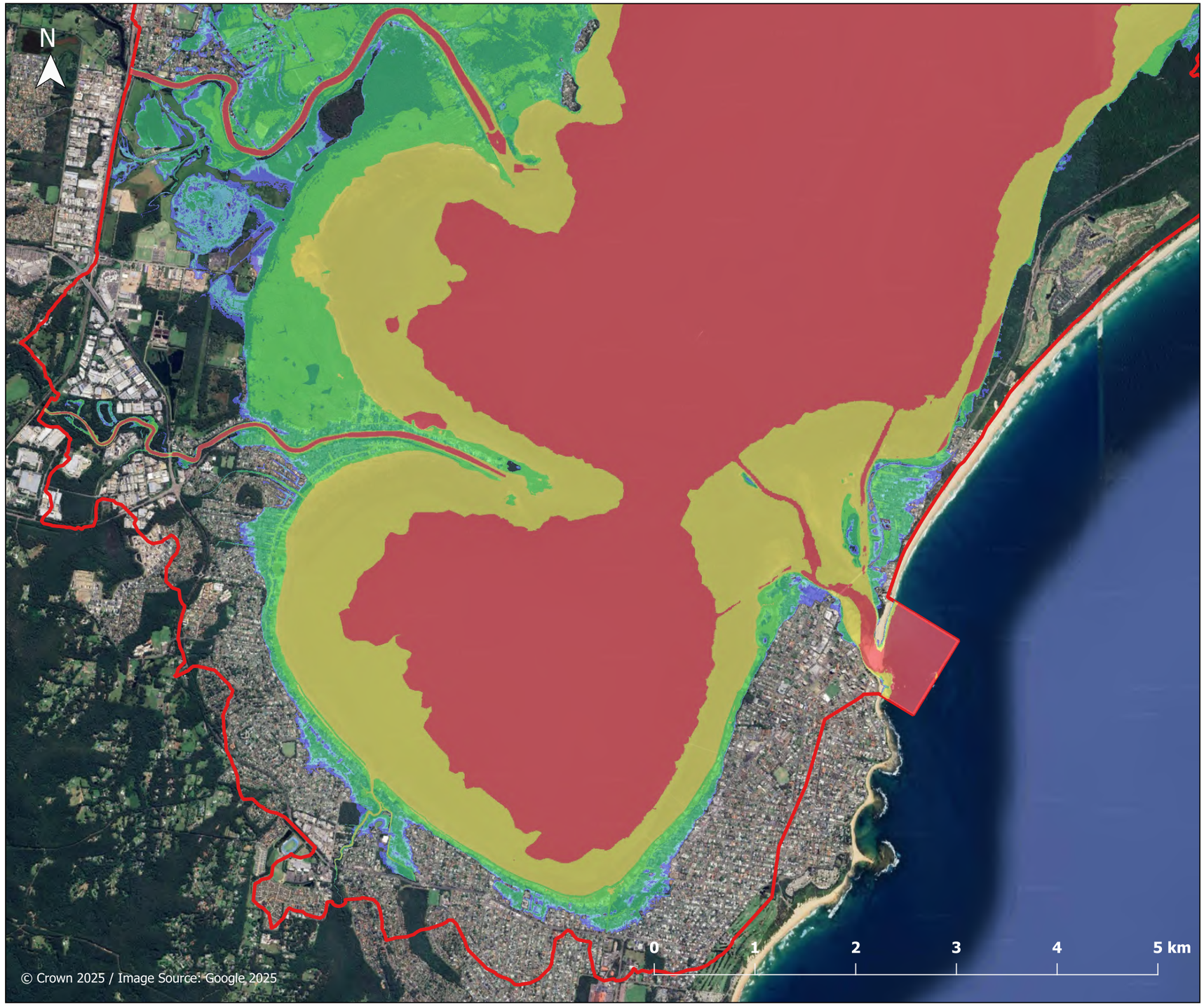

Figure D.6.A

1 in 200 AEP flood event - flood hazard

Legend

- Model domain

Flood hazard

- H1 - Generally safe for people, vehicles and buildings
- H2 - Unsage for small vehicles
- H3 - Unsafe for vehicles, children and elderly
- H4 - Unsafe for people and vehicles
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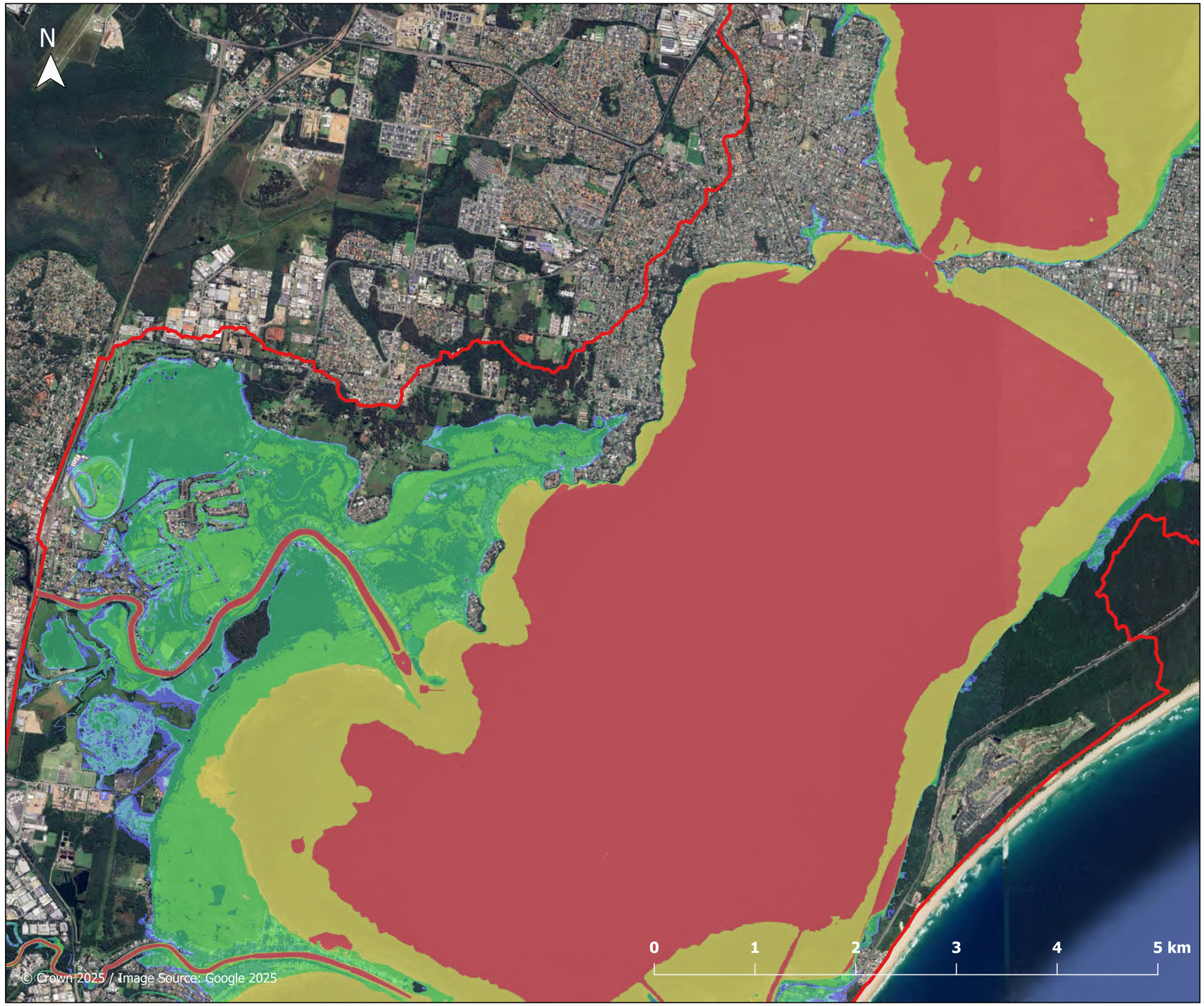

Figure D.6.B

1 in 200 AEP flood event - flood hazard

Legend

- Model domain

Flood hazard

- H1 - Generally safe for people, vehicles and buildings
- H2 - Unsage for small vehicles
- H3 - Unsafe for vehicles, children and elderly
- H4 - Unsafe for people and vehicles
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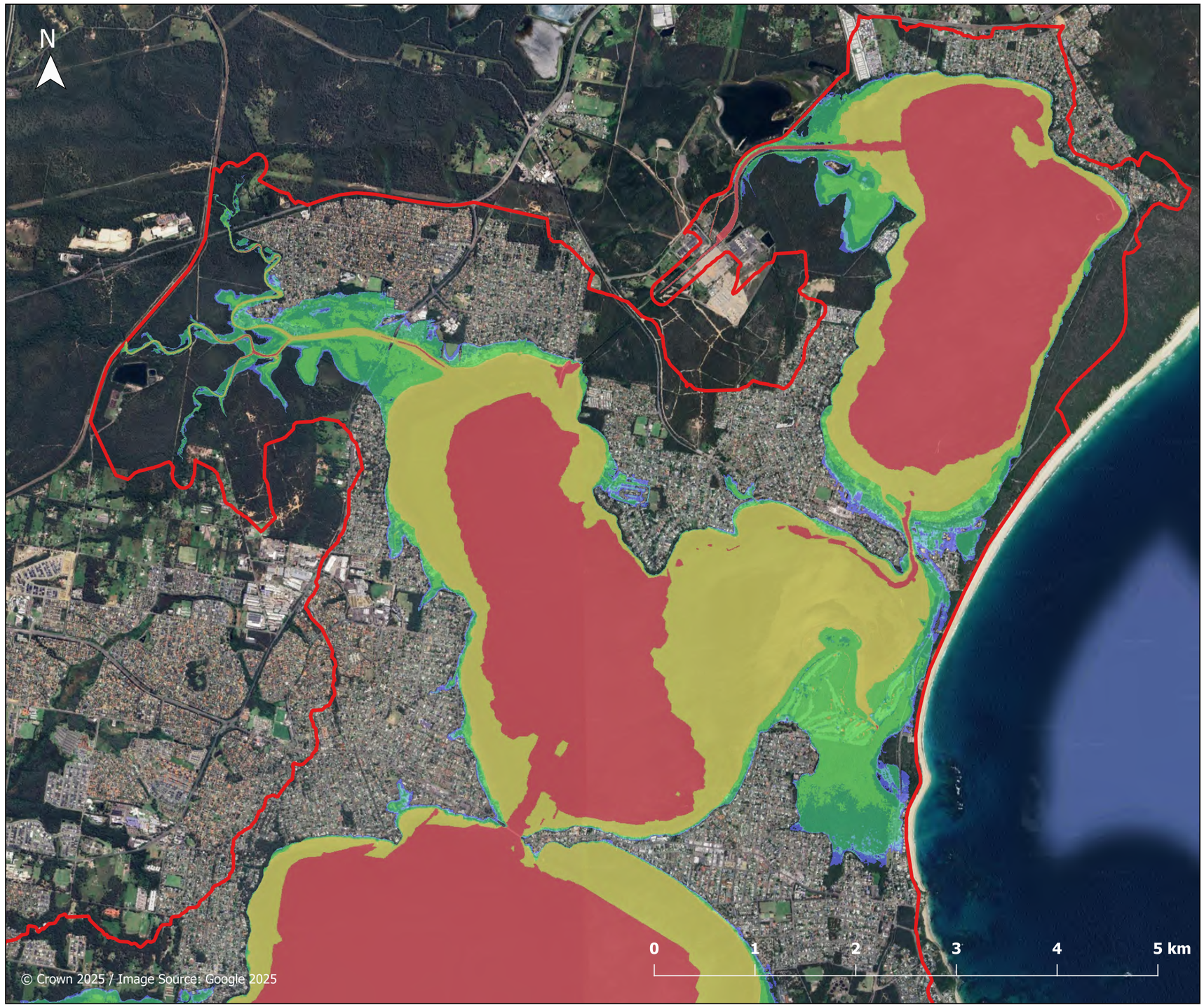

Figure D.6.C

1 in 200 AEP flood event - flood hazard

Legend

- Model domain

Flood hazard

- H1 - Generally safe for people, vehicles and buildings
- H2 - Unsage for small vehicles
- H3 - Unsafe for vehicles, children and elderly
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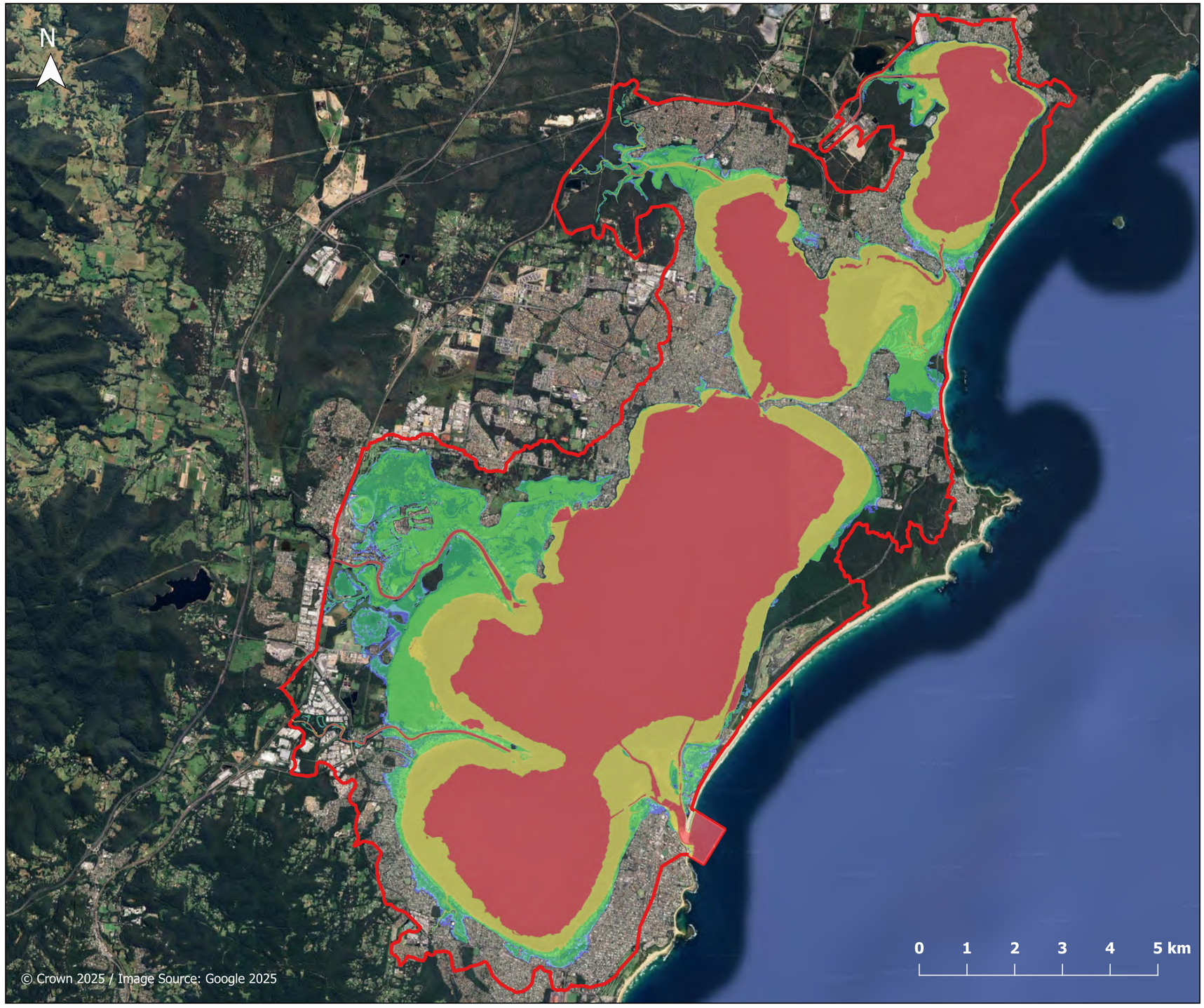

Figure D.7

1 in 500 AEP flood event - flood hazard

Legend

- Model domain

Flood hazard

- H1 - Generally safe for people, vehicles and buildings
- H2 - Unsage for small vehicles
- H3 - Unsafe for vehicles, children and elderly
- H4 - Unsafe for people and vehicles
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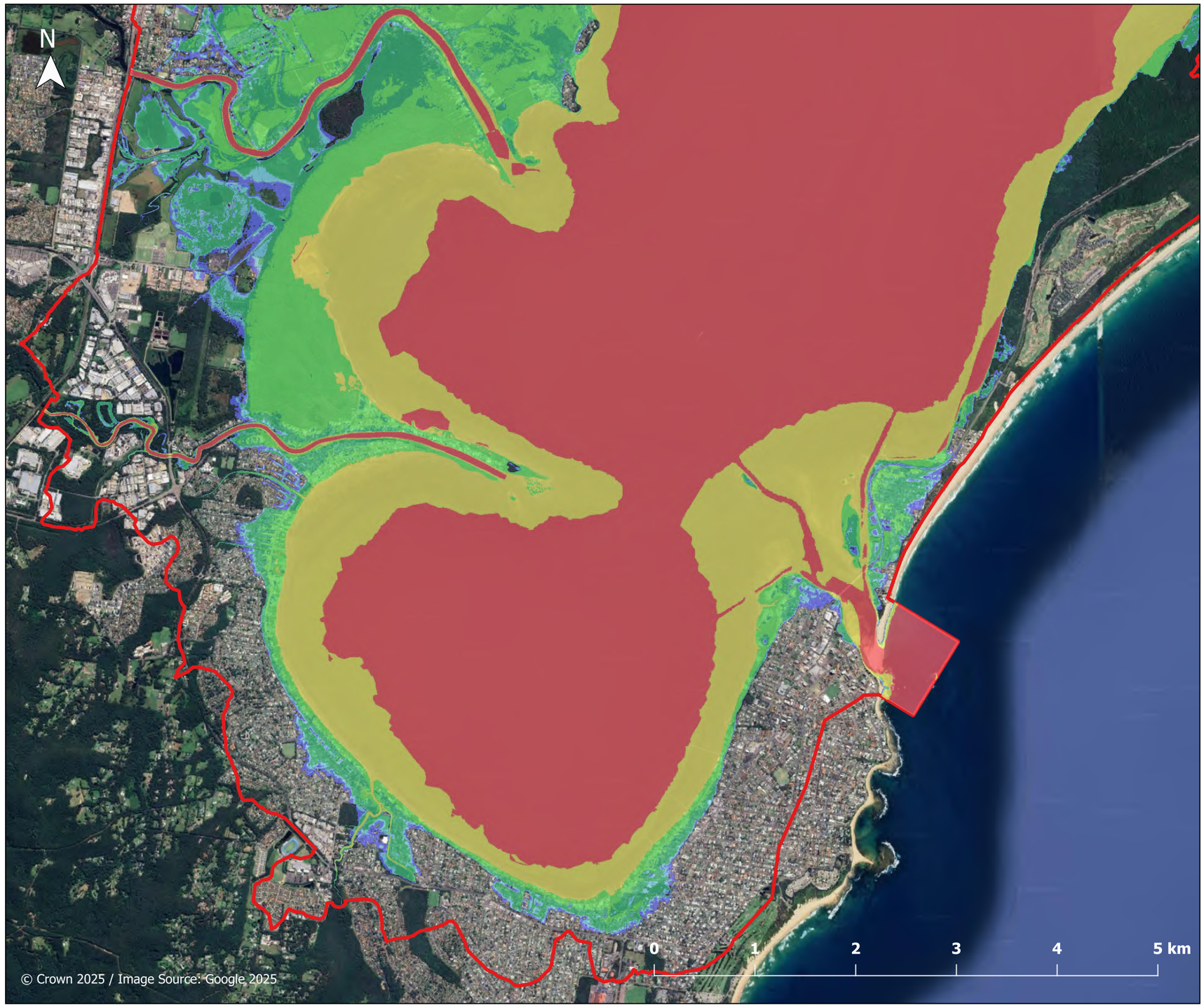

Figure D.7.A

1 in 500 AEP flood event - flood hazard

Legend

- Model domain

Flood hazard

- H1 - Generally safe for people, vehicles and buildings
- H2 - Unsage for small vehicles
- H3 - Unsafe for vehicles, children and elderly
- H4 - Unsafe for people and vehicles
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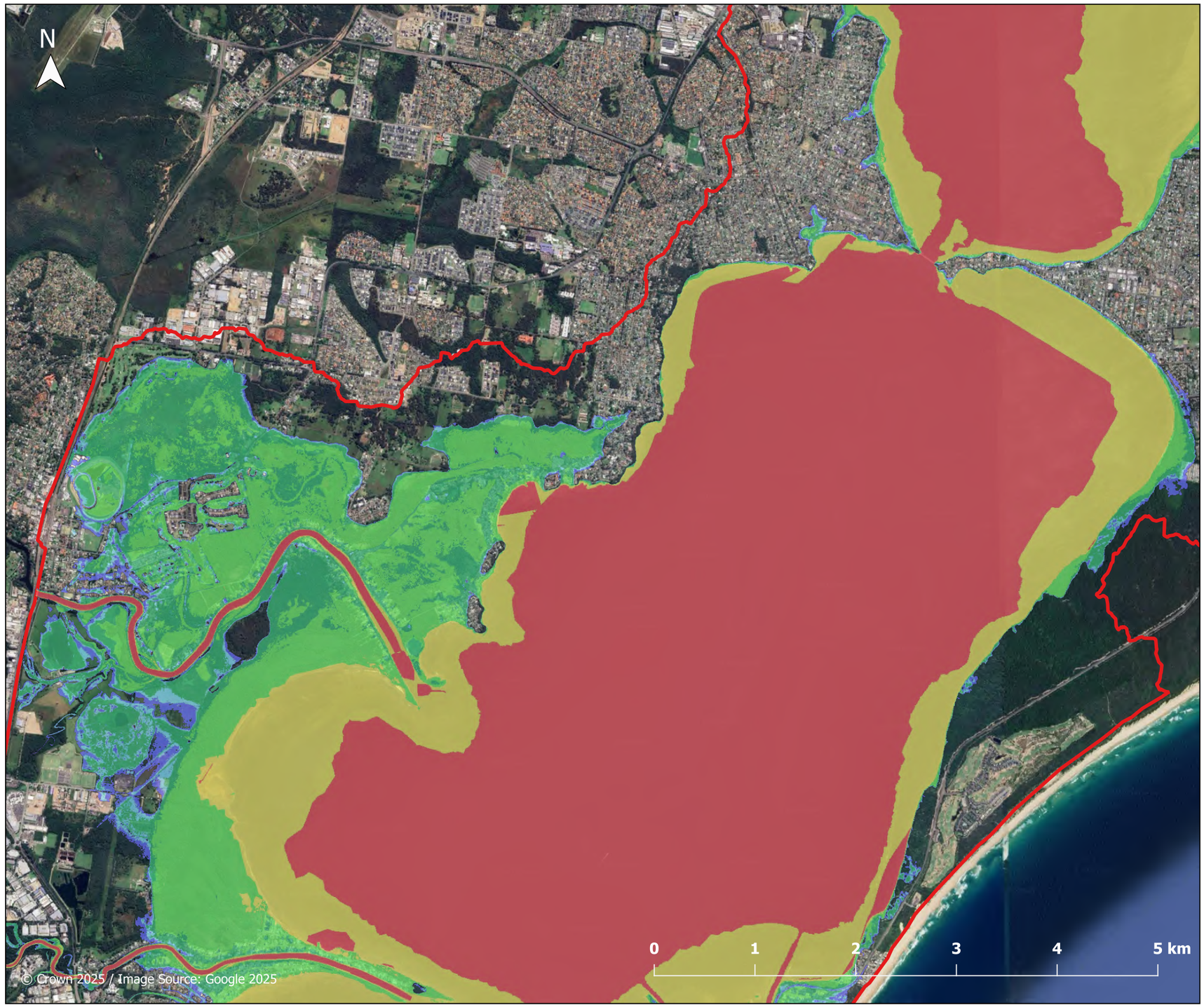

Figure D.7.B

1 in 500 AEP flood event - flood hazard

Legend

- Model domain

Flood hazard

- H1 - Generally safe for people, vehicles and buildings
- H2 - Unsage for small vehicles
- H3 - Unsafe for vehicles, children and elderly
- H4 - Unsafe for people and vehicles
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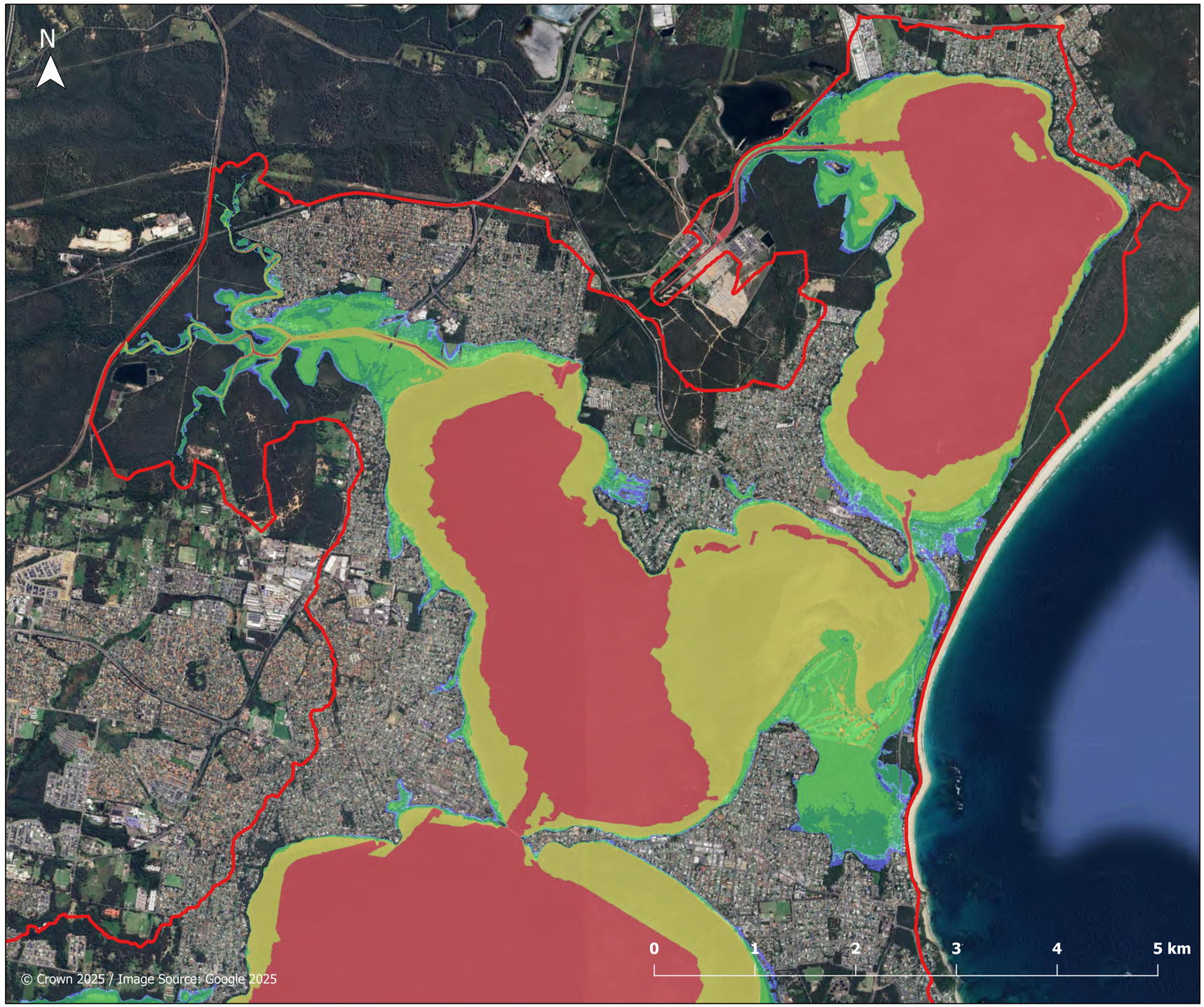

Figure D.7.C

1 in 500 AEP flood event - flood hazard

Legend

- Model domain

Flood hazard

- H1 - Generally safe for people, vehicles and buildings
- H2 - Unsage for small vehicles
- H3 - Unsafe for vehicles, children and elderly
- H4 - Unsafe for people and vehicles
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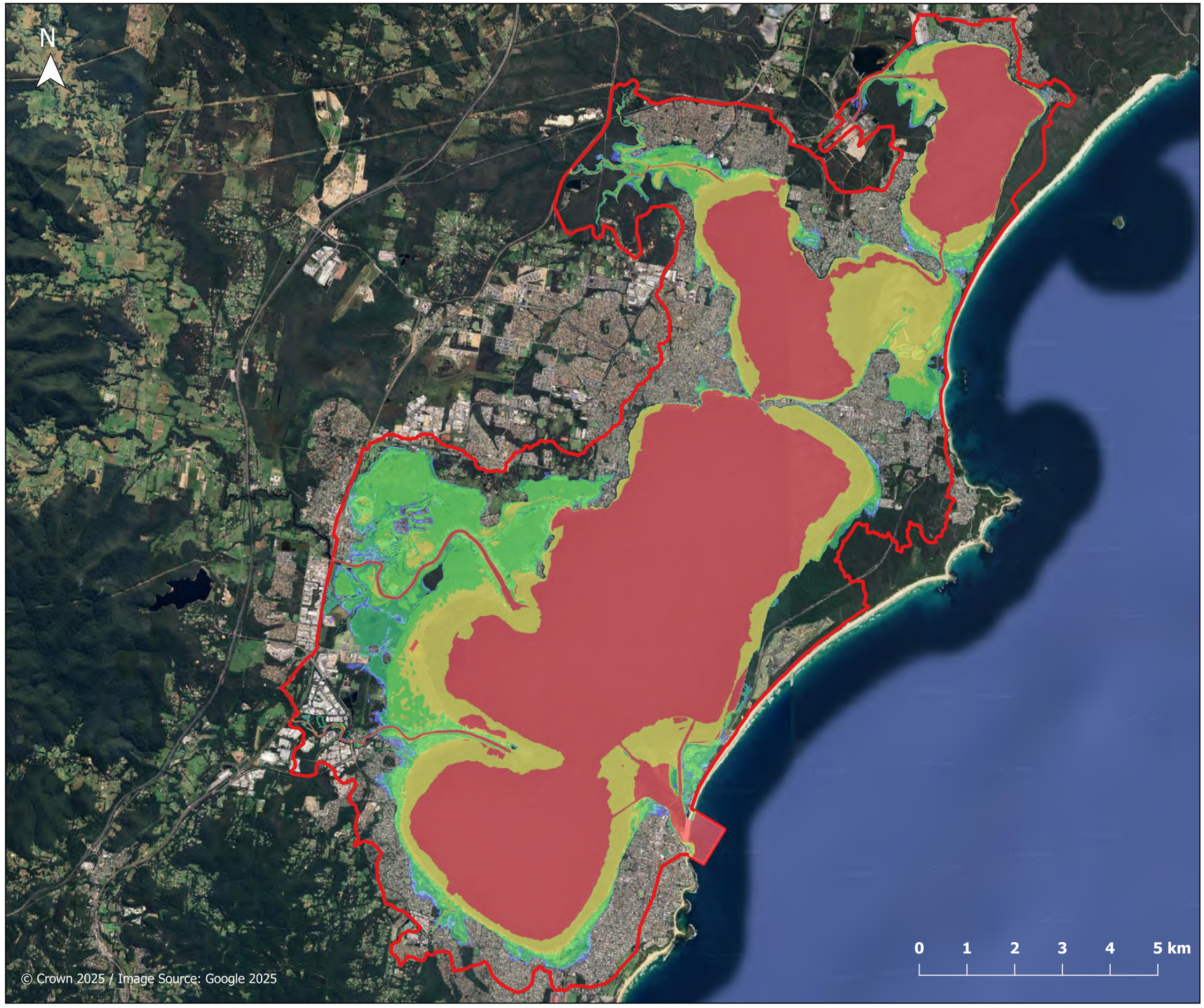

Figure D.8

PMF flood event - flood hazard

Legend

- Model domain

Flood hazard

- H1 - Generally safe for people, vehicles and buildings
- H2 - Unsage for small vehicles
- H3 - Unsafe for vehicles, children and elderly
- H4 - Unsafe for people and vehicles
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage
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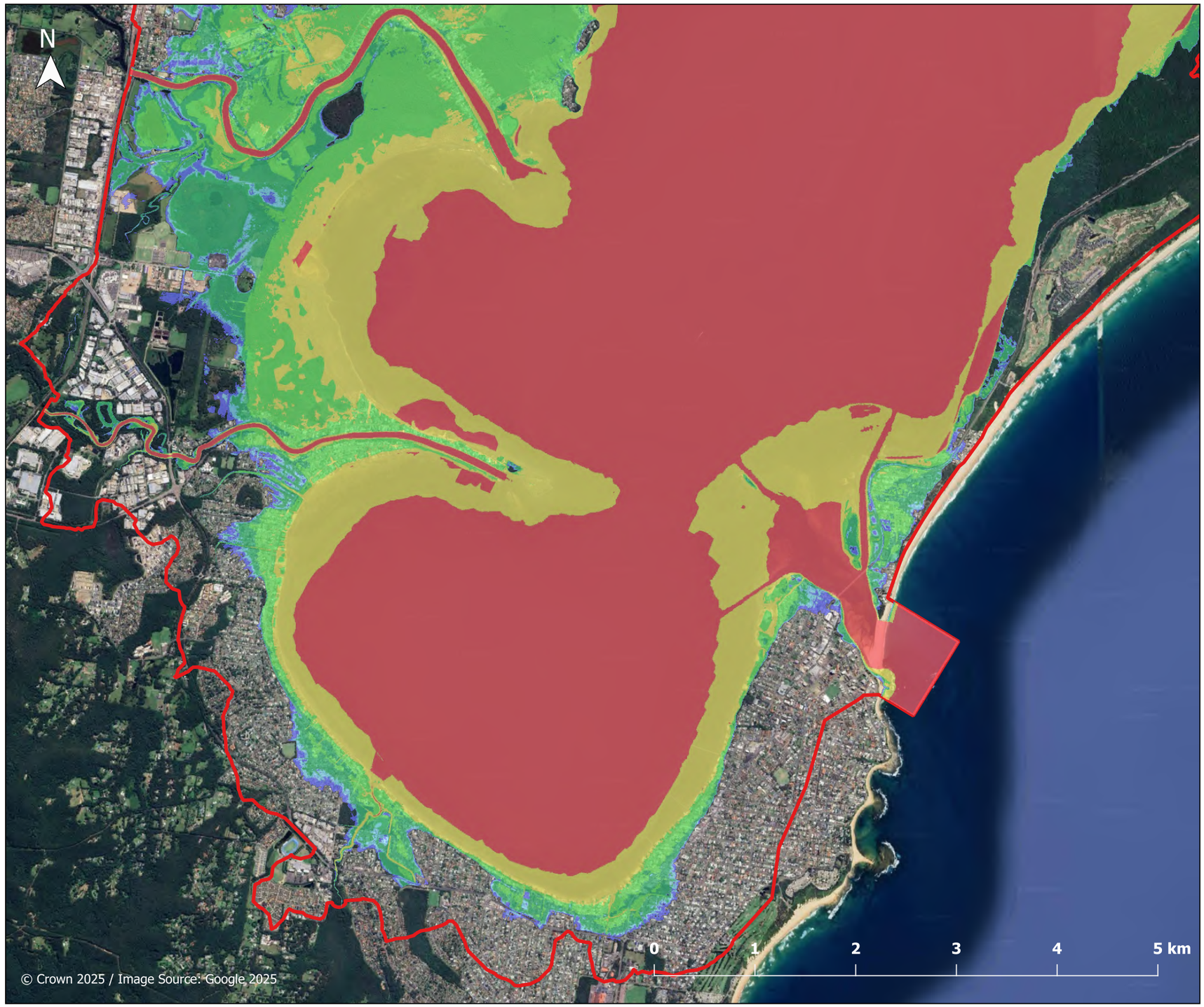

Figure D.8.A

PMF flood event - flood hazard

Legend

- Model domain

Flood hazard

- H1 - Generally safe for people, vehicles and buildings
- H2 - Unsage for small vehicles
- H3 - Unsafe for vehicles, children and elderly
- H4 - Unsafe for people and vehicles
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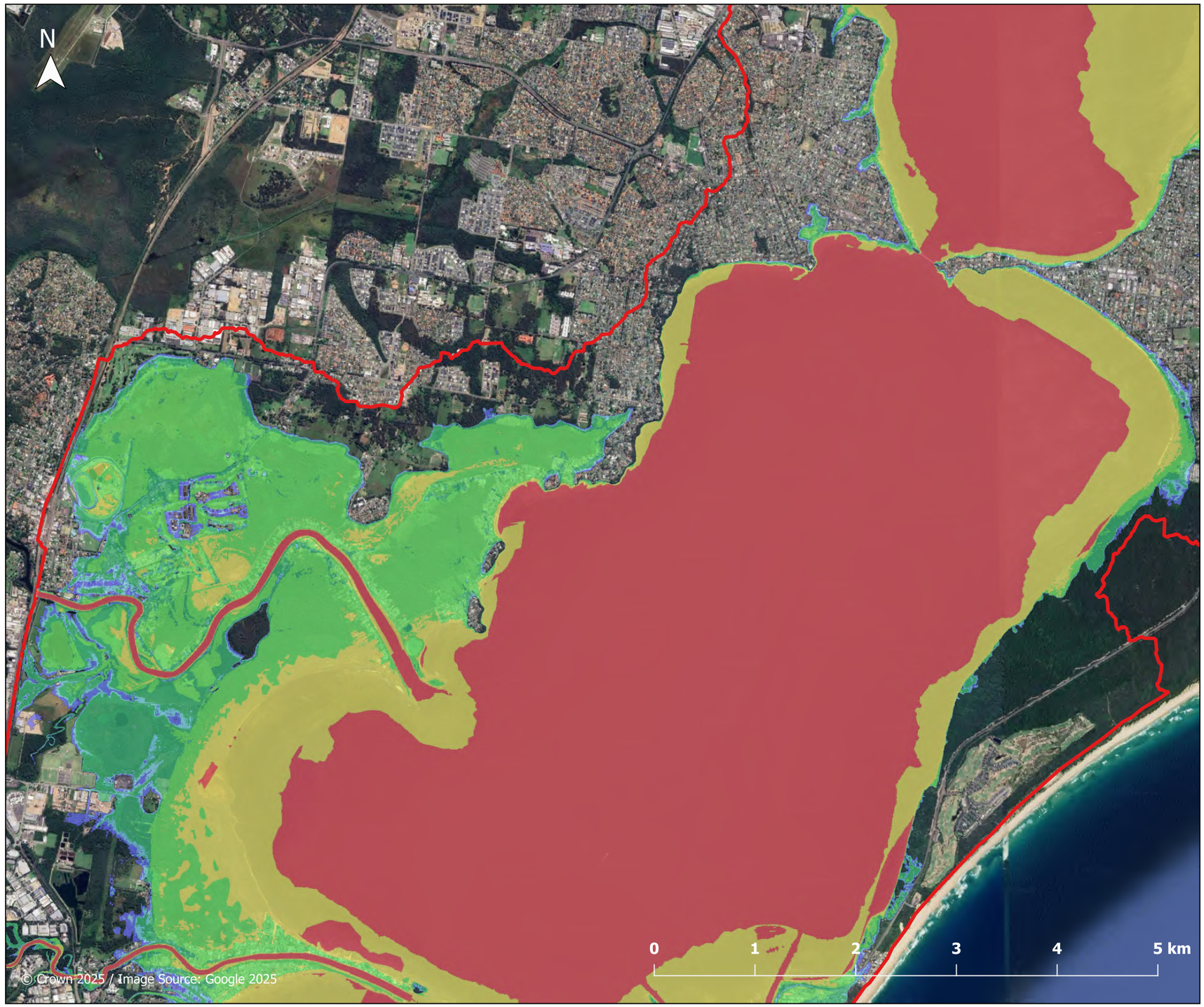

Figure D.8.B

PMF flood event - flood hazard

Legend

- Model domain

Flood hazard

- H1 - Generally safe for people, vehicles and buildings
- H2 - Unsage for small vehicles
- H3 - Unsafe for vehicles, children and elderly
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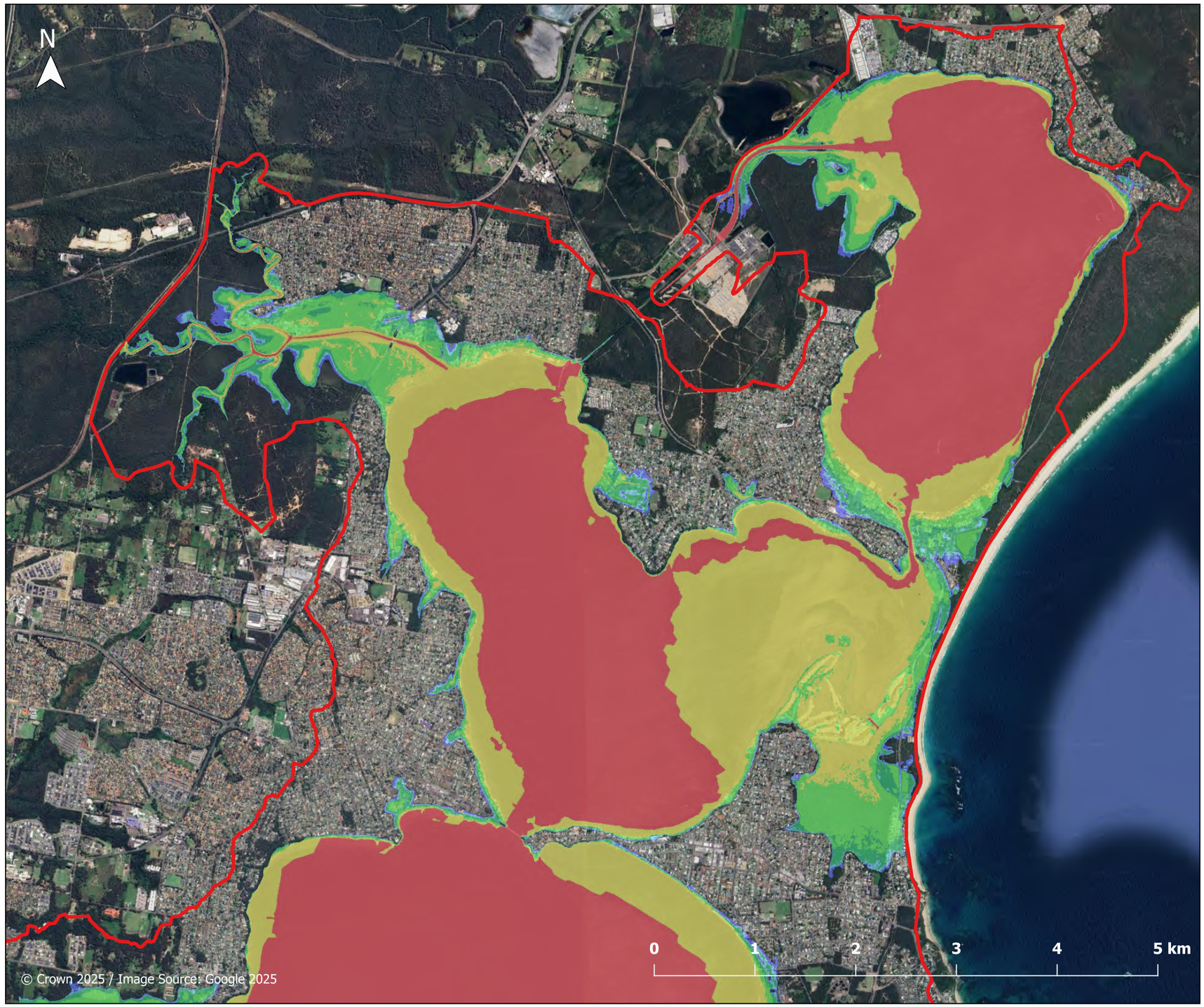

Figure D.8.C

PMF flood event - flood hazard

Legend

- Model domain

Flood hazard

- H1 - Generally safe for people, vehicles and buildings
- H2 - Unsage for small vehicles
- H3 - Unsafe for vehicles, children and elderly
- H4 - Unsafe for people and vehicles
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure

Disclaimer:
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Appendix E Flood function maps

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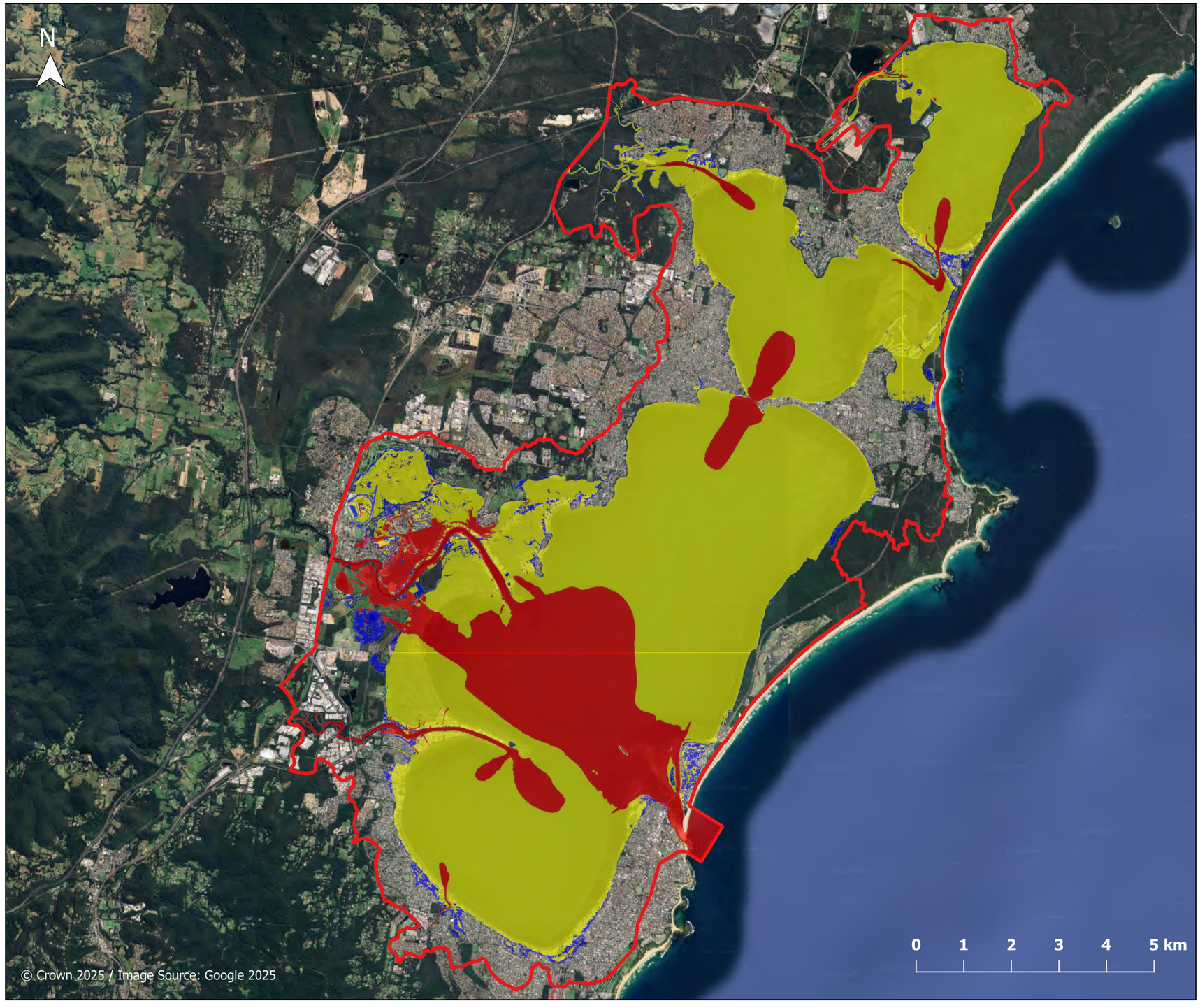

Figure E.1

1% AEP flood event - flood function

Legend

- Model domain

Flood function

- Floodway
- Flood Storage
- Flood Fringe

Disclaimer:
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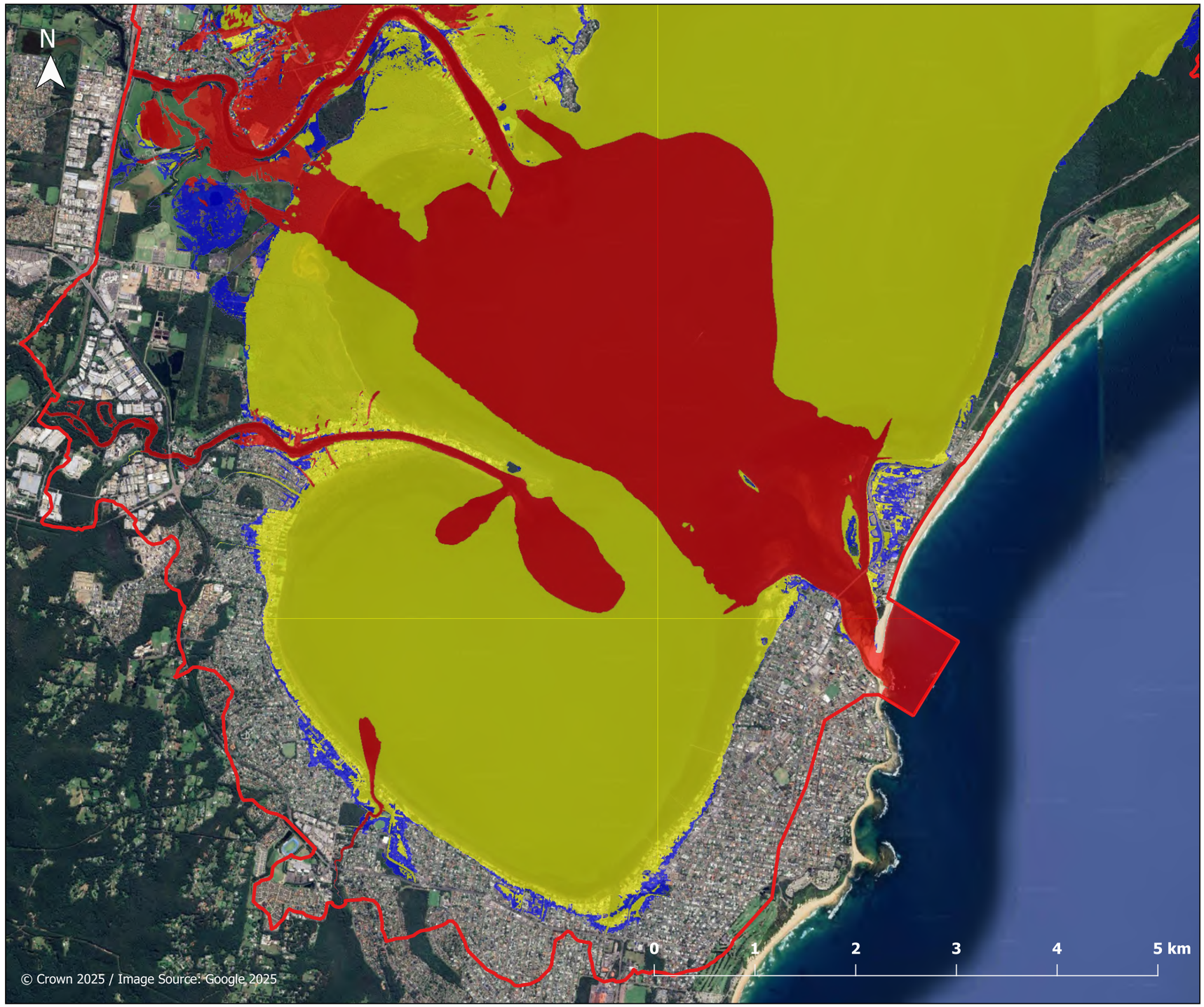

Figure E.1.A

1% AEP flood event - flood function

Legend

Model domain

Flood function

Floodway
Flood Storage
Flood Fringe

Disclaimer:
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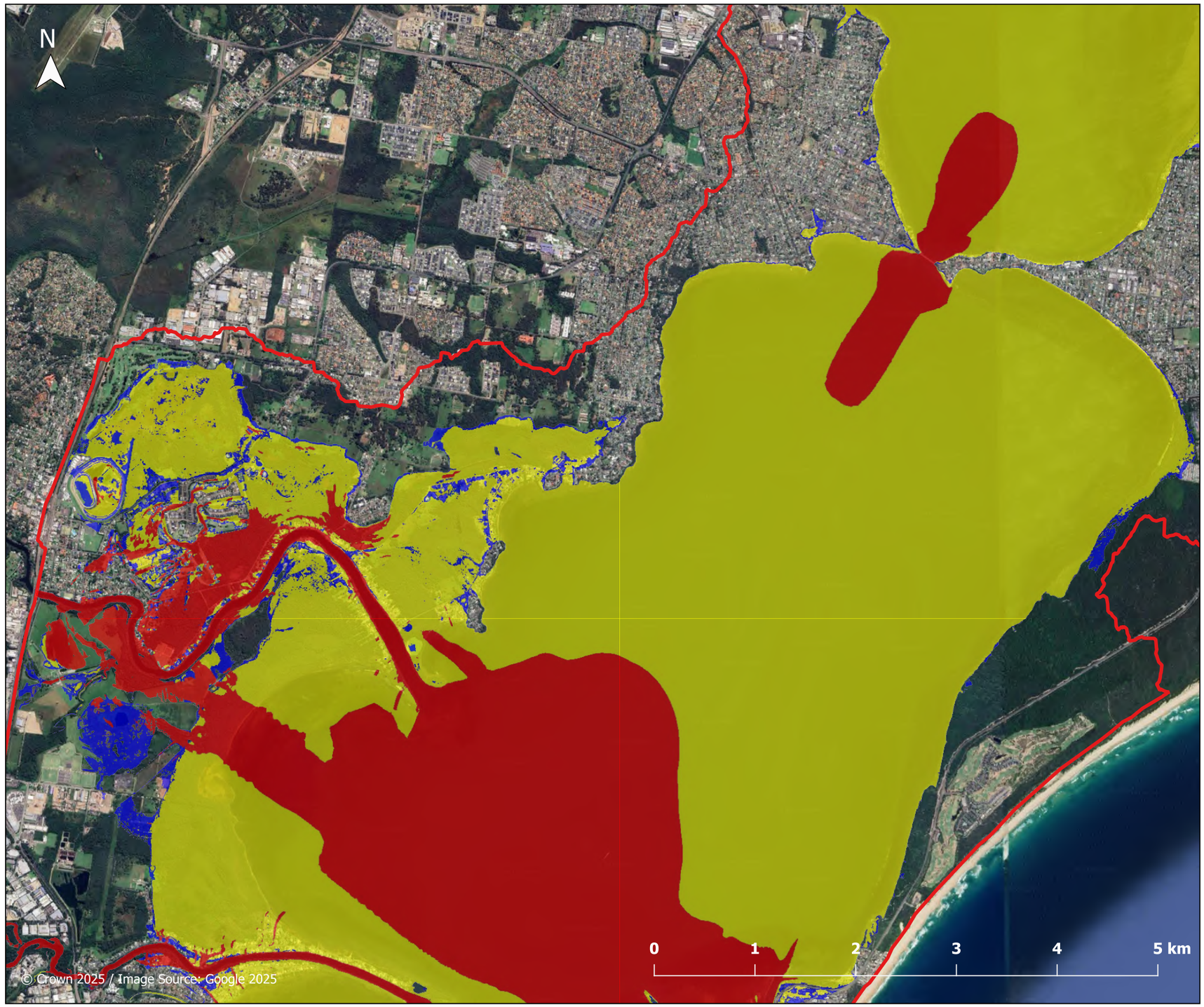

Figure E.1.B

1% AEP flood event - flood function

Legend

Model domain

Flood function

Floodway

Flood Storage

Flood Fringe

Disclaimer:
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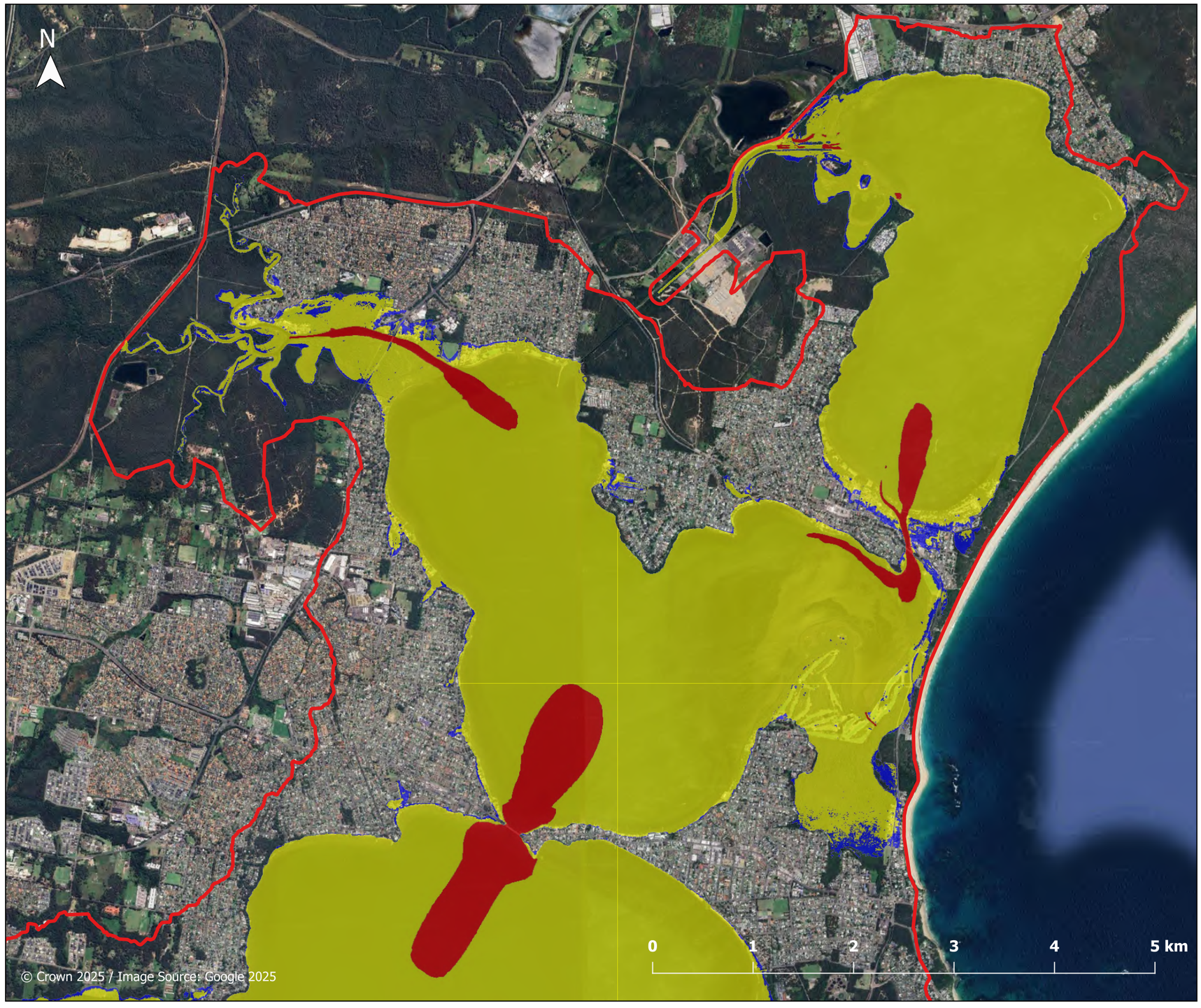

Figure E.1.C

1% AEP flood event - flood function

Legend

- Model domain

Flood function

- Floodway
- Flood Storage
- Flood Fringe

Disclaimer:
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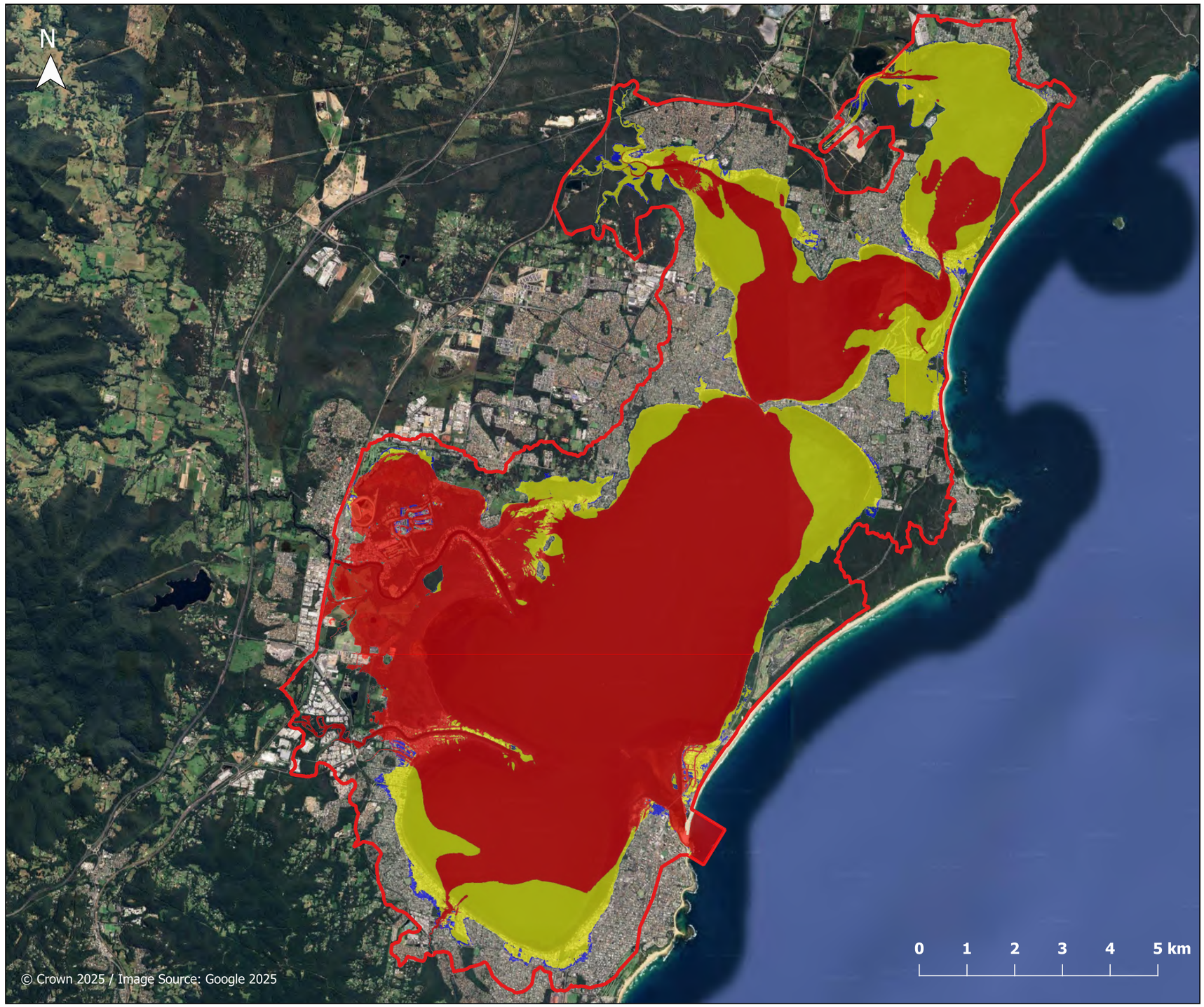

Figure E.2

PMF flood event - flood function

Legend

Model domain

Flood function

Floodway

Flood Storage

Flood Fringe

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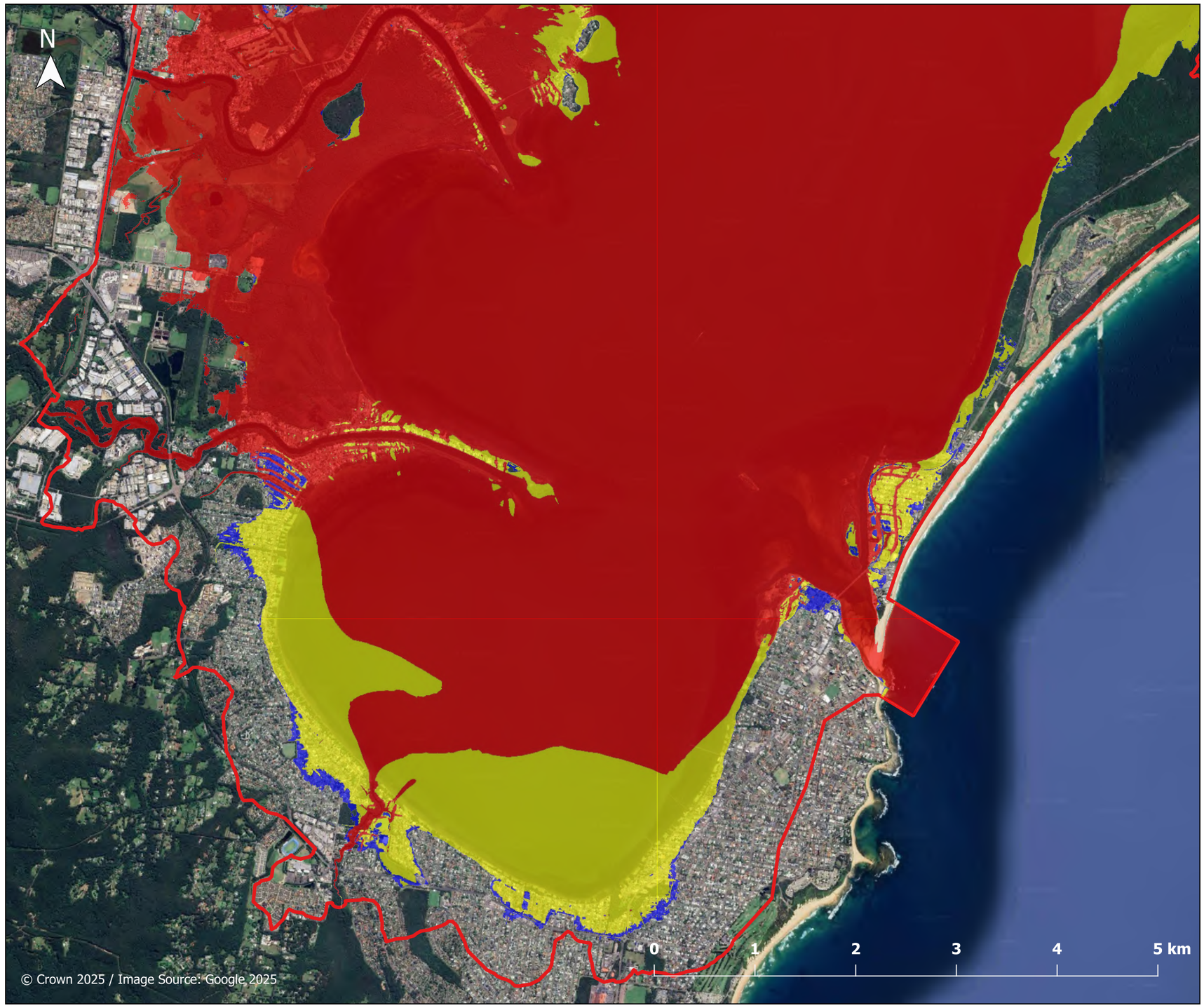

Figure E.2.A

PMF flood event - flood function

Legend

Model domain

Flood function

Floodway

Flood Storage

Flood Fringe

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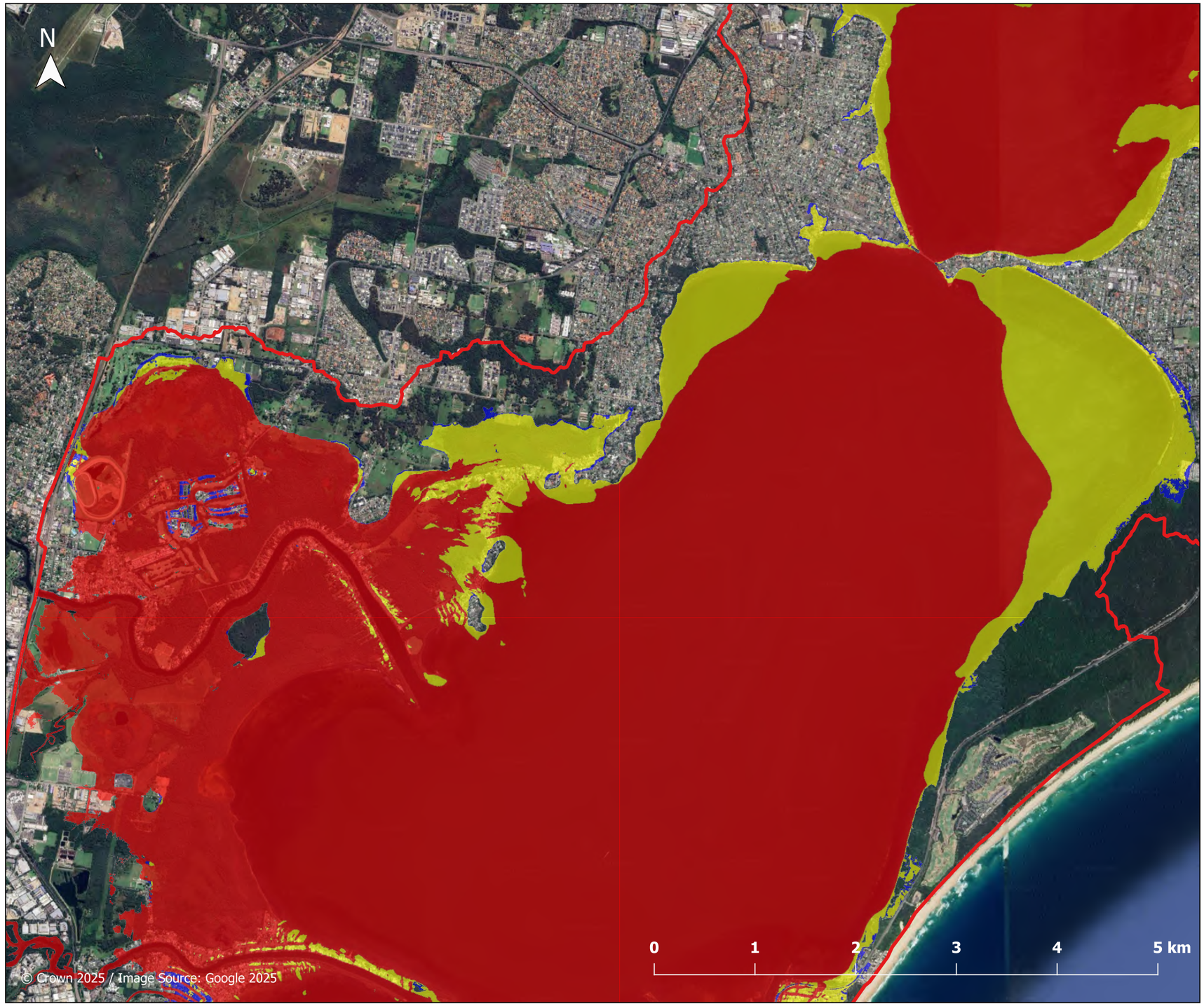

Figure E.2.B

PMF flood event - flood function

Legend

Model domain

Flood function

Floodway

Flood Storage

Flood Fringe

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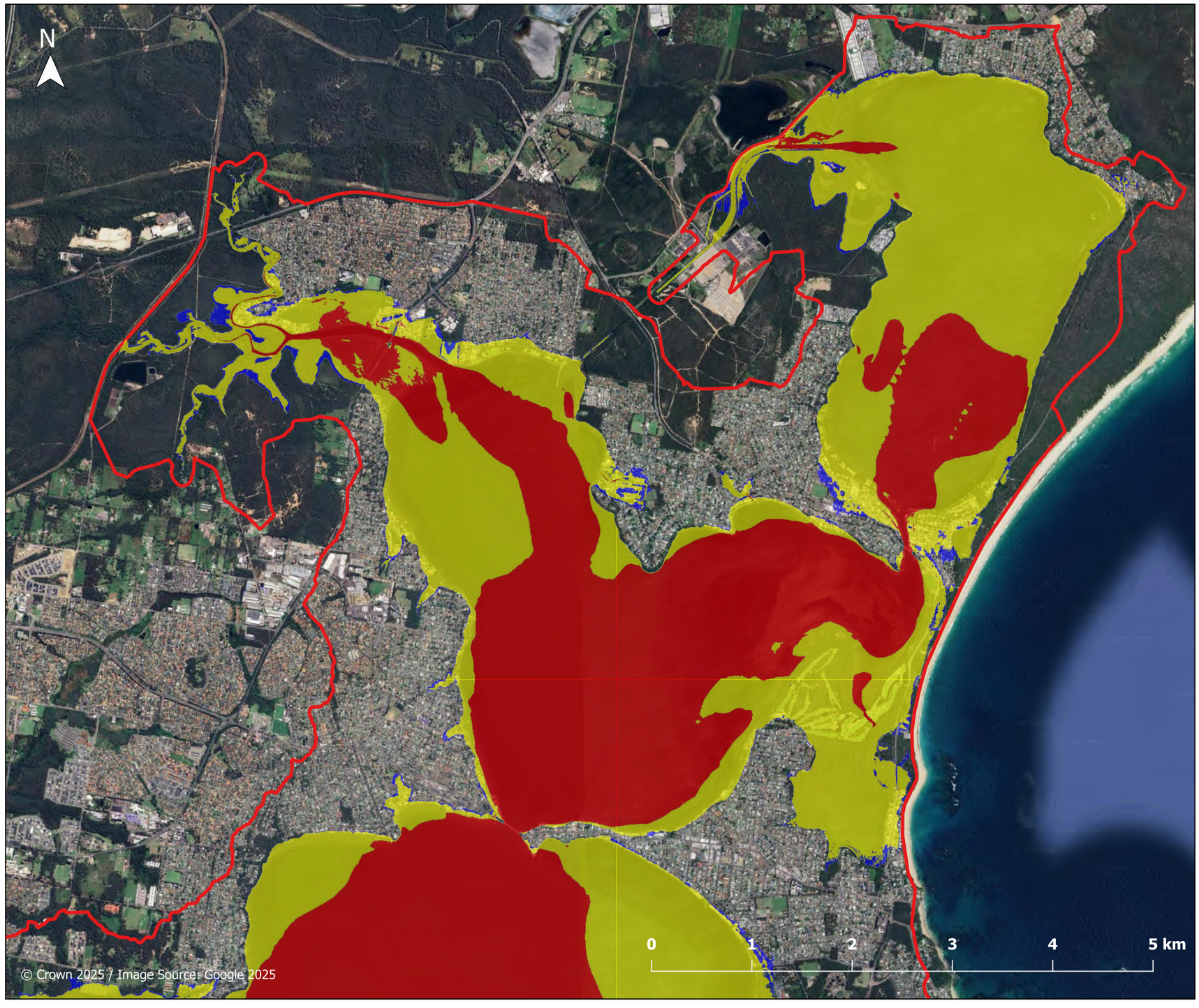

Figure E.2.C

PMF flood event - flood function

Legend

Model domain

Flood function

Floodway

Flood Storage

Flood Fringe

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Appendix F Flood emergency response classification maps

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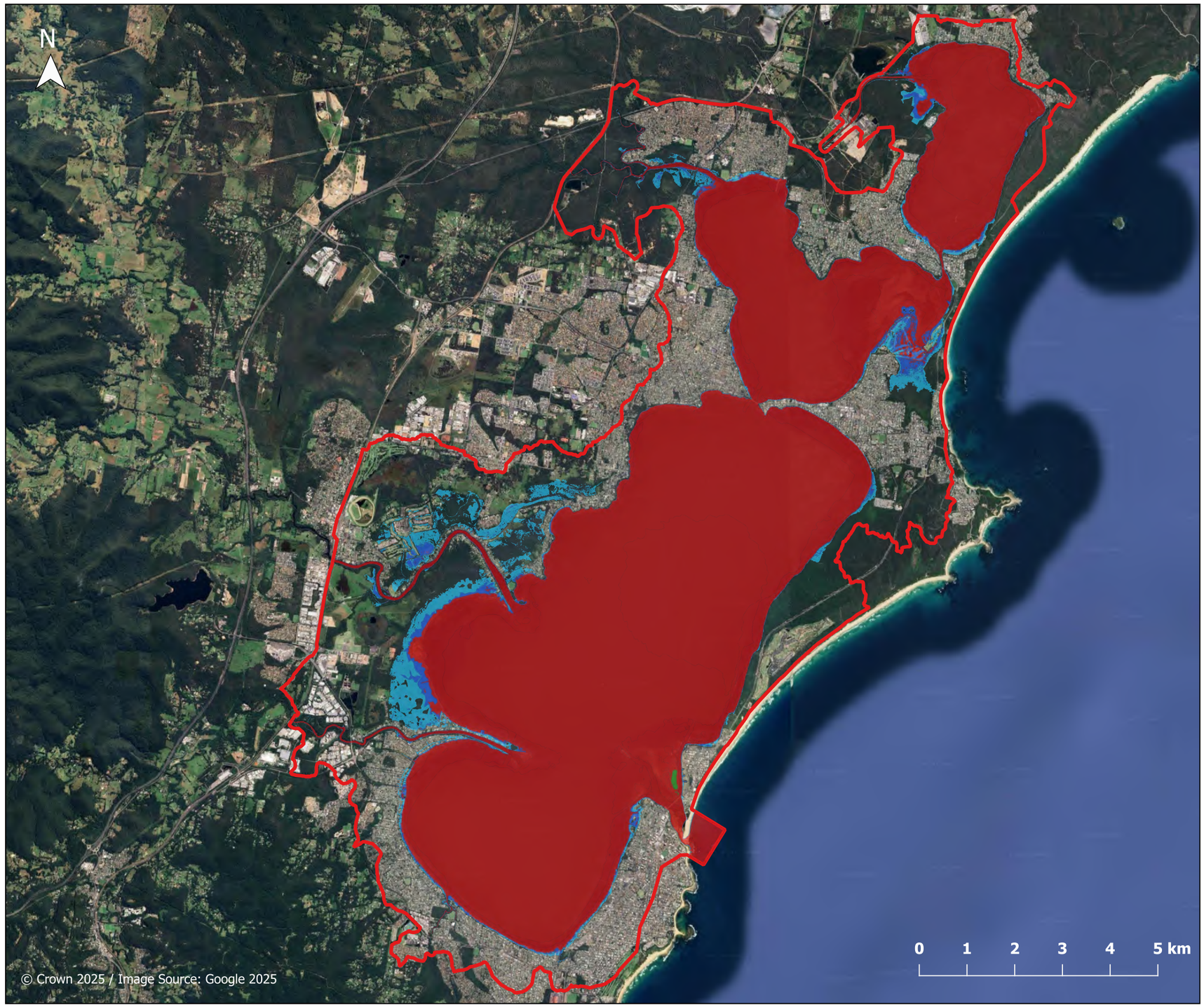

Figure F.1

20% AEP flood event - flood emergency response classification

Legend

- Model domain

Flood emergency response classification

- Rising road
- Overland escape
- Low flood island
- High flood island

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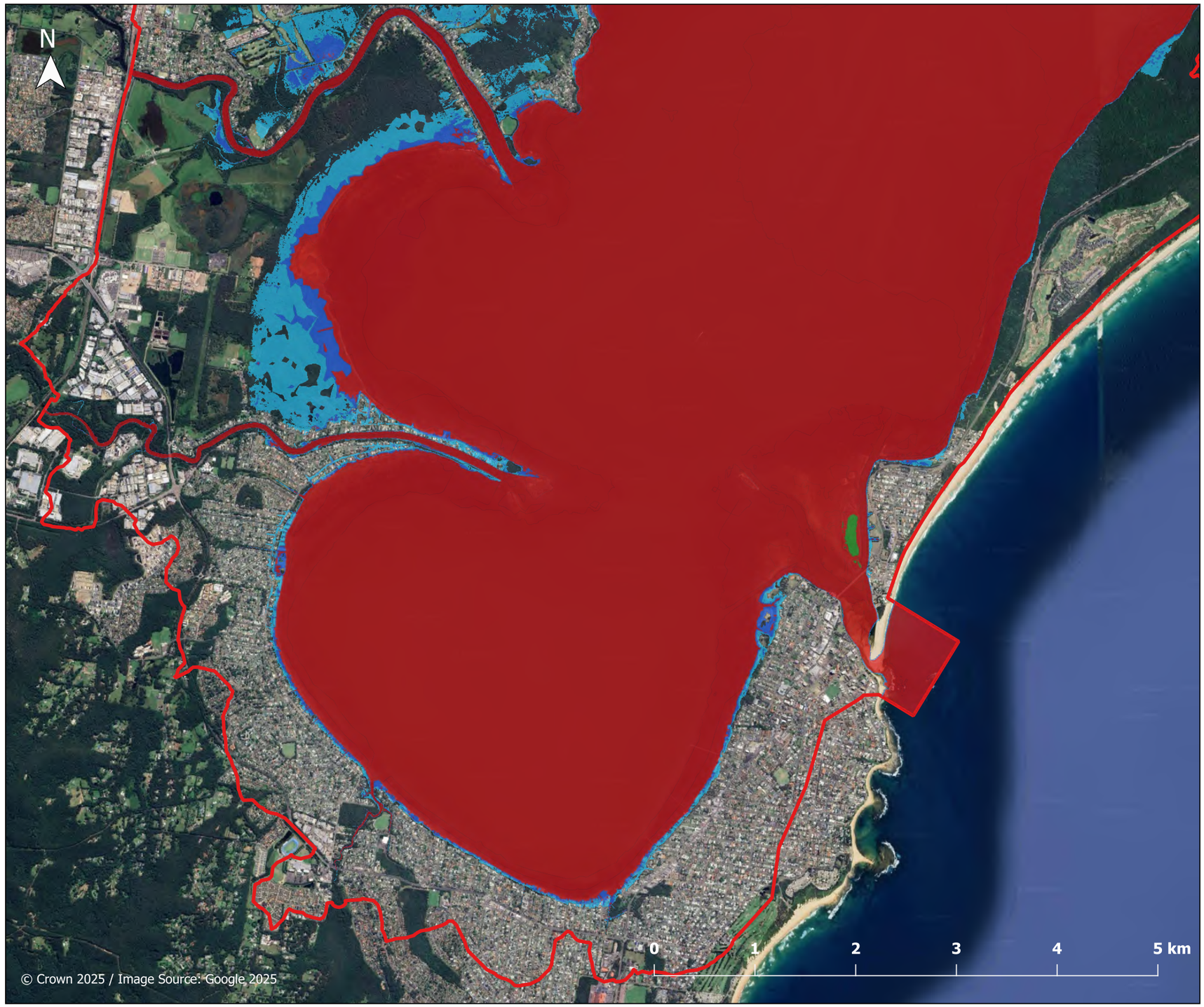

Figure F.1.A

20% AEP flood event - flood emergency response classification

Legend

- Model domain

Flood emergency response classification

- Rising road
- Overland escape
- Low flood island
- High flood island

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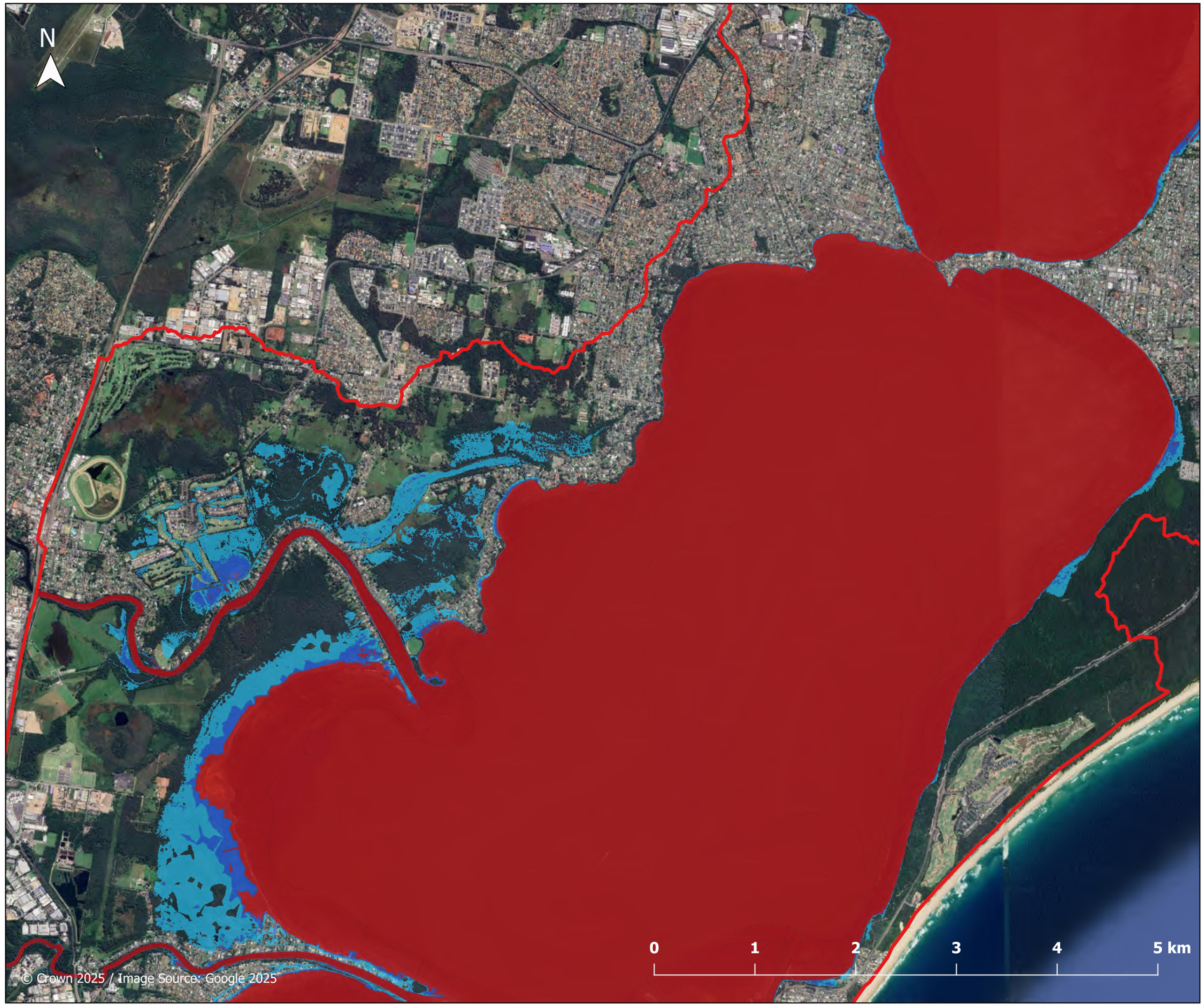

Figure F.1.B

20% AEP flood event - flood emergency response classification

Legend

- Model domain

Flood emergency response classification

- Rising road
- Overland escape
- Low flood island
- High flood island

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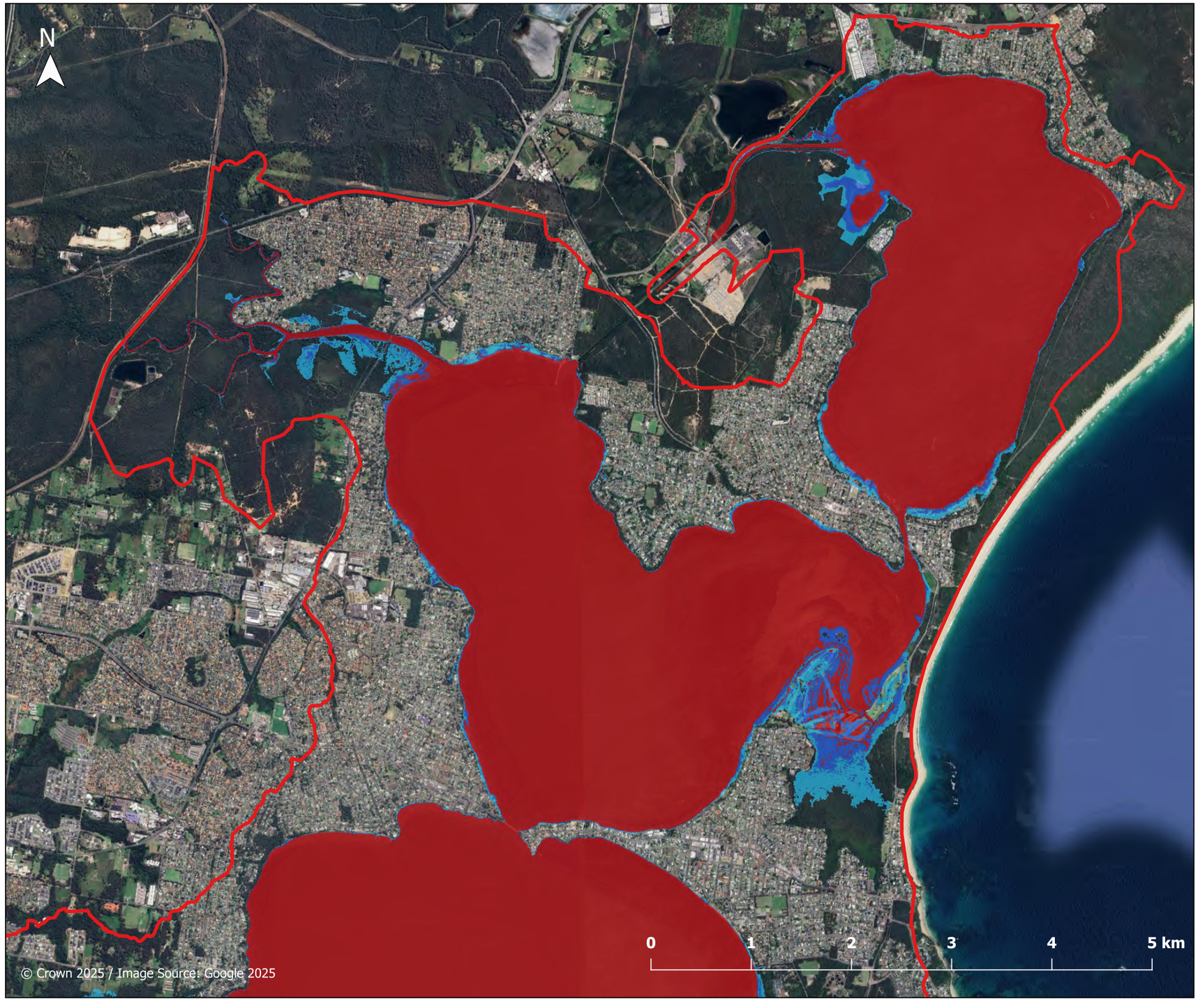

Figure F.1.C

20% AEP flood event - flood emergency response classification

Legend

- Model domain

Flood emergency response classification

- Rising road
- Overland escape
- Low flood island
- High flood island

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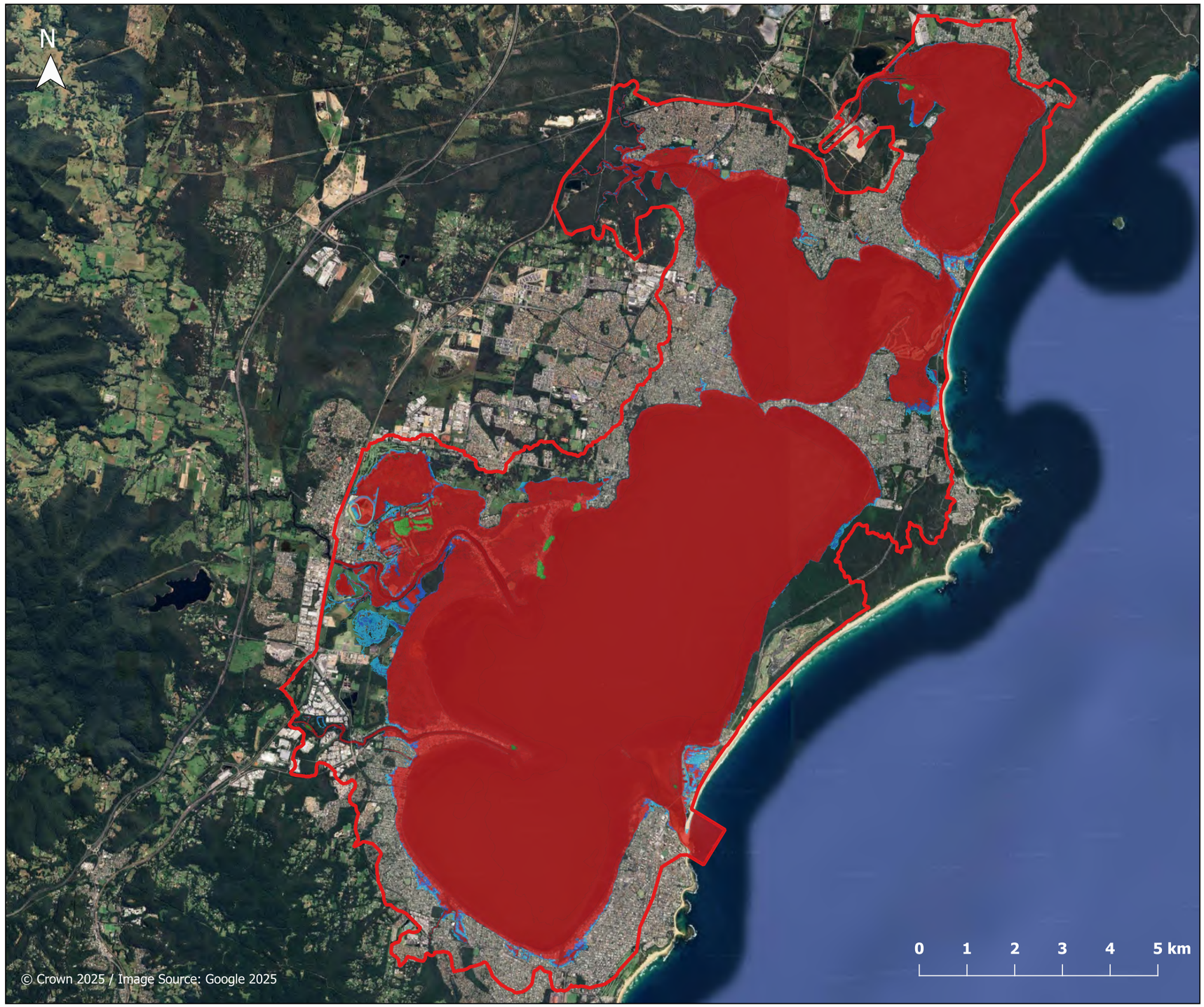

Figure F.2

1% AEP flood event - flood emergency response classification

Legend

Model domain

Flood emergency response classification

- Rising road
- Overland escape
- Low flood island
- High flood island

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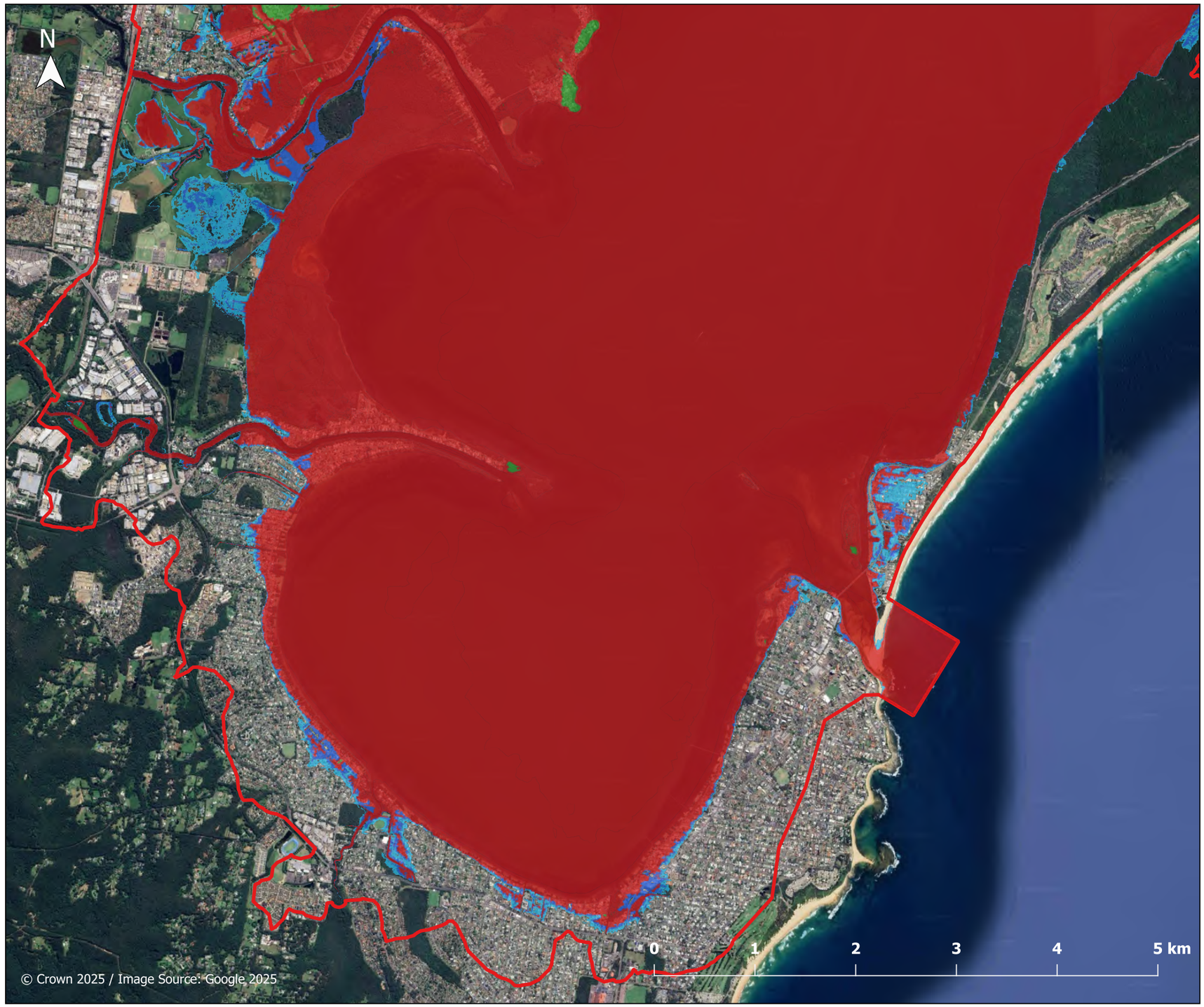

Figure F.2.A

1% AEP flood event - flood emergency response classification

Legend

- Model domain

Flood emergency response classification

- Rising road
- Overland escape
- Low flood island
- High flood island

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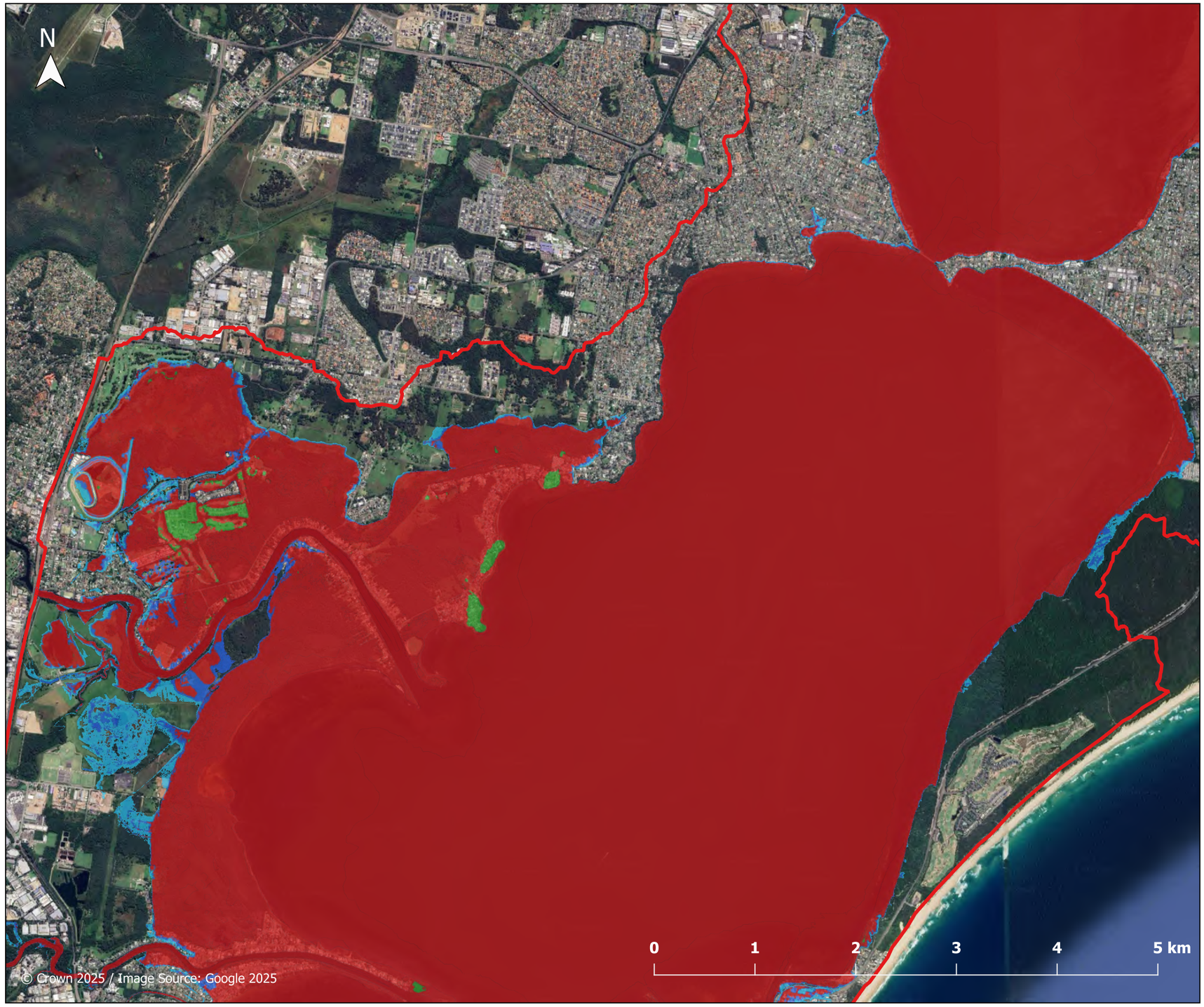

Figure F.2.B

1% AEP flood event - flood emergency response classification

Legend

- Model domain

Flood emergency response classification

- Rising road
- Overland escape
- Low flood island
- High flood island

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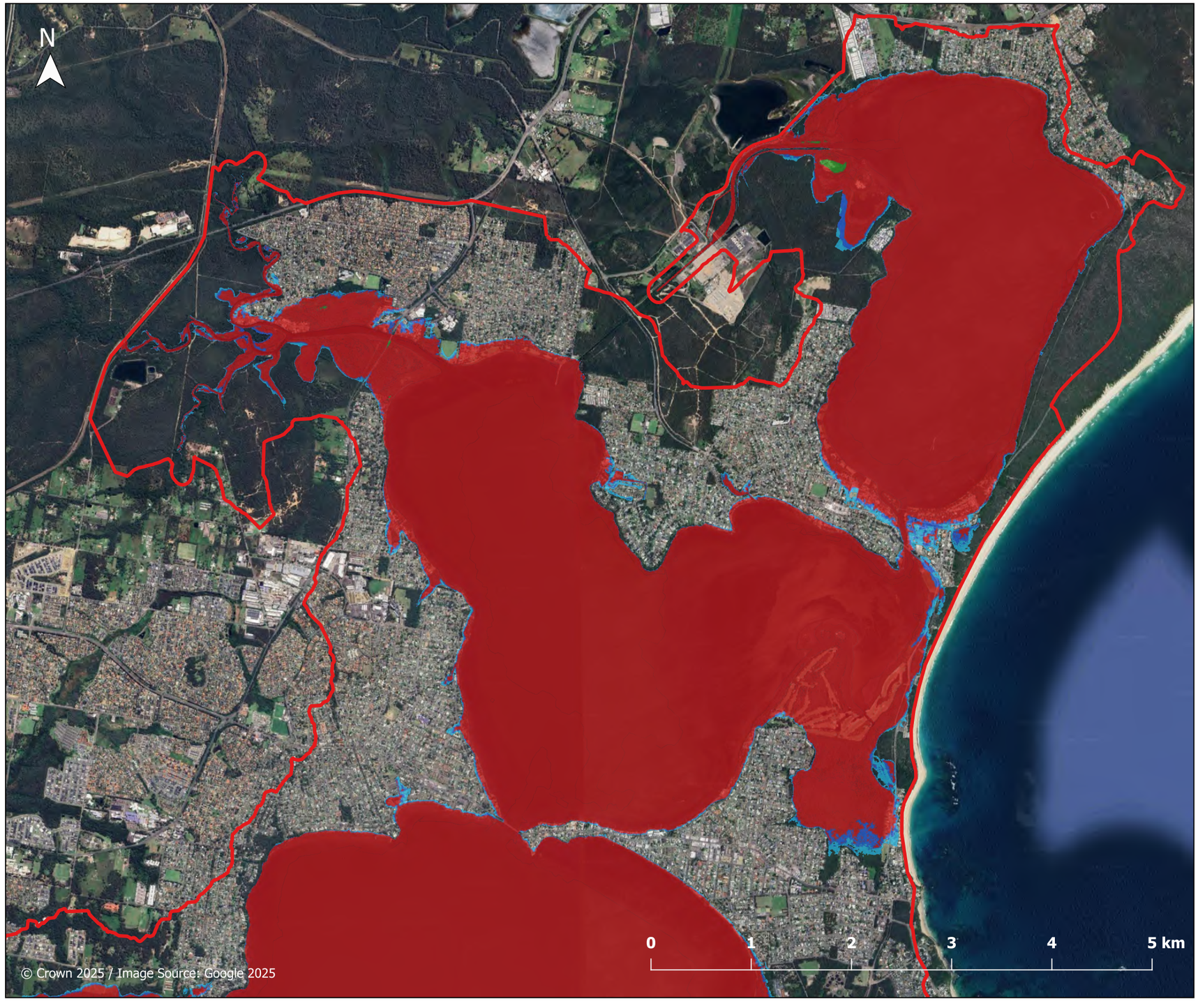

Figure F.2.C

1% AEP flood event - flood emergency response classification

Legend

- Model domain

Flood emergency response classification

- Rising road
- Overland escape
- Low flood island
- High flood island

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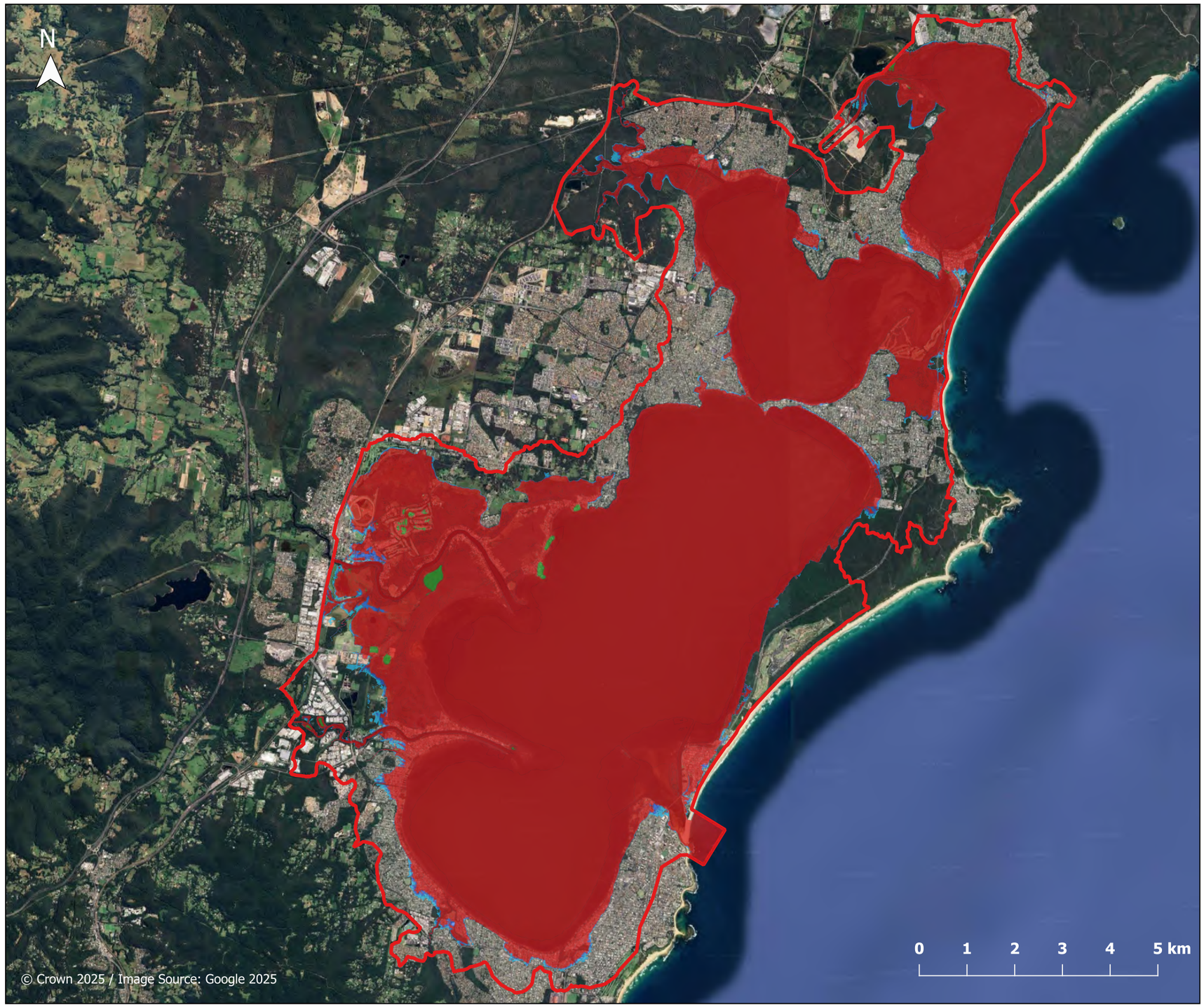

Figure F.3

PMF flood event - flood emergency response classification

Legend

- Model domain

Flood emergency response classification

- Rising road
- Overland escape
- Low flood island
- High flood island

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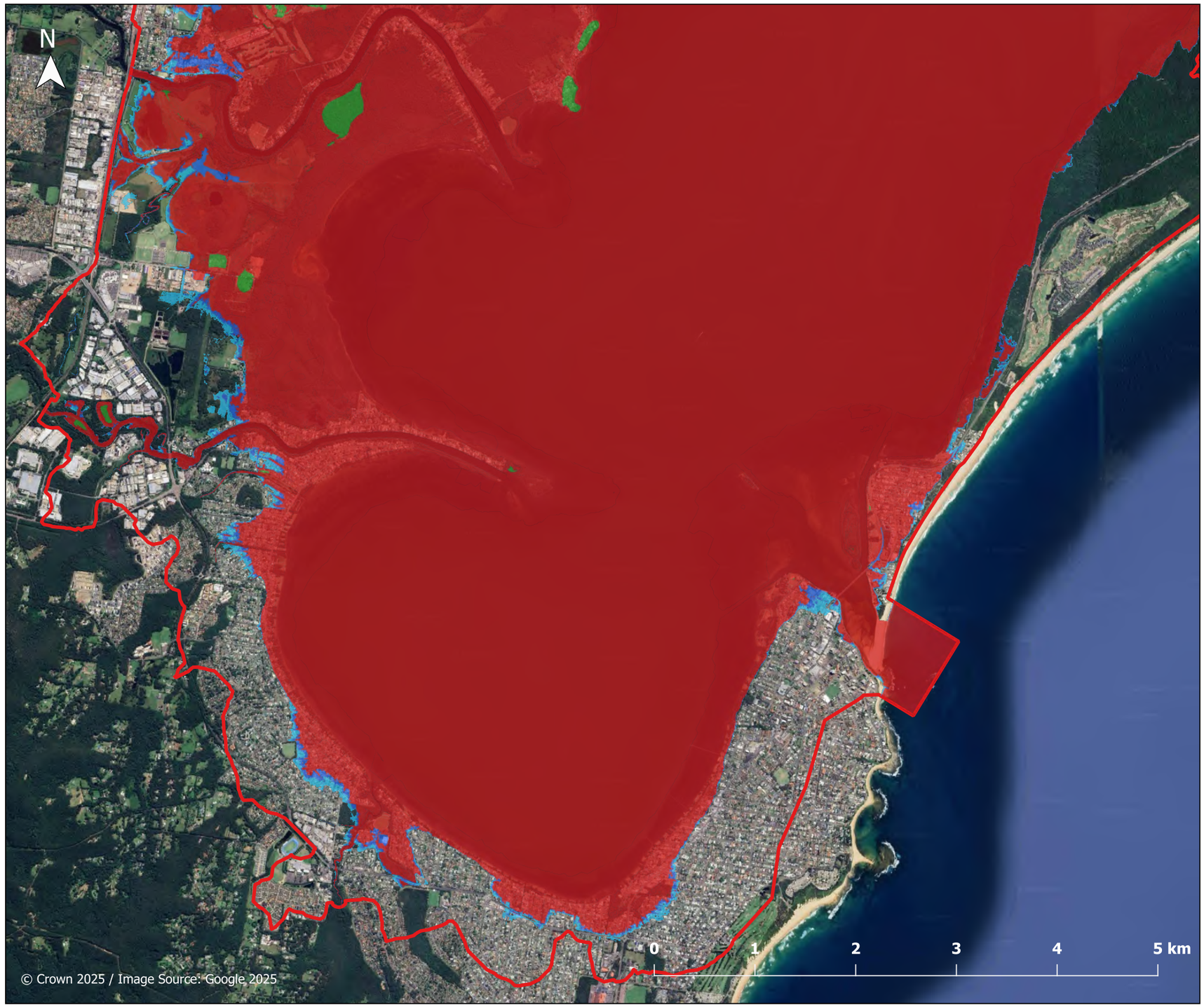

Figure F.3.A

PMF flood event - flood emergency response classification

Legend

- Model domain

Flood emergency response classification

- Rising road
- Overland escape
- Low flood island
- High flood island

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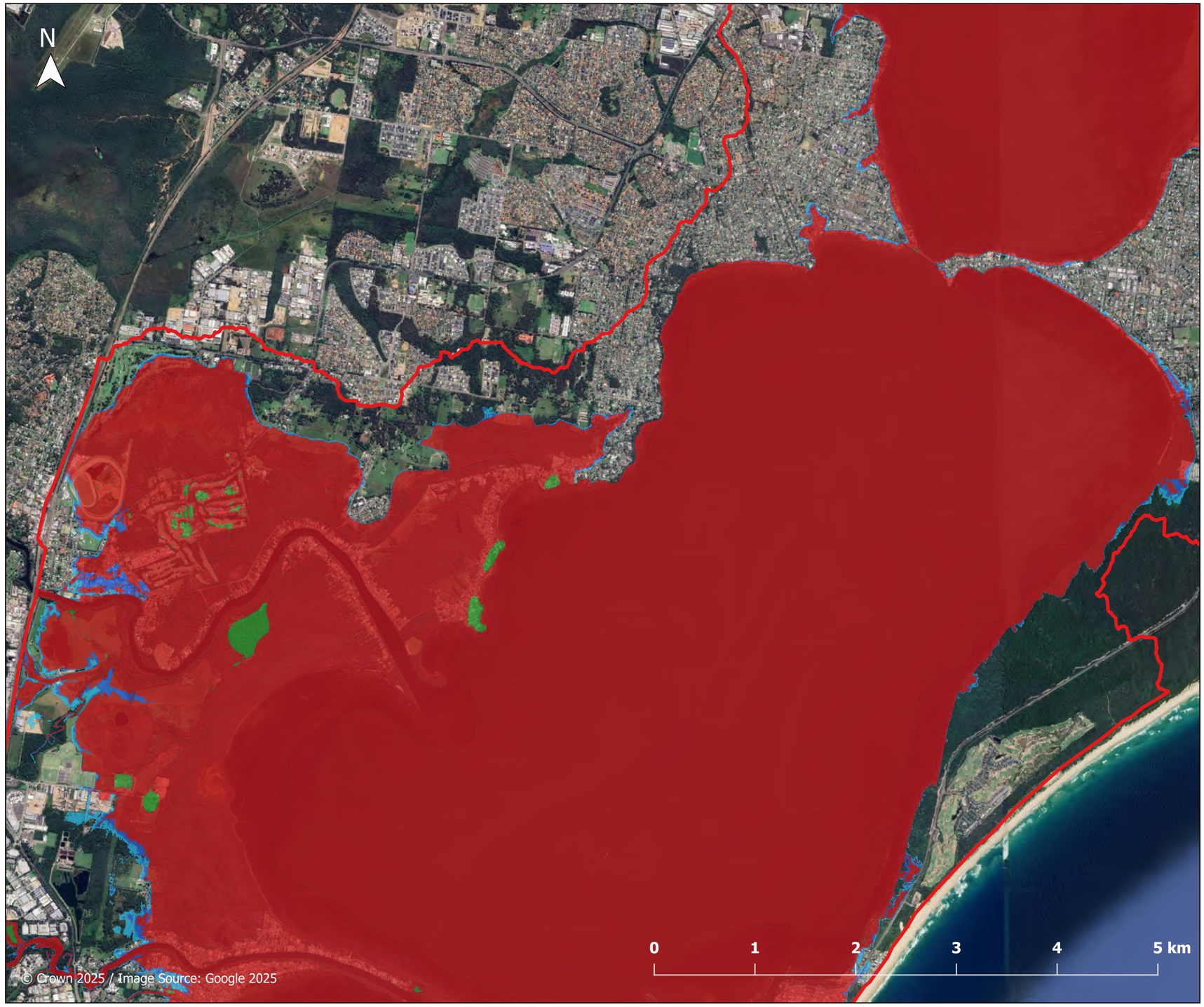

Figure F.3.B

PMF flood event - flood emergency response classification

Legend

- Model domain

Flood emergency response classification

- Rising road
- Overland escape
- Low flood island
- High flood island

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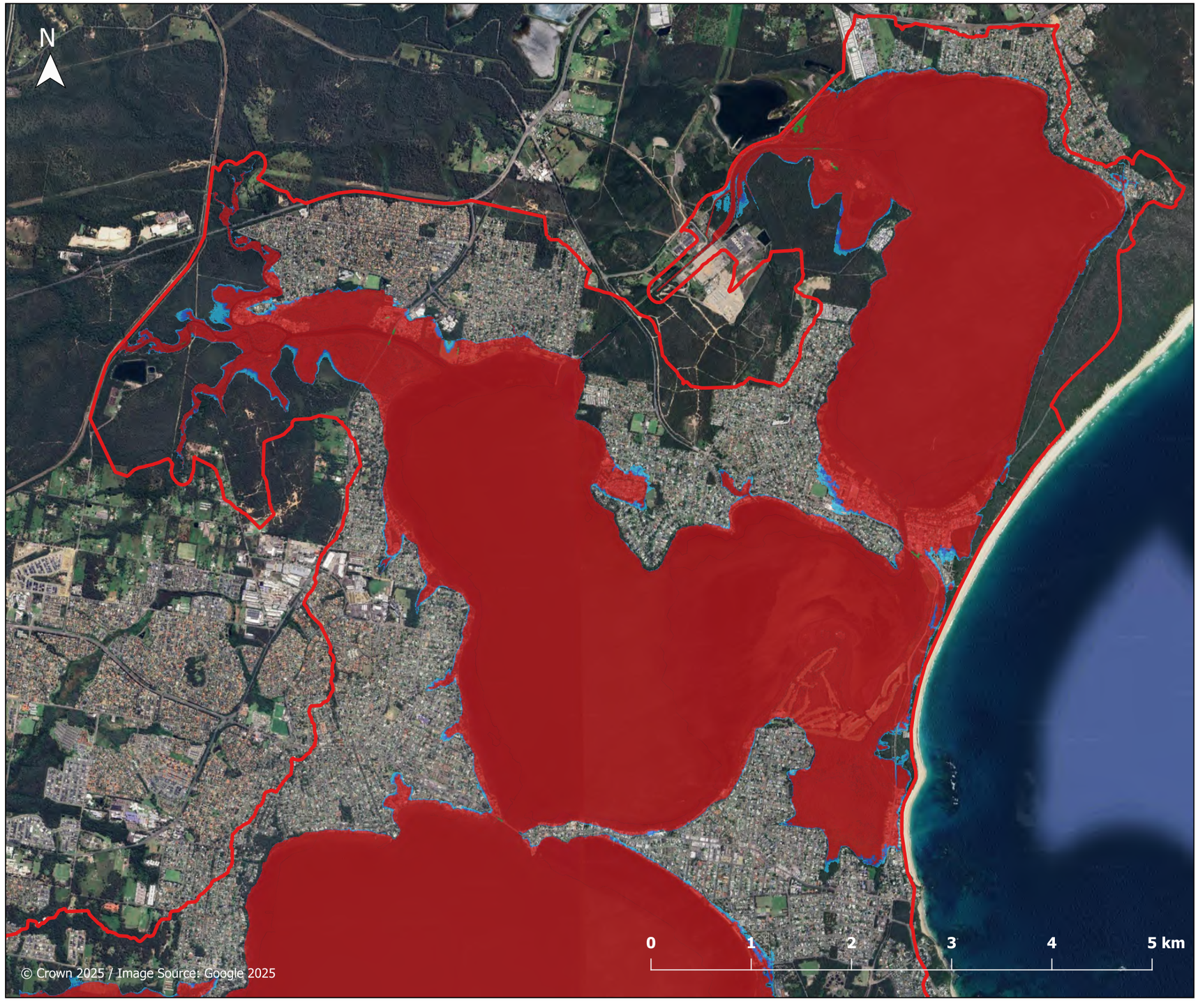

Figure F.3.C

PMF flood event - flood emergency response classification

Legend

- Model domain

Flood emergency response classification

- Rising road
- Overland escape
- Low flood island
- High flood island

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Appendix G Road closure maps

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Figure G.2.1

20% AEP flood event - road closure time

Legend

- Model domain

Road closure time (hours after event start)

- 0 - 5
- 5 - 10
- 10 - 15
- 15 - 20
- 20 - 25
- 25 - 30
- 30 - 35
- 35 - 40
- 40 - 45
- 45 - 50
- 50 - 55
- 55 - 58.2

Disclaimer:
1. The road closure times presented have been based on the maximum level of flooding in the Tuggerah Lakes waterbody and does not consider tributary effects.
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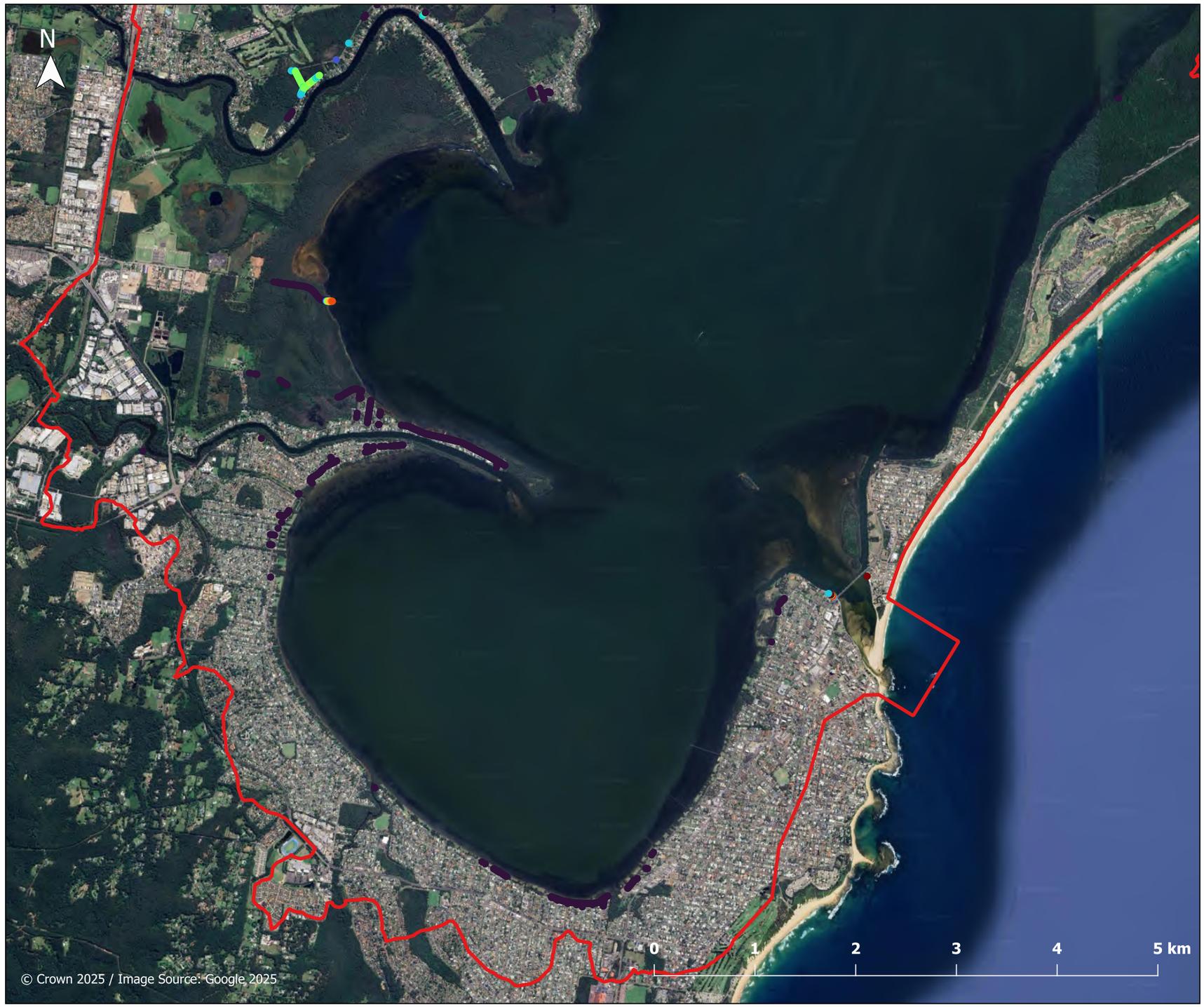

Figure G.2.1.A

20% AEP flood event - road closure time

Legend

- Model domain

Road closure time (hours after event start)

- 0 - 5
- 5 - 10
- 10 - 15
- 15 - 20
- 20 - 25
- 25 - 30
- 30 - 35
- 35 - 40
- 40 - 45
- 45 - 50
- 50 - 55
- 55 - 58.2

Disclaimer:
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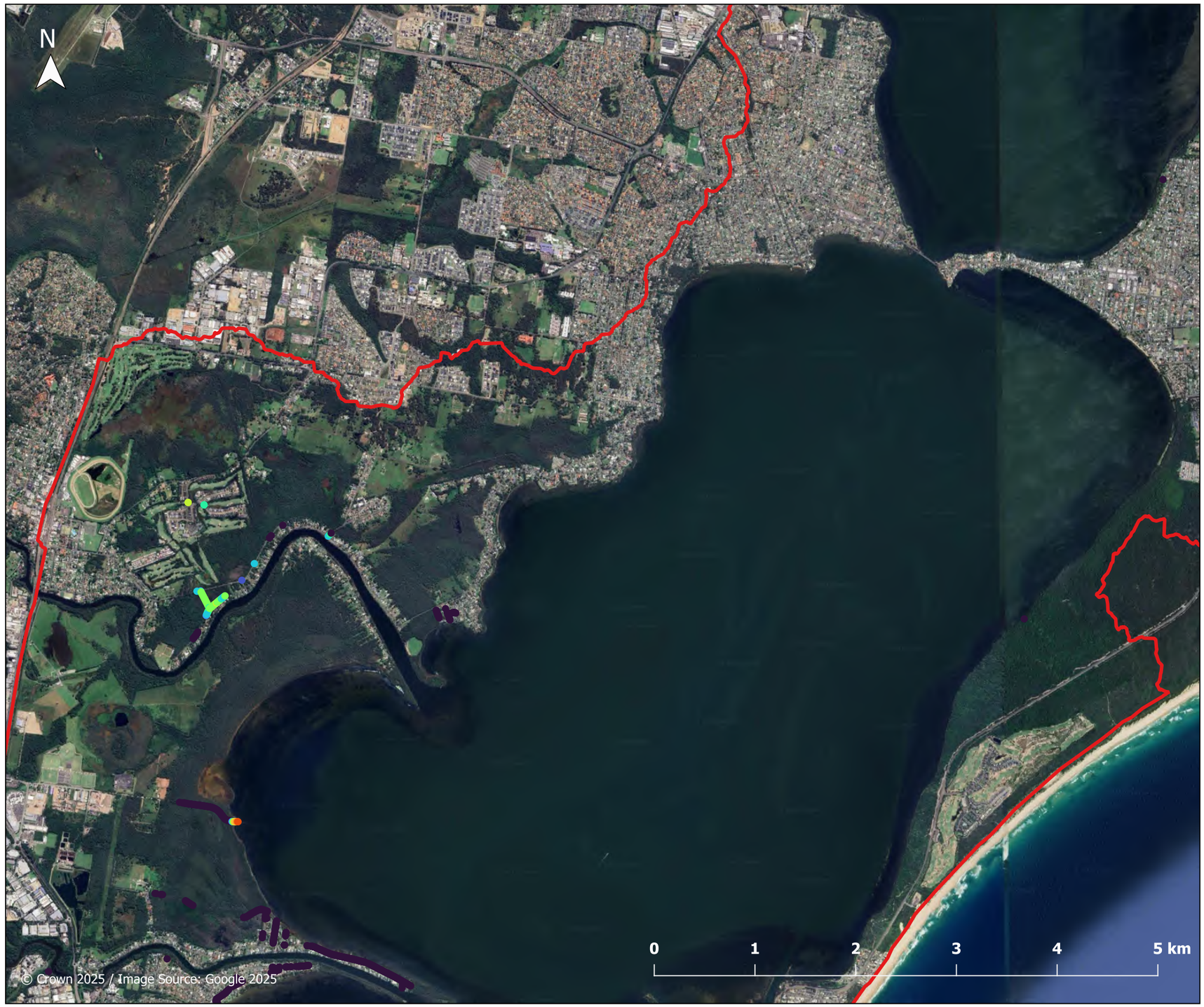

Figure G.2.1.B

20% AEP flood event - road closure time

Legend

- Model domain

Road closure time (hours after event start)

- 0 - 5
- 5 - 10
- 10 - 15
- 15 - 20
- 20 - 25
- 25 - 30
- 30 - 35
- 35 - 40
- 40 - 45
- 45 - 50
- 50 - 55
- 55 - 58.2

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Figure G.2.1.C

20% AEP flood event - road closure time

Legend

Model domain

Road closure time (hours after event start)

- 0 - 5
- 5 - 10
- 10 - 15
- 15 - 20
- 20 - 25
- 25 - 30
- 30 - 35
- 35 - 40
- 40 - 45
- 45 - 50
- 50 - 55
- 55 - 58.2

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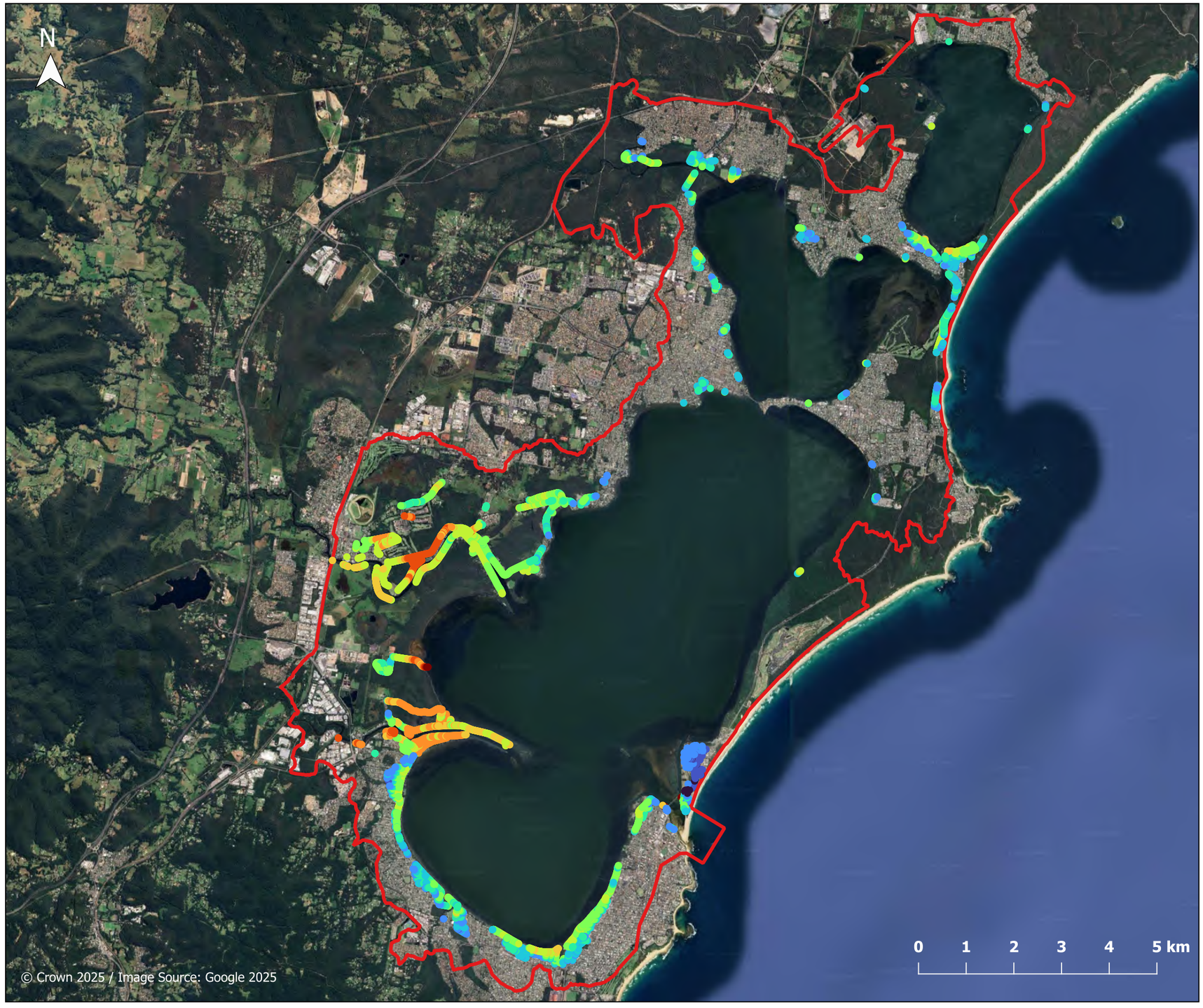

Figure G.2.2

1% AEP flood event - road closure time

Legend

Model domain

Road closure time (hours after event start)

- 0 - 5
- 5 - 10
- 10 - 15
- 15 - 20
- 20 - 25
- 25 - 30
- 30 - 35
- 35 - 40
- 40 - 45
- 45 - 50
- 50 - 55
- 55 - 58.2

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Figure G.2.2.A

1% AEP flood event - road closure time

Legend

Model domain

Road closure time (hours after event start)

- 0 - 5
- 5 - 10
- 10 - 15
- 15 - 20
- 20 - 25
- 25 - 30
- 30 - 35
- 35 - 40
- 40 - 45
- 45 - 50
- 50 - 55
- 55 - 58.2

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Figure G.2.2.B

1% AEP flood event - road closure time

Legend

- Model domain

Road closure time (hours after event start)

- 0 - 5
- 5 - 10
- 10 - 15
- 15 - 20
- 20 - 25
- 25 - 30
- 30 - 35
- 35 - 40
- 40 - 45
- 45 - 50
- 50 - 55
- 55 - 58.2

Disclaimer:
1. The road closure times presented have been based on the maximum level of flooding in the Tuggerah Lakes waterbody and does not consider triburtary effects.
2. Road closure times relating to tributary catchments should be obtained from the respective tributary catchment studies.

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Tuggerah Lakes Flood Study Review

NSW GOVERNMENT
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Figure G.2.2.C

1% AEP flood event - road closure time

Legend

Model domain

Road closure time (hours after event start)

- 0 - 5
- 5 - 10
- 10 - 15
- 15 - 20
- 20 - 25
- 25 - 30
- 30 - 35
- 35 - 40
- 40 - 45
- 45 - 50
- 50 - 55
- 55 - 58.2

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Figure G.2.3

PMF flood event - road closure time

Legend

Model domain

Road closure time (hours after event start)

- 0 - 5
- 5 - 10
- 10 - 15
- 15 - 20
- 20 - 25
- 25 - 30
- 30 - 35
- 35 - 40
- 40 - 45
- 45 - 50
- 50 - 55
- 55 - 58.2

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Figure G.2.3.A

PMF flood event - road closure time

Legend

- Model domain

Road closure time (hours after event start)

- 0 - 5
- 5 - 10
- 10 - 15
- 15 - 20
- 20 - 25
- 25 - 30
- 30 - 35
- 35 - 40
- 40 - 45
- 45 - 50
- 50 - 55
- 55 - 58.2

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Tuggerah Lakes Flood Study Review

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Figure G.2.3.B

PMF flood event - road closure time

Legend

- Model domain

Road closure time (hours after event start)

- 0 - 5
- 5 - 10
- 10 - 15
- 15 - 20
- 20 - 25
- 25 - 30
- 30 - 35
- 35 - 40
- 40 - 45
- 45 - 50
- 50 - 55
- 55 - 58.2

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Figure G.2.3.C

PMF flood event - road closure time

Legend

Model domain

Road closure time (hours after event start)

- 0 - 5
- 5 - 10
- 10 - 15
- 15 - 20
- 20 - 25
- 25 - 30
- 30 - 35
- 35 - 40
- 40 - 45
- 45 - 50
- 50 - 55
- 55 - 58.2

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Figure G.1.1

20% AEP flood event - road closure duration

Legend

Model domain

Road closure duration (hours)

- 0.1 - 10
- 10 - 20
- 20 - 30
- 30 - 40
- 40 - 50
- 50 - 60
- 60 - 70
- 70 - 80
- 80 - 90
- 90 - 100
- 100 - 110
- 110 - 119.7

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Figure G.1.1.A

20% AEP flood event - road closure duration

Legend

- Model domain

Road closure duration (hours)

- 0.1 - 10
- 10 - 20
- 20 - 30
- 30 - 40
- 40 - 50
- 50 - 60
- 60 - 70
- 70 - 80
- 80 - 90
- 90 - 100
- 100 - 110
- 110 - 119.7

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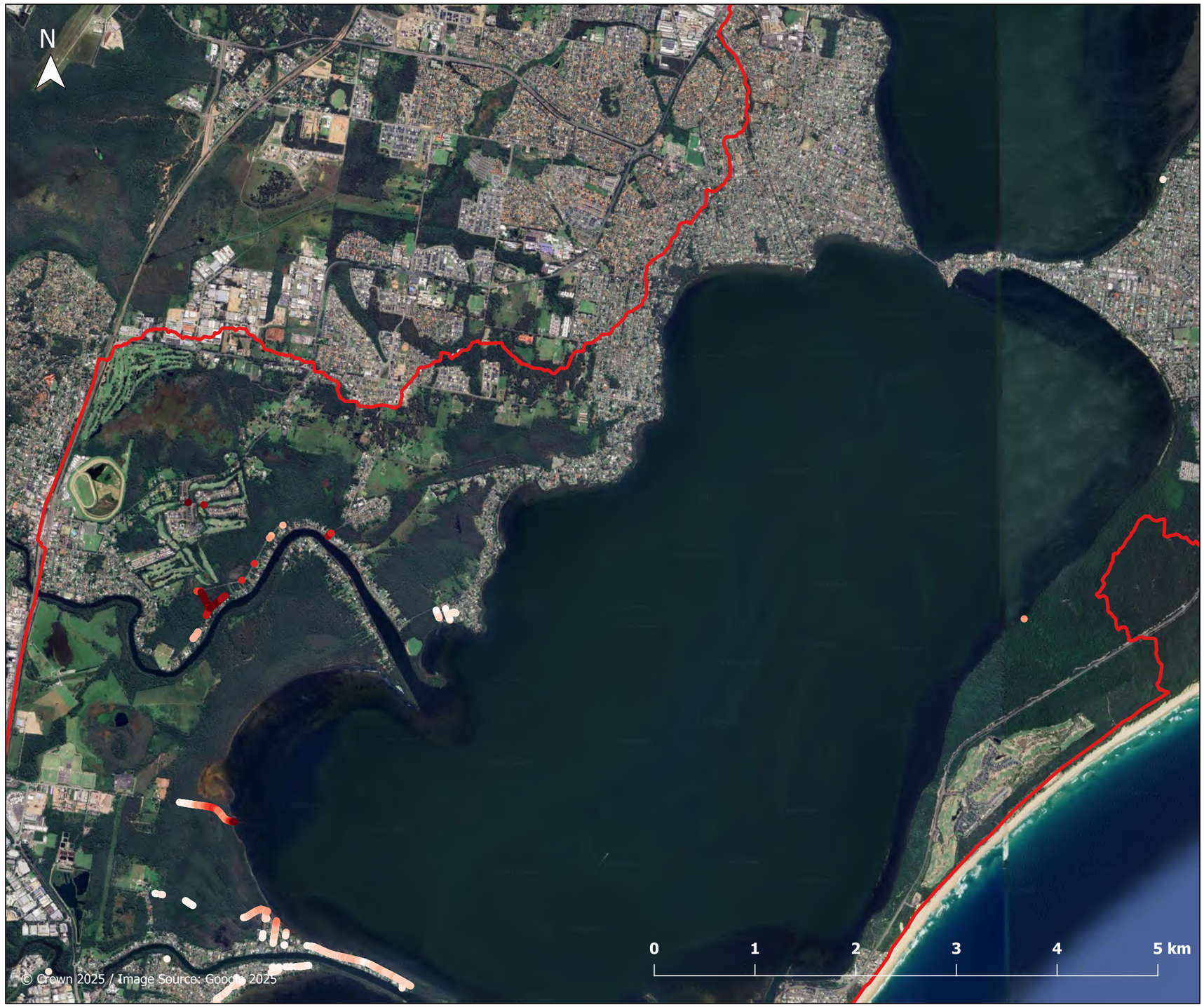

Figure G.1.1.B

20% AEP flood event - road closure duration

Legend

- Model domain

Road closure duration (hours)

- 0.1 - 10
- 10 - 20
- 20 - 30
- 30 - 40
- 40 - 50
- 50 - 60
- 60 - 70
- 70 - 80
- 80 - 90
- 90 - 100
- 100 - 110
- 110 - 119.7

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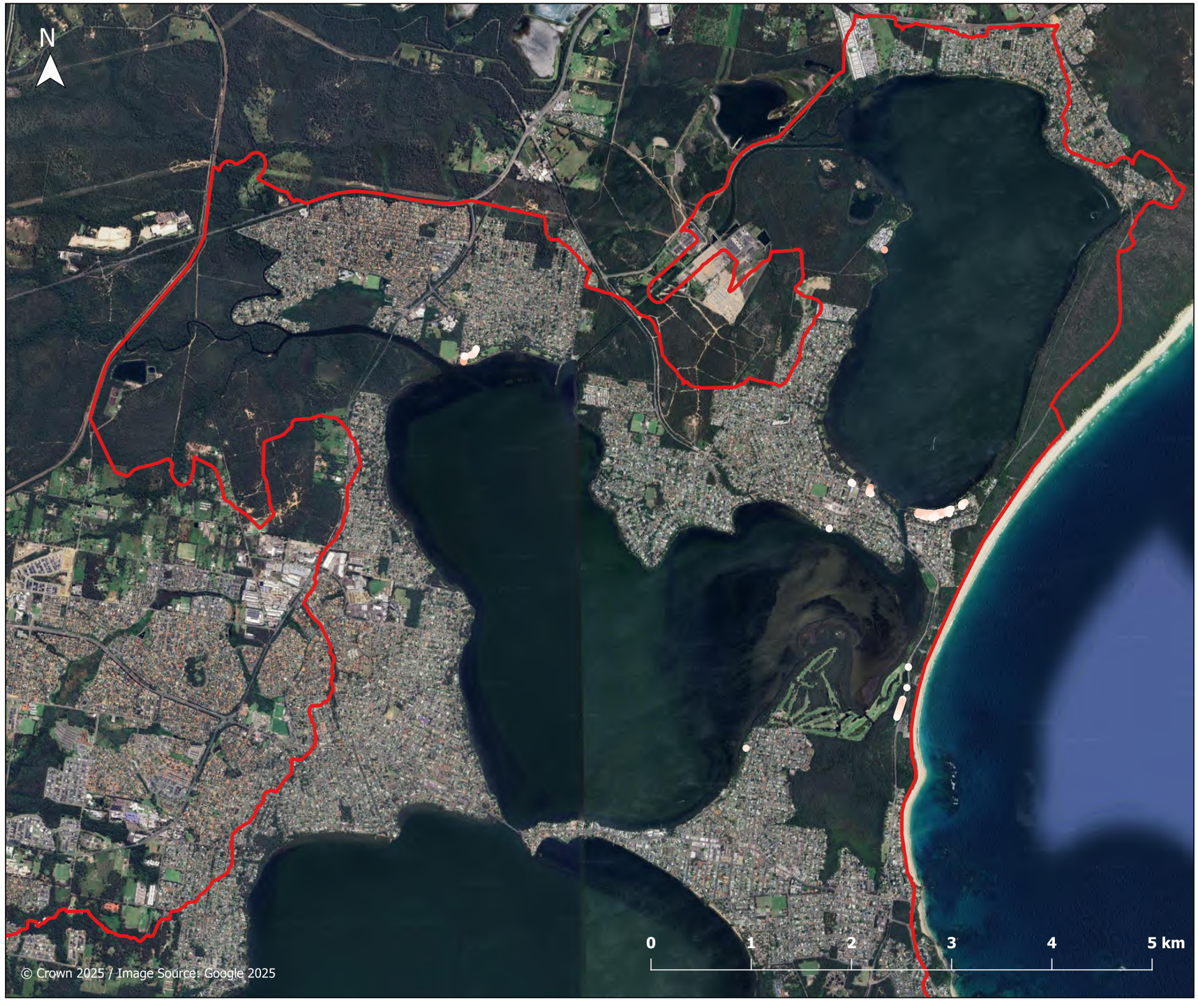

Figure G.1.1.C

20% AEP flood event - road closure duration

Legend

Model domain

Road closure duration (hours)

- 0.1 - 10
- 10 - 20
- 20 - 30
- 30 - 40
- 40 - 50
- 50 - 60
- 60 - 70
- 70 - 80
- 80 - 90
- 90 - 100
- 100 - 110
- 110 - 119.7

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Figure G.1.2

1% AEP flood event - road closure duration

Legend

Model domain

Road closure duration (hours)

- 0.1 - 10
- 10 - 20
- 20 - 30
- 30 - 40
- 40 - 50
- 50 - 60
- 60 - 70
- 70 - 80
- 80 - 90
- 90 - 100
- 100 - 110
- 110 - 119.7

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Figure G.1.2.A

1% AEP flood event - road closure duration

Legend

- Model domain

Road closure duration (hours)

- 0.1 - 10
- 10 - 20
- 20 - 30
- 30 - 40
- 40 - 50
- 50 - 60
- 60 - 70
- 70 - 80
- 80 - 90
- 90 - 100
- 100 - 110
- 110 - 119.7

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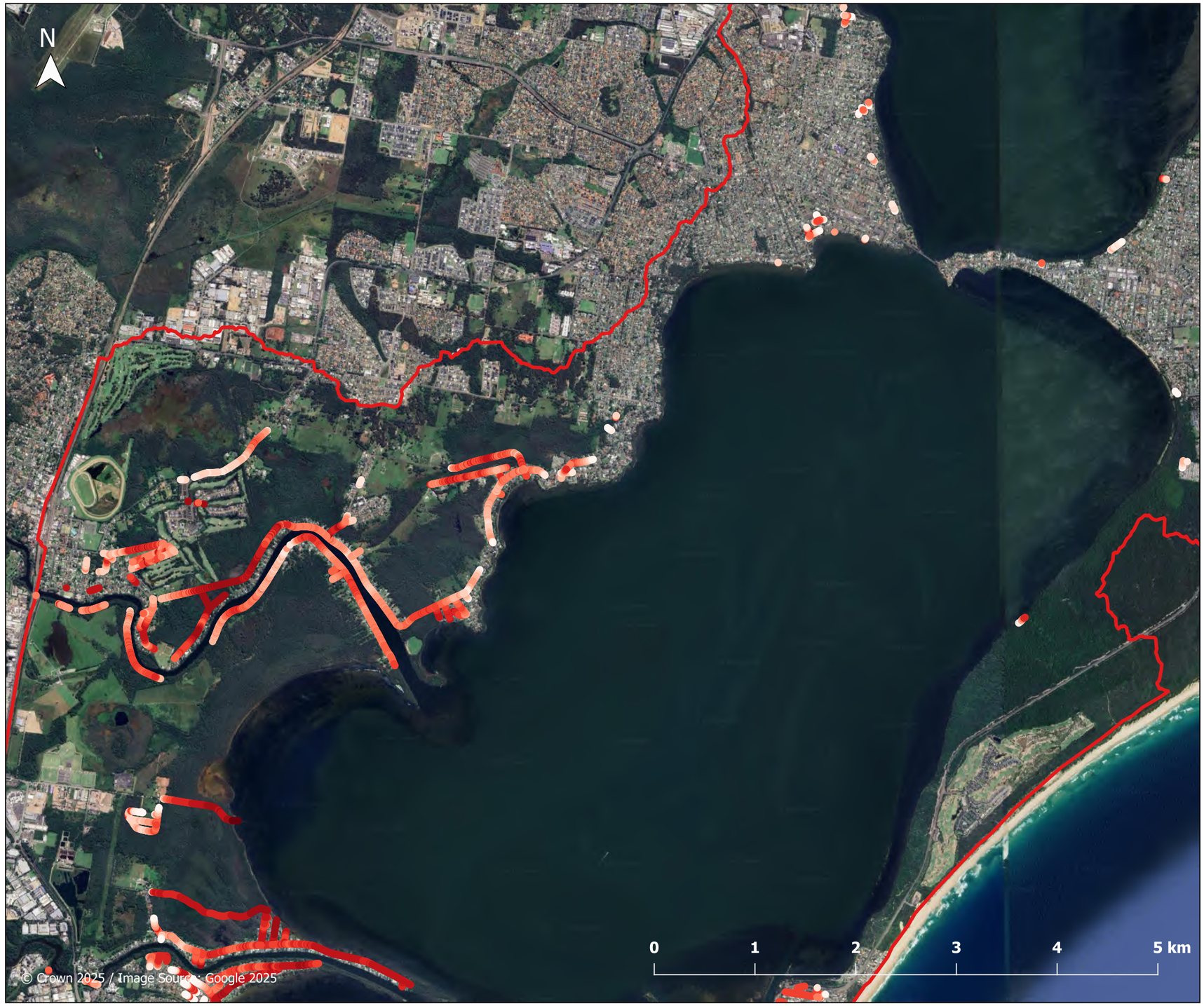

Figure G.1.2.B

1% AEP flood event - road closure duration

Legend

- Model domain

Road closure duration (hours)

- 0.1 - 10
- 10 - 20
- 20 - 30
- 30 - 40
- 40 - 50
- 50 - 60
- 60 - 70
- 70 - 80
- 80 - 90
- 90 - 100
- 100 - 110
- 110 - 119.7

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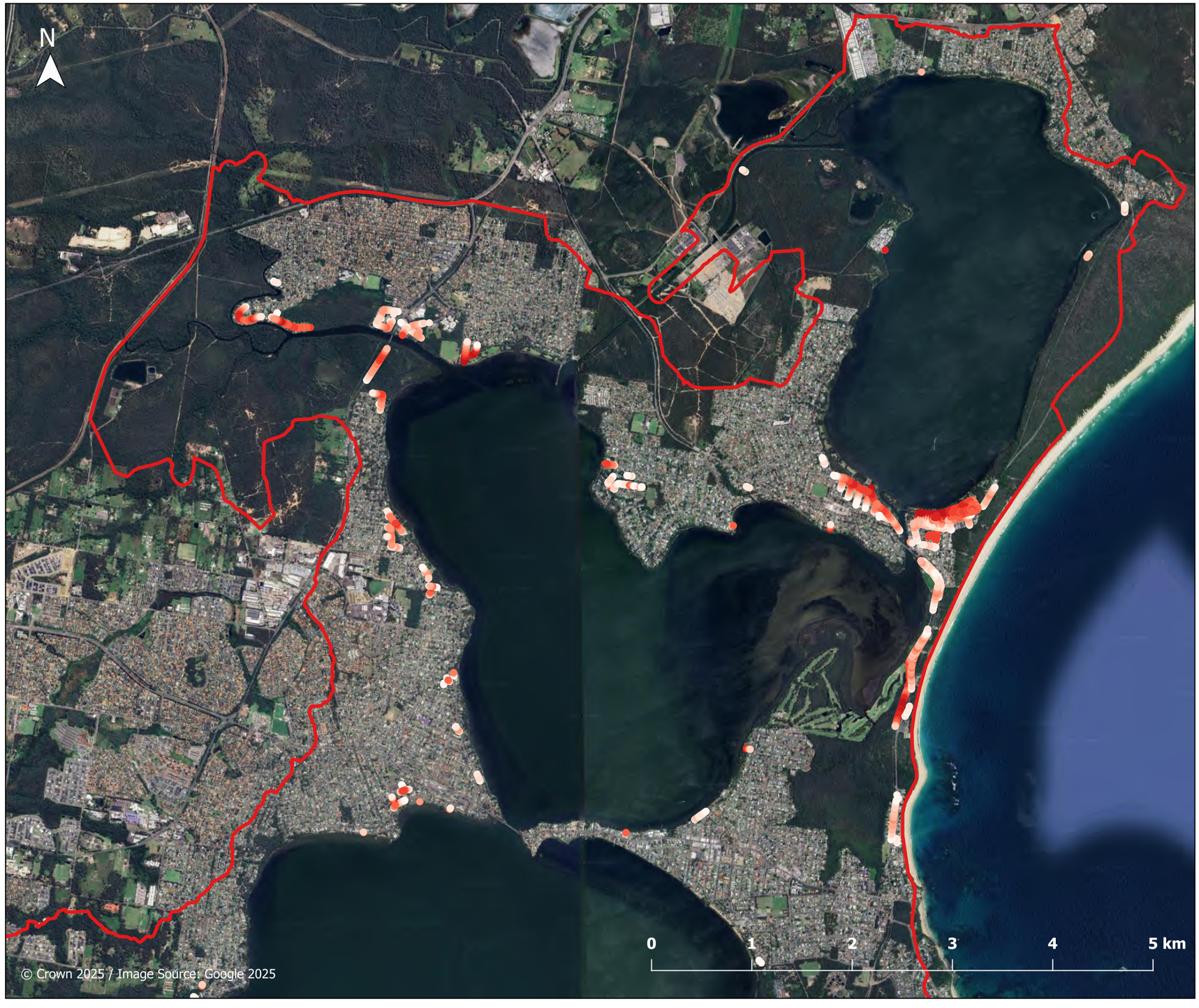

Figure G.1.2.C

1% AEP flood event - road closure duration

Legend

- Model domain

Road closure duration (hours)

- 0.1 - 10
- 10 - 20
- 20 - 30
- 30 - 40
- 40 - 50
- 50 - 60
- 60 - 70
- 70 - 80
- 80 - 90
- 90 - 100
- 100 - 110
- 110 - 119.7

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Figure G.1.3

PMF flood event - road closure duration

Legend

Model domain

Road closure duration (hours)

- 0.1 - 10
- 10 - 20
- 20 - 30
- 30 - 40
- 40 - 50
- 50 - 60
- 60 - 70
- 70 - 80
- 80 - 90
- 90 - 100
- 100 - 110
- 110 - 119.7

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Figure G.1.3.A

PMF flood event - road closure duration

Legend

Model domain

Road closure duration (hours)

- 0.1 - 10
- 10 - 20
- 20 - 30
- 30 - 40
- 40 - 50
- 50 - 60
- 60 - 70
- 70 - 80
- 80 - 90
- 90 - 100
- 100 - 110
- 110 - 119.7

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Figure G.1.3.B

PMF flood event - road closure duration

Legend

- Model domain

Road closure duration (hours)

- 0.1 - 10
- 10 - 20
- 20 - 30
- 30 - 40
- 40 - 50
- 50 - 60
- 60 - 70
- 70 - 80
- 80 - 90
- 90 - 100
- 100 - 110
- 110 - 119.7

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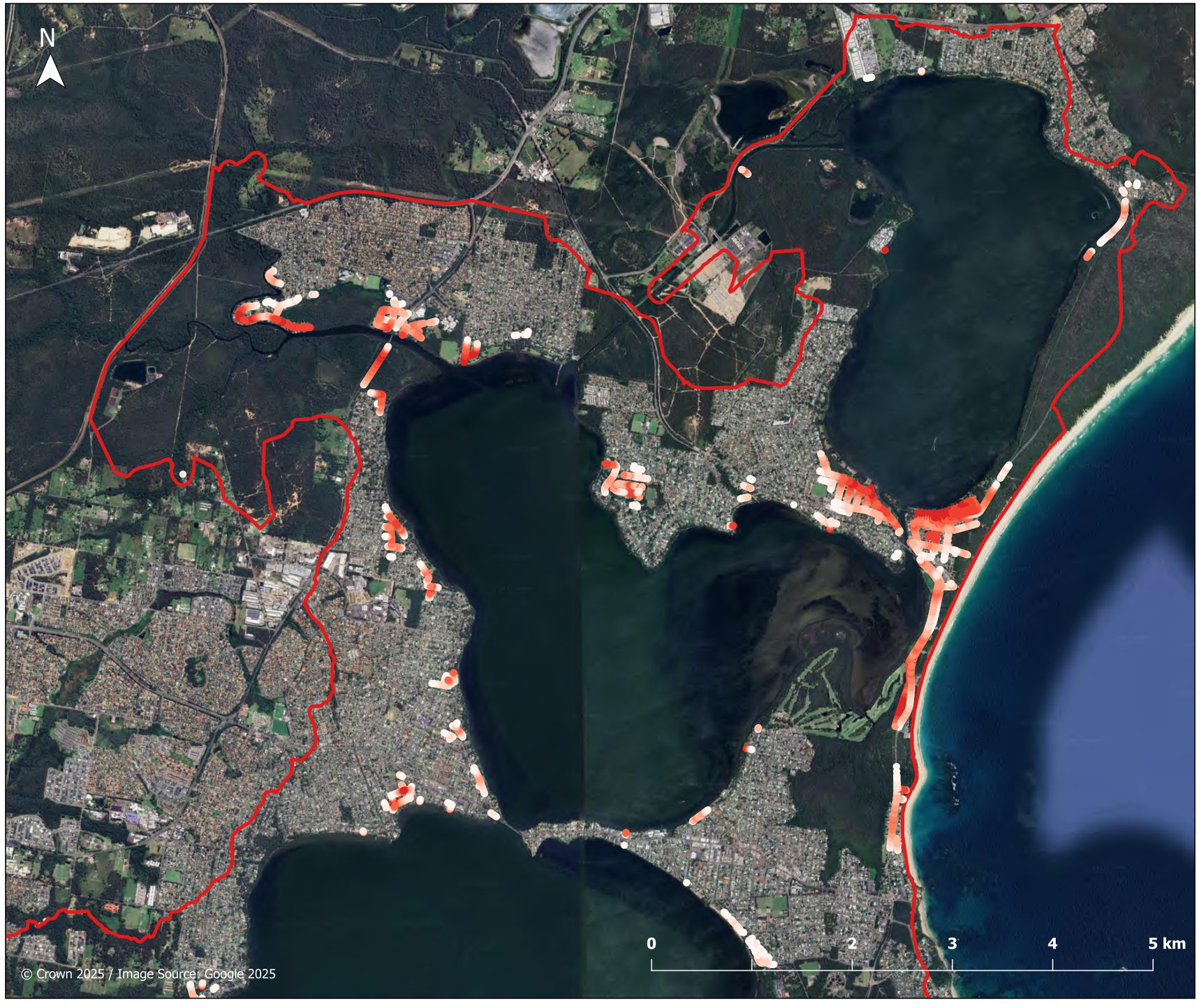

Figure G.1.3.C

PMF flood event - road closure duration

Legend

Model domain

Road closure duration (hours)

- 0.1 - 10
- 10 - 20
- 20 - 30
- 30 - 40
- 40 - 50
- 50 - 60
- 60 - 70
- 70 - 80
- 80 - 90
- 90 - 100
- 100 - 110
- 110 - 119.7

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Part 3 Environmental Controls
Chapter 3.6 Heritage Conservation

CHAPTER 3.6 HERITAGE CONSERVATION

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3.6.1 INTRODUCTION

Heritage consists of the places and objects that we have inherited from the past, and that we want to pass on to future generations. The Central Coast has a rich and varied heritage. The Aboriginal heritage of the Central Coast includes tangible and intangible markers allowing for a rich understanding of the traditional connection of Aboriginal people, past and present, to Country. The Central Coast also has a rich diversity of heritage buildings, places and archaeological sites that demonstrate the settlement and use of the region post-1788.

Heritage items, heritage conservation areas and Aboriginal places and objects in the Central Coast LGA are protected under State legislation and local planning controls. This Chapter has been prepared to provide guidance to persons proposing to carry out development that involves cultural heritage in the Central Coast LGA. This is to ensure that our heritage is protected and enhanced, while allowing our towns, suburbs, and cities to grow and evolve.

This Chapter has been prepared to support the provisions of Clause 5.10 of the *Central Coast Local Environmental Plan* 2022 (CCLEP 2022) and the provisions of Clause 5.36 of Chapter 5 Gosford City Centre of the *State Environmental Planning Policy (Precincts-Regional) 2021* (Regional SEPP).

This Chapter is also guided by the conservation policy, principles and definitions established in the Australia ICOMOS *Charter for the Conservation of Places of Cultural Significance* (The Burra Charter).

3.6.1.1 Aims

The aims of this chapter are to:

- conserve Aboriginal objects and places, heritage items, and heritage conservation areas in the Central Coast;
- ensure that development of heritage items conserves and respects the heritage significance of the item including fabric and setting;
- ensure that Aboriginal cultural heritage and archaeology are given due consideration during the development process;
- ensure that new development is based on an understanding of the significance of heritage items and heritage conservation areas;
- ensure that development in the vicinity of heritage items and heritage conservation areas respects the heritage item or place in terms of siting, scale, orientation, and character and does not impact on setting or impede views; and
- facilitate the implementation of the objectives and provisions relating to heritage conservation which are contained within the CCLEP 2022.

3.6.1.2 Land to which this chapter applies

This Chapter applies to all land to which the CCLEP 2022 applies. This Chapter applies also to land covered by the Chapter 5 of the Regional SEPP.

Relationship to other plans and policies

This Chapter must be read in conjunction with other relevant Chapters within the DCP. Where there is an inconsistency, the provisions of this Chapter prevail.

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Gosford City Centre

Development within Gosford City Centre is guided by the *Gosford City Centre Development Control Plan 2018* (Gosford City Centre DCP 2018). The Gosford City Centre DCP 2018 adopts the provisions of this DCP. Where the provisions in this Chapter conflict with those in the Gosford City Centre DCP 2018, the provisions of the latter prevail.

3.6.1.3 Development to which this chapter applies

This Chapter applies to development on land that contains, or is in the vicinity of, an Aboriginal object or place, an archaeological site, or a heritage item or heritage conservation area.

Applicants can contact Council's Heritage Officer for advice on application requirements, heritage significance and best practice conservation practices.

Development without consent

Some works or activities may not require development consent; however, may still require notification to or consultation with Council. See below for types of development that may not require consent.

Minor works and essential maintenance

Clause 5.10(3) of the CCLEP 2022 and Clause 5.36(3) of the Regional SEPP allow property owners to seek an exemption from formal development approval for minor works or maintenance that will not negatively impact the heritage significance of their property. This process helps simplify the management of heritage properties while safeguarding their heritage value.

Before beginning any work, property owners must submit the **Heritage Exemption Form** for assessment by the Council's Heritage Team and must receive written approval from Central Coast Council.

Minor works and essential maintenance might include:

- minor repairs using the same materials and finishes
- resealing/treating timber
- replacing broken windows
- re-hanging doors or gates
- repainting
- replacing or establishing gutters and downpipes
- re-pointing brickwork
- restoring posts or fence posts
- repairing stonework and plasterwork
- underpinning and damp proofing
- replacing plumbing and wiring
- general maintenance of heritage gardens (pruning or replanting original species)

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- under certain circumstances the installation of solar panels (subject to certain location and criteria).

Refer to Council's website for further information, and to access the **Heritage Exemption Form**:

https://www.centralcoast.nsw.gov.au/heritage-exemption-and-heritage-nomination-forms

Exempt development

Exempt development is development that does not require planning or building approval. Exempt development applies to works that are low impact, provided that they meet all relevant development standards.

The majority of exempt development types and their relevant standards are identified in the *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008* (Codes SEPP). Other types of development may be exempt under other plans or policies.

However, not all types of exempt development are applicable if they involve a heritage item, heritage conservation area, or Aboriginal object or place.

Refer to NSW Government guidance for further information:

https://www.planning.nsw.gov.au/assess-and-regulate/development-assessment/planning-approval-pathways/exempt-development

Complying development

Complying development is development that is considered to have a minor environmental impact on neighbourhood amenity which can be addressed by predetermined development standards. Complying development approvals are determined through a fast-track assessment process by Council or an accredited certifier. The majority of complying development types and their standards are outlined in the Codes SEPP.

However, complying development does not apply to land that is identified as a heritage item. Some types of complying development do not apply in heritage conservation areas.

Refer to NSW Government guidance for further information:

https://www.planning.nsw.gov.au/assess-and-regulate/development-assessment/planning-approval-pathways/complying-development

Development with consent

All other development types require consent from Central Coast Council through the Development Application (DA) process.

Information about the DA process can be found on Council's website:

- https://www.centralcoast.nsw.gov.au/plan-and-build/development-applications/understanding-development-process

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Conservation incentives

Clause 5.10(10) of the CCLEP 2022 (and Clause 5.36(10) of the Regional SEPP) provides for specific circumstances where Conservation Incentives may be applicable. Conservation incentives may be applicable to development:

- On land containing a heritage item or Aboriginal place of heritage significance, and
- That proposes a purpose that is otherwise not permissible under the relevant plan.

The conservation incentive clause will only apply if the consent authority is satisfied that:

(a) the conservation of the heritage item or Aboriginal place of heritage significance is facilitated by the granting of consent, and

(b) the proposed development is in accordance with a heritage management document that has been approved by the consent authority, and

(c) the consent to the proposed development would require that all necessary conservation work identified in the heritage management document is carried out, and

(d) the proposed development would not adversely affect the heritage significance of the heritage item, including its setting, or the heritage significance of the Aboriginal place of heritage significance, and

(e) the proposed development would not have any significant adverse effect on the amenity of the surrounding area.

Development applications under this clause must be supported by a Conservation Management Plan that demonstrates that the proposed development meets the above requirements.

Most development proposals involving a heritage item or heritage conservation area will not involve Clause 5.10(10) (or Clause 5.36(10)). Consult with a suitably experienced heritage professional to determine whether this clause applies to your proposed development.

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3.6.2 ABORIGINAL HERITAGE

Aboriginal cultural heritage consists of places, traditions, beliefs, customs, values, and objects that represent the history of Aboriginal generations past and continuing and are of cultural and heritage significance to Aboriginal people.

First Nations people have lived within the Central Coast LGA for over 50,000 years. There are thousands of registered Aboriginal places and objects within the Central Coast LGA that speak to this long and enduring connection to Country. These include habitation sites, rock engravings and stencil art sites, axe grinding grooves sites, middens, culturally modified trees, stone arrangements, and stone artefact scatters.

Legislative framework

The primary legislative instrument for the protection of Aboriginal cultural heritage in NSW is the *National Parks and Wildlife Act 1974* (NPW Act).

Aboriginal cultural heritage is also protected under:

- *Environmental Planning and Assessment Act 1979* (NSW)
- *Central Coast Local Environmental Plan 2022*
- *Heritage Act 1977* (NSW)

Registered Aboriginal sites are recorded on the Aboriginal Heritage Information Management System (AHIMS). Several Aboriginal sites are listed as heritage items on Schedule 5 of the CCLEP 2022. In addition, State Heritage Register items may include objects or places of Aboriginal cultural heritage.

Approval requirements under the National Parks and Wildlife Act

Part 6 of the NPW Act provides specific protection for Aboriginal objects and declared Aboriginal places by establishing offences of harm. Anyone proposing to carry out an activity that could potentially cause harm to an Aboriginal object or place must investigate, assess, and report on the harm that may be caused in an Aboriginal Cultural Heritage Assessment Report (ACHAR). Where harm cannot be avoided, an Aboriginal Heritage Impact Permit will be required from Heritage NSW.

This process must be undertaken in accordance with the following guidelines:

- *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (Department of Environment, Climate Change and Water NSW, 2010);
- *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales* (Office of Environment and Heritage, Department of Premier and Cabinet, 2011); and
- *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (Department of Environment, Climate Change and Water NSW, 2010).

Refer to the Heritage NSW webpage for additional information on assessment and permit requirements for Aboriginal cultural heritage –

- https://www2.environment.nsw.gov.au/topics/heritage/about-heritage/aboriginal-cultural-heritage

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3.6.2.1 Aboriginal objects and places

Under Clause 5.10 of the CCLEP 2022, development consent is required for works that may impact an Aboriginal object or place. This includes:

- demolishing, moving, or altering an Aboriginal object;
- disturbing or excavating an Aboriginal place of heritage significance;
- erecting a building on land on which an Aboriginal object is located or that is within an Aboriginal place of heritage significance; and
- subdividing land on which an Aboriginal object is located or that is within an Aboriginal place of heritage significance.

Development application requirements

Development application requirements will depend on the location and type of development, and the known or likely presence of Aboriginal objects or places. All development that involves ground disturbance or excavation must consider potential impacts to Aboriginal objects and places. At a minimum this must include:

- an **AHIMS search** to identify whether registered Aboriginal sites are located on, in the vicinity of, and/or within a 200m buffer of the development site; and
- an assessment of the landscape to identify the potential for Aboriginal objects and places.

Development with the potential to impact an Aboriginal object or place, indicated by the results of the above, must follow the investigation, assessment, and reporting pathway established by the NPW Act. This may include:

- a **Due Diligence Assessment** to determine whether Aboriginal objects are likely to be present in an area, whether they are likely to be harmed by an activity, and whether further assessment and approval is required;
- an **Aboriginal Cultural Heritage Assessment Report** (ACHAR) to document the process of investigation, consultation, and assessment of Aboriginal cultural heritage; if required, the ACHAR will be used to apply for a permit from Heritage NSW; and
- an **Aboriginal Heritage Impact Permit** (AHIP) – a legal document that gives permission to harm Aboriginal objects or places and sets out conditions to comply with.

Development requiring an Aboriginal Heritage Impact Permit

Development which requires an AHIP is classified as 'integrated development', meaning consent is required from both Council and Heritage NSW. The development application must be accompanied by an ACHAR prepared in line with Heritage NSW requirements. Council will then refer the development application and ACHAR to Heritage NSW.

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OBJECTIVES	
O1	To conserve Aboriginal objects and Aboriginal places in the Central Coast.
O2	To ensure that consideration of known or potential Aboriginal objects and places forms part of initial site investigations and site planning.
REQUIREMENTS	
R1	Applicants proposing to undertake any development involving ground disturbance or excavation must undertake the following prior to lodging the development application: ▪ an **AHIMS search** to identify whether any registered Aboriginal sites are located on, in the vicinity of, and/or within a 200m buffer of the development site; and ▪ an **assessment of the landscape** to identify whether the area of proposed development is: o classed as an 'environmentally sensitive area', as defined in Clause 3.3 of the CCLEP 2022; o within the vicinity of or containing mature tree/s that may be over 150 years old; o within 200 meters of waters (being the whole or any part of any river, stream, lake, lagoon, swamp, wetlands, natural watercourse, or tidal waters including the sea); o within a sand dune system; o on a ridge top, ridge line or headland; o within 200m below or above a cliff face; or o within 20m of or in a cave, rock shelter, or cave mouth. This information must be included in the Statement of Environmental Effects.
R2	If the development site: ▪ contains, is in the vicinity of, and/or is within a 200m buffer of a registered Aboriginal site; and/or ▪ is within the above landscape types, A **Due Diligence Assessment** must be submitted with the development application. The Due Diligence Assessment must be prepared in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (Department of Environment, Climate Change and Water NSW, 2010).
R3	Development involving Aboriginal cultural heritage must be undertaken in accordance with the relevant provisions of the National Parks and Wildlife Act and other relevant legislative and statutory instruments.

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3.6.2.2 Connecting with Country Framework

Refer to the Government Architect NSW webpage for further information on the Connecting with Country Framework:

- https://www.planning.nsw.gov.au/government-architect-nsw/policies-and-frameworks/connecting-with-country

The Government Architect NSW has prepared the Connecting with Country Framework to provide good practice guidance on how to respond to Country in the planning, design, and delivery of built environment projects in NSW. The Connecting with Country Framework presents a place-led design approach that can be applied at multiple scales, from individual buildings, to public parks, plaza and malls, to neighbourhoods and precincts.

OBJECTIVES	
O1	To ensure that built environment projects in the Central Coast are guided by, and respond to, Country.
REQUIREMENTS	
R1	Development proposals involving: ▪ development applications on sites 20 ha or more in size; ▪ development application progressing under the design excellence panel; ▪ development located within areas of Aboriginal significance, where appropriate, and ▪ any public domain/urban design projects on sites in excess of 1000m2 must demonstrate engagement with the Connecting with Country Framework.
R2	Development applications must demonstrate how the Connecting with Country Framework has been implemented and how the outcomes of engagement have informed the design outcomes.

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3.6.3 HISTORICAL ARCHAEOLOGY

Historical archaeology refers to archaeological remains that relate to the settlement of NSW post-1788, other than Aboriginal settlement. Archaeological remains are deposits, artefacts, objects, or material evidence that are principally present underground. Archaeological sites are areas with known archaeological remains.

Archaeological sites in the Central Coast include remains of houses, inns, mills, roads, and railways, as well as maritime sites such as shipwrecks, jetties, wharves, and boatsheds.

Legislative framework

Historical archaeology in NSW is primarily protected by the *Heritage Act 1977* (NSW) (Heritage Act).

Archaeological sites in the Central Coast LGA are also protected under:

- *Environmental Planning and Assessment Act 1979*; and
- *Central Coast Local Environmental Plan 2022* (CCLEP 2022) and Chapter 5 of the *State Environmental Planning Policy (Precincts—Regional) 2021* (Regional SEPP).

Requirements under the NSW Heritage Act

Known and potential archaeological remains that are of State or local heritage significance are protected under the Heritage Act. These are referred to as archaeological relics. Works or activities that will disturb or excavate land where relics are known or suspected may require:

- a Section 139 exception;
- a Section 140 excavation permit; or
- approval from Heritage NSW if the works are within a State Heritage Register item.

This process must be undertaken in accordance with the following guidelines:

- *Assessing Significance for Historical Archaeological Sites and 'Relics'* (Heritage Branch of the Department of Planning 2009);
- *Archaeological Assessments Guidelines* (Department of Urban Affairs and Planning 1996); and
- *Historical Archaeology Code of Practice* (Department of Planning 2006).

If archaeological relics are unexpectedly or unintentionally uncovered, Heritage NSW must be notified.

Refer to the Heritage NSW webpage for further information on requirements under the Heritage Act:

- https://www2.environment.nsw.gov.au/topics/heritage/apply-for-heritage-approvals-and-permits/historical-archaeology

3.6.3.1 Archaeological sites

Archaeological sites that have been assessed as of significance to the Central Coast are listed on Part 3 Schedule 5 of the CCLEP 2022 and Part 3 Schedule 9 of the Regional SEPP. Heritage items and heritage conservation areas listed on the CCLEP 2022 or Regional SEPP may also contain known or potential archaeological remains associated with former uses or structures. Check the State Heritage Inventory listing sheet for information about a listed archaeological site or heritage item.

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The nature of archaeological remains means that their presence may not be visible on the ground surface. It is important that the potential for archaeological remains is identified early in the planning of development, to minimise the risk of unexpected finds, and minimise disruptions during the course of development.

Development application requirements

Under Clause 5.10(2) of the CCLEP 2022, development consent is required to:

- disturb or excavate an archaeological site; and/or
- demolish, move, or alter a relic within a heritage conservation area.

Where development proposes excavation or ground disturbance in a listed archaeological site, or where archaeological remains are known or suspected, the development application must include:

- a **Historical Archaeological Assessment** to evaluate the likely extent, nature, integrity, and significance of the archaeological remains.

Where development has the potential to impact archaeological remains, additional reporting and assessment may be required to support an exception or permit application. These may include:

- a **Historical Archaeological Research Design**;
- a **Test Excavation Report**; and
- an **Excavation Report.**

Obtaining necessary excavation exceptions or permits may be included as a condition of consent.

OBJECTIVES	
O1	To preserve known and potential historical archaeology in the Central Coast LGA.
O2	To ensure that consideration of historical archaeology forms part of initial site investigations and site planning.
REQUIREMENTS	
R1	Development of sites with known or potential historical archaeology must be undertaken in accordance with the relevant provisions of the Heritage Act and the CCLEP 2022.
R2	Development applications for development involving excavation or ground disturbance to an identified archaeological site must include a **Historical Archaeological Assessment**.
R3	Assessment of impacts to historical archaeology must form part of initial site investigations and site planning.

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3.6.4 HERITAGE ITEMS

Heritage items are places and objects that have been assessed as being of significance for their historical, associative, aesthetic, social, research, representative, and/or rarity values. Heritage items in the Central Coast include buildings, structures, and places such as houses, churches, farm buildings, hotels, cemeteries, wharves, and streetscapes. Heritage items are assessed as being of local, State or national significance.

If a property is listed as a heritage item, it is subject to specific planning and development controls that seek to retain the heritage significance of the item.

Legislative framework

Heritage items in the Central Coast LGA are listed on Schedule 5 of the CCLEP 2022 and on Schedule 9 of the Regional SEPP. These include local heritage items, as well as items that are of State and National heritage significance.

Items of State heritage significance are listed on the State Heritage Register, and are protected under the *Heritage Act 1977* (NSW). Items of National significance are listed on the National Heritage List, and are protected under the *Environment Protection and Biodiversity Conservation Act 1999*.

Refer to the State Heritage Inventory database to access the State Heritage Register:

- https://www2.environment.nsw.gov.au/topics/heritage/search-heritage-databases/state-heritage-inventory

Refer to the Australian Government Department of Climate Change, Energy, the Environment and Water webpage to access the National Heritage List

- https://www.dcceew.gov.au/parks-heritage/heritage/places/national-heritage-list

Development application requirements

Under Clause 5.10 of the CCLEP 2022 and Clause 5.36 of the Regional SEPP, development consent is required for works with the potential to impact the significance of a heritage item, including its fabric, setting and views.

The name of a heritage item will usually identify the things that are part of the heritage significance of the item – for example, "House, front garden and front fence". More information about the significance of a heritage item can be found in the State Heritage Inventory listing for the item (refer link below). Additional assessment may be required to understand the significance of the item.

Definitions

Cultural significance means aesthetic, historic, scientific, social or spiritual value for past, present or future generations. Cultural significance is embodied in the place itself, its fabric, setting, use, associations, meanings, records, related places and related objects

Fabric means all the physical material of the place including elements, fixtures, contents and objects.

Setting means the immediate and extended environment of a place that is part of or contributes to its cultural significance and distinctive character.

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State Heritage Inventory

The State Heritage Inventory holds records for most heritage items in NSW. This can include information about the item's historical context, a physical description, assessment of significance, and/or management recommendations.

Refer to the NSW Environment and Heritage webpage for more information on the State Heritage Inventory:

- https://www2.environment.nsw.gov.au/topics/heritage/search-heritage-databases/state-heritage-inventory

Where development is proposed to land that is a heritage item, the development application must include a heritage management document that addresses the potential impacts of the proposed development on the significance of the heritage item/s concerned. Typically, this will take the form of a:

- **Heritage Impact Statement** (HIS), also referred to as a **Statement of Heritage Impact** (SOHI)

Depending on the nature of the development and the heritage item or area involved, additional heritage management documentation may be required, such as:

- a Conservation Management Plan (CMP);
- a Heritage Asset Action Plan (HAAP);
- an Archival Record; or
- a Schedule of Conservation Works.

Further information on development application requirements and guidelines for the preparation of Heritage Impact Statement are included at 3.6.7 Additional Information.

Development involving heritage items listed on the State Heritage Register

Works to heritage items that are listed on the State Heritage Register (SHR) are subject to approval requirements under the Heritage Act. Development to SHR-listed items that requires both consent from Central Coast Council and approval from Heritage NSW, is referred to as 'integrated development.' For integrated development, a Statement of Heritage Impact, prepared in accordance with the *Guidelines For Preparing Statements of Heritage Impact* (Department of Planning and Environment 2023), must be submitted with the development application. Council will refer the development application to Heritage NSW.

Refer to the Heritage NSW website for approval requirements for items on the State Heritage Register:

- https://www2.environment.nsw.gov.au/topics/heritage/apply-for-heritage-approvals-and-permits/state-heritage-register-items

3.6.4.1 General requirements for development to heritage items

OBJECTIVES	
O1	To conserve the significance of heritage items, including form, scale, character, fabric, setting, and key views to and from the item.
O2	To ensure that change to heritage items is appropriate to their significance.

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REQUIREMENTS	
R1	Development must have regard to the Burra Charter principle of 'do as much as necessary to care for the place and to make it useable, but otherwise change it as little as possible so that its cultural significance is retained.'
R2	Development must not alter the significant form, scale, style, and details of the heritage item.
R3	Development must retain significant fabric. Where it is not possible to retain fabric: i. changes to significant fabric must be minimised and reversible, where possible; or, ii. restoration or repair to the significant fabric must be undertaken using appropriate materials and methods, and must be based on historical or physical evidence.
R4	Development must retain significant settings and views to and from the heritage item.
R5	New works to heritage items, including additions and alterations, must be: i. subservient in scale to the heritage item; ii. located away from primary elevations to the rear of the existing building form; iii. located away from highly intact or significant areas; and iv. designed and located so that they do not detract from the aesthetic significance of the item.
R6	New decorative elements must be appropriate to the style and period of the heritage item, and must based on documentary or physical evidence.
R7	New development should include the removal of any unsympathetic elements, especially where substantial changes are proposed to a heritage item and the reversal will provide an improved heritage outcome.
R8	Servicing, fire safety or BCA compliance upgrades for a new use must not impact on the heritage significance of the item.
R9	Development applications involving a heritage item must be accompanied by a **Heritage Impact Statement** that addresses the impacts of the development on the item(s) involved.
R10	Development involving State Heritage Register items must be undertaken in accordance with the relevant provisions of the Heritage Act.

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3.6.4.2 Subdivision and site consolidation

Read in conjunction with:

- Chapter 2.4 Subdivision

The cadastral lot boundary of a heritage item usually corresponds to its curtilage – the area of land that is protected by heritage controls. However, some heritage items may have an expanded curtilage (more than one cadastral lot) or a reduced curtilage (part of a cadastral lot).

Definition

curtilage, in relation to a heritage item or conservation area, means the area of land (including land covered by water) surrounding a heritage item, a heritage conservation area, or building, work or place within a heritage conservation area, that contributes to its heritage significance.

Examples

The curtilage of this heritage item (shaded in brown) includes the dwelling, and associated garden, plantings and landscaping elements.

The curtilage of this heritage item (Hardys Bay Wharf and timber toilet blocks, I67; shaded in brown) is specific to the footprint of the significant structures, and is not tied to allotment boundaries.

Development applications for subdivision and site consolidation involving a heritage item must address the impacts of the development on the significance, curtilage, and setting of the heritage item from both the subdivision/site consolidation. The development application must also address the impacts of future development resulting from the subdivision/site consolidation.

It is important to note that the subdivision or site consolidation of a heritage item does not change the heritage curtilage – it does not remove the heritage listing on any part of the land. The altering of a heritage curtilage requires an amendment to the relevant environmental planning instrument (the CCLEP 2022 or the Regional SEPP), which can only be approved through a Planning Proposal.

OBJECTIVES	
O1	To ensure that subdivision or site consolidation retains the significant curtilage and setting of heritage items.

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O2	To ensure that subdivision or site consolidation enables future development that is sympathetic to, and does not detract from, the significance and setting of heritage items.
O3	To ensure that subdivision or site consolidation enables development that respects the established streetscape and the historical patterns of subdivision.
O4	To ensure that subdivision or site consolidation enables historical boundaries to be interpreted.
REQUIREMENTS	
R1	Subdivision or site consolidation must retain all significant elements on the same allotment to protect the relationship between each significant element.
R2	Subdivision or site consolidation must not visually or physically disconnect the heritage item from its original street frontage.
R3	Subdivision or site consolidation must: i. retain an adequate area around the heritage item to retain existing views to primary frontages/elevations, i.e. front/street facing elevations or side elevations; and ii. retain an appropriate setback to all building frontages.
R4	Subdivision or site consolidation must ensure new development respects the established streetscape and the historical patterns of subdivision.
R5	Subdivision or site consolidation involving a heritage item must provide for the item's ongoing use and conservation.
R6	Development applications for subdivision or site consolidation involving a heritage item must include, at a minimum, the building envelope and footprint of the intended development.
R7	Development applications must have regard to the provisions of 3.6.6 Development in the Vicinity of Heritage.
R8	Development applications involving consolidated development sites zoned medium-to-high density that include a heritage item(s) must include: ▪ a Conservation Management Plan or Strategy, and ▪ an Interpretation Plan.

3.6.4.3 Change of use

The original or historic use of a heritage item is usually associated with its significance. Changes of use of heritage items from the originally intended use should only happen when there is no viable option for its ongoing historic use. Development that changes the use of a heritage item must consider impacts on the significance of the item.

Works required to modify a heritage item to a new use are known as adaptive reuse. Adaptive reuse may be considered where the existing use of an item is no longer viable, for example, the adaptation of a former residential building to a commercial use. The adaptive reuse of a heritage item must have regard to the controls for Internal Works (3.6.4.4) and Alterations and Additions (3.6.4.5).

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Additional supporting documentation or documentation required as a condition of consent for development applications involving change of use may include:

- Interpretation Plan
- Conservation Management Plan
- Conservation Management Strategy

Conservation incentives

Clause 5.10(10) of the CCLEP 2022 and Clause 5.36(10) of the Regional SEPP provides for development involving a heritage item that would otherwise not be allowed by other provisions of the LEP. This could include the introduction of a non-permissible use. To be eligible, the development proposal must meet all requirements of the Clause. Consult with suitably experienced heritage professional to determine whether Clause 5.10(10) (or Clause 5.36(10)) is applicable to your development.

OBJECTIVES	
O1	To ensure that significant or original uses of heritage items are retained unless no longer viable.
O2	To ensure that new uses are sympathetic to the heritage significance of heritage items.
O3	To ensure that the adaptive reuse resulting from change of use does not adversely impact the significance of heritage items.
REQUIREMENTS	
R1	Evidence of significant or original uses must be retained in the form, fabric, and layout of the heritage item.
R2	New uses must be consistent with any management recommendations or policies included in the inventory sheet for the heritage item.
R3	Changes to significant fabric to accommodate new uses must be minimised and reversible where possible, including the introduction of new services and compliance with the BCA.
R4	Changes to accommodate new uses must have regard to the provisions for Alterations and Additions at 3.6.4.4.
R5	Development applications for the change of use of a heritage item must demonstrate how the former use will be interpreted.
R6	Development applications that seek to use Clause 5.10(10) to introduce a new use must be accompanied by a heritage management document (such as a Conservation Management Plan or Conservation Management Strategy), which must be approved by the consent authority.

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Example

The Chapman Building in Wyong is a good example of sympathetic adaptive reuse.

The building is listed as a local heritage item on the CCLEP 2022. The building's historic use was as a retail store.

This significant use was retained, and part of the item was converted to a café. The adaptive reuse of the item restored and conserved original and significant fabric, while ensuring its ongoing use and appreciation by the community.

3.6.4.4 Internal works

The internal layout and fabric of a heritage item can be a key contributor to its significance. It can relate to historic or former uses, demonstrate original architectural details and features, and provide evidence of the building's use over time.

OBJECTIVES	
O1	To retain significant internal fabric and layout of heritage items.
O2	To ensure that internal works are sympathetic to the significance of heritage items.
REQUIREMENTS	
R1	Internal works must not adversely impact significant architectural details, finishes, fittings, and elements.
R2	Internal works must avoid impacts to significant fabric, and must be reversible where possible.
R3	Alterations to the room layout of a heritage item must ensure that the original room configuration remains discernible and able to be interpreted.

3.6.4.5 Alterations and additions

Alterations and additions include changes to the interior or exterior of a heritage item to accommodate its ongoing or new use. This may include adaptive reuse, the introduction of new bathrooms or kitchens, installation of new services, or the construction of extensions or additions.

Development consent is required to alter the exterior of a heritage item, including, in the case of a building, making changes to its detail, fabric, finish, or appearance. Alterations and additions to a heritage item are usually acceptable if they retain the significant form, scale, fabric, original details, and setting of the heritage item. New works to heritage items should be located in areas that are not original or have already been altered. The key objective is to retain all the elements that contribute to the significance of the item.

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OBJECTIVES	
O1	To ensure that alterations and additions are sympathetic to the significance of heritage items in terms of scale, form, massing and character.
O2	To ensure that alterations and additions retain significant fabric, form, and features of heritage items.
O3	To ensure that the design and siting of alterations and additions are sympathetic to the character and setting of heritage items.
O4	To ensure that alterations and additions do not adversely impact the significant views to and from heritage items.
REQUIREMENTS	
R1	Significant architectural detailing (doors, windows, verandahs, sills, chimneys etc) must be retained. If these are required to be replaced due to poor condition, they must be replaced like-for-like.
R2	Alterations and additions must not significantly alter the primary or significant frontages of the heritage item, except to remove detracting features.
R3	Notwithstanding the above, the reconstruction or restoration of significant architectural features or detailing (such as verandahs or windows) is encouraged. This must be based on adequate historical and/or physical evidence.
R4	Alterations and additions must not significantly alter the primary or significant roof form of the heritage item, except to remove detracting features.
R5	Alterations and additions must be located at the side or rear of the property and must be set back behind the existing building line (refer Figure 1 below).
R6	Alterations and additions should not alter the scale of the original building when observed from significant viewpoints, as determined by the setting of the item (refer Figures 2 and 3 below).
R7	Alterations and additions must be sympathetically designed, and complementary to the scale, form, massing and character of the heritage item.
R8	Alterations and additions must not adversely impact significant garden and landscape features.

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Guidance for alterations and additions

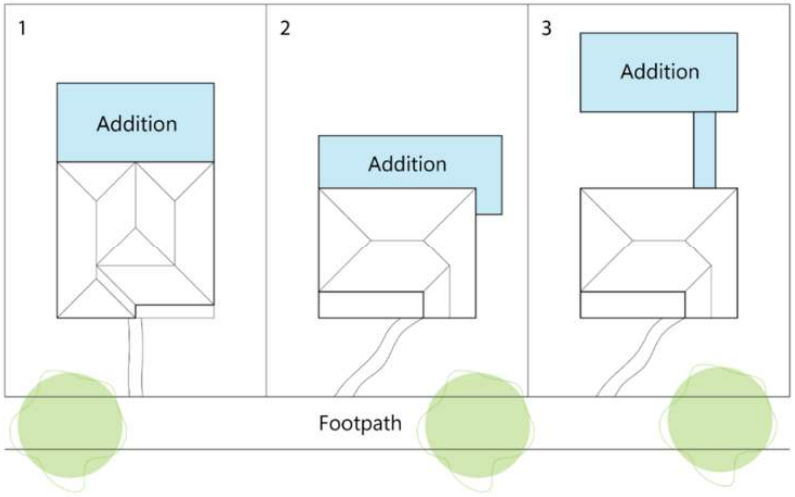
Figure 1

Additions to these dwellings are sensitively designed and sited.

Dwelling 1: rear addition equal in width to the original dwelling.

Dwelling 2: rear addition slightly wider than the original dwelling. Where the addition extends out from the original dwelling, it is set back suitably behind the existing building line.

Dwelling 3: rear pavilion addition, separated from the original dwelling and linked by a narrow passageway.



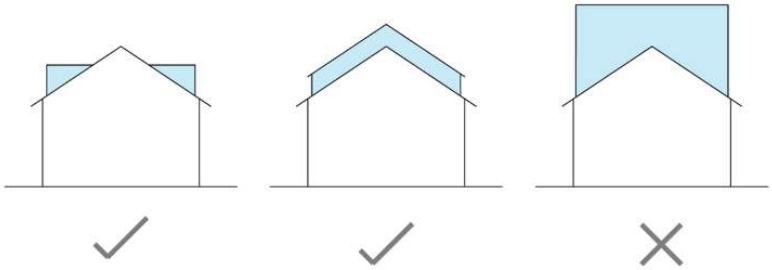


Figure 2

Rear additions that extend above the roof height of the original dwelling may be acceptable where they do not dominate or overwhelm the heritage item.

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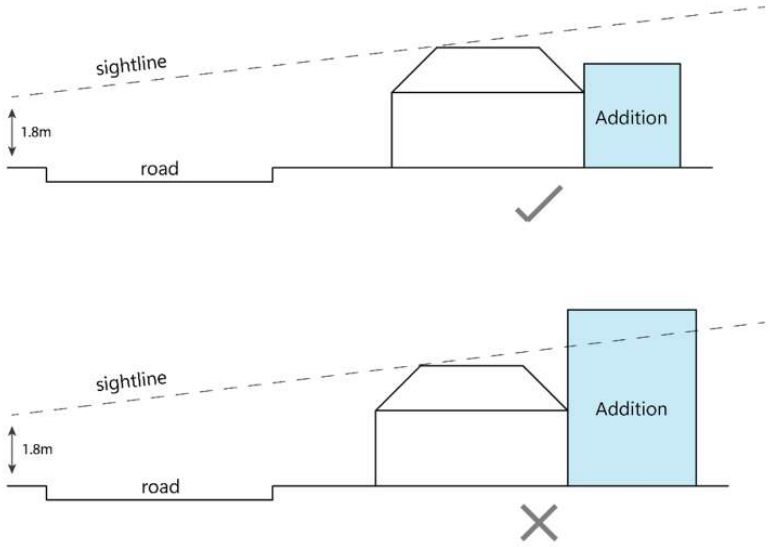

Figure 3

The addition in the top example is acceptable, as it is lower in height than the original building and is not visible from the street frontage.

The addition in the bottom example is not acceptable, as it is significantly higher than the original building, and is highly visible from the street frontage.

3.6.4.5.1 Materials, finishes and paint schemes

The materials, finishes, and paint schemes of a heritage item often contribute to its significance, through association with historic uses, architectural styles, and contribution to its aesthetic value.

Methods of maintenance and repair for historic building fabric may differ from contemporary standards. Works involving building materials, finishes and painting must be guided by heritage conservation and maintenance best practice, such as the Heritage NSW technical guides.

OBJECTIVES	
O1	To retain original or characteristic materials, finishes, and paint schemes on heritage items.
O2	To ensure that new materials, finishes, and paint schemes are sympathetic to heritage items.
REQUIREMENTS	
R1	Significant original external finishes and materials of the heritage item are to be retained, restored, and respected.
R2	Original materials, finishes and paint schemes must not be removed.
R3	Existing face brick or masonry surfaces must not be rendered, painted or otherwise coated.
R4	Repainting of existing painted surfaces must utilise appropriate paint type and colour.
R5	New colour schemes must be appropriate to the style and period of the heritage item, and must not obscure or detract from architectural details.

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R6	Materiality of new work must be complementary to the materials and style of the heritage item.

Materiality, finishes and paint schemes are often characteristic to a particular architectural style or period. For example, the fibro-cement sheeting and face-brick foundation of the heritage item at left is typical of Post-War lakeside development in the Central Coast; while the painted weatherboard sheeting to the heritage item on the right is typical of early twentieth century buildings.

3.6.4.5.2 Services

New services may include skylights, solar panels, battery storage, air conditioners, mechanical exhaust fans and grills, and other non-traditional elements. These may be desired to accommodate contemporary living standards or building use, and improve sustainability outcomes.

Refer to *Sustainable heritage buildings guide* (Department of Climate Change, Energy, the Environment and Water 2024) for more information regarding the introduction of services to heritage items.

OBJECTIVES	
O1	To ensure that the introduction of new services is sympathetic to significance of heritage items.
O2	To ensure that new services do not adversely impact significant fabric, setting, and views of heritage items.
REQUIREMENTS	
R1	New services must be located and arranged to be as visually recessive as possible.
R2	Solar panels must not be located on front or street-facing roof planes.
R3	Introduction of new services must not detract from, damage, or otherwise adversely impact architectural detailing or building elements (such as verandahs, chimneys or parapets).

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R4	Impacts to building fabric (including walls, roofs) must be minimised and reversible where possible.
R5	Development applications must demonstrate that the building is capable of taking the weight of the new equipment.

3.6.4.6 Gardens, plantings and landscaping

Read in conjunction with:

- Chapter 3.5 Tree and Vegetation Management

Gardens, plantings, or landscaping features within the curtilage of a heritage item form part of its immediate setting, and may contribute directly or indirectly to its significance. These can include original pathways or paving, driveways, garden beds, significant trees associated with the development of the item, and natural rock outcrops. Significant garden or landscaping features may be identified in the item name as listed on Schedule 5 of the CCLEP 2022 (or Schedule 9 of the Regional SEPP), or in the State Heritage Inventory listing sheet for the item. Additional assessment may be required to determine the contribution of garden and landscaping features to the significance of the item.

This item is identified as 'Cottage and garden' on the CCLEP 2022. The garden directly contributes to the significance of the item.

The plantings, trees and landscaping of Wyong Town Park contribute to the setting of its heritage listed buildings and contributes to its landmark qualities.

OBJECTIVES	
O1	To retain and conserve significant gardens, plantings, and landscape features of heritage items.
O2	To ensure that new gardens, plantings and landscape features do not adversely impact significant fabric, setting and views of heritage items.
REQUIREMENTS	
R1	Significant gardens, plantings and landscape features must be retained, repaired, and maintained.

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R2	New gardens, plantings, and landscape features must be sympathetic to the form, scale, style, and setting of the heritage item and must not impact significant views to and from the heritage item. High, solid hedges that screen buildings from the street are not permitted.
R3	New garden, planting, and landscape features must not adversely impact the health and longevity of significant or mature vegetation.
R4	New gardens and landscape elements must be horticulturally and stylistically sympathetic to the heritage item.

3.6.4.7 Fencing

Read in conjunction with:

- Chapter 2.1 Dwelling Houses, Secondary Dwellings and Ancillary Development
  - 2.1.7.4 Fencing
- Chapter 2.2 Dual Occupancy and Multi Dwelling Housing
  - 2.2.10.4 Fencing
- Chapter 2.3 Residential Flat Buildings
  - 2.3.9.4 Fencing

Fencing provides a visual and physical boundary to a heritage item, and can enhance or detract from the setting and views of a heritage item. Existing fencing may be original fabric to the existing building, or may be associated with an earlier building or use of the property.

OBJECTIVES	
O1	To retain and conserve significant original fencing.
O2	To ensure that new fencing is sympathetic to the significance of heritage items.
O3	To ensure that new fencing does not adversely impact significant fabric, setting, or views of heritage items.
REQUIREMENTS	
R1	Significant fencing must be retained and repaired.
R2	Replacement may be permitted where it can be demonstrated that the fence is beyond repair. Replacement must match the original in design, height and materiality.
R3	New fencing must adhere to the maximum heights specified in Chapter 2.1.7.4: ▪ Front boundary fencing – maximum height of 1.2 m. ▪ Side and rear fencing – maximum height of 1.8 m.
R4	New fencing must be sympathetic to the character and style of the heritage item. Appropriate fence styles may include timber pickets, iron palisade, low brick, and stone fences.

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R5	New fences to street frontages must not obscure existing views to and from the heritage item.

3.6.4.8 Car parking and driveways

Read in conjunction with:

- Chapter 2.1 Dwelling Houses, Secondary Dwellings and Ancillary Development
  - 2.1.5 Carparking and Access
- Chapter 2.2 Dual Occupancy and Multi Dwelling Housing
  - 2.2.8 Parking and Access
- Chapter 2.3 Residential Flat Buildings
  - 2.3.7 Parking and Access
- Chapter 2.13 Transport and Parking

A car parking space may be an open hard stand space, carport, or garage, attached to or detached from the dwelling house or building. Development involving car parking must consider the potential impacts on the significance and setting of the heritage item.

OBJECTIVES	
O1	To retain and conserve significant garages and carports.
O2	To ensure that new garages, carports, and driveways are sympathetic to the significance of the heritage item.
O3	To ensure that new car parking does not adversely impact the fabric, setting, or views of the heritage item.
REQUIREMENTS	
R1	Significant car parking structures (including driveways, wheel strips, garages, car parking, coach houses) must be retained, repaired, and maintained.
R2	Replacement may be permitted where it can be demonstrated that the significant carparking structure is beyond repair. Replacement must match the original in design, height and materiality.
R3	New garages and carports must be detached from the original building, where possible.
R4	New driveways and car parking structures must not impact significant garden, planting, or landscape features.
R5	New car parking structures must be of simple, sympathetic design, and must not dominate the heritage item in form, scale, height, or style.
R6	The materials of new car parking structures must be sympathetic to the heritage item and its setting.

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R7	The location of new car parking must consider the following options, in order of priority: 1. Where a property has access to a rear lane, new garages and carports must be located at the rear of the site, with access from the rear lane; 2. Where there is no rear lane, new garages and carports must be located at the rear of the site, with access from the street frontage; 3. Where a garage or carport cannot be located at the rear, it must be located at the side of the principal building, set back a minimum of 3m from the building's front facade; 4. Where car parking cannot be located at the rear or side, and in some specific circumstances only, a single uncovered hardstand area may be permissible within the front setback to the side of the building; and 5. Whether there is available street parking. Refer to Figure 4.

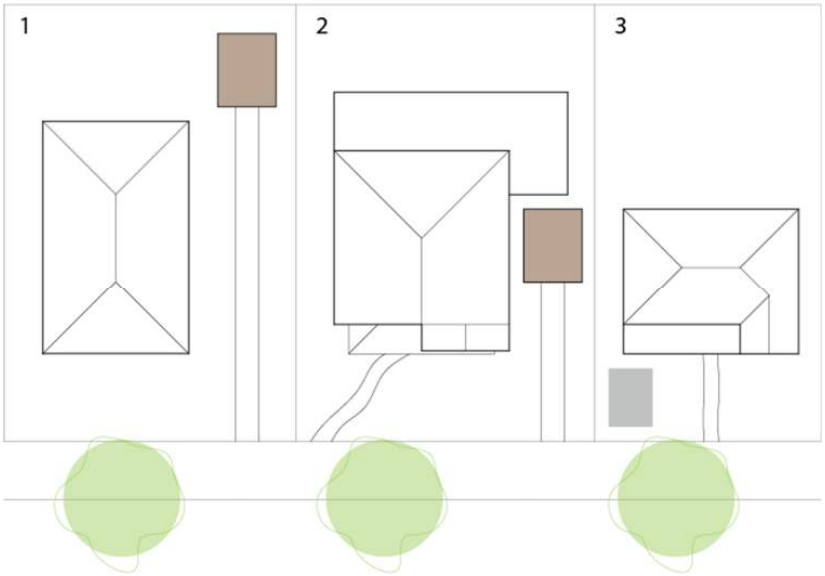

Figure 4

Examples 1 and 2 show new carparking structures in brown. These are detached structures, located to the rear or ride of the houses.

Example 3 shows an uncovered hardstand area in grey, located within the front setback to the side of the building.

3.6.4.9 Outbuildings

Read in conjunction with:

- Chapter 2.1.7 Ancillary Development

Outbuildings include garden sheds, cabanas, cubby houses, gazebos, greenhouses, or farm buildings. They also include structures such as balconies, decks, patios, terraces, or verandahs where these are detached from a dwelling house.

OBJECTIVES	
O1	To retain significant outbuildings.

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O2	To ensure that new outbuildings are sympathetic to heritage items.
O3	To ensure that new outbuildings do not adversely impact the fabric, setting or views of heritage items.
REQUIREMENTS	
R1	Significant outbuildings must be retained and conserved.
R2	Replacement may be permitted where it can be demonstrated that the significant outbuilding is beyond repair. Replacement must match the original in design, height and materiality.
R3	New outbuildings must be of simple, sympathetic design, and must be subservient to the heritage item in form, scale, or style.
R4	New outbuildings must be detached from the existing building.
R5	New outbuildings must be located at the rear of the existing building.
R6	New outbuildings must not adversely impact significant garden and landscape features.

3.6.4.10 Secondary dwellings

Read in conjunction with:

- Chapter 2.1.8 Secondary Dwellings

A secondary dwelling is a self-contained dwelling located within, attached to, or separate from another dwelling on the same site.

OBJECTIVES	
O1	To ensure that secondary dwellings do not have an adverse impact on the heritage significance of the item, including its fabric, views, and setting.
REQUIREMENTS	
R1	Secondary dwellings must be of simple, sympathetic design, and must be subservient to the heritage item in form, scale, and style.
R2	Secondary dwellings must be located at the rear of the property.
R3	Secondary dwellings, including arrangements for separate pedestrian or vehicle access, must be adequately set back from the primary dwelling.
R4	Secondary dwellings, including arrangements for separate pedestrian or vehicle access, must not adversely impact significant garden, planting, or landscape features.

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3.6.4.11 Signage

Read in conjunction with:

- Chapter 2.15 Signage and Advertising

This section applies to both the management of existing signage on heritage items and the introduction of new signage to heritage items and heritage conservation areas.

The Savoy Theatre in Long Jetty is now in use as a bar and music venue. This historic painted sign, though faded and located on a side elevation, provides valuable evidence of the former and continuing uses of the building.

The former Woy Woy Council Chambers building has been adaptively reused as the Woy Woy Public Library. New lettering to indicate the new use does not overwhelm the building, nor detract from architectural style or detailing.

OBJECTIVES	
O1	To retain original and significant signage.
O2	To ensure that new signage is sympathetic to the significance of heritage items.
O3	To ensure that signage does not overwhelm or visually detract from heritage items (including heritage items in the vicinity).
O4	To ensure that visual clutter of individual premises and streetscapes is avoided.
REQUIREMENTS	
R1	Significant signage must be retained, repaired, and conserved.
R2	Signage must be identified as permissible in Table 1 below.
R3	Signage must be identified as suitable in Table 2 below.
R4	Signage must be sympathetic to the heritage item in terms of its size, scale, colour and character.

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R5	Development applications must consider the cumulative visual impact of new signage.
R6	New signage must not obscure or adversely impact significant architectural features.
R7	New signage must not obscure or cover glazed areas.
R8	Where signage is to be fixed to the building, it must be done so in a manner that: ▪ Minimises damage to significant fabric, and ▪ Is reversible.
R9	Signage must not be painted onto previously unpainted surfaces.
R10	Freestanding pylon signage must be sensitively sited and not interrupt significant views to or from the heritage item.

3.6.4.11.1 Prohibited and permissible signage

In accordance with *State Environmental Planning Policy (Industry and Employment) 2021* Chapter 3 Advertising and Signage, advertising signs, advertising display areas, and advertising structures are not permitted within a heritage area.

Advertising on or within the curtilage of a heritage item or heritage conservation area is not permissible.

Table 1. Prohibited and permissible signs in a heritage area.

Prohibited signs on or within the curtilage of a heritage item or heritage conservation area	Permissible signs on or within the curtilage of a heritage item or heritage conservation area
Advertising signs Advertising display areas Advertising structures	Business identification signs Building identification signs Wayfinding signage Heritage interpretation signage

3.6.4.11.2 Sign types

The following sign types refer to business identification signs, building identification signs, wayfinding signage, and heritage interpretation signage.

Note: There may be some circumstances in which the below classifications do not apply. For example, a 'suitable sign type' may be inappropriate for a particular heritage item. Each application is subject to a merits-based assessment at Council's discretion.

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Table 2. Suitable and unsuitable sign types.

Suitable sign types	Unsuitable sign types
Parapet signs	Projecting wall signs
Elevation bay signs	Above awning signs
Flush wall signs	Roof, awning and verandah mounted signs
Awning fascia signs	Digital signs, internally illuminated signs, neon signs, flashing lights, flashing/scrolling signs
Under awning signs	3-dimensional signs
Top hamper signs	
Painted or etched window signs	
Freestanding pylon sign	

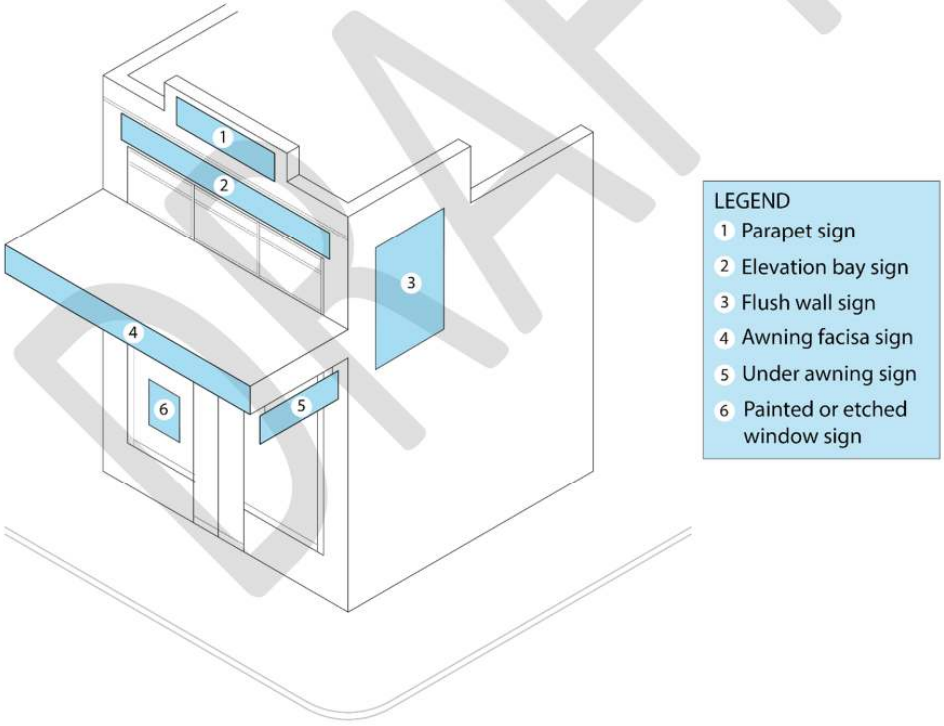

Figure 5. Suitable sign types and locations.

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3.6.4.14 Demolition and relocation

Under Clause 5.10 of the CCLEP 2022, development consent is required for the demolition or relocation of a heritage item. Demolition of a heritage item, or any portion of that item, will only be considered where it is reconstructed in accordance with the original style, form, character and materials of the heritage item. Poor condition of a heritage item cannot be used to justify demolition or relocation.

OBJECTIVES	
O1	To ensure that heritage items are retained and conserved.
O2	To ensure that the significance of heritage items is retained and conserved.
O3	To ensure that heritage items are retained in their original location where this location contributes to their heritage significance.
REQUIREMENTS	
R1	Council does not support the full or partial demolition of heritage items.
R2	Full or partial demolition will be considered only where it is demonstrated to Council's satisfaction that: ▪ The fabric to be demolished is not original to the heritage item and does not contribute to the significance of the heritage item; and/or ▪ The retention, repair or restoration of the fabric to be demolished is unviable.
R3	Where full or partial demolition due to condition is proposed, the replacement development must: ▪ Retain remnant significant or original fabric; and ▪ Must be consistent with the style, form, character, and materials of the heritage item.
R4	Development applications for the demolition of a heritage item must be accompanied by the following: ▪ a **Heritage Impact Statement** that assesses the impact of the proposed demolition on the significance of the heritage item; and ▪ a **structural engineering assessment** prepared by an engineer with heritage experience that assesses the structural stability and future viability of the building or structure, including details of the likely cost of repairs; and ▪ A design for an **appropriate replacement building** that is consistent with the style, form, character, and materials of the heritage item. *Note: Submitting the necessary reports or justifications does not imply that the consent authority will agree to the proposed demolition. Where a heritage item is damaged by neglect, disaster or otherwise, the heritage listing will continue to apply to that land.*

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R5	Council does not support the relocation of heritage items, unless: ▪ The structure does not have a strong association with its present site; ▪ The structure is designed to be movable; ▪ The structure will be moved to an appropriate setting and given an appropriate use; ▪ The relocated structure will not impact on any place or any item of heritage significance once relocated; and ▪ The relocated structure does not confuse or impact on the history of its new site and can be interpreted as a relocated structure
R6	Development applications for the relocation of a heritage item must be accompanied by the following: ▪ a **Heritage Impact Statement** that assesses the impact of the proposed relocation on the significance of the heritage item; ▪ a **structural engineering assessment**, prepared by an engineer with heritage experience, that demonstrates that the structure can be relocated without adversely impacting on the fabric or structural integrity; and ▪ plans for the **proposed use of the site** and **ongoing use and conservation of the structure.**

3.6.4.15 Commercial, civic, and industrial heritage items

The Central Coast LGA contains many heritage items that are of significance for their existing or historical commercial, civic and industrial uses. These include, but are not limited to, shops, stores, pubs, hotels, schools, churches, fire stations, police and ambulance stations, banks, and warehouses.

Development applications for works to these item types should consider all other relevant provisions of this chapter, as well as the specific controls below.

OBJECTIVES	
O1	To ensure that significant former uses of commercial, civic, and industrial heritage items are able to be understood.
O2	To retain and conserve significant fabric, form, style, and character of commercial, civic, and industrial heritage items.
REQUIREMENTS	
R1	Significant fabric associated with the former use(s) of a heritage item must be retained. This may include architectural details, building layout, signage, lettering or schemes.
R2	Changes to significant fabric must be avoided. Where they are necessary, changes must minimised, documented and reversible

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3.6.4.15.1 Shopfronts

OBJECTIVES	
O1	To retain and enhance original shopfronts of heritage items.
O2	To ensure that changes to heritage listed shopfronts are sympathetic to their significance.
REQUIREMENTS	
R1	Significant fabric of shopfronts must be retained, even if not completely intact.
R2	Alterations must not alter the significant form, characteristics, and features of shopfronts.
R3	Reconstruction of an original shopfront is encouraged where there is sufficient historical and/or evidence.
R4	Glazed shopfronts must remain transparent.
R5	Security screens must be of open grill style and placed behind the glass shop front.
R6	Original awnings must be retained and conserved.
R7	Replacement of missing awnings must be appropriate to the style of the heritage item and adjacent awnings.

3.6.4.16 Landscape heritage items

Read in conjunction with:

- Chapter 3.5 Tree and Vegetation Management

Landscape items are items that are characterised by their landscape features, including topography, vegetation, trees, and/or plantings. These include, but are not limited to, parks, reserves, areas of bushland, and beaches. Their significance is primarily drawn from their natural and cultural qualities and uses; however, they may also contain significant built features.

OBJECTIVES	
O1	To retain the significance of landscape heritage items.
O2	To retain the dominant landscape character, qualities and use of landscape heritage items.
O3	To ensure that development does not adversely impact the significance, setting and views of landscape heritage items.
O4	To ensure that significant trees, plantings and other natural features are protected and retained.

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REQUIREMENTS	
R1	New work must not adversely impact significant trees, plantings, natural features or built fabric.
R2	New built structures are only acceptable where these are necessary to support the public use of the item.
R3	Development applications for new work must be accompanied by a landscape plan.
R4	Development applications or permit applications must be accompanied by an arborist report.
R5	Where significant trees or vegetation are to be removed, they must be replaced either with the same species or with an appropriate alternative.
R6	Where significant trees or vegetation are reaching their end-of-life, a succession planting program should be prepared.

3.6.4.17 Cemeteries, monuments and memorials

Cemeteries, monuments, and memorials are often characterised by both their built elements and their landscaped setting or siting. The continued use and appreciation of these items is integral to their significance.

Note: Some types of development in cemeteries do not require development consent. Check 5.10(3) of the CCLEP 2022 (5.36(3) of the Regional SEPP) for further information.

Example

Woy Woy Memorial Park and wall is listed on the CCLEP 2022 as an item of local significance (I348).

The central sandstone pillar and formal landscaping are key features of the item. These features are enhanced by the foreshore setting to the north, the avenue of pines along Brick Wharf Road, and the character of the adjoining residential areas.

Just as important as the fabric and setting of the item is ongoing use of the park, in particular the continued addition of new commemorative plaques.

OBJECTIVES	
O1	To retain the significance of cemeteries, monuments, and memorials.
O2	To retain the character, qualities and use of cemeteries, monuments, and memorials.

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O3	To ensure that development does not adversely impact the significance, setting and views of cemeteries, monuments, and memorials.
REQUIREMENTS	
R1	Repair or restoration of significant elements must use traditional materials and methods and must be informed by historical and/or physical evidence.
R2	Materials to be replaced, restored or reinstated must be like-for-like.
R3	New gravestones, monuments, plaques, or commemorative structures must be sensitively sited, and must not overwhelm or detract from significant fabric, setting, or views.
R4	New built structures are only acceptable where these are necessary to support the public use of the item, and must not adversely impact significant fabric, setting, or views of the item.

3.6.4.18 Rural heritage items

Read in conjunction with:

- Chapter 2.17 Character and Scenic Quality

The Central Coast LGA contains many heritage items in rural locations. These include homesteads, farm buildings, roads and walking tracks. Development must retain all elements which contribute to an understanding of the significance and historical function of rural heritage items. This may include homesteads, outbuildings, fences, gates, driveways, plantings, stands of native vegetation, or topographical features such as ridgelines and creek lines.

OBJECTIVES	
O1	To retain the significance of rural heritage items.
O2	To ensure that the rural character of rural heritage items is retained.
O3	To ensure that development does not adversely impact the significance, setting and views of rural heritage items.
REQUIREMENTS	
R1	Development must retain all significant elements of the item, including the primary building, outbuildings, plantings, vegetation and topographic features.
R2	Development must not visually or physically disconnect the primary building from significant built or landscape features.
R3	Development must not interrupt significant view corridors within, to and from the heritage item.
R4	Alterations and additions to significant built structures must be subservient in scale, form and character to the original structure, and must not detract from their rural character.

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R5	New built structures must be low-scale and appropriate to the rural character of the item.
R6	Where new built structures are proposed for the existing or new use of the property, these must be located away from the immediate setting of the primary building.
R7	Development applications for the subdivision of a rural heritage item must include an analysis of the historic and visual curtilage of the item, identifying significant connections within, to and from the heritage item.
R8	Significant movement networks (roads, pathways, driveways) within, to and from the heritage item must be retained and/or interpreted.

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3.6.5 HERITAGE CONSERVATION AREAS

A heritage conservation area is an area of land that is recognised and valued for the collective nature of buildings and elements in the area that distinguish it from other places and its surroundings. It may contain individual heritage items listed on the Central Coast LEP or other statutory heritage registers.

The General Controls at 3.6.5.1 apply to all heritage conservation areas. Specific controls for individual heritage conservation areas are provided below.

Legislative framework

Heritage conservation areas in the Central Coast are identified on Schedule 5 of the CCLEP 2022, and are shown on the Heritage Map.

Development application requirements

Under Clause 5.10 of the CCLEP 2022, development consent is required for works with the potential to impact the significance of a heritage conservation area, including its fabric, setting and views. Where development is proposed within a heritage conservation area, the development application must address the relevant objectives and requirement below.

Depending on the nature of the development, Council may require a heritage management document that addresses the potential impacts of the proposed development on the significance of the heritage conservation area and property/s concerned. Typically, this will take the form of a **Heritage Impact Statement** (HIS), also commonly referred to as a **Statement of Heritage Impact** (SOHI).

3.6.5.1 General controls

OBJECTIVES	
O1	To conserve the significance of heritage conservation areas.
O2	To retain the significant fabric, settings and views to built and landscape features of heritage conservation areas.
O3	To ensure that development is sympathetic to the character and significant characteristics of heritage conservation areas.
O4	To ensure that development in heritage conservation areas is appropriate to the contribution of individual properties.
REQUIREMENTS	
R1	Development must be sympathetic to the significance of the heritage conservation area.
R2	Development must have regard to the objectives and controls for specific heritage conservation areas.
R3	Development must be appropriate to the identified contribution of the property or properties involved and respond to the appropriate controls for building contributions.

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R4	Development must retain all elements that contribute to the significance of the heritage conservation area, including (but not limited to): ▪ built form; ▪ subdivision pattern; ▪ scale; ▪ building setbacks; ▪ gardens, plantings and landscape features; ▪ public domain elements; and ▪ views.
R5	Development must not detract from, overwhelm, or dominate, significant or contributory elements.
R6	Development must be appropriate to the existing character, scale, form and style of contributory elements and heritage items in the heritage conservation area.
R7	New development in heritage conservation areas must have regard to the provisions of 3.6.6. Development in the Vicinity of Heritage.

3.6.5.2 Building contributions

The significance of a heritage conservation area comes from the collective significance each of the many components of the area and the relationships formed between these components. Each component, including buildings and landscapes, will vary in its contribution to the significance of the heritage conservation area. This contribution needs to be assessed before the degree of change that can be accommodated can be determined.

Component properties in heritage conservation areas in the Central Coast are classified into three categories: contributory, neutral, and non-contributory. Development must be undertaken with the classifications for individual properties included in this chapter. Further information about the significance of a heritage conservation area can be found on the State Heritage Inventory.

In the circumstances where the contribution of a property has not been assigned a classification (for example in the case of newly listed heritage conservation areas), applicants should use the definitions provided below to identify the contribution of the place to the significance of the conservation area. Council must agree with the classification for the relevant provisions to apply.

3.6.5.2.1 Contributory buildings

Contributory properties are those that make an important and significant contribution to the significance and character of the heritage conservation area. They may be buildings or elements which:

- date from a key period of significance;
- display characteristic form, scale, details and materials; and
- are substantially intact or are altered yet recognisable.

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OBJECTIVES	
O1	To retain and enhance the contribution of contributory buildings to the heritage conservation area.
REQUIREMENTS	
R1	Original fabric and significant characteristics of contributory buildings must be retained.
R2	Development to contributory buildings must have regard to the provisions of 3.6.4 Heritage Items.
R3	Contributory buildings must not be demolished.
R4	Alterations and additions to contributory buildings must not alter the characteristic form, style, and scale of the building, as viewed from the public domain.

3.6.5.2.2 Neutral buildings

Neutral properties are those that neither contribute to nor detract from the significant character of the Heritage Conservation Area. They may be buildings or elements which:

- do not belong to a key period of significance but sit comfortably in the historic streetscape;
- are of contemporary design that is compatible with the significant character of the area; or,
- are from a key period of significance and have been altered, but the alterations are reversible.

OBJECTIVES	
O1	To maintain or improve the contribution of neutral buildings to the heritage conservation area.
REQUIREMENTS	
R1	Fabric from the key period of significance of neutral properties must be retained where this demonstrates significant characteristics of the heritage conservation area.
R2	Alterations and additions to neutral buildings must be appropriate to the characteristic form and scale of the building, as viewed from the public domain.
R3	Unsympathetic changes to neutral properties must be reversed.

3.6.5.2.3 Non-contributory buildings

Non-contributory properties are those which detract from the significant character of the heritage conservation area. They may be buildings which are:

- not from a key period of significance, or
- are aesthetically intrusive due to their inappropriate scale, bulk, setback, setting, and/or materials.

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OBJECTIVES	
O1	To improve the contribution of non-contributory buildings to heritage conservation areas.
REQUIREMENTS	
R1	Development to non-contributory properties must result in an improved outcome that responds to the significant form, style, and scale of contributory buildings in the heritage conservation area.
R2	Replacement development to non-contributory buildings must be sympathetic to the significance and character of the heritage conservation area.
R3	Replacement development to non-contributory properties must have regard to the provisions of 3.6.6 Development in the Vicinity of Heritage.

3.6.5.3 Wyong Town Centre

Read in conjunction with:

- Chapter 4.5 Wyong Town Centre

Statement of Significance

The Wyong Town Centre is a fine representative example of a town centre that retains good examples of civic, commercial, and residential development of high integrity, constructed in the period commencing with the railway in 1889 up until c.1945. It remains largely intact in terms of retaining its historical subdivision pattern, its natural prominence located above the River, its built fabric, avenue tree planting, and the prominence of the Railway and Station buildings. Collectively, the built environment, transport links and natural features of the town centre contributes to it being a unique precinct that captures the historical development of an important town, and one which retains its historical setting and character. The town centre retains examples of its historic development across a broad range of historic themes including Aboriginal heritage, European heritage, other cultural and social heritage, natural heritage, and themes such as transport, agriculture, commerce, education, health, government and law and order. Given its level of intactness and integrity, it comprises a rare sets of significant heritage items and contributory buildings and composite streetscapes and is of historic, aesthetic, technical and cultural significance.

Key period of significance: 1889 – 1945

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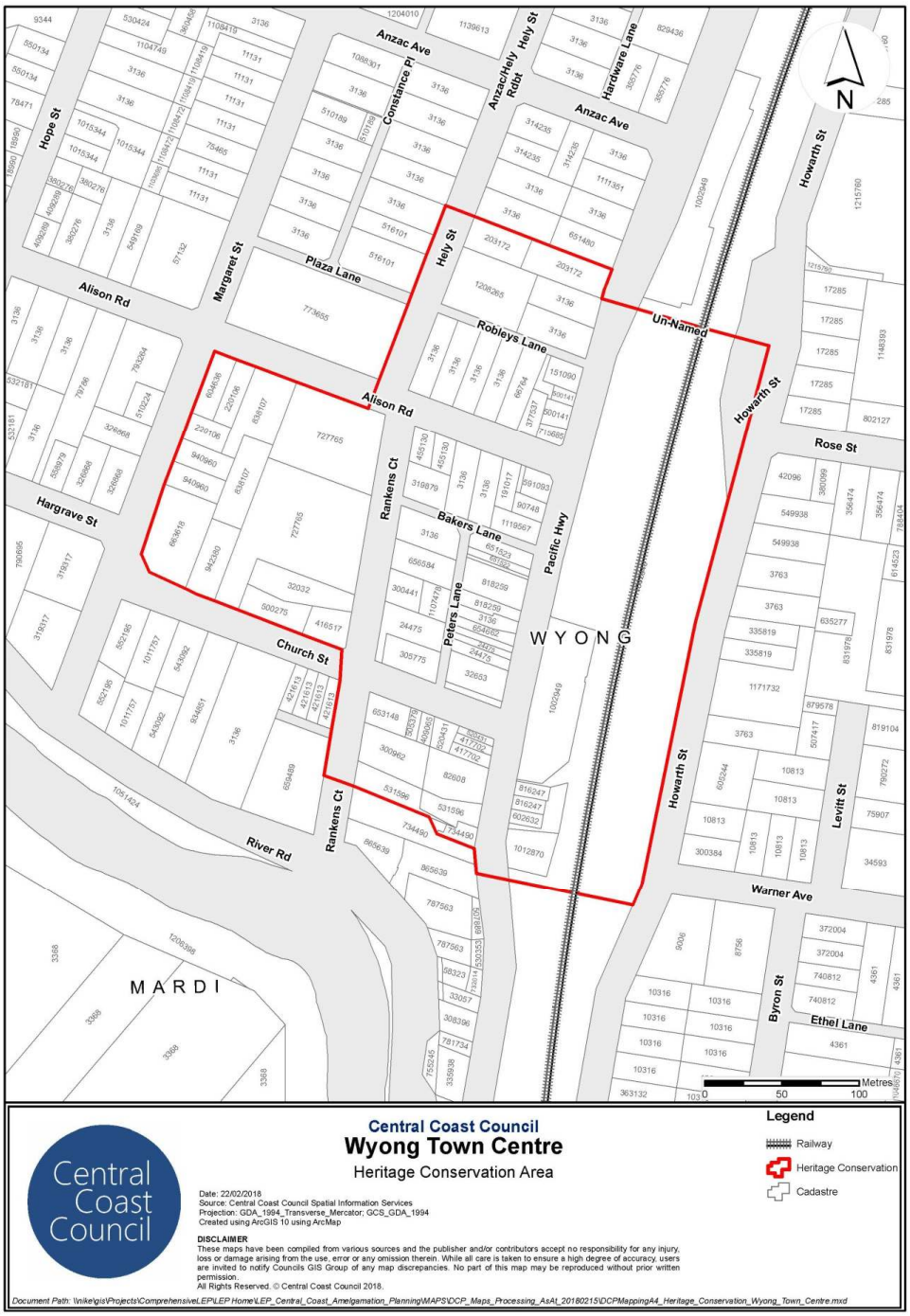

Figure 6. Wyong Town Centre Heritage Conservation Area.

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Figure 7. Wyong Town Centre Heritage Conservation Area building contribution mapping.

OBJECTIVES	
O1	To conserve the significance of Wyong Town Centre Heritage Conservation Area, including its fabric, setting, and views.
O2	To retain the civic, commercial, and residential character of the Wyong Town Centre Heritage Conservation Area.
O3	To ensure that new development is sympathetic to the significance and character of Wyong Town Centre Heritage Conservation Area.
REQUIREMENTS	
R1	Development must be sympathetic to the characteristic form, scale, style, details, and materials of contributory buildings and heritage items within the Heritage Conservation Area.
R2	New development must be reflect the existing one- and two-storey scale of the Heritage Conservation Area. Where increased height is proposed, it must be demonstrated that the impacts of this height have been offset through the use of appropriate massing, siting, materials, and detailing.
R3	Development must not result in changes to the scale or bulk of contributory buildings.

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R4	Development must not overwhelm, dominate or detract from significant streetscapes, buildings or elements within the Heritage Conservation Area, including the Pacific Highway streetscape and the Wyong Railway Station Group.
R5	Development must not detract from or obstruct significant views, including views from Wyong Town Park to the north and east.
R6	Materials of new development must be sympathetic to the characteristic materials of the Heritage Conservation Area: ▪ face brick; ▪ painted render; ▪ weatherboard; and ▪ deep gloss ceramic tiles.
R7	Street plantings and reserve vegetation along Pacific Highway and Alison Road must be retained unless the planting is diseased, dying or dead, or poses a risk to human life or property.
R8	Where street plantings and reserve vegetation have reached their end of life, they must be replaced by a suitable replacement planting. The species of any replacement planting must be approved by Council's Heritage Officer.

3.6.5.4 Oakland Avenue

27 – 51 Oakland Avenue, The Entrance

Statement of Significance

The Oakland Avenue area is a fine representative example of a residential precinct that retains good examples of housing constructed up until c.1950 of high integrity. The streetscape remains largely intact in terms of retaining the historical narrow lot subdivision pattern, the natural features located on rising ground away from the river, and simply built vernacular house designs with short garden settings. Collectively, the buildings and gardens contribute to it being a distinctive area that captures the historical development of a representative type of residential development that retains its historical setting and character. The streetscape is linear and single sided and provides the Heritage Conservation Area with historic, aesthetic, and cultural significance. Given the level of intactness and integrity, the area is of high local heritage significance.

Key period of significance: 1921-1950

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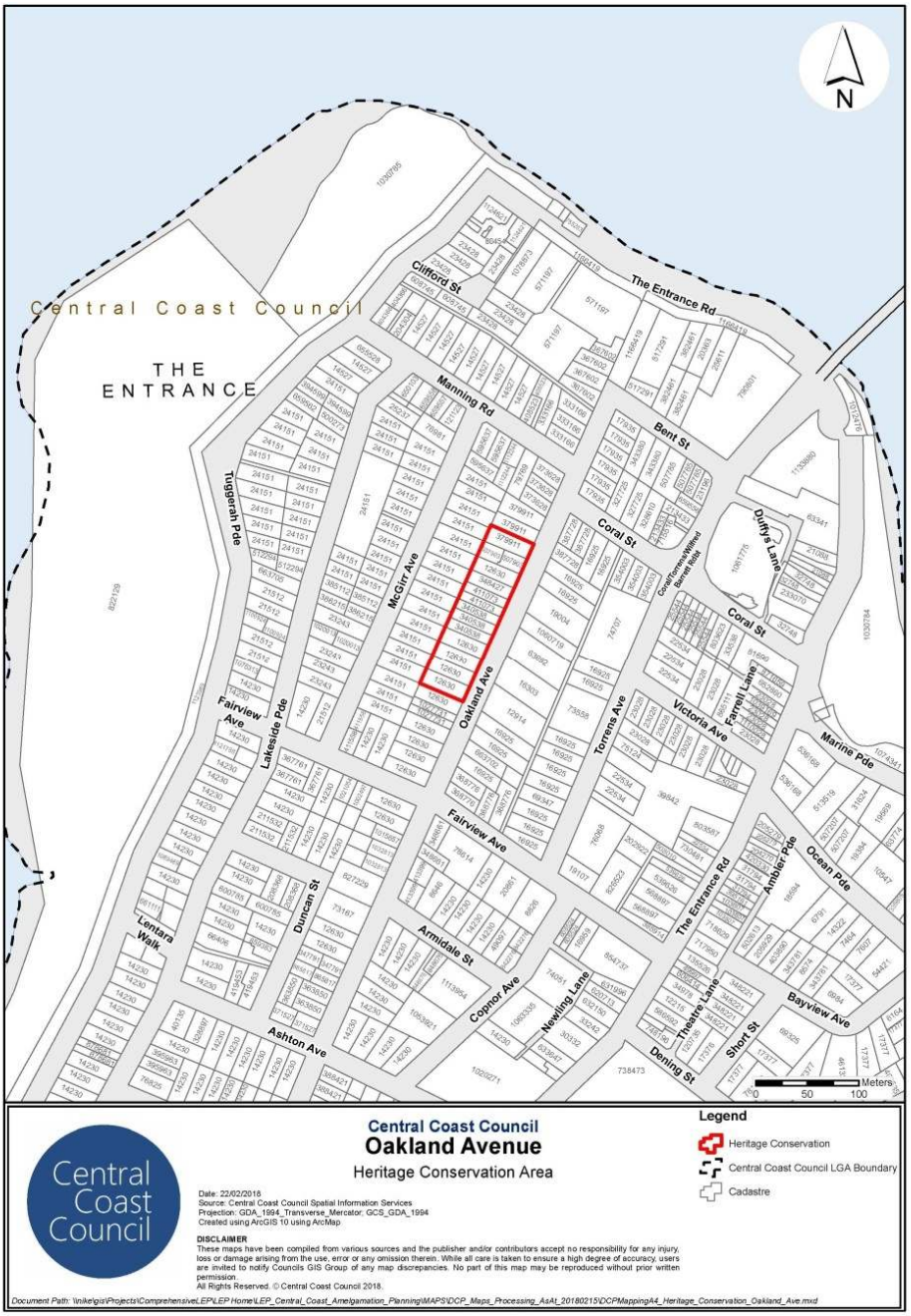

Figure 8. Oakland Avenue Heritage Conservation Area.

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Figure 9. Oakland Avenue Heritage Conservation Area building contribution mapping.

OBJECTIVES	
O1	To conserve the significance of Oakland Avenue Heritage Conservation Area, including its fabric, setting, views, and subdivision pattern.
O2	To retain the single-storey residential character of the Oakland Avenue Heritage Conservation Area.
O3	To ensure that change is sympathetic to the significance and character of Oakland Avenue Heritage Conservation Area.
REQUIREMENTS	
R1	Development must maintain the consistent form and scale of buildings within the Heritage Conservation Area.
R2	New development must be simple in design and sympathetic to the character, form, scale, and materials of the Heritage Conservation Area.
R3	Front and side setbacks must be consistent with the established building line and siting in the Heritage Conservation Area.
R4	Allotment configurations must be consistent with the characteristic subdivision pattern.

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R5	Development must not obscure views to the principal elevations of all properties within the Heritage Conservation Area.
R6	Secondary dwellings may be acceptable where there is sufficient site area at the rear of the property. Secondary dwellings on all properties within the Heritage Conservation Area must have regard to the provisions of Chapter 2.1.8 of the DCP.
R7	Open carport structures must be set back 6m behind the building line.
R8	Garages and outbuildings must be located to the rear of the main building.
R9	Original galvanised iron roofing must be retained, or where no longer feasible to be retained, it may be replaced with traditional galvanised steel and traditional rolled flashings.
R10	New development must use materials sympathetic to the characteristic materials of the Heritage Conservation Area: ▪ painted sheeting; ▪ weatherboard cladding; and ▪ galvanised iron.
R11	Colour schemes must not detract from original significant colours or obscure architectural details.
R12	The height of front boundary fencing must be consistent with the existing low front boundary fencing in the Heritage Conservation Area. Side and rear fencing must rake or step down from the front building alignment to meet the height of front boundary fencing.
R13	Style and materiality of fencing must be appropriate to the significant character and period of the Heritage Conservation Area and houses.

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3.6.5.5 Mount Penang Parklands Heritage Conservation Area

Refer to Chapter 5.3 for development controls relating to the Mount Penang Parklands Heritage Conservation Area.

Mount Penang Parklands is listed on the State Heritage Register. Refer to the State Heritage Inventory for management recommendations and for further information on the State heritage significance of the area.

Statement of Significance

The Mount Penang Juvenile Justice Centre has been the most important juvenile detention centre in NSW for most of the twentieth century and is a direct continuation of the nineteenth century system of reformatory training ships. The design of the early buildings, their configuration and the layout of the site itself, as well as its agricultural and pastoral features, its remnant dairy and its landscaping collectively and individually illustrate juvenile penal philosophies and practices of the period and their subsequent evolution over eighty-five years of operation. The location of the Centre is a feature in the historical expansion of the City of Sydney into its rural hinterland and its operations are an element in the development of Gosford and the Central Coast.

Mount Penang also has significance for the local Aboriginal people both pre and post-contact, and during the time when Mount Penang was used as a juvenile detention centre and accommodated a number of Aboriginal detainees for whom the site would have profound associations.

The Centre has notable aesthetic qualities associated with its site and the available views, and layout of the low- scale buildings and the landscaping. The earlier buildings are attractive, human-scaled structures, which, while of an institutional character, utilise colonial homestead architecture, appropriate to their setting and construction techniques of particular interest. The earlier buildings reproduce these forms to reinforce the characteristic appearance of the complex, whilst the McCabe Cottages group is an excellent example of the Inter-War Functionalist architectural style.

The siting and relationship of buildings to each other and to the sports fields, paddocks and vistas are all components of the operational requirements and practices of the Centre. These provide technical information regarding juvenile detention and reformatory practices. Mount Penang is very important to the many boys and young men who were detained there over the course of nearly a century. For most detainees, Mount Penang is a place where the unforgettable occurred - experiences that strongly influenced the course of their lives. The place is significant to the many men and women who lived and worked at the former detention centre. For many of these people, it is a place of substantial personal and professional achievement. Mount Penang is also important to the local community as a landmark of historical and aesthetic importance. The place has functioned as a community meeting point, with many links between the wider community and the detainees and staff.

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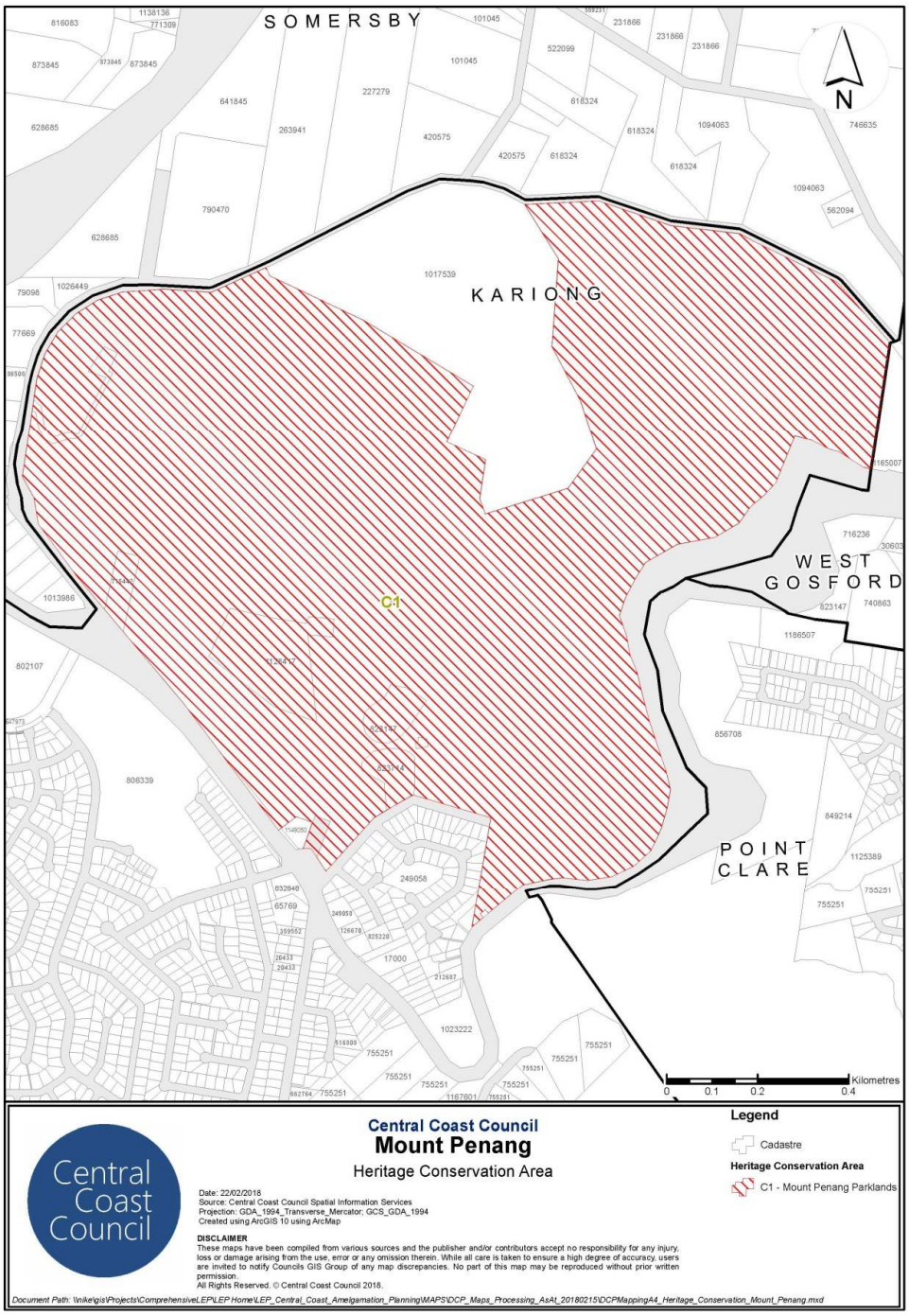

Figure 10. Mount Penang Parklands Heritage Conservation Area.

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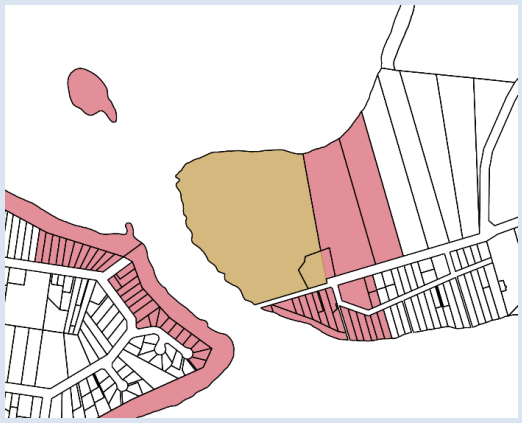
3.6.6 DEVELOPMENT IN THE VICINITY OF HERITAGE

Development in the vicinity refers to development that occurs outside the curtilage or boundary of a heritage item or heritage conservation area, but is located near to and has the potential to impact the significance of the heritage item or area. These impacts can relate to the setting, views, or use of the item or area.

The definition of vicinity is relative to the physical and spatial context of the heritage item or area concerned. In a dense urban environment, 'in the vicinity' may refer to the neighbouring allotments. In a more sparsely developed area, it may refer to land significantly further away.

In this residential block, 'vicinity' (indicated in red) may refer to the properties immediately adjoining or facing the heritage item (indicated in brown).



In this waterfront setting, 'vicinity' (indicated in red) may refer to properties adjoining or facing the heritage item, and may also refer to properties that form part of key views to or from the heritage item (indicated in brown).

Development application requirements

Under Clause 5.10(5) of the CCLEP 2022 and Clause 5.36(5) of the Regional SEPP, before granting consent to development on land that is in the vicinity of a heritage item or heritage conservation area, Council may require a heritage management document to be prepared that addresses the potential impacts of the proposed development on the significance of the heritage item or heritage conservation areas concerned. Typically, this will take the form of a **Heritage Impact Statement** (HIS), also commonly referred to as a Statement of Heritage Impact (SOHI).

3.6.6.1 General controls for development in the vicinity of heritage

OBJECTIVES	
O1	To conserve the significance of heritage items and heritage conservation areas.
O2	To retain the significant setting and views of heritage items and heritage conservation areas.
O3	To ensure that development in the vicinity is sympathetic to the scale, form, and character of the heritage items and heritage conservation areas.

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REQUIREMENTS	
R1	Development must consider potential impacts to heritage items and heritage conservation areas in the vicinity.
R2	Development applications must demonstrate that the design of new development has mitigated potential impacts to heritage items/areas in the vicinity through consideration of: ▪ character; ▪ scale; ▪ form; ▪ siting; ▪ materials and colour; and ▪ detailing. Refer to 3.6.6.3 for additional guidance relating to the design of new development in the vicinity of heritage items.
R4	Development must have front and side setbacks that enable the retention of public domain views of the heritage item or heritage conservation area.
R5	Development must not cause adverse overshadowing impacts to the heritage item or heritage conservation area.

3.6.6.2 Infill development

Read in conjunction with:

- Chapter 2.17 Character and Scenic Quality

Infill development refers to new development within a historic streetscape, or new development adjacent to, or in the vicinity of, heritage items or heritage conservation areas. Successful infill development is that which responds to existing characteristics of a streetscape or area, and is sympathetic to the significance of heritage items and heritage conservation areas in the vicinity.

The design of infill development is to be informed by the following guidelines:

- *Better Placed* (Government Architect NSW 2023), and
- *Design in Context* (NSW Heritage Office 2005).

OBJECTIVES	
O1	To ensure that infill development is sympathetic to heritage items and heritage conservation areas in the vicinity.
O2	To ensure that infill development is complementary to the character and scale of heritage items and heritage conservation areas in the vicinity.

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O3	To ensure that infill development does not detract from or interrupt the relationship between heritage items/areas and public domain, including views and vistas.
REQUIREMENTS	
R1	Infill development must respond to the existing character, scale, form and style of the heritage item or heritage conservation area in the vicinity with regard to: ▪ character; ▪ scale; ▪ form; ▪ siting; ▪ materials and colour; and ▪ detailing. Refer to 3.6.6.3 for additional guidance relating to the design of new development in the vicinity of heritage items.
R2	Infill development must not dominate heritage items/areas in the vicinity, in terms of scale, bulk, setbacks and architectural character.
R3	Infill development must not result in significantly larger scale or bulk than the heritage item in the vicinity.
R4	Siting and setback of infill development must reflect the existing siting and setback pattern of the surrounding streetscape
R5	Infill development must not obstruct or detract from physical, spatial, or visual connections between significant elements.
R6	Infill development must not obscure or detract from significant views to, from, and between heritage items and conservation areas

3.6.6.3 Character

The character of a place is defined by the combination of its particular characteristics or qualities.

This can include its natural landform and landscape elements, its street and subdivision patterns, as well as the date, style, scale, form, siting, materials, and details of its built form.

Heritage items and heritage conservation areas are often key contributors to the character of a place. Infill development must respond to the character of the place through its use of scale, form, siting, materials, colour and detailing that is characteristic or predominant to the item or area. New development that is inconsistent with the predominant scale, form, siting, materials, colour or detailing of surrounding built form can detract from the character and significance of the place.

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Davistown

The character of Davistown is formed by its mostly early-twentieth century cottages, with their consistent pattern of pitched roofs, with projecting sunrooms or enclosed veradahs.

The building at the centre of this image is a new development, with heriatge items to either side.

It has been designed symapthetically to the heritage items, taking cues from the gabled roof forms, fenestration and materiality of its neighbours, to ensure that it sits cohesively in its streetscape.

Woy Woy

Buildings in Woy Woy's town centre vary in their form, date, and style. However, their consistent scale unifies the streetscape and contributes to the character of the area.

Long Jetty

The suburb of Long Jetty is characterised by its Post-War lakeside houses and apartments.

The two buildings in this image are similar in their scale, form, siting and materiality. The front building is listed as a local heritage item (Dwellings I141), while the rear is not. However, both contribute strongly to the local character of the area.

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Definitions

Scale

Scale is the size of a building and its relationship with its surrounding buildings or landscape. The scale of a building relates to its height, bulk, density and grain – not simply how big a building is, but how big it feels.

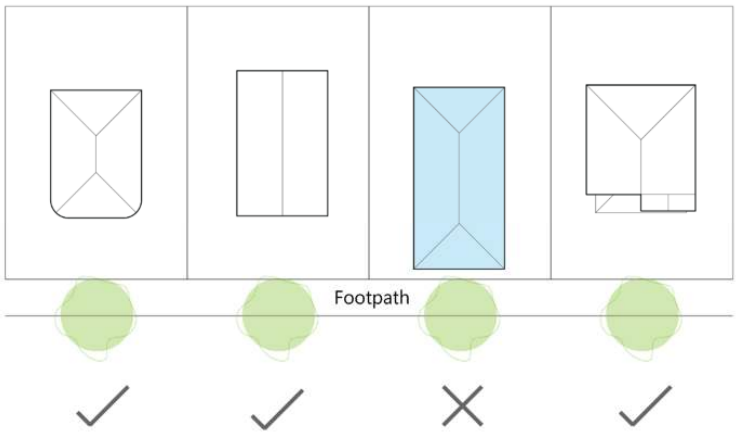
Form

The form of a building is its overall shape and volume. Roof line and pitch is a key component of form.

The below dwellings have a consistent form. While they differ in their arrangement of doors and windows, their identical gabled roof forms provides a cohesive streetscape.

Siting

The siting of a building refers to its position on its allotment, and its setback from its road frontage and neighbouring buildings. In the below example, the new development in blue is inconsistent with the predominant siting of the streetscape.



Materials, colour and detailing

Materials and colour refers to the cladding, rendering or other external finish of a building.

Detailing can include façade articulation, parapets, window and door openings, verandahs, chimneys or other architectural features.

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3.6.7 ADDITIONAL INFORMATION

3.6.7.1 Heritage Management Documents

Heritage Impact Statement

A Heritage Impact Statement (HIS) (or Statement of Heritage Impact) is a heritage management document that assesses how a proposed development will impact a heritage item or heritage conservation area. It assists the consent authority to consider if an application should be approved based on its potential impacts on the significance of the heritage item.

A HIS will be required for development to a heritage item or heritage conservation area, or within the vicinity of a heritage item or heritage conservation area. Development involving State Heritage Register items will require a SOHI prepared in accordance with *Guidelines for preparing a statement of heritage impact* (Department of Planning and Environment 2023).

A HIS is to include the following information:

- site description (including site map)
- site history
- physical analysis
- heritage significance of the item, its elements, and its setting (this may be the existing assessment of significance for the heritage item, although an updated or more rigorous assessment may be required)
- description of proposed works and/or activities
- assessment of the development against the relevant provisions of the CCLEP 2022 (or Regional SEPP) and the CCDCP (or Gosford City Centre DCP)
- assessment of the impact of the proposed works on the fabric and significance of the heritage item or heritage conservation area
- conclusion, including recommended conditions and/or mitigation measures.

It is important that your development application is supported by an adequate assessment of heritage impact. The length or complexity of a HIS will depend on the nature of the development and its potential impacts to heritage items or heritage conservation areas. Some development may only require a short HIS that can be written by the property owner or architect/designer. Others may require a more substantial assessment, that should be prepared by an appropriately qualified and experienced heritage professional with relevant expertise.

Historical Archaeological Assessment

Historical Archaeological Assessments (HAA) are predictive studies that evaluate the likely extent, nature, integrity and significance of the archaeological resource at a site. A HAA must be prepared by a suitably qualified archaeologist, and must address:

- the historical development of the land and modifications over time
- the likelihood or potential for archaeological relics
- the significance of those relics

- what would be the impacts of your proposed activity or work
- what options have been considered to avoid disturbance to retain the relics
- management advice that is consistent with the significance of the archaeological relic/s.

The HAA will recommend specific actions to manage the archaeological resource, such as:

- No further action
- Archaeological monitoring
- Test excavation
- Archaeological excavation
- In situ conservation

The HAA must be prepared in accordance with guidelines available on the NSW Environment and Heritage webpage, including:

- *Archaeological assessments guidelines* (Department of Urban Affairs and Planning 1996)
- *Assessing Significance for Historical Archaeological Sites and 'Relics'* (Heritage Branch of the Department of Planning, 2009)

Conservation Management Plan

The purpose of a Conservation Management Plan (CMP) is to evaluate the significance of the heritage item and to make detailed recommendations on its continuing conservation and management. CMPs guide the use, management and change of heritage items. They should achieve the best possible conservation of heritage significance within the context of the real-world management circumstances of the item.

A CMP must not be written:

- with the purpose of justifying a specific project or development
- to exclusively meet the needs of users (e.g. heritage authority, owner/manager, maintenance staff).

A CMP will be required for development proposals involving:

- A State Heritage Register item;
- A complex local item such as a school campus or Council owned property; or
- Any proposal that relies on Clause 5.10(10) – Heritage Incentives

A CMP may be required for development proposals involving other local heritage items. A CMP must be prepared by a suitably qualified heritage consultant with reference to existing management recommendations in the State Heritage Inventory listing sheet for the item.

The CMP must be prepared in accordance with guidelines available on the NSW Environment and Heritage webpage, including:

- *Statement of best practice for conservation management plans* (Department of Premier and Cabinet 2021).
- *Guidance on developing a conservation management plan* (Department of Premier and Cabinet 2021).
- *Conservation management plan checklist* (Department of Premier and Cabinet 2021).

Heritage Asset Action Plan

Heritage Asset Action Plans (HAAP) are relatively simple and succinct documents that provide guidance about targeted aspects of the maintenance or management of a heritage item. HAAPs are not suitable in the context of a major change or development affecting a heritage item, but can be prepared to provide guidance on:

- the maintenance of a heritage asset or item;
- a specific aspect of conservation or management;
- a conservation approach that applies across an asset type ; or
- a specific component of an item.

An understanding of the heritage significance for the item is essential to underpin the HAAP. Where an existing and robust statement of significance already exists, such as from a heritage register like the State Heritage Register, then this should be used. If a statement of significance is not available, then a heritage investigation and assessment should be completed.

The HAAP must be prepared in accordance with guidelines available on the NSW Environment and Heritage webpage, including:

- *Statement of best practice for heritage asset action plans* (Department of Premier and Cabinet, 2021).

Heritage Interpretation Plan

A Heritage Interpretation Plan (HIP) is a document that provides the policies, strategies and detailed advice for interpreting a heritage item. It is based on research and analysis, and plans to communicate the significance of the item, both during a conservation project and in the ongoing life of the item. The HIP identifies key themes, storylines and audiences and provides recommendations about interpretative devices. It includes practical and specific advice about how to implement the plan.

The HIP must be prepared in accordance with guidelines available on the NSW Environment and Heritage webpage, including:

- *Interpreting Heritage Places and Items Guidelines* (NSW Heritage Office 2005)

Archival record

An Archival Record consists of a photographic recording of an item, place or object. The purpose of an Archival Record is to record the item, place or object in its current condition, before it is changed or lost. The requirements of an Archival Record will depend on the nature of the works proposed. At minimum, it will include a photographic survey and site plan, and may also require measured drawings of the item, clearly identifying previous alterations, dates of construction and materials.

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The preparation of an Archival Record may be a condition of consent for development applications involving changes to heritage items or heritage conservation areas. The Archival Record must be provided to Council for their review and approval. Once finalised, the Archival Record should be provided to the Central Coast Library Service.

The Archival Record must be prepared in accordance with guidelines available on the NSW Environment and Heritage webpage, including:

- *Heritage Information Series: How to Prepare Archival Records of Heritage Items* (NSW Heritage Office)

Note: The above guidelines specify requirements for hard copies of Archival Recordings; however, in some circumstances only a digital copy will be required.

Schedule of Conservation Works

Development applications that involving repair, conservation or maintenance works to the significant fabric of a heritage item, or involve a heritage item in need of repair, conservation or maintenance works, must be accompanied by a Schedule of Conservation Works (SoCW).

A SoCW identifies the methods, materials and tradesperson to be used for the conservation works. The SoCW must be prepared by a suitably experienced heritage consultant, architect or tradesperson, and must be based on the principles of the Burra Charter.

Refer to heritage maintenance guidelines available on the NSW Environment and Heritage webpage:

- https://www2.environment.nsw.gov.au/topics/heritage/manage-heritage-items/heritage-maintenance-guides

3.6.7.2 References and links

Local studies – researching the history of your property

Local Studies, within the Central Coast Library, has a wealth of resources that can assist in researching the history of a heritage place, including books, reports, local newspapers, pamphlet, files, aerial photos, maps and street directories. The Local Studies team can help you learn more about the history of your property.

Central Coast Libraries

- https://libraries.centralcoast.nsw.gov.au/history

Central Coast Memories

Central Coast Memories provides historic images, sound recordings, subdivision plans, postcards and tourist publications. It is part of the Central Coast Council Library Service's local history images collection.

Central Coast Memories

- https://centralcoast.contentdm.oclc.org/

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Heritage NSW Publications

Heritage NSW, which sits within the NSW Department of Climate Change, Energy, the Environment and Water (DCEEW), has a wide range of heritage publications available to download.

NSW Environment and Heritage, Manage heritage items

- https://www2.environment.nsw.gov.au/topics/heritage/manage-heritage-items

3.6.7.3 Definitions

Generally, the terms used in this Chapter have the same meaning as those terms defined within the CCLEP 2022. Where a term is defined within the CCLEP 2022, it is not repeated here. The following additional terms are relevant to this Chapter:

adaptation means modifying a heritage place to a new use that conserves its heritage values.

alter in relation to a heritage item means physical changes to the fabric, setting or layout of a heritage place.

archival record means a record of evidence, including written, photographic, illustrative, diagrammatic and/or video evidence that identifies the environment, aesthetics, technical skills, and customs associated with the creation and use of the heritage item.

building element means an architectural component of a building or site.

compatible use means a use which involves no change to the significant fabric of a building or work, changes which are substantially reversible, or changes which make a minimal impact.

conservation means all the processes of looking after a building or work so as to retain its heritage significance. Conservation can include maintenance, preservation, restoration, protection, reconstruction and adaptation.

contributory item means a building, work, place, relic, tree, or place and its setting, which contributes to the heritage significance of a conservation area.

fabric means all the physical material of a site, building or work.

form means the overall shape and volume and the arrangement of the parts of a building.

heritage interpretation is the process of explaining or representing the heritage significance of a place to the community.

Heritage Inventory Assessment Report means a report taken from the State Heritage Inventory database for a heritage item.

historic character means the combination of particular characteristics or special qualities of a place related to its period of style or construction.

infill development means a new building in an established and developed area which is adjacent to or in the vicinity of a heritage item or Heritage Conservation Area.

measured drawing means a technical or architectural record of the heritage item in its existing state.

natural heritage means natural features consisting of physical and biological formations or groups of such formations, which demonstrate natural significance. Geological and physiographical formations and precisely delineated areas that constitute the habitat of indigenous species of animals and plants, which demonstrate natural significance, and/or natural sites or precisely-delineated natural areas which demonstrate natural significance from the point of view of science, conservation or natural beauty.

natural significance means the importance of ecosystems, biodiversity and geodiversity for their existence value or for present or future generations, in terms of their scientific, social, aesthetic and life-support value.

neutral building means a building or building element that neither contributes nor detracts from the significant character of the Heritage Conservation Area.

non-contributory building means a building or building element that detracts from the significant character of the Heritage Conservation Area.

preservation means maintaining the fabric of a building or work in its existing state to prevent deterioration.

reconstruction means returning a building or work as nearly as possible to a known earlier state and is distinguished by the introduction of materials old or new into the fabric.

relic means any deposit, artefact, object or material evidence that relates to the settlement of the area that comprises NSW, not being Aboriginal settlement and is of State or local heritage significance

restoration means returning the existing fabric of a building or work to a known earlier state by removing accretions or by reassembling existing components without the introduction of new materials.

setting means the context within which a structure is located with respect to streetscape.

Statement of Significance means a statement or document that describes and explains the characteristics that give an item its heritage significance.

vicinity means land or surroundings that have a physical or visual relationship to the site of a heritage item or Heritage Conservation Area, and that potentially may affect the heritage significance of the item or area.

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Part 4 Major Centres
Chapter 4.5 Wyong Town Centre

CHAPTER 4.5 WYONG TOWN CENTRE

4.5.1 INTRODUCTION

4.5.1.1 Objectives of this Chapter

This Chapter aims to facilitate appropriate high quality development in the Wyong Town Centre by providing guidelines, particularly in relation to:

- The reinforcement and preservation of the existing heritage character of the Wyong Town Centre
- Urban design provisions which will provide a cohesive approach for development
- The appropriate scale and density with higher density development concentrated around the Wyong Town Centre
- The provisions which will facilitate mixed use and commercial development
- The car parking requirements for development in the Wyong Town Centre; and
- Special provisions for specific areas

4.5.1.2 Land to which this Chapter Applies

This chapter applies to all land within the Wyong Town Centre as shown in Figure 1 and covers a wide variety of land uses such as retail, commercial, mixed-use and residential. The Chapter should be read in conjunction with the provisions of the *Central Coast Local Environmental Plan (LEP) 2022*.

4.5.1.3 Relationship to other Chapters and Policies

This Chapter should be read in conjunction with other relevant Chapters of this Development Control Plan and other Policy Documents of Council, including but not limited to:

- Chapter 2.1: Dwelling Houses, Secondary Dwellings and Ancillary Development
- Chapter 2.2: Dual Occupancies and Multi-Dwelling Housing
- Chapter 2.3: Residential Flat Buildings and Shop-Top Housing
- Chapter 2.13: Transport and Parking
- Chapter 5.48: Northern Areas -Public Art
- Chapter 3.6: Heritage Conservation

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Part 4 Major Centres
Chapter 4.5 Wyong Town Centre

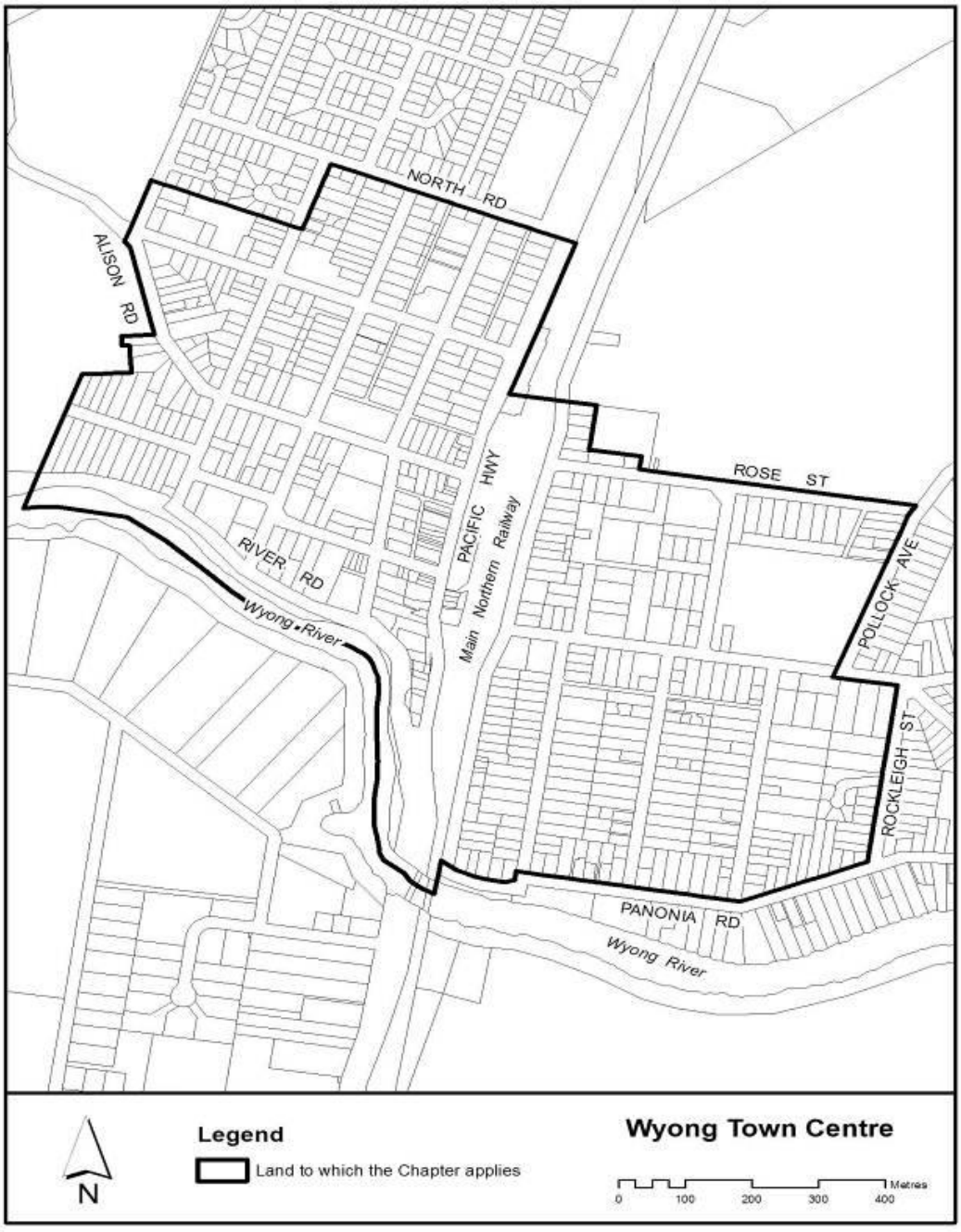

Figure 1 Wyong Town Centre Area

Part 4 Major Centres
Chapter 4.5 **Wyong Town Centre**

4.5.2 DESIGN THEME

4.5.2.1 Vision for the Wyong Town Centre

The Tuggerah-Wyong area will perform vital economic, employment, civic, residential, social and cultural roles for the northern half of the Central Coast and support the Gosford Regional City. Council's and the Community's vision for Wyong is contained in the Wyong/Tuggerah Planning Strategy (2007) as revised. The Strategy's main visions for Wyong are to:

- Provide an important and attractive gateway for the Central Coast
- Become the cultural and heritage focus area and a culturally-based tourist destination for people visiting and living on the Central Coast
- Have strong links (physical, visual and cultural) between the Town Centre, Wyong River and the surrounding districts, including the valleys to the west and Tuggerah Straight to the south
- Provide a high quality public domain that complements the surrounding residential development and the town's heritage focus
- Provide a variety of housing, accommodation and lifestyle choices
- Develop a superior standard of urban and building design
- Make a strong statement as to the community identity through its people, built form and natural topography
- Perform a strong business and employment function as a central administrative and town-based commercial area
- Integrate a range of recreation, sporting, cultural, leisure and social activities within high quality spaces and places
- Concentrate higher density development around the Town Centre and key public areas including the Wyong River foreshore, Baker Park and the Wyong Town Park
- Enjoy a strong District retail component;
- Supply a regional transport node that integrates all transport functions
- Create a new system of pedestrian and bicycle paths to link existing and new residential areas, as well as cultural and tourism facilities

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Part 4 Major Centres
Chapter 4.5 **Wyong Town Centre**

4.5.2.2 Heritage Theme

One of the main visions for the Wyong Town Centre is to become the cultural and heritage focus area and a culturally-based tourist destination for people visiting and living on the Central Coast. There is a relatively large concentration of heritage items in the Wyong Town Centre compared to other towns on the Central Coast Accordingly, a heritage theme has been adopted for the Wyong Town Centre to preserve and reinforce its historic character.

This section describes the significance of the Wyong Town Centre and identifies the general Heritage Character Areas for the purposes of providing a context for development in the Wyong Town Centre.

4.5.2.2.1 Aboriginal Heritage in the Wyong Town Centre

Council has adopted a Thematic History which provides some information on the Aboriginal heritage of the Wyong Town Centre. A copy of this history can be obtained by contacting Council. This history talks about Aboriginal Territories that may have been near the Wyong Town Centre, which include the Lower Wyong River and Jilliby Creek Valleys. Due to the Wyong Town Centre's proximity to the river, it can be expected that Aboriginal archaeological sites might appear in the Wyong Town Centre area. For these reasons reference to heritage in the Wyong Town Centre should include Aboriginal heritage as well.

OBJECTIVES

- To acknowledge Aboriginal people as the traditional custodians of the Central Coast
- To provide a reference to the Aboriginal heritage of Wyong in public art
- To preserve existing sites of significance to Aboriginal people in the Wyong Town Centre

REQUIREMENTS

a Public signage at Gateway locations is to provide appropriate reference to local Aboriginal heritage.

b Development that is required to have Public Art shall incorporate the work of a local Aboriginal artist to a value of at least 20% of the total budget for Public Art.

c Refer to Section 3.6.2 for assessment requirements relating to Aboriginal cultural heritage.

4.5.2.2.2 Built Heritage

Council has adopted a Thematic History which provides information on the built heritage of the Wyong Town Centre. A copy of this history can be obtained by contacting Council. The most significant drivers of development in the Wyong Town Centre were the Great Northern Railway (c. 1887) and the accompanying timber, farming and dairy industries. A photo of railway sleepers being loaded at Wyong Station is shown in Figure 2 below.

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Part 4 Major Centres
Chapter 4.5 **Wyong Town Centre**

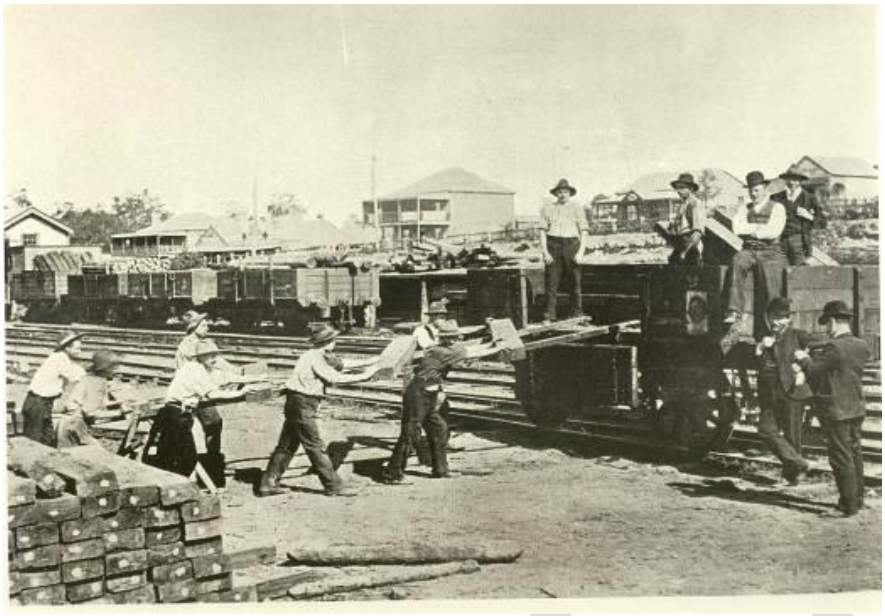

Figure 2 **Photograph of Railway Sleepers being loaded at the Wyong Railway Yard c.1904**

(Source: Stinson c1909)

In the 20th Century roads and transport changed the character to that of a service town. Some of the historic buildings typical of the period remain today, such as the Chapman stores, which are shown in Figure 3 below.

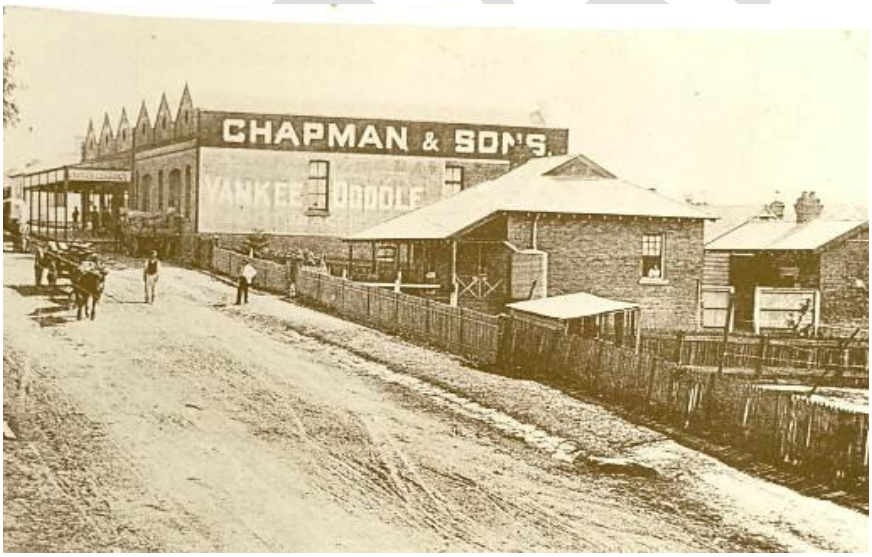

Figure 3 **Photograph of the Chapman Stores c.1901**

Part 4 Major Centres
Chapter 4.5 **Wyong Town Centre**

4.5.2.2.3 Heritage Items and Heritage Conservation Area

Heritage Items and the Heritage Conservation Area in the Wyong Town Centre are identified in the Central Coast LEP 2022. Photos of a selection of these heritage items are shown at Figure 5. For the current listing of heritage items refer to the Central Coast LEP 2022. Development provisions for heritage items are provided in Section 3.6.4; development provisions for heritage conservation areas are provided in Section 3.6.5.

"The following Statement of Significance has been prepared for the Wyong Town Centre Heritage Conservation Area:

"The Wyong Town Centre is a fine representative example of a town centre that retains good examples of civic, commercial, and residential development of high integrity, constructed in the period commencing with the railway in 1889 up until c.1945. It remains largely intact in terms of retaining its historical subdivision pattern, its natural prominence located above the River, its built fabric, avenue tree planting, and the prominence of the Railway and Station buildings. Collectively, the built environment, transport links and natural features of the town centre contributes to it being a unique precinct that captures the historical development of an important town, and one which retains its historical setting and character. The town centre retains examples of its historic development across a broad range of historic themes including Aboriginal heritage, European heritage, other cultural and social heritage, natural heritage, and themes such as transport, agriculture, commerce, education, health, government and law and order. Given its level of intactness and integrity, it comprises a rare sets of significant heritage items and contributory buildings and composite streetscapes and is of historic, aesthetic, technical and cultural significance."

OBJECTIVE

- To reinforce and preserve the existing heritage character of the Wyong Town Centre

REQUIREMENT

A Heritage Impact Statement will be required for new work to Heritage Items or new work on sites adjacent to Heritage items. In the example at Figure 4 below, a new development is proposed next to the Turton Heritage Building. The new development is adjacent to a heritage item, so will require a Heritage Impact Statement and need to adhere to the development provisions in Section 3.6.4 Heritage Items.

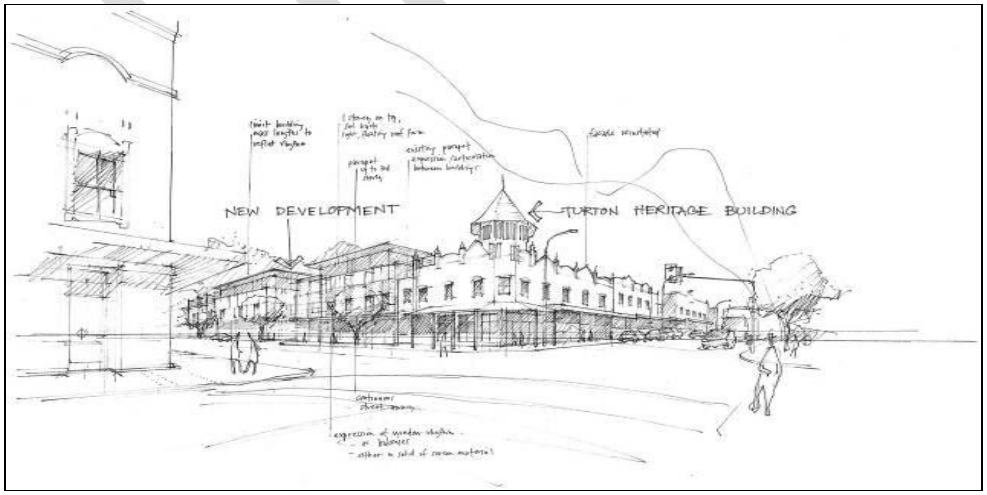

Figure 4 **Example of new development requiring a Heritage Impact Statement**

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Chapter 4.5 **Wyong Town Centre**

Dwelling

Alison Road

Former Court House

Alison Road

Police Station and Quarters

Alison Road

Retail Store

Alison Road

St Cecilia's Catholic Church Group, Byron Street

Former Public School

Church Street

World War I and II

Monument, Church Street

Shops

Corner Church Street and Pacific Highway

Dwelling

Hope Street

Dwelling

Hope Street

Dwelling

Hope Street

Brisbane Water Ambulance Station, Pacific Highway

Former Rural Bank

Pacific Highway

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Shopping Complex

Pacific Highway

Wyong Railway Station

Pacific Highway

Former Methodist Church

Rankens Court

(recently burnt down)

Commercial Office

Building, Rankens Court

Council Building,

Corner Hely Street and Anzac Avenue

Figure 5 **Photos of selected Wyong Town Centre heritage items**

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4.5.2.2.4 Heritage Character Areas

Within the Wyong Town Centre area there are six main building precincts of generally consistent architectural style and character:

1 Wyong Hill Community Area
2 Railway Station Area
3 Pacific Highway and Alison Road
4 Administration Area
5 West Wyong Residential
6 East Wyong Residential

These Heritage Character Areas have been identified on the map below at Figure 6.

OBJECTIVE

- To enable new development that respects the existing character that has been established and integrates successfully with existing development within the Heritage Character Area

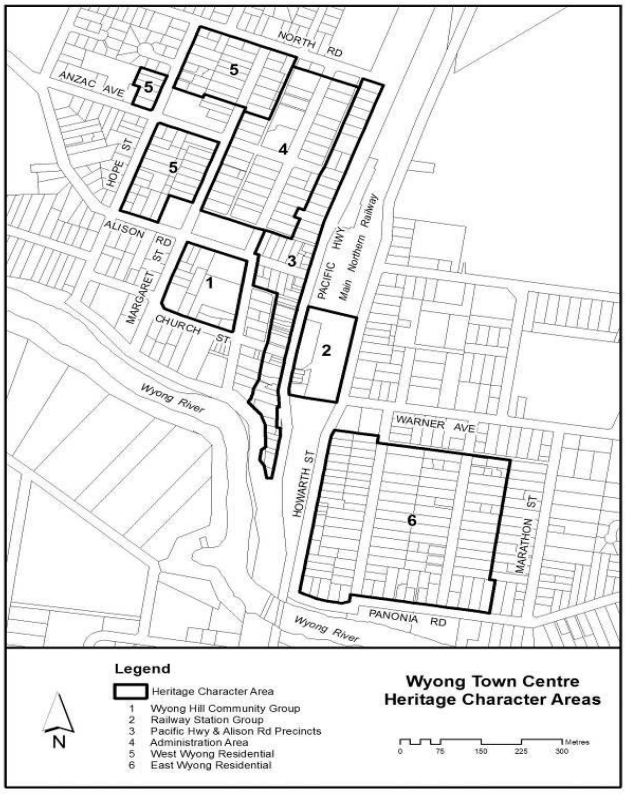

Figure 6 Heritage character areas in the Wyong Town Centre

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Precinct 1 – Wyong Hill Community Area

The Wyong Hill Community Area is centred on Wyong Town Park. Within its area are significant public structures including the former Wyong Public School (the oldest surviving building in Wyong Town Centre), the former Court House, and the WW1 and WW2 Memorial. The area is of social, historical and aesthetic significance.

REQUIREMENTS

a Maintain the 'hill top' effect. Any development within the vicinity of Wyong Hill Community Area must consider the impact of building bulk and scale in relation to Wyong Hill to ensure that Wyong Hill retains its prominence as a high point in the Wyong Town Centre.

b Provide opportunities for viewing aspects of the Wyong Town Centre and maintain visual links to Alison Road and Rankens Court.

c Development must make provision for accessibility in order to ensure that the area becomes a focal point for open-air activities in the Wyong Town Centre.

Precinct 2 – Railway Station Area

The Railway Station Area includes late-Victorian style railway buildings (now much altered) and the 1920s Railway Square shops constructed by A.H. Warner in an inter-War Gothic Style. The buildings are of historic, social and architectural significance because of their roles in the growth of the Wyong Town Centre.

Figure 7 Historic photo of Wyong Railway Station built in 1887

(Source: Rod Howard Heritage Conservation, 1994)

REQUIREMENTS

a Development must retain heritage items located within the railway station area.

b New buildings must respect the existing heritage structures, and be sympathetic in form and visual relationship.

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Precinct 3 – Pacific Highway and Alison Road

The Pacific Highway and Alison Road area incorporates buildings in a strip along the western edge of the Pacific Highway and up Alison Road to the Wyong Town Park Hill. It includes a range of commercial buildings such as hotels, cafes and shops. The architectural style of the area is dominated by a low-budget Modernist approach, often exemplified by the successive modernisations of street facades undertaken in the decades after World War 2.

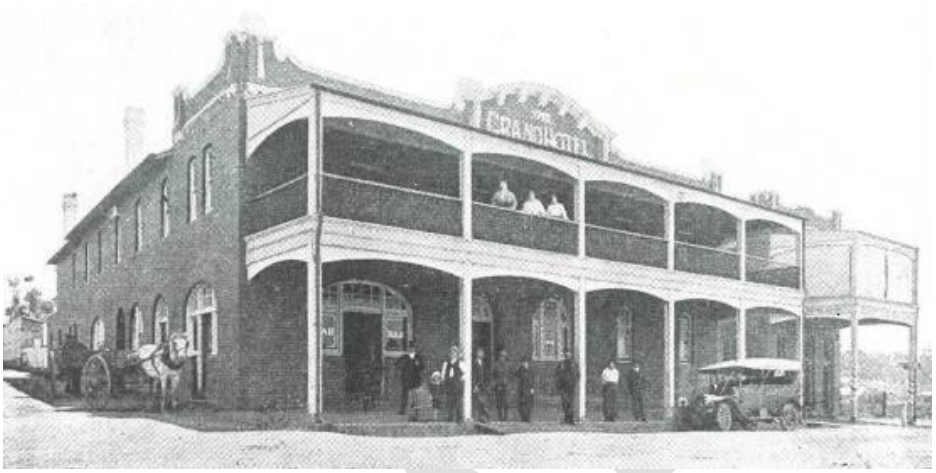

Figure 8 **Historic photo of the Grand Hotel on the Pacific Highway**

(Source: Stinson)

REQUIREMENTS

a New development should respect boundary setbacks of existing buildings.

b Ensure future development addresses the Wyong River on those sites with frontage to River Road.

c Ensure uses above ground level that complement existing uses at ground floor level.

d Ensure that new development is complementary to and consistent with the form, scale, height, and detail of the existing building stock in the vicinity. An example of new development that is compatible with the existing form, scale and height of an adjacent heritage building is provided below at Figure 9.

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Example of Commercial Heritage Infill Development:

Figure 9 below shows an example of new development on Church Street adjacent to a prominent heritage building along the Pacific Highway. The new development is built to the boundary which is consistent with the existing zero setback in an urban street. The scale and form of new development respects that of the heritage building. Upper levels of the new development are setback behind the front façade and do not detract from the historic turret that is a landmark along the Pacific Highway.

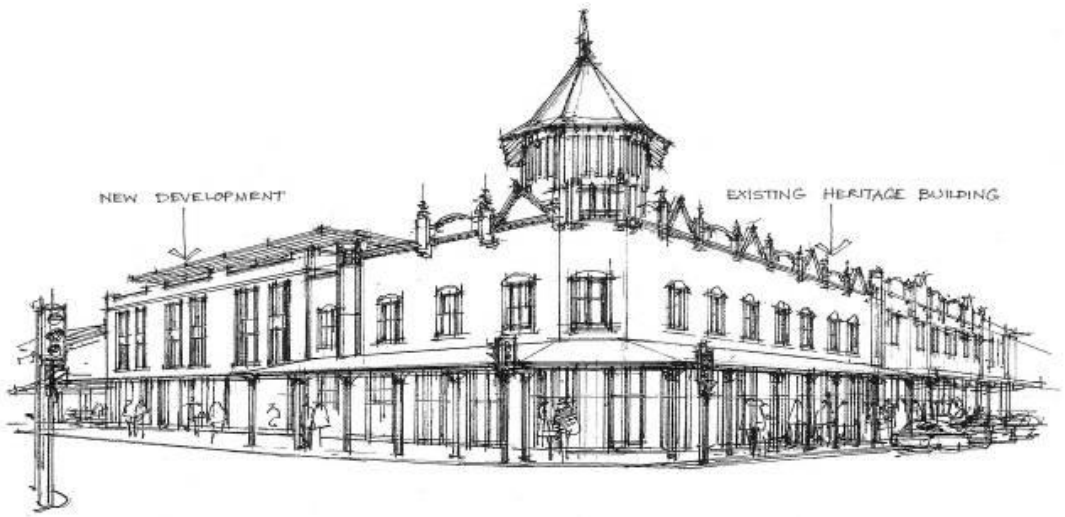

Figure 9 **Example of new development compatible with the scale of an adjacent heritage building**

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Precinct 4 – Administration Area

The buildings along Hely Street, Anzac Avenue and Margaret Street are relatively large-scale free-standing, Modernist design government administrative and community buildings constructed at various times after World War 2. Within the Administration Area is the Council Chambers building (1959), the Wyong Fire Station (c.1960), and the Wyong Memorial Community Hall (1965). The buildings in the Administration Area contribute to the social and historic significance of Wyong as a centre of Government administration.

Figure 10 **Solicitors' offices in an historic building on Margaret Street**

(Source: Stinson)

REQUIREMENTS

a Ensure future developments are consistent with and complement the existing characteristics of this area.

b New development should respect boundary setbacks of existing buildings and maintain distinctive freestanding arrangement of buildings.

Precinct 5 – Residential Cottages

This area is characterised by its uniformity of freestanding single storey typically timber dwellings on large allotments of land on gentle hill-slopes. The dwellings are of modest proportions, with larger, more substantial and opulent buildings in select locations nearer the top of the hill and adjacent to the Wyong River. The houses in the Residential Cottages area are from all periods of the 20th century and are representative of the housing stock evident throughout the Wyong Town Centre. The houses are of aesthetic and cultural/historic significance for their potential to demonstrate the architectural styles, forms, scale and materials of residential living in the Wyong Town Centre.

REQUIREMENTS

a Design of new houses on existing allotments should complement, not imitate, nearby existing houses.

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b The setback of new houses on existing allotments should match adjacent existing houses.

c Any infill development must be set back behind the existing stock.

d The form, bulk, scale and detailing of new houses on existing allotments should be consistent with nearby houses. An example of new development that is compatible with the existing form, bulk, scale and detailing of an adjacent heritage building is provided below at Figure 11.

Example of Residential Heritage Infill Development:

Figure 11 below shows a well-considered example of Residential Heritage Infill Development behind an existing heritage cottage on Hope Street. The new development is set back behind the existing heritage cottage. The width of the development mimics the scale of the cottage and the three storey height of the development is set down the hill from the cottage, so that the overall form does not overwhelm the existing cottage when viewed from the street. In addition, the change of materials on the façade further breaks up the apparent scale. The new development has a masonry base and the timber used as a highlight on the gable end reinterprets the timber used in the historic cottage.

Figure 11 Example of residential heritage infill development at Hope Street

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4.5.2.2.5 Heritage Setbacks

OBJECTIVE

- To provide sufficient separation so that new development does not have a negative impact on heritage buildings and permits appreciation of the significant aspects of the adjoining heritage building

REQUIREMENTS

a Buildings adjacent to heritage buildings are to have a maximum height of four storeys stepping down to two storeys at street frontages.

b Buildings adjacent to heritage buildings are required to have sufficient appropriate setback from significant parts of the heritage item. This is especially important at the street address and should be in the order of 3-5 metres. The exception to this requirement is in urban commercial areas where zero lot setbacks are permitted and are part of the existing character of the streetscape.

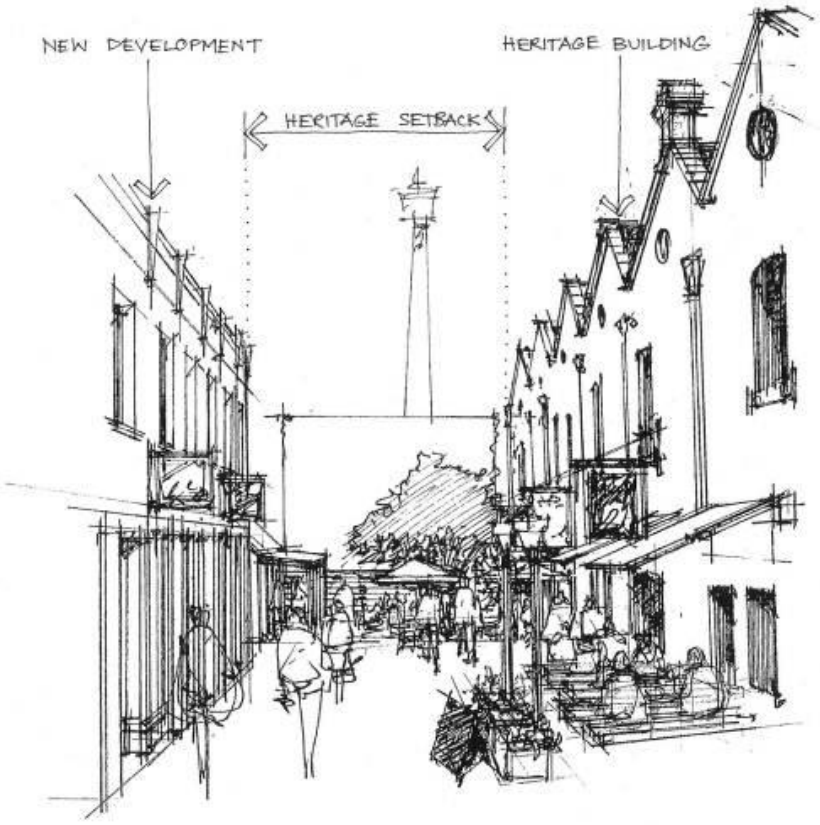

Figure 12 **Example of separation between a heritage building and new development on Hely Street**

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4.5.2.2.6 Heritage Materials and Colours

In order to maintain the overall integrity of Heritage Buildings, any new work should incorporate the use of traditional materials and colours in the external façade where appropriate. Traditional materials and colours can also be used for detailing in new development in the Wyong Town Centre to support the Heritage Theme.

OBJECTIVE

To maintain a traditional materials and colour palette for heritage buildings and to incorporate some reference to traditional materials and colours into new buildings

REQUIREMENTS

a Refer to the requirements in Section 3.6.4 for new works to heritage items and Section 3.6.5 for new works in heritage conservation areas.

b For works in other areas of the Wyong Town Centre consider reinterpreting and incorporating some heritage materials into new buildings. Heritage materials that are characteristic of the Wyong Town Centre include sandstone, timber, brickwork and metal roofing as shown in Figure 13 below.

c For development that does not involve works to Heritage Buildings, consider incorporating some traditional heritage colours in certain areas. For example, colour can be used to highlight a repetitive building element that introduces a human scale to a contemporary design.

d Commercial ranges of 'heritage' colours from major paint suppliers and reference texts are available to assist selection. An example of a traditional range of paint colours is shown in Figure 15 below.

Metal Roofing Sandstone Brickwork Timber

Figure 13 Examples of traditional materials found in the Wyong Town Centre heritage buildings

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Example of heritage materials in new Development:

An example of heritage materials used in a masonry base of a new development adjacent to a heritage building is shown at Figure 14.

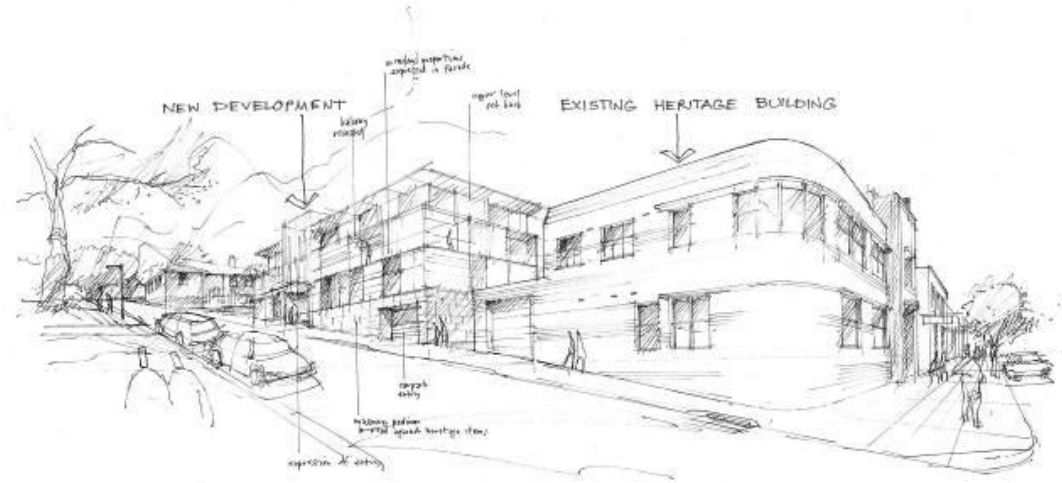

Figure 14 Example of heritage materials used in a masonry base of a heritage infill building

Figure 15 Example of heritage colours by Dulux

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4.5.2.3 Streetscape and Public Areas

OBJECTIVES

- To provide a range of features which create an identifiable heritage character for the public realm of the Wyong Town Centre and the surrounding residential areas
- To provide street furniture in appropriate locations that is well designed, distinctive and will complement existing items, including the heritage theme
- To provide unique lighting for the public realm that is high quality, well designed, appropriate to the location, adds safety and liveliness to the town and is of a scale suited to pedestrian activity
- To ensure a practical and safe ground surface for the public realm which must meet specific criteria in terms of appearance, structural properties, cost, quality control and cleaning

REQUIREMENTS

4.5.2.3.1 Paving

a Provide street paving in front of new development in accordance with Figures 16 and 17 below.

b The individual character of special precincts or places should be identified and enhanced with lighting, planting, street furniture, public art, signage, and paving material provided that is consistent with the location.

c Heritage items or buildings of significance are to be highlighted and interpreted by the use of bronze plaques in the paving, which provide a brief history of the particular building. An example of a plaque is shown in Figure 21 of this Chapter. The content and the design of the plaque is to be approved by Council.

d Adjacent public and private owned outdoor spaces should be integrated through the choice of consistent paving materials and detailing.

Figure 16 Example of urban street paving in the Wyong Town Centre

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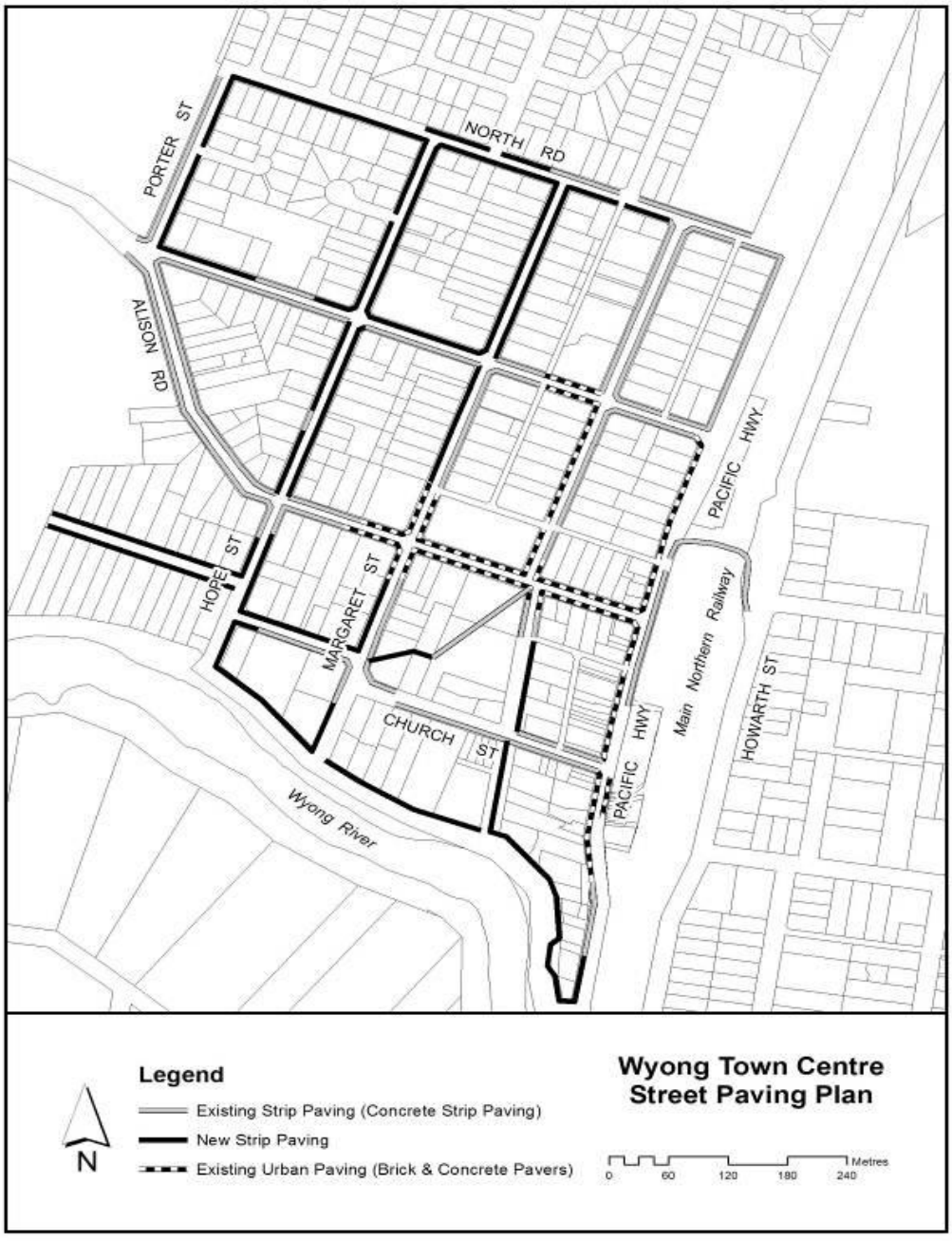

Figure 17 Street paving plan for the Wyong Town Centre

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4.5.2.3.2 Lighting

a The public realm should be illuminated by high quality, well designed fittings appropriate to the location and of a scale suited to pedestrian activity.

b The materials, colours, finishes or detailing of lighting fixtures should provide a reference to the heritage town.

c Lighting for the public realm of the Wyong Town Centre should:

i accentuate the entrances and major gateways;

ii highlight special elements and features;

iii increase the understanding and navigation of the town at night by highlighting major streets, open spaces and single elements;

iv improve the attractiveness and appeal of the town at night.

v assist security

4.5.2.3.3 Street Furniture

REQUIREMENTS

a Provide street furniture that harmonises with the Heritage Theme for the Wyong Town Centre. Examples of existing street furniture in the Wyong Town Centre are shown in Figure 18.

b Seating should be ergonomically designed to provide comfort and ease of use (including for the elderly and very young). Materials should maximise comfort and amenity in relation to climate, safety and maintenance issues.

c The location of seating should be based on public need, especially considering the aged and parents with children.

d The form and structural strength of bollards should be adequate to meet function requirements. Removable and hinged bollards should be provided to meet the needs of service access.

e Bollards should be attractive in appearance, especially with regard to situations where a number of bollards are required.

f Rubbish bins should be located in a clear line-of-site to seating, public transport stops, or pedestrian routes.

g The form and strength of bin enclosures should be adequate to meet functional requirements. Bin enclosures should be aesthetically well designed with an obvious indication of purpose.

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Figure 18 An example of street furniture in the Wyong Town Centre

4.5.2.4 Landscape Design

The history of Wyong as a timber and farming town has resulted in a mix of vegetation. Remnant native forest trees, salt marshes and coastal tree species dominate the town's canopy. Cultural planting of *Phoenix canariensis* (Date Palm) in the 1920s along the Pacific Highway gives a strong focal point to the town. Street trees should be provided wherever possible to improve the appearance and amenity of the Wyong Town Centre.

Figure 19 An example of a date palm along the Pacific Highway

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OBJECTIVES

- To retain any existing landscaping that complements the existing buildings and the public realm generally
- To provide additional street trees and plantings wherever possible, that are consistent with the Street Tree Masterplan for the Wyong Town Centre, in order to improve the appearance and amenity of the public realm

REQUIREMENTS

a Council requires a high standard of landscaping fitting for a town centre, especially around Gateway sites therefore, landscape design should be prepared by a suitably qualified landscape professional.

b Development is to provide a structured and ordered landscape treatment within the Town Centre and Business/ Administration Precinct which reinforces and enhances the urban and civic character.

c The entry to Wyong at the Pacific Highway and River Road intersection is to be emphasised through the use of distinctive plant forms and colours.

d Landscape treatment is to express the transition from naturalistic and informal along the Wyong River to structured and formal within the Town Centre through the use of indigenous species in ordered layouts, clustered planting of single tree species and the use of a mix of indigenous and exotic species.

e Where possible and appropriate, native plant species, particularly those endemic to the locality should be used. In the Wyong Town Centre, some exotic species have been used or are suggested as they relate better to the adjoining built form.

f The planting of canopy trees at street level is encouraged to soften the visual impact of surrounding buildings.

g New development and landscaping is to have minimal impact on significant cultural plantings which form the setting of heritage buildings.

h Street tree planting should support the scale, hierarchy, continuity and amenity of streets.

i Major streets should use large urban trees and minor streets should use smaller clean-trunked trees. In some situations such as narrow lanes or adjacent to heritage buildings or special features, street trees should be omitted or used to frame the special features.

j The hierarchy of streets in the town should be reinforced by a selection of species appropriate to the scale and type of street. The Greening Wyong Strategy, prepared by Council's Landscape Architects, identifies appropriate street trees for the Wyong Town Centre. The Street Tree Masterplan that was current in May 2011 is shown in Figure 20.

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	STREET TREES LIST		STREETS
	Arbutus unedo	Irish Strawberry Tree	Margaret Street, Hely Street
	Lophostemon confertus	Brush Box	Warner Avenue
	Tristaniopsis laurina	Watergum	
	Magnolia grandiflora	Bull Bay Magnolia	Pacific Highway
	Pyrus calleryana	Callery's Pear	Alison Road
	Acmena smithi	Lillypilly	Margaret Street
	Pistachia chinensis	Chinese Pistachio	Anzac Avenue
	RIVERINE SPECIES		
	Eucalyptus maculate	Spotted Gum	River Road
	Eucalyptus tereticornis	Forest Red Gum	Hope Street
	Alphitonia excelsa	Red Ash	Howard Street
	Waterhousia floribunda	Weeping Lillypilly	Rose Street
	Acmena smithi	Lillypilly	North Road, Byron Street
	Ceratopetalum gummiferum	NSW Christmas Bush	Porter Street, Hope Street
	Glochidion ferdinandi	Cheese Tree	Leppington Street, Marathon Street
	Arrival planning of large trees in reserve areas, eg. *Eucalyptus tereticornis, Corymbia maculata*		

Figure 20 **Street tree masterplan for the Wyong Town Centre as at May 2011**

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4.5.2.5 Public Art

The Wyong Town Centre has a long association with the arts and many local artists' groups currently have their facilities in buildings in the Town Centre area. If the Wyong Town Centre is to become a cultural and heritage focus for the Central Coast, it is important that some consideration be given to the provision of public art in new development.

OBJECTIVE

To physically express the cultural and heritage focus of the Wyong Town Centre through the provision of public art in new development

REQUIREMENTS

a Major developments valued at $5 million or greater must implement public art as part of the development in accordance with Chapter 5.48: Northern Areas -Public Art

b Developments valued between $1 million and $5 million are strongly encouraged to provide the opportunity for public art in new development.

c For developments under $5 million, public art could include an item of work commissioned by a local artist, a custom designed mural on an external surface, a heritage image superimposed onto an external structure, or a contribution made to the Heritage Walking Trail.

d The proposed Heritage Walking Trail takes in the major heritage sites in the Wyong Town Centre and is shown in Figure 22. A contribution to the Heritage Walking Trail could include the provision of paving around heritage or significant buildings or an indication of the significance of the item by providing a plaque as shown in Figure 21 below.

Figure 21 Heritage plaque laid in paving in front of the Turton Building on the Pacific Highway

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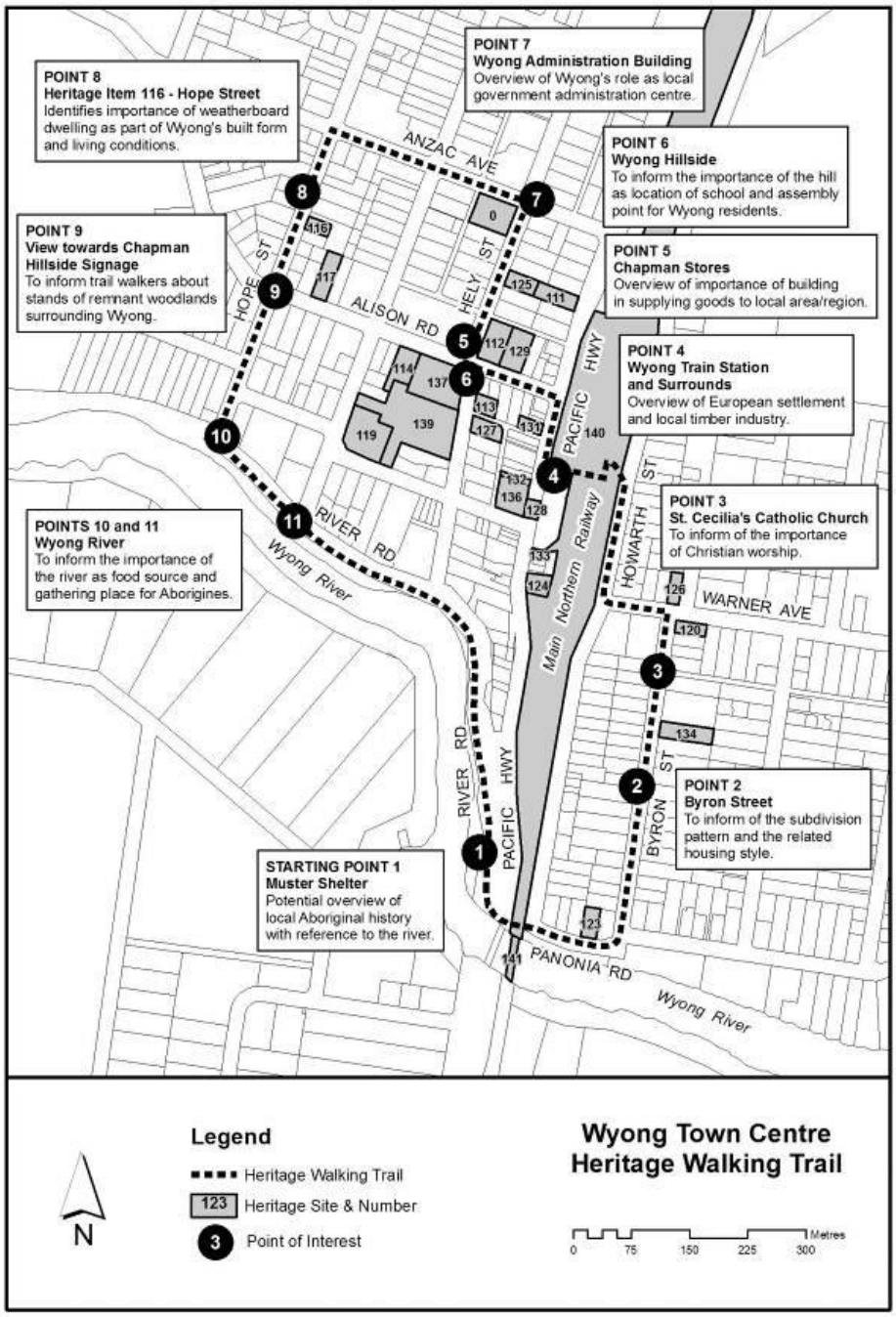

Figure 22 **Proposed heritage walking trail for the Wyong Town Centre**

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4.5.3 SPECIAL PROVISIONS FOR SPECIFIC AREAS

4.5.3.1 Precincts

Six precincts, as shown below, have been identified in the Wyong Town Centre and are shown in Figure 23:

- Town Centre
- Business Administration
- Mixed Density
- Active River Foreshore
- Baker Park Precinct
- Parkland Cottages

OBJECTIVE

To enable new development that is consistent and compatible with the functions of the precincts and respects the existing features and character of the area

4.5.3.1.1 Town Centre

The Town Centre is a mixed-use precinct incorporating a range of retail, commercial and community functions. Several prominent heritage buildings and landscape elements are located in the Centre.

REQUIREMENTS

a Promote heritage buildings as a point of difference for retail and strengthen the heritage character of the precinct.

b Continuous awnings are to be provided along the Pacific Highway.

c Lots fronting the Pacific Highway and Anzac Avenue are to have noise attenuation and security measures provided to achieve adequate amenity.

d Buildings are to create a consistent edge to the Pacific Highway, Hely Street, Margaret Street, Alison Road, and Anzac Avenue.

e In order to maintain the heritage scale of the Wyong Town Centre, a stepped setback is required for selected sites on Alison Road and the Pacific Highway in accordance with Central Coast LEP 2022. An illustration of this setback is provided below in Figure 25.

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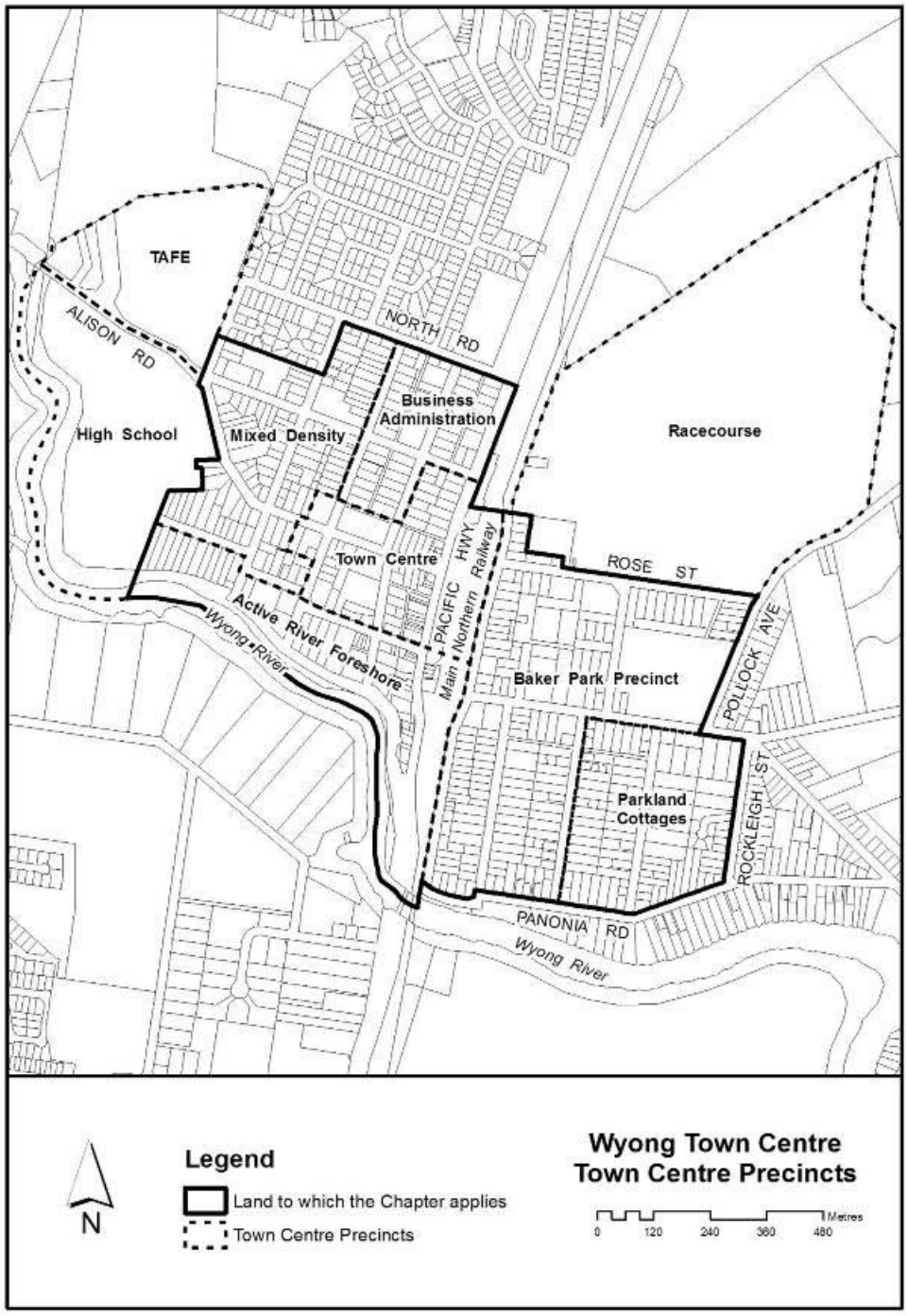

Figure 23 Wyong Town Centre Precincts

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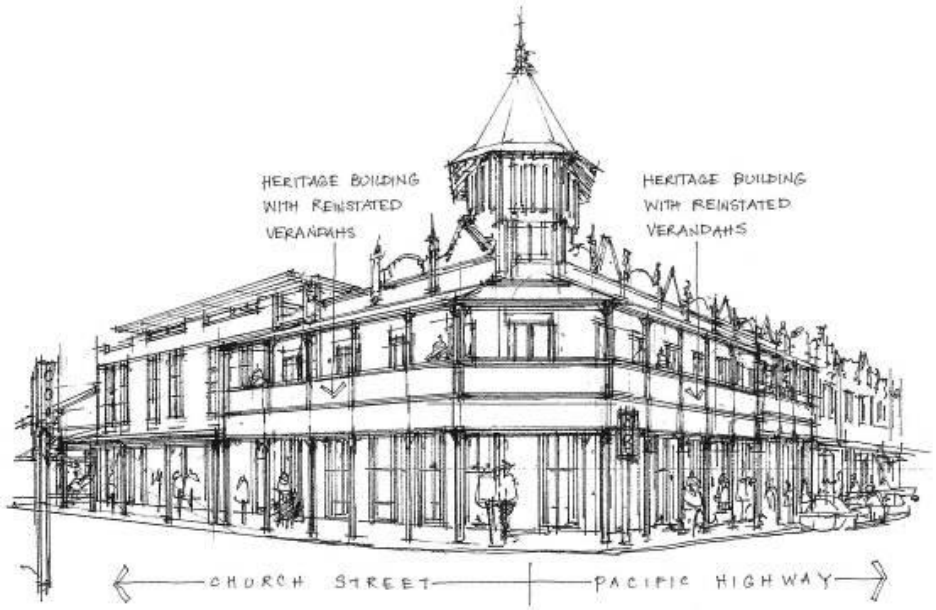

Figure 24 Example of reinstating verandahs to a heritage building to provide a continuous pedestrian awning along the Pacific Highway

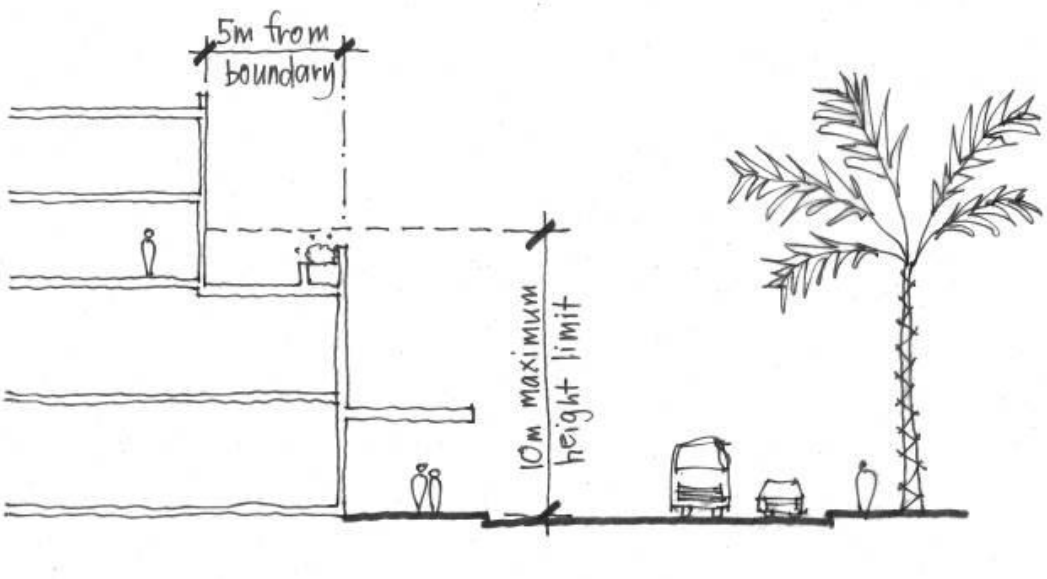

Figure 25 Heritage stepped setback

4.5.3.1.2 Business Administration

The Business / Administration precinct provides regional administrative and commercial functions. Civic functions include the Court House, Council offices, Civic Centre and Memorial Hall. This precinct has low-lying areas along an old creek line in the centre of the precinct.

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REQUIREMENTS

a Extend existing streetscape improvements to reinforce the civic character of the precinct.

b Extend streetscape improvements along the Pacific Highway to upgrade the approach to the Town Centre.

c Upgrade existing laneways for pedestrian access.

d Provide connections from Hardware and Pauline Lanes to Hely and Margaret Streets adjacent to the public / special use lands.

e Buildings are to create a consistent edge to the Pacific Highway, Hely Street, Margaret Street, Anzac Avenue and North Road.

Figure 26 **Example of buildings creating a consistent edge along the Pacific Highway**

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4.5.3.1.3 Mixed Density

This is a residential precinct predominantly comprised of detached dwellings with small areas of new medium density development consisting of single storey villa and two storey townhouses. The area is characterised by moderate to gentle slopes falling to a low-lying central zone.

REQUIREMENTS

a Buildings are to create a consistent edge to Margaret Street, Alison Road, Anzac Avenue and North Road.

b Ensure medium density buildings address the street and are not orientated to an access driveway running down a deep lot.

c Upgrade streetscapes through such measures as street tree planting and landscaped frontages to medium density residential buildings.

4.5.3.1.4 Active River Foreshore

The Active River Foreshore has a mix of commercial and retail uses along the Pacific Highway and commercial / residential areas adjacent to Wyong River.

REQUIREMENTS

a Buildings are to create a consistent edge to the Pacific Highway and Margaret Street.

b For further requirements for this precinct refer to Section 4.5.3.7 Local Area Masterplans in this Chapter.

4.5.3.1.5 Baker Park Precinct

A residential and sporting precinct incorporating extensive active recreation facilities including Baker Park oval, netball courts, tennis courts, public swimming pool, and the Wyong Racecourse.

REQUIREMENT

For requirements for this precinct refer to Section 4.5.3.7 Local Area Masterplans in this Chapter.

4.5.3.1.6 Parkland Cottages

A predominantly residential precinct comprised of single cottages as well as some single storey unit and villa developments.

REQUIREMENT

Upgrade streetscapes through such measures as street tree planting and landscaped frontages to residential buildings.

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4.5.3.2 Gateways

Five (5) main 'gateway' locations to the Wyong Town Centre have been identified for special attention to establish attractive entrance features to the township. Three (3) minor entry points to the retail/commercial precinct have also been identified. Figure 27 is a map showing the sites adjacent to the 'gateways' in the Wyong Town Centre. Two of the main gateway locations are adjacent to previously identified Key Sites as indicated in Figure 32 of this Chapter.

OBJECTIVE

- To establish "gateway" locations to the Wyong Town Centre to ensure a favourable first impression which projects a sense of arrival and encourages visitors to stay and explore

REQUIREMENTS

a Development of Gateway Adjacent Sites is to be of particularly high quality to assist in creating a favourable first impression, project a sense of arrival and encourage visitors to stay and explore.

b A landscape assessment and design report prepared by a suitably qualified landscape professional is required to accompany applications for development at these critical locations. Council's Landscape Architect should be contacted to ascertain any specific landscaping requirements.

c Gateway Signage is to be located at strategic entrances, particularly those Gateways to the Town Centre. Such signage should be developed in consultation with the community.

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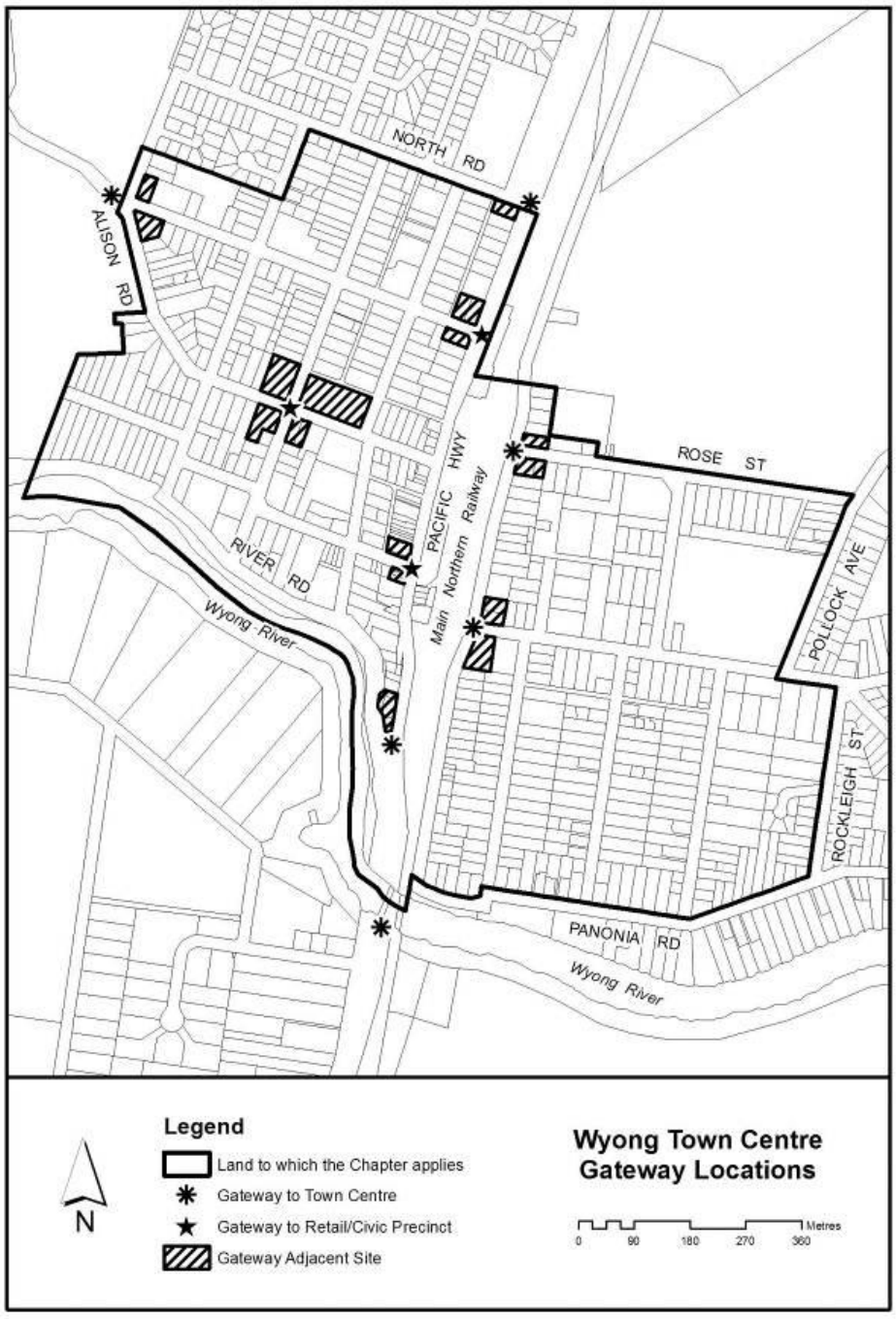

Figure 27 **Map showing sites adjacent to gateways in the Wyong Town Centre**

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4.5.3.3 View Corridors

Looking towards The Entrance from Wyong Town Park Hill

Looking towards Chapman Hill from Wyong Town Park Hill

Looking down Hely Street from Wyong Town Park Hill

Looking towards Jilliby from Wyong Town Park Hill

Looking towards Wyong River from the Corner of Church and Margaret Streets

Looking towards Mardi from Wyong Town Park Hill

Figure 28 Examples of existing views in the Wyong Town Centre to be retained

OBJECTIVES

- To ensure that Wyong Park remains the dominant element in the townscape emphasising the hill and the landscape elements of the town
- To encourage development and allow for increased height while ensuring that existing significant view corridors are maintained

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REQUIREMENTS

a View corridors are to be maintained from Town Park Hill west to Ourimbah State Forest, east and south to The Entrance, Tuggerah Lake, Long Jetty, Glenning Valley and Tumbi Umbi, north along Hely Street and north-west to Chapman's Hill.

b View corridors are to be maintained along Hely Street from Town Park Hill to Wyong Grove Primary School.

c View corridors are to be maintained across the Active River Foreshore precinct from Wyong Town Park Hill to McPhersons Road, south of Wyong River, and to Mardi and Kangy Angy Mountain.

d View corridors are to be maintained across the Baker Park precinct from Wyong Town Park Hill to Noraville and Toukley and The Entrance and Tuggerah Lake.

e Provide view corridors between buildings from Church Street to Wyong River.

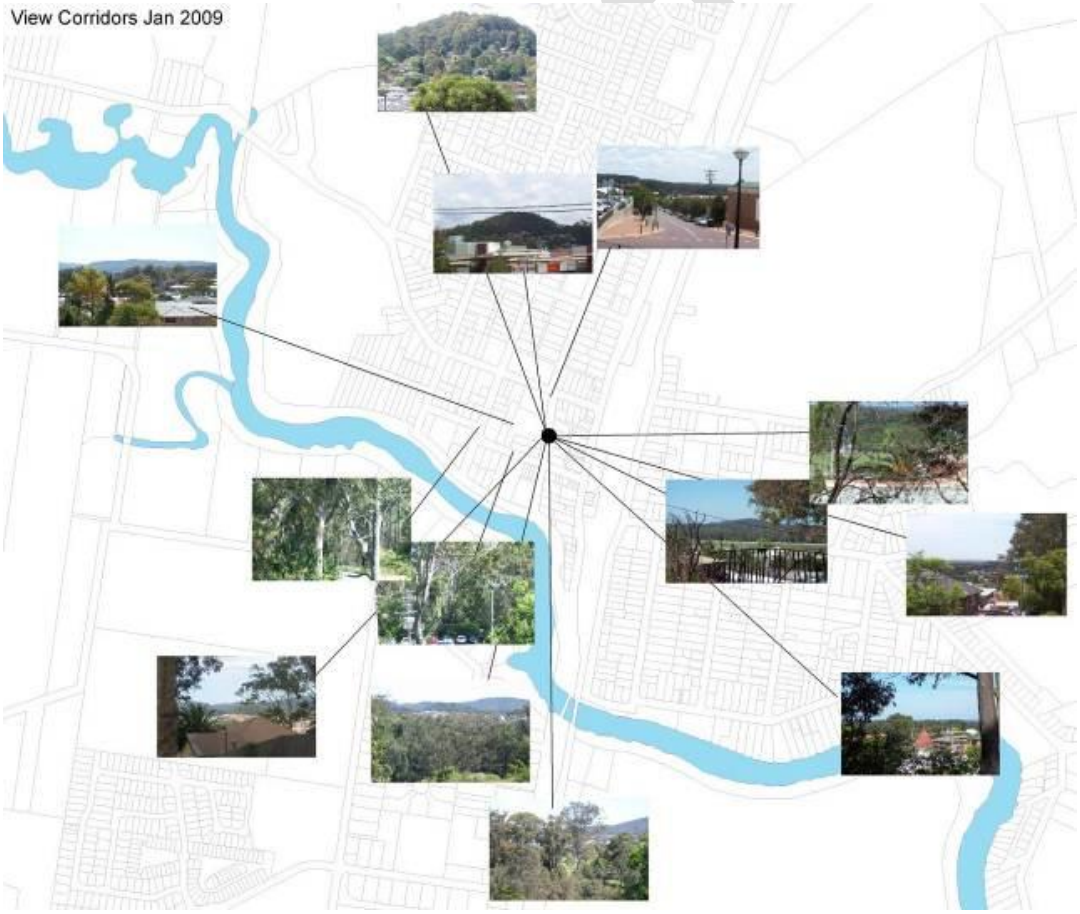

Figure 29 View corridors to be maintained in the Wyong Town Centre

4.5.3.4 Low-Lying Areas

Low-lying areas within the Wyong Town Centre may experience high ground water levels and/or potential acid sulphate soils due to the location of the town on the Wyong River.

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OBJECTIVE

- To identify those sites at risk of high ground water levels, and/or potential acid sulphate soils, and assess their suitability for development

REQUIREMENT

a A geo-technical assessment is required for low-lying areas to assess the suitability of sub-strata to support development. A ground-water study is also required to be submitted for all development in these areas addressing the requirements contained in Section 5.2.5 Stormwater Management. In the Wyong Town Centre, low-lying areas are defined as those sites below 8 metres AHD and shown grey on Figure 30 below

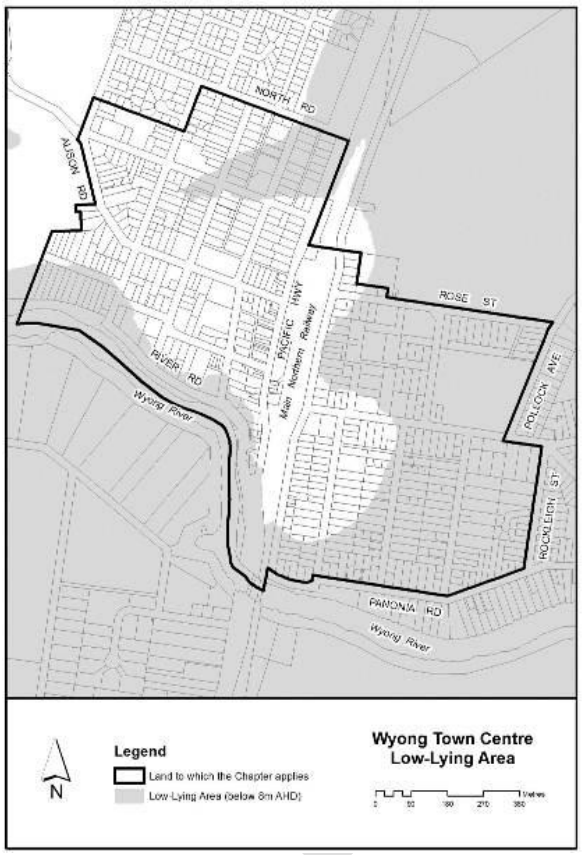

Figure 30 Map showing general location of the low-lying area (below 8m AHD)

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4.5.3.5 Laneways

OBJECTIVE

- To create a pedestrian and bicycle focussed environment by enhancing or providing new pedestrian connections in the local area

REQUIREMENT

a New development on sites adjoining the laneways and pedestrian connections illustrated in Figure 31 below shall contribute to these works as directed by Council.

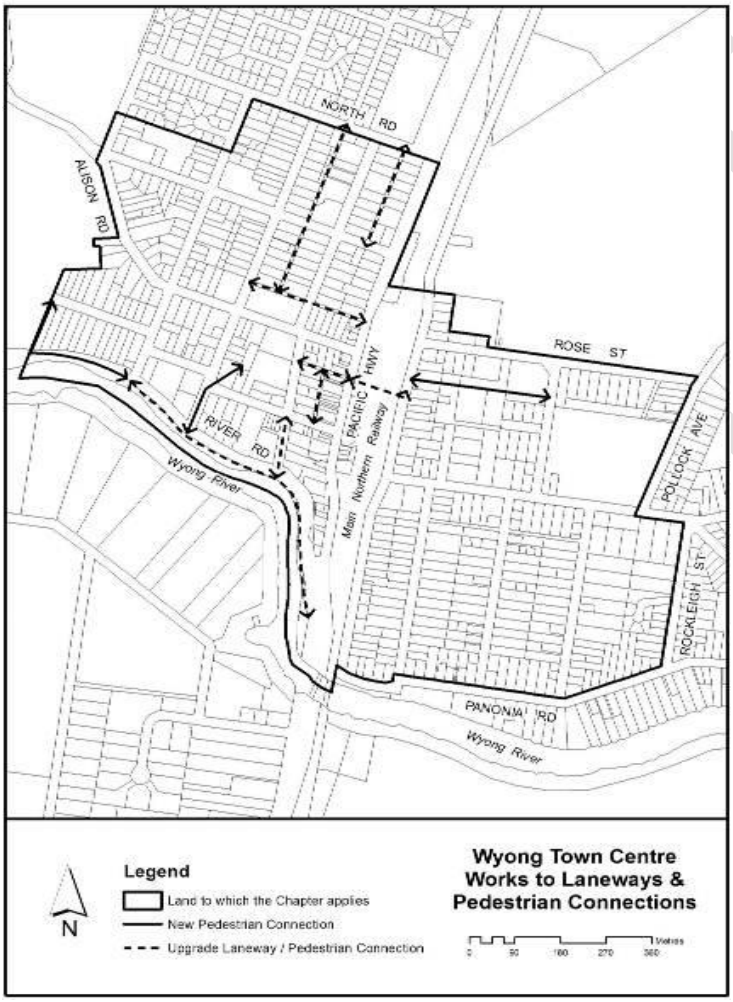

Figure 31 Map showing proposed new pedestrian connections and upgrades to laneways

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4.5.3.6 Key Sites

Wyong LEP 2013 identified Key Sites that have the potential to be a catalyst for economic growth and development confidence. Several of these sites are within the Wyong Town Centre area and are identified in Figure 32. Applicants should verify the current status of the Key Sites with Council and if any sites relevant to their area have been added or subtracted.

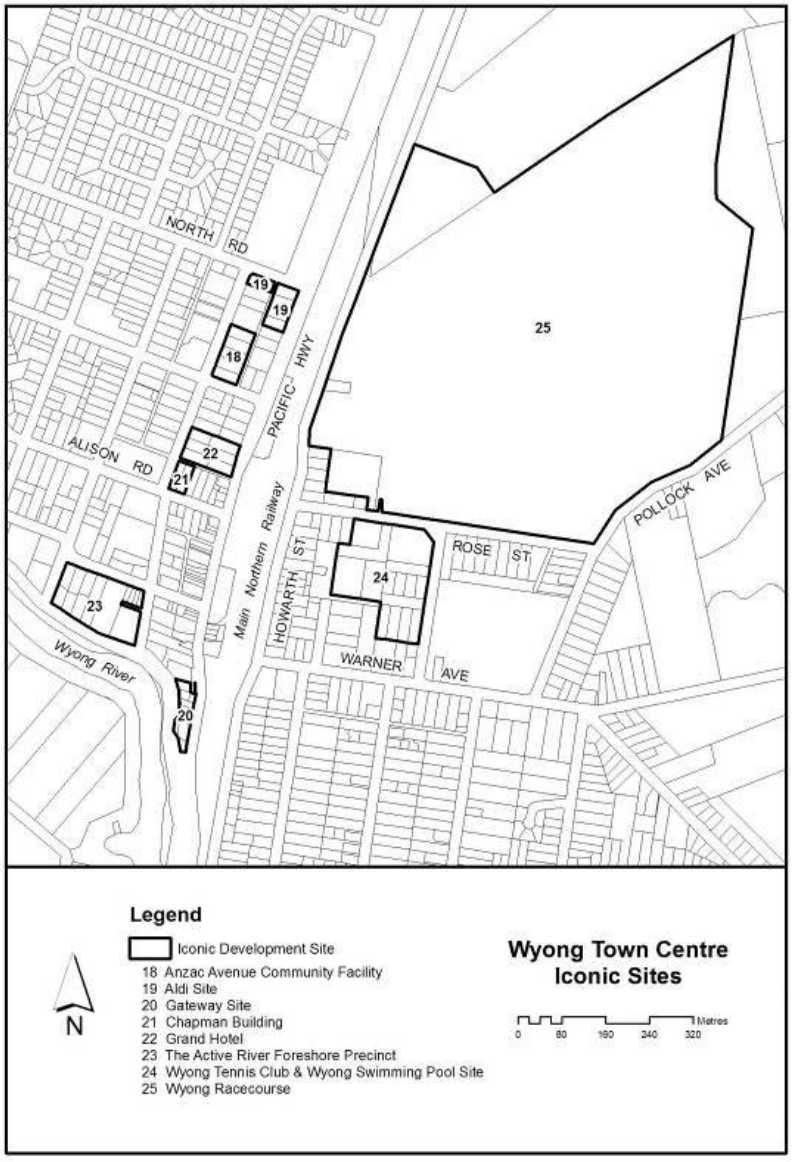

Figure 32 **Map showing the location of key sites**

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OBJECTIVES

- To facilitate the economic growth by identifying sites within the various commercial/retail centres that would provide a significant economic benefit if they were developed to a suitable standard
- To ensure that any redevelopment of nominated Key Sites considers the existing heritage character of the Wyong Town Centre

REQUIREMENT

a For the requirements for development of Key Sites, applicants should refer to Chapter 5.49 Northern Are Key Sites where relevant.

b Figures 33 and 34 show two examples of the possible reuse and redevelopment of the Chapman Building Key Site. This site contains a heritage building fronting Alison Road that is to be considered by proponents when proposing to redevelop the subject site and other sites in this locality.

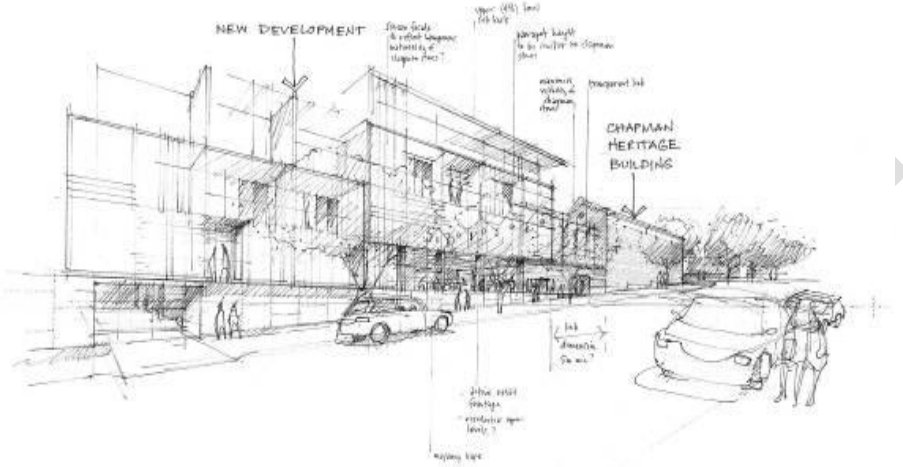

Figure 33 First example of the possible reuse and redevelopment of the Chapman Building Key Site viewed from Hely Street

Figure 34 Second example of the possible reuse and redevelopment of the Chapman Building Key Site viewed from the corner of Hely Street and Alison Road

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4.5.3.7 Local Area Masterplans

A Masterplan is a long term strategic planning document that describes visually and by narrative the desired future of an area. Masterplans seek to provide a general land use plan based upon the opportunities and constraints that exist. A Masterplan will generally focus on a smaller area and provide a higher level of detail compared to a local planning strategy, but will not provide the level of detail found in detailed design plans. They are not statutory documents but provide a detailed vision for an area which informs planning instruments such as Local Environmental Plans and Development Control Plans.

The following Local Area Masterplans apply to development within the Wyong Town Centre:

- Active River Foreshore Masterplan;
- Baker Park Masterplan; and
- Wyong Cultural and Civic Centre Masterplan

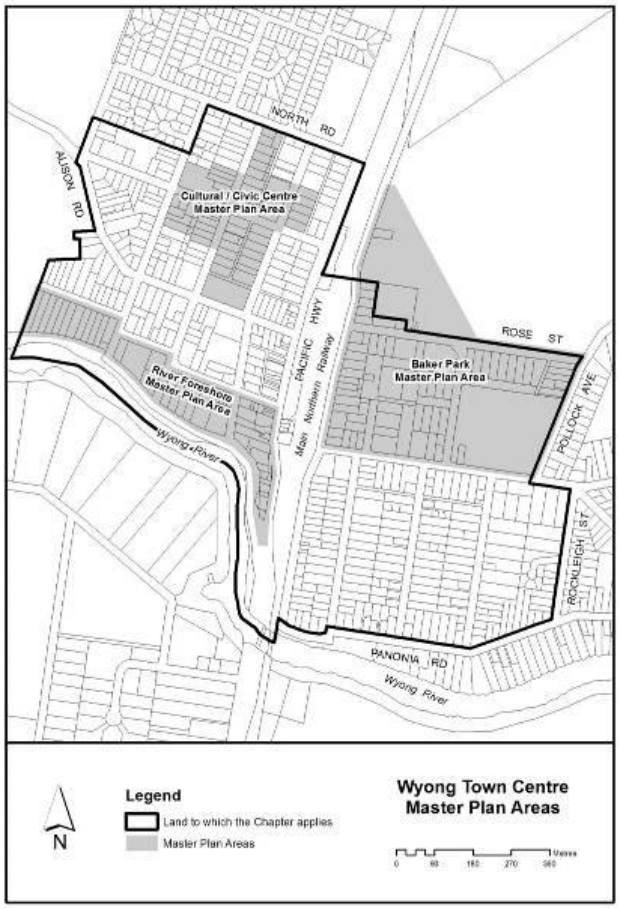

Figure 35 Map showing the masterplan areas for the Baker Park, River Foreshore and Cultural / Civic Centre Areas

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4.5.3.7.1 Wyong Cultural and Civic Centre Masterplan

The Wyong Cultural and Civic Precinct Masterplan forms part of the implementation program of the Wyong/Tuggerah Planning Strategy adopted in October 2007. The Masterplan seeks to provide a framework for the future cultural and civic precinct, based on a clear vision and a comprehensive set of design principles. The masterplan aims to aesthetically strengthen the area as the civic and cultural hub.

The adopted masterplan identifies particular key proposals that include significant public domain improvement works. These have been developed from the analysis of the opportunities and constraints in existence and how they could be applied. These projects include the Anzac Avenue Cultural Precinct, Frank Balance Park and also the Civic Plaza.

OBJECTIVE

To improve the urban fabric of the precinct in order to aesthetically strengthen the area as the civic and cultural hub

REQUIREMENTS

a Minimise development in the low–lying areas of Anzac Avenue to mitigate potential storm water issues.

b Development is to continue any new paving works commenced within the precinct in accordance with the principles outlined in the masterplan.

c Development on the corner of Margaret Street and Anzac Avenue shall provide public open space to enable pedestrian activity in the cultural hub.

d Development surrounding Frank Balance Park should relate to the scale of the park. Buildings should be set back from the boundary and step down towards the park.

e Development must not excessively overshadow Frank Balance Park.

f Development on sites on Anzac Avenue to the north of Frank Balance Park should have a minimum six metre setback to the boundary adjacent to Anzac Avenue.

g Development occurring immediately to the south of Frank Balance Park must visually address both the street and the park and provide passive surveillance opportunities. Long windowless or unarticulated walls will not be permitted along the park boundary.

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Figure 36 Wyong Cultural and Civic Centre Masterplan dated July 2011

4.5.3.7.2 Active River Foreshore Masterplan

The former Wyong Shire Council adopted the Active River Foreshore Masterplan in 2009. The intent of the Masterplan is to provide a long term vision with directions to sustainably manage the reactivation of the Wyong River Foreshore over the next 20 years. A copy of the Active River Foreshore Masterplan can be obtained by contacting Council or can be downloaded from Council's website at http://www.wyong.nsw.gov.au/building-and-development/planning-strategies/wyong-active-river-foreshore-and-baker-park-masterplans/

The Active River Foreshore Masterplan looks at reactivating the river frontage and creating a visual and physical link with the Wyong Town Centre. The focus is on residential development orientated to the river and commercial/civic development along the Pacific Highway and the Rankens Court laneway. A site plan of the preferred option for development on the Active River Foreshore precinct is provided in Figure 37. Some objectives and requirements for development in this area are also listed below.

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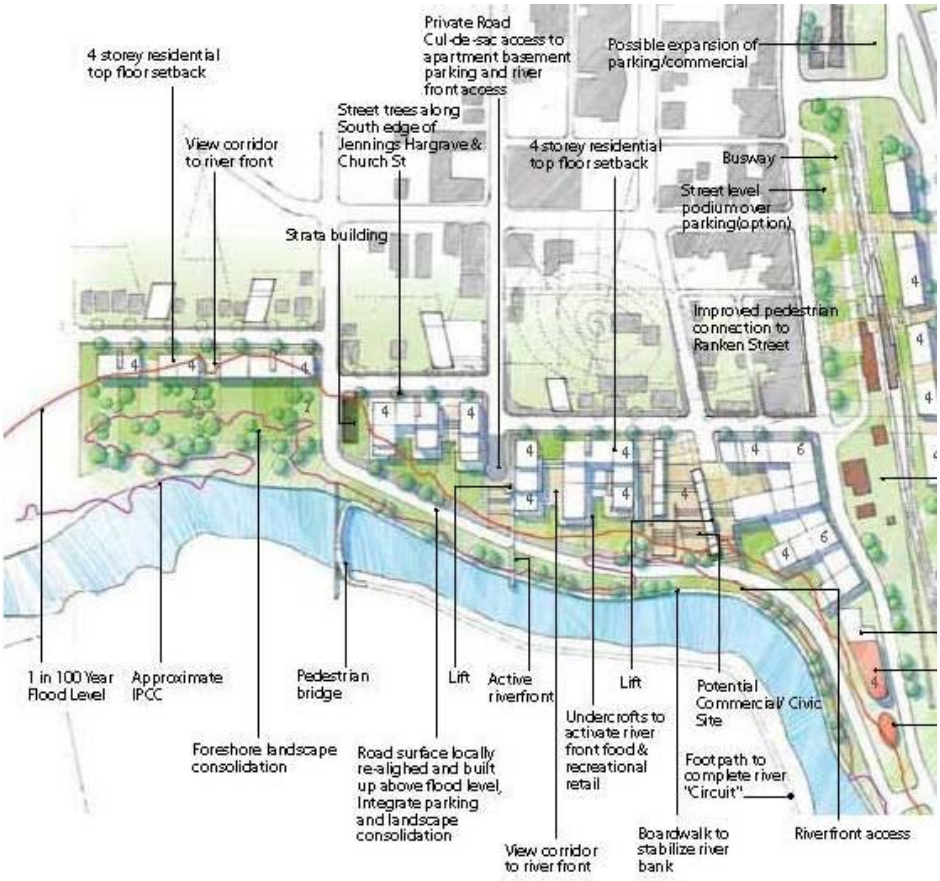

Figure 37 Site plan of the preferred masterplan option for the Active River Foreshore Area

OBJECTIVES

- To encourage amalgamation of smaller sites while retaining and promoting fine grain frontage to Hargrave Street and River Road as well as encouraging address to side access down to riverfront areas
- To activate a retail precinct to Church Street and Hargrave Street
- To allow an increase in residential uses and height in key sites where additional height can be demonstrated to have an overall positive effect upon the built form of the Precinct
- To ensure a consistent contemporary and modern architectural form and treatment
- To encourage a degree of unity in the built form through adherence to a typology that encourages a cohesive pattern with which buildings occupy the block and address the street
- To create an active frontage and definition of public domain
- To maintain and enhance where possible the amenity of the Active River Foreshore area

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REQUIREMENTS

a Overland flow paths to be provided at four locations: adjacent to Hope Street, adjacent to Margaret Street, midway between Margaret Street and Rankens Court, and at the end of Rankens Court leading down to the River Foreshore.

b Development is to maintain or enhance view corridors looking towards Wyong River.

c View corridors along Rankens Court and Margaret Street are to be retained and building forms are to respond to view corridor vantage points.

d Development is to provide views between building forms and enable view sharing of the river to the south.

e Development to be elevated above the adopted flood level as per Council's requirements. Development must provide pedestrian egress to Church Street, Hargrave Street, Jennings Road or the Pacific Highway in the event of a flood.

f Development is to avoid extensively overshadowing Wyong River parkland.

g Building form and location is to minimise overshadowing of public open space, in particular along River Road. Applicants are to demonstrate the impacts of overshadowing on open space through different times of the year.

h Buildings are to formally address Church Street and River Road and provide an active frontage to both these streets.

i Buildings are to create a consistent edge and continuous awnings are to be provided along the Pacific Highway.

j Development is to activate the pedestrian connection from Rankens Court to Wyong River with retail and commercial uses. Investigate and consider opportunities to incorporate commercial activity along River Road, at street level, adjacent to the Rankens Court walkway.

k Development is to provide clear public domain areas to Rankens Court and Margaret Street and view corridors to the south looking over Wyong River.

l A continuous podium along Church Street and Hargrave Street to define the street frontage is encouraged.

m Development west of Hope Street along Jennings Road is to be lower scaled, consistent with the existing character of area.

n Differentiate and emphasise Gateway Sites through use of landmark buildings in particular at the Junction of River Road and Pacific Highway and at Rankens Court.

o Continuous awnings along Church Street and Hargrave Street should be provided.

p Housing choice and mix should be determined through consideration of the whole precinct, not just particular lots or street frontages.

q Development should provide for a mix of apartments, attached and semi-detached dwellings across the site. The housing mix should also relate to the topography of the site.

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4.5.3.7.3 Baker Park Masterplan

The former Wyong Shire Council adopted the Baker Park Masterplan in 2009. The intent of the Masterplan is to provide a long term vision with directions to reinforce the role of the recreation precinct of Baker Park over the next 20 years. A copy of the Baker Park Masterplan can be obtained by contacting Council.

The Baker Park Masterplan looks at reinforcing the recreational precinct in the Wyong Town Centre. Commercial development and car parking is located to the west of Howarth Street and mixed use is encouraged to the east, and residential development surrounds the recreational facilities. There is the opportunity for northern orientation and visual links between the Town Centre and new development. A site plan of the preferred option for development in the Baker Park precinct is provided in Figure 38. Some objectives and requirements for development in this area are also listed below.

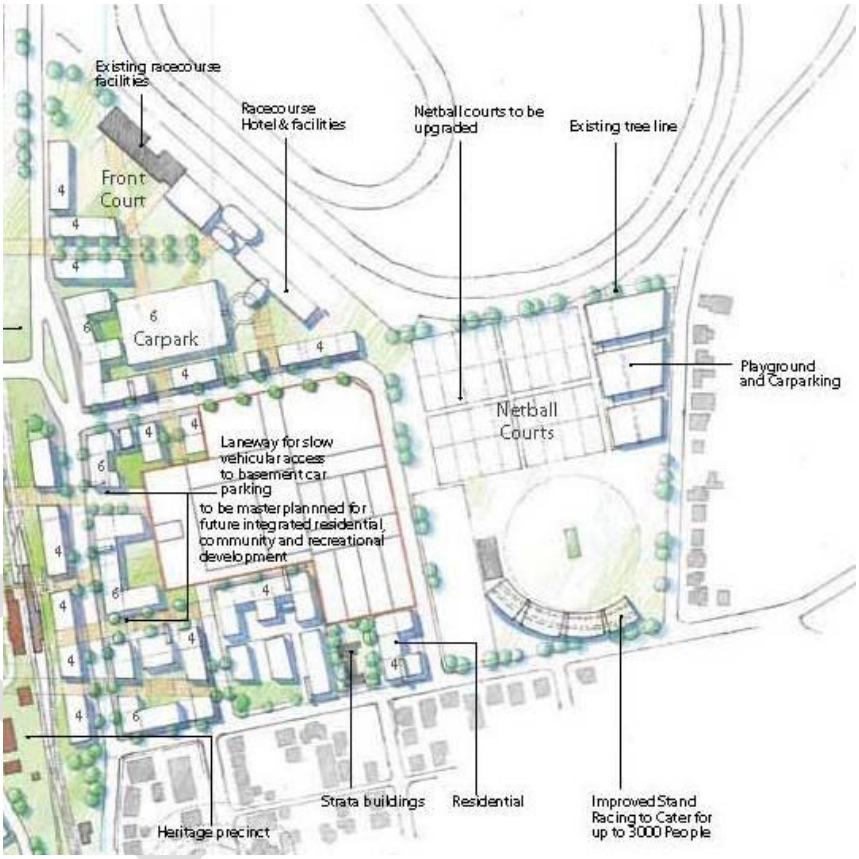

Figure 38 Site plan of the preferred masterplan option for the Baker Park Area

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OBJECTIVES

- To create improved car parking opportunities that do not detract from the streetscape and quality of built form in the Precinct
- To promote the integration of basement car parking for all developable sites in particular residential apartment buildings
- To strengthen open space linkages to Wyong Town Centre by integration of open corridor extension from Alison Road over Railway Corridor through existing Tennis Courts and Wyong Pool
- To improve connectivity to Wyong Race Course at intersection with Rose Street and south to Warner Avenue
- To provide improved Open Space recreational facilities to Baker Park
- To promote the acquisition of private lots along Pollock Avenue
- To create stronger identity through built form differentiation and diversity
- To create residential opportunities through the provision of more floor space with higher density residential development ranging between four and six storeys
- To maintain and enhance where possible the amenity of the Baker Park area

REQUIREMENTS

a Maintain view corridors from the Wyong Town Centre to Baker Park Sports Fields and Wyong Pool.

b Promote view corridors to recreational open space at Baker Park Sporting Fields to the east of the site.

c Promote views looking north over Wyong Race Club.

d Maintain a view corridor from Alison Road looking east across Wyong Station to the Baker Park Precinct.

e Orientate apartment buildings to maximise northern aspect for sunlight into living areas whilst respecting the existing urban block form.

f Provide noise attenuation measures to achieve adequate amenity for lots fronting Howarth Street and the Main Northern Railway Line.

g Address the presence of existing high voltage power lines for development of lots fronting Howarth Street.

h Provide high density residential development with low level retail space at ground floor along Howarth Street on the eastern and western sides close to the railway line.

i Reinforce the existing urban grid and block structure between Warner Avenue and Rose Street.

j Ensure housing choice and mix is determined through a consideration of the whole precinct, not only particular lots or street frontages.

k Provide for a mix of apartments, and attached dwellings across the site. The housing mix should generally be promoted as having a high quality urban character.

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4.5.4. CAR PARKING

The Wyong Town Centre currently has a relatively small number of public car parking areas. Most existing smaller developments provide car parking either formally or informally on-site. Some larger developments provide car parking on-site in basements and the remainder is currently taken up by on-street parking. It is envisaged that in the future, as development and demand increases, public car parking will be provided in formal parking stations. This section aims to provide guidance on car parking provisions that are unique to the Wyong Town Centre. For general car parking provisions, such as the number of required spaces, applicants should refer to Chapter 2.13: and Parking.

4.5.4.1 Public Car parking

Four sites have been identified by Council as having potential to be developed into public car parking locations. The public car parking locations are proposed to contain a mix of at-grade and multi-level car parking, and are expected to be developed as demand and development increases. The location of these sites is shown on the map at Figure 39.

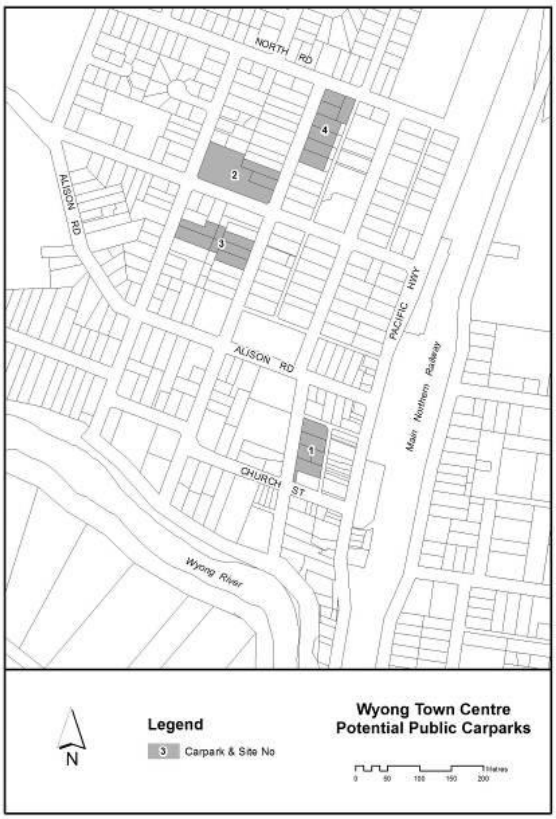

Figure 39 Wyong Town Centre potential public carpark locations

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4.5.4.2 Commercial Development Car parking

OBJECTIVE

To provide provisions relating to car parking for commercial development in the Wyong Town Centre

REQUIREMENTS

a All car parking for commercial development must be provided on-site, where this is not possible, Council may accept developer contributions up to a maximum of 10% of the required car parking. Refer to the Wyong Town Centre Section 7.11 Contribution Plan for rates.

b For commercial development on sites within 400 metres of the railway station, concessions may be considered for the number of required car parking spaces if the proposal is accompanied by a Transport Management Plan. For further details of this concession refer to Chapter 2.13: Transport and Parking. This clause relates only to development on sites that have their main pedestrian entrance located within 400 metres of the railway station as shown in Figure 40 below.

c The above clause only applies to commercial development and does not apply to the residential component of mixed use development. Residential development will need to comply with the requirements of Chapter 2.13: Transport and Parking.

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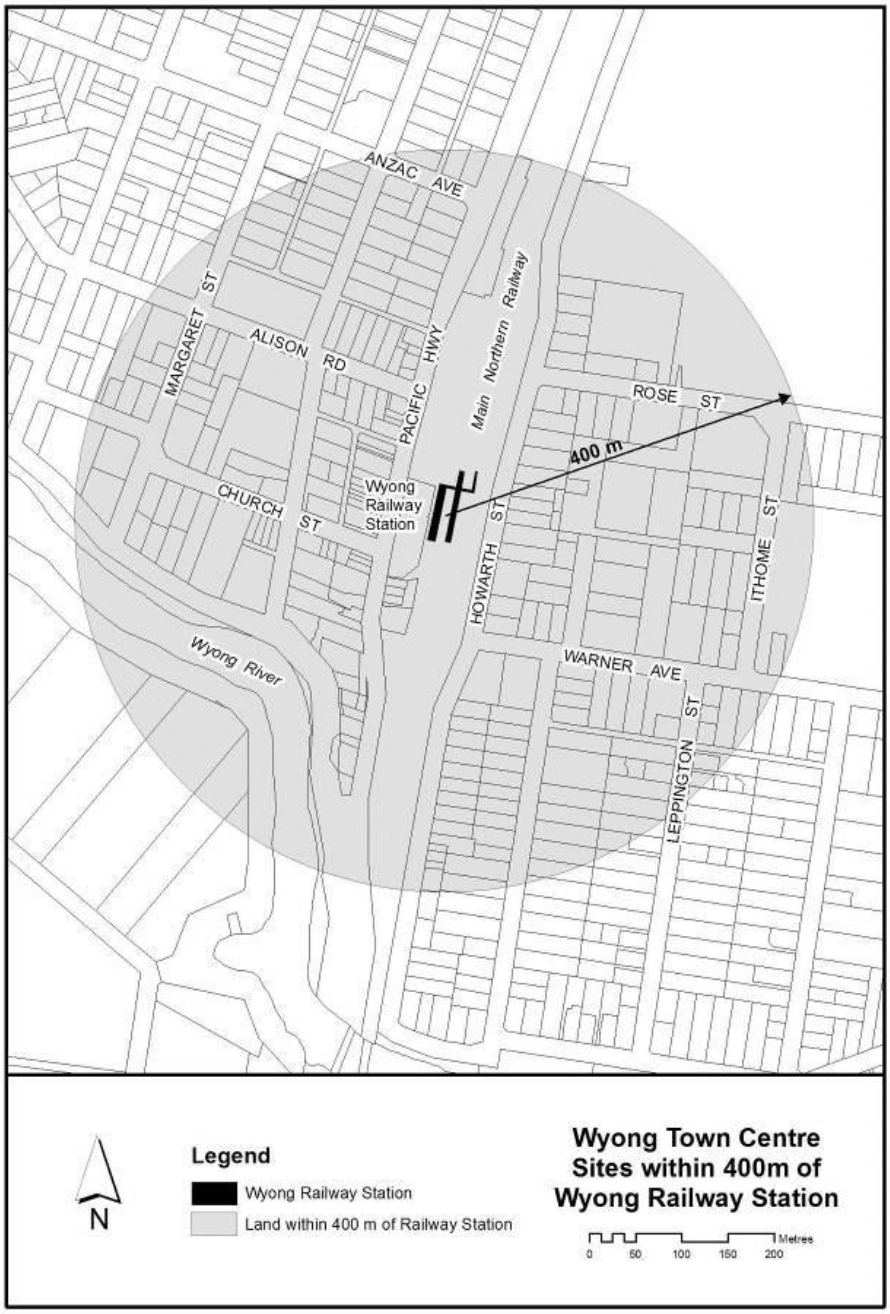

Figure 40 **Sites within 400 metres of the Wyong Railway Station**

4.5.4.3 Mixed Use Development Car parking

OBJECTIVE

- To provide provisions for car parking in mixed-use developments in the Wyong Town Centre

REQUIREMENTS

a For general car parking provisions for mixed-use development, refer to Chapter 2.13: Transport and Parking.

b For mixed-use developments that contain functions that are generally used at separate times, some dual use car parking spaces may be used to satisfy the number of required spaces. An example of this development type might be a mixed use development that contains offices and residential. The office parking is generally used during weekdays and the residential parking is generally used at nights and on weekends. Therefore, some spaces especially visitor spaces, could satisfy the requirements of both development types. Any application for dual use car parking spaces must be supported by a Transport Management Plan that addresses the requirements outlined in Chapter 2.13: Transport and Parking.

c Use security gates to all entrances to private areas, such as underground car parks and internal courtyards.

4.5.4.4 Basement Exclusion Zone

In most parts of the Wyong Town Centre, basement car parking is encouraged to improve the visual amenity of the streetscape. However, some areas of the town centre are unsuitable for basement car parking due to localised stormwater and drainage issues.

OBJECTIVE

- To exclude basement car parking on sites with localised stormwater and drainage issues

REQUIREMENT

Basement car parking is prohibited for developments on those sites located on Hardware Lane and shown on Figure 41.

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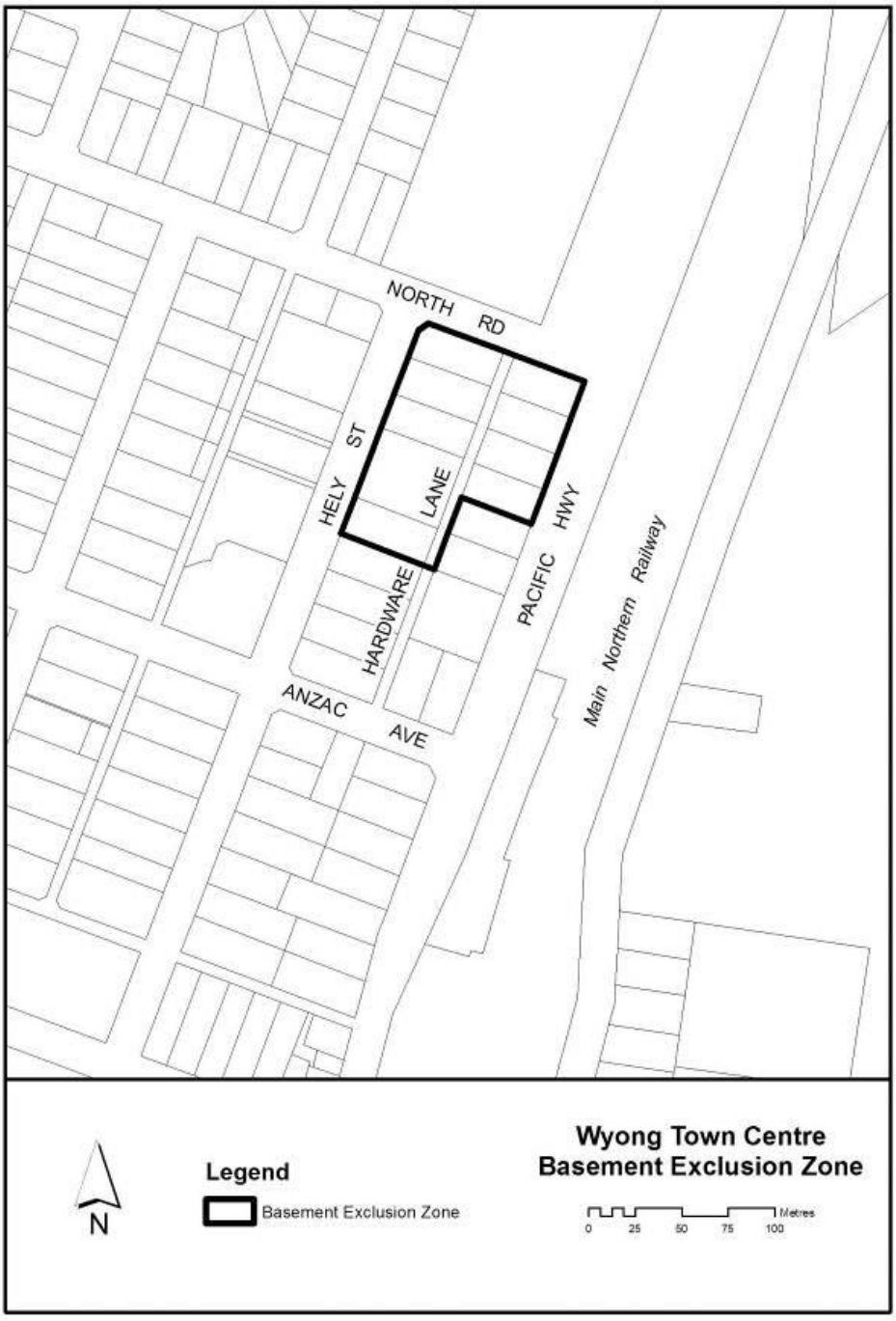

Figure 41 **Wyong Town Centre basement exclusion zone**

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4.5.4.5 Rear Service Lane

In the Wyong Town Centre, there are several sites with frontage to the Pacific Highway and River Road. Some of these sites require vehicular access via the creation of a rear service lane off River Road. Part of this service lane has been constructed, however the remainder of the lane will need to be finalised.

OBJECTIVE

To complete the formalisation of a rear service access lane to those properties situated between the River Road reserve and the Pacific Highway. A photo of the formed and unformed parts of the rear service lane is shown below in Figure 42

Figure 42 Formed and unformed sections of the rear service lane

REQUIREMENTS

a Upon development of Lot B DP 308296, identified in Figure 43, Council will require the construction of a rear service lane in accordance with Council's Civil Works Specifications.

b Prior to determination of applications on Lot B DP 308296, Council will require a transfer in fee simple to Council of the land required for the rear service laneway at no cost to Council.

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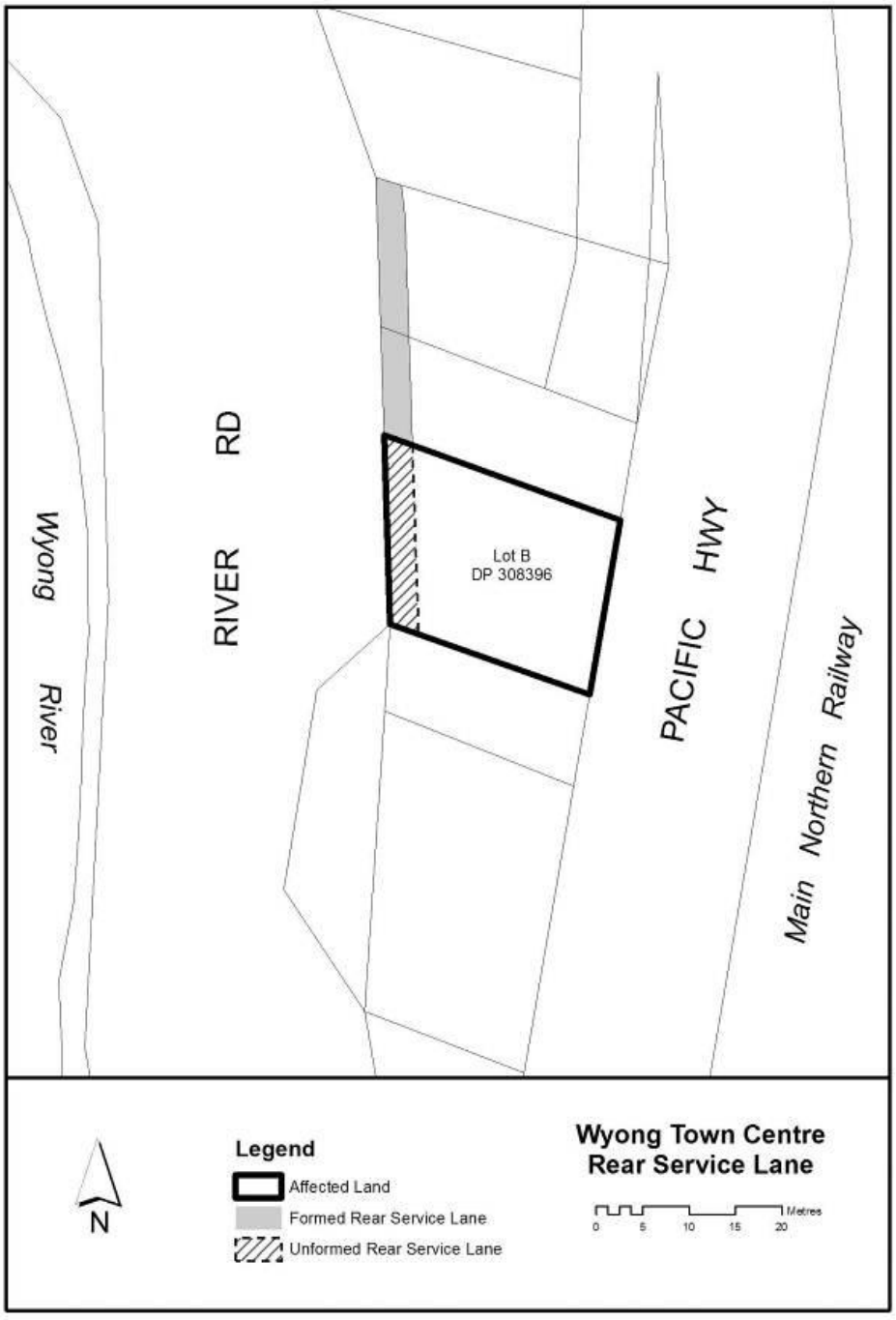

Figure 43 **Rear service lane**

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4.5.5 MIXED-USE AND COMMERCIAL DEVELOPMENT

This section provides provisions for mixed-use and commercial development in the Wyong Town Centre. Commercial development is development that is used for business or commercial purposes. Mixed-use development is development that has a mix of uses on the one site and generally involves some combination of commercial space combined with residential units in an urban area. Mixed-use development can range from smaller scale "shop-top housing" to larger scale developments with shopping centres and apartment towers. For residential only development refer to the relevant Chapters within this DCP.

4.5.5.1 Scale

This section provides provisions for the scale of mixed-use and commercial development. For more scale provisions relating to zoning, height, bonuses and FSR in the Wyong Town Centre refer to the Central Coast LEP 2022.

4.5.5.1.1 Setbacks

OBJECTIVE

- To allow reduced building setbacks in urban areas for mixed-use and commercial development, and to avoid excessive overshadowing of neighbouring sites

REQUIREMENTS

a For commercial development in B3 Commercial Core and B4 Mixed Use zones, zero building setbacks to all boundaries are generally permitted except where a heritage setback is required or the development could cause excessive overshadowing to public places. Refer to Section 4.5.2.2.5 – Heritage Setbacks of this Chapter for requirements relating to setbacks of new development adjacent to heritage items.

b For mixed-use development in B3 Commercial Core and B4 Mixed Use zones, zero building setbacks for the first two storeys are generally permitted except where a heritage setback is required or the development could cause excessive overshadowing to public places.

c For mixed-use development above two storeys, a zero front boundary setback is permitted except where a heritage setback is required. A zero side setback is permitted for the front 50% of the side boundary above two storeys. For the rear 50% of any side boundary above two storeys and for any rear boundary above two storeys, the building line requirements of Chapter 2.3: Residential Flat Buildings and Shop-Top Housing will apply.

d For lots with a double frontage, at least 50% of the site must adhere to the minimum setback requirements of Chapter 2.3.

e The above setbacks are minimum requirements. Floor space ratio limits and other factors will have an additional effect on the possible building envelope achievable.

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For example, six-storey mixed-use development is permitted to have zero building setback to all boundaries for the first two storeys. The upper storeys are residential and so a zero front boundary setback is permitted except where a heritage setback is required. Zero side boundary setbacks are permitted for the upper storeys for the first 50% of the side boundary except where a heritage setback is required. A 6 metre side setback is required for the rear 50% of the side boundary of the third and fourth storeys. A 9 metre side setback is required for the rear 50% of the side boundary of the fifth and sixth storeys. Finally a 6 metre rear setback is required for the third and fourth storeys, and a 9 metre rear setback is required for the fifth and sixth storeys of residential in accordance with the Building Setbacks section of Chapter 2.3: Residential Flat Buildings and Shop-Top Housing

The example above is illustrated in Figure 44 below.

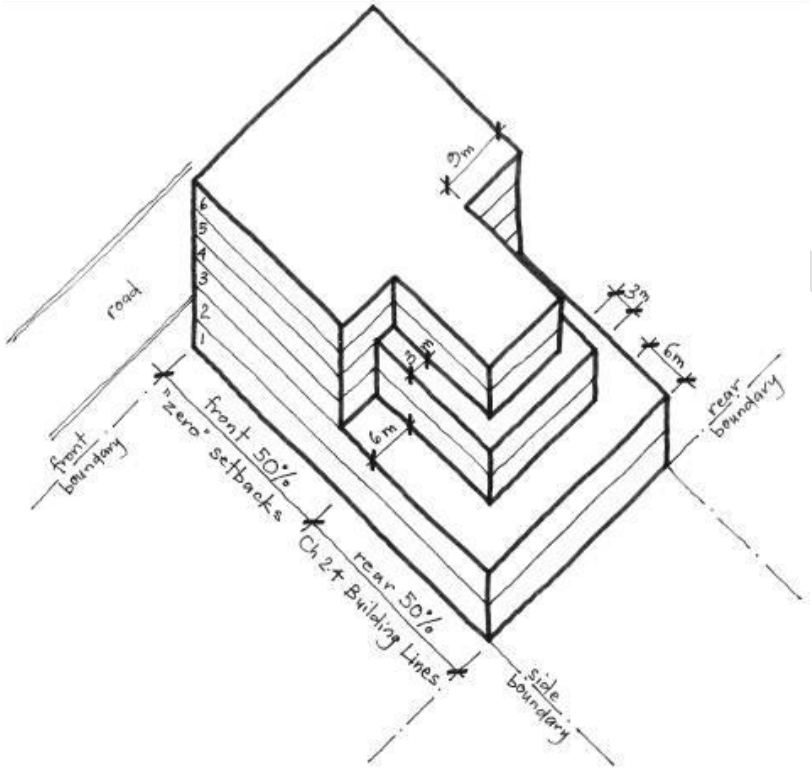

Figure 44 Example of setback requirements for a mixed use development or shop top housing above two storeys

f For building setbacks on corner blocks the front boundary is generally taken to be the street boundary that is shorter in length of the two street boundaries and/or that is facing the principal street.

g For mixed-use and commercial development with zero setbacks to boundaries, Council requires facades to be articulated in length and height. This clause particularly applies to those facades facing streets or laneways. Monotonous and unbroken lengths of wall exceeding 10 metres and two storeys in height will not be permitted. Textured facades or a mix of materials is encouraged. For development over two storeys, physical design elements shall be used to provide visual interest and articulation to the building. These can include balconies, screens, awnings, projecting windows, recessed entrances, and wall offsets.

h Note that on some lots fronting the Pacific Highway and Alison Road, a heritage height limit of 10 metres applies for the first 5m from the boundary addressing these roads. This applies to all types of development as required in the Central Coast LEP 2022.

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4.5.5.1.2 Floor to Floor Heights

For economic reasons, most development is designed to the minimum requirements for a particular scheme. In commercial buildings floor to floor heights are generally required to be greater than in residential buildings. This means that in the future, commercial buildings can be converted to residential but the reverse is not always possible. This section aims to provide some guidance for appropriate floor to floor heights to allow buildings to be flexible.

OBJECTIVE

- To set minimum floor to floor heights for mixed-use and commercial development

REQUIREMENTS

a Mixed-use and commercial buildings are required to have a minimum floor to floor height of 3.6 metres for the ground floor and second storey, whether the use be retail, commercial or residential.

b Car parking and residential levels of a commercial or mixed-use development are required to have a minimum floor to floor height of 3.0 metres.

4.5.5.2 Building Design

4.5.5.2.1 Corner Sites

Corner sites are particularly suited to commercial and mixed-use development. Their two street frontages provide more potential exposure for ground floor retail development. They have access to daylight and views from two sides which provides greater amenity for apartments. Their address to two streets also means there is more opportunity for dual entrances, or to differentiate between entrances like pedestrian and vehicular.

OBJECTIVE

- To ensure that commercial and mixed-use development on corner sites are articulated appropriately considering the highly visible position

REQUIREMENT

Corner buildings must address both streets and should provide some architectural distinction on the corner.

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4.5.5.2.1 Streetscape

OBJECTIVE

- To ensure that the appearance of the development is in keeping with the surrounding streetscape in mixed-use and commercial development

REQUIREMENTS

a Mixed-use development must be in keeping with the existing heritage and administrative character of the Wyong Town Centre. The ground floor of any mixed-use development facing the street must be retail or commercial development. The second storey of any mixed-use development should be retail or commercial or able to be adapted to retail or commercial by complying with the minimum floor to floor heights provided in Section 4.5.5.1.2 above.

b Entry doors are to be clearly visible from the street and recessed or covered to provide weather protection.

4.5.5.2.2 Pedestrian Access

OBJECTIVE

- To ensure that pedestrian access in mixed-use and commercial development is of a high standard

REQUIREMENTS

a In mixed-use development, each vertical use must have a distinct and separate pedestrian entrance from the ground floor use. For example, residential development on the second storey must have a ground floor pedestrian entrance that is separate from the commercial or retail development that is also on the ground floor.

b Locate all entrances directly off the public street, ensuring adequate lighting and good surveillance from the surrounding area.

c Entry doors are to be clearly visible from the street and recessed or covered to provide weather protection.

4.5.5.2.3 Car parking

General car parking provisions that apply in the Wyong Town Centre are contained in Section 4.5.4.0 Car parking of this Chapter. For parking rates refer to Chapter 2.13: Transport and Parking.

4.5.5.2.4 Sustainability

Mixed use and commercial development are required to have regard for sustainable design principles. Commercial development is currently required to comply with Part J of the *Building Code of Australia*. Residential components of mixed-use development are currently required to obtain a BASIX certificate. The commercial component of mixed-use development is also subject to Part J of the *Building Code of Australia*.

Part 4 Major Centres
Chapter 4.5 **Wyong Town Centre**

4.5.5.2.5 Stormwater Management

This section provides provisions on stormwater management for mixed-use and commercial development.

OBJECTIVE

- To ensure that land can be adequately drained, and that the development does not result in any impact, including any cumulative impact, to drainage or flooding elsewhere

REQUIREMENTS

a A stormwater management plan is to be submitted with the development application, incorporating one of the following:

  i the provision of on-site stormwater detention with delayed release into the stormwater system; or

  ii site design to minimise impervious areas and maximise on-site infiltration so increased run-off does not reach the stormwater system; or

  iii a combination of both; due consideration will be given to the location of the development and the impacts a detention system will have on the drainage catchment.

b Site works are not to obstruct or divert overland flows from upstream properties.

c All excess stormwater runoff from roof and paved areas shall be directed into inter-allotment or street stormwater drainage systems.

d Where possible, use vegetated buffers to treat and minimise stormwater runoff from parking areas and streets.

e Where easements over downstream properties are required, evidence of agreement with the relevant property owners is to be submitted with the development application.

f For developments incorporating basement car parking in low-lying areas as identified in Section 4.5.3.5 Low-lying Areas in this Chapter, a groundwater study is to be submitted, addressing the following:

  i draw down effects;

  ii potential for water mounding;

  iii Acid Sulphate Soils;

  iv water quality;

  v impacts on the proposed development and on adjoining properties;

  vi construction methodology.

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Part 4 Major Centres
Chapter 4.5 Wyong Town Centre

4.5.5.2.6 Waste Management

The garbage and recycling systems installed in commercial developments will vary depending on the types and quantities of waste and recyclables generated. In mixed-use developments, there are often operational problems caused by commercial and residential tenants using each other's garbage and recycling systems. The areas set aside for waste management in commercial and mixed-use development need to be carefully designed to allow for flexibility with the use of the building, and to provide separate waste areas that can be maintained by the individual user groups or tenants.

OBJECTIVES

- To avoid the generation of waste through design, material selection and building practices
- To plan for the types, amount and disposal of waste to be generated during demolition, excavation and construction of development
- To encourage waste minimisation, including material separation, reuse and recycling
- To ensure efficient storage and collection of waste and quality design of facilities

REQUIREMENTS

a Development applications shall include details of an appropriate means of waste disposal, demonstrating compliance with Chapter 2.13: Waste Management, Council's 'Waste Management Guidelines', as well as the requirements of this Chapter.

b Waste management systems for the residential component of mixed-use development are to be provided in accordance with the provisions contained in Chapter 2.3: Residential Flat Buildings and Shop-Top Housing.

c Waste management systems for the commercial component of mixed-use development and for commercial only development is to be provided in accordance with the provisions contained in Council's Waste Management Guidelines that accompany Chapter 2.13: Waste Management.

d Waste management areas for commercial and residential tenants are to be separated in mixed-use development.

e Regardless of which waste management system is proposed, it is important to establish and assign responsibility for the following ongoing management tasks.

  i transporting bins between the storage area and collection point on collection day and returning bins promptly to the storage area following collection:

  ii washing the bins and the storage area regularly;

  iii monitoring and maintaining the chute system, where proposed;

  iv maintaining the development free of litter and dumped rubbish; and

  v ensuring communication of waste management issues to residents;

f ongoing management must be addressed in the Waste Management Plan submitted with the development application.

Part 4 Major Centres
Chapter 4.5 Wyong Town Centre

4.5.5.3 Solar Access and Overshadowing

Solar access and overshadowing can present more problems in the Wyong Town Centre due to the east-west orientation of many of the lots. Accordingly, special provisions for mixed-use and commercial buildings have been developed to offer some concessions for solar access in accordance with the Apartment Design Guide (ADG) while also preventing excessive overshadowing to sites to the south of proposed development. These provisions are particularly critical to enable successful mixed-use development in the town centre.

OBJECTIVES

- To provide special provisions for mixed-use and commercial development in the Wyong Town Centre to prevent excessive overshadowing
- To provide some concessions for solar access in mixed-use development appropriate to urban areas and in accordance with the ADG
- To provide adequate natural lighting and minimise the need for artificial lighting during daylight hours

REQUIREMENTS

a In accordance with recommendations for residential (and mixed-use) development contained in the ADG for Daylight Access: Living rooms and private open spaces for at least 70% of apartments in a development should receive a minimum of 3 hours direct sunlight between 9.00am and 3.00pm in mid-winter.

b Also in accordance with the ADG: Limit the number of single-aspect apartments with a southerly aspect (SW-SE) to a maximum of 10% of the total units proposed. Developments which seek to vary from the minimum standards must demonstrate how site constraints and orientation prohibit the achievement of these standards and how energy efficiency is addressed.

c Commercial and mixed-use development shall provide setbacks to boundaries to enable solar access in accordance with Section 4.5.5.1.1 Setbacks of this Chapter. In addition to providing setbacks, overshadowing of adjacent sites can be reduced by allowing some separation or modulation of buildings. Building modulation can occur by stepping the façade in plan and by varying the building in height. The diagram shows the effects of building modulation on overshadowing.

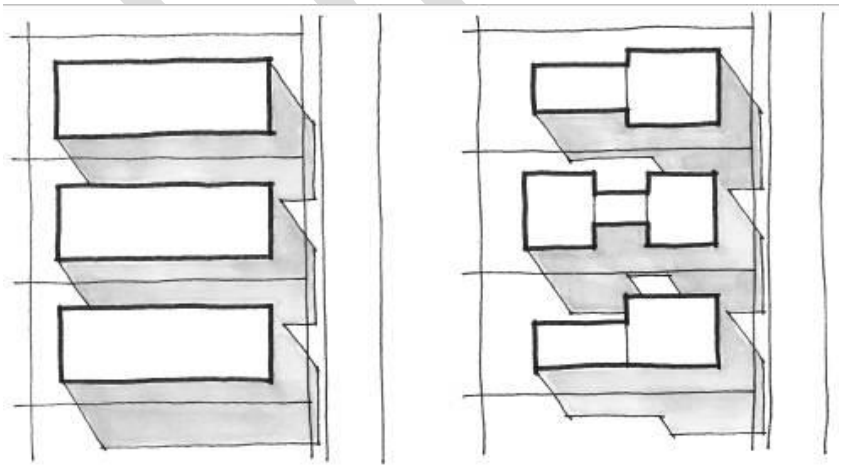

Figure 45 Effects of Building Modulation on Overshadowing

d Developments of two storeys height and above shall provide shadow diagrams based on a survey of the site and adjoining development, showing shadow casting at 9.00am, 12.00noon and 3.00pm on June 21 (winter solstice). The shadow diagrams must show the impact on the proposed development and surrounding areas of the shadows cast by the proposed development, and the surrounding existing development, the area's natural topography, fencing, and any cut and fill.

e In assessing the impact of shadow on an adjoining property, Council shall have regard for the standards stated above in Section 4.5.5.3 Solar Access and Overshadowing of this Chapter and also for the setback requirements for the particular development type.

f Where a development does not comply with the required solar access requirements under s.4.5.5.3, additional information in the form of elevational shadow diagrams shall be submitted to show the impact of the shadowing on affected properties.

4.5.5.4 Amenity

Good design provides amenity through the physical, spatial and environmental quality of a development. Optimising amenity requires appropriate room dimensions and shapes, access to sunlight, natural ventilation, visual and acoustic privacy, storage, indoor and outdoor space, efficient layouts and service areas, outlook and ease of access for all age groups and degrees of mobility.

4.5.5.4.1 Private and Communal Open Space

The requirements for private and communal open space in mixed-use development are provided in Chapter 2.3.

4.5.5.4.2 Acoustic Privacy

OBJECTIVE

- To avoid potential conflict between different uses by designing for acoustic privacy between residential and other uses in mixed-use development

REQUIREMENTS

a Separate residential uses from ground floor leisure or retail uses by an intermediate quiet use, such as offices. Alternatively, provide increased acoustic insulation between residential and those uses that are likely to generate noise.

b Design for acoustic privacy from the beginning of a project to avoid potential conflicts between residential and other uses. For example, noise associated with plant such as air conditioning or extractor fans should be contained within an acoustically insulated part of the development or located away from residential uses. These items should not be an add-on solution to roofs that are beneath residential balconies and units.

c Pedestrian entrances and exits, and roller doors for vehicles, should not be located near the bedrooms of residences.

4.5.5.4.3 Visual Privacy

OBJECTIVE

- To ensure visual privacy between different uses in mixed-use development

Part 4 Major Centres
Chapter 4.5 Wyong Town Centre

REQUIREMENTS

a Buildings are to be sited and designed to ensure visual privacy between dwellings.

b Effective location of windows and balconies to avoid overlooking is preferred to the use of screening devices, high sills or obscured glass.

4.5.5.5 Landscape Design

This part provides provisions for landscape design that are relevant to mixed-use and commercial development. For general landscape design provisions relating to the Wyong Town Centre refer to Section 4.5.2.4 Landscape Design of this Chapter.

OBJECTIVE

- To ensure appropriate landscape design is provided for in mixed-use and commercial development

REQUIREMENTS

4.5.5.5.1 Planting on Structures

A common scenario in urban areas is the establishment of landscape areas on top of basement car parks, podiums or roofs. High quality landscape design and open space amenity relies in part on the quality and health of plants. The plants in these areas are grown in total containment with artificial soils, drainage and irrigation. Plants grown in such situations are subject to a range of environmental stresses that affect the health and survival of the plants.

a Design for optimum conditions for plant growth by:

i providing soil depth, volume and area appropriate to the mature size of proposed plantings;

ii providing appropriate soil conditions and irrigation methods;

iii providing appropriate drainage.

b Design planters to support the appropriate soil depth and plant selection by:

i ensuring planter proportions accommodate the largest volume of soil possible. Minimum soil depths will vary depending on the size of the plant however, soil depths less than 1.5 metres are unlikely to have any benefits for tree growth;

ii providing square or circular planting areas rather than long, narrow linear areas to promote balanced root development and robust plant structure.

c Increase minimum soil depths in accordance with:

i the mix of plants;

ii the level of landscape management, particularly the frequency of irrigation;

iii anchorage requirements of large and medium trees;

iv soil type and quality.

Part 4 Major Centres
Chapter 4.5 **Wyong Town Centre**

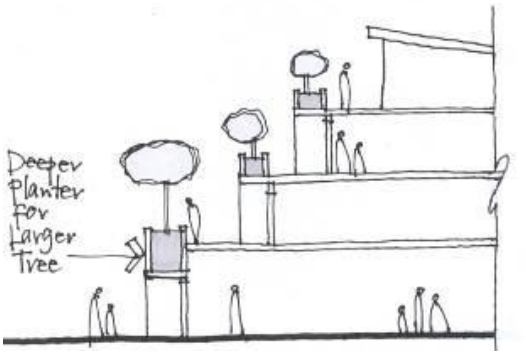

Figure 46 **Example of suitable planting on structures**

4.5.5.5.2 Street Trees

All mixed-use and commercial development shall incorporate street tree plantings at a rate of at least two semi-advanced trees per 15 metres of frontage. The tree species that have been selected for the Wyong Town Centre are shown in the Street Tree Masterplan in Section 4.5.2.4 Landscape Design of this Chapter.

Details of the proposed street tree planting including species and locations shall be submitted with the development application. Street trees are to be maintained and nurtured until established.

A street tree planting plan shall be included as part of the landscape design report, except in circumstances where it is demonstrably impractical to provide street trees.

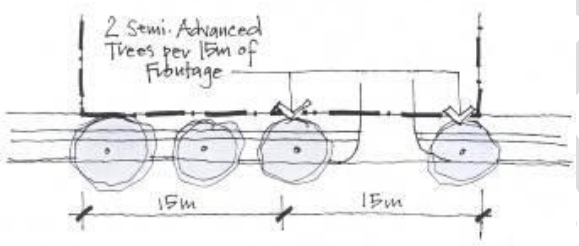

Figure 47 **Example of street tree planting**

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CHAPTER 5.4 KINCUMBER, AVOCA DRIVE (MANASSEH FROST HOUSE)

5.4.1 LAND TO WHICH THIS CHAPTER APPLIES

Manasseh Frost House is located on part of Lot 112 DP 1124060 (previously Lot 11 DP 635510) Avoca Drive, Kincumber as indicated in figure 1.

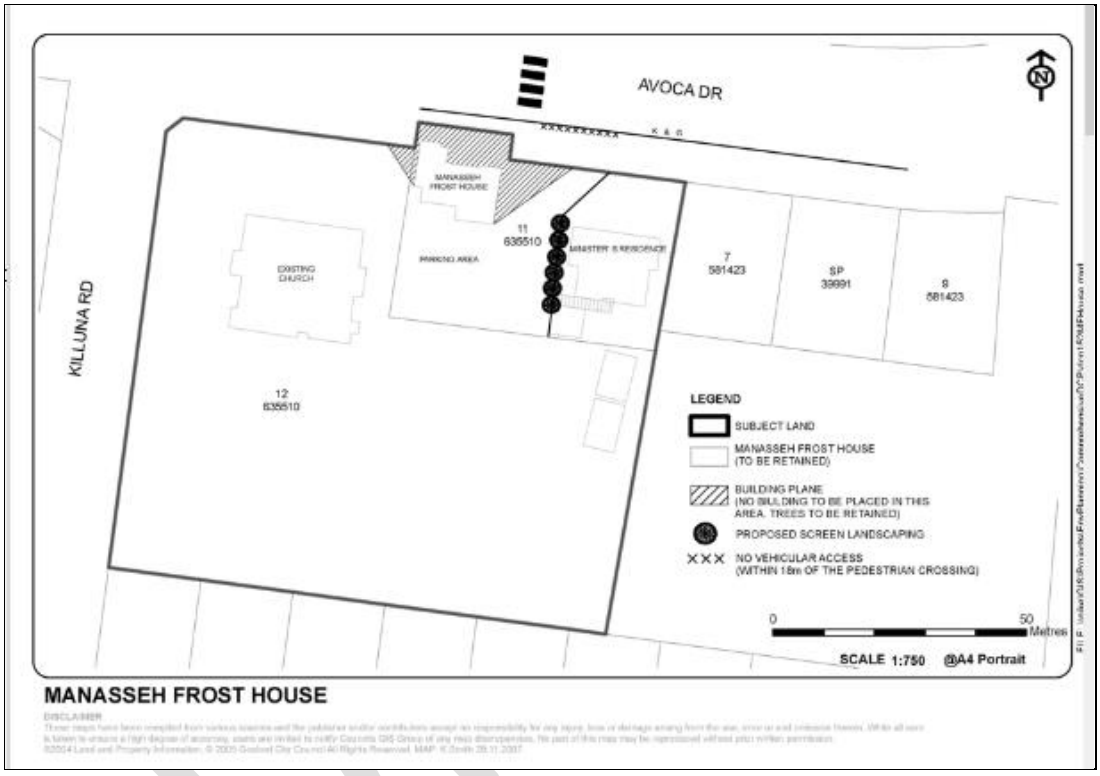

Figure 1 – Land to which this Chapter applies

5.4.2 PURPOSE OF THIS CHAPTER

The purpose of this chapter is to provide more detailed guidelines for the development of the land, having regard to Manasseh Frost House being an item of environmental heritage.

5.4.3 OBJECTIVES

The objectives of this chapter are as follows:

- To protect the heritage value of the weatherboard cottage
- To guide conservation of the cottage
- To facilitate traffic management and safety

5.4.4 REQUIREMENTS

a To protect the heritage value of the weatherboard cottage. This building is identified as an item of environmental heritage under Central Coast Local Environment Plan (LEP) 2022. Clause 5.10 of the LEP provides conservation incentives for heritage items, which enables a particular item to be used for a purpose not necessarily permitted within a zone provided that its use will maintain the historical value of the building (subject to development consent). Alternatively, uses permitted within the R2 Low Density Residential could be considered for the building subject to development consent.

i Any development application for Manasseh Frost House is to be referred to Council's Heritage Officer for comment.

ii Any development on the subject site or on adjoining properties within the vicinity of the weatherboard cottage is to give due consideration to its impact upon the historic building. Any such development is to be designed to be sympathetic in scale, style, and character to the architectural appearance of the cottage.

iii In order to retain views of the house from Avoca Drive and not diminish its appearance with other structures, no new building is to be located in front of the house within a 45° plane projected to the front of the property from the rear corners of the house, as delineated on the map.

iv All mature trees located in front of the building and within the 45 degree plane are to be retained.

v Alterations and/or additions to the rear of the building are permitted provided they are sympathetic in design to the existing cottage and, when viewed from Avoca Drive, they are predominantly unable to be seen.

vi Any signage is to be consistent with the architecture of the building and compatible with its heritage character.

b To guide conservation of the cottage

Any conservation works must ensure the original character of the cottage is retained whilst implementing current health and building practices., The external facade is considered of high significance and must be restored. The interior may be altered if this will not result in adverse impacts to the significance of the building.

i The exterior of the dwelling is to be restored to its original character. Records of its appearance at this time are held in Council (reference: *Gosford/Wyong History and Heritage Summary and Recommendations* 1986).

ii The internal design and layout may be varied to suit the intended use.

iii The building is to generally comply with the provisions or performance standards of the *Building Code of Australia.*

c To facilitate traffic management and safety

Currently, the dwelling does not have vehicular access to Avoca Drive, although any future use of the building may require the provision of vehicular access to the site from Avoca Drive. Given the high traffic volumes on Avoca Drive, and the location of a pedestrian crossing directly in front of the dwelling, the location of the vehicular access point is limited from a traffic safety aspect.

i The vehicular access point, servicing the building, is to be located a minimum of 18 metres to the east of the pedestrian crossing in Avoca Drive.

ii No right turn into, or out of, the site is permitted from/to Avoca Drive.

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iii Any parking spaces provided on site are to be located to the rear of the building.

iv In order to screen the adjoining dwelling from the car park, a landscaping strip is to be planted along the dividing fence. The vegetation is to consist of native shrubs that have a mature height of 2.5 metres.

v Now that Manasseh Frost House is located Lot 112 DP1124060, access is gained via Killuna Road.

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Part 3 Environmental Controls
Chapter 3.6 Heritage Conservation

CHAPTER 3.6 HERITAGE CONSERVATION

3.6.1 INTRODUCTION

~~The history and character of the Central Coast is unique and highly valued by the community. The built environment, cultural landscapes and Aboriginal history of the local government area all contribute to this unique character. These are recognised and protected to ensure that current and future generations can gain an understanding and appreciation of the area's history and heritage.~~

~~This Development Control Plan (DCP) Chapter aims to conserve and enhance this unique heritage by providing general heritage principles, objectives and controls relating to development of, or in the vicinity of, heritage items and Heritage Conservation Areas. This Chapter provides guidelines for new development, alterations and additions, maintenance, infill development, demolition, subdivision and adaptive reuse of heritage items. This Chapter must be read in conjunction with other relevant Chapters within the DCP.~~

~~3.6.1.1 Heritage Significance~~

~~Heritage significance is based on the understanding that a particular item or area has historical, scientific, cultural, social, archaeological, architectural, natural or aesthetic value for past, present or future generations.~~

~~Items and places of heritage significance within the local government area include:~~

~~a Natural heritage – fossil sites, geological formations, rivers and other cultural landscape heritage assets such as parks, gardens and rural landscapes;~~

~~b Archaeological heritage – cemeteries, ruins, foundations of early built fabric;~~

~~c Aboriginal cultural heritage – Aboriginal reserves/missions, sites of conflict, axe grinding grooves, ceremonial sites, burial sites, scar trees, occupation sites, landscapes, lake and river foreshores;~~

~~d European heritage – convict settlement sites, government sites, rural cultural landscapes, churches, schools, war memorials, bridges and railways, dwellings, inns and coaching stations, public buildings, commercial development, industrial development, villages, subdivision patterns, wharf structures and multicultural heritage.~~

~~For further information on heritage significance including the types and levels of significance please refer to the NSW Heritage Branch website http://www.environment.nsw.gov.au/resources/heritagebranch/heritage/listings/assessingheritagesignificance.pdf~~

Heritage consists of the places and objects that we have inherited from the past, and that we want to pass on to future generations. The Central Coast has a rich and varied heritage. The Aboriginal heritage of the Central Coast includes tangible and intangible markers allowing for a rich understanding of the traditional connection of Aboriginal people, past and present, to Country. The Central Coast also has a rich diversity of heritage buildings, places and archaeological sites that demonstrate the settlement and use of the region post-1788.

Heritage items, heritage conservation areas and Aboriginal places and objects in the Central Coast LGA are protected under State legislation and local planning controls. This Chapter has been prepared to provide guidance to persons proposing to carry out development that involves cultural heritage in the Central Coast LGA. This is to ensure that our heritage is protected and enhanced, while allowing our towns, suburbs, and cities to grow and evolve.

Part 3 Environmental Controls
Chapter 3.6 Heritage Conservation

This Chapter has been prepared to support the provisions of Clause 5.10 of the *Central Coast Local Environmental Plan* 2022 (CCLEP 2022) and the provisions of Clause 5.36 of Chapter 5 Gosford City Centre of the *State Environmental Planning Policy (Precincts-Regional) 2021* (Regional SEPP).

~~3.6.1.2 Burra Charter~~

~~Council acknowledges the principles of, and practices recommended by, the Burra Charter in the conservation of items of cultural heritage and have informed the preparation of this section of the DCP. The Burra Charter provides guidance for the conservation and management of places of cultural significance (cultural heritage places). The Charter sets a standard of practice for those who provide advice, make decisions about, or undertake works to places of cultural significance, including owners, managers and custodians.~~

~~When preparing a development application, the principles of the Burra Charter should be applied. In the event of any inconsistencies between the Burra Charter and the DCP, the DCP will prevail.~~

~~For further information on the Burra Charter principles please refer to Australia ICOMOS - http://australia.icomos.org/wp-content/uploads/The-Burra-Charter-2013-Adopted-31.10.2013.pdf~~

This Chapter is also guided by the conservation policy, principles and definitions established in the Australia ICOMOS *Charter for the Conservation of Places of Cultural Significance* (The Burra Charter).

~~3.6.1.3~~ 3.6.1.1 ~~Objectives of this Chapter~~Aims

~~The aim of this Chapter is to promote conservation of the Central Coast's cultural heritage through promoting appropriate development that is sensitive to, and designed in consideration of, the local heritage context. This Development Control Plan Chapter aims to guide and provide a management framework for the development of heritage items, land in the vicinity of heritage items, and land within a Heritage Conservation Area.~~

~~The objectives of the plan are to:~~

~~a Conserve heritage items and Heritage Conservation Areas~~

~~b Ensure that significant items and places retain their important character, fabric and setting~~

~~c Establish a framework for detailed heritage and conservation planning for the Central Coast~~

~~d Ensure that Aboriginal Cultural Heritage and archaeology are taken into due consideration during the development process~~

~~e Promote new development that is sympathetic to the identified heritage significance~~

~~f Maximise the retention of heritage items, Heritage Conservation Areas and contributory items~~

~~g Provide controls for encouraging contemporary design sympathetic with the identified heritage significance~~

~~h Enable appropriate and expert consideration to be given by Applicants and Council for development relating to heritage assets~~

~~i Provide incentives for owners of properties that are listed as individual heritage items or located in a Heritage Conservation Area~~

~~j Facilitate the implementation of the objectives and provisions relating to heritage conservation which are contained within Central Coast LEP 2022~~

The aims of this chapter are to:

- conserve Aboriginal objects and places, heritage items, and heritage conservation areas in the Central Coast;
- ensure that development of heritage items conserves and respects the heritage significance of the item including fabric and setting;
- ensure that Aboriginal cultural heritage and archaeology are given due consideration during the development process;
- ensure that new development is based on an understanding of the significance of heritage items and heritage conservation areas;
- ensure that development in the vicinity of heritage items and heritage conservation areas respects the heritage item or place in terms of siting, scale, orientation, and character and does not impact on setting or impede views; and
- facilitate the implementation of the objectives and provisions relating to heritage conservation which are contained within the CCLEP 2022.

~~3.6.1.4~~ 3.6.1.2 Land to which this Chapter Applies

This Chapter applies to all land to which Central Coast LEP 2022 applies. This Chapter applies also to land covered by the Chapter 5 of the Regional SEPP.

~~Refer to Schedule 5 of the LEP to ascertain if a site is a heritage item, or is located within a Heritage Conservation Area. Applicants must also conduct a Due Diligence Assessment for Aboriginal Objects and consider any draft amendments to the LEP which may relate to heritage items.~~

~~If the site is a heritage item or is located within a Heritage Conservation Area, Applicants must refer to clause 5.10 of the LEP and to this Chapter for the relevant provisions.~~

Relationship to other plans and policies

This Chapter must be read in conjunction with other relevant Chapters within the DCP. Where there is an inconsistency, the provisions of this Chapter prevail.

Gosford City Centre

Development within Gosford City Centre is guided by the *Gosford City Centre Development Control Plan 2018* (Gosford City Centre DCP 2018). The Gosford City Centre DCP 2018 adopts the provisions of this DCP. Where the provisions in this Chapter conflict with those in the Gosford City Centre DCP 2018, the provisions of the latter prevail.

3.6.1.3 Development to which this chapter applies

This Chapter applies to development on land that contains, or is in the vicinity of, an Aboriginal object or place, an archaeological site, or a heritage item or heritage conservation area.

Applicants can contact Council's Heritage Officer for advice on application requirements, heritage significance and best practice conservation practices.

~~3.6.2.1~~ Development without Consent

~~a Clause 5.10 of Central Coast LEP 2022 provides controls for heritage conservation including when development consent is not required. Pursuant to Clause 5.10(3) of Central Coast LEP 2022 development consent may not be required for work to a heritage item or Heritage Conservation Area~~

~~b Proponents are to contact Council's Heritage Officer to determine whether development consent is required. Written advice from Council must be obtained prior to commencement of works for development without consent.~~

Some works or activities may not require development consent; however, may still require notification to or consultation with Council. See below for types of development that may not require consent.

~~3.6.3.4 Essential Maintenance~~

~~Council may waive the requirement for a development application where works can be demonstrated to be essential maintenance only. For the purposes of this Plan:~~

~~a essential maintenance includes works required to be undertaken because of structural inadequacy or concerns about public safety;~~

~~b reconstruction approved as part of essential maintenance shall be limited to the form of the existing structure, or to a known earlier form in accordance with the definition of reconstruction contained in this Plan.~~

~~Minor works and essential maintenance~~

Clause 5.10(3) of the CCLEP 2022 and Clause 5.36(3) of the Regional SEPP allow property owners to seek an exemption from formal development approval for minor works or maintenance that will not negatively impact the heritage significance of their property. This process helps simplify the management of heritage properties while safeguarding their heritage value.

Before beginning any work, property owners must submit the **Heritage Exemption Form** for assessment by the Council's Heritage Team and must receive written approval from Central Coast Council.

Minor works and essential maintenance might include:

- minor repairs using the same materials and finishes
- resealing/treating timber
- replacing broken windows
- re-hanging doors or gates
- repainting
- replacing or establishing gutters and downpipes
- re-pointing brickwork
- restoring posts or fence posts
- repairing stonework and plasterwork
- underpinning and damp proofing

- replacing plumbing and wiring
- general maintenance of heritage gardens (pruning or replanting original species)
- under certain circumstances the installation of solar panels (subject to certain location and criteria).

Refer to Council's website for further information, and to access the **Heritage Exemption Form**:

https://www.centralcoast.nsw.gov.au/heritage-exemption-and-heritage-nomination-forms

Exempt development

Exempt development is development that does not require planning or building approval. Exempt development applies to works that are low impact, provided that they meet all relevant development standards.

The majority of exempt development types and their relevant standards are identified in the *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008* (Codes SEPP). Other types of development may be exempt under other plans or policies.

However, not all types of exempt development are applicable if they involve a heritage item, heritage conservation area, or Aboriginal object or place.

Refer to NSW Government guidance for further information:

https://www.planning.nsw.gov.au/assess-and-regulate/development-assessment/planning-approval-pathways/exempt-development

Complying development

Complying development is development that is considered to have a minor environmental impact on neighbourhood amenity which can be addressed by predetermined development standards. Complying development approvals are determined through a fast-track assessment process by Council or an accredited certifier. The majority of complying development types and their standards are outlined in the Codes SEPP.

However, complying development does not apply to land that is identified as a heritage item. Some types of complying development do not apply in heritage conservation areas.

Refer to NSW Government guidance for further information:

https://www.planning.nsw.gov.au/assess-and-regulate/development-assessment/planning-approval-pathways/complying-development

Development with consent~~3.6.2 DEVELOPMENT CONSENT~~

~~Development consent is required for works to a heritage item as required under Central Coast LEP 2022 and include proposals that involve:~~

~~c demolition, in whole or in part, of any buildings, works or horticultural features of a heritage item;~~

~~d altering a heritage item that is a building by making structural changes to its interior or by making changes to anything inside the item that is specified in Schedule 5 of Central Coast LEP 2022 in relation to the heritage item;~~

~~e alterations and additions to the exterior of a heritage item~~

~~f erecting a building or structure on land on which a heritage item is located, or within a Heritage Conservation Area~~

~~g subdividing land on which a heritage item is located or within a Heritage Conservation Area;~~

~~h disturbing or excavating an archaeological site;~~

~~i Altering the use of the heritage item.~~

~~3.6.2.4 Assessment Requirements~~

~~In determining how heritage items and Heritage Conservation Areas should be conserved, every proposal must be considered on its own merits. Two key objectives in a merit assessment will be to conserve those items and features that are significant, and to ensure that an item remains recognisable of its period and value. The significance of items and features of a heritage item are determined using the criteria developed by the NSW Heritage Council.~~

~~Prior to granting consent, Council will consider:~~

~~a the applicants Due Diligence Assessment of the likely impact on any Aboriginal objects or places;~~

~~b the potential impacts of the proposal on the heritage significance of the item or Heritage Conservation Area;~~

~~c the extent to which the carrying out of the development in accordance with the consent would affect the heritage significance of the item and its setting having considered a statement of heritage impact supplied by the applicant;~~

~~d whether the setting of the item, and in particular, whether any stylistic, horticultural or archaeological features of the setting should be retained; and~~

~~measures to be taken to conserve heritage items identified in any Conservation Plan or Heritage Impact Statement prepared by the Applicant.~~

All other development types require consent from Central Coast Council through the Development Application (DA) process.

Information about the DA process can be found on Council's website:

- https://www.centralcoast.nsw.gov.au/plan-and-build/development-applications/understanding-development-process

3.6.2 ABORIGINAL HERITAGE

Aboriginal cultural heritage consists of places, traditions, beliefs, customs, values, and objects that represent the history of Aboriginal generations past and continuing and are of cultural and heritage significance to Aboriginal people.

First Nations people have lived within the Central Coast LGA for over 50,000 years. There are thousands of registered Aboriginal places and objects within the Central Coast LGA that speak to this long and enduring connection to Country. These include habitation sites, rock engravings and stencil art sites, axe grinding grooves sites, middens, culturally modified trees, stone arrangements, and stone artefact scatters.

Legislative framework

The primary legislative instrument for the protection of Aboriginal cultural heritage in NSW is the *National Parks and Wildlife Act 1974* (NPW Act).

Aboriginal cultural heritage is also protected under:

- *Environmental Planning and Assessment Act 1979* (NSW)
- *Central Coast Local Environmental Plan 2022*
- *Heritage Act 1977* (NSW)

Registered Aboriginal sites are recorded on the Aboriginal Heritage Information Management System (AHIMS). Several Aboriginal sites are listed as heritage items on Schedule 5 of the CCLEP 2022. In addition, State Heritage Register items may include objects or places of Aboriginal cultural heritage.

Approval requirements under the National Parks and Wildlife Act

Part 6 of the NPW Act provides specific protection for Aboriginal objects and declared Aboriginal places by establishing offences of harm. Anyone proposing to carry out an activity that could potentially cause harm to an Aboriginal object or place must investigate, assess, and report on the harm that may be caused in an Aboriginal Cultural Heritage Assessment Report (ACHAR). Where harm cannot be avoided, an Aboriginal Heritage Impact Permit will be required from Heritage NSW.

This process must be undertaken in accordance with the following guidelines:

- *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (Department of Environment, Climate Change and Water NSW, 2010)
- *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales* (Office of Environment and Heritage, Department of Premier and Cabinet, 2011); and
- *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (Department of Environment, Climate Change and Water NSW, 2010).

Refer to the Heritage NSW webpage for additional information on assessment and permit requirements for Aboriginal cultural heritage –

- https://www2.environment.nsw.gov.au/topics/heritage/about-heritage/aboriginal-cultural-heritage

~~**3.6.2.2.1 Preparing a Due Diligence Assessment for Aboriginal Objects**~~

~~a a Reference to the following documents is required in relation to Aboriginal Cultural Heritage Assessment:~~

- ~~Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales(DECCW 2010);~~
- ~~Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales, April, 2011;~~
- ~~Aboriginal Cultural Heritage Consultation requirements for Proponents, April, 2010;~~
- ~~The Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW, 24 September, 2010; and~~

~~i *The Guide to Aboriginal Heritage Impact Permit Processes and Decision Making,* August, 2011.~~

~~An Aboriginal Heritage Impact Permit from NSW Office of Environment and Heritage is required for development that causes harm to Aboriginal Object or Aboriginal Places.~~

3.6.2.1 Aboriginal objects and places

Under Clause 5.10 of the CCLEP 2022, development consent is required for works that may impact an Aboriginal object or place. This includes:

- demolishing, moving, or altering an Aboriginal object;
- disturbing or excavating an Aboriginal place of heritage significance;
- erecting a building on land on which an Aboriginal object is located or that is within an Aboriginal place of heritage significance; and
- subdividing land on which an Aboriginal object is located or that is within an Aboriginal place of heritage significance.

Development application requirements

Development application requirements will depend on the location and type of development, and the known or likely presence of Aboriginal objects or places. All development that involves ground disturbance or excavation must consider potential impacts to Aboriginal objects and places. At a minimum this must include:

- an **AHIMS search** to identify whether registered Aboriginal sites are located on, in the vicinity of, and/or within a 200m buffer of the development site; and
- an assessment of the landscape to identify the potential for Aboriginal objects and places.

Development with the potential to impact an Aboriginal object or place, indicated by the results of the above, must follow the investigation, assessment, and reporting pathway established by the NPW Act. This may include:

- a **Due Diligence Assessment** to determine whether Aboriginal objects are likely to be present in an area, whether they are likely to be harmed by an activity, and whether further assessment and approval is required;

- an **Aboriginal Cultural Heritage Assessment Report** (ACHAR) to document the process of investigation, consultation, and assessment of Aboriginal cultural heritage; if required, the ACHAR will be used to apply for a permit from Heritage NSW; and
- an **Aboriginal Heritage Impact Permit** (AHIP) – a legal document that gives permission to harm Aboriginal objects or places and sets out conditions to comply with.

Development requiring an Aboriginal Heritage Impact Permit

Development which requires an AHIP is classified as 'integrated development', meaning consent is required from both Council and Heritage NSW. The development application must be accompanied by an ACHAR prepared in line with Heritage NSW requirements. Council will then refer the development application and ACHAR to Heritage NSW.

OBJECTIVES	
O1	To conserve Aboriginal objects and Aboriginal places in the Central Coast.
O2	To ensure that consideration of known or potential Aboriginal objects and places forms part of initial site investigations and site planning.
REQUIREMENTS	
R1	Applicants proposing to undertake any development involving ground disturbance or excavation must undertake the following prior to lodging the development application: ▪ an **AHIMS search** to identify whether any registered Aboriginal sites are located on, in the vicinity of, and/or within a 200m buffer of the development site; and ▪ an **assessment of the landscape** to identify whether the area of proposed development is: o classed as an 'environmentally sensitive area', as defined in Clause 3.3 of the CCLEP 2022; o within the vicinity of or containing mature tree/s that may be over 150 years old; o within 200 meters of waters (being the whole or any part of any river, stream, lake, lagoon, swamp, wetlands, natural watercourse, or tidal waters including the sea); o within a sand dune system; o on a ridge top, ridge line or headland; o within 200m below or above a cliff face; or o within 20m of or in a cave, rock shelter, or cave mouth. This information must be included in the Statement of Environmental Effects.

R2	If the development site: ▪ contains, is in the vicinity of, and/or is within a 200m buffer of a registered Aboriginal site; and/or ▪ is within the above landscape types, A **Due Diligence Assessment** must be submitted with the development application. The Due Diligence Assessment must be prepared in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (Department of Environment, Climate Change and Water NSW, 2010).
R3	Development involving Aboriginal cultural heritage must be undertaken in accordance with the relevant provisions of the National Parks and Wildlife Act and other relevant legislative and statutory instruments.

3.6.2.2 Connecting with Country Framework

Refer to the Government Architect NSW webpage for further information on the Connecting with Country Framework:

- https://www.planning.nsw.gov.au/government-architect-nsw/policies-and-frameworks/connecting-with-country

The Government Architect NSW has prepared the Connecting with Country Framework to provide good practice guidance on how to respond to Country in the planning, design, and delivery of built environment projects in NSW. The Connecting with Country Framework presents a place-led design approach that can be applied at multiple scales, from individual buildings, to public parks, plaza and malls, to neighbourhoods and precincts.

OBJECTIVES	
O1	To ensure that built environment projects in the Central Coast are guided by, and respond to, Country.
REQUIREMENTS	
R1	Development proposals involving: ▪ development applications on sites 20 ha or more in size; ▪ development application progressing under the design excellence panel; ▪ development located within areas of Aboriginal significance, where appropriate, and ▪ any public domain/urban design projects on sites in excess of 1000m2 must demonstrate engagement with the Connecting with Country Framework.

R2	Development applications must demonstrate how the Connecting with Country Framework has been implemented and how the outcomes of engagement have informed the design outcomes.

3.6.3 HISTORICAL ARCAHEOLOGY

Historical archaeology refers to archaeological remains that relate to the settlement of NSW post-1788, other than Aboriginal settlement. Archaeological remains are deposits, artefacts, objects, or material evidence that are principally present underground. Archaeological sites are areas with known archaeological remains.

Archaeological sites in the Central Coast include remains of houses, inns, mills, roads, and railways, as well as maritime sites such as shipwrecks, jetties, wharves, and boatsheds.

Legislative framework

Historical archaeology in NSW is primarily protected by the *Heritage Act 1977* (NSW) (Heritage Act).

Archaeological sites in the Central Coast LGA are also protected under:

- *Environmental Planning and Assessment Act 1979*; and
- *Central Coast Local Environmental Plan 2022* (CCLEP 2022) and Chapter 5 of the *State Environmental Planning Policy (Precincts—Regional) 2021* (Regional SEPP).

Requirements under the NSW Heritage Act

Known and potential archaeological remains that are of State or local heritage significance are protected under the Heritage Act. These are referred to as archaeological relics. Works or activities that will disturb or excavate land where relics are known or suspected may require:

- a Section 139 exception;
- a Section 140 excavation permit; or
- approval from Heritage NSW if the works are within a State Heritage Register item.

This process must be undertaken in accordance with the following guidelines:

- *Assessing Significance for Historical Archaeological Sites and 'Relics'* (Heritage Branch of the Department of Planning 2009);
- *Archaeological Assessments Guidelines* (Department of Urban Affairs and Planning 1996); and
- *Historical Archaeology Code of Practice* (Department of Planning 2006).

If archaeological relics are unexpectedly or unintentionally uncovered, Heritage NSW must be notified.

Refer to the Heritage NSW webpage for further information on requirements under the Heritage Act:

- **https://www2.environment.nsw.gov.au/topics/heritage/apply-for-heritage-approvals-and-permits/historical-archaeology**

3.6.3.1 Archaeological sites

Archaeological sites that have been assessed as of significance to the Central Coast are listed on Part 3 Schedule 5 of the CCLEP 2022 and Part 3 Schedule 9 of the Regional SEPP. Heritage items and heritage conservation areas listed on the CCLEP 2022 or Regional SEPP may also contain known or potential archaeological remains associated with former uses or structures. Check the State Heritage Inventory listing sheet for information about a listed archaeological site or heritage item.

The nature of archaeological remains means that their presence may not be visible on the ground surface. It is important that the potential for archaeological remains is identified early in the planning of development, to minimise the risk of unexpected finds, and minimise disruptions during the course of development.

Development application requirements

Under Clause 5.10(2) of the CCLEP 2022, development consent is required to:

- disturb or excavate an archaeological site; and/or
- demolish, move, or alter a relic within a heritage conservation area.

Where development proposes excavation or ground disturbance in a listed archaeological site, or where archaeological remains are known or suspected, the development application must include:

- a **Historical Archaeological Assessment** to evaluate the likely extent, nature, integrity, and significance of the archaeological remains.

Where development has the potential to impact archaeological remains, additional reporting and assessment may be required to support an exception or permit application. These may include:

- a **Historical Archaeological Research Design**;
- a **Test Excavation Report**; and
- an **Excavation Report.**

Obtaining necessary excavation exceptions or permits may be included as a condition of consent.

OBJECTIVES	
O1	To preserve known and potential historical archaeology in the Central Coast LGA.
O2	To ensure that consideration of historical archaeology forms part of initial site investigations and site planning.
REQUIREMENTS	
R1	Development of sites with known or potential historical archaeology must be undertaken in accordance with the relevant provisions of the Heritage Act and the CCLEP 2022.
R2	Development applications for development involving excavation or ground disturbance to an identified archaeological site must include a **Historical Archaeological Assessment**.
R3	Assessment of impacts to historical archaeology must form part of initial site investigations and site planning.

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3.6.4 HERITAGE ITEMS~~3.6.3 GENERAL HERITAGE & DEVELOPMENT GUIDELINES~~

~~3.6.1.1.1 Heritage Items~~

~~Heritage items include built or natural forms, archaeological or maritime heritage, movable heritage or items. The *NSW Heritage Act 1977* and *the Environmental Planning and Assessment Act* (EP&A Act), 1979 provide the legislative framework for heritage management in New South Wales. Heritage items are identified in the *Central Coast Local Environmental Plan* (LEP) *2022* and are administered under these two Acts.~~

~~In addition, any known Aboriginal sites, places and relics are identified in the Aboriginal Heritage Information Management System (AHIMS) Register and all Aboriginal sites, places and relics are protected under the *National Parks and Wildlife Act 1974*.~~

Heritage items are places and objects that have been assessed as being of significance for their historical, associative, aesthetic, social, research, representative, and/or rarity values. Heritage items in the Central Coast include buildings, structures, and places such as houses, churches, farm buildings, hotels, cemeteries, wharves, and streetscapes. Heritage items are assessed as being of local, State or national significance.

If a property is listed as a heritage item, it is subject to specific planning and development controls that seek to retain the heritage significance of the item.

Legislative framework

Heritage items in the Central Coast LGA are listed on Schedule 5 of the CCLEP 2022 and on Schedule 9 of the Regional SEPP. These include local heritage items, as well as items that are of State and National heritage significance.

Items of State heritage significance are listed on the State Heritage Register, and are protected under the *Heritage Act 1977* (NSW). Items of National significance are listed on the National Heritage List, and are protected under the *Environment Protection and Biodiversity Conservation Act 1999*.

Refer to the State Heritage Inventory database to access the State Heritage Register:

- https://www2.environment.nsw.gov.au/topics/heritage/search-heritage-databases/state-heritage-inventory

Refer to the Australian Government Department of Climate Change, Energy, the Environment and Water webpage to access the National Heritage List

- https://www.dcceew.gov.au/parks-heritage/heritage/places/national-heritage-list

~~3.6.2.2 Application Requirements~~Development application requirements

~~a Proponents are to consult with Council before applying to carry out any works to buildings or sites which are listed as heritage items, are in the vicinity of a heritage item, or which are within a Heritage Conservation Area. A development application for works on or in the vicinity of a heritage item or Heritage Conservation Area may need to be accompanied by any of the following:~~

~~i Due Diligence Assessment for Aboriginal Objects http://www.environment.nsw.gov.au/resources/cultureheritage/ddcop/10798ddcop.pdf~~

~~ii Statement of Heritage Impact http://www.environment.nsw.gov.au/resources/cultureheritage/ddcop/10798ddcop.pdf~~

~~iii Conservation Management Plan;~~

~~iv Demolition Report;~~

~~v Plans for appropriate alteration/additions and/or replacement building;~~

~~vi Archival Record http://www.environment.nsw.gov.au/resources/heritagebranch/heritage/infoarchivalrecords.pdf~~

Under Clause 5.10 of the CCLEP 2022 and Clause 5.36 of the Regional SEPP, development consent is required for works with the potential to impact the significance of a heritage item, including its fabric, setting and views.

The name of a heritage item will usually identify the things that are part of the heritage significance of the item – for example, "House, front garden and front fence". More information about the significance of a heritage item can be found in the State Heritage Inventory listing for the item (refer link below). Additional assessment may be required to understand the significance of the item.

Definitions

Cultural significance means aesthetic, historic, scientific, social or spiritual value for past, present or future generations. Cultural significance is embodied in the place itself, its fabric, setting, use, associations, meanings, records, related places and related objects

Fabric means all the physical material of the place including elements, fixtures, contents and objects.

Setting means the immediate and extended environment of a place that is part of or contributes to its cultural significance and distinctive character.

State Heritage Inventory

The State Heritage Inventory holds records for most heritage items in NSW. This can include information about the item's historical context, a physical description, assessment of significance, and/or management recommendations.

Refer to the NSW Environment and Heritage webpage for more information on the State Heritage Inventory:

- https://www2.environment.nsw.gov.au/topics/heritage/search-heritage-databases/state-heritage-inventory

Where development is proposed to land that is a heritage item, the development application must include a heritage management document that addresses the potential impacts of the proposed development on the significance of the heritage item/s concerned. Typically, this will take the form of a:

- **Heritage Impact Statement** (HIS), also referred to as a **Statement of Heritage Impact** (SOHI)

Depending on the nature of the development and the heritage item or area involved, additional heritage management documentation may be required, such as:

- a Conservation Management Plan (CMP);
- a Heritage Asset Action Plan (HAAP);

- an Archival Record; or
- a Schedule of Conservation Works.

Further information on development application requirements and guidelines for the preparation of Heritage Impact Statement are included at 3.6.7 Additional Information.

Development involving heritage items listed on the State Heritage Register

Works to heritage items that are listed on the State Heritage Register (SHR) are subject to approval requirements under the Heritage Act. Development to SHR-listed items that requires both consent from Central Coast Council and approval from Heritage NSW, is referred to as 'integrated development.' For integrated development, a Statement of Heritage Impact, prepared in accordance with the *Guidelines For Preparing Statements of Heritage Impact* (Department of Planning and Environment 2023), must be submitted with the development application. Council will refer the development application to Heritage NSW.

Refer to the Heritage NSW website for approval requirements for items on the State Heritage Register:

- https://www2.environment.nsw.gov.au/topics/heritage/apply-for-heritage-approvals-and-permits/state-heritage-register-items

3.6.4.1 General requirements for development to heritage items

OBJECTIVES	
O1	To conserve the significance of heritage items, including form, scale, character, fabric, setting, and key views to and from the item.
O2	To ensure that change to heritage items is appropriate to their significance.
REQUIREMENTS	
R1	Development must have regard to the Burra Charter principle of 'do as much as necessary to care for the place and to make it useable, but otherwise change it as little as possible so that its cultural significance is retained.'
R2	Development must not alter the significant form, scale, style, and details of the heritage item.
R3	Development must retain significant fabric. Where it is not possible to retain fabric: ▪ changes to significant fabric must be minimised and reversible, where possible; or, ▪ restoration or repair to the significant fabric must be undertaken using appropriate materials and methods, and must be based on historical or physical evidence.
R4	Development must retain significant settings and views to and from the heritage item.

R5	New works to heritage items, including additions and alterations, must be: ▪ subservient in scale to the heritage item; ▪ located away from primary elevations to the rear of the existing building form; ▪ located away from highly intact or significant areas; and ▪ designed and located so that they do not detract from the aesthetic significance of the item.
R6	New decorative elements must be appropriate to the style and period of the heritage item, and must based on documentary or physical evidence.
R7	New development should include the removal of any unsympathetic elements, especially where substantial changes are proposed to a heritage item and the reversal will provide an improved heritage outcome.
R8	Servicing, fire safety or BCA compliance upgrades for a new use must not impact on the heritage significance of the item.
R9	Development applications involving a heritage item must be accompanied by a **Heritage Impact Statement** that addresses the impacts of the development on the item(s) involved.
R10	Development involving State Heritage Register items must be undertaken in accordance with the relevant provisions of the Heritage Act.

~~3.6.6 SUBDIVISION~~

~~3.6.6.1~~3.6.4.2 Subdivision and Site Consolidation ~~of a Heritage Item~~

Read in conjunction with:

- Chapter 2.4 Subdivision

The cadastral lot boundary of a heritage item usually corresponds to its curtilage – the area of land that is protected by heritage controls. However, some heritage items may have an expanded curtilage (more than one cadastral lot) or a reduced curtilage (part of a cadastral lot).

Definition

curtilage, in relation to a heritage item or conservation area, means the area of land (including land covered by water) surrounding a heritage item, a heritage conservation area, or building, work or place within a heritage conservation area, that contributes to its heritage significance.

Examples

The curtilage of this heritage item (shaded in brown) includes the dwelling, and associated garden, plantings and landscaping elements.

The curtilage of this heritage item (Hardys Bay Wharf and timber toilet blocks, I67; shaded in brown) is specific to the footprint of the significant structures, and is not tied to allotment boundaries.

Development applications for subdivision and site consolidation involving a heritage item must address the impacts of the development on the significance, curtilage, and setting of the heritage item from both the subdivision/site consolidation. The development application must also address the impacts of future development resulting from the subdivision/site consolidation.

It is important to note that the subdivision or site consolidation of a heritage item does not change the heritage curtilage – it does not remove the heritage listing on any part of the land. The altering of a heritage curtilage requires an amendment to the relevant environmental planning instrument (the CCLEP 2022 or the Regional SEPP), which can only be approved through a Planning Proposal.

~~Subdivision applications for land either in the vicinity of or on which heritage items are situated shall be accompanied by adequate plans, showing the building envelopes, siting and setbacks of the proposed buildings, and shall demonstrate to Council's satisfaction that:~~

~~a The subdivision does not adversely affect the cultural significance of the heritage item;~~

~~b Evidence of the historical setting, landscape and subdivision pattern can be recognised and/or retained;~~

~~c The allotment and building spacing, that is, frontage widths, side and front boundary setbacks, are typical so that vistas and views to, and of, heritage items, especially the principal elevations of buildings, are not interrupted or obscured and so that the setting of the heritage item and a satisfactory curtilage, including important landscape and garden elements, are retained;~~

~~d The scale and form of proposed new construction or buildings is compatible with and does not detract from the significant heritage characteristics of the items;~~

~~e The subdivision will not require rearranged vehicular access and car parking (on or off the site of the proposal), that would adversely affect the principal elevation of the heritage item.~~

~~3.6.6.2 Heritage Items within consolidated development sites zoned medium to high density~~

~~The following controls apply for consolidated sites that include a heritage item:~~

~~a Consolidated development sites that include heritage items are to provide for conservation works to the building and its setting as part of the redevelopment;~~

~~b The distance or setback of a new development from the heritage items is to consider the curtilage and setting of the items and informed by a conservation management. The following item is defined as a planning matter pursuant to the *Local Government Act, 1993* and EP&A Act, 1979;~~

~~c Buildings, structures and garden settings that contribute to the significance of the heritage item are to be retained and sensitively incorporated into the development proposal;~~

~~d New buildings to be articulated to respond to the significance of heritage items to achieve an appropriate transition in height, bulk and scale;~~

~~e Where appropriate the front setback of the new development is to be greater than that of the heritage item;~~

~~f Key views to and from the heritage item are to be conserved as part of the development.~~

OBJECTIVES	
O1	To ensure that subdivision or site consolidation retains the significant curtilage and setting of heritage items.
O2	To ensure that subdivision or site consolidation enables future development that is sympathetic to, and does not detract from, the significance and setting of heritage items.
O3	To ensure that subdivision or site consolidation enables development that respects the established streetscape and the historical patterns of subdivision.
O4	To ensure that subdivision or site consolidation enables historical boundaries to be interpreted.
REQUIREMENTS	
R1	Subdivision or site consolidation must retain all significant elements on the same allotment to protect the relationship between each significant element.
R2	Subdivision or site consolidation must not visually or physically disconnect the heritage item from its original street frontage.
R3	Subdivision or site consolidation must: i. retain an adequate area around the heritage item to retain existing views to primary frontages/elevations, i.e. front/street facing elevations or side elevations; and ii. retain an appropriate setback to all building frontages.
R4	Subdivision or site consolidation must ensure new development respects the established streetscape and the historical patterns of subdivision.

R5	Subdivision or site consolidation involving a heritage item must provide for the item's ongoing use and conservation.
R6	Development applications for subdivision or site consolidation involving a heritage item must include, at a minimum, the building envelope and footprint of the intended development.
R7	Development applications must have regard to the provisions of 3.6.6 Development in the Vicinity of Heritage.
R8	Development applications involving consolidated development sites zoned medium-to-high density that include a heritage item(s) must include: ▪ a Conservation Management Plan or Strategy, and ▪ an Interpretation Plan.

~~3.6.3.12 Adaptive Re-use~~3.6.4.3 Change of use

The original or historic use of a heritage item is usually associated with its significance. Changes of use of heritage items from the originally intended use should only happen when there is no viable option for its ongoing historic use. Development that changes the use of a heritage item must consider impacts on the significance of the item.

Works required to modify a heritage item to a new use are known as adaptive reuse. Adaptive reuse may be considered where the existing use of an item is no longer viable, for example, the adaptation of a former residential building to a commercial use. The adaptive reuse of a heritage item must have regard to the controls for Internal Works (3.6.4.4) and Alterations and Additions (3.6.4.5).

Additional supporting documentation or documentation required as a condition of consent for development applications involving change of use may include:

- Interpretation Plan
- Conservation Management Plan
- Conservation Management Strategy

Conservation incentives

Clause 5.10(10) of the CCLEP 2022 and Clause 5.36(10) of the Regional SEPP provides for development involving a heritage item that would otherwise not be allowed by other provisions of the LEP. This could include the introduction of a non-permissible use. To be eligible, the development proposal must meet all requirements of the Clause. Consult with suitably experienced heritage professional to determine whether Clause 5.10(10) (or Clause 5.36(10)) is applicable to your development.

~~a Any proposal involving the adaptive reuse or change of use of a heritage item is to demonstrate that:~~

~~i the new use requires minimal alterations to significant fabric and building elements, and that any changes to these are reversible or have minimal impact on the heritage significance of the item;~~

~~ii alterations and/or additions required to support the new use do not obscure the understanding of the building's significant use;~~

~~iii the significance of the place can be interpreted;~~

~~iv any internal changes do not compromise the heritage significance of the external appearance of the building or any significant internal elements;~~

~~v the introduction of new services will not have a detrimental impact on significant fabric or spaces; and~~

~~vi the new use is consistent with the management recommendations provided in the Heritage Inventory Assessment Report.~~

~~b The significant use of the building should be interpreted on site. Interpretation of the significant use may include the use of historic artefacts, retention of historic internal layouts, the in situ retention of machinery and signage, or artistic interpretation.~~

~~c Reinstatement of lost heritage significant fabric (e.g. windows, decoration, verandahs, garden elements etc.) is encouraged.~~

~~d Changes to fabric should be reversible, where possible, and their effect on the heritage fabric and other characteristic features should be minimised. Non-reversible changes to a heritage item will only be considered where there is no alternative way of retaining the place as a viable asset. New work is to be identifiable as such.~~

~~a New additions and adjacent or related new construction will be undertaken in such a way that, if they are removed in the future, the essential form and integrity of the place is unimpaired.~~

OBJECTIVES	
O1	To ensure that significant or original uses of heritage items are retained unless no longer viable.
O2	To ensure that new uses are sympathetic to the heritage significance of heritage items.
O3	To ensure that the adaptive reuse resulting from change of use does not adversely impact the significance of heritage items.
REQUIREMENTS	
R1	Evidence of significant or original uses must be retained in the form, fabric, and layout of the heritage item.
R2	New uses must be consistent with any management recommendations or policies included in the inventory sheet for the heritage item.
R3	Changes to significant fabric to accommodate new uses must be minimised and reversible where possible, including the introduction of new services and compliance with the BCA.
R4	Changes to accommodate new uses must have regard to the provisions for Alterations and Additions at 3.6.4.4.
R5	Development applications for the change of use of a heritage item must demonstrate how the former use will be interpreted.

R6	Development applications that seek to use Clause 5.10(10) to introduce a new use must be accompanied by a heritage management document (such as a Conservation Management Plan or Conservation Management Strategy), which must be approved by the consent authority.

Example

The Chapman Building in Wyong is a good example of sympathetic adaptive reuse.

The building is listed as a local heritage item on the CCLEP 2022. The building's historic use was as a retail store.

This significant use was retained, and part of the item was converted to a café. The adaptive reuse of the item restored and conserved original and significant fabric, while ensuring its ongoing use and appreciation by the community.

~~3.6.3.5.10~~ 3.6.4.4 Internal Works

~~Development consent is needed for structural changes to the interior of heritage items. Alterations to the room layout of heritage items are to ensure that the original room configuration remains discernible and can be interpreted.~~

The internal layout and fabric of a heritage item can be a key contributor to its significance. It can relate to historic or former uses, demonstrate original architectural details and features, and provide evidence of the building's use over time.

OBJECTIVES	
O1	To retain significant internal fabric and layout of heritage items.
O2	To ensure that internal works are sympathetic to the significance of heritage items.
REQUIREMENTS	
R1	Internal works must not adversely impact significant architectural details, finishes, fittings, and elements.
R2	Internal works must avoid impacts to significant fabric, and must be reversible where possible.
R3	Alterations to the room layout of a heritage item must ensure that the original room configuration remains discernible and able to be interpreted.

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~~3.6.3.5~~ 3.6.4.5 Alterations and Additions

Alterations and additions include changes to the interior or exterior of a heritage item to accommodate its ongoing or new use. This may include adaptive reuse, the introduction of new bathrooms or kitchens, installation of new services, or the construction of extensions or additions.

Development consent is required to alter the exterior of a heritage item, including, in the case of a building, making changes to its detail, fabric, finish, or appearance. Alterations and additions to a heritage item are usually acceptable if they retain the significant form, scale, fabric, original details, and setting of the heritage item. New works to heritage items should be located in areas that are not original or have already been altered. The key objective is to retain all the elements that contribute to the significance of the item.

~~a Alterations and additions to heritage items should:~~

~~i avoid changes which distort the significance of the place or falsify evidence of its history. New work should not mimic the original or significant fabric and should be discernible as new work;~~

~~ii consider the contribution of all periods of development or use to the heritage significance of a place and provide justification where significant elements are to be removed;~~

~~iii avoid addition of new features on the front facades of buildings, or which obscure the view of the item from a public place;~~

~~iv ensure changes to fabric are reversible where possible and their effect on the heritage fabric and other characteristic features is minimised;~~

~~v ensure an appropriate setting is maintained;~~

~~vi ensure structures are retained in their present location where the location contributes to the significance and interpretation of the heritage item. If a structure does not have strong association with its present site or location Council may consider removal to be appropriate;~~

~~vii ensure where possible, extensions are located to the rear and are sympathetically designed.~~

~~3.6.3.5.1 Roofs~~

~~a New buildings should have roofs that are sympathetic with the size, shape, pitch, height, bulk and materials of the existing roof.~~

~~b Roofs of extensions should relate to the existing roof in materials, shape and pitch, replacement materials shall match existing or use approved alternatives.~~

~~c Roof additions should generally be confined to the rear of the existing building and should not alter the essential form and character of single storey buildings.~~

~~d Dormer windows to attic rooms are generally inappropriate unless these cannot be seen from the street. Windows of suitable scale to gable ends and gablets and in-plane flat skylights are generally acceptable on rear faces of roofs and where these will not be visible from the street. Dormer windows or gablets are only suitable for styles up to the Federation era and should not be excessively large for the roof surface relative to the main roof form or differ in pitch to the existing roof and should generally be located to the rear.~~

~~e Attic rooms in extensions shall be generally contained within the existing roof form and must not form a dominant feature visible on the principal elevations.~~

~~f A habitable attic room may be created providing the existing roof volume is sufficiently large and the roof profile is generally maintained.~~

~~g Commercial buildings or mixed use buildings roofs should be gabled, hipped or hidden from the street by parapets. Where there is no parapet roof pitch shall be similar to the significant streetscape.~~

~~h Retain and restore parapets to existing commercial buildings where they exist.~~

~~i Packaged air conditioners and mechanical exhaust fans and grills shall not be placed on street facades or on any part of the building that can be seen from the street.~~

~~j Skylights, solar heating panels, satellite dishes and other non-traditional elements are considered to be intrusive and should not be located where visible from the street and other public spaces.~~

~~3.6.3.5.2Basement Addition~~

~~a Before initiating any basement additions, carefully consider the type of materials to be removed, access for machinery and equipment, the removal of piers and installation of alternative supporting structures, drainage and the possible need for retaining walls. Care must be exercised to ensure adequate underfloor cross ventilation and to avoid water seepage or rising damp. Engineering advice is recommended and will probably be required.~~

~~b Additional considerations include the placement of stairs and their effect on other areas of the house, the appearance of new windows and exterior doors which should be designed in terms of the overall appearance of the building and retention of most of the original foundation.~~

~~c Due to its constraints, this form of addition is not highly recommended though sometimes garages can be accommodated in undercroft areas.~~

~~d Ensure archaeological sites or potential archaeological sites are not adversely affected by the proposed development.~~

~~3.6.3.5.3 Doors and Windows~~

~~a Where possible, retain and repair/restore original doors and windows. Authentic reconstruction using similar material to the original is encouraged where repair of the original doors and windows is not possible.~~

~~b Original leadlight and coloured glass panes should be kept.~~

~~c Modern aluminium windows are generally not permissible.~~

~~d The design of windows and doors in new development should be drawn from traditional characteristic door and window patterns.~~

~~e Replacement windows and doors must match the original characteristic pattern and materials.~~

~~f New doors and window openings should reflect the existing style, size, proportion, position and where possible match all sill and head heights of existing doors and windows.~~

~~3.6.3.5.4 Walls~~

~~a Alterations of the form and materials of principal elevations are not favoured. Removal of the external skin or rendering of exterior walls is not favoured unless associated with acceptable reconstruction works and unpainted surfaces should not be painted.~~

~~b Matching materials shall be used in repairing the fabric of external surfaces.~~

~~c New development shall use materials similar to or compatible with that of the original building.~~

~~3.6.3.5.5 Wing Addition~~

~~a Wing additions must be added at the side or rear of the building in a manner which minimises disruption to the main elevation and the streetscape. Wing additions must not compromise the heritage significance or interpretation of the place.~~

~~b The size and slope of the land and the form of the house will usually dictate the location of the wing, which is generally better suited to asymmetrical buildings.~~

~~c Where the original design produced an irregular plan and roof shape, an additional wing, gablet or dormer to one side may reinforce this theme. The additions should:~~

~~i not be located in the same elevation plane as the original work;~~

~~ii not project forward of the main façade and may ideally be setback behind the main façade a distance equivalent to the depth of the front setback.~~

~~d Side additions should not remove the possibility of car access to the rear of the site unless there is alternative rear lane access.~~

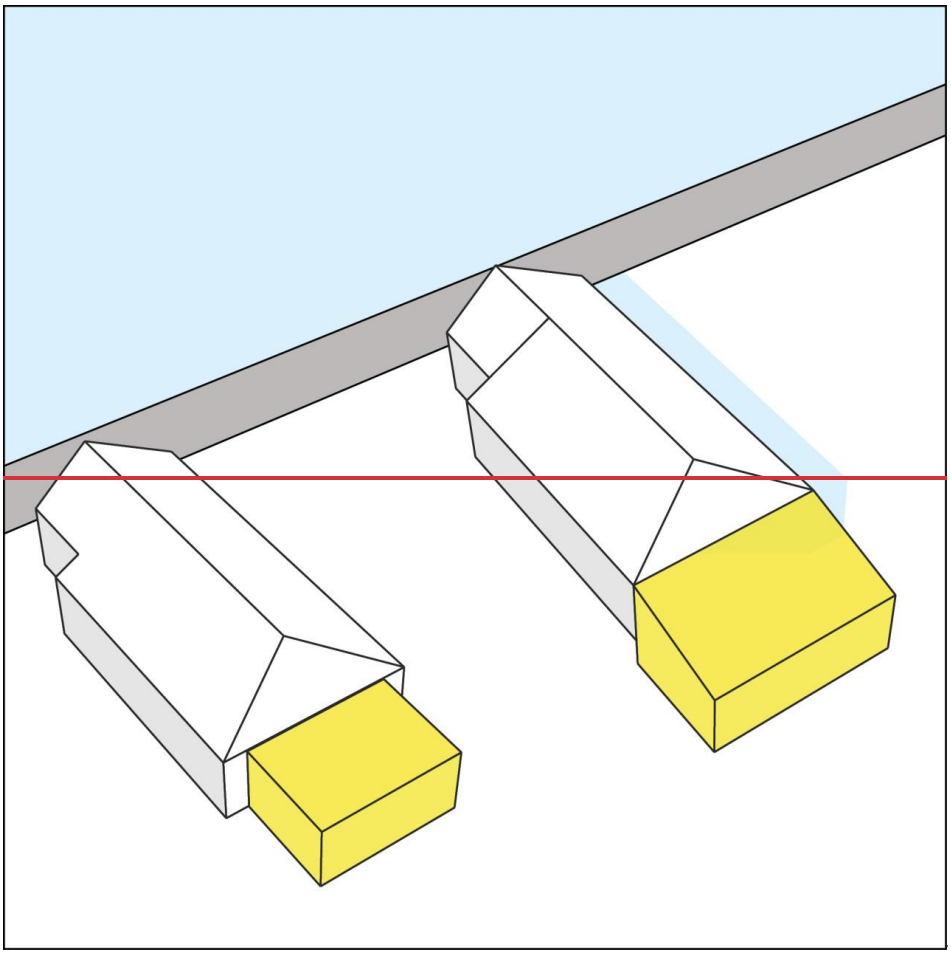
~~e The existing roof form and pitch should be repeated and new detailing should reflect the gables, hips, eaves, ventilation, window hoods and other projections of the main roof.~~

~~3.6.3.5.6Lean-To Addition~~

~~a Where lean-to additions are constructed at the rear and are not visible from the street, materials should be sympathetic with the significant building or building elements but need not match the original.~~

~~b The size of the lean-to addition will be limited by the need to provide adequate head height, depending on land slope.~~

~~c Light access can be improved with a lean-to addition by adding gablets or skylights to the rear face of the roof.~~



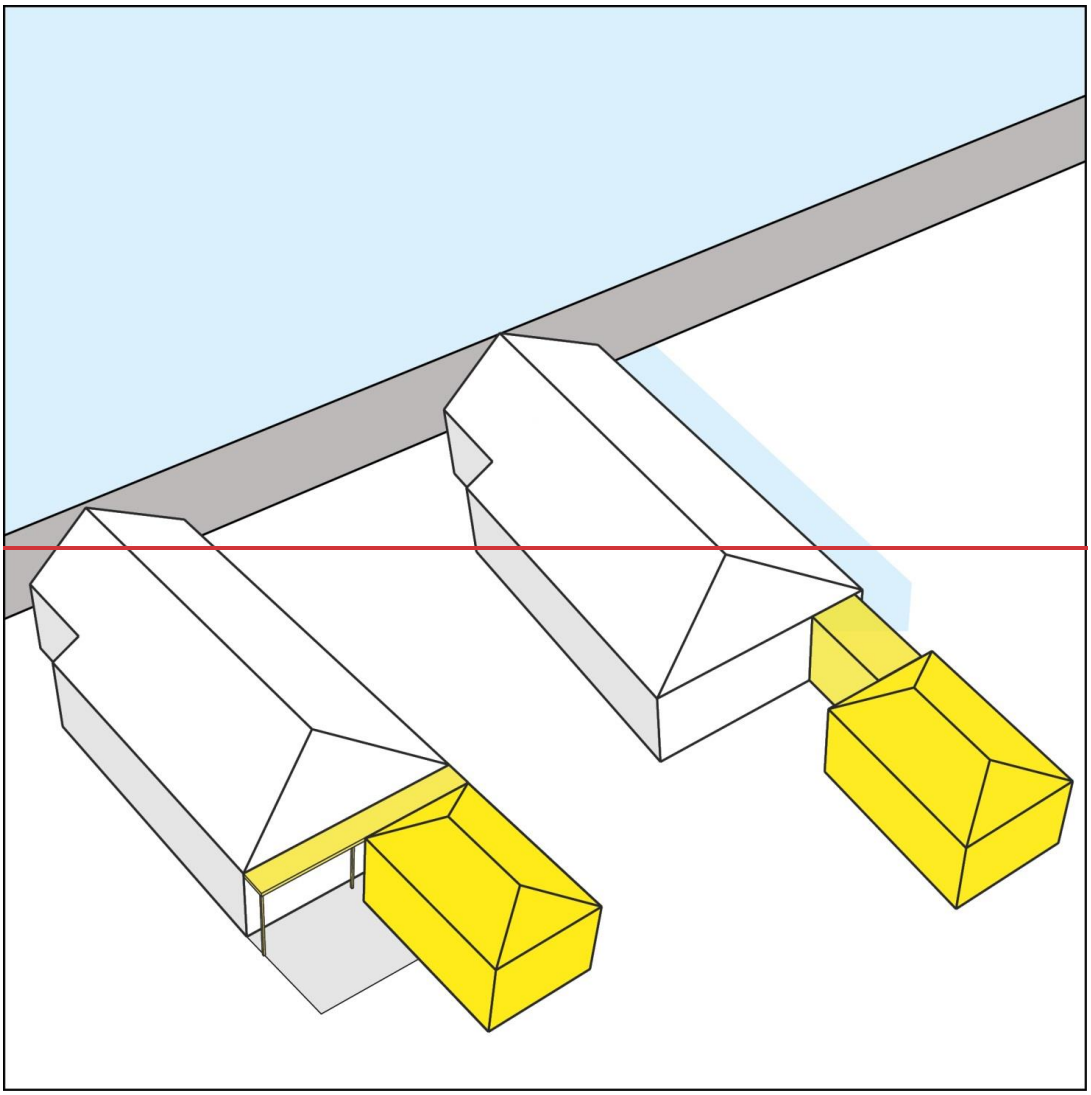
~~Figure 1Examples of appropriate lean-to additions~~

~~3.6.3.5.7 Pavilion Addition~~

~~a A pavilion addition involves constructing a separate block element which may repeat the general form of the original house. A pavilion addition may be an appropriate design solution where the original design would be diminished by a lean-to or wing addition, or where the use of either of these would result in the loss of natural light or views.~~

~~b Pavilions may be connected to the main building by a breezeway or small utility area, such as a laundry or bathroom.~~

~~c Pavilions may be an appropriate design solution for long and/or narrow allotments and can be functionally integrated with landscaping to provide internal courtyards.~~



~~Figure 2Examples of appropriate pavilion additions~~

~~3.6.3.5.8 Chimneys and Other Roof Structures~~

~~a All chimneys should be retained internally and externally and, where necessary, repaired, even if the fire place is no longer used: demolition of chimneys is not favoured unless necessary for critical structural reasons and preceding construction.~~

~~Skylights or other structures attached to the exterior roof, such as solar hot water heaters, ventilators, satellite dishes and the like, shall not be located where visible on the principle elevations of buildings.3.6.3.5.11 Window Sunhoods, Blinds, Awnings, Skirts~~

~~In altering heritage houses, original sunhoods, blinds, awnings and skirts should be retained and repaired. Authentic construction or reconstruction is supported.~~

~~3.6.3.5.13 Verandahs~~

~~a Removal of verandahs is not favoured. Authentic construction or reconstruction is supported.~~

~~b In altering existing buildings, original verandahs should be kept, repaired and respected. Additional verandahs should not compete with the importance of the original and should be simple in design.~~

~~3.6.3.8 Architectural Elements~~

~~a Original characteristic architectural elements are to be retained. Alterations to these elements or the use of materials or the adaptation for access for example, should be sympathetic. Architectural styles which detract from this character will not be permitted.~~

~~b The reinstatement of original characteristic architectural elements that have been removed is encouraged. Where a building is part of a "set", other, more intact, buildings in that set can provide guidance as to appropriate reinstatement works.~~

~~c Alterations and additions to buildings within a 'set' are not to diminish the coherency of that set.~~

~~d Maintenance, reinstatement work and alterations and additions to existing buildings is to be of a material matching the original construction.~~

~~e Individual architectural features are not to be removed or obscured.~~

OBJECTIVES	
O1	To ensure that alterations and additions are sympathetic to the significance of heritage items in terms of scale, form, massing and character.
O2	To ensure that alterations and additions retain significant fabric, form, and features of heritage items.
O3	To ensure that the design and siting of alterations and additions are sympathetic to the character and setting of heritage items.
O4	To ensure that alterations and additions do not adversely impact the significant views to and from heritage items.
REQUIREMENTS	
R1	Significant architectural detailing (doors, windows, verandahs, sills, chimneys etc) must be retained. If these are required to be replaced due to poor condition, they must be replaced like-for-like.
R2	Alterations and additions must not significantly alter the primary or significant frontages of the heritage item, except to remove detracting features.
R3	Notwithstanding the above, the reconstruction or restoration of significant architectural features or detailing (such as verandahs or windows) is encouraged. This must be based on adequate historical and/or physical evidence.
R4	Alterations and additions must not significantly alter the primary or significant roof form of the heritage item, except to remove detracting features.
R5	Alterations and additions must be located at the side or rear of the property and must be set back behind the existing building line (refer Figure 1 below).

R6	Alterations and additions should not alter the scale of the original building when observed from significant viewpoints, as determined by the setting of the item (refer Figures 2 and 3 below).
R7	Alterations and additions must be sympathetically designed, and complementary to the scale, form, massing and character of the heritage item.
R8	Alterations and additions must not adversely impact significant garden and landscape features.

Guidance for alterations and additions

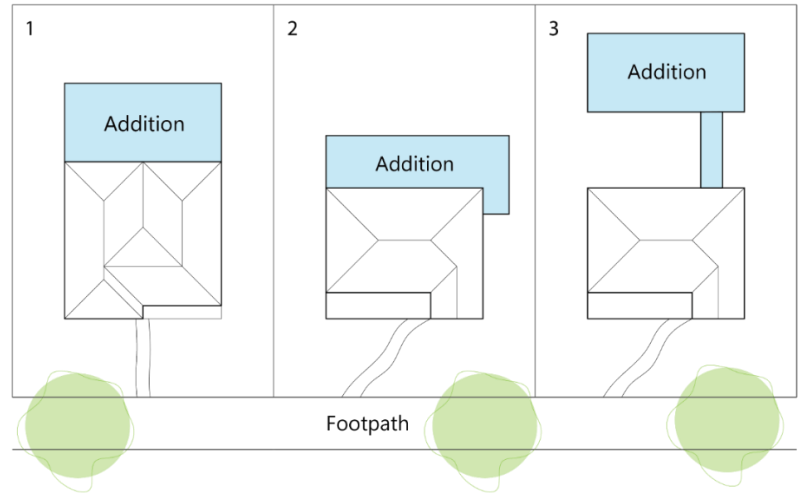
Figure 11

Additions to these dwellings are sensitively designed and sited.

Dwelling 1: rear addition equal in width to the original dwelling.

Dwelling 2: rear addition slightly wider than the original dwelling. Where the addition extends out from the original dwelling, it is set back suitably behind the existing building line.

Dwelling 3: rear pavilion addition, separated from the original dwelling and linked by a narrow passageway.



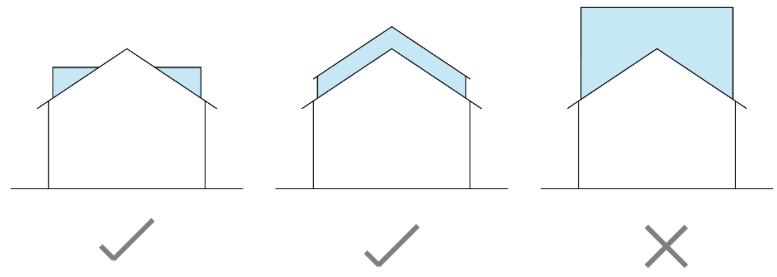


Figure 2

Rear additions that extend above the roof height of the original dwelling may be acceptable where they do not dominate or overwhelm the heritage item.

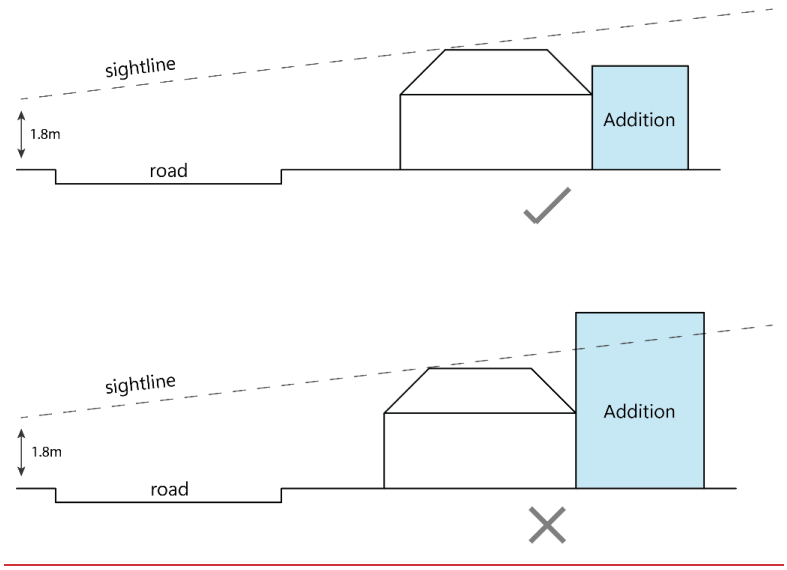


Figure 3

The addition in the top example is acceptable, as it is lower in height than the original building and is not visible from the street frontage.

The addition in the bottom example is not acceptable, as it is significantly higher than the original building, and is highly visible from the street frontage.

~~3.6.3.6 Colour Schemes and Materials~~3.6.4.5.1 Materials, finishes and paint schemes

The materials, finishes, and paint schemes of a heritage item often contribute to its significance, through association with historic uses, architectural styles, and contribution to its aesthetic value.

Methods of maintenance and repair for historic building fabric may differ from contemporary standards. Works involving building materials, finishes and painting must be guided by heritage conservation and maintenance best practice, such as the Heritage NSW technical guides.

~~The following requirements apply to development that proposes changes to the material, colour, texture or finish of a heritage item:~~

~~a Details of the proposed colour scheme are to be provided with the Development Application.~~

~~a Applicants are to demonstrate how colour selection has been informed by original finishes and colours; paint scrapings and early photographs may enable building owners to approximate early or sequential and appropriate colour schemes.~~

~~b Materials are to be used in building elements that reflect their characteristic usage, e.g. stone for foundations.~~

~~c Rendering and/or painting original face bricks and sandstone is not permitted, unless evidence is submitted to Council that their condition has been irreversibly altered.~~

~~d Applicants should refer to the commercial ranges of 'traditional' or 'heritage' colours from major paint suppliers to assist in selecting authentic colour schemes.~~

~~e Applicants should ensure that new finishes are compatible with the existing substrate and prior applied finishes. The following Heritage Council publication is to be consulted: *Maintenance Series 7.2: Paint*~~

~~*Finishes; researching and uncovering authentic paint schemes and how to conserve them*. This is available for download from www.environment.nsw.gov.au/heritage/publications/~~

~~f Historic Colour Scheme Characteristics – the following descriptions provide guidance to applicants on the characteristic colour schemes of heritage building types of a particular era and should be referenced when proposing changes to materials and colour schemes:~~

~~i *Vernacular Rural Buildings: 1880 – 1900* – Generally painted weatherboards, galvanised iron walls and roofs with pink beige and buff timber, unpainted brick and stone and unpainted sheet iron. Windows were generally cream with red or green frames;~~

~~ii *Federation and Edwardian era: 1900 - 1915* – Unpainted face brick walls and sandstone foundations. Pressed red brick or red-ochre dressed front elevations. Polychromatic brickwork including contrasting blues or buffs for arched lintels and string courses. Cheaper, variable common bricks were used for the lesser elevations. Strong colours used in trims, timberwork painted in a light colour;~~

~~iii *Inter War: 1915 - 1930* – The Bungalow dominated housing with lower sections, below eaves or window sills, face brick with upper sections roughcast or shingled gable. Exteriors used no more than two colours with a green or red contrasted with a pale cream, off white or beige;~~

~~iv *Art Deco and Modern style* buildings, particularly commercial premises were predominantly either natural materials such as brick and stone with strong horizontal and vertical courses and mouldings, or rendered facades in white and off white with pale colours to contrast the applied mouldings.~~

OBJECTIVES	
O1	To retain original or characteristic materials, finishes, and paint schemes on heritage items.
O2	To ensure that new materials, finishes, and paint schemes are sympathetic to heritage items.
REQUIREMENTS	
R1	Significant original external finishes and materials of the heritage item are to be retained, restored, and respected.
R2	Original materials, finishes and paint schemes must not be removed.
R3	Existing face brick or masonry surfaces must not be rendered, painted or otherwise coated.
R4	Repainting of existing painted surfaces must utilise appropriate paint type and colour.
R5	New colour schemes must be appropriate to the style and period of the heritage item, and must not obscure or detract from architectural details.
R6	Materiality of new work must be complementary to the materials and style of the heritage item.

Materiality, finishes and paint schemes are often characteristic to a particular architectural style or period. For example, the fibro-cement sheeting and face-brick foundation of the heritage item at left is typical of Post-War lakeside development in the Central Coast; while the painted weatherboard sheeting to the heritage item on the right is typical of early twentieth century buildings.

3.6.4.5.2 Services

New services may include skylights, solar panels, battery storage, air conditioners, mechanical exhaust fans and grills, and other non-traditional elements. These may be desired to accommodate contemporary living standards or building use, and improve sustainability outcomes.

Refer to *Sustainable heritage buildings guide* (Department of Climate Change, Energy, the Environment and Water 2024) for more information regarding the introduction of services to heritage items.

OBJECTIVES	
O1	To ensure that the introduction of new services is sympathetic to significance of heritage items.
O2	To ensure that new services do not adversely impact significant fabric, setting, and views of heritage items.
REQUIREMENTS	
R1	New services must be located and arranged to be as visually recessive as possible.
R2	Solar panels must not be located on front or street-facing roof planes.
R3	Introduction of new services must not detract from, damage, or otherwise adversely impact architectural detailing or building elements (such as verandahs, chimneys or parapets).
R4	Impacts to building fabric (including walls, roofs) must be minimised and reversible where possible.

R5	Development applications must demonstrate that the building is capable of taking the weight of the new equipment.

3.6.4.6 Gardens, plantings and landscaping

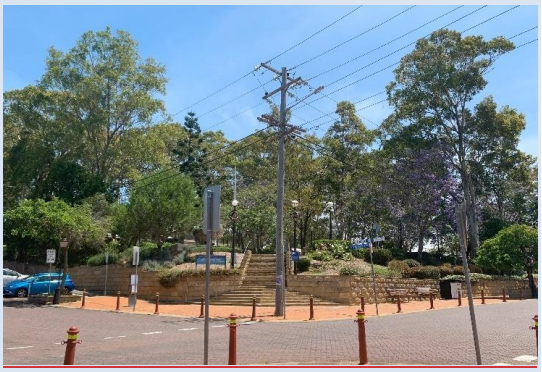
~~**3.6.3.5.12 Garden Elements including Paving and Driveways**~~

Read in conjunction with:

- Chapter 3.5 Tree and Vegetation Management

Gardens, plantings, or landscaping features within the curtilage of a heritage item form part of its immediate setting, and may contribute directly or indirectly to its significance. These can include original pathways or paving, driveways, garden beds, significant trees associated with the development of the item, and natural rock outcrops. Significant garden or landscaping features may be identified in the item name as listed on Schedule 5 of the CCLEP 2022 (or Schedule 9 of the Regional SEPP), or in the State Heritage Inventory listing sheet for the item. Additional assessment may be required to determine the contribution of garden and landscaping features to the significance of the item.

This item is identified as 'Cottage and garden' on the CCLEP 2022. The garden directly contributes to the significance of the item.



The plantings, trees and landscaping of Wyong Town Park contribute to the setting of its heritage listed buildings and contributes to its landmark qualities.

~~a Surviving original garden elements should be retained, repaired and maintained. Appropriate reconstruction of lost garden elements is encouraged.~~

~~a Garden design elements and plant species should, where possible, apply the same style as the established gardens within the grounds (curtilage) of the item.~~

OBJECTIVES	
O1	To retain and conserve significant gardens, plantings, and landscape features of heritage items.
O2	To ensure that new gardens, plantings and landscape features do not adversely impact significant fabric, setting and views of heritage items.
REQUIREMENTS	

R1	Significant gardens, plantings and landscape features must be retained, repaired, and maintained.
R2	New gardens, plantings, and landscape features must be sympathetic to the form, scale, style, and setting of the heritage item and must not impact significant views to and from the heritage item. High, solid hedges that screen buildings from the street are not permitted.
R3	New garden, planting, and landscape features must not adversely impact the health and longevity of significant or mature vegetation.
R4	New gardens and landscape elements must be horticulturally and stylistically sympathetic to the heritage item.

3.6.4.7 Fencing

~~3.6.3.5.12 Fences~~

Read in conjunction with:

- Chapter 2.1 Dwelling Houses, Secondary Dwellings and Ancillary Development
  - 2.1.7.4 Fencing
- Chapter 2.2 Dual Occupancy and Multi Dwelling Housing
  - 2.2.10.4 Fencing
- Chapter 2.3 Residential Flat Buildings
  - 2.3.9.4 Fencing

Fencing provides a visual and physical boundary to a heritage item, and can enhance or detract from the setting and views of a heritage item. Existing fencing may be original fabric to the existing building, or may be associated with an earlier building or use of the property.

~~a Original fences are to be retained and repaired where possible.~~

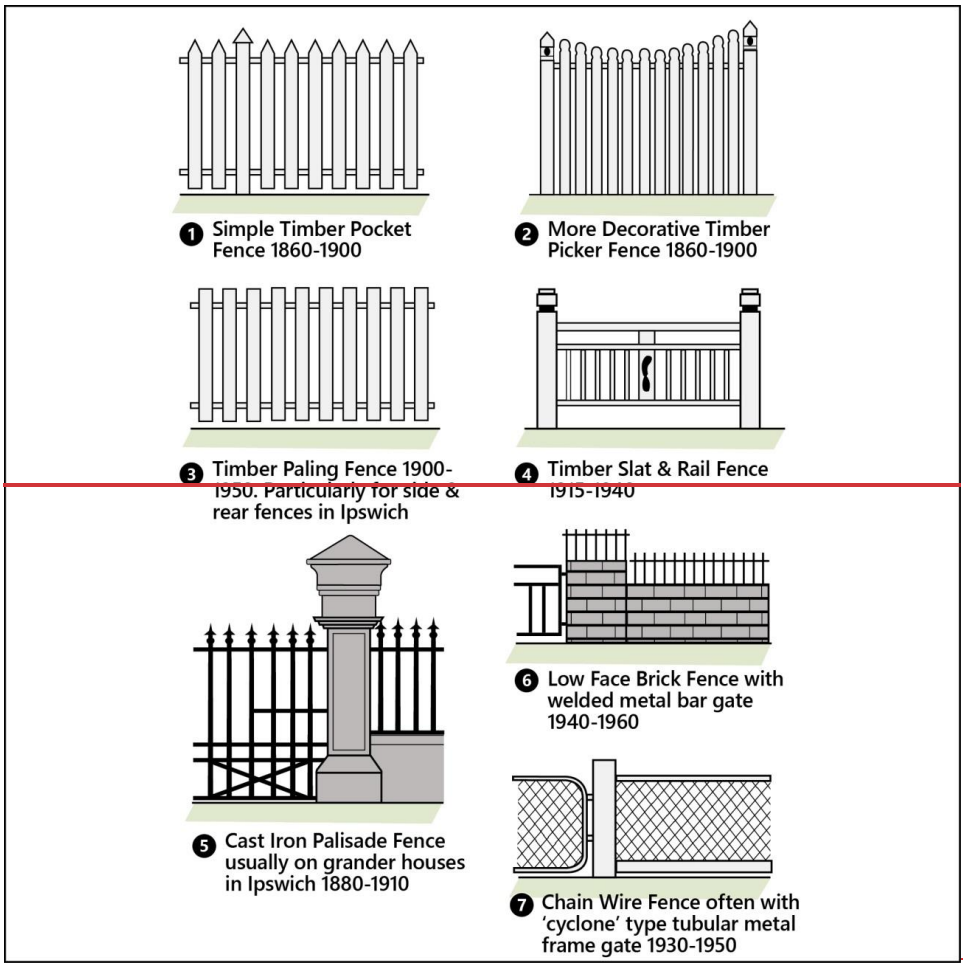
~~b Fence details should be simple rather than complex and match the style of the house.~~

~~c Open or partially transparent fence styles such as picket or palisade fences are to be no higher than 1200mm with posts and piers no higher than 1500mm along the primary street frontage.~~

~~d New solid fences of any material on front alignments are generally not acceptable.~~

~~e Solid masonry fences no higher than 900mm in height above footpath level (excluding the height of any retaining wall) are acceptable where this matches the built form appropriately.~~

~~f New side and rear fences are to be no higher than 1800mm.~~



~~**Figure 3 Typical fence picket details**~~

OBJECTIVES	
O1	To retain and conserve significant original fencing.
O2	To ensure that new fencing is sympathetic to the significance of heritage items.
O3	To ensure that new fencing does not adversely impact significant fabric, setting, or views of heritage items.
REQUIREMENTS	
R1	Significant fencing must be retained and repaired.
R2	Replacement may be permitted where it can be demonstrated that the fence is beyond repair. Replacement must match the original in design, height and materiality.

R3	New fencing must adhere to the maximum heights specified in Chapter 2.1.7.4: ▪ Front boundary fencing – maximum height of 1.2 m. ▪ Side and rear fencing – maximum height of 1.8 m.
R4	New fencing must be sympathetic to the character and style of the heritage item. Appropriate fence styles may include timber pickets, iron palisade, low brick, and stone fences.
R5	New fences to street frontages must not obscure existing views to and from the heritage item.

~~3.6.3.11~~3.6.4.8 Car parking and driveways

Read in conjunction with:

- Chapter 2.1 Dwelling Houses, Secondary Dwellings and Ancillary Development
  - 2.1.5 Carparking and Access
- Chapter 2.2 Dual Occupancy and Multi Dwelling Housing
  - 2.2.8 Parking and Access
- Chapter 2.3 Residential Flat Buildings
  - 2.3.7 Parking and Access
- Chapter 2.13 Transport and Parking

A car parking space may be an open hard stand space, carport, or garage, attached to or detached from the dwelling house or building. Development involving car parking must consider the potential impacts on the significance and setting of the heritage item.

~~Development is to ensure that provisions for car parking do not impact on the heritage significance of a building, site or area.~~

~~a Provisions for car parking are to demonstrate that consideration has been given to the following options which must be considered in order of priority:~~

~~i locate at the rear of the site, with access from a rear lane;~~

~~ii locate at the rear of the site, with access from the street frontage;~~

~~iii locate at the side of the principle building, well setback from the building facade;~~

~~iv uncovered paved area within the front setback (preferably to the side of the building);~~

~~v street parking;~~

~~vi open, sympathetically designed carport within the front setback offset to the building elevation.~~

~~b Front garages are strongly discouraged, no matter how sympathetic. They generally obscure views of the main building and break up the established setback line in the street.~~

~~3.6.3.5.14 Garages and Carports~~

~~a New garages and carports should:~~

~~i have regard to the effect on their sites. They should generally be located behind the existing principle buildings, unless there are no other alternative off-street locations;~~

~~ii be of simple appropriate design, attuned to the design of the individual building to which they are functionally attached and not overly elaborate.~~

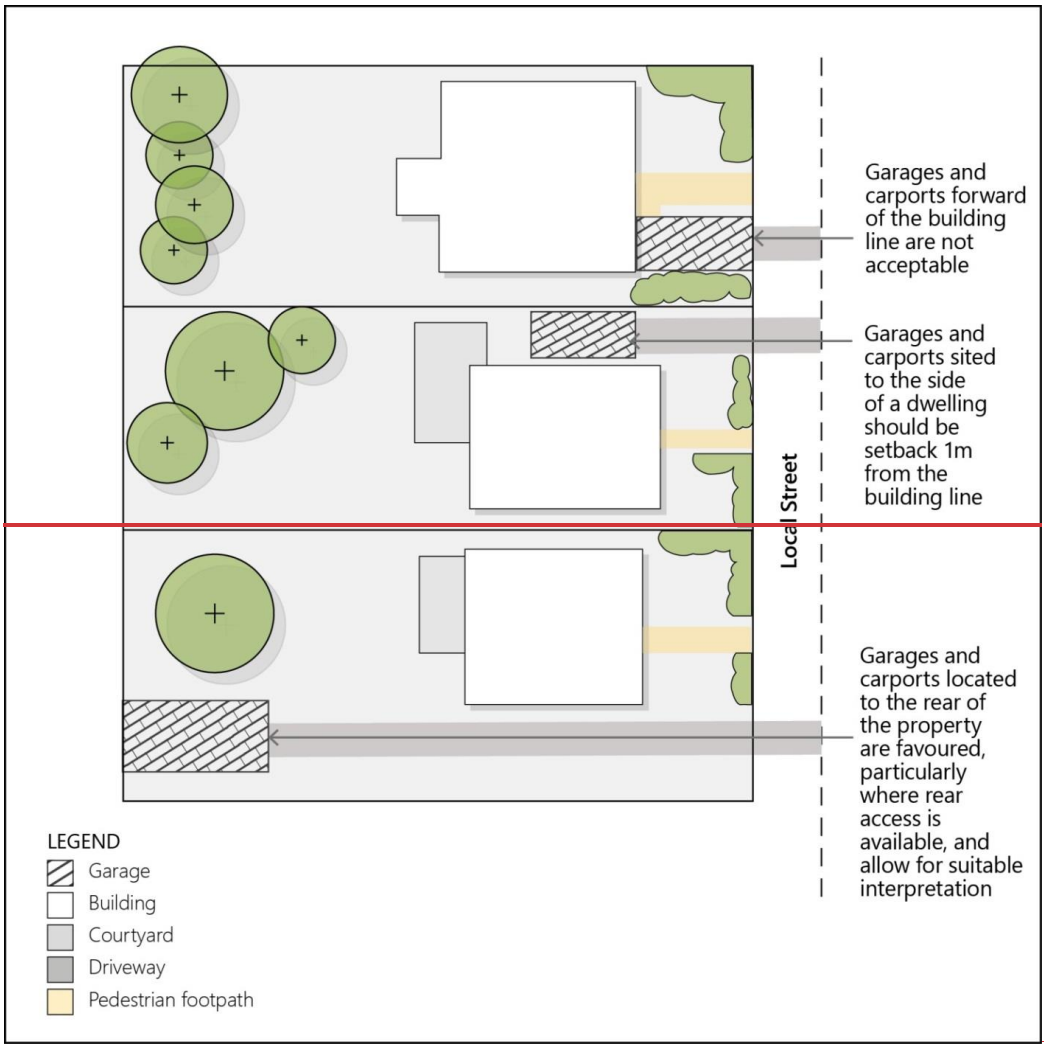
~~b Attachment of garages and carports to the buildings they service is generally not favoured and will only be acceptable where:~~

~~i the structure is located at the rear of the building and is not visible from the surrounding streets;~~

~~ii the structure forms part of a basement level (which in all other respects meets with the guidelines) or it is well setback from the front facade and unobtrusively attached.~~

~~c Rear lane access shall be used wherever available.~~

~~d The retention, repair and restoration of significant older garages is encouraged.~~



~~Figure 4Garage locations~~

OBJECTIVES	
O1	To retain and conserve significant garages and carports.
O2	To ensure that new garages, carports, and driveways are sympathetic to the significance of the heritage item.
O3	To ensure that new car parking does not adversely impact the fabric, setting, or views of the heritage item.
REQUIREMENTS	
R1	Significant car parking structures (including driveways, wheel strips, garages, car parking, coach houses) must be retained, repaired, and maintained.
R2	Replacement may be permitted where it can be demonstrated that the significant carparking structure is beyond repair. Replacement must match the original in design, height and materiality.
R3	New garages and carports must be detached from the original building, where possible.
R4	New driveways and car parking structures must not impact significant garden, planting, or landscape features.
R5	New car parking structures must be of simple, sympathetic design, and must not dominate the heritage item in form, scale, height, or style.
R6	The materials of new car parking structures must be sympathetic to the heritage item and its setting.
R7	The location of new car parking must consider the following options, in order of priority: 1. Where a property has access to a rear lane, new garages and carports must be located at the rear of the site, with access from the rear lane; 2. Where there is no rear lane, new garages and carports must be located at the rear of the site, with access from the street frontage; 3. Where a garage or carport cannot be located at the rear, it must be located at the side of the principal building, set back a minimum of 3m from the building's front facade; 4. Where car parking cannot be located at the rear or side, and in some specific circumstances only, a single uncovered hardstand area may be permissible within the front setback to the side of the building; and 5. Whether there is available street parking. Refer to Figure 4.

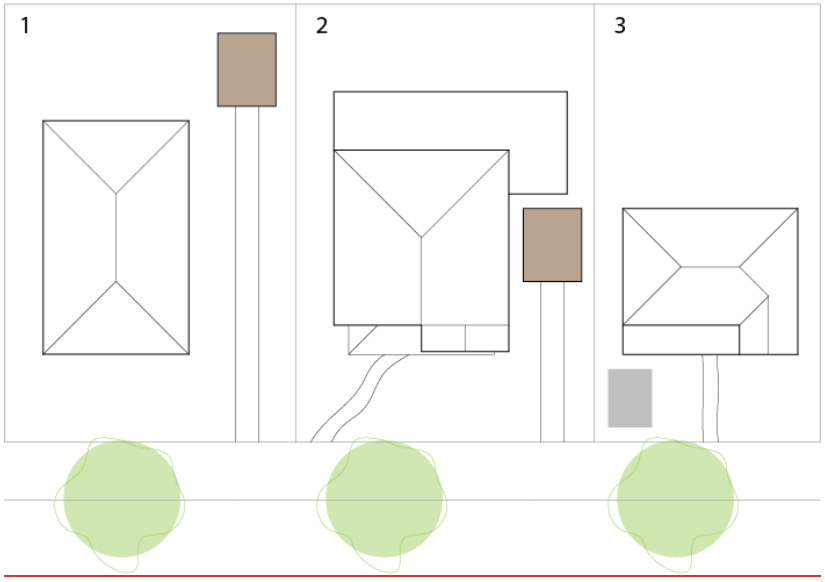


Figure 4

Examples 1 and 2 show new carparking structures in brown. These are detached structures, located to the rear or ride of the houses.

Example 3 shows an uncovered hardstand area in grey, located within the front setback to the side of the building.

3.6.4.9 Outbuildings

Read in conjunction with:

- Chapter 2.1.7 Ancillary Development

Outbuildings include garden sheds, cabanas, cubby houses, gazebos, greenhouses, or farm buildings. They also include structures such as balconies, decks, patios, terraces, or verandahs where these are detached from a dwelling house.

~~3.6.3.5.9 Sheds and Outbuildings~~

~~a In considering any application for permission to erect a shed or outbuilding, Council shall consider:~~

~~i. the proposed form, scale, size, materials and colours;~~

~~ii. the location of the proposed structure in relation to the principal building, boundaries and other details of the site;~~

~~iii. the relative prominence and visibility of the proposed structure from the street frontage or frontages of the site and neighbouring properties;~~

~~iv. the desirability of, or need for, landscaping such as screening or planting, to reconcile a proposed structure with its intended site.~~

~~b Preferred shapes, roof form and materials are:~~

~~i. simple plan shapes, square or rectangular, without complicated or interconnected shapes and with doors and windows of appropriate vertical proportions;~~

~~ii. simple hipped, gabled or skillion roof forms of the smallest practicable scale in a given situation, the use of lean-to or skillion roofs over any forms attached to the main part of the structure will help minimise scale;~~

~~iii. building materials that have been traditionally used in the locality and/or the main building.~~

OBJECTIVES	
O1	To retain significant outbuildings.
O2	To ensure that new outbuildings are sympathetic to heritage items.
O3	To ensure that new outbuildings do not adversely impact the fabric, setting or views of heritage items.
REQUIREMENTS	
R1	Significant outbuildings must be retained and conserved.
R2	Replacement may be permitted where it can be demonstrated that the significant outbuilding is beyond repair. Replacement must match the original in design, height and materiality.
R3	New outbuildings must be of simple, sympathetic design, and must be subservient to the heritage item in form, scale, or style.
R4	New outbuildings must be detached from the existing building.
R5	New outbuildings must be located at the rear of the existing building.
R6	New outbuildings must not adversely impact significant garden and landscape features.

3.6.4.10 Secondary dwellings

Read in conjunction with:

- Chapter 2.1.8 Secondary Dwellings

A secondary dwelling is a self-contained dwelling located within, attached to, or separate from another dwelling on the same site.

OBJECTIVES	
O1	To ensure that secondary dwellings do not have an adverse impact on the heritage significance of the item, including its fabric, views, and setting.
REQUIREMENTS	
R1	Secondary dwellings must be of simple, sympathetic design, and must be subservient to the heritage item in form, scale, and style.
R2	Secondary dwellings must be located at the rear of the property.

R3	Secondary dwellings, including arrangements for separate pedestrian or vehicle access, must be adequately set back from the primary dwelling.
R4	Secondary dwellings, including arrangements for separate pedestrian or vehicle access, must not adversely impact significant garden, planting, or landscape features.

~~3.6.3.10~~3.6.4.11 Signage

~~The materials, colours and design of signage varied in different historical periods. Generally, in the period of development which gave heritage buildings and/or heritage conservation areas their character and significance, colours were muted and signs were placed consistently on particular and limited locations on the building. Subsequently, signage has become larger and more dominant and is generally positioned with less cognisance of the form and design of the building and adjacent streetscape. These later elements are now seen as intrusive.~~

This section applies to both the management of existing signage on heritage items and the introduction of new signage to heritage items and heritage conservation areas.

The Savoy Theatre in Long Jetty is now in use as a bar and music venue. This historic painted sign, though faded and located on a side elevation, provides valuable evidence of the former and continuing uses of the building.

The former Woy Woy Council Chambers building has been adaptively reused as the Woy Woy Public Library. New lettering to indicate the new use does not overwhelm the building, nor detract from architectural style or detailing.

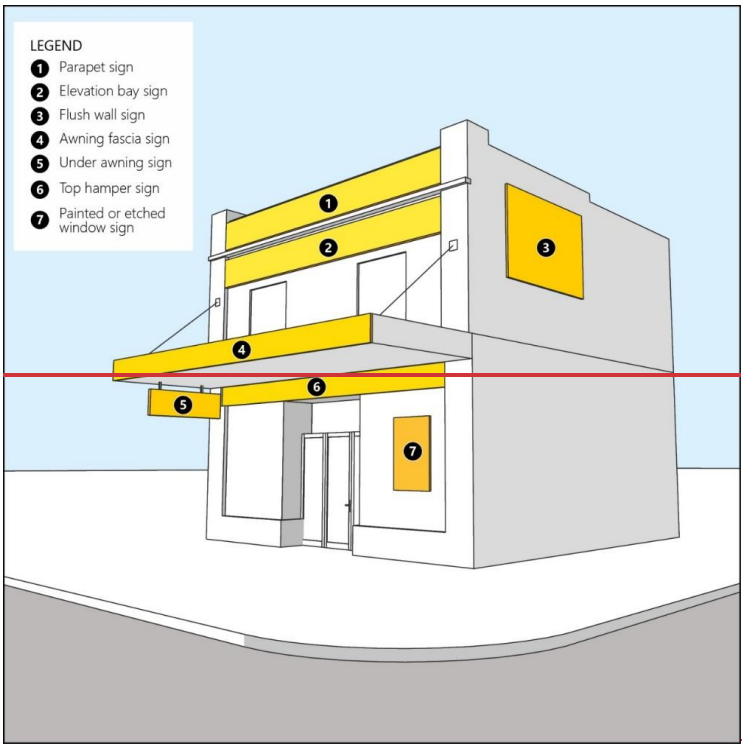
~~3.6.3.10.3 Existing Signs~~

~~a Any existing signage identified as contributing to heritage significance should be retained, including building name or date lettering, former business names, and advertising signs.~~

~~3.6.3.10.4 Location of Signs~~

~~a The use of traditional signage locations, font sizes and styles on all existing or new buildings is encouraged.~~

~~b Signage is to be fixed to buildings in a manner which will eliminate damage to significant building fabric and be reversible, e.g., when fixing to brickwork or stone ensure that the fixing method is located in brick mortar joints and not into the face of the masonry. Mortar joints are easily repairable when signs are removed. The method of attachment is to be detailed in any application for signage on heritage items. Signs for retail and commercial buildings are to be restricted to the types identified in Figure 5 as follows.~~



~~Figure 5Sign types~~

~~c Signs must be located and designed so that:~~

~~i.they do not obscure the architectural features of a building;~~

~~ii.they are capable of being moved or replaced without damaging building fabric;~~

~~iii.the overall number of signs on any one building is reduced, and has consistency in terms of proportions, colour and style;~~

~~iv.lettering is in a traditional style consistent with the age of the building and/or any original signage.~~

~~d The cumulative visual impacts of signage should be assessed and the number of signs limited appropriately to avoid visual clutter of individual premises and the streetscape.~~

~~e Where a building contains more than two tenants, a directory of tenants should be provided at the ground-floor level in order to minimise the amount of advertising on the building.~~

~~c Unobtrusive painted signs to upper-storey windows may be permitted at Council's discretion to identify tenants when appropriate wall surfaces or other areas for advertising are not available.~~

~~d Painted signs on shopfront windows must not dominate, obscure the transparency or clutter the shopfront windows.~~

~~e The erection of roof mounted signs, above-awning signs, projecting wall signs, pylon or pole signs is not supported.~~

~~f Decorative forms, mouldings and other distinguishing and significant features of a building must not be obscured by signage.~~

~~3.6.3.10.5 Number of Signs Permitted~~

~~a The number of signs per site is a principal mechanism for controlling appearance. Business owners are advised to consider the general streetscape, the visual conflict between signs on adjoining buildings and the equity between businesses in the vicinity. The general options and recommended limits are as follows:~~

~~b forecourt and footpath: one free-standing sign;~~

~~c ground floor façade (refer to Figure 6):~~

~~i awning fascia (b1);~~

~~ii one suspended under awning/verandah sign or cantilevered over-footpath sign at standard awning level where there is no verandah (b2);~~

~~iii above door head/above window transom (b3);~~

~~iv piers (b4);~~

~~v below window sill (not recommended) (b5);~~

~~vi one sign on the hamper panel or glass (b6);~~

~~vii one decal sign on the shopfront window glass or masonry beside the door;~~

~~d Permitted Signs: b1, b2, and b6 plus numbers b3 or b4 (i.e. on the ground floor façade there should be a maximum of four signs) refer to Figure 6.~~

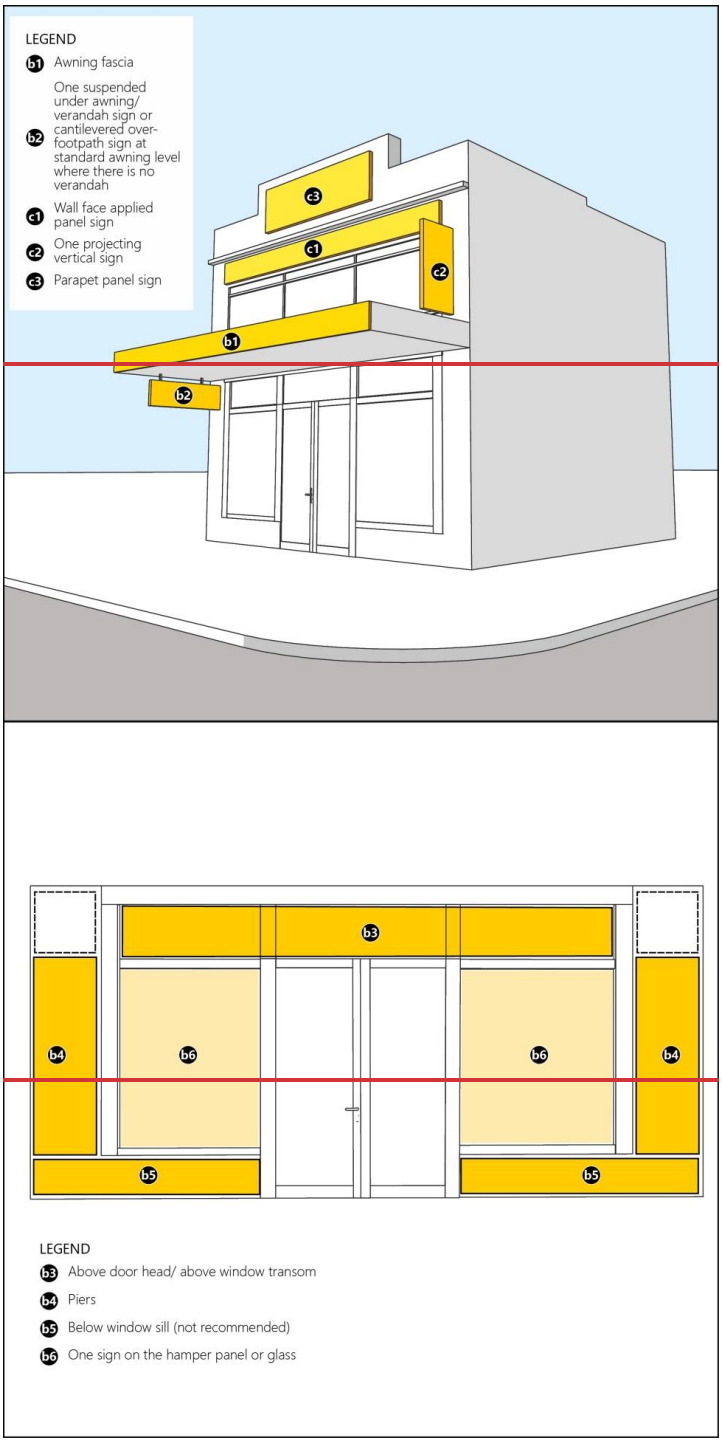
~~e upper level signs (refer to Figure 6):~~

~~i wall face applied panel sign (c1);~~

~~ii one projecting vertical sign (c2);~~

~~iii parapet panel sign (c3).~~

~~f Permitted Signs: c3 and c1 or c2 – refer to figure 6.~~



~~Figure 6Sign locations~~

~~3.6.3.10.6 Sign Area~~

~~a In general, there are no standard sizes for signs in heritage areas. They may vary according to the design and history of the building or its environment. The following will be utilised for guidance in applications for buildings which are contemporary or in assessing existing signs:~~

~~i signs are to be designed to an appropriate size and scale for the building on which it is to be erected;~~

~~ii the total area of signs mounted parallel to the façade of a building will, in general be less than 4 square metres in area for smaller properties and not more than 6 square metres for larger properties;~~

~~iii signs suspended beneath awnings or verandahs will be less than 1 square metre in area on each face;~~

~~iv signs on shop windows should not exceed 25% of the window area. Window signs shall be of a professional quality, discreet and should not unduly obscure the interior of the building;~~

~~v the total area of signs on a building will be less than eight square metres.~~

~~b The following conditions apply with regard to these restrictions and exceptions:~~

~~i heritage photographs should be utilised to demonstrate specific applications;~~

~~ii internally illuminated signs are restricted to the under awning location. This is both to be fair to retailers and to ensure visibility;~~

~~iii it is good retail practice to limit window signs in number and area, thus allowing customers to view the merchandise;~~

~~iv corporate and franchise colour schemes and signs will be considered in relation to the overall colour scheme of the building and must abide by the heritage principles;~~

~~v signs shall not be erected directly on top of an awning, roofline or verandah;~~

~~vi signs that detract from the architectural appearance of the building will not be permitted;~~

~~vii all signs must be maintained in good condition and repaired within 6 weeks of notification.~~

~~3.6.3.10.7 Style, Colour and Lettering~~

~~a The style, lettering (font), materials, colours and design of signage should reflect the style and character of the building.~~

~~b Corporate logos and colour schemes to buildings are regarded as signage and will not be permitted where in conflict with the other provisions of this section. Corporate image requirements should be adapted to suit the specific site, and should not dominate the character of the building.~~

~~c Buildings and awnings should not be painted in bright obtrusive colours to attract attention and as a form of advertising.~~

~~d Signs should be painted and externally spot lit.~~

~~e Signs should not be painted on previously unpainted surfaces of significant buildings.~~

~~f Internally lit signs are permitted where this is consistent with the history of the building.~~

~~g For all signage fixed to a building, wording should be restricted to the name and nature of the business. More detailed description of individual products for sale should be restricted to smaller removable panels e.g. sandwich board signs and chalkboard signs.~~

~~Signs on parapets must be restricted to the name of the building/business, and be located so as to respect the symmetry or grid of the façade.~~

OBJECTIVES	
O1	To retain original and significant signage.
O2	To ensure that new signage is sympathetic to the significance of heritage items.
O3	To ensure that signage does not overwhelm or visually detract from heritage items (including heritage items in the vicinity).
O4	To ensure that visual clutter of individual premises and streetscapes is avoided.
REQUIREMENTS	
R1	Significant signage must be retained, repaired, and conserved.
R2	Signage must be identified as permissible in Table 1 below.
R3	Signage must be identified as suitable in Table 2 below.
R4	Signage must be sympathetic to the heritage item in terms of its size, scale, colour and character.
R5	Development applications must consider the cumulative visual impact of new signage.
R6	New signage must not obscure or adversely impact significant architectural features.
R7	New signage must not obscure or cover glazed areas.
R8	Where signage is to be fixed to the building, it must be done so in a manner that: ▪ Minimises damage to significant fabric, and ▪ Is reversible.
R9	Signage must not be painted onto previously unpainted surfaces.
R10	Freestanding pylon signage must be sensitively sited and not interrupt significant views to or from the heritage item.

~~3.6.3.10.1~~3.6.4.11.1 Prohibited and permissible signs

~~The following sign types are permissible with consent:~~

~~a business identification signs.~~

~~a building identification signs.~~

~~b Wayfinding signage.~~

~~c Heritage Interpretation signage~~

~~3.6.3.10.2 Unsuitable Signs~~

~~a In accordance with *State Environmental Planning Policy (Industry and Employment) 2021 Chapter 3 Advertising and Signage*, advertising signs, advertising display areas, and advertising structures are not permitted within a Heritage Conservation Area. Advertising on or within the curtilage of a heritage item is considered unsuitable.~~

~~a Signs types which must not be used include:~~

~~i internally illuminated neon signs, flashing lights or flashing/scrolling signs, except on a small scale within shopfront windows;~~

~~ii projecting wall signs;~~

~~iii ridge signs, or mid-span on verandah roof;~~

~~iv sky signs raised on poles above the roof;~~

~~v 3-dimensional signs;~~

~~signs mounted on vehicles, trailers or shipping containers that stand continuously stationary for the purpose of advertising on either public or private land.~~In accordance with *State Environmental Planning Policy (Industry and Employment) 2021* Chapter 3 Advertising and Signage, advertising signs, advertising display areas, and advertising structures are not permitted within a heritage area.

Advertising on or within the curtilage of a heritage item or heritage conservation area is not permissible.

Table 1. Prohibited and permissible signs in a heritage area.

Prohibited signs on or within the curtilage of a heritage item or heritage conservation area	Permissible signs on or within the curtilage of a heritage item or heritage conservation area
Advertising signs Advertising display areas Advertising structures	Business identification signs Building identification signs Wayfinding signage Heritage interpretation signage

3.6.4.11.2 Sign types

The following sign types refer to business identification signs, building identification signs, wayfinding signage, and heritage interpretation signage.

Note: There may be some circumstances in which the below classifications do not apply. For example, a 'suitable sign type' may be inappropriate for a particular heritage item. Each application is subject to a merits-based assessment at Council's discretion.

Table 2. Suitable and unsuitable sign types.

Suitable sign types	Unsuitable sign types
Parapet signs	Projecting wall signs
Elevation bay signs	Above awning signs
Flush wall signs	Roof, awning and verandah mounted signs
Awning fascia signs	Digital signs, internally illuminated signs, neon signs, flashing lights, flashing/scrolling signs
Under awning signs	3-dimensional signs
Top hamper signs	
Painted or etched window signs	
Freestanding pylon sign	

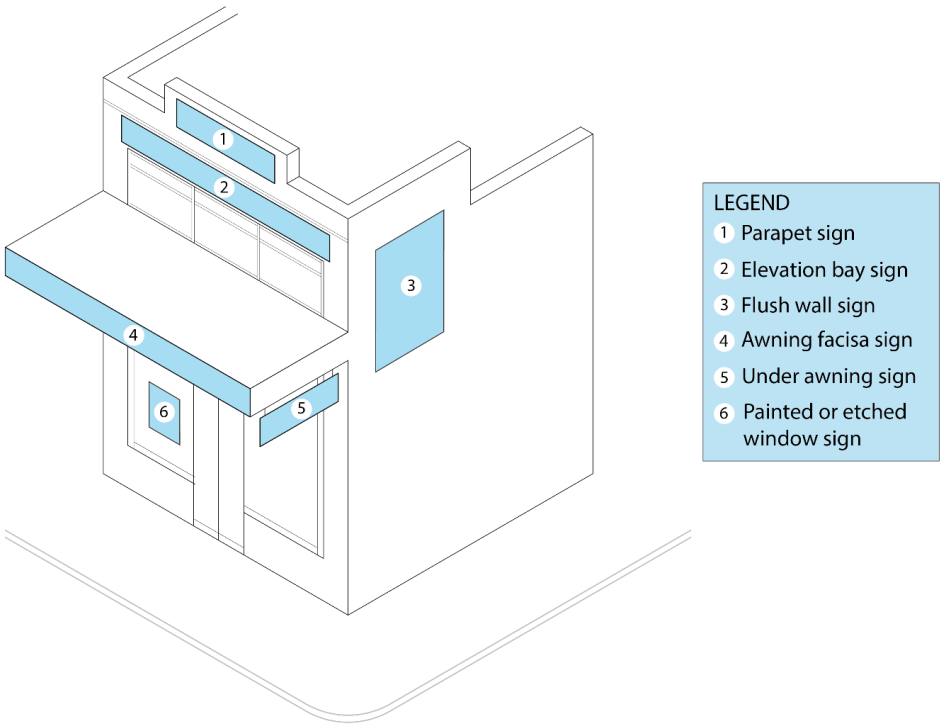


Figure 5. Suitable sign types and locations.

Part 3 Environmental Controls
Chapter 3.6 **Heritage Conservation**

~~3.6.3.1~~3.6.4.14 ~~Demolition and Replacement Development~~Demolition and relocation

Under Clause 5.10 of the CCLEP 2022, development consent is required for the demolition or relocation of a heritage item. Demolition of a heritage item, or any portion of that item, will only be considered where it is reconstructed in accordance with the original style, form, character and materials of the heritage item. Poor condition of a heritage item cannot be used to justify demolition or relocation.

~~a An application for the full or partial demolition of a heritage item, or structure within a Heritage Conservation Area will only be considered when the following documentation supports the application:~~

~~i a development application for the development of an appropriate replacement building;~~

~~ii a Heritage Impact Statement that includes options for adaptive reuse;~~

~~iii a demolition report that considers the structural stability and future viability of the building in the form of a structural engineer's report;~~

~~iv a quantity surveyor statement comparing the cost of demolition and cost of retention where demolition is sought primarily on economic grounds; and~~

~~v other consultant's report(s) as required, for example, archaeologist report, historian report, archival record.~~

~~b Submitting the necessary reports or justifications does not imply that the consent authority will agree to the proposed demolition.~~

~~c Where demolition is permitted, an archival record must be submitted to Council prior to commencement of demolition. Details on the requirements for preparing an archival record are provided in this Chapter.~~

~~3.6.3.3 Relocation of Structures~~

~~a Structures should be retained in their present location. The relocation of a structure will only be considered if it is determined that:~~

~~i. the structure is designed to be readily removable, or has a history of previous moves (e.g. prefabricated dwellings); or~~

~~ii. the structure does not have a strong association with its present site.~~

~~b Prior to consent being granted to the relocation of a structure the applicant is to demonstrate, to Council's satisfaction, that:~~

~~i. the structure will be moved to an appropriate setting and given an appropriate use;~~

~~ii. the relocated structure will not impact on any place or any item of heritage significance once relocated;~~

~~iii. the relocated structure does not confuse or impact on the history of its new site and can be interpreted as a relocated structure; and~~

~~iv. a structural engineering report is to be included that verifies that the structure can be relocated without adversely impacting on the fabric or structural integrity.~~

~~3.6.2.2.4 Demolition Report~~

~~a Requests to demolish heritage items or contributory items within Heritage Conservation Areas are generally not supported by Council. However, should an applicant insist on pursuing such a request, the onus is on the applicant to demonstrate why the building is not reasonably capable of retention~~

~~b Demolition of a heritage item is usually only considered where the structure is demonstrated to be structurally unsound and~~

~~c A demolition report is required for applications where total demolition is proposed. A demolition report should include the following:~~

~~i structural engineer's report which assesses the structural condition of the item; and~~

~~ii a quantity surveyor statement comparing the cost of demolition and cost of retention where demolition is sought primarily on economic grounds.~~

OBJECTIVES	
O1	To ensure that heritage items are retained and conserved.
O2	To ensure that the significance of heritage items is retained and conserved.
O3	To ensure that heritage items are retained in their original location where this location contributes to their heritage significance.
REQUIREMENTS	
R1	Council does not support the full or partial demolition of heritage items.
R2	Full or partial demolition will be considered only where it is demonstrated to Council's satisfaction that: ▪ The fabric to be demolished is not original to the heritage item and does not contribute to the significance of the heritage item; and/or ▪ The retention, repair or restoration of the fabric to be demolished is unviable.
R3	Where full or partial demolition due to condition is proposed, the replacement development must: ▪ Retain remnant significant or original fabric; and ▪ Must be consistent with the style, form, character, and materials of the heritage item.

R4	Development applications for the demolition of a heritage item must be accompanied by the following: ▪ a **Heritage Impact Statement** that assesses the impact of the proposed demolition on the significance of the heritage item; and ▪ a **structural engineering assessment** prepared by an engineer with heritage experience that assesses the structural stability and future viability of the building or structure, including details of the likely cost of repairs; and ▪ A design for an **appropriate replacement building** that is consistent with the style, form, character, and materials of the heritage item. *Note: Submitting the necessary reports or justifications does not imply that the consent authority will agree to the proposed demolition. Where a heritage item is damaged by neglect, disaster or otherwise, the heritage listing will continue to apply to that land.*
R5	Council does not support the relocation of heritage items, unless: ▪ The structure does not have a strong association with its present site; ▪ The structure is designed to be movable; ▪ The structure will be moved to an appropriate setting and given an appropriate use; ▪ The relocated structure will not impact on any place or any item of heritage significance once relocated; and ▪ The relocated structure does not confuse or impact on the history of its new site and can be interpreted as a relocated structure
R6	Development applications for the relocation of a heritage item must be accompanied by the following: ▪ a **Heritage Impact Statement** that assesses the impact of the proposed relocation on the significance of the heritage item; ▪ a **structural engineering assessment**, prepared by an engineer with heritage experience, that demonstrates that the structure can be relocated without adversely impacting on the fabric or structural integrity; and ▪ plans for the **proposed use of the site** and **ongoing use and conservation of the structure.**

~~3.6.3.9~~3.6.4.15 ~~Commercial Development~~Commercial, civic and industrial heritage items

The Central Coast LGA contains many heritage items that are of significance for their existing or historical commercial, civic and industrial uses. These include, but are not limited to, shops, stores, pubs, hotels, schools, churches, fire stations, police and ambulance stations, banks, and warehouses.

Development applications for works to these item types should consider all other relevant provisions of this chapter, as well as the specific controls below.

OBJECTIVES

O1	To ensure that significant former uses of commercial, civic, and industrial heritage items are able to be understood.
O2	To retain and conserve significant fabric, form, style, and character of commercial, civic, and industrial heritage items.
REQUIREMENTS	
R1	Significant fabric associated with the former use(s) of a heritage item must be retained. This may include architectural details, building layout, signage, lettering or schemes.
R2	Changes to significant fabric must be avoided. Where they are necessary, changes must minimised, documented and reversible

~~3.6.3.9.1~~3.6.4.15.1 Shopfronts

~~a Original shopfronts are to be retained; restoration and reinstatement of original shop-fronts is encouraged.~~

~~a Alterations to glazed area, fixed canopies, awnings, blinds or security screens are to maintain the narrow-fronted vertical proportions of the building facade.~~

~~b Security screens, where considered necessary, are to be placed behind the glass shop-front and should be in an architectural style and materials sympathetic to the style of the building. Only open grill security screens will be considered.~~

~~c Original shopfront glazing or tiling is not to be painted out or obscured.~~

~~d Exposed vents, pipes and the like should not be visible from the street.~~

~~e Alterations and additions to existing buildings should incorporate remnants of original shopfronts into new layouts.~~

~~f New shopfronts should reflect the typical details and finishes which set the significant character of the streetscape.~~

~~g Alterations and additions to existing buildings should retain non-typical shopfronts which indicate the former use of a place, unless there is sufficient historic information to allow accurate reconstruction of an earlier form.~~

~~h The use of traditional gloss ceramic tiles to shopfronts is encouraged.~~

~~3.6.3.9.2 Shop Awnings~~

~~a Retail/commercial buildings shall generally have awnings. The materials, height and architectural styling should match traditional adjacent awnings.~~

~~a Retain existing awnings on all commercial buildings, encouraging their conservation and reconstruction of missing details where appropriate.~~

~~b Awnings on all new buildings, or alterations and additions to existing buildings must avoid modern or pseudo-historic materials and details, such as aluminium lace, metal pipe framing or tightly rolled bull nosed iron.~~

~~c Awnings on new buildings must correspond to the building by extending to adjacent awnings to provide continuous weather protection for pedestrians beneath.~~

~~d Awnings should not run unbroken across adjacent buildings where they are clearly of different construction, even though they may now function as one.~~

~~e New or reinstated awnings must be set back from the kerb by approximately 300-600mm, or otherwise as required by Council policy, to minimise the risk of damage by motor vehicles.~~

~~f Where the base of posts has rotted, galvanised steel brackets or straps may be used to support the post, however these should be no more than 5-10cm high and clad in a skirting type profile. If the post has rotted beyond retention it should be replaced with one of a similar timber species, size and detailing to match.~~

~~g Alterations and additions to existing buildings must be of an appropriate style and detail for the design of the building where the original awning is reconstructed.~~

~~h Suspended awnings must not be adapted with false posts to imitate traditional verandahs.~~

~~Sunblinds as traditional practical features are encouraged in appropriate locations.~~

OBJECTIVES	
O1	To retain and enhance original shopfronts of heritage items.
O2	To ensure that changes to heritage listed shopfronts are sympathetic to their significance.
REQUIREMENTS	
R1	Significant fabric of shopfronts must be retained, even if not completely intact.
R2	Alterations must not alter the significant form, characteristics, and features of shopfronts.
R3	Reconstruction of an original shopfront is encouraged where there is sufficient historical and/or evidence.
R4	Glazed shopfronts must remain transparent.
R5	Security screens must be of open grill style and placed behind the glass shop front.
R6	Original awnings must be retained and conserved.
R7	Replacement of missing awnings must be appropriate to the style of the heritage item and adjacent awnings.

~~3.6.7 NATURAL HERITAGE~~

~~Natural heritage is distinct from cultural heritage and generally refers to natural areas which demonstrate the dynamic ecological processes, biodiversity and/or geodiversity of a place. Natural heritage may also have cultural significance.~~

~~The Australian Natural Heritage Charter is intended to achieve a uniform approach to conservation of places of natural significance in Australia that can be applied to public and privately-owned places, to terrestrial, marine or freshwater areas, and to protected and unprotected areas. In cases where a heritage item is identified as having natural heritage significance, Applicants should refer to 'Protecting Natural Heritage – Using the Australian Natural Heritage Charter' Guideline developed by the Australian Heritage Commission.~~

3.6.4.16 Landscape heritage items

Read in conjunction with:

- Chapter 3.5 Tree and Vegetation Management

Landscape items are items that are characterised by their landscape features, including topography, vegetation, trees, and/or plantings. These include, but are not limited to, parks, reserves, areas of bushland, and beaches. Their significance is primarily drawn from their natural and cultural qualities and uses; however, they may also contain significant built features. ~~The following requirements apply to heritage items that are identified as having natural heritage significance:~~

~~a a Heritage Impact Statement is to be prepared and submitted with an application for development;~~

~~b development proposals are to be accompanied by research indicating the origins and historical development pattern of soft plantings, and hard materials and finishes within landscapes;~~

~~c significant plantings, structures, water bodies and landscape elements are to be retained with sympathetic adaptive re-uses and complementary planting;~~

~~d new development is to enhance and improve natural systems through preventing erosion, pollution and other detracting activity;~~

~~e new landscaping and planting and infill development is to be sympathetic in scale, form, character and materials;~~

~~f new development is to allow a suitable curtilage around the significant retained elements;~~

~~g new development is to protect and enhance vistas/views to and from the significant elements;~~

~~h exotic planting is to be retained where the planting has historic and aesthetic significance;~~

~~i new development is to support fauna habitats within the natural system evident on the site and vicinity;~~

~~j development is to respect and complement the soils and hydrology in the vicinity;~~

a ~~interpretation is to be provided to illustrate the heritage significance of the place.~~

~~3.6.3.2 Tree Removal~~

~~a Applications for the removal of any tree within the curtilage of a heritage item or within a Heritage Conservation Area are to be accompanied by a Heritage Impact Statement. An arborist report prepared by a suitably qualified professional will be required by Council.~~

~~b Any works that may impact on the health or longevity of trees within a heritage item or a Heritage Conservation Area must identify the impact of the development on existing tree(s) and proposed methods of tree retention.~~

~~c The above requirements are limited to trees or other vegetation that the Council is satisfied does not present a risk to human life or property.~~

OBJECTIVES	
O1	To retain the significance of landscape heritage items.
O2	To retain the dominant landscape character, qualities and use of landscape heritage items.
O3	To ensure that development does not adversely impact the significance, setting and views of landscape heritage items.
O4	To ensure that significant trees, plantings and other natural features are protected and retained.
REQUIREMENTS	
R1	New work must not adversely impact significant trees, plantings, natural features or built fabric.
R2	New built structures are only acceptable where these are necessary to support the public use of the item.
R3	Development applications for new work must be accompanied by a landscape plan.
R4	Development applications or permit applications must be accompanied by an arborist report.
R5	Where significant trees or vegetation are to be removed, they must be replaced either with the same species or with an appropriate alternative.
R6	Where significant trees or vegetation are reaching their end-of-life, a succession planting program should be prepared.

3.6.4.17 Cemeteries, monuments and memorials

Cemeteries, monuments, and memorials are often characterised by both their built elements and their landscaped setting or siting. The continued use and appreciation of these items is integral to their significance.

Note: Some types of development in cemeteries do not require development consent. Check 5.10(3) of the CCLEP 2022 (5.36(3) of the Regional SEPP) for further information.

Example

Woy Woy Memorial Park and wall is listed on the CCLEP 2022 as an item of local significance (I348).

The central sandstone pillar and formal landscaping are key features of the item. These features are enhanced by the foreshore setting to the north, the avenue of pines along Brick Wharf Road, and the character of the adjoining residential areas.

Just as important as the fabric and setting of the item is ongoing use of the park, in particular the continued addition of new commemorative plaques.

OBJECTIVES	
O1	To retain the significance of cemeteries, monuments, and memorials.
O2	To retain the character, qualities and use of cemeteries, monuments, and memorials.
O3	To ensure that development does not adversely impact the significance, setting and views of cemeteries, monuments, and memorials.
REQUIREMENTS	
R1	Repair or restoration of significant elements must use traditional materials and methods and must be informed by historical and/or physical evidence.
R2	Materials to be replaced, restored or reinstated must be like-for-like.
R3	New gravestones, monuments, plaques, or commemorative structures must be sensitively sited, and must not overwhelm or detract from significant fabric, setting, or views.
R4	New built structures are only acceptable where these are necessary to support the public use of the item, and must not adversely impact significant fabric, setting, or views of the item.

3.6.4.18 Rural heritage items

Read in conjunction with:

- Chapter 2.17 Character and Scenic Quality

The Central Coast LGA contains many heritage items in rural locations. These include homesteads, farm buildings, roads and walking tracks. Development must retain all elements which contribute to an understanding of the significance and historical function of rural heritage items. This may include homesteads,

outbuildings, fences, gates, driveways, plantings, stands of native vegetation, or topographical features such as ridgelines and creek lines.

OBJECTIVES	
O1	To retain the significance of rural heritage items.
O2	To ensure that the rural character of rural heritage items is retained.
O3	To ensure that development does not adversely impact the significance, setting and views of rural heritage items.
REQUIREMENTS	
R1	Development must retain all significant elements of the item, including the primary building, outbuildings, plantings, vegetation and topographic features.
R2	Development must not visually or physically disconnect the primary building from significant built or landscape features.
R3	Development must not interrupt significant view corridors within, to and from the heritage item.
R4	Alterations and additions to significant built structures must be subservient in scale, form and character to the original structure, and must not detract from their rural character.
R5	New built structures must be low-scale and appropriate to the rural character of the item.
R6	Where new built structures are proposed for the existing or new use of the property, these must be located away from the immediate setting of the primary building.
R7	Development applications for the subdivision of a rural heritage item must include an analysis of the historic and visual curtilage of the item, identifying significant connections within, to and from the heritage item.
R8	Significant movement networks (roads, pathways, driveways) within, to and from the heritage item must be retained and/or interpreted.

Part 3 Environmental Controls
Chapter 3.6 **Heritage Conservation**

~~3.6.4~~3.6.5 ~~DEVELOPMENT IN A~~ HERITAGE CONSERVATION AREA~~S~~

~~Heritage Conservation Areas are one whole heritage item in their own right. The Character of the Heritage Conservation Area comes from each of the many components of the area (buildings, landscape elements, fences, roads, railway etc.) and the relationships formed between these components.~~

~~Each component will vary in its contribution to the significance of the Heritage Conservation Area. This contribution needs to be assessed before the degree of change that can be accommodated can be determined. Depending on this determination, some components can be replaced (and may be encouraged to be replaced); some will need to be retained in their current form; while most will be able to grow and change to accommodate contemporary needs provided those changes are designed to also maintain the contribution of the property to the heritage significance of the Heritage Conservation Area.~~

~~3.6.1.1.2 Heritage Conservation Areas~~

~~A Heritage Conservation Area is a geographic area containing many different elements which collectively have heritage significance. It may consist of a particular precinct, streetscape, suburb, landscape, town or group of buildings and collectively has particular values which distinguish it from other places and from its surroundings. It is an area in which its historical origins and contributory elements create a sense of place that the community values.~~

~~A Heritage Conservation Area is identified by assessing its heritage significance and the characteristics and elements that make up that significance. These can include subdivision patterns, consistency of building materials, consistency of building styles, the common age of the building stock, planting elements, common uses and/or a layering of historical elements that provide evidence of the development of the area through various periods.~~

~~The *NSW Heritage Act 1977* and the EP&A Act 1979 provide the legislative framework for heritage management. Heritage Conservation Areas identified in Schedule 5 of Central Coast LEP 2022 are administered under these two Acts.~~A heritage conservation area is an area of land that is recognised and valued for the collective nature of buildings and elements in the area that distinguish it from other places and its surroundings. It may contain individual heritage items listed on the Central Coast LEP or other statutory heritage registers.

The General Controls at 3.6.5.1 apply to all heritage conservation areas. Specific controls for individual heritage conservation areas are provided below.

Legislative framework

Heritage conservation areas in the Central Coast are identified on Schedule 5 of the CCLEP 2022, and are shown on the Heritage Map.

Development application requirements

Under Clause 5.10 of the CCLEP 2022, development consent is required for works with the potential to impact the significance of a heritage conservation area, including its fabric, setting and views. Where development is proposed within a heritage conservation area, the development application must address the relevant objectives and requirement below.

Depending on the nature of the development, Council may require a heritage management document that addresses the potential impacts of the proposed development on the significance of the heritage conservation

area and property/s concerned. Typically, this will take the form of a **Heritage Impact Statement** (HIS), also commonly referred to as a **Statement of Heritage Impact** (SOHI).

~~3.6.4.1~~3.6.5.1 General Controls

~~A Development Application and accompanying Heritage Impact Statement will generally be required work within the Heritage Conservation Area. However, some works may be exempt from requiring Council approval under *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008*. Applicants should refer to this Policy prior to submitting an application for development in a Heritage Conservation Area.~~

~~a Development within a Heritage Conservation Area is to be compatible with the surrounding built form and pattern of development by responding sympathetically to:~~

~~i existing form, massing, setbacks, scale and architectural style;~~

~~ii site topography and landscape;~~

~~iii views to and from the area;~~

~~iv surrounding neighbourhood character and streetscape, including buildings;~~

~~v existing subdivision patterns; and~~

~~vi established building lines.~~

~~b Alterations and additions are not to dominate or detract from the heritage significance of the building or Heritage Conservation Area.~~

~~c Alterations and additions are to respect the uniformity of properties which form part of a consistent row, semi-pair or group of buildings.~~

~~d Development is to respect and minimise the impact on any significant public domain features.~~

~~e Any application for development within a Heritage Conservation Area is to demonstrate consistency with an item's Heritage Inventory Assessment Report where this is available; in particular, any unique management recommendations which are provided in the Report.~~

~~f Features that are present within the Heritage Conservation Area which are out of character with other traditional buildings in the locality should not be replicated.~~

~~g Development within a Heritage Conservation Area is to consider the characteristic forms in the environment and should aim to contribute to the appearance and unity of the streetscape.~~

~~h Where there is a uniform building setback within streets, alterations and additions are to respect the established pattern and not be located forward of adjacent buildings.~~

~~i Where variations in setbacks exist within the immediate vicinity and the streetscape, the larger setback will apply.~~

~~3.6.6.3 Subdivision and site consolidation within a Heritage Conservation Area~~

~~Applications for subdivision and site consolidation within an HCA are discouraged and will only be considered if the application:~~

~~a Will not adversely affect the significance of the HCA;~~

~~b Retains the typical block width characteristics and historic subdivision pattern of the area, including rear lanes;~~

~~c Ensures new subdivisions and local consolidations do not have an adverse impact upon the curtilage of heritage items, the streetscape setting of significant or contributory buildings, and the identified character of the HCA as a whole;~~

~~d Views to and from heritage items and contributory properties, are not on interrupted or obscured;~~

~~e The landscape character of the streetscape is retained;~~

~~f Will result in future development which will not adversely affect the significance, character or appearance of the HCA.~~

OBJECTIVES	
O1	To conserve the significance of heritage conservation areas.
O2	To retain the significant fabric, settings and views to built and landscape features of heritage conservation areas.
O3	To ensure that development is sympathetic to the character and significant characteristics of heritage conservation areas.
O4	To ensure that development in heritage conservation areas is appropriate to the contribution of individual properties.
REQUIREMENTS	
R1	Development must be sympathetic to the significance of the heritage conservation area.
R2	Development must have regard to the objectives and controls for specific heritage conservation areas.
R3	Development must be appropriate to the identified contribution of the property or properties involved and respond to the appropriate controls for building contributions.

R4	Development must retain all elements that contribute to the significance of the heritage conservation area, including (but not limited to): ▪ built form; ▪ subdivision pattern; ▪ scale; ▪ building setbacks; ▪ gardens, plantings and landscape features; ▪ public domain elements; and ▪ views.
R5	Development must not detract from, overwhelm, or dominate, significant or contributory elements.
R6	Development must be appropriate to the existing character, scale, form and style of contributory elements and heritage items in the heritage conservation area.
R7	New development in heritage conservation areas must have regard to the provisions of 3.6.6. Development in the Vicinity of Heritage.

~~3.6.4.2 Contribution to the Streetscape~~3.6.5.2 Building contributions

~~Buildings located within a Heritage Conservation Area contribute to the streetscape in different ways and can be classified into three categories; contributory, neutral, and non-contributory. The definitions and controls for contributory, non-contributory and neutral buildings are provided below.~~

The significance of a heritage conservation area comes from the collective significance each of the many components of the area and the relationships formed between these components. Each component, including buildings and landscapes, will vary in its contribution to the significance of the heritage conservation area. This contribution needs to be assessed before the degree of change that can be accommodated can be determined.

Component properties in heritage conservation areas in the Central Coast are classified into three categories: contributory, neutral, and non-contributory. Development must be undertaken with the classifications for individual properties included in this chapter. Further information about the significance of a heritage conservation area can be found on the State Heritage Inventory.

In the circumstances where the contribution of a property has not been assigned a classification (for example in the case of newly listed heritage conservation areas), applicants should use the definitions provided below to identify the contribution of the place to the significance of the conservation area. Council must agree with the classification for the relevant provisions to apply.

~~3.6.4.2.1~~3.6.5.2.1 Contributory Buildings

~~Contributory Buildings are those that make an important and significant contribution to the character of the Heritage Conservation Area. They have a reasonable to high degree of integrity and intactness, and date from a key development period of significance. They may be buildings which are from a significant historical period; highly or substantially intact; or altered yet recognisable and reversible. Contributory Buildings include all Heritage Items identified in Central Coast LEP 2022 and other buildings identified as such in a Heritage Impact Statement or Conservation Management Plan.~~

Contributory properties are those that make an important and significant contribution to the significance and character of the heritage conservation area. They may be buildings or elements which:

- date from a key period of significance;
- display characteristic form, scale, details and materials; and
- are substantially intact or are altered yet recognisable.

~~The primary objective of all work to contributory buildings should be the maintenance of the item's heritage value, scale, form and significant physical fabric and to ensure that the cultural significance of the place is retained and enhanced. Work to contributory buildings is to demonstrate the following:~~

~~a a focus on the restoration of original elements and features;~~

~~a the retention of significant internal and external fabric of the building;~~

~~b the removal of unsympathetic alterations and additions;~~

~~c the appropriate use of colours and materials;~~

~~d any future use of the place shall be chosen based on its ability to retain its cultural significance;~~

~~e items in the vicinity of the proposed works are not compromised or impacted by the proposed works;~~

~~f individual heritage items are retained;~~

~~g the original form of the building is respected.~~

OBJECTIVES	
O1	To retain and enhance the contribution of contributory buildings to the heritage conservation area.
REQUIREMENTS	
R1	Original fabric and significant characteristics of contributory buildings must be retained.
R2	Development to contributory buildings must have regard to the provisions of 3.6.4 Heritage Items.
R3	Contributory buildings must not be demolished.
R4	Alterations and additions to contributory buildings must not alter the characteristic form, style, and scale of the building, as viewed from the public domain.

~~3.6.4.2.2~~3.6.5.2.2 Neutral Buildings

~~Neutral Buildings are those that neither contribute to nor detract from the significant character of the Heritage Conservation Area. Neutral buildings may include those that do not belong to a key period of significance; are of contemporary design that is compatible with the significant character of the area; or which are from a key period of significance but have been irreversibly altered.~~

Neutral properties are those that neither contribute to nor detract from the significant character of the Heritage Conservation Area. They may be buildings or elements which:

- do not belong to a key period of significance but sit comfortably in the historic streetscape;
- are of contemporary design that is compatible with the significant character of the area; or,
- are from a key period of significance and have been altered, but the alterations are reversible.

~~a The objective of all new work to Neutral Buildings should be to enhance these buildings where appropriate and feasible. The following controls apply to work to neutral buildings:~~

~~i where retention of a neutral building is proposed the original form of the building is to be respected. Alterations and additions are not to dominate the original building form, but enhance it;~~

~~ii for neutral buildings that may relate to the areas historic development but have been substantially altered restoration may be preferable to new development, depending on the building's context and significance. For this type of building, demolition is to be justified where restoration is not proposed;~~

~~iii where demolition is proposed, justification for the removal of the building is to be demonstrated in accordance with the requirements for demolition within this Chapter.~~

~~a Alterations and additions to buildings identified as 'neutral' should demonstrate the following:~~

~~i the removal of unsympathetic alterations and additions;~~

~~ii the appropriate use of colours and materials.~~

OBJECTIVES	
O1	To maintain or improve the contribution of neutral buildings to the heritage conservation area.
REQUIREMENTS	
R1	Fabric from the key period of significance of neutral properties must be retained where this demonstrates significant characteristics of the heritage conservation area.
R2	Alterations and additions to neutral buildings must be appropriate to the characteristic form and scale of the building, as viewed from the public domain.
R3	Unsympathetic changes to neutral properties must be reversed.

~~3.6.4.2.3~~3.6.5.2.3 Non-Contributory Buildings

~~Non-contributory Buildings are those that are aesthetically intrusive to the Heritage Conservation Area due to their inappropriate scale, bulk, setback, setting and/or materials. Such buildings are not representative of a key period of significance and detract from the character of the Heritage Conservation Area. Redevelopment of these sites with sympathetic buildings is highly desirable. The objective of all work to Non-Contributory Buildings should be to remove or minimise detracting elements or to replace the Non-contributory Building with one more sympathetic to the Heritage Conservation Area.~~ Non-contributory properties are those which detract from the significant character of the heritage conservation area. They may be buildings which are:

- not from a key period of significance, or
- are aesthetically intrusive due to their inappropriate scale, bulk, setback, setting, and/or materials.

~~The following controls apply to work on non-contributory buildings:~~

~~a New development should respond to the surrounding context and generally not seek to emulate the features of the detracting building it is proposed to replace.~~

~~b New development that is sensitive to the heritage values and intrinsic character, scale form and materials of the Heritage Conservation Area is encouraged.~~

~~c Alterations and additions to buildings identified as non-contributory should demonstrate the following:~~

~~i the removal of detracting elements;~~

~~i the enhancement of the building.~~

~~d New development should:~~

~~i maintain opportunities for new buildings which address the character of the streetscape and Heritage Conservation Area generally;~~

~~ii maintain the scale of existing buildings, where appropriate, or the predominant scale in the vicinity.~~

~~e Replacement or enhancement development is to involve the removal of detracting elements and ensure that the site is more responsive to the surrounding context.~~

OBJECTIVES	
O1	To improve the contribution of non-contributory buildings to heritage conservation areas.
REQUIREMENTS	
R1	Development to non-contributory properties must result in an improved outcome that responds to the significant form, style, and scale of contributory buildings in the heritage conservation area.
R2	Replacement development to non-contributory buildings must be sympathetic to the significance and character of the heritage conservation area.
R3	Replacement development to non-contributory properties must have regard to the provisions of 3.6.6 Development in the Vicinity of Heritage.

~~3.6.4.3~~3.6.5.3 Wyong Town Centre Heritage Conservation Area

Read in conjunction with:

- Chapter 4.5 Wyong Town Centre

~~3.6.4.3.1~~ Statement of Significance

The Wyong Town Centre is a fine representative example of a town centre that retains good examples of civic, commercial and residential development of high integrity, constructed up until c.1945. It remains largely intact in terms of retaining its historical subdivision pattern, its natural prominence located above the River, its built fabric, main street commercial development, avenue tree planting and the prominence of the Railway and Station buildings. Collectively, the hilltop town square, civic built environment, transport links and natural features of the town centre contributes to it being a unique precinct that captures the historical development of an important town and one which retains its historical setting and character. The town centre retains examples of its historic development across a broad range of historic themes including Aboriginal heritage, European heritage, other cultural and social heritage, natural heritage and themes such as transport, agriculture, commerce, education, health, government and law and order. The Heritage Conservation Area is of historic, aesthetic, technical and cultural significance. Given its level of intactness and integrity, it is of high local heritage significance.

~~Further detail regarding the requirements for development proposals in the Wyong Town Centre Conservation area are located in Chapter 4.5: Wyong Town Centre.~~

Key period of significance: 1889 – 1945

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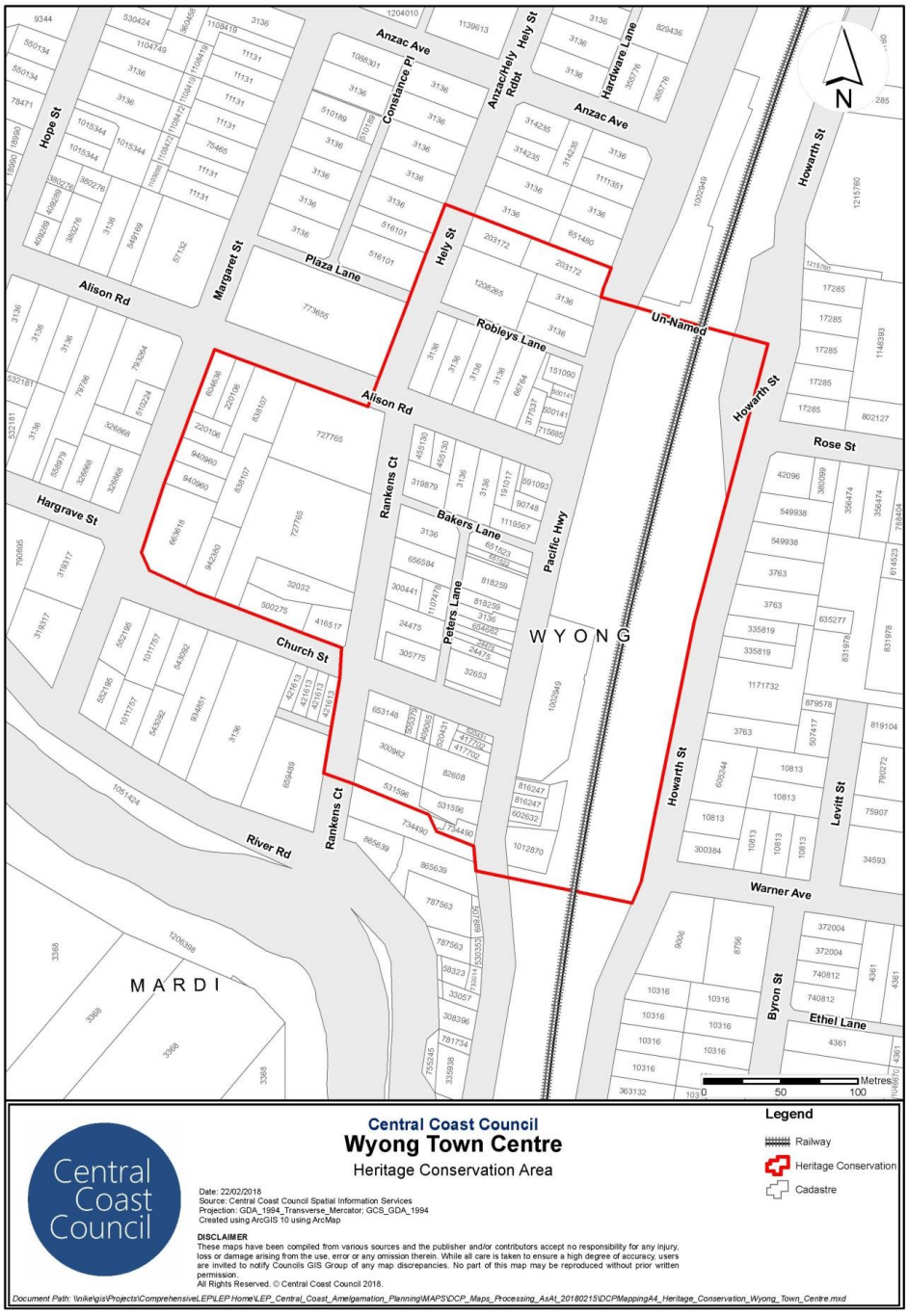

Figure ~~67~~ **Wyong Town Centre Heritage Conservation Area**

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Figure 67. Wyong Town Centre Heritage Conservation Area building contribution mapping.

OBJECTIVES	
O1	To conserve the significance of Wyong Town Centre Heritage Conservation Area, including its fabric, setting, and views.
O2	To retain the civic, commercial, and residential character of the Wyong Town Centre Heritage Conservation Area.
O3	To ensure that new development is sympathetic to the significance and character of Wyong Town Centre Heritage Conservation Area.
REQUIREMENTS	
R1	Development must be sympathetic to the characteristic form, scale, style, details, and materials of contributory buildings and heritage items within the Heritage Conservation Area.
R2	New development must be reflect the existing one- and two-storey scale of the Heritage Conservation Area. Where increased height is proposed, it must be demonstrated that the impacts of this height have been offset through the use of appropriate massing, siting, materials, and detailing.
R3	Development must not result in changes to the scale or bulk of contributory buildings.

R4	Development must not overwhelm, dominate or detract from significant streetscapes, buildings or elements within the Heritage Conservation Area, including the Pacific Highway streetscape and the Wyong Railway Station Group.
R5	Development must not detract from or obstruct significant views, including views from Wyong Town Park to the north and east.
R6	Materials of new development must be sympathetic to the characteristic materials of the Heritage Conservation Area: ▪ face brick; ▪ painted render; ▪ weatherboard; and ▪ deep gloss ceramic tiles.
R7	Street plantings and reserve vegetation along Pacific Highway and Alison Road must be retained unless the planting is diseased, dying or dead, or poses a risk to human life or property.
R8	Where street plantings and reserve vegetation have reached their end of life, they must be replaced by a suitable replacement planting. The species of any replacement planting must be approved by Council's Heritage Officer.

~~3.6.4.4~~3.6.5.4 Oakland Avenue Heritage Conservation Area

27 – 51 Oakland Avenue, The Entrance

~~3.6.4.4.1~~ Statement of Significance

The Oakland Avenue area is a fine representative example of a residential precinct that retains good examples of housing constructed up until c.1950 of high integrity. The streetscape remains largely intact in terms of retaining the historical narrow lot subdivision pattern, the natural features located on rising ground away from the river, and simply built vernacular house designs with short garden settings. Collectively, the buildings and gardens contribute to it being a distinctive area that captures the historical development of a representative type of residential development that retains its historical setting and character. The streetscape is linear and single sided and provides the Heritage Conservation Area with historic, aesthetic and cultural significance. Given the level of intactness and integrity, the area is of high local heritage significance.

Key period of significance: 1921-1950

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Figure 8 Oakland Avenue Heritage Conservation Area

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Figure 79. Oakland Avenue Heritage Conservation Area building contribution mapping.

OBJECTIVES	
O1	To conserve the significance of Oakland Avenue Heritage Conservation Area, including its fabric, setting, views, and subdivision pattern.
O2	To retain the single-storey residential character of the Oakland Avenue Heritage Conservation Area.
O3	To ensure that change is sympathetic to the significance and character of Oakland Avenue Heritage Conservation Area.
REQUIREMENTS	
R1	Development must maintain the consistent form and scale of buildings within the Heritage Conservation Area.
R2	New development must be simple in design and sympathetic to the character, form, scale, and materials of the Heritage Conservation Area.
R3	Front and side setbacks must be consistent with the established building line and siting in the Heritage Conservation Area.
R4	Allotment configurations must be consistent with the characteristic subdivision pattern.

R5	Development must not obscure views to the principal elevations of all properties within the Heritage Conservation Area.
R6	Secondary dwellings may be acceptable where there is sufficient site area at the rear of the property. Secondary dwellings on all properties within the Heritage Conservation Area must have regard to the provisions of Chapter 2.1.8 of the DCP.
R7	Open carport structures must be set back 6m behind the building line.
R8	Garages and outbuildings must be located to the rear of the main building.
R9	Original galvanised iron roofing must be retained, or where no longer feasible to be retained, it may be replaced with traditional galvanised steel and traditional rolled flashings.
R10	New development must use materials sympathetic to the characteristic materials of the Heritage Conservation Area: ▪ painted sheeting; ▪ weatherboard cladding; and ▪ galvanised iron.
R11	Colour schemes must not detract from original significant colours or obscure architectural details.
R12	The height of front boundary fencing must be consistent with the existing low front boundary fencing in the Heritage Conservation Area. Side and rear fencing must rake or step down from the front building alignment to meet the height of front boundary fencing.
R13	Style and materiality of fencing must be appropriate to the significant character and period of the Heritage Conservation Area and houses.

~~3.6.4.5~~3.6.5.5 Mount Penang Heritage Conservation Area

Refer to Chapter 5.3 for development controls relating to the Mount Penang Parklands Heritage Conservation Area.

Mount Penang Parklands is listed on the State Heritage Register. Refer to the State Heritage Inventory for management recommendations and for further information on the State heritage significance of the area.

~~3.6.4.5.1~~ Statement of ~~Heritage~~ Significance

The Mount Penang Juvenile Justice Centre has been the most important juvenile detention centre in NSW for most of the twentieth century and is a direct continuation of the nineteenth century system of reformatory training ships. The design of the early buildings, their configuration and the layout of the site itself, as well as its agricultural and pastoral features, its remnant dairy and its landscaping collectively and individually illustrate juvenile penal philosophies and practices of the period and their subsequent evolution over eighty-five years of operation. The location of the Centre is a feature in the historical expansion of the City of Sydney into its rural hinterland and its operations are an element in the development of Gosford and the Central Coast.

Mount Penang also has significance for the local Aboriginal people both pre and post-contact, and during the time when Mount Penang was used as a juvenile detention centre and accommodated a number of Aboriginal detainees for whom the site would have profound associations.

The Centre has notable aesthetic qualities associated with its site and the available views, and layout of the low- scale buildings and the landscaping. The earlier buildings are attractive, human-scaled structures, which, while of an institutional character, utilise colonial homestead architecture, appropriate to their setting and construction techniques of particular interest. The earlier buildings reproduce these forms to reinforce the characteristic appearance of the complex, whilst the McCabe Cottages group is an excellent example of the Inter-War Functionalist architectural style.

The siting and relationship of buildings to each other and to the sports fields, paddocks and vistas are all components of the operational requirements and practices of the Centre. These provide technical information regarding juvenile detention and reformatory practices. Mount Penang is very important to the many boys and young men who were detained there over the course of nearly a century. For most detainees, Mount Penang is a place where the unforgettable occurred - experiences that strongly influenced the course of their lives. The place is significant to the many men and women who lived and worked at the former detention centre. For many of these people, it is a place of substantial personal and professional achievement. Mount Penang is also important to the local community as a landmark of historical and aesthetic importance. The place has functioned as a community meeting point, with many links between the wider community and the detainees and staff.

Further detail regarding the requirements for development proposals in the Mt Penang Heritage Conservation area are located in Chapter 5.3: Kariong, Mount Penang Parklands

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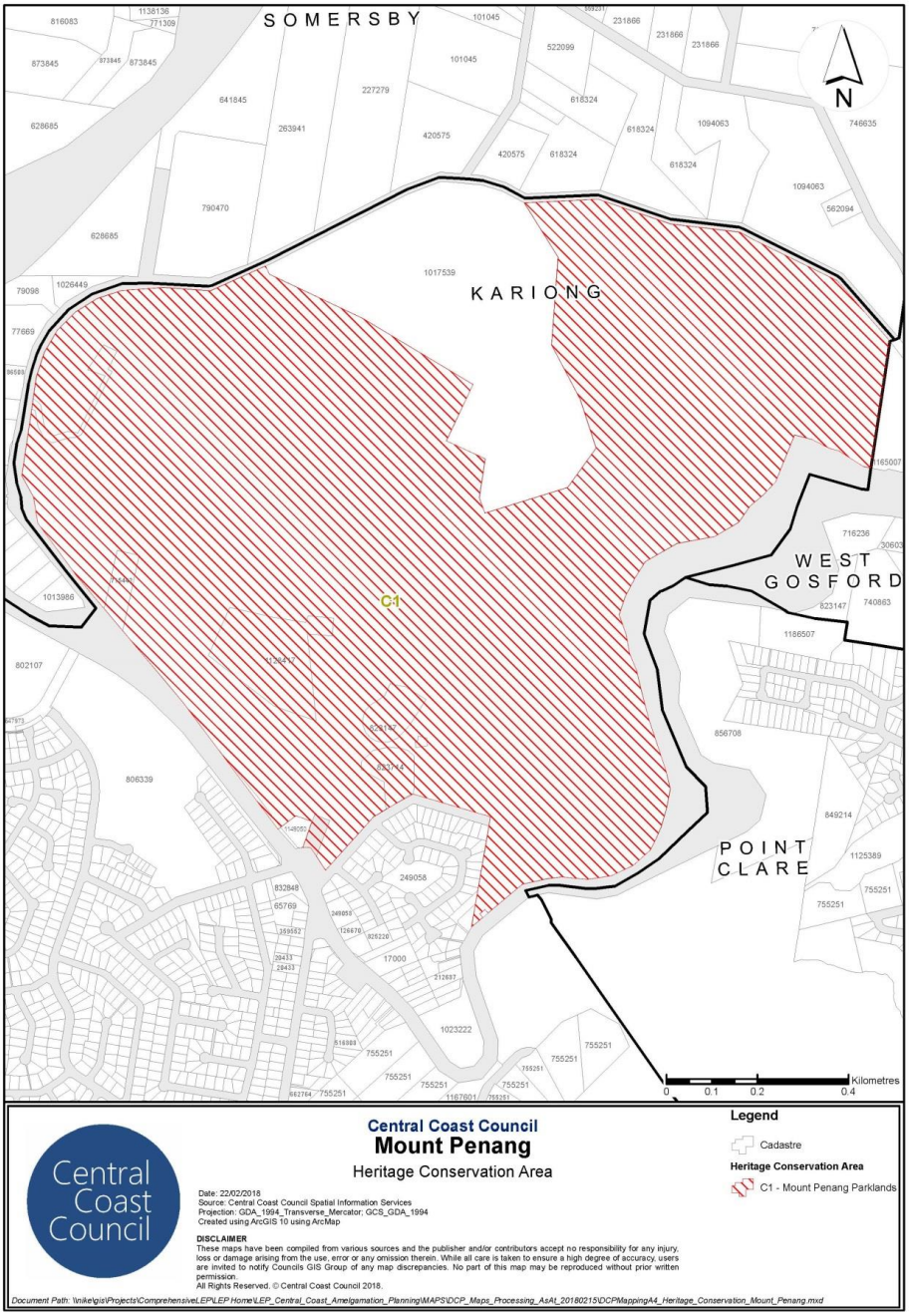
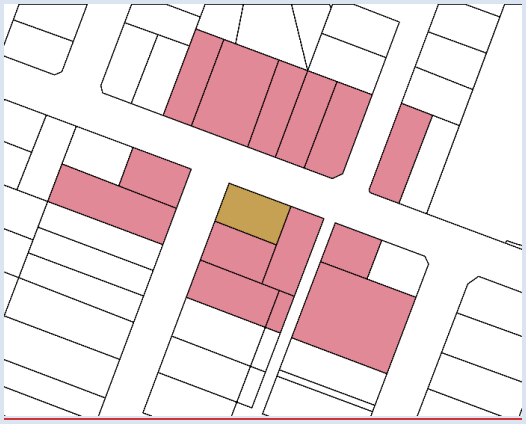


Figure 9 **Mt Penang Heritage Conservation Area**

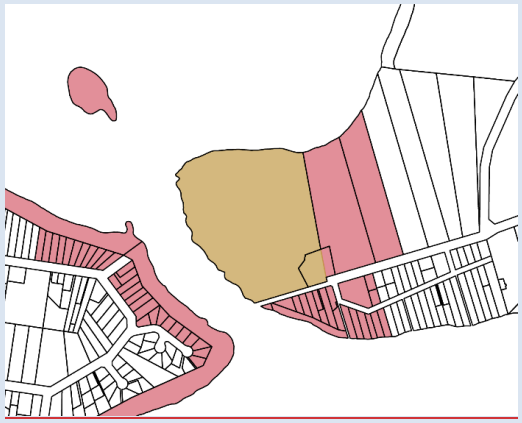
3.6.6 Development in the vicinity of heritage

Development in the vicinity refers to development that occurs outside the curtilage or boundary of a heritage item or heritage conservation area, but is located near to and has the potential to impact the significance of the heritage item or area. These impacts can relate to the setting, views, or use of the item or area.

The definition of vicinity is relative to the physical and spatial context of the heritage item or area concerned. In a dense urban environment, 'in the vicinity' may refer to the neighbouring allotments. In a more sparsely developed area, it may refer to land significantly further away.



In this residential block, 'vicinity' (indicated in red) may refer to the properties immediately adjoining or facing the heritage item (indicated in brown).



In this waterfront setting, 'vicinity' (indicated in red) may refer to properties adjoining or facing the heritage item, and may also refer to properties that form part of key views to or from the heritage item (indicated in brown).

Development application requirements

Under Clause 5.10(5) of the CCLEP 2022 and Clause 5.36(5) of the Regional SEPP, before granting consent to development on land that is in the vicinity of a heritage item or heritage conservation area, Council may require a heritage management document to be prepared that addresses the potential impacts of the proposed development on the significance of the heritage item or heritage conservation areas concerned. Typically, this will take the form of a **Heritage Impact Statement** (HIS), also commonly referred to as a Statement of Heritage Impact (SOHI).

~~3.6.2.3 Development in the vicinity of a Heritage Item or Heritage Conservation Area~~

3.6.6.1 General controls for development in the vicinity of heritage

~~a Development in the vicinity of a Heritage Item or a Heritage Conservation Area should respect the nearby heritage item~~

~~a Development in the vicinity of a heritage item or Heritage Conservation Area must respect and not dominate or detract from their heritage significance and should be sympathetic with the item or area in terms of the:~~

~~i building envelope, bulk, scale and height;~~

~~i architectural style;~~

~~ii materials, colours and finishes; and~~

~~iii building and street alignment.~~

~~b Development in the vicinity of a heritage item or Heritage Conservation Area is to minimise the impact on the setting of the item by:~~

~~i providing an adequate area around the heritage item;~~

~~ii retaining original or significant landscaping, including planting with direct links or association with the heritage item;~~

~~iii retaining and respecting significant views to and from the heritage item.~~

~~iv for rural heritage items, the scale of new work is not to overwhelm the heritage item and its setting.~~

OBJECTIVES	
O1	To conserve the significance of heritage items and heritage conservation areas.
O2	To retain the significant setting and views of heritage items and heritage conservation areas.
O3	To ensure that development in the vicinity is sympathetic to the scale, form, and character of the heritage items and heritage conservation areas.
REQUIREMENTS	
R1	Development must consider potential impacts to heritage items and heritage conservation areas in the vicinity.
R2	Development applications must demonstrate that the design of new development has mitigated potential impacts to heritage items/areas in the vicinity through consideration of: ▪ character; ▪ scale; ▪ form; ▪ siting; ▪ materials and colour; and ▪ detailing. Refer to 3.6.6.3 for additional guidance relating to the design of new development in the vicinity of heritage items.
R4	Development must have front and side setbacks that enable the retention of public domain views of the heritage item or heritage conservation area.
R5	Development must not cause adverse overshadowing impacts to the heritage item or heritage conservation area.

~~3.6.5 INFILL DEVELOPMENT~~

3.6.6.2 Infill development

~~Infill development refers to those buildings adjacent to or in the vicinity of heritage items as well as development within an identified Heritage Conservation Area. The following controls relate to the scale, bulk, siting, form, character, materials and colours and design of infill development:~~

Read in conjunction with:

- Chapter 2.17 Character and Scenic Quality

Infill development refers to new development within a historic streetscape, or new development adjacent to, or in the vicinity of, heritage items or heritage conservation areas. Successful infill development is that which responds to existing characteristics of a streetscape or area, and is sympathetic to the significance of heritage items and heritage conservation areas in the vicinity.

The design of infill development is to be informed by the following guidelines:

- *Better Placed* (Government Architect NSW 2023), and
- *Design in Context* (NSW Heritage Office 2005).

~~3.6.5.1 Character~~

~~a New development of the site is to respond to the character and significance of the heritage item or Heritage Conservation Area.~~

~~b In demonstrating the appropriateness of infill development to the existing historical character of the heritage item or Heritage Conservation Area, the applicant may be required to provide annotated diagrams, photographs and/or sketches to describe the factors which contribute to the character of the historic context (this will depend on the complexity of the new infill development and likely impact), including:~~

~~i topography of site and its surroundings;~~

~~ii distinctive landscape elements and quality;~~

~~iii the scale and form of the surrounding buildings;~~

~~iv street and subdivision patterns;~~

~~v setbacks of the buildings;~~

~~vi materials, building techniques and details; and~~

~~vii views, vistas and skylines.~~

~~3.6.5.2 Design~~

~~a The design of new buildings should complement and not adversely impact on the design characteristics of existing heritage items, particularly adjacent to the site;~~

~~b New buildings and building elements should not mimic traditional styles but rather be sympathetic in design to their context, through appropriate scale, form and materials.~~

c Details that contribute to the historic character of the streetscape should be identified and used to inform the design of the new building.

d Modern details can reinterpret traditional details and create new relationships between the old and new. This can be seen in the example of commercial heritage infill development in Figure 10 below. The horizontal masonry detailing on the existing building has been picked up in the horizontal detailing of the balconies of the adjoining new development.

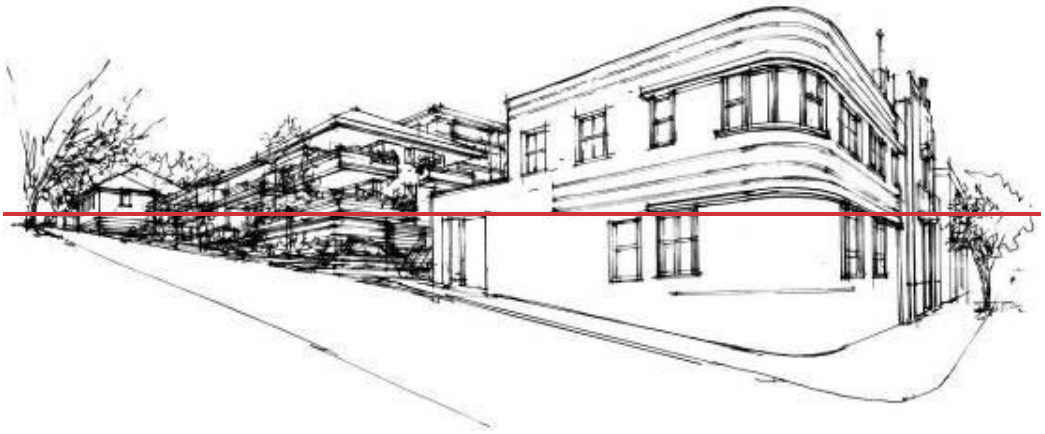


Figure 10 Contextual design

3.6.5.3 Bulk

In the case of new retail/commercial buildings, the bulk of the building should be divided into narrow and vertical elements reflecting the width of traditional shopfronts and parapets. On corner lots buildings should be splayed to address the corner.

3.6.5.4 Form

The form of a building refers to its overall shape and volume and the arrangement of its parts. Infill design should be sympathetic with the predominant form of its neighbours. Where a building form is highly repetitive in an area, variations to this form appear discordant.

a New residential buildings should be sympathetic to the height, proportions, roof pitches and materials of Heritage Items, streetscapes and Heritage Conservation Areas.

b Infill buildings should respond to, or reinforce, existing ridge or parapet lines, roof slopes and other features such as party walls and chimneys.

c Annotate drawings, photographs of models or photomontages which describe the relationship between the proposed new development and the context may be required (this will depend on the complexity of the new infill development and likely impact), in terms of the following:

i predominant form of neighbours;

i roof form and skyline, that is ridge and parapet lines, roof slopes, punctuation by party walls, chimneys and lanterns or skylights;

ii proportion and number of openings;

iii solid to void ratios;

iv relationship between internal and external spaces.

3.6.5.5 Scale

The scale of a building refers to its size in relation to surrounding buildings or landscape. Infill design should recognise the predominant scale (height, bulk, density, grain) of the setting and then respond sympathetically.

a Any subdivision of lots within a Heritage Conservation Area should reinforce the townscape pattern. Where a subdivision pattern contributes to the significance of a Heritage Conservation Area, consolidation of lots within it will have a negative impact on the place.

b Infill development must provide appropriate articulation of the elevations to ensure the scale and form of the development is sympathetic and does not dominate the streetscape as demonstrated in the figure below. The larger new development on the left is broken down by the columns and bays of the awning and windows and the building height mimics that of neighbouring development.

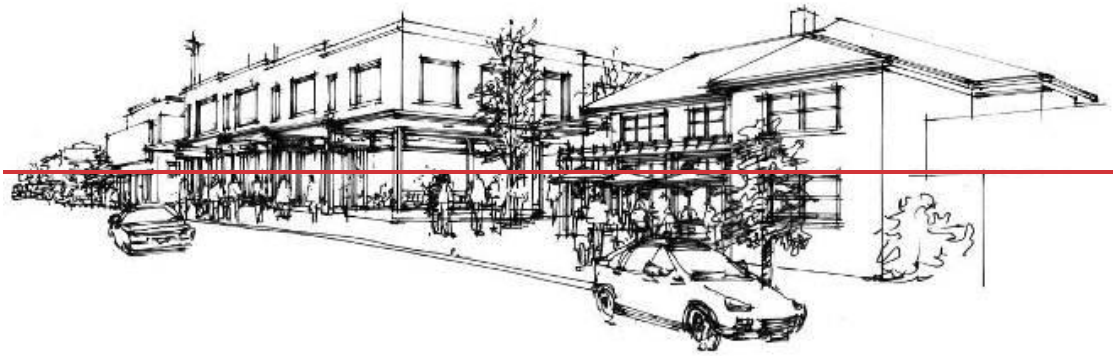


Figure 11 Sympathetic scale

3.6.5.6 Siting

a New buildings should not be orientated across sites in a manner that is contrary to the established pattern.

b Where the facades in a streetscape create a more or less continuous line, this pattern of setback should be repeated with new development.

c Where there is an established pattern of side setbacks that contribute to the character of the streetscape, this should be continued with new development.

d Modern materials can be used if their proportions and details are sympathetic within the surrounding historic context.

e Details that contribute to the historic character of the streetscape should inform the design of new buildings.

f In residential areas, where side access is available, garages and carports should be located behind the front building line to minimise their impact on the streetscape.

g New fences, garden walls and other landscape treatments in the vicinity of a heritage item or Heritage Conservation Area should not detract from the identified heritage significance. Existing features that contribute to the heritage significance of the streetscape should be retained.

~~3.6.3.7 Building Orientation~~

~~a Generally, buildings should be constructed to the street alignment.~~

~~a If, in Council's opinion, an existing setback makes a positive contribution to the streetscape then it shall be retained.~~

~~b The front façade of buildings shall be orientated towards the street.~~

~~c Corner buildings should 'turn' the corner with their main point of entry either on the corner itself or on the street to which it fronts the road.~~

~~3.6.5.7 Materials and Colour~~

~~a Use of characteristic materials within the existing area is encouraged in the construction of new buildings.~~

~~b Materials and colours of surrounding buildings should not be copied, but should be reinterpreted in new development.~~

~~c Modern materials can be used provided their proportions and details are harmonious within the surrounding context; colour, texture and tonal contrast can be unifying elements.~~

~~d Annotated drawings, photographs of models or photomontages which describe the relationship between the proposed new development and the context may be required (this will depend on the complexity of the new infill development and likely impact), in terms of the following:~~

~~i response to predominant materials, textures and colour palette, are they harmonious, complementary or contrasting;~~

~~i commensurate quality of new materials to the existing building(s);~~

~~ii qualities of light and shadow;~~

~~iii hierarchy of material use, for example, solid masonry base and lightweight upper levels;~~

~~iv relationship between skeleton or structure and skin.~~

OBJECTIVES	
O1	To ensure that infill development is sympathetic to heritage items and heritage conservation areas in the vicinity.
O2	To ensure that infill development is complementary to the character and scale of heritage items and heritage conservation areas in the vicinity.
O3	To ensure that infill development does not detract from or interrupt the relationship between heritage items/areas and public domain, including views and vistas.
REQUIREMENTS	

R1	Infill development must respond to the existing character, scale, form and style of the heritage item or heritage conservation area in the vicinity with regard to: ▪ character; ▪ scale; ▪ form; ▪ siting; ▪ materials and colour; and ▪ detailing. Refer to 3.6.6.3 for additional guidance relating to the design of new development in the vicinity of heritage items.
R2	Infill development must not dominate heritage items/areas in the vicinity, in terms of scale, bulk, setbacks and architectural character.
R3	Infill development must not result in significantly larger scale or bulk than the heritage item in the vicinity.
R4	Siting and setback of infill development must reflect the existing siting and setback pattern of the surrounding streetscape
R5	Infill development must not obstruct or detract from physical, spatial, or visual connections between significant elements.
R6	Infill development must not obscure or detract from significant views to, from, and between heritage items and conservation areas

3.6.6.3 Character

The character of a place is defined by the combination of its particular characteristics or qualities.

This can include its natural landform and landscape elements, its street and subdivision patterns, as well as the date, style, scale, form, siting, materials, and details of its built form.

Heritage items and heritage conservation areas are often key contributors to the character of a place. Infill development must respond to the character of the place through its use of scale, form, siting, materials, colour and detailing that is characteristic or predominant to the item or area. New development that is inconsistent with the predominant scale, form, siting, materials, colour or detailing of surrounding built form can detract from the character and significance of the place.

Davistown

The character of Davistown is formed by its mostly early-twentieth century cottages, with their consistent pattern of pitched roofs, with projecting sunrooms or enclosed veradahs.

The building at the centre of this image is a new development, with heriatge items to either side.

It has been designed symapthetically to the heritage items, taking cues from the gabled roof forms, fenestration and materiality of its neighbours, to ensure that it sits cohesively in its streetscape.

Woy Woy

Buildings in Woy Woy's town centre vary in their form, date, and style. However, their consistent scale unifies the streetscape and contributes to the character of the area.

Long Jetty

The suburb of Long Jetty is characterised by its Post-War lakeside houses and apartments.

The two buildings in this image are similar in their scale, form, siting and materiality. The front building is listed as a local heritage item (Dwellings I141), while the rear is not. However, both contribute strongly to the local character of the area.

Definitions

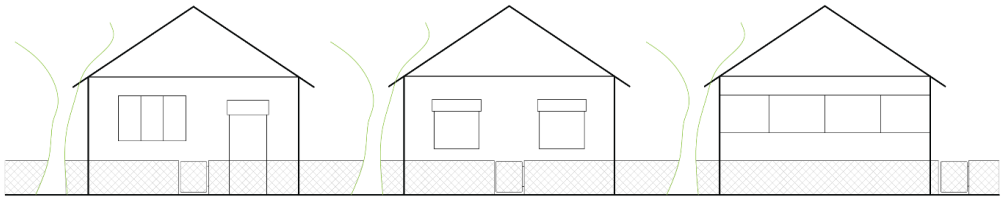
Scale

Scale is the size of a building and its relationship with its surrounding buildings or landscape. The scale of a building relates to its height, bulk, density and grain – not simply how big a building is, but how big it feels.

Form

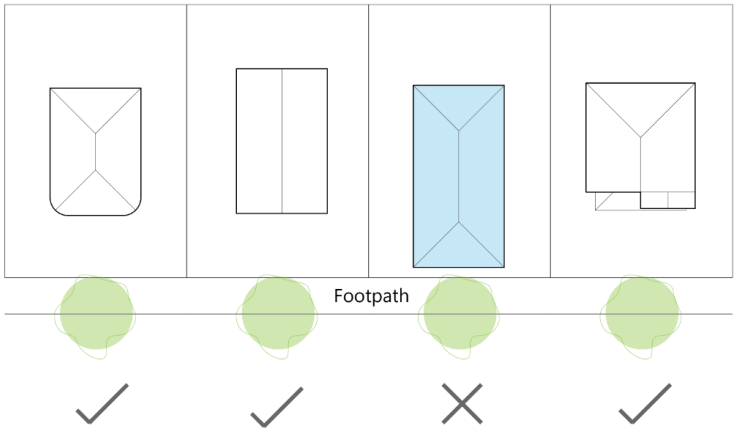
The form of a building is its overall shape and volume. Roof line and pitch is a key component of form.

The below dwellings have a consistent form. While they differ in their arrangement of doors and windows, their identical gabled roof forms provides a cohesive streetscape.



Siting

The siting of a building refers to its position on its allotment, and its setback from its road frontage and neighbouring buildings. In the below example, the new development in blue is inconsistent with the predominant siting of the streetscape.



Materials, colour and detailing

Materials and colour refers to the cladding, rendering or other external finish of a building.

Detailing can include façade articulation, parapets, window and door openings, verandahs, chimneys or other architectural features.

3.6.7 Additional information

3.6.7.1 Heritage Management Documents

~~3.6.2.2.2~~ Heritage Impact Statement

~~a A Heritage Impact Statement may be required for works on, or in the vicinity of, development related to a heritage item or land within a Heritage Conservation Area. The heritage impact statement should address the impact of a development on the heritage significance of the place, as well as the impact on a Heritage Conservation Area. Where a heritage item is of State significance a more detailed Conservation Management Plan or Strategy may be required.~~

~~b A Heritage Impact Statement should address the following:~~

~~i A description of the item and its setting (e.g. garden, fences, ancillary buildings etc.);~~

~~ii The item's contribution to the streetscape in terms of height, scale, mass, setback, architectural style and period;~~

~~iii A statement of significance for the heritage item, archaeological site, or Heritage Conservation Area;~~

~~iv An assessment of the impact that the proposed development will have on the significance of the heritage item, archaeological site, place of Aboriginal heritage significance or Heritage Conservation Area;~~

~~v Proposed measures to minimise that impact;~~

~~vi Design options and justification for the preferred option;~~

~~vii Consideration of any recommended management policies contained in the Heritage Inventory Assessment Report for the heritage item, Heritage Conservation Area or streetscape.~~

A Heritage Impact Statement (HIS) (or Statement of Heritage Impact) is a heritage management document that assesses how a proposed development will impact a heritage item or heritage conservation area. It assists the consent authority to consider if an application should be approved based on its potential impacts on the significance of the heritage item.

A HIS will be required for development to a heritage item or heritage conservation area, or within the vicinity of a heritage item or heritage conservation area. Development involving State Heritage Register items will require a SOHI prepared in accordance with *Guidelines for preparing a statement of heritage impact* (Department of Planning and Environment 2023).

A HIS is to include the following information:

- site description (including site map)
- site history
- physical analysis
- heritage significance of the item, its elements, and its setting (this may be the existing assessment of significance for the heritage item, although an updated or more rigorous assessment may be required)
- description of proposed works and/or activities

- assessment of the development against the relevant provisions of the CCLEP 2022 (or Regional SEPP) and the CCDCP (or Gosford City Centre DCP)
- assessment of the impact of the proposed works on the fabric and significance of the heritage item or heritage conservation area
- conclusion, including recommended conditions and/or mitigation measures.

It is important that your development application is supported by an adequate assessment of heritage impact. The length or complexity of a HIS will depend on the nature of the development and its potential impacts to heritage items or heritage conservation areas. Some development may only require a short HIS that can be written by the property owner or architect/designer. Others may require a more substantial assessment, that should be prepared by an appropriately qualified and experienced heritage professional with relevant expertise.

Historical Archaeological Assessment

Historical Archaeological Assessments (HAA) are predictive studies that evaluate the likely extent, nature, integrity and significance of the archaeological resource at a site. A HAA must be prepared by a suitably qualified archaeologist, and must address:

- the historical development of the land and modifications over time
- the likelihood or potential for archaeological relics
- the significance of those relics
- what would be the impacts of your proposed activity or work
- what options have been considered to avoid disturbance to retain the relics
- management advice that is consistent with the significance of the archaeological relic/s.

The HAA will recommend specific actions to manage the archaeological resource, such as:

- No further action
- Archaeological monitoring
- Test excavation
- Archaeological excavation
- In situ conservation

The HAA must be prepared in accordance with guidelines available on the NSW Environment and Heritage webpage, including:

- *Archaeological assessments guidelines* (Department of Urban Affairs and Planning 1996)
- *Assessing Significance for Historical Archaeological Sites and 'Relics'* (Heritage Branch of the Department of Planning, 2009)

~~3.6.2.2.3~~ Conservation Management Plan

The purpose of a Conservation Management Plan (CMP) is to evaluate the significance of the heritage item and to make detailed recommendations on its continuing conservation and management. CMPs guide the use, management and change of heritage items. They should achieve the best possible conservation of heritage significance within the context of the real-world management circumstances of the item.

~~a A CMP is required for development proposals involving heritage items which are listed on the State Heritage Register as an item of State significance.~~

~~b A CMP may be required for significant, extensive or complex development proposals involving local heritage items.~~

~~c The CMP must be carried out by a suitably qualified heritage consultant and should consider compliance with any recommended management policies contained in the Heritage Inventory Assessment Report for the heritage item, Heritage Conservation Area or streetscape.~~

A CMP must not be written:

- with the purpose of justifying a specific project or development
- to exclusively meet the needs of users (e.g. heritage authority, owner/manager, maintenance staff).

A CMP will be required for development proposals involving:

- A State Heritage Register item;
- A complex local item such as a school campus or Council owned property; or
- Any proposal that relies on Clause 5.10(10) – Heritage Incentives

A CMP may be required for development proposals involving other local heritage items. A CMP must be prepared by a suitably qualified heritage consultant with reference to existing management recommendations in the State Heritage Inventory listing sheet for the item.

The CMP must be prepared in accordance with guidelines available on the NSW Environment and Heritage webpage, including:

- *Statement of best practice for conservation management plans* (Department of Premier and Cabinet 2021).
- *Guidance on developing a conservation management plan* (Department of Premier and Cabinet 2021).
- *Conservation management plan checklist* (Department of Premier and Cabinet 2021).

Heritage Asset Action Plan

Heritage Asset Action Plans (HAAP) are relatively simple and succinct documents that provide guidance about targeted aspects of the maintenance or management of a heritage item. HAAPs are not suitable in the context of a major change or development affecting a heritage item, but can be prepared to provide guidance on:

- the maintenance of a heritage asset or item;

- a specific aspect of conservation or management;
- a conservation approach that applies across an asset type ; or
- a specific component of an item.

An understanding of the heritage significance for the item is essential to underpin the HAAP. Where an existing and robust statement of significance already exists, such as from a heritage register like the State Heritage Register, then this should be used. If a statement of significance is not available, then a heritage investigation and assessment should be completed.

The HAAP must be prepared in accordance with guidelines available on the NSW Environment and Heritage webpage, including:

- *Statement of best practice for heritage asset action plans* (Department of Premier and Cabinet, 2021).

Heritage Interpretation Plan

A Heritage Interpretation Plan (HIP) is a document that provides the policies, strategies and detailed advice for interpreting a heritage item. It is based on research and analysis, and plans to communicate the significance of the item, both during a conservation project and in the ongoing life of the item. The HIP identifies key themes, storylines and audiences and provides recommendations about interpretative devices. It includes practical and specific advice about how to implement the plan.

The HIP must be prepared in accordance with guidelines available on the NSW Environment and Heritage webpage, including:

- *Interpreting Heritage Places and Items Guidelines* (NSW Heritage Office 2005)

~~3.6.2.2.5~~ Archival Record

~~An Archival Record is made of a heritage item as a way of contributing to our understanding and appreciation of our culture and history. They record for the future the environment, aesthetics, technical skills and customs associated with the creation and use of heritage items before they are lost, either by progressive changes or the passing of time.~~

~~e Archival Records are usually prepared:~~

~~i when establishing the heritage significance of the item~~

~~ii before making decisions on the management of the item (e.g. when preparing a conservation plan);~~

~~iii when developing or carrying out a maintenance and monitoring program for the item (e.g. for annual maintenance inspections);~~

~~iv before and during work to the item (e.g. alterations and additions);~~

~~v before full or partial demolition of the item or relocation of objects or collections; and~~

~~vi before and during archaeological investigations.~~

~~A photographic survey and measured drawings of the item clearly identifying previous alterations, dates of construction and materials is required where application for total demolition is made. Preparation of such an~~

~~archival record is generally a condition of consent. The archival record shall be consistent with the guidelines provided by the NSW Heritage Council 'Heritage Information Series: How to Prepare Archival Records of Heritage Items' available from the Heritage Branch website.~~An Archival Record consists of a photographic recording of an item, place or object. The purpose of an Archival Record is to record the item, place or object in its current condition, before it is changed or lost. The requirements of an Archival Record will depend on the nature of the works proposed. At minimum, it will include a photographic survey and site plan, and may also require measured drawings of the item, clearly identifying previous alterations, dates of construction and materials.

The preparation of an Archival Record may be a condition of consent for development applications involving changes to heritage items or heritage conservation areas. The Archival Record must be provided to Council for their review and approval. Once finalised, the Archival Record should be provided to the Central Coast Library Service.

The Archival Record must be prepared in accordance with guidelines available on the NSW Environment and Heritage webpage, including:

- *Heritage Information Series: How to Prepare Archival Records of Heritage Items* (NSW Heritage Office)

Note: The above guidelines specify requirements for hard copies of Archival Recordings; however, in some circumstances only a digital copy will be required.

Schedule of Conservation Works

Development applications that involving repair, conservation or maintenance works to the significant fabric of a heritage item, or involve a heritage item in need of repair, conservation or maintenance works, must be accompanied by a Schedule of Conservation Works (SoCW).

A SoCW identifies the methods, materials and tradesperson to be used for the conservation works. The SoCW must be prepared by a suitably experienced heritage consultant, architect or tradesperson, and must be based on the principles of the Burra Charter.

Refer to heritage maintenance guidelines available on the NSW Environment and Heritage webpage:

- https://www2.environment.nsw.gov.au/topics/heritage/manage-heritage-items/heritage-maintenance-guides

3.6.7.2 References and links

Local studies – researching the history of your property

Local Studies, within the Central Coast Library, has a wealth of resources that can assist in researching the history of a heritage place, including books, reports, local newspapers, pamphlet, files, aerial photos, maps and street directories. The Local Studies team can help you learn more about the history of your property.

Central Coast Libraries

- https://libraries.centralcoast.nsw.gov.au/history

Central Coast Memories

Central Coast Memories provides historic images, sound recordings, subdivision plans, postcards and tourist publications. It is part of the Central Coast Council Library Service's local history images collection.

Central Coast Memories

- https://centralcoast.contentdm.oclc.org/

Heritage NSW Publications

Heritage NSW, which sits within the NSW Department of Climate Change, Energy, the Environment and Water (DCEEW), has a wide range of heritage publications available to download.

NSW Environment and Heritage, Manage heritage items

- https://www2.environment.nsw.gov.au/topics/heritage/manage-heritage-items

~~3.6.1.5~~ 3.6.7.3 Definitions

Generally, the terms used in this Chapter have the same meaning as those terms defined within Central Coast LEP 2022. Where a term is defined within Central Coast LEP 2022, it is not repeated here. The following additional terms are relevant to this Chapter:

adaptation means modifying a heritage place to a new use that conserves its heritage values.

alter in relation to a heritage item means physical changes to the fabric, setting or layout of a heritage place.

archival record means a record of evidence, including written, photographic, illustrative, diagrammatic and/or video evidence that identifies the environment, aesthetics, technical skills, and customs associated with the creation and use of the heritage item.

building element means an architectural component of a building or site.

compatible use means a use which involves no change to the significant fabric of a building or work, changes which are substantially reversible, or changes which make a minimal impact.

conservation means all the processes of looking after a building or work so as to retain its heritage significance. Conservation can include maintenance, preservation, restoration, protection, reconstruction and adaptation.

contributory item means a building, work, place, relic, tree, or place and its setting, which contributes to the heritage significance of a conservation area.

fabric means all the physical material of a site, building or work.

form means the overall shape and volume and the arrangement of the parts of a building.

heritage interpretation is the process of explaining or representing the heritage significance of a place to the community.

Heritage Inventory Assessment Report means a report taken from the Heritage Inventory database for a heritage item.

historic character means the combination of particular characteristics or special qualities of a place related to its period of style or construction.

infill development means a new building in an established and developed area which is adjacent to or in the vicinity of a heritage item or Heritage Conservation Area.

measured drawing means a technical or architectural record of the heritage item in its existing state.

natural heritage means natural features consisting of physical and biological formations or groups of such formations, which demonstrate natural significance. Geological and physiographical formations and precisely delineated areas that constitute the habitat of indigenous species of animals and plants, which demonstrate natural significance, and/or natural sites or precisely-delineated natural areas which demonstrate natural significance from the point of view of science, conservation or natural beauty.

natural significance means the importance of ecosystems, biodiversity and geodiversity for their existence value or for present or future generations, in terms of their scientific, social, aesthetic and life-support value.

neutral building means a building or building element that neither contributes nor detracts from the significant character of the Heritage Conservation Area.

non-contributory building means a building or building element that detracts from the significant character of the Heritage Conservation Area.

preservation means maintaining the fabric of a building or work in its existing state to prevent deterioration.

reconstruction means returning a building or work as nearly as possible to a known earlier state and is distinguished by the introduction of materials old or new into the fabric.

relic means any deposit, artefact, object or material evidence that relates to the settlement of the area that comprises NSW, not being Aboriginal settlement and is of State or local heritage significance

restoration means returning the existing fabric of a building or work to a known earlier state by removing accretions or by reassembling existing components without the introduction of new materials.

setting means the context within which a structure is located with respect to streetscape.

Statement of Significance means a statement or document that describes and explains the characteristics that give an item its heritage significance.

vicinity means land or surroundings that have a physical or visual relationship to the site of a heritage item or Heritage Conservation Area, and that potentially may affect the heritage significance of the item or area.

Part 4 Major Centres
Chapter 4.5 **Wyong Town Centre**

CHAPTER 4.5 WYONG TOWN CENTRE

4.5.1 INTRODUCTION

4.5.1.1 Objectives of this Chapter

This Chapter aims to facilitate appropriate high quality development in the Wyong Town Centre by providing guidelines, particularly in relation to:

- The reinforcement and preservation of the existing heritage character of the Wyong Town Centre
- Urban design provisions which will provide a cohesive approach for development
- The appropriate scale and density with higher density development concentrated around the Wyong Town Centre
- The provisions which will facilitate mixed use and commercial development
- The car parking requirements for development in the Wyong Town Centre; and
- Special provisions for specific areas

4.5.1.2 Land to which this Chapter Applies

This chapter applies to all land within the Wyong Town Centre as shown in Figure 1 and covers a wide variety of land uses such as retail, commercial, mixed-use and residential. The Chapter should be read in conjunction with the provisions of the *Central Coast Local Environmental Plan (LEP) 2022*.

4.5.1.3 Relationship to other Chapters and Policies

This Chapter should be read in conjunction with other relevant Chapters of this Development Control Plan and other Policy Documents of Council, including but not limited to:

- Chapter 2.1: Dwelling Houses, Secondary Dwellings and Ancillary Development
- Chapter 2.2: Dual Occupancies and Multi-Dwelling Housing
- Chapter 2.3: Residential Flat Buildings and Shop-Top Housing
- Chapter 2.13: Transport and Parking
- Chapter 5.48: Northern Areas -Public Art
- Chapter 3.6: Heritage Conservation

Part 4 Major Centres
Chapter 4.5 Wyong Town Centre

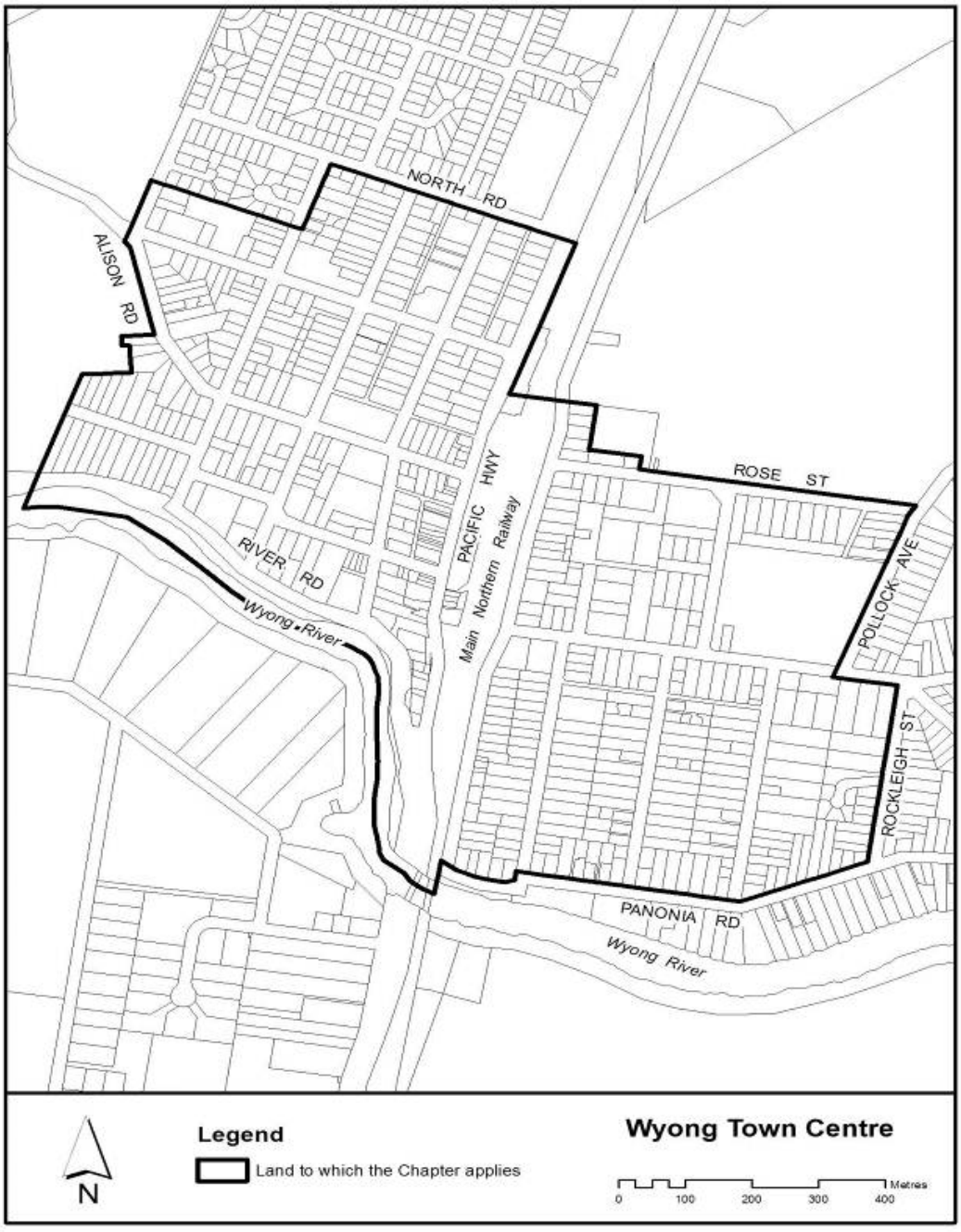


Figure 1 Wyong Town Centre Area

Part 4 Major Centres
Chapter 4.5 **Wyong Town Centre**

4.5.2 DESIGN THEME

4.5.2.1 Vision for the Wyong Town Centre

The Tuggerah-Wyong area will perform vital economic, employment, civic, residential, social and cultural roles for the northern half of the Central Coast and support the Gosford Regional City. Council's and the Community's vision for Wyong is contained in the Wyong/Tuggerah Planning Strategy (2007) as revised. The Strategy's main visions for Wyong are to:

- Provide an important and attractive gateway for the Central Coast
- Become the cultural and heritage focus area and a culturally-based tourist destination for people visiting and living on the Central Coast
- Have strong links (physical, visual and cultural) between the Town Centre, Wyong River and the surrounding districts, including the valleys to the west and Tuggerah Straight to the south
- Provide a high quality public domain that complements the surrounding residential development and the town's heritage focus
- Provide a variety of housing, accommodation and lifestyle choices
- Develop a superior standard of urban and building design
- Make a strong statement as to the community identity through its people, built form and natural topography
- Perform a strong business and employment function as a central administrative and town-based commercial area
- Integrate a range of recreation, sporting, cultural, leisure and social activities within high quality spaces and places
- Concentrate higher density development around the Town Centre and key public areas including the Wyong River foreshore, Baker Park and the Wyong Town Park
- Enjoy a strong District retail component;
- Supply a regional transport node that integrates all transport functions
- Create a new system of pedestrian and bicycle paths to link existing and new residential areas, as well as cultural and tourism facilities

Part 4 Major Centres
Chapter 4.5 **Wyong Town Centre**

4.5.2.2 Heritage Theme

One of the main visions for the Wyong Town Centre is to become the cultural and heritage focus area and a culturally-based tourist destination for people visiting and living on the Central Coast. There is a relatively large concentration of heritage items in the Wyong Town Centre compared to other towns on the Central Coast Accordingly, a heritage theme has been adopted for the Wyong Town Centre to preserve and reinforce its historic character.

This section describes the significance of the Wyong Town Centre and identifies the general Heritage Character Areas for the purposes of providing a context for development in the Wyong Town Centre.

4.5.2.2.1 Aboriginal Heritage in the Wyong Town Centre

Council has adopted a Thematic History which provides some information on the Aboriginal heritage of the Wyong Town Centre. A copy of this history can be obtained by contacting Council. This history talks about Aboriginal Territories that may have been near the Wyong Town Centre, which include the Lower Wyong River and Jilliby Creek Valleys. Due to the Wyong Town Centre's proximity to the river, it can be expected that Aboriginal archaeological sites might appear in the Wyong Town Centre area. For these reasons reference to heritage in the Wyong Town Centre should include Aboriginal heritage as well.

OBJECTIVES

- To acknowledge Aboriginal people as the traditional custodians of the Central Coast
- To provide a reference to the Aboriginal heritage of Wyong in public art
- To preserve existing sites of significance to Aboriginal people in the Wyong Town Centre

REQUIREMENTS

a Public signage at Gateway locations is to provide appropriate reference to local Aboriginal heritage.

b Development that is required to have Public Art shall incorporate the work of a local Aboriginal artist to a value of at least 20% of the total budget for Public Art.

c ~~If a Section 10.7 Certificate describes a site as having archaeological significance, an assessment of the site must be carried out in accordance with Chapter 3.4: Heritage (European and Aboriginal)~~Refer to Section 3.6.2 for assessment requirements relating to Aboriginal cultural heritage.

4.5.2.2.2 Built Heritage

Council has adopted a Thematic History which provides information on the built heritage of the Wyong Town Centre. A copy of this history can be obtained by contacting Council. The most significant drivers of development in the Wyong Town Centre were the Great Northern Railway (c. 1887) and the accompanying timber, farming and dairy industries. A photo of railway sleepers being loaded at Wyong Station is shown in Figure 2 below.

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Chapter 4.5 Wyong Town Centre

Figure 2 Photograph of Railway Sleepers being loaded at the Wyong Railway Yard c.1904

(Source: Stinson c1909)

In the 20th Century roads and transport changed the character to that of a service town. Some of the historic buildings typical of the period remain today, such as the Chapman stores, which are shown in Figure 3 below.

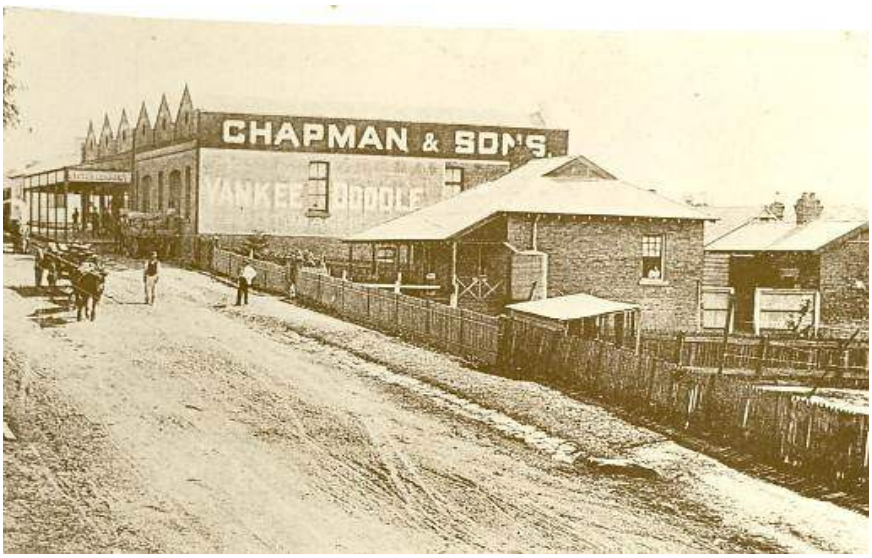

Figure 3 Photograph of the Chapman Stores c.1901

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Chapter 4.5 Wyong Town Centre

4.5.2.2.3 Heritage Items and Heritage Conservation Area

Heritage Items and the Heritage Conservation Area in the Wyong Town Centre are identified in the Central Coast LEP 2022. Photos of a selection of these heritage items are shown at Figure 5. For the current listing of heritage items refer to the Central Coast LEP 2022. Development provisions for heritage items are provided in Section 3.6.4; development provisions for heritage conservation areas are provided in Section 3.6.5.

~~"In the 2011 Wyong Shire-wide Heritage Review, a statement of significance was prepared about the heritage value of the Wyong Town Centre conservation area which is provided below:~~

~~"The Wyong Town Centre is a fine representative example of a town centre that retains good examples of civic, commercial and residential development constructed up until c. 1945 of high integrity. It remains largely intact in terms of retaining its historical subdivision pattern, its natural features located above the River, its built fabric and landscaping and the prominence of the Railway. Collectively, the built environment, transport links and natural features of the town centre contributes to it being a unique precinct that captures the historical development of an important town centre that retains its historical setting and character.~~

~~The town centre retains examples of its historic development across a broad range of historic themes including Aboriginal heritage, European heritage, other cultural and social heritage, natural heritage, and themes such as transport, agriculture, commerce, education, health, government and law and order. The conservation area is of historic, aesthetic, technical and cultural significance. Given its level of intactness and integrity, it is of high local heritage significance."~~

The following Statement of Significance has been prepared for the Wyong Town Centre Heritage Conservation Area:

"The Wyong Town Centre is a fine representative example of a town centre that retains good examples of civic, commercial, and residential development of high integrity, constructed in the period commencing with the railway in 1889 up until c.1945. It remains largely intact in terms of retaining its historical subdivision pattern, its natural prominence located above the River, its built fabric, avenue tree planting, and the prominence of the Railway and Station buildings. Collectively, the built environment, transport links and natural features of the town centre contributes to it being a unique precinct that captures the historical development of an important town, and one which retains its historical setting and character. The town centre retains examples of its historic development across a broad range of historic themes including Aboriginal heritage, European heritage, other cultural and social heritage, natural heritage, and themes such as transport, agriculture, commerce, education, health, government and law and order. Given its level of intactness and integrity, it comprises a rare sets of significant heritage items and contributory buildings and composite streetscapes and is of historic, aesthetic, technical and cultural significance."

OBJECTIVE

- To reinforce and preserve the existing heritage character of the Wyong Town Centre

REQUIREMENT

A Heritage Impact Statement will be required for new work to Heritage Items or new work on sites adjacent to Heritage items. In the example at Figure 4 below, a new development is proposed next to the Turton Heritage Building. The new development is adjacent to a heritage item, so will require a Heritage Impact Statement and need to adhere to the development provisions in ~~Chapter~~ Section 3.6.4 Heritage Items~~: Heritage Conservation~~.

Part 4 Major Centres
Chapter 4.5 **Wyong Town Centre**

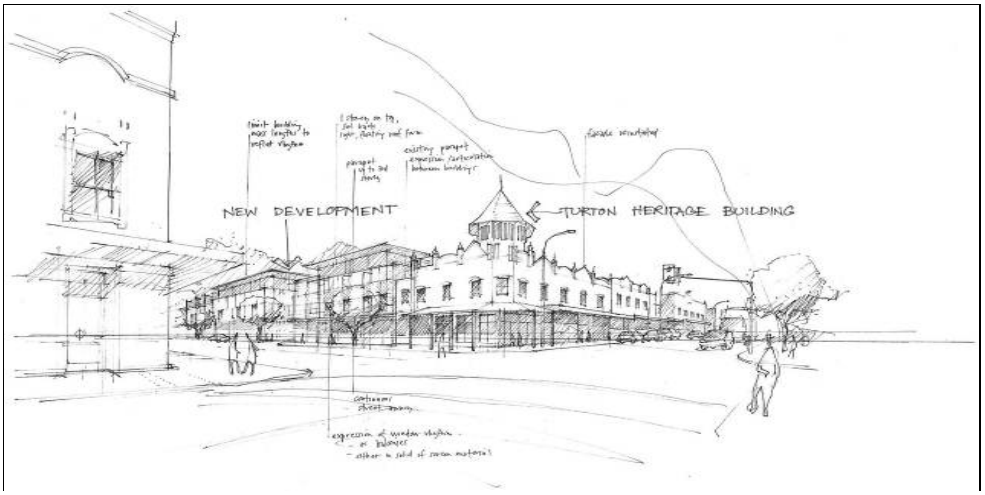

Figure 4 **Example of new development requiring a Heritage Impact Statement**

Dwelling

Alison Road

Former Court House

Alison Road

Police Station and Quarters

Alison Road

Retail Store

Alison Road

St Cecilia's Catholic Church Group, Byron Street

Former Public School

Church Street

World War I and II

Shops

Dwelling

Hope Street

Monument, Church Street

Dwelling

Hope Street

Shopping Complex

Pacific Highway

Commercial Office

Building, Rankens Court

Corner Church Street and Pacific Highway

Brisbane Water Ambulance Station, Pacific Highway

Wyong Railway Station

Pacific Highway

Council Building,

Corner Hely Street and Anzac Avenue

Dwelling

Hope Street

Former Rural Bank

Pacific Highway

Former Methodist Church

Rankens Court

(recently burnt down)

Figure 5 **Photos of selected Wyong Town Centre heritage items**

Part 4 Major Centres
Chapter 4.5 Wyong Town Centre

4.5.2.2.4 Heritage Character Areas

Within the Wyong Town Centre area there are six main building precincts of generally consistent architectural style and character:

1 Wyong Hill Community Area
2 Railway Station Area
3 Pacific Highway and Alison Road
4 Administration Area
5 West Wyong Residential
6 East Wyong Residential

These Heritage Character Areas have been identified on the map below at Figure 6.

OBJECTIVE

- To enable new development that respects the existing character that has been established and integrates successfully with existing development within the Heritage Character Area

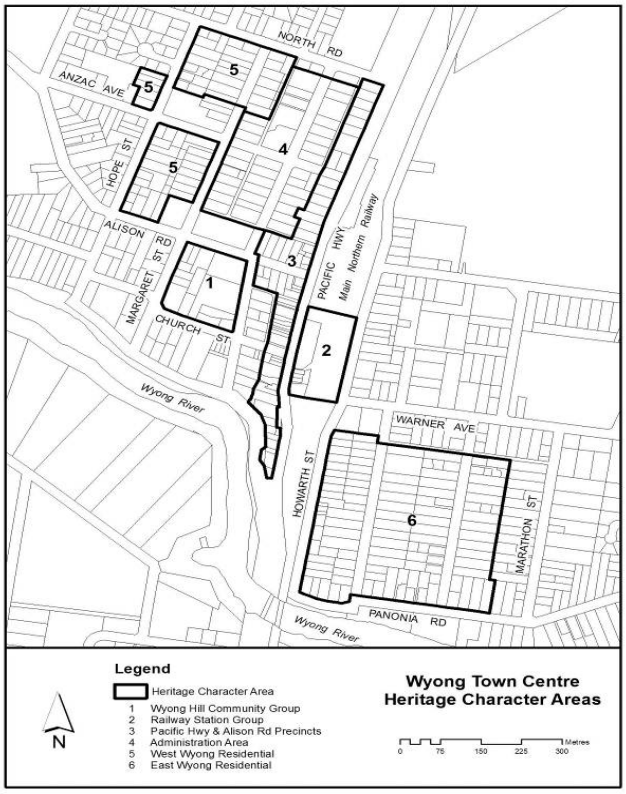

Figure 6 Heritage character areas in the Wyong Town Centre

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Precinct 1 – Wyong Hill Community Area

The Wyong Hill Community Area is centred on Wyong Town Park. Within its area are significant public structures including the former Wyong Public School (the oldest surviving building in Wyong Town Centre), the former Court House, and the WW1 and WW2 Memorial. The area is of social, historical and aesthetic significance.

REQUIREMENTS

a Maintain the 'hill top' effect. Any development within the vicinity of Wyong Hill Community Area must consider the impact of building bulk and scale in relation to Wyong Hill to ensure that Wyong Hill retains its prominence as a high point in the Wyong Town Centre.

b Provide opportunities for viewing aspects of the Wyong Town Centre and maintain visual links to Alison Road and Rankens Court.

c Development must make provision for accessibility in order to ensure that the area becomes a focal point for open-air activities in the Wyong Town Centre.

Precinct 2 – Railway Station Area

The Railway Station Area includes late-Victorian style railway buildings (now much altered) and the 1920s Railway Square shops constructed by A.H. Warner in an inter-War Gothic Style. The buildings are of historic, social and architectural significance because of their roles in the growth of the Wyong Town Centre.

Figure 7 Historic photo of Wyong Railway Station built in 1887

(Source: Rod Howard Heritage Conservation, 1994)

REQUIREMENTS

a Development must retain heritage items located within the railway station area.

b New buildings must respect the existing heritage structures, and be sympathetic in form and visual relationship.

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Precinct 3 – Pacific Highway and Alison Road

The Pacific Highway and Alison Road area incorporates buildings in a strip along the western edge of the Pacific Highway and up Alison Road to the Wyong Town Park Hill. It includes a range of commercial buildings such as hotels, cafes and shops. The architectural style of the area is dominated by a low-budget Modernist approach, often exemplified by the successive modernisations of street facades undertaken in the decades after World War 2.

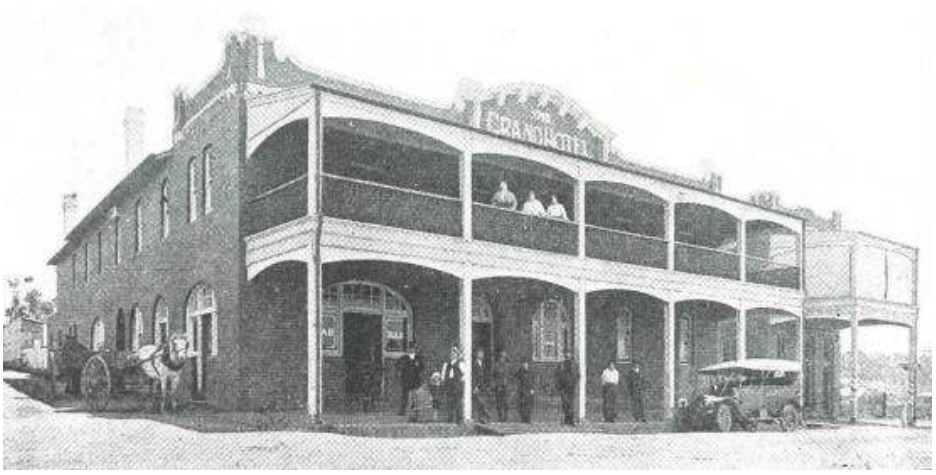

Figure 8 **Historic photo of the Grand Hotel on the Pacific Highway**

(Source: Stinson)

REQUIREMENTS

a New development should respect boundary setbacks of existing buildings.

b Ensure future development addresses the Wyong River on those sites with frontage to River Road.

c Ensure uses above ground level that complement existing uses at ground floor level.

d Ensure that new development is complementary to and consistent with the form, scale, height, and detail of the existing building stock in the vicinity. An example of new development that is compatible with the existing form, scale and height of an adjacent heritage building is provided below at Figure 9.

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Example of Commercial Heritage Infill Development:

Figure 9 below shows an example of new development on Church Street adjacent to a prominent heritage building along the Pacific Highway. The new development is built to the boundary which is consistent with the existing zero setback in an urban street. The scale and form of new development respects that of the heritage building. Upper levels of the new development are setback behind the front façade and do not detract from the historic turret that is a landmark along the Pacific Highway.

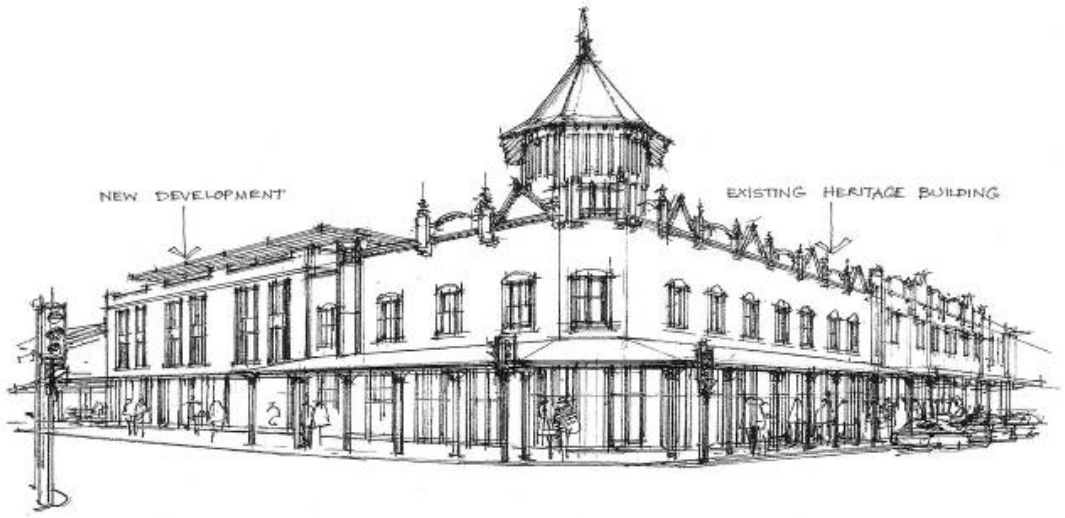

Figure 9 **Example of new development compatible with the scale of an adjacent heritage building**

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Precinct 4 – Administration Area

The buildings along Hely Street, Anzac Avenue and Margaret Street are relatively large-scale free-standing, Modernist design government administrative and community buildings constructed at various times after World War 2. Within the Administration Area is the Council Chambers building (1959), the Wyong Fire Station (c.1960), and the Wyong Memorial Community Hall (1965). The buildings in the Administration Area contribute to the social and historic significance of Wyong as a centre of Government administration.

Figure 10 Solicitors' offices in an historic building on Margaret Street

(Source: Stinson)

REQUIREMENTS

a Ensure future developments are consistent with and complement the existing characteristics of this area.

b New development should respect boundary setbacks of existing buildings and maintain distinctive freestanding arrangement of buildings.

Precinct 5 – Residential Cottages

This area is characterised by its uniformity of freestanding single storey typically timber dwellings on large allotments of land on gentle hill-slopes. The dwellings are of modest proportions, with larger, more substantial and opulent buildings in select locations nearer the top of the hill and adjacent to the Wyong River. The houses in the Residential Cottages area are from all periods of the 20th century and are representative of the housing stock evident throughout the Wyong Town Centre. The houses are of aesthetic and cultural/historic significance for their potential to demonstrate the architectural styles, forms, scale and materials of residential living in the Wyong Town Centre.

REQUIREMENTS

a Design of new houses on existing allotments should complement, not imitate, nearby existing houses.

b The setback of new houses on existing allotments should match adjacent existing houses.

c Any infill development must be set back behind the existing stock.

d The form, bulk, scale and detailing of new houses on existing allotments should be consistent with nearby houses. An example of new development that is compatible with the existing form, bulk, scale and detailing of an adjacent heritage building is provided below at Figure 11.

Example of Residential Heritage Infill Development:

Figure 11 below shows a well-considered example of Residential Heritage Infill Development behind an existing heritage cottage on Hope Street. The new development is set back behind the existing heritage cottage. The width of the development mimics the scale of the cottage and the three storey height of the development is set down the hill from the cottage, so that the overall form does not overwhelm the existing cottage when viewed from the street. In addition, the change of materials on the façade further breaks up the apparent scale. The new development has a masonry base and the timber used as a highlight on the gable end reinterprets the timber used in the historic cottage.

Figure 11 Example of residential heritage infill development at Hope Street

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4.5.2.2.5 Heritage Setbacks

OBJECTIVE

- To provide sufficient separation so that new development does not have a negative impact on heritage buildings and permits appreciation of the significant aspects of the adjoining heritage building

REQUIREMENTS

a Buildings adjacent to heritage buildings are to have a maximum height of four storeys stepping down to two storeys at street frontages.

b Buildings adjacent to heritage buildings are required to have sufficient appropriate setback from significant parts of the heritage item. This is especially important at the street address and should be in the order of 3-5 metres. The exception to this requirement is in urban commercial areas where zero lot setbacks are permitted and are part of the existing character of the streetscape.

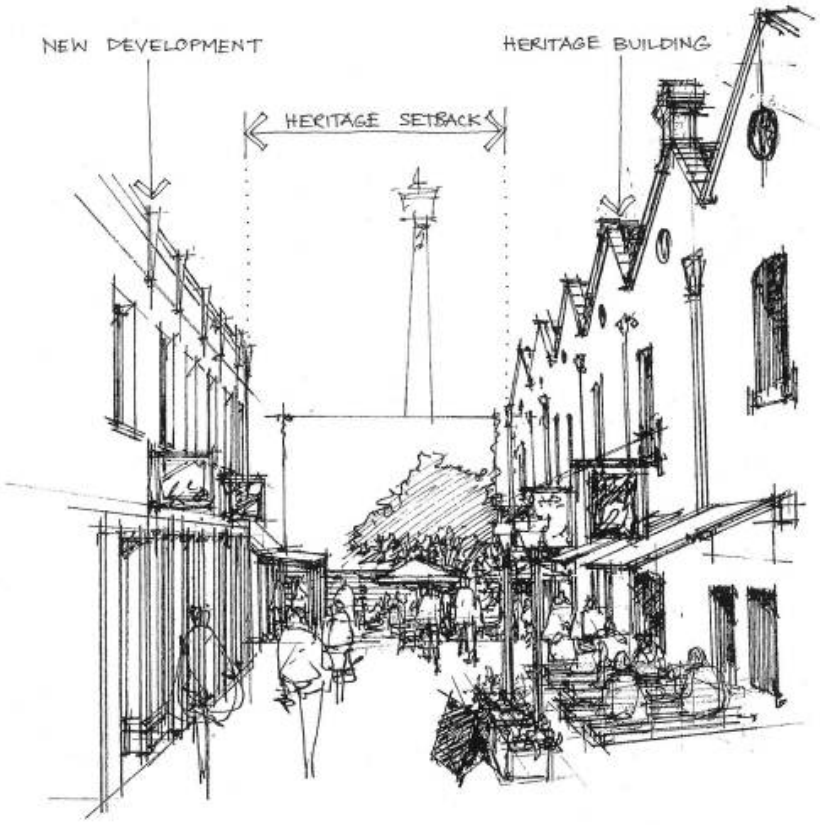

Figure 12 **Example of separation between a heritage building and new development on Hely Street**

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4.5.2.2.6 Heritage Materials and Colours

In order to maintain the overall integrity of Heritage Buildings, any new work should incorporate the use of traditional materials and colours in the external façade where appropriate. Traditional materials and colours can also be used for detailing in new development in the Wyong Town Centre to support the Heritage Theme.

OBJECTIVE

To maintain a traditional materials and colour palette for heritage buildings and to incorporate some reference to traditional materials and colours into new buildings

REQUIREMENTS

a Refer to the requirements in Section 3.6.4 ~~the Chapter 3.6: Heritage Conservation~~ for new works to ~~Heritage Buildings~~heritage items and Section 3.6.5 for new works in heritage conservation areas.

b For works in other areas of the Wyong Town Centre consider reinterpreting and incorporating some heritage materials into new buildings. Heritage materials that are characteristic of the Wyong Town Centre include sandstone, timber, brickwork and metal roofing as shown in Figure 13 below.

c For development that does not involve works to Heritage Buildings, consider incorporating some traditional heritage colours in certain areas. For example, colour can be used to highlight a repetitive building element that introduces a human scale to a contemporary design.

d Commercial ranges of 'heritage' colours from major paint suppliers and reference texts are available to assist selection. An example of a traditional range of paint colours is shown in Figure 15 below.

Metal Roofing Sandstone Brickwork Timber

Figure 13 Examples of traditional materials found in the Wyong Town Centre heritage buildings

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Example of heritage materials in new Development:

An example of heritage materials used in a masonry base of a new development adjacent to a heritage building is shown at Figure 14.

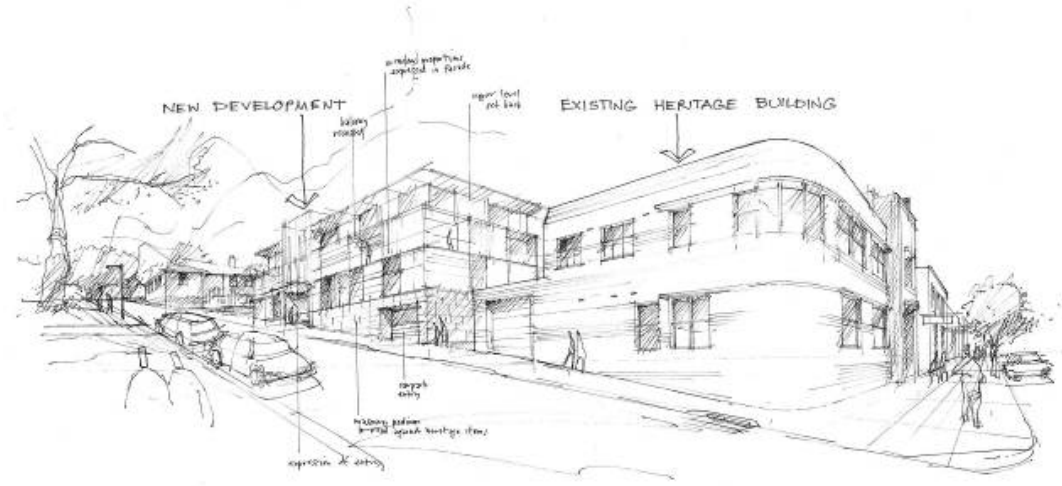

Figure 14 Example of heritage materials used in a masonry base of a heritage infill building

Figure 15 Example of heritage colours by Dulux

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4.5.2.3 Streetscape and Public Areas

OBJECTIVES

- To provide a range of features which create an identifiable heritage character for the public realm of the Wyong Town Centre and the surrounding residential areas
- To provide street furniture in appropriate locations that is well designed, distinctive and will complement existing items, including the heritage theme
- To provide unique lighting for the public realm that is high quality, well designed, appropriate to the location, adds safety and liveliness to the town and is of a scale suited to pedestrian activity
- To ensure a practical and safe ground surface for the public realm which must meet specific criteria in terms of appearance, structural properties, cost, quality control and cleaning

REQUIREMENTS

4.5.2.3.1 Paving

a Provide street paving in front of new development in accordance with Figures 16 and 17 below.

b The individual character of special precincts or places should be identified and enhanced with lighting, planting, street furniture, public art, signage, and paving material provided that is consistent with the location.

c Heritage items or buildings of significance are to be highlighted and interpreted by the use of bronze plaques in the paving, which provide a brief history of the particular building. An example of a plaque is shown in Figure 21 of this Chapter. The content and the design of the plaque is to be approved by Council.

d Adjacent public and private owned outdoor spaces should be integrated through the choice of consistent paving materials and detailing.

Figure 16 Example of urban street paving in the Wyong Town Centre

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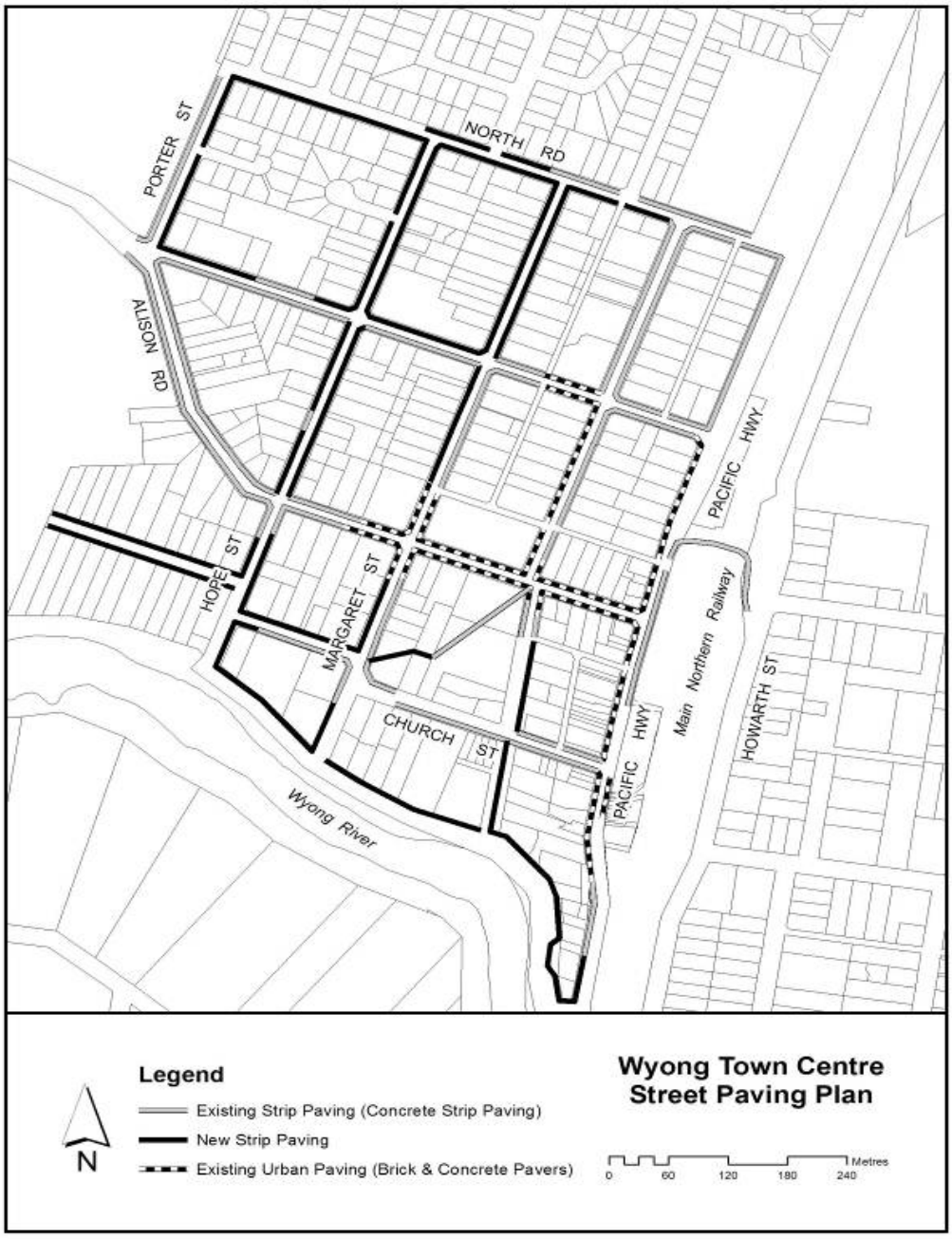

Figure 17 Street paving plan for the Wyong Town Centre

4.5.2.3.2 Lighting

a The public realm should be illuminated by high quality, well designed fittings appropriate to the location and of a scale suited to pedestrian activity.

b The materials, colours, finishes or detailing of lighting fixtures should provide a reference to the heritage town.

c Lighting for the public realm of the Wyong Town Centre should:

i accentuate the entrances and major gateways;

ii highlight special elements and features;

iii increase the understanding and navigation of the town at night by highlighting major streets, open spaces and single elements;

iv improve the attractiveness and appeal of the town at night.

v assist security

4.5.2.3.3 Street Furniture

REQUIREMENTS

a Provide street furniture that harmonises with the Heritage Theme for the Wyong Town Centre. Examples of existing street furniture in the Wyong Town Centre are shown in Figure 18.

b Seating should be ergonomically designed to provide comfort and ease of use (including for the elderly and very young). Materials should maximise comfort and amenity in relation to climate, safety and maintenance issues.

c The location of seating should be based on public need, especially considering the aged and parents with children.

d The form and structural strength of bollards should be adequate to meet function requirements. Removable and hinged bollards should be provided to meet the needs of service access.

e Bollards should be attractive in appearance, especially with regard to situations where a number of bollards are required.

f Rubbish bins should be located in a clear line-of-site to seating, public transport stops, or pedestrian routes.

g The form and strength of bin enclosures should be adequate to meet functional requirements. Bin enclosures should be aesthetically well designed with an obvious indication of purpose.

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Figure 18 An example of street furniture in the Wyong Town Centre

4.5.2.4 Landscape Design

The history of Wyong as a timber and farming town has resulted in a mix of vegetation. Remnant native forest trees, salt marshes and coastal tree species dominate the town's canopy. Cultural planting of *Phoenix canariensis* (Date Palm) in the 1920s along the Pacific Highway gives a strong focal point to the town. Street trees should be provided wherever possible to improve the appearance and amenity of the Wyong Town Centre.

Figure 19 An example of a date palm along the Pacific Highway

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OBJECTIVES

- To retain any existing landscaping that complements the existing buildings and the public realm generally
- To provide additional street trees and plantings wherever possible, that are consistent with the Street Tree Masterplan for the Wyong Town Centre, in order to improve the appearance and amenity of the public realm

REQUIREMENTS

a Council requires a high standard of landscaping fitting for a town centre, especially around Gateway sites therefore, landscape design should be prepared by a suitably qualified landscape professional.

b Development is to provide a structured and ordered landscape treatment within the Town Centre and Business/ Administration Precinct which reinforces and enhances the urban and civic character.

c The entry to Wyong at the Pacific Highway and River Road intersection is to be emphasised through the use of distinctive plant forms and colours.

d Landscape treatment is to express the transition from naturalistic and informal along the Wyong River to structured and formal within the Town Centre through the use of indigenous species in ordered layouts, clustered planting of single tree species and the use of a mix of indigenous and exotic species.

e Where possible and appropriate, native plant species, particularly those endemic to the locality should be used. In the Wyong Town Centre, some exotic species have been used or are suggested as they relate better to the adjoining built form.

f The planting of canopy trees at street level is encouraged to soften the visual impact of surrounding buildings.

g New development and landscaping is to have minimal impact on significant cultural plantings which form the setting of heritage buildings.

h Street tree planting should support the scale, hierarchy, continuity and amenity of streets.

i Major streets should use large urban trees and minor streets should use smaller clean-trunked trees. In some situations such as narrow lanes or adjacent to heritage buildings or special features, street trees should be omitted or used to frame the special features.

j The hierarchy of streets in the town should be reinforced by a selection of species appropriate to the scale and type of street. The Greening Wyong Strategy, prepared by Council's Landscape Architects, identifies appropriate street trees for the Wyong Town Centre. The Street Tree Masterplan that was current in May 2011 is shown in Figure 20.

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	STREET TREES LIST		**STREETS**
	Arbutus unedo	Irish Strawberry Tree	Margaret Street, Hely Street
	Lophostemon confertus	Brush Box	Warner Avenue
	Tristaniopsis laurina	Watergum	
	Magnolia grandiflora	Bull Bay Magnolia	Pacific Highway
	Pyrus calleryana	Callery's Pear	Alison Road
	Acmena smithi	Lillypilly	Margaret Street
	Pistachia chinensis	Chinese Pistachio	Anzac Avenue
	RIVERINE SPECIES		
	Eucalyptus maculate	Spotted Gum	River Road
	Eucalyptus tereticornis	Forest Red Gum	Hope Street
	Alphitonia excelsa	Red Ash	Howard Street
	Waterhousia floribunda	Weeping Lillypilly	Rose Street
	Acmena smithi	Lillypilly	North Road, Byron Street
	Ceratopetalum gummiferum	NSW Christmas Bush	Porter Street, Hope Street
	Glochidion ferdinandi	Cheese Tree	Leppington Street, Marathon Street
	Arrival planning of large trees in reserve areas, eg. *Eucalyptus tereticornis, Corymbia maculata*		

Figure 20 Street tree masterplan for the Wyong Town Centre as at May 2011

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4.5.2.5 Public Art

The Wyong Town Centre has a long association with the arts and many local artists' groups currently have their facilities in buildings in the Town Centre area. If the Wyong Town Centre is to become a cultural and heritage focus for the Central Coast, it is important that some consideration be given to the provision of public art in new development.

OBJECTIVE

To physically express the cultural and heritage focus of the Wyong Town Centre through the provision of public art in new development

REQUIREMENTS

a Major developments valued at $5 million or greater must implement public art as part of the development in accordance with Chapter 5.48: Northern Areas -Public Art

b Developments valued between $1 million and $5 million are strongly encouraged to provide the opportunity for public art in new development.

c For developments under $5 million, public art could include an item of work commissioned by a local artist, a custom designed mural on an external surface, a heritage image superimposed onto an external structure, or a contribution made to the Heritage Walking Trail.

d The proposed Heritage Walking Trail takes in the major heritage sites in the Wyong Town Centre and is shown in Figure 22. A contribution to the Heritage Walking Trail could include the provision of paving around heritage or significant buildings or an indication of the significance of the item by providing a plaque as shown in Figure 21 below.

Figure 21 **Heritage plaque laid in paving in front of the Turton Building on the Pacific Highway**

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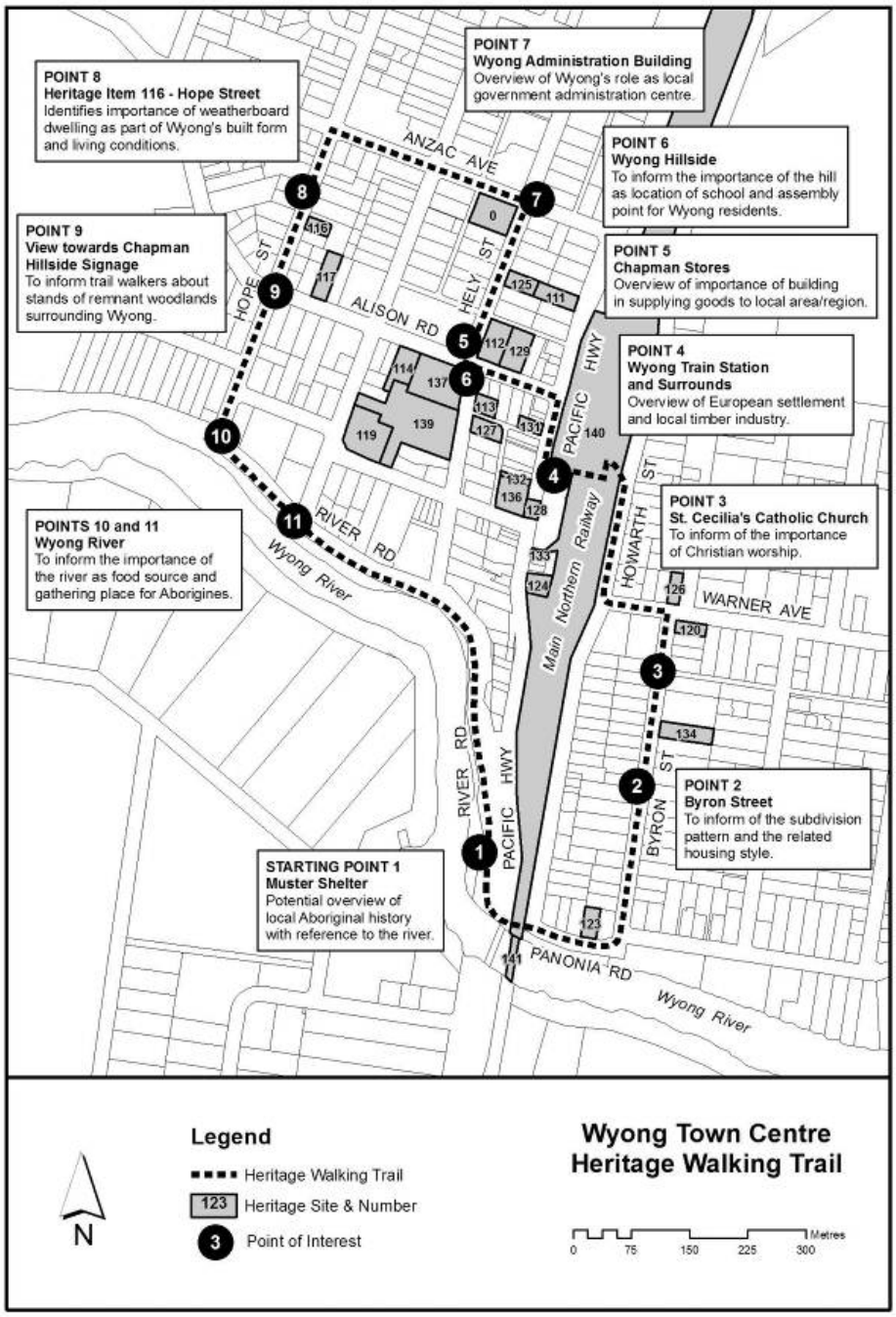

Figure 22 Proposed heritage walking trail for the Wyong Town Centre

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4.5.3 SPECIAL PROVISIONS FOR SPECIFIC AREAS

4.5.3.1 Precincts

Six precincts, as shown below, have been identified in the Wyong Town Centre and are shown in Figure 23:

- Town Centre
- Business Administration
- Mixed Density
- Active River Foreshore
- Baker Park Precinct
- Parkland Cottages

OBJECTIVE

To enable new development that is consistent and compatible with the functions of the precincts and respects the existing features and character of the area

4.5.3.1.1 Town Centre

The Town Centre is a mixed-use precinct incorporating a range of retail, commercial and community functions. Several prominent heritage buildings and landscape elements are located in the Centre.

REQUIREMENTS

a Promote heritage buildings as a point of difference for retail and strengthen the heritage character of the precinct.

b Continuous awnings are to be provided along the Pacific Highway.

c Lots fronting the Pacific Highway and Anzac Avenue are to have noise attenuation and security measures provided to achieve adequate amenity.

d Buildings are to create a consistent edge to the Pacific Highway, Hely Street, Margaret Street, Alison Road, and Anzac Avenue.

e In order to maintain the heritage scale of the Wyong Town Centre, a stepped setback is required for selected sites on Alison Road and the Pacific Highway in accordance with Central Coast LEP 2022. An illustration of this setback is provided below in Figure 25.

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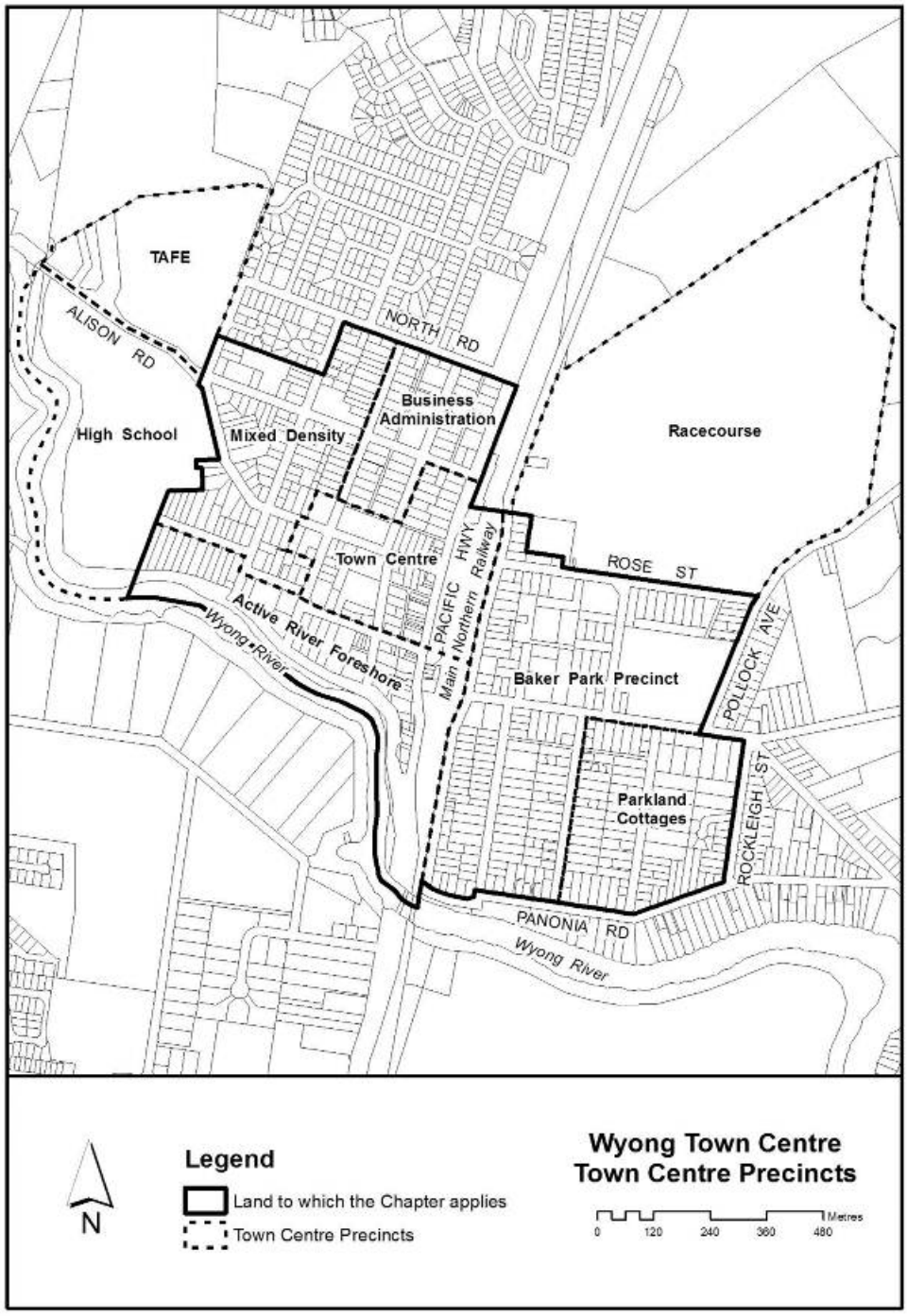

Figure 23 Wyong Town Centre Precincts

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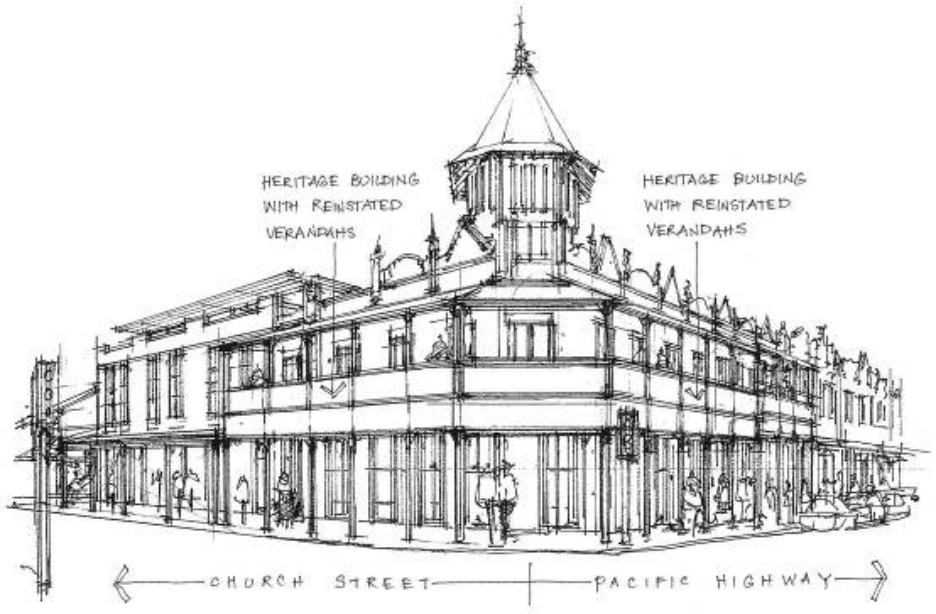

Figure 24 Example of reinstating verandahs to a heritage building to provide a continuous pedestrian awning along the Pacific Highway

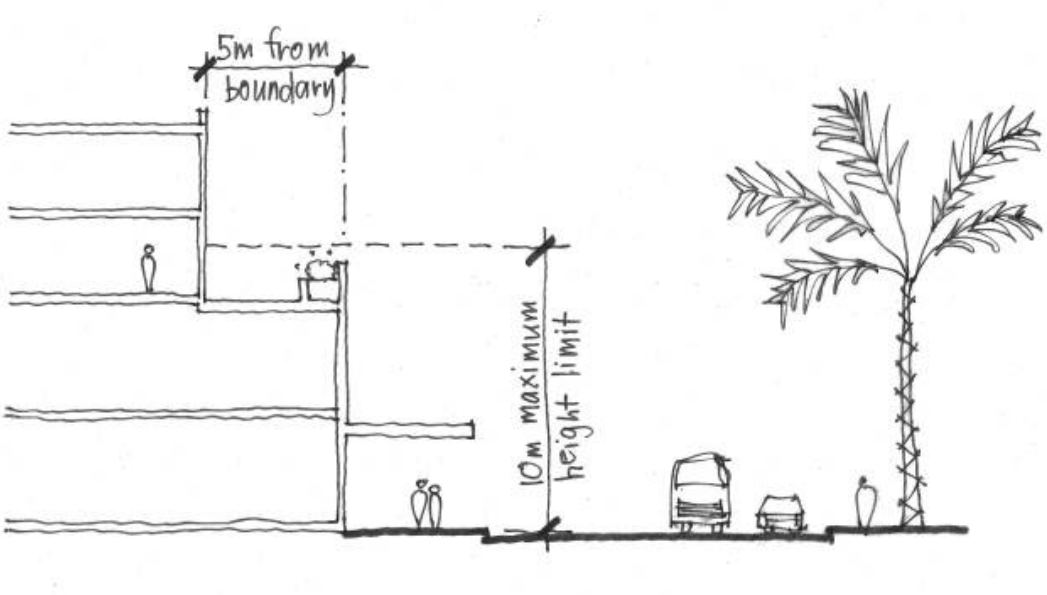

Figure 25 Heritage stepped setback

4.5.3.1.2 Business Administration

The Business / Administration precinct provides regional administrative and commercial functions. Civic functions include the Court House, Council offices, Civic Centre and Memorial Hall. This precinct has low-lying areas along an old creek line in the centre of the precinct.

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REQUIREMENTS

a Extend existing streetscape improvements to reinforce the civic character of the precinct.

b Extend streetscape improvements along the Pacific Highway to upgrade the approach to the Town Centre.

c Upgrade existing laneways for pedestrian access.

d Provide connections from Hardware and Pauline Lanes to Hely and Margaret Streets adjacent to the public / special use lands.

e Buildings are to create a consistent edge to the Pacific Highway, Hely Street, Margaret Street, Anzac Avenue and North Road.

Figure 26 **Example of buildings creating a consistent edge along the Pacific Highway**

4.5.3.1.3 Mixed Density

This is a residential precinct predominantly comprised of detached dwellings with small areas of new medium density development consisting of single storey villa and two storey townhouses. The area is characterised by moderate to gentle slopes falling to a low-lying central zone.

REQUIREMENTS

a Buildings are to create a consistent edge to Margaret Street, Alison Road, Anzac Avenue and North Road.

b Ensure medium density buildings address the street and are not orientated to an access driveway running down a deep lot.

c Upgrade streetscapes through such measures as street tree planting and landscaped frontages to medium density residential buildings.

4.5.3.1.4 Active River Foreshore

The Active River Foreshore has a mix of commercial and retail uses along the Pacific Highway and commercial / residential areas adjacent to Wyong River.

REQUIREMENTS

a Buildings are to create a consistent edge to the Pacific Highway and Margaret Street.

b For further requirements for this precinct refer to Section 4.5.3.7 Local Area Masterplans in this Chapter.

4.5.3.1.5 Baker Park Precinct

A residential and sporting precinct incorporating extensive active recreation facilities including Baker Park oval, netball courts, tennis courts, public swimming pool, and the Wyong Racecourse.

REQUIREMENT

For requirements for this precinct refer to Section 4.5.3.7 Local Area Masterplans in this Chapter.

4.5.3.1.6 Parkland Cottages

A predominantly residential precinct comprised of single cottages as well as some single storey unit and villa developments.

REQUIREMENT

Upgrade streetscapes through such measures as street tree planting and landscaped frontages to residential buildings.

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4.5.3.2 Gateways

Five (5) main 'gateway' locations to the Wyong Town Centre have been identified for special attention to establish attractive entrance features to the township. Three (3) minor entry points to the retail/commercial precinct have also been identified. Figure 27 is a map showing the sites adjacent to the 'gateways' in the Wyong Town Centre. Two of the main gateway locations are adjacent to previously identified Key Sites as indicated in Figure 32 of this Chapter.

OBJECTIVE

- To establish "gateway" locations to the Wyong Town Centre to ensure a favourable first impression which projects a sense of arrival and encourages visitors to stay and explore

REQUIREMENTS

a Development of Gateway Adjacent Sites is to be of particularly high quality to assist in creating a favourable first impression, project a sense of arrival and encourage visitors to stay and explore.

b A landscape assessment and design report prepared by a suitably qualified landscape professional is required to accompany applications for development at these critical locations. Council's Landscape Architect should be contacted to ascertain any specific landscaping requirements.

c Gateway Signage is to be located at strategic entrances, particularly those Gateways to the Town Centre. Such signage should be developed in consultation with the community.

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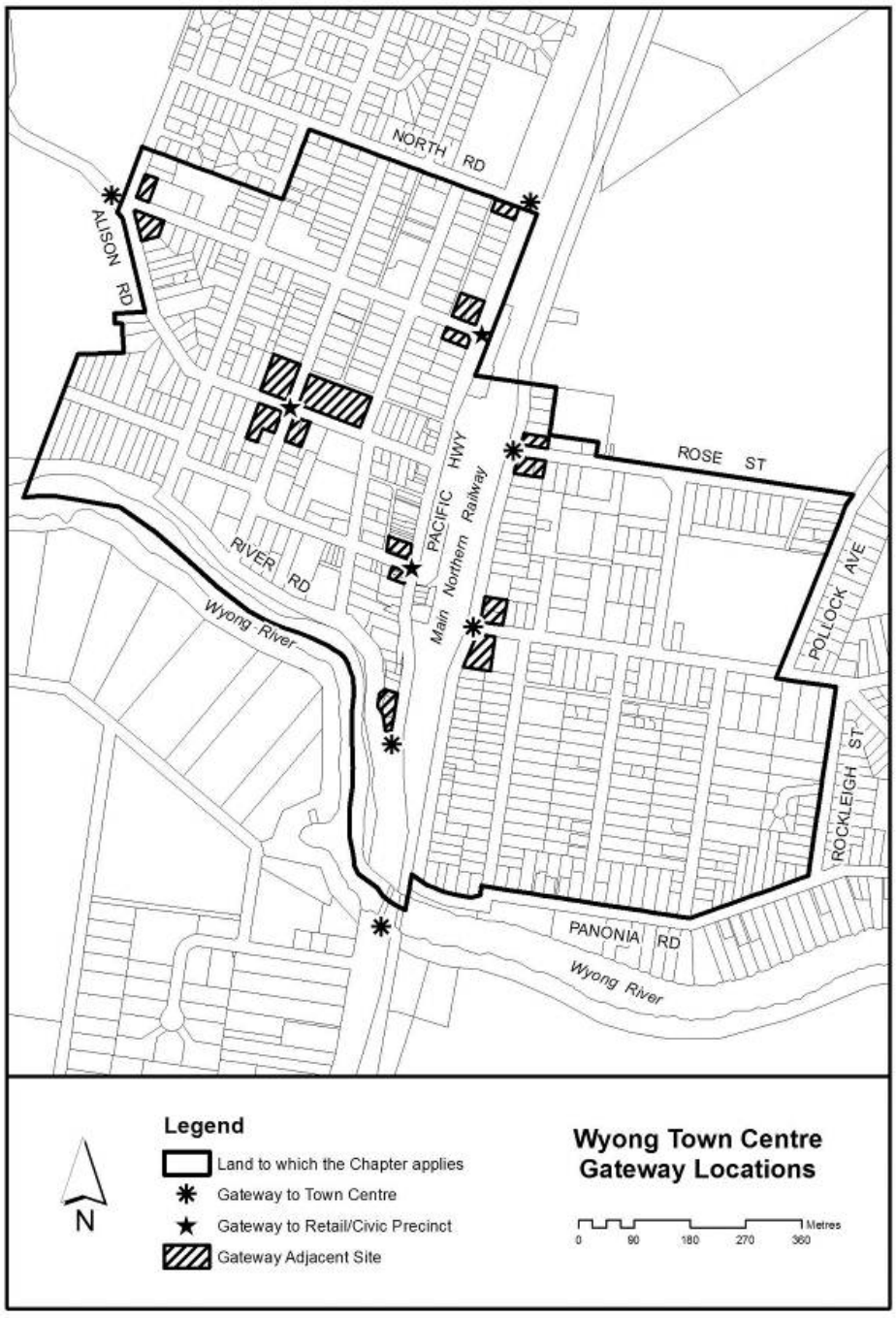

Figure 27 Map showing sites adjacent to gateways in the Wyong Town Centre

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4.5.3.3 View Corridors

Looking towards The Entrance from Wyong Town Park Hill

Looking towards Chapman Hill from Wyong Town Park Hill

Looking down Hely Street from Wyong Town Park Hill

Looking towards Jilliby from Wyong Town Park Hill

Looking towards Wyong River from the Corner of Church and Margaret Streets

Looking towards Mardi from Wyong Town Park Hill

Figure 28 Examples of existing views in the Wyong Town Centre to be retained

OBJECTIVES

- To ensure that Wyong Park remains the dominant element in the townscape emphasising the hill and the landscape elements of the town
- To encourage development and allow for increased height while ensuring that existing significant view corridors are maintained

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REQUIREMENTS

a View corridors are to be maintained from Town Park Hill west to Ourimbah State Forest, east and south to The Entrance, Tuggerah Lake, Long Jetty, Glenning Valley and Tumbi Umbi, north along Hely Street and north-west to Chapman's Hill.

b View corridors are to be maintained along Hely Street from Town Park Hill to Wyong Grove Primary School.

c View corridors are to be maintained across the Active River Foreshore precinct from Wyong Town Park Hill to McPhersons Road, south of Wyong River, and to Mardi and Kangy Angy Mountain.

d View corridors are to be maintained across the Baker Park precinct from Wyong Town Park Hill to Noraville and Toukley and The Entrance and Tuggerah Lake.

e Provide view corridors between buildings from Church Street to Wyong River.

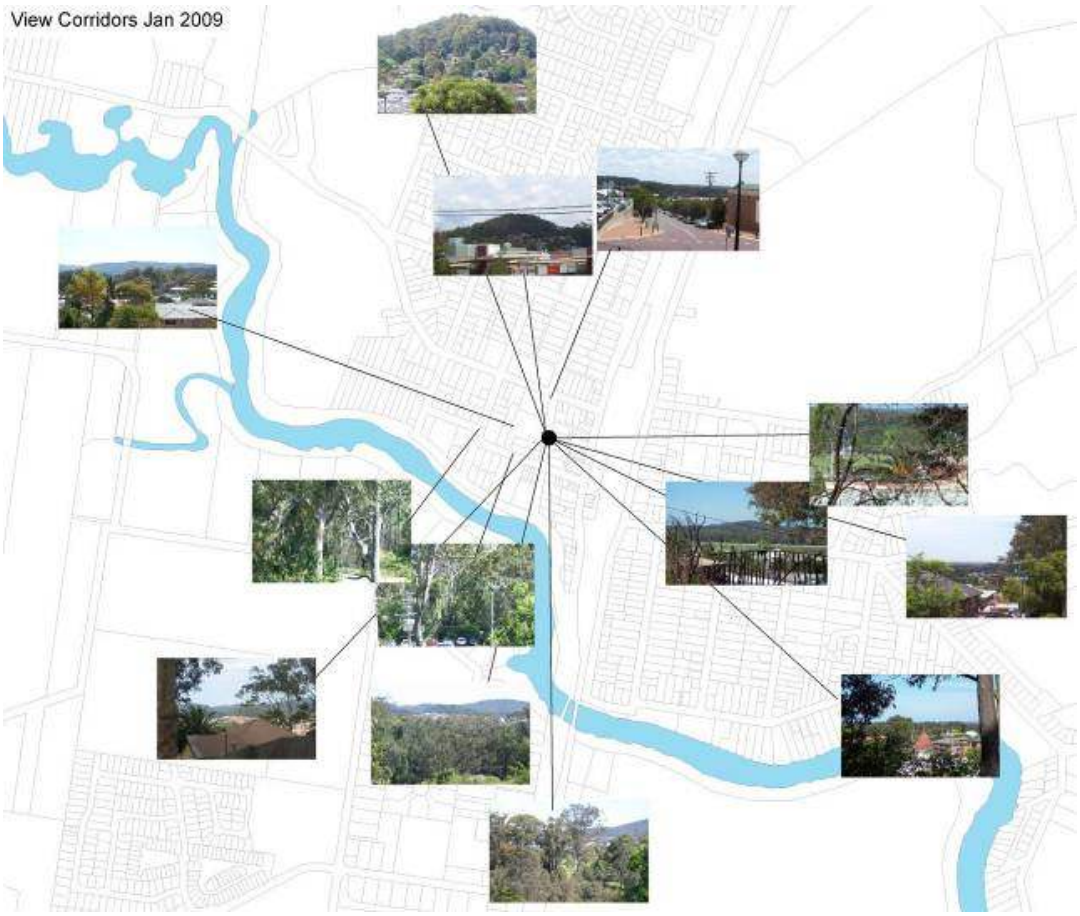

Figure 29 View corridors to be maintained in the Wyong Town Centre

4.5.3.4 Low-Lying Areas

Low-lying areas within the Wyong Town Centre may experience high ground water levels and/or potential acid sulphate soils due to the location of the town on the Wyong River.

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OBJECTIVE

- To identify those sites at risk of high ground water levels, and/or potential acid sulphate soils, and assess their suitability for development

REQUIREMENT

a A geo-technical assessment is required for low-lying areas to assess the suitability of sub-strata to support development. A ground-water study is also required to be submitted for all development in these areas addressing the requirements contained in Section 5.2.5 Stormwater Management. In the Wyong Town Centre, low-lying areas are defined as those sites below 8 metres AHD and shown grey on Figure 30 below

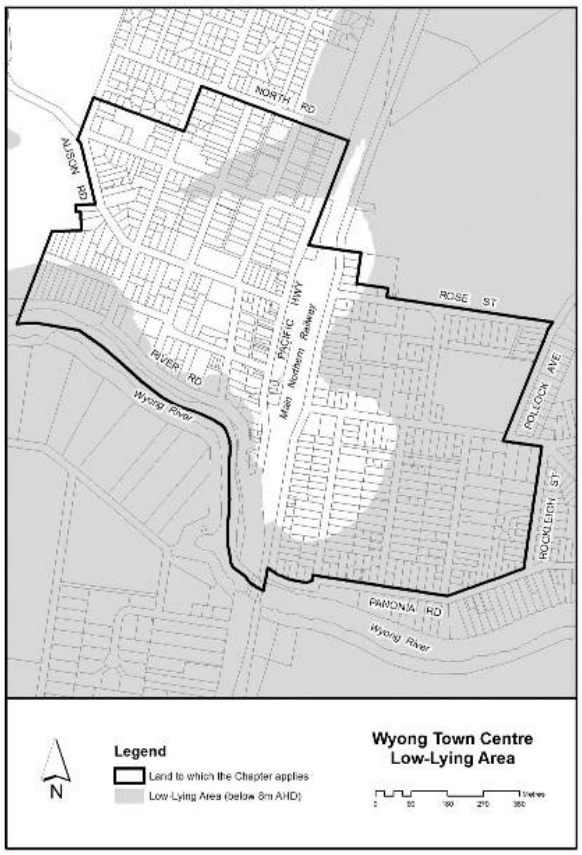

Figure 30 Map showing general location of the low-lying area (below 8m AHD)

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4.5.3.5 Laneways

OBJECTIVE

- To create a pedestrian and bicycle focussed environment by enhancing or providing new pedestrian connections in the local area

REQUIREMENT

a New development on sites adjoining the laneways and pedestrian connections illustrated in Figure 31 below shall contribute to these works as directed by Council.

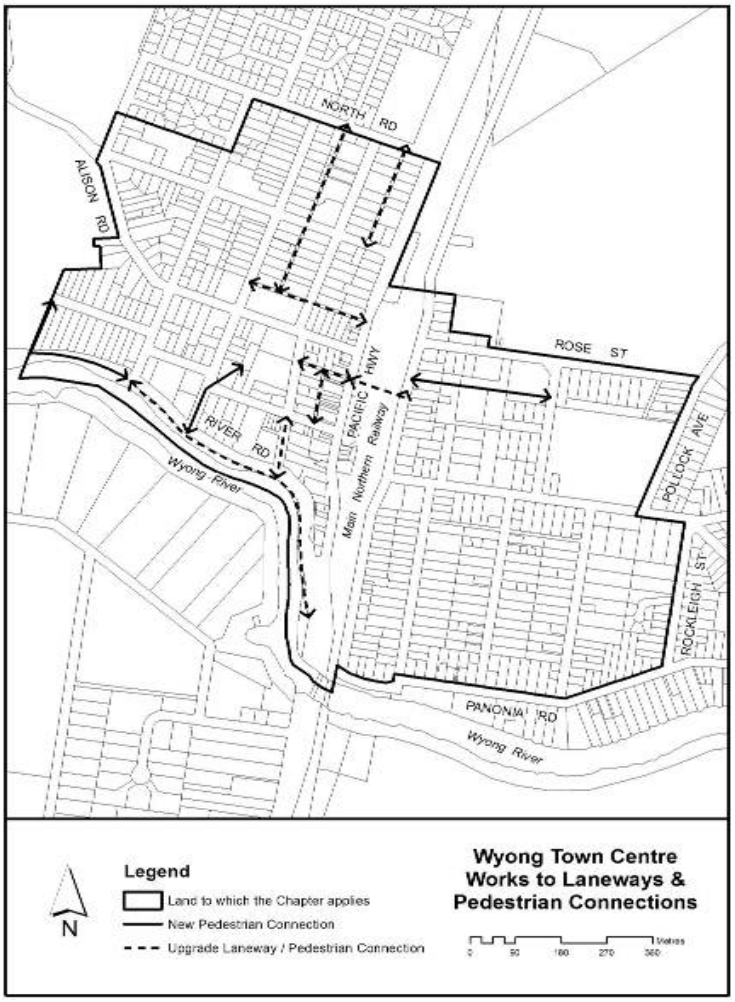

Figure 31 Map showing proposed new pedestrian connections and upgrades to laneways

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4.5.3.6 Key Sites

Wyong LEP 2013 identified Key Sites that have the potential to be a catalyst for economic growth and development confidence. Several of these sites are within the Wyong Town Centre area and are identified in Figure 32. Applicants should verify the current status of the Key Sites with Council and if any sites relevant to their area have been added or subtracted.

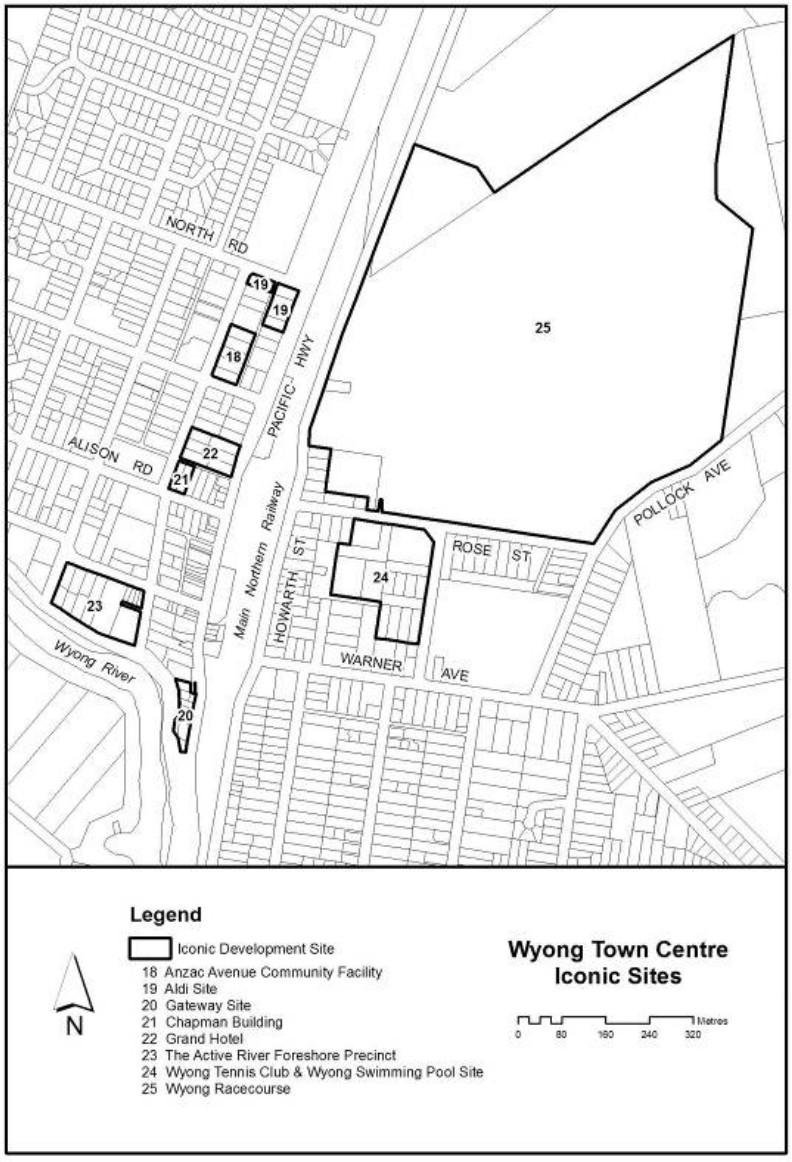

Figure 32 **Map showing the location of key sites**

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OBJECTIVES

- To facilitate the economic growth by identifying sites within the various commercial/retail centres that would provide a significant economic benefit if they were developed to a suitable standard
- To ensure that any redevelopment of nominated Key Sites considers the existing heritage character of the Wyong Town Centre

REQUIREMENT

a For the requirements for development of Key Sites, applicants should refer to Chapter 5.49 Northern Are Key Sites where relevant.

b Figures 33 and 34 show two examples of the possible reuse and redevelopment of the Chapman Building Key Site. This site contains a heritage building fronting Alison Road that is to be considered by proponents when proposing to redevelop the subject site and other sites in this locality.

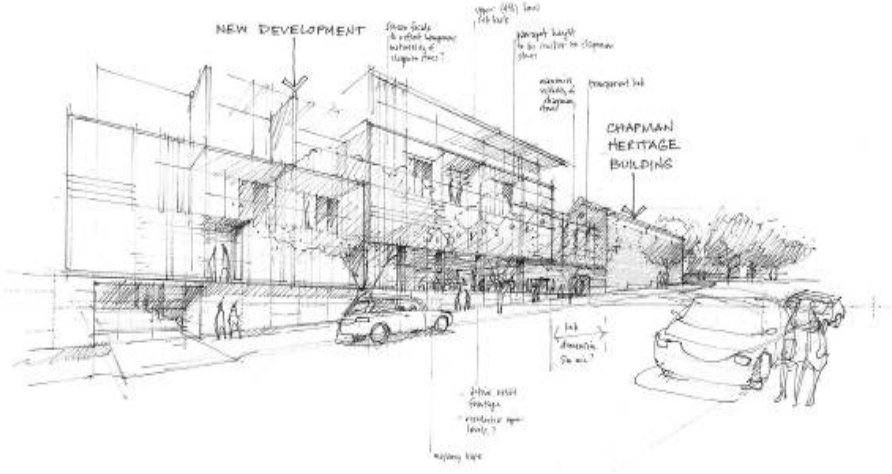

Figure 33 First example of the possible reuse and redevelopment of the Chapman Building Key Site viewed from Hely Street

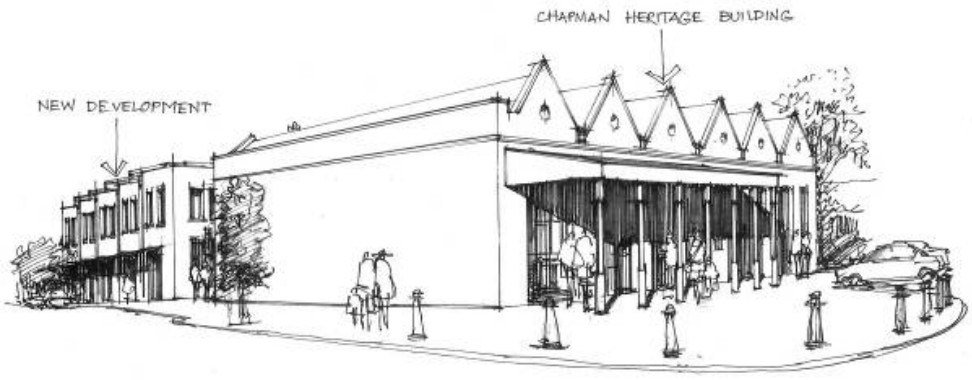

Figure 34 Second example of the possible reuse and redevelopment of the Chapman Building Key Site viewed from the corner of Hely Street and Alison Road

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4.5.3.7 Local Area Masterplans

A Masterplan is a long term strategic planning document that describes visually and by narrative the desired future of an area. Masterplans seek to provide a general land use plan based upon the opportunities and constraints that exist. A Masterplan will generally focus on a smaller area and provide a higher level of detail compared to a local planning strategy, but will not provide the level of detail found in detailed design plans. They are not statutory documents but provide a detailed vision for an area which informs planning instruments such as Local Environmental Plans and Development Control Plans.

The following Local Area Masterplans apply to development within the Wyong Town Centre:

- Active River Foreshore Masterplan;
- Baker Park Masterplan; and
- Wyong Cultural and Civic Centre Masterplan

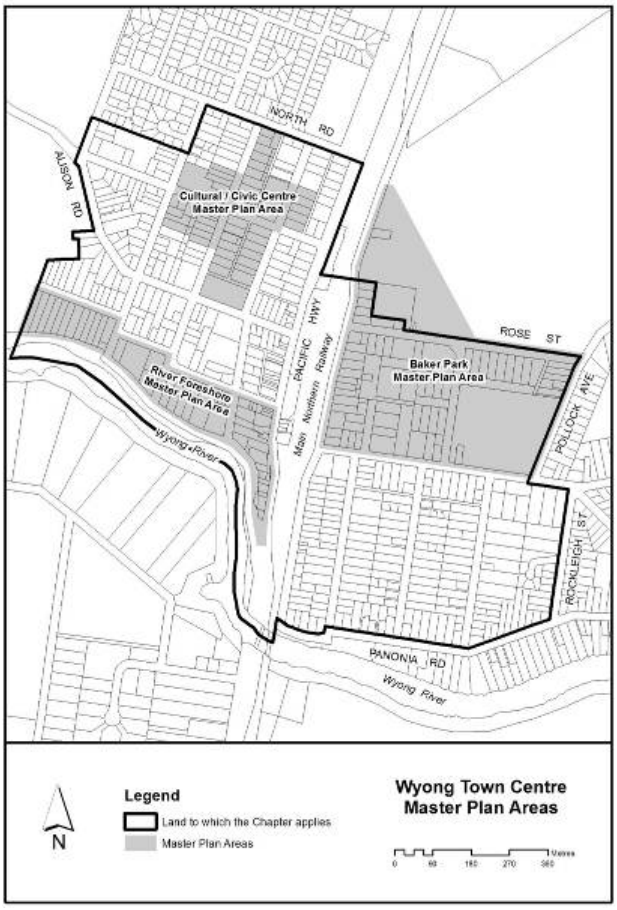

Figure 35 Map showing the masterplan areas for the Baker Park, River Foreshore and Cultural / Civic Centre Areas

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4.5.3.7.1 Wyong Cultural and Civic Centre Masterplan

The Wyong Cultural and Civic Precinct Masterplan forms part of the implementation program of the Wyong/Tuggerah Planning Strategy adopted in October 2007. The Masterplan seeks to provide a framework for the future cultural and civic precinct, based on a clear vision and a comprehensive set of design principles. The masterplan aims to aesthetically strengthen the area as the civic and cultural hub.

The adopted masterplan identifies particular key proposals that include significant public domain improvement works. These have been developed from the analysis of the opportunities and constraints in existence and how they could be applied. These projects include the Anzac Avenue Cultural Precinct, Frank Balance Park and also the Civic Plaza.

OBJECTIVE

To improve the urban fabric of the precinct in order to aesthetically strengthen the area as the civic and cultural hub

REQUIREMENTS

a Minimise development in the low–lying areas of Anzac Avenue to mitigate potential storm water issues.

b Development is to continue any new paving works commenced within the precinct in accordance with the principles outlined in the masterplan.

c Development on the corner of Margaret Street and Anzac Avenue shall provide public open space to enable pedestrian activity in the cultural hub.

d Development surrounding Frank Balance Park should relate to the scale of the park. Buildings should be set back from the boundary and step down towards the park.

e Development must not excessively overshadow Frank Balance Park.

f Development on sites on Anzac Avenue to the north of Frank Balance Park should have a minimum six metre setback to the boundary adjacent to Anzac Avenue.

g Development occurring immediately to the south of Frank Balance Park must visually address both the street and the park and provide passive surveillance opportunities. Long windowless or unarticulated walls will not be permitted along the park boundary.

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Figure 36 Wyong Cultural and Civic Centre Masterplan dated July 2011

4.5.3.7.2 Active River Foreshore Masterplan

The former Wyong Shire Council adopted the Active River Foreshore Masterplan in 2009. The intent of the Masterplan is to provide a long term vision with directions to sustainably manage the reactivation of the Wyong River Foreshore over the next 20 years. A copy of the Active River Foreshore Masterplan can be obtained by contacting Council or can be downloaded from Council's website at http://www.wyong.nsw.gov.au/building-and-development/planning-strategies/wyong-active-river-foreshore-and-baker-park-masterplans/

The Active River Foreshore Masterplan looks at reactivating the river frontage and creating a visual and physical link with the Wyong Town Centre. The focus is on residential development orientated to the river and commercial/civic development along the Pacific Highway and the Rankens Court laneway. A site plan of the preferred option for development on the Active River Foreshore precinct is provided in Figure 37. Some objectives and requirements for development in this area are also listed below.

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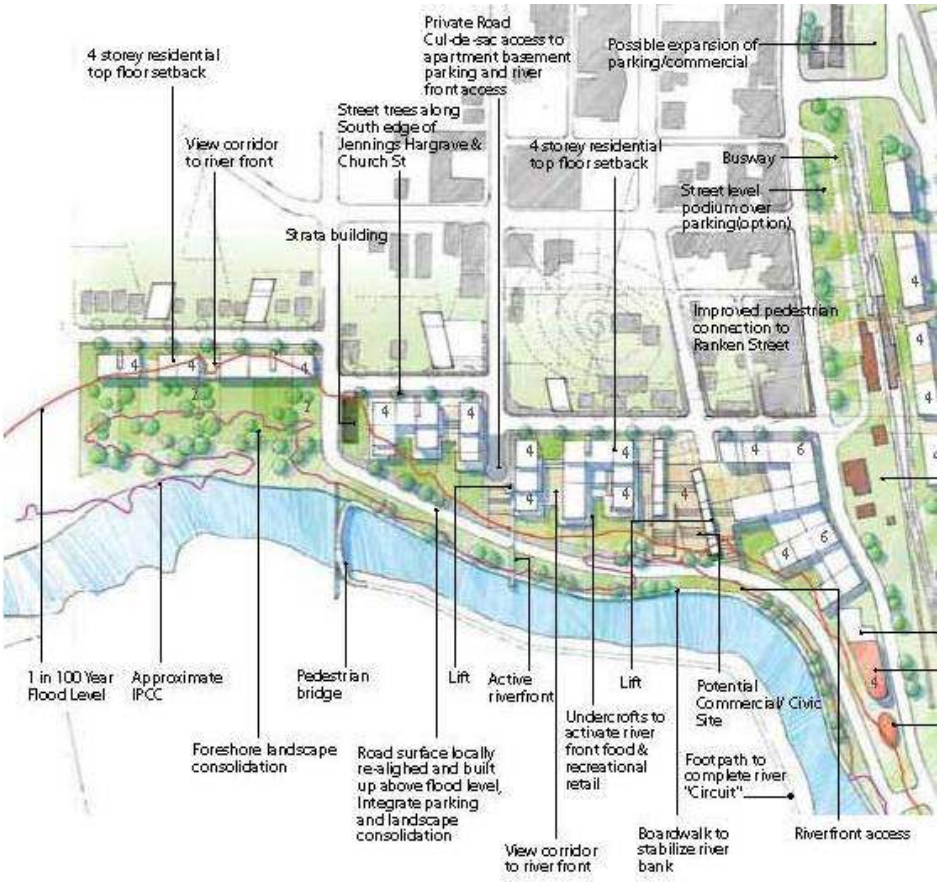

Figure 37 Site plan of the preferred masterplan option for the Active River Foreshore Area

OBJECTIVES

- To encourage amalgamation of smaller sites while retaining and promoting fine grain frontage to Hargrave Street and River Road as well as encouraging address to side access down to riverfront areas
- To activate a retail precinct to Church Street and Hargrave Street
- To allow an increase in residential uses and height in key sites where additional height can be demonstrated to have an overall positive effect upon the built form of the Precinct
- To ensure a consistent contemporary and modern architectural form and treatment
- To encourage a degree of unity in the built form through adherence to a typology that encourages a cohesive pattern with which buildings occupy the block and address the street
- To create an active frontage and definition of public domain
- To maintain and enhance where possible the amenity of the Active River Foreshore area

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REQUIREMENTS

a Overland flow paths to be provided at four locations: adjacent to Hope Street, adjacent to Margaret Street, midway between Margaret Street and Rankens Court, and at the end of Rankens Court leading down to the River Foreshore.

b Development is to maintain or enhance view corridors looking towards Wyong River.

c View corridors along Rankens Court and Margaret Street are to be retained and building forms are to respond to view corridor vantage points.

d Development is to provide views between building forms and enable view sharing of the river to the south.

e Development to be elevated above the adopted flood level as per Council's requirements. Development must provide pedestrian egress to Church Street, Hargrave Street, Jennings Road or the Pacific Highway in the event of a flood.

f Development is to avoid extensively overshadowing Wyong River parkland.

g Building form and location is to minimise overshadowing of public open space, in particular along River Road. Applicants are to demonstrate the impacts of overshadowing on open space through different times of the year.

h Buildings are to formally address Church Street and River Road and provide an active frontage to both these streets.

i Buildings are to create a consistent edge and continuous awnings are to be provided along the Pacific Highway.

j Development is to activate the pedestrian connection from Rankens Court to Wyong River with retail and commercial uses. Investigate and consider opportunities to incorporate commercial activity along River Road, at street level, adjacent to the Rankens Court walkway.

k Development is to provide clear public domain areas to Rankens Court and Margaret Street and view corridors to the south looking over Wyong River.

l A continuous podium along Church Street and Hargrave Street to define the street frontage is encouraged.

m Development west of Hope Street along Jennings Road is to be lower scaled, consistent with the existing character of area.

n Differentiate and emphasise Gateway Sites through use of landmark buildings in particular at the Junction of River Road and Pacific Highway and at Rankens Court.

o Continuous awnings along Church Street and Hargrave Street should be provided.

p Housing choice and mix should be determined through consideration of the whole precinct, not just particular lots or street frontages.

q Development should provide for a mix of apartments, attached and semi-detached dwellings across the site. The housing mix should also relate to the topography of the site.

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4.5.3.7.3 Baker Park Masterplan

The former Wyong Shire Council adopted the Baker Park Masterplan in 2009. The intent of the Masterplan is to provide a long term vision with directions to reinforce the role of the recreation precinct of Baker Park over the next 20 years. A copy of the Baker Park Masterplan can be obtained by contacting Council.

The Baker Park Masterplan looks at reinforcing the recreational precinct in the Wyong Town Centre. Commercial development and car parking is located to the west of Howarth Street and mixed use is encouraged to the east, and residential development surrounds the recreational facilities. There is the opportunity for northern orientation and visual links between the Town Centre and new development. A site plan of the preferred option for development in the Baker Park precinct is provided in Figure 38. Some objectives and requirements for development in this area are also listed below.

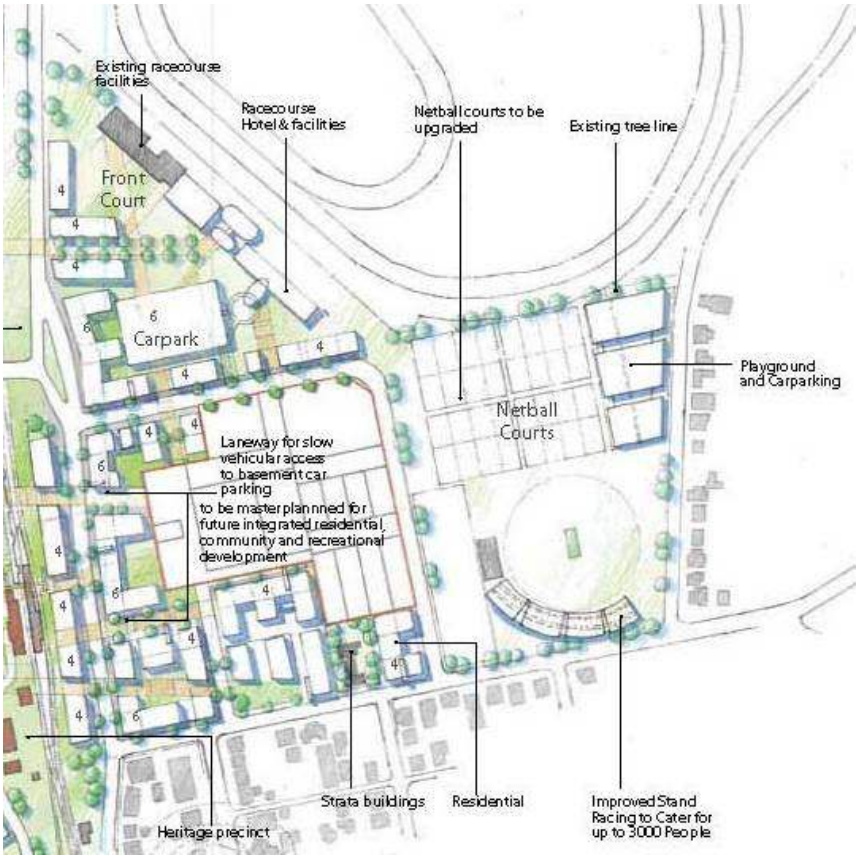

Figure 38 Site plan of the preferred masterplan option for the Baker Park Area

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OBJECTIVES

- To create improved car parking opportunities that do not detract from the streetscape and quality of built form in the Precinct
- To promote the integration of basement car parking for all developable sites in particular residential apartment buildings
- To strengthen open space linkages to Wyong Town Centre by integration of open corridor extension from Alison Road over Railway Corridor through existing Tennis Courts and Wyong Pool
- To improve connectivity to Wyong Race Course at intersection with Rose Street and south to Warner Avenue
- To provide improved Open Space recreational facilities to Baker Park
- To promote the acquisition of private lots along Pollock Avenue
- To create stronger identity through built form differentiation and diversity
- To create residential opportunities through the provision of more floor space with higher density residential development ranging between four and six storeys
- To maintain and enhance where possible the amenity of the Baker Park area

REQUIREMENTS

a Maintain view corridors from the Wyong Town Centre to Baker Park Sports Fields and Wyong Pool.

b Promote view corridors to recreational open space at Baker Park Sporting Fields to the east of the site.

c Promote views looking north over Wyong Race Club.

d Maintain a view corridor from Alison Road looking east across Wyong Station to the Baker Park Precinct.

e Orientate apartment buildings to maximise northern aspect for sunlight into living areas whilst respecting the existing urban block form.

f Provide noise attenuation measures to achieve adequate amenity for lots fronting Howarth Street and the Main Northern Railway Line.

g Address the presence of existing high voltage power lines for development of lots fronting Howarth Street.

h Provide high density residential development with low level retail space at ground floor along Howarth Street on the eastern and western sides close to the railway line.

i Reinforce the existing urban grid and block structure between Warner Avenue and Rose Street.

j Ensure housing choice and mix is determined through a consideration of the whole precinct, not only particular lots or street frontages.

k Provide for a mix of apartments, and attached dwellings across the site. The housing mix should generally be promoted as having a high quality urban character.

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4.5.4. CAR PARKING

The Wyong Town Centre currently has a relatively small number of public car parking areas. Most existing smaller developments provide car parking either formally or informally on-site. Some larger developments provide car parking on-site in basements and the remainder is currently taken up by on-street parking. It is envisaged that in the future, as development and demand increases, public car parking will be provided in formal parking stations. This section aims to provide guidance on car parking provisions that are unique to the Wyong Town Centre. For general car parking provisions, such as the number of required spaces, applicants should refer to Chapter 2.13: and Parking.

4.5.4.1 Public Car parking

Four sites have been identified by Council as having potential to be developed into public car parking locations. The public car parking locations are proposed to contain a mix of at-grade and multi-level car parking, and are expected to be developed as demand and development increases. The location of these sites is shown on the map at Figure 39.

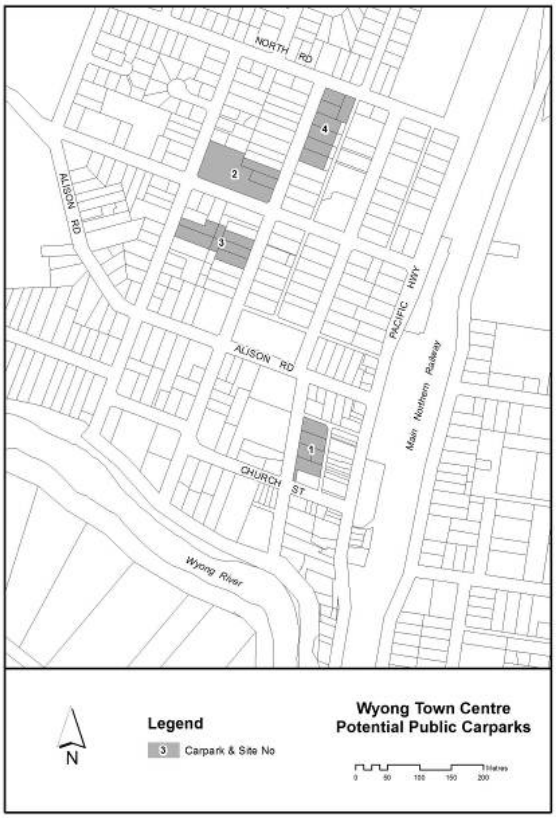

Figure 39 Wyong Town Centre potential public carpark locations

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4.5.4.2 Commercial Development Car parking

OBJECTIVE

To provide provisions relating to car parking for commercial development in the Wyong Town Centre

REQUIREMENTS

a All car parking for commercial development must be provided on-site, where this is not possible, Council may accept developer contributions up to a maximum of 10% of the required car parking. Refer to the Wyong Town Centre Section 7.11 Contribution Plan for rates.

b For commercial development on sites within 400 metres of the railway station, concessions may be considered for the number of required car parking spaces if the proposal is accompanied by a Transport Management Plan. For further details of this concession refer to Chapter 2.13: Transport and Parking. This clause relates only to development on sites that have their main pedestrian entrance located within 400 metres of the railway station as shown in Figure 40 below.

c The above clause only applies to commercial development and does not apply to the residential component of mixed use development. Residential development will need to comply with the requirements of Chapter 2.13: Transport and Parking.

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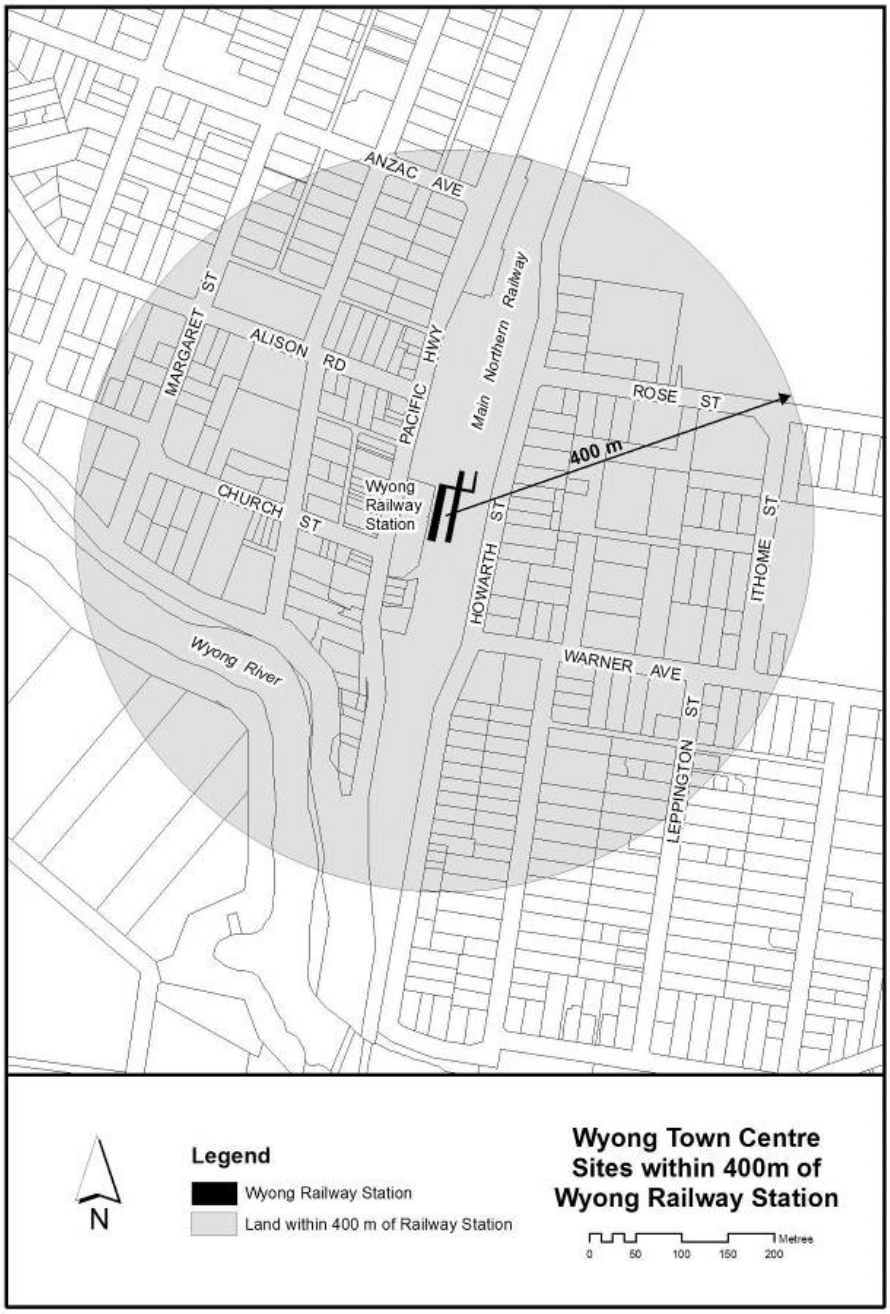

Figure 40 **Sites within 400 metres of the Wyong Railway Station**

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4.5.4.3 Mixed Use Development Car parking

OBJECTIVE

- To provide provisions for car parking in mixed-use developments in the Wyong Town Centre

REQUIREMENTS

a For general car parking provisions for mixed-use development, refer to Chapter 2.13: Transport and Parking.

b For mixed-use developments that contain functions that are generally used at separate times, some dual use car parking spaces may be used to satisfy the number of required spaces. An example of this development type might be a mixed use development that contains offices and residential. The office parking is generally used during weekdays and the residential parking is generally used at nights and on weekends. Therefore, some spaces especially visitor spaces, could satisfy the requirements of both development types. Any application for dual use car parking spaces must be supported by a Transport Management Plan that addresses the requirements outlined in Chapter 2.13: Transport and Parking.

c Use security gates to all entrances to private areas, such as underground car parks and internal courtyards.

4.5.4.4 Basement Exclusion Zone

In most parts of the Wyong Town Centre, basement car parking is encouraged to improve the visual amenity of the streetscape. However, some areas of the town centre are unsuitable for basement car parking due to localised stormwater and drainage issues.

OBJECTIVE

- To exclude basement car parking on sites with localised stormwater and drainage issues

REQUIREMENT

Basement car parking is prohibited for developments on those sites located on Hardware Lane and shown on Figure 41.

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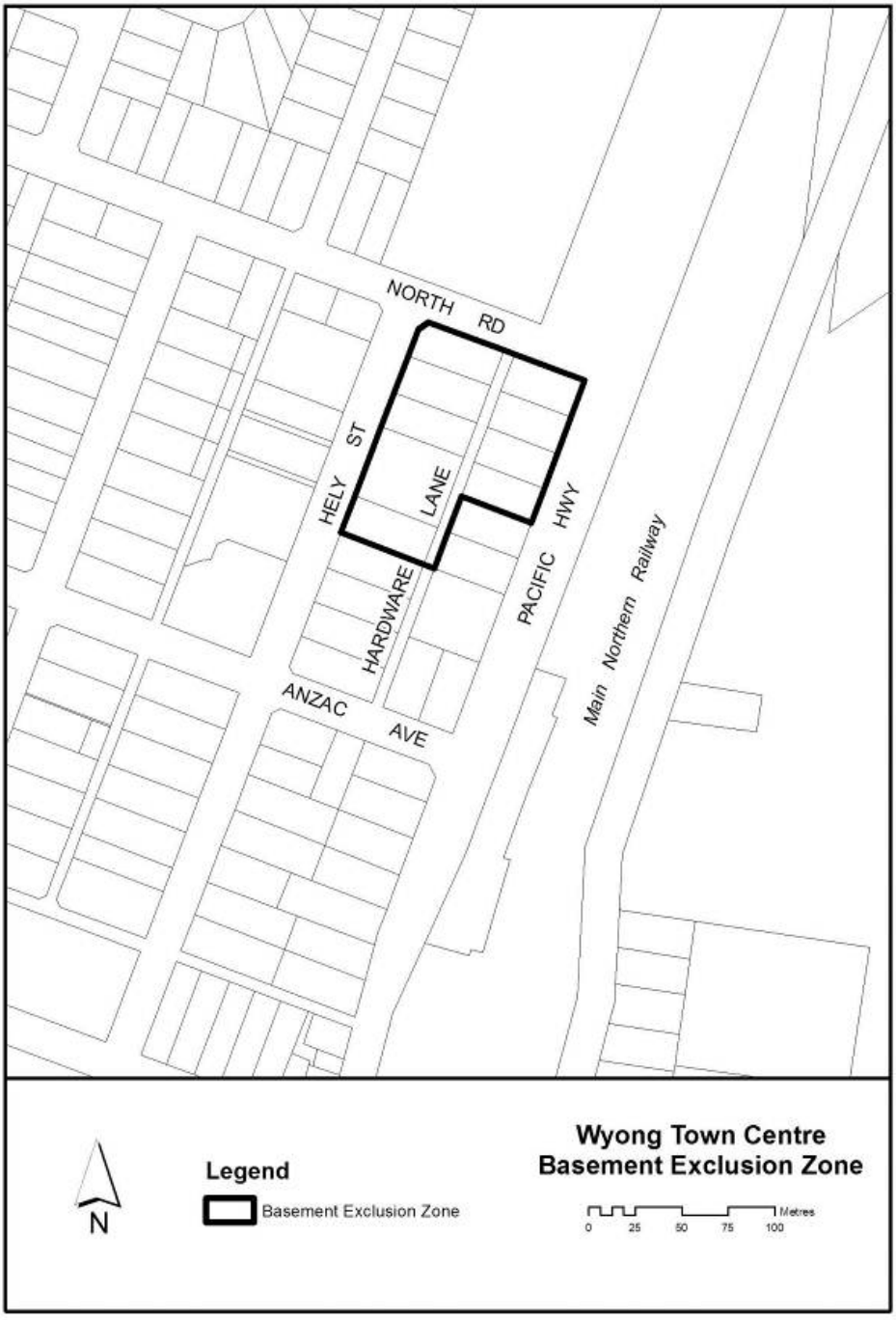

Figure 41 **Wyong Town Centre basement exclusion zone**

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4.5.4.5 Rear Service Lane

In the Wyong Town Centre, there are several sites with frontage to the Pacific Highway and River Road. Some of these sites require vehicular access via the creation of a rear service lane off River Road. Part of this service lane has been constructed, however the remainder of the lane will need to be finalised.

OBJECTIVE

To complete the formalisation of a rear service access lane to those properties situated between the River Road reserve and the Pacific Highway. A photo of the formed and unformed parts of the rear service lane is shown below in Figure 42

Figure 42 **Formed and unformed sections of the rear service lane**

REQUIREMENTS

a Upon development of Lot B DP 308296, identified in Figure 43, Council will require the construction of a rear service lane in accordance with Council's Civil Works Specifications.

b Prior to determination of applications on Lot B DP 308296, Council will require a transfer in fee simple to Council of the land required for the rear service laneway at no cost to Council.

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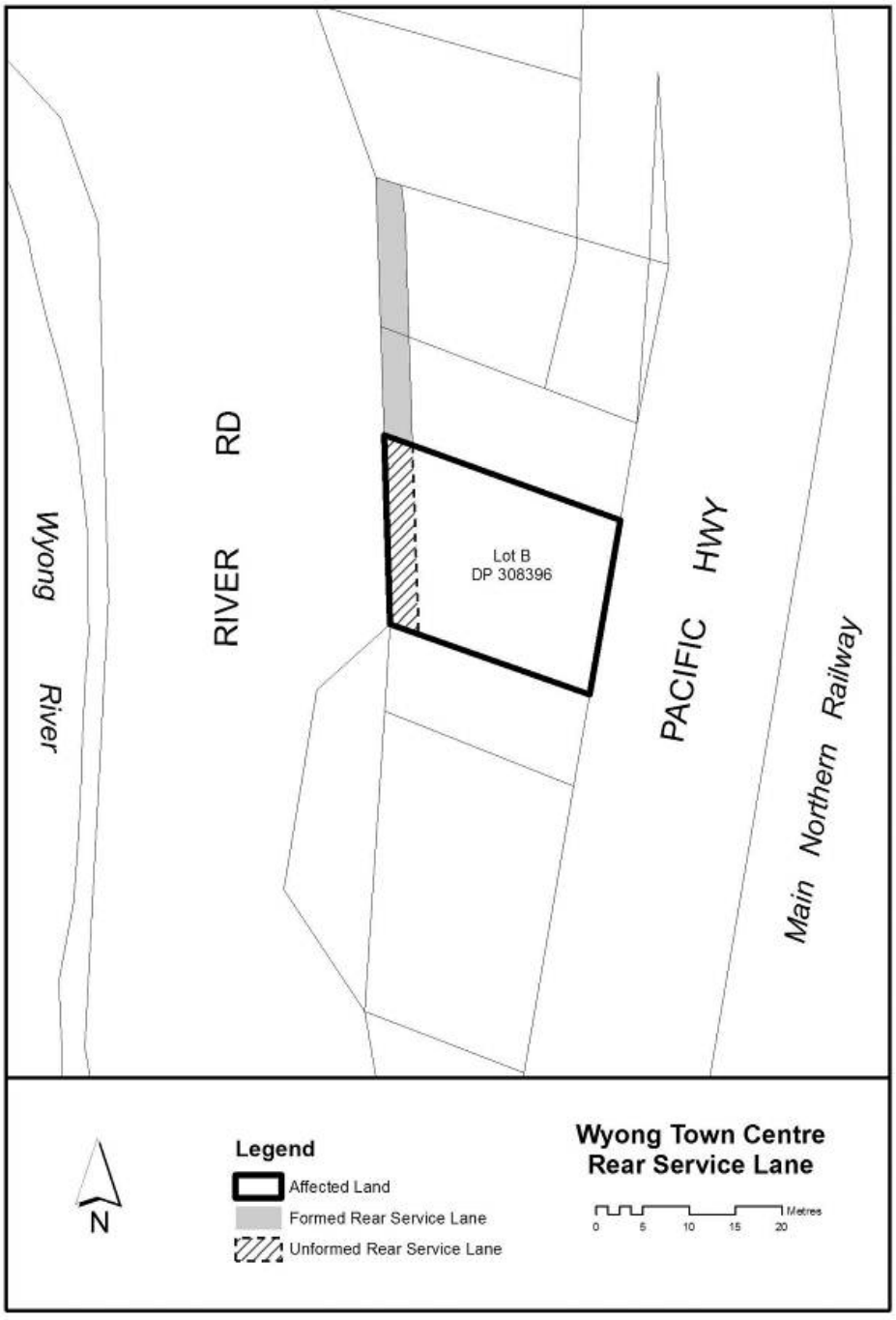

Figure 43 **Rear service lane**

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4.5.5 MIXED-USE AND COMMERCIAL DEVELOPMENT

This section provides provisions for mixed-use and commercial development in the Wyong Town Centre. Commercial development is development that is used for business or commercial purposes. Mixed-use development is development that has a mix of uses on the one site and generally involves some combination of commercial space combined with residential units in an urban area. Mixed-use development can range from smaller scale "shop-top housing" to larger scale developments with shopping centres and apartment towers. For residential only development refer to the relevant Chapters within this DCP.

4.5.5.1 Scale

This section provides provisions for the scale of mixed-use and commercial development. For more scale provisions relating to zoning, height, bonuses and FSR in the Wyong Town Centre refer to the Central Coast LEP 2022.

4.5.5.1.1 Setbacks

OBJECTIVE

- To allow reduced building setbacks in urban areas for mixed-use and commercial development, and to avoid excessive overshadowing of neighbouring sites

REQUIREMENTS

a For commercial development in B3 Commercial Core and B4 Mixed Use zones, zero building setbacks to all boundaries are generally permitted except where a heritage setback is required or the development could cause excessive overshadowing to public places. Refer to Section 4.5.2.2.5 – Heritage Setbacks of this Chapter for requirements relating to setbacks of new development adjacent to heritage items.

b For mixed-use development in B3 Commercial Core and B4 Mixed Use zones, zero building setbacks for the first two storeys are generally permitted except where a heritage setback is required or the development could cause excessive overshadowing to public places.

c For mixed-use development above two storeys, a zero front boundary setback is permitted except where a heritage setback is required. A zero side setback is permitted for the front 50% of the side boundary above two storeys. For the rear 50% of any side boundary above two storeys and for any rear boundary above two storeys, the building line requirements of Chapter 2.3: Residential Flat Buildings and Shop-Top Housing will apply.

d For lots with a double frontage, at least 50% of the site must adhere to the minimum setback requirements of Chapter 2.3.

e The above setbacks are minimum requirements. Floor space ratio limits and other factors will have an additional effect on the possible building envelope achievable.

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For example, six-storey mixed-use development is permitted to have zero building setback to all boundaries for the first two storeys. The upper storeys are residential and so a zero front boundary setback is permitted except where a heritage setback is required. Zero side boundary setbacks are permitted for the upper storeys for the first 50% of the side boundary except where a heritage setback is required. A 6 metre side setback is required for the rear 50% of the side boundary of the third and fourth storeys. A 9 metre side setback is required for the rear 50% of the side boundary of the fifth and sixth storeys. Finally a 6 metre rear setback is required for the third and fourth storeys, and a 9 metre rear setback is required for the fifth and sixth storeys of residential in accordance with the Building Setbacks section of Chapter 2.3: Residential Flat Buildings and Shop-Top Housing

The example above is illustrated in Figure 44 below.

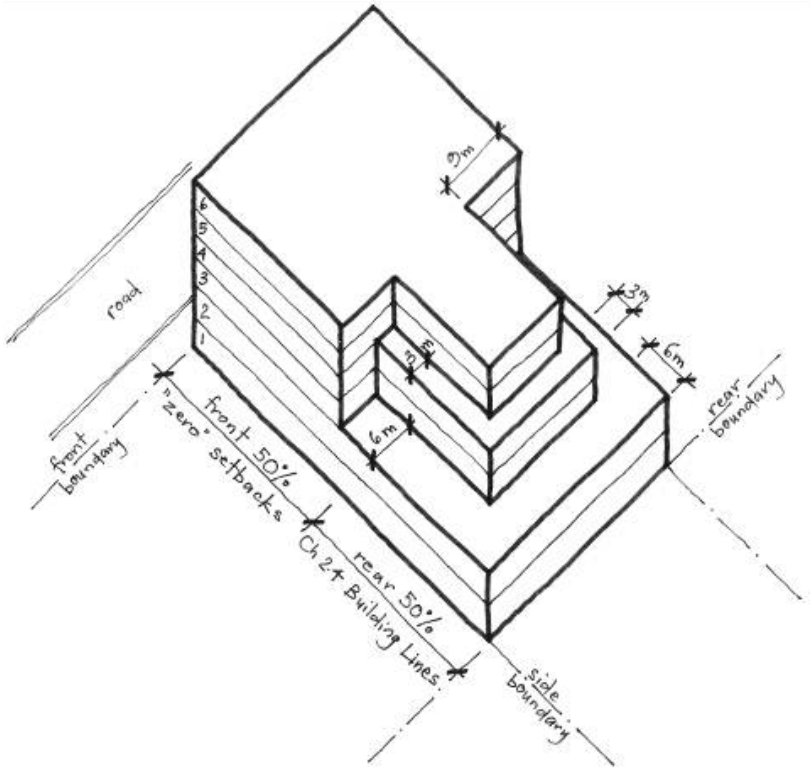

Figure 44 Example of setback requirements for a mixed use development or shop top housing above two storeys

f For building setbacks on corner blocks the front boundary is generally taken to be the street boundary that is shorter in length of the two street boundaries and/or that is facing the principal street.

g For mixed-use and commercial development with zero setbacks to boundaries, Council requires facades to be articulated in length and height. This clause particularly applies to those facades facing streets or laneways. Monotonous and unbroken lengths of wall exceeding 10 metres and two storeys in height will not be permitted. Textured facades or a mix of materials is encouraged. For development over two storeys, physical design elements shall be used to provide visual interest and articulation to the building. These can include balconies, screens, awnings, projecting windows, recessed entrances, and wall offsets.

h Note that on some lots fronting the Pacific Highway and Alison Road, a heritage height limit of 10 metres applies for the first 5m from the boundary addressing these roads. This applies to all types of development as required in the Central Coast LEP 2022.

4.5.5.1.2 Floor to Floor Heights

For economic reasons, most development is designed to the minimum requirements for a particular scheme. In commercial buildings floor to floor heights are generally required to be greater than in residential buildings. This means that in the future, commercial buildings can be converted to residential but the reverse is not always possible. This section aims to provide some guidance for appropriate floor to floor heights to allow buildings to be flexible.

OBJECTIVE

- To set minimum floor to floor heights for mixed-use and commercial development

REQUIREMENTS

a Mixed-use and commercial buildings are required to have a minimum floor to floor height of 3.6 metres for the ground floor and second storey, whether the use be retail, commercial or residential.

b Car parking and residential levels of a commercial or mixed-use development are required to have a minimum floor to floor height of 3.0 metres.

4.5.5.2 Building Design

4.5.5.2.1 Corner Sites

Corner sites are particularly suited to commercial and mixed-use development. Their two street frontages provide more potential exposure for ground floor retail development. They have access to daylight and views from two sides which provides greater amenity for apartments. Their address to two streets also means there is more opportunity for dual entrances, or to differentiate between entrances like pedestrian and vehicular.

OBJECTIVE

- To ensure that commercial and mixed-use development on corner sites are articulated appropriately considering the highly visible position

REQUIREMENT

Corner buildings must address both streets and should provide some architectural distinction on the corner.

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4.5.5.2.1 Streetscape

OBJECTIVE

- To ensure that the appearance of the development is in keeping with the surrounding streetscape in mixed-use and commercial development

REQUIREMENTS

a Mixed-use development must be in keeping with the existing heritage and administrative character of the Wyong Town Centre. The ground floor of any mixed-use development facing the street must be retail or commercial development. The second storey of any mixed-use development should be retail or commercial or able to be adapted to retail or commercial by complying with the minimum floor to floor heights provided in Section 4.5.5.1.2 above.

b Entry doors are to be clearly visible from the street and recessed or covered to provide weather protection.

4.5.5.2.2 Pedestrian Access

OBJECTIVE

- To ensure that pedestrian access in mixed-use and commercial development is of a high standard

REQUIREMENTS

a In mixed-use development, each vertical use must have a distinct and separate pedestrian entrance from the ground floor use. For example, residential development on the second storey must have a ground floor pedestrian entrance that is separate from the commercial or retail development that is also on the ground floor.

b Locate all entrances directly off the public street, ensuring adequate lighting and good surveillance from the surrounding area.

c Entry doors are to be clearly visible from the street and recessed or covered to provide weather protection.

4.5.5.2.3 Car parking

General car parking provisions that apply in the Wyong Town Centre are contained in Section 4.5.4.0 Car parking of this Chapter. For parking rates refer to Chapter 2.13: Transport and Parking.

4.5.5.2.4 Sustainability

Mixed use and commercial development are required to have regard for sustainable design principles. Commercial development is currently required to comply with Part J of the *Building Code of Australia*. Residential components of mixed-use development are currently required to obtain a BASIX certificate. The commercial component of mixed-use development is also subject to Part J of the *Building Code of Australia*.

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4.5.5.2.5 Stormwater Management

This section provides provisions on stormwater management for mixed-use and commercial development.

OBJECTIVE

- To ensure that land can be adequately drained, and that the development does not result in any impact, including any cumulative impact, to drainage or flooding elsewhere

REQUIREMENTS

a A stormwater management plan is to be submitted with the development application, incorporating one of the following:

  i the provision of on-site stormwater detention with delayed release into the stormwater system; or

  ii site design to minimise impervious areas and maximise on-site infiltration so increased run-off does not reach the stormwater system; or

  iii a combination of both; due consideration will be given to the location of the development and the impacts a detention system will have on the drainage catchment.

b Site works are not to obstruct or divert overland flows from upstream properties.

c All excess stormwater runoff from roof and paved areas shall be directed into inter-allotment or street stormwater drainage systems.

d Where possible, use vegetated buffers to treat and minimise stormwater runoff from parking areas and streets.

e Where easements over downstream properties are required, evidence of agreement with the relevant property owners is to be submitted with the development application.

f For developments incorporating basement car parking in low-lying areas as identified in Section 4.5.3.5 Low-lying Areas in this Chapter, a groundwater study is to be submitted, addressing the following:

  i draw down effects;

  ii potential for water mounding;

  iii Acid Sulphate Soils;

  iv water quality;

  v impacts on the proposed development and on adjoining properties;

  vi construction methodology.

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Chapter 4.5 **Wyong Town Centre**

4.5.5.2.6 Waste Management

The garbage and recycling systems installed in commercial developments will vary depending on the types and quantities of waste and recyclables generated. In mixed-use developments, there are often operational problems caused by commercial and residential tenants using each other's garbage and recycling systems. The areas set aside for waste management in commercial and mixed-use development need to be carefully designed to allow for flexibility with the use of the building, and to provide separate waste areas that can be maintained by the individual user groups or tenants.

OBJECTIVES

- To avoid the generation of waste through design, material selection and building practices
- To plan for the types, amount and disposal of waste to be generated during demolition, excavation and construction of development
- To encourage waste minimisation, including material separation, reuse and recycling
- To ensure efficient storage and collection of waste and quality design of facilities

REQUIREMENTS

a Development applications shall include details of an appropriate means of waste disposal, demonstrating compliance with Chapter 2.13: Waste Management, Council's 'Waste Management Guidelines', as well as the requirements of this Chapter.

b Waste management systems for the residential component of mixed-use development are to be provided in accordance with the provisions contained in Chapter 2.3: Residential Flat Buildings and Shop-Top Housing.

c Waste management systems for the commercial component of mixed-use development and for commercial only development is to be provided in accordance with the provisions contained in Council's Waste Management Guidelines that accompany Chapter 2.13: Waste Management.

d Waste management areas for commercial and residential tenants are to be separated in mixed-use development.

e Regardless of which waste management system is proposed, it is important to establish and assign responsibility for the following ongoing management tasks.

  i transporting bins between the storage area and collection point on collection day and returning bins promptly to the storage area following collection:

  ii washing the bins and the storage area regularly;

  iii monitoring and maintaining the chute system, where proposed;

  iv maintaining the development free of litter and dumped rubbish; and

  v ensuring communication of waste management issues to residents;

f ongoing management must be addressed in the Waste Management Plan submitted with the development application.

Part 4 Major Centres
Chapter 4.5 Wyong Town Centre

4.5.5.3 Solar Access and Overshadowing

Solar access and overshadowing can present more problems in the Wyong Town Centre due to the east-west orientation of many of the lots. Accordingly, special provisions for mixed-use and commercial buildings have been developed to offer some concessions for solar access in accordance with the Apartment Design Guide (ADG) while also preventing excessive overshadowing to sites to the south of proposed development. These provisions are particularly critical to enable successful mixed-use development in the town centre.

OBJECTIVES

- To provide special provisions for mixed-use and commercial development in the Wyong Town Centre to prevent excessive overshadowing
- To provide some concessions for solar access in mixed-use development appropriate to urban areas and in accordance with the ADG
- To provide adequate natural lighting and minimise the need for artificial lighting during daylight hours

REQUIREMENTS

a In accordance with recommendations for residential (and mixed-use) development contained in the ADG for Daylight Access: Living rooms and private open spaces for at least 70% of apartments in a development should receive a minimum of 3 hours direct sunlight between 9.00am and 3.00pm in mid-winter.

b Also in accordance with the ADG: Limit the number of single-aspect apartments with a southerly aspect (SW-SE) to a maximum of 10% of the total units proposed. Developments which seek to vary from the minimum standards must demonstrate how site constraints and orientation prohibit the achievement of these standards and how energy efficiency is addressed.

c Commercial and mixed-use development shall provide setbacks to boundaries to enable solar access in accordance with Section 4.5.5.1.1 Setbacks of this Chapter. In addition to providing setbacks, overshadowing of adjacent sites can be reduced by allowing some separation or modulation of buildings. Building modulation can occur by stepping the façade in plan and by varying the building in height. The diagram shows the effects of building modulation on overshadowing.

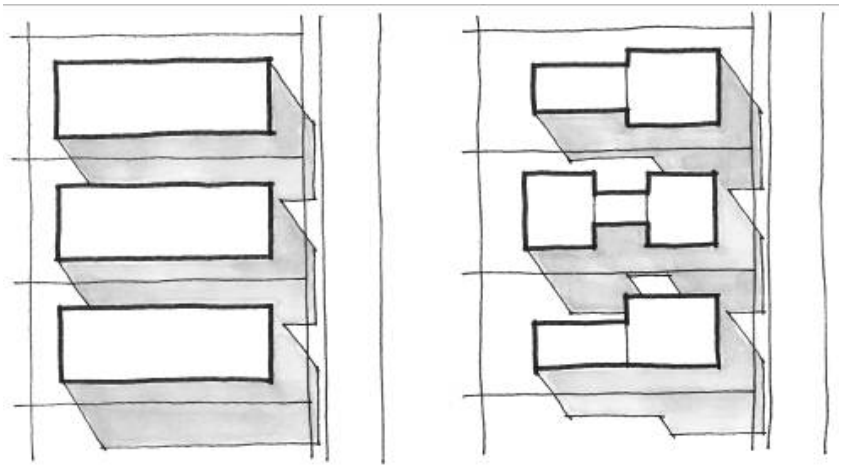

Figure 45 Effects of Building Modulation on Overshadowing

d Developments of two storeys height and above shall provide shadow diagrams based on a survey of the site and adjoining development, showing shadow casting at 9.00am, 12.00noon and 3.00pm on June 21 (winter solstice). The shadow diagrams must show the impact on the proposed development and surrounding areas of the shadows cast by the proposed development, and the surrounding existing development, the area's natural topography, fencing, and any cut and fill.

e In assessing the impact of shadow on an adjoining property, Council shall have regard for the standards stated above in Section 4.5.5.3 Solar Access and Overshadowing of this Chapter and also for the setback requirements for the particular development type.

f Where a development does not comply with the required solar access requirements under s.4.5.5.3, additional information in the form of elevational shadow diagrams shall be submitted to show the impact of the shadowing on affected properties.

4.5.5.4 Amenity

Good design provides amenity through the physical, spatial and environmental quality of a development. Optimising amenity requires appropriate room dimensions and shapes, access to sunlight, natural ventilation, visual and acoustic privacy, storage, indoor and outdoor space, efficient layouts and service areas, outlook and ease of access for all age groups and degrees of mobility.

4.5.5.4.1 Private and Communal Open Space

The requirements for private and communal open space in mixed-use development are provided in Chapter 2.3.

4.5.5.4.2 Acoustic Privacy

OBJECTIVE

- To avoid potential conflict between different uses by designing for acoustic privacy between residential and other uses in mixed-use development

REQUIREMENTS

a Separate residential uses from ground floor leisure or retail uses by an intermediate quiet use, such as offices. Alternatively, provide increased acoustic insulation between residential and those uses that are likely to generate noise.

b Design for acoustic privacy from the beginning of a project to avoid potential conflicts between residential and other uses. For example, noise associated with plant such as air conditioning or extractor fans should be contained within an acoustically insulated part of the development or located away from residential uses. These items should not be an add-on solution to roofs that are beneath residential balconies and units.

c Pedestrian entrances and exits, and roller doors for vehicles, should not be located near the bedrooms of residences.

4.5.5.4.3 Visual Privacy

OBJECTIVE

- To ensure visual privacy between different uses in mixed-use development

Part 4 Major Centres
Chapter 4.5 Wyong Town Centre

REQUIREMENTS

a Buildings are to be sited and designed to ensure visual privacy between dwellings.

b Effective location of windows and balconies to avoid overlooking is preferred to the use of screening devices, high sills or obscured glass.

4.5.5.5 Landscape Design

This part provides provisions for landscape design that are relevant to mixed-use and commercial development. For general landscape design provisions relating to the Wyong Town Centre refer to Section 4.5.2.4 Landscape Design of this Chapter.

OBJECTIVE

- To ensure appropriate landscape design is provided for in mixed-use and commercial development

REQUIREMENTS

4.5.5.5.1 Planting on Structures

A common scenario in urban areas is the establishment of landscape areas on top of basement car parks, podiums or roofs. High quality landscape design and open space amenity relies in part on the quality and health of plants. The plants in these areas are grown in total containment with artificial soils, drainage and irrigation. Plants grown in such situations are subject to a range of environmental stresses that affect the health and survival of the plants.

a Design for optimum conditions for plant growth by:

  i providing soil depth, volume and area appropriate to the mature size of proposed plantings;

  ii providing appropriate soil conditions and irrigation methods;

  iii providing appropriate drainage.

b Design planters to support the appropriate soil depth and plant selection by:

  i ensuring planter proportions accommodate the largest volume of soil possible. Minimum soil depths will vary depending on the size of the plant however, soil depths less than 1.5 metres are unlikely to have any benefits for tree growth;

  ii providing square or circular planting areas rather than long, narrow linear areas to promote balanced root development and robust plant structure.

c Increase minimum soil depths in accordance with:

  i the mix of plants;

  ii the level of landscape management, particularly the frequency of irrigation;

  iii anchorage requirements of large and medium trees;

  iv soil type and quality.

Part 4 Major Centres
Chapter 4.5 Wyong Town Centre

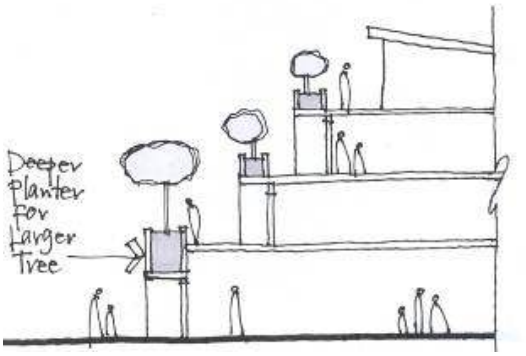

Figure 46 Example of suitable planting on structures

4.5.5.5.2 Street Trees

All mixed-use and commercial development shall incorporate street tree plantings at a rate of at least two semi-advanced trees per 15 metres of frontage. The tree species that have been selected for the Wyong Town Centre are shown in the Street Tree Masterplan in Section 4.5.2.4 Landscape Design of this Chapter.

Details of the proposed street tree planting including species and locations shall be submitted with the development application. Street trees are to be maintained and nurtured until established.

A street tree planting plan shall be included as part of the landscape design report, except in circumstances where it is demonstrably impractical to provide street trees.

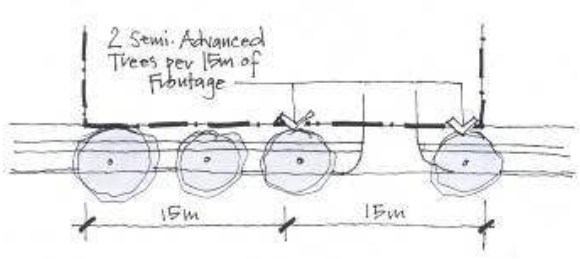

Figure 47 Example of street tree planting

CHAPTER 5.4 KINCUMBER, AVOCA DRIVE (MANASSEH FROST HOUSE)

5.4.1 LAND TO WHICH THIS CHAPTER APPLIES

Manasseh Frost House is located on part of Lot 112 DP 1124060 (previously Lot 11 DP 635510) Avoca Drive, Kincumber as indicated in figure 1.

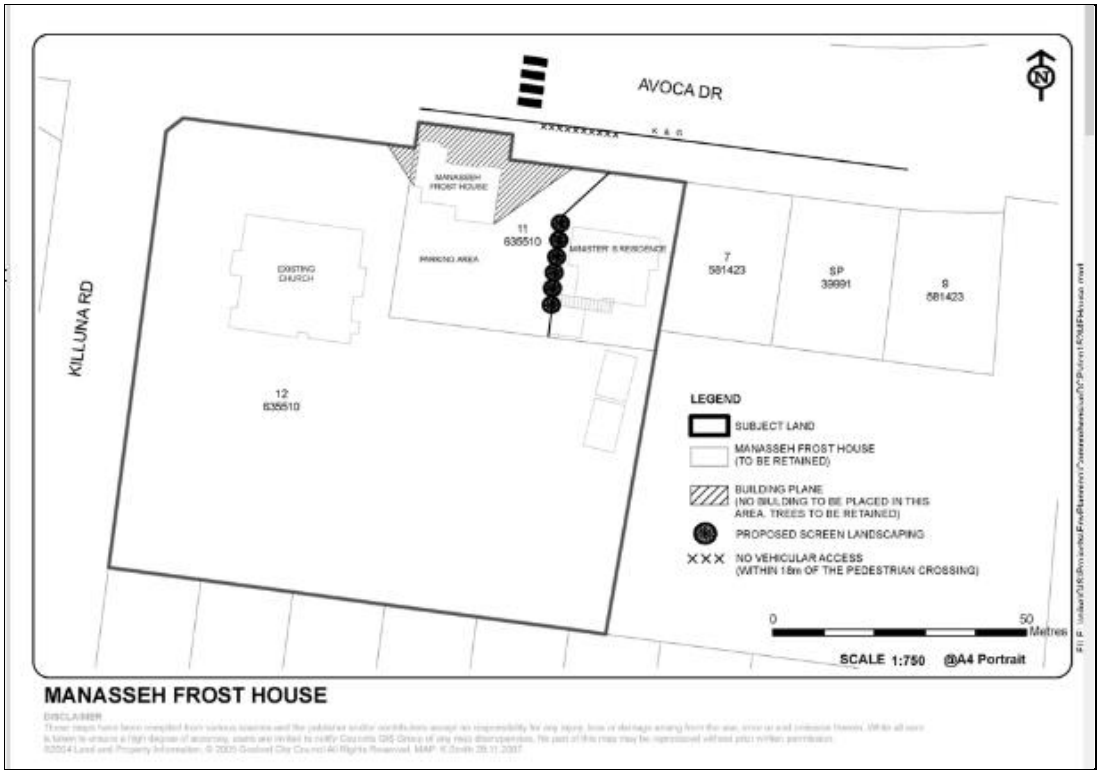

Figure 1 – Land to which this Chapter applies

5.4.2 PURPOSE OF THIS CHAPTER

The purpose of this chapter is to provide more detailed guidelines for the development of the land, having regard to Manasseh Frost House being an item of environmental heritage.

5.4.3 OBJECTIVES

The objectives of this chapter are as follows:

- To protect the heritage~~historical~~ value of the weatherboard cottage
- To guide ~~restoration~~ conservation of the cottage
- To facilitate traffic management and safety

5.4.4 REQUIREMENTS

a To protect the ~~historical~~ heritage value of the weatherboard cottage. This building is identified as an item of environmental heritage under Central Coast Local Environment Plan (LEP) 2022. Clause 5.10 of the LEP provides conservation incentives for heritage items, which enables a particular item to be used for a purpose not necessarily permitted within a zone provided that its use will maintain the historical value of the building (subject to development consent). Alternatively, uses permitted within the R2 Low Density Residential could be considered for the building subject to development consent.

i Any development application for Manasseh Frost House is to be referred to ~~Council's Heritage Committee or to~~ Council's ~~Relevant~~ Heritage Officer for comment.

ii Any development on the subject site or on adjoining properties within ~~10 metres~~ the vicinity of the weatherboard cottage is to give due consideration to its impact upon the historic building. Any such development is to be designed to be sympathetic in scale, style and character ~~complementary~~ to the architectural appearance of the cottage.

iii In order to retain views of the house from Avoca Drive and not diminish its appearance with other structures, no new building is to be located in front of the house within a 45° plane projected to the front of the property from the rear corners of the house, as delineated on the map.

iv All mature trees located in front of the building and within the 45 plane are to be retained.

v Alterations and/or additions to the rear of the building are permitted provided they are sympathetic in design to the existing cottage and, when viewed from Avoca Drive, they are predominantly unable to be seen.

vi Any signage is to be consistent with the architecture of the building and compatible with its heritage character.

b To guide conservation ~~restoration~~ of the cottage

Any ~~restorative~~ conservation works must ~~will have to~~ ensure the original character of the cottage is retained whilst implementing current health and building practices. ~~For visual amenity reasons~~, ~~the~~ The external facade is considered ~~the most important element to be restored~~ of high significance and must be restored. ~~whereas the internal design can be varied~~ The interior may be altered if this will not result in adverse impacts to the significance of the building.

i The exterior of the dwelling is to be restored to its ~~1980s~~ original character. Records of its appearance at this time are held in Council (reference: *Gosford/Wyong History and Heritage Summary and Recommendations* 1986).

ii The internal design and layout ~~is able to~~ may be varied to suit the intended use.

iii The building is to generally comply with the provisions ~~of~~ or performance standards of the *Building Code of Australia.*

c To facilitate traffic management and safety

Currently, the dwelling does not have vehicular access to Avoca Drive, although any future use of the building may require the provision of vehicular access to the site from Avoca Drive. Given the high traffic volumes on Avoca Drive, and the location of a pedestrian crossing directly in front of the dwelling, the location of the vehicular access point is limited from a traffic safety aspect.

i The vehicular access point, servicing the building, is to be located a minimum of 18 metres to the east of the pedestrian crossing in Avoca Drive.

ii No right turn into, or out of, the site is permitted from/to Avoca Drive.

iii Any parking spaces provided on site are to be located to the rear of the building.

iv In order to screen the adjoining dwelling from the car park, a landscaping strip is to be planted along the dividing fence. The vegetation is to consist of native shrubs that have a mature height of 2.5 metres.

v Now that Manasseh Frost House is located Lot 112 ~~DO~~ DP1124060, access is gained via Killuna Road.

Central Coast Council

Open Pile Burning Policy

Date Adopted: **XX/XX/2025**
Revision: **X**

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DRAFT

1. Policy Objectives

1.1. The objective of the Open Pile Burning Policy (Policy) is to enable the burning of dead and dry vegetation for the purposes of maintaining rural residential properties in a way that is safe and poses minimal risk to the environment and public health.

2. Policy Scope

2.1. The Policy specifies conditions of consent for the pile burning of dead and dry vegetative material in appropriately zoned lands within the Central Coast Local Government Area (LGA).

3. Policy Statement

3.1. Open pile burning is regulated across NSW by the Regulation under the Protection of the Environment Operations Act 1997 (the Act). Under the Regulation, local councils can voluntarily choose the level of control over burning that is best suited to their LGA.

3.2. Open pile burning in the Central Coast LGA is prohibited except in accordance with an approval under clause 18(1), and Schedule 1, Part 2 of the Protection of the Environment Operations (Clean Air) Regulation 2022.

3.3. Council will provide approval for the open burning of dead and dry vegetative material on parcels of land that meet the conditions of consent outlined in this policy. Such approval is intended for properties that are not in urban areas that have a large number of mature trees that are likely to generate larger than average quantities of vegetative debris.

3.4. Council cannot provide approval for the burning of non-vegetative waste.

3.5. Burning must be undertaken in a safe manner by complying with the conditions of consent outlined in section 5 of this Policy.

3.6. In the making of this Policy Council has taken into consideration the following issues:

3.6.1. impact on local and regional air quality and amenity;

3.6.2. feasibility of re-use, recycling, or other alternative means of disposal such as mulching or chipping;

3.6.3. the views of the sector of the public likely to be affected by the proposed approval;

3.6.4. the views of the NSW Environment Protection Authority (EPA) in relation to the self-approval process; and

3.6.5. the views of the RFS in support of this policy.

3.7. Special provisions apply to land parcels located in Cogra Bay, Wondabyne, Little Wobby, Bar Point, Marlow Creek, and Patonga Creek (Hawkesbury River Communities) due to boat only access to properties, which is outlined in Schedule 1 of this policy.

4. Conditions of Consent

4.1. Open pile burning of dead and dry vegetative material may be carried out on properties used for residential purposes in the Central Coast LGA under deemed approval from Council, which is granted subject to the following conditions.

4.2. Parcels of land must be either:

4.2.1. Greater than 4,000m^2 in area; and

4.2.2. zoned E2 Environmental Conservation, E3 Environmental Management, E4 Environmental Living, RE2 Private Recreation, R5 Large Lot Residential, RU1 Primary Production, RU2 Rural Landscape, RU5 Village, or RU6 Transition under the Central Coast Local Environment Plan 2022 (CCLEP), or

4.2.3. Less than 4,000m^2 in area, located in Hawkesbury River Communities (where there is boat-only access to properties), and zoned C2 Environmental Conservation under the CCLEP.

4.3. Only one pile of vegetation may be burnt at any one time.

4.4. Pile size must not exceed 2 metres in diameter and 1.5 metres in height. As the pile burns down vegetation may be added to bring the pile back up to the maximum pile size.

4.5. Deemed approval is only granted for the burning of dead and dry vegetation at the premises on which the vegetation grew.

4.6. Vegetation such as branches or logs added to the pile must be of a diameter of 150mm or less, to minimise smoke and make the pile easier to extinguish.

4.7. Smoke impacts must be minimised by not burning green, damp and compacted piles.

4.8. An open pile burn fire must be at least 20 metres from any dwelling structure, building, or unmanaged vegetation (native or non-native).

4.9. All combustible material within 4.5 metres of the fire must be removed.

4.10. You must ensure that there is a sufficient water supply and that you have a hose with appropriate water pressure and length that can reach around the whole pile to extinguish the fire if required and contain any spot fires that may occur.

4.11. Adjacent property occupiers (or, if there are no occupiers, the owners) must be given 24 hours' notice (verbal or written) of the intention to undertake an open pile burn, unless otherwise specified by the conditions of a Fire Permit granted by the RFS. Adjacent properties include land separated by a lane, road or

waterway from the land on which the fire is to be lit. Details to be provided include name and contact of the person/s proposing to light the fire, location, date/time, purpose, and expected duration of the fire.

4.12. For land in a Rural Fire District, the RFS must be provided with 24 hours' notice (verbal or written) unless otherwise specified by the conditions of a Fire Permit granted by the RFS. Details of the notification process are located on the NSW RFS website or alternatively contact 1800 679 737 for assistance.

4.13. For land not in a Rural Fire District, the NSW Fire and Rescue must be provided with 24 hours' notice, either in writing or verbally. Details of the notification process are located on the NSW Fire and Rescue website or alternatively contact 02 9265 2999 for assistance.

4.14. An open fire must be supervised by a responsible adult at all times.

4.15. Burning should only take place when weather conditions are suitable with winds under 15km/h.

4.16. Burning should not cause nuisance to neighbours or a smoke hazard to traffic. Where nuisance or smoke hazard occurs, the fire is to be immediately extinguished.

4.17. Burning must only be undertaken between the hours of 7am and 10pm.

4.18. All fires must be completely extinguished between the hours of 10pm and 7am.

4.19. Approvals granted by this Policy will no longer be valid should any of the conditions of consent be breached.

4.20. Approvals granted by this Policy are in force (unless revoked) for 4 years or until this policy is reviewed, whichever comes first.

4.21. All obligations under the Rural Fires Act 1997, Protection of the Environment Operations Act 1997, Biodiversity Conservation Act 2016, and Local Land Services Act 2013 take precedence over this policy.

4.22. Council Officers have the authority under section 134 of the Protection of the Environment Operations Act 1997 to direct that an open pile burn fire be immediately extinguished (and not relit for 48 hours) if the air pollution is likely to cause serious discomfort or inconvenience to any person.

5. Other Legislative Provisions

5.1. It is an offence under the Protection of the Environment Operations (Clean Air) Regulation 2022 to burn any of the following items at any time:

- Tyres,
- Coated wire,
- Paint/solvent containers and residues, and
- Treated timber.

5.2. An approval granted under this Policy does not provide approval to burn for any other purpose, such as:

- clearing vegetation;
- burning vegetation resulting from the clearing of land related to development consent under the *Environmental Planning and Assessment Act 1979*; or
- undertaking bush fire hazard reduction burns, ecological burns or Aboriginal cultural heritage burns.

5.3. Approval to undertake bush fire hazard reduction burns are required to be made in accordance with the Rural Fires Act 1997 and must be sought from the RFS.

5.4. Approval to undertake ecological burns or Aboriginal cultural heritage burns must be sought from the Office of Environment & Heritage.

5.5. Burning of vegetation on the premises on which the vegetation grew for the purpose of agricultural operations is authorised by the Protection of the Environment Operations (Clean Air) Regulation 2022, and as such, is not subject to the conditions of consent in this Policy. Burning as part of agricultural operations must include:

- clearing the premises of vegetation (other than for construction on the premises); or
- the burning of stubble, orchard prunings, diseased crops, weeds, or pest animal habitats on farms; or
- the burning of pasture for regenerative purposes.

5.6. Burning for recreational purposes such as cooking, barbecuing, picnicking, camping, and scouting, is authorised by the Protection of the Environment Operations (Clean Air) Regulation 2022, and as such, is not subject to the requirements of this Policy. Recreational burning may only be undertaken utilising the following fuels:

- dry, seasoned, untreated wood;
- liquid petroleum gas (LPG);
- natural gas; or
- proprietary barbecue fuel, including a small quantity of fire starter.

5.7. A Fire Permit must be obtained from the RFS under the Rural Fires Act 1997 for open pile burning in a Rural Fire District during the Bushfire Danger Period (usually 1 October to 31 March, however, that may vary due to local conditions).

5.8. A Fire Permit must be obtained from Fire and Rescue NSW for open pile burning in a Fire District all year round.

5.9. No open burning can be undertaken on 'No Burn Days' (related to air pollution), or during a 'Total Fire Ban' (related to bush fire safety) that may be declared by the relevant authority. Any approval under this policy is suspended on such days.

5.10. It is the responsibility of the approval holder to identify whether one of the days provided in clause 5.8 and 5.10 is occurring prior to lighting their fire.

5.11. An open pile burn fire must not be lit, or must be extinguished, if the closest air monitor exceeds an Air Quality Index (AQI) of 66 (fair-yellow) for particulate matter PM10 or PM 2.5.

5.12. Smoke impacts and air pollution associated with open burning should be minimised in order to protect local and regional air quality, local amenity, and human health.

5.13. Council will investigate reported breaches of the Policy and may undertake enforcement action under the provisions of the Act with reference to Council's Regulatory Policy.

6. Special provisions for Hawkesbury River Communities

The conditions set out below replace conditions 4.4 and 4.8 for properties in the Hawkesbury River Communities. All other conditions in Section 4 remain applicable.

6.1. Pile size must not exceed 1 metre in diameter and 1.5 metres in height. As the pile burns down vegetation may be added to bring the pile back up to the maximum pile size.

6.2. An open pile burn fire must be at least 20 metres (or 3 metres for Hawkesbury River communities) from any dwelling structure, building, or unmanaged vegetation (native or non-native).

7. Responsibilities

Compliance, monitoring and review

7.1 Council may take regulatory action to address any impact produced by the burning of any material.

7.2 An impact may include: Odour

- Smoke
- Dust
- Safety risks

7.3 Where Council decides to take action to address any impact, such action will be undertaken in accordance with the Central Coast Council Regulatory Policy.

Records management

7.4 Staff must maintain all records relevant to administering this protocol in accordance with Council's Information and Records Management Policy and the State Records Act 1998.

8 Policy Definitions

Policy	means Council's *Open Pile Burning Policy*
Regulation	means the *Protection of the Environment Operations (Clean Air) Regulation 2022* (NSW)
Act	means the *Protection of the Environment Operations Act 1997* (NSW)
CCLEP	means the *Central Coast Local Environment Plan 2022*
Council	means Central Coast Council
RFS	means NSW Rural Fire Service
EPA	means NSW Environment Protection Authority
OEH	means NSW Office of Environment & Heritage
LGA	means Local Government Area
Hawkesbury River Communities	means Cogra Bay, Wondabyne, Little Wobby, Bar Point, Marlow Creek, and Patonga Creek

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9 Policy Administration

Business Group	Environment and Planning
Responsible Officer	Section Manager Development Control & Environment Protection
Associated Procedure (if any, reference document(s) number(s))	Nil
Policy Review Date	*July 2029*
File Number / Document Number	F2010/00542: CORPORATE MANAGEMENT - POLICY - Policy Register - Draft Working Documentation D16771447
Relevant Legislation (reference specific sections)	• Section 134, *Protection of the Environment Operations Act 1997,* • Part 5.4, Division 3 Domestic Air Pollution, Protection of the *Environment Operations Act 1997* • Part 3, Division 4 Controls for Local Government Area, *Protection of the Environment Operations (Clean Air) Regulation 2022* • Schedule 1 Local Government Areas in which burning is prohibited, *Protection of the Environment Operations (Clean Air) Regulation 2022*
Link to Community Strategic Plan	Theme 4: Responsible Goal L: Healthy lifestyle for a growing community B-A4: Enhance community safety within neighbourhoods, public spaces and places.
Related Policies / Protocols / Procedures / Documents (reference document numbers)	▪ Information and Records Management Policy (D14025241) ▪ Council's Code of Conduct ▪ Delegations Register

10 Policy Authorisations

No.	Authorised Function	Authorised Business Unit / Role(s)

11 Policy History

Revision	Date Approved / Authority	Description Of Changes
1	27 May 2019 / Central Coast Council	Adopt the draft Open Pile Burning Policy.
2	14 September 2020 / Central Coast Council	Adopt the Open Pile Burning Policy to permit open pile burning for the Hawkesbury River communities.
3	July 2025 Central Coast Council	Adopt the draft Open Pile Burning Policy.

DRAFT

Wyong Shire Council
CENTRAL COAST

POLICY No: WSC019

POLICY FOR OPERATION OF TEMPORARY FOOD PREMISES

© Wyong Shire Council
Wyong Shire Council
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PO Box 20 Wyong NSW 2259
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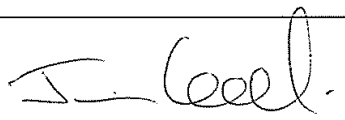
Policy for Operation of Temporary Food Premises

Wyong Shire Council
CENTRAL COAST

AUTHORITY	NAME & TITLE
AUTHOR	Jamie Loader, Manager Building Certification, Health & Compliance
MANAGER	Jamie Loader, Manager Building Certification, Health & Compliance
(ACTING) DIRECTOR	Brian Glendenning, General Counsel
GENERAL MANAGER	Michael Whittaker

CERTIFIED A TRUE COPY OF POLICY ADOPTED BY COUNCIL

AUTHOR SIGNATURE	
COUNCIL RESOLUTION DATE	**9/4/2014**

History of Revisions:

Version	Date	TRIM Doc. #
1	18/5/2009	D01914658
2	9/4/2014	D06269925

A. POLICY SUMMARY

A1 To ensure food sold from Temporary Food Premises does not become unsafe or unsuitable.

B. POLICY BACKGROUND

B1 A policy designed to ensure that food sold from temporary food premises is prepared, stored and handled so as to not become unsafe or unsuitable for sale within Wyong Shire. Further, the Policy will ensure operators obtain a "Single Event" or an "Annual Approval to Operate" within the Wyong Shire, to enable suitable ongoing monitoring of health standards.

C. DEFINITIONS

C1 **The Act** means the *Local Government Act NSW 1993*.

C2 **Council** means Wyong Shire Council, being the organisation responsible for the administration of Council affairs and operations and the implementation of Council policy and strategies.

D. POLICY STATEMENTS

Jurisdiction

D1 This Policy covers all elected members of Council, all personnel employed by Council, any person or organisation contracted to or acting on behalf of Council, any person or organisation employed to work on Council premises or facilities and all activities of the Council.

D2 This policy does not confer any delegated authority upon any person. All delegations to staff are issued by the General Manager.

General

D3 Food businesses selling food at temporary events are required to comply with the Food Act 2003, Food Regulation 2010, the Australia New Zealand Food Standards Code and the NSW Food Authority's guidelines "Food Handling Guidelines at Temporary Events".

D4 Prior to selling any food at a temporary event, a food business must hold a current "single event" or "Annual Approval to Operate" issued by Wyong Shire Council.

D5 Food businesses holding an "Annual Approval to Operate" a temporary food business must be renewed annually (at the completion of each financial year) if the food business continues to operate within Wyong Shire.

E. POLICY IMPLEMENTATION - PROCEDURES

E1 This policy should be read in conjunction with the Wyong Council Code of Conduct.

E2 It is the personal responsibility of all Council employees and agents thereof to have knowledge of, and to ensure compliance with this policy.

E3 Where any charge, fee, supply of products or services under this policy is subject to a Goods and Services Tax (GST) an amount equal to the GST paid or payable in respect of the charge fee, supply of products or services shall be indicated in the amount of consideration paid or payable under this policy.

E4 Associated documents

a) Wyong Council Code of Conduct

b) NSW Food Act 2003

c) NSW Food Regulation 2010

d) Australia New Zealand Standards Code

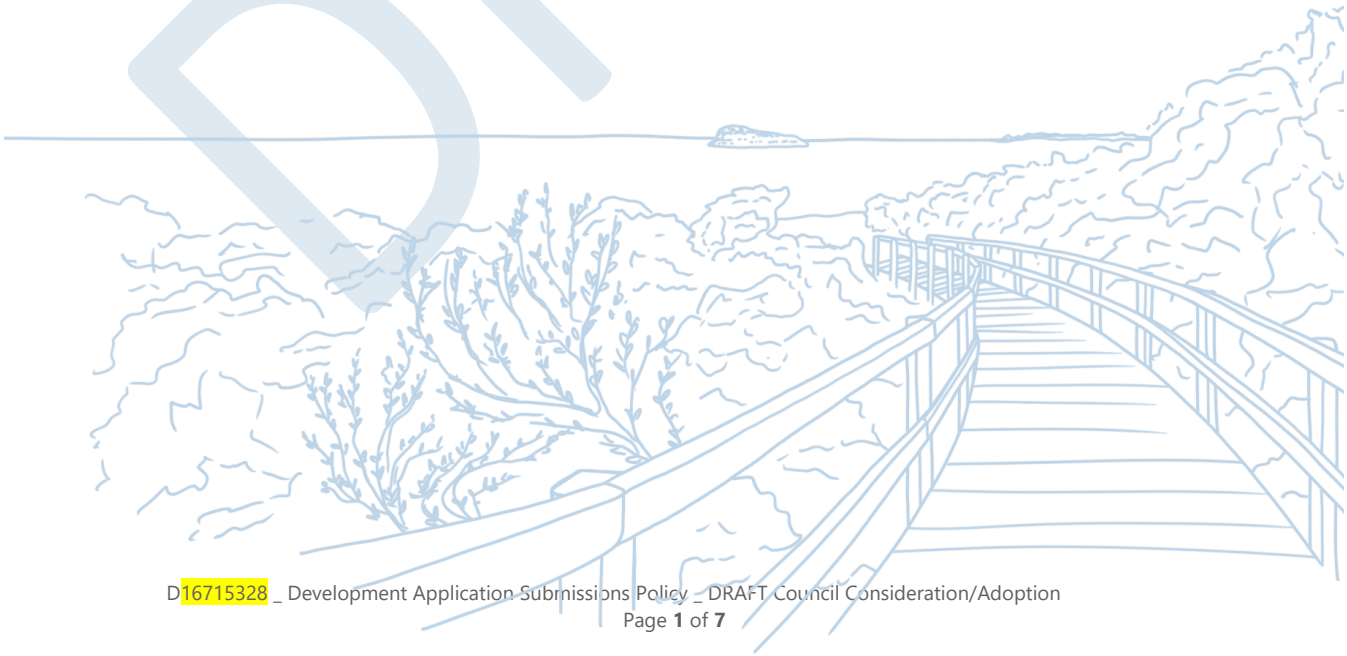
Central Coast Council

Local Planning Panel

Development Application Submissions Policy

Date Adopted: **DRAFT FOR CONSIDERATION/ADOPTION BY COUNCIL**
Revision: **1.1**

DRAFT



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1. Policy Objectives

1.1. This Policy identifies the circumstances in which a contentious Development Application will be referred to the Central Coast Local Planning Panel (**CCLPP**) when the application is the subject of unique written submissions by way of objection.

1.2. This Policy is made pursuant to the provisions of Part 2(a) of Schedule 2 of the Ministerial Direction titled *'Local Planning Panels Direction – Development Applications and Applications to Modify Development Consents'* endorsed by the NSW Minister for Planning and Public Spaces on 6 May 2024.

2. Policy Scope

2.1. This Policy applies to Development Applications that are subject to unique submissions by way of objection, as defined '*Local Planning Panels Direction – Development Applications and Applications to Modify Development Consents'* dated 6 May 2024.

3. Policy Statement

3.1. Central Coast Council (Council) is committed to providing a robust and transparent process for the assessment of Development Applications in accordance with legislative requirements. This Policy identifies the circumstances in which a development application will be referred to the CCLEP for determination based on the number of submissions.

3.2. The *'Local Planning Panels Direction – Development Applications and Applications to Modify Development Consents',* dated 6 May 2024, determines the range and type of Development Applications that are required to be referred to the CCLEP. One of the criteria for referral is 'contentious development' which includes Development Applications subject to a pre-determined number of unique submissions by way of objection.

3.3. Part 2(a) of Schedule 2 of the Local Planning Panels Direction – Development Applications and Applications to Modify Development Consents sets out that Council may endorse a *Development Application Submissions Policy* to set out the number of unique submissions by way of objection that must be received during the notification period for a Development Application to trigger determination of that application by the Local Planning Panel.

4. Contentious Development Referral Criteria

4.1. A Development Application that is the subject of 20 or more unique submissions by way of objection will be referred to the CCLEP for Determination.

4.2. The 20 unique objections trigger does not apply to applications that have been delegated to Council staff for determination by the Panel, or where Council staff are otherwise delegated to deal with the application without referral to the CCLEP.

4.3. This Policy applies to all Development Applications lodged from the date of the final adoption of this Policy by Council.

5. Responsibilities

Compliance, monitoring and review

5.1. This Policy shall be reviewed not more than four years from its date of adopted. Where there is a change in legislation and/or Ministerial Directions or other matters that impact Local Planning Panel operations, review may be undertaken at an earlier time.

5.2. Suspected breaches or misuse of this policy are to be reported to the Chief Executive Officer. Alleged breaches of this policy may be dealt with by the processes outlined for breaches of the Code of Conduct, as detailed in the Code of Conduct and in the Procedures for the Administration of the Code of Conduct.

Reporting

5.3. No additional reporting is required.

Records management

5.4. Staff must maintain all records relevant to administering this Policy in accordance with Council's Information and Records Management Policy, the requirements of the *Environmental Planning & Assessment Act 1979* and the *Government Information (Public Access) Act 2009*.

7. Policy Definitions

7.1. In this policy:

Act	means the *Local Government Act 1993* (NSW)
CCLPP	means the Central Coast Local Planning Panel
Council	means Central Coast Council

Development	has the same meaning as Section 1.5 of the Environmental Planning and Assessment Act 1979 and includes any of the following – (a) the use of land, (b) the subdivision of land, (c) the erection of a building, (d) the carrying out of a work, (e) the demolition of a building or work, (f) any other act, matter or thing that may be controlled by an environmental planning instrument.
EP&A Act	means the *Environmental Planning & Assessment Act 1979*.
Unique submission	has the same meaning as set out in the '*Local Planning Panels Direction – Development Applications and Applications to Modify Development Consents*' dated 6 May 2024, or in any document that replaces or supersedes that document.

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Policy Administration

Business Group	Environment and Planning
Responsible Officer	Unit Manager Development Assessment
Policy Review Date	Four years from date of adoption.
File Number / Document Number	D16715328
Relevant Legislation (reference specific sections)	This Policy supports Council's compliance with the following legislation: ▪ *Environmental Planning & Assessment Act 1979* (and associated Regulations); and ▪ Local Planning Panels Direction – '*Development Applications and Applications to Modify Development Consents'*, dated 6 May 2024.
Link to Community Strategic Plan	Theme 4: Responsible **Goal I: Balanced and sustainable development** R-I2: Ensure all new developments are well planned with good access to public transport, green space and community facilities and support active transport.
Related Policies / Protocols / Procedures / Documents (reference document numbers)	▪ Information and Records Management Policy (D14025241) ▪ Council's Code of Conduct

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9. Policy Authorisations

No.	Authorised Function	Authorised Business Unit / Role(s)
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10. Policy History

Revision	Date Approved / Authority	Description Of Changes
1	TBA	New policy adopted

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Attachment 1 – Summary of Submissions (Local Planning Panel Submission Policy)

The formal public notification period for the draft *Local Planning Panel Submissions Policy* was open for 28 days, concluding on Monday 2 June 2025.

Eight submissions were received during the notification period. Six of the submissions objected to the draft Policy approach of increasing the number of submissions required to trigger a Development Application to be determined by the Central Coast Local Planning Panel, and raised various concerns. Two submissions supported the approach in the draft Policy.

A summary of the submissions, including matters raised and comment by Council officers, is included in the following table.

Ref.	Object/ Support	Matters Raised	Comment/s
1	Objection	The Central Coast should not depart from the Ministerial Directions (requiring 10 submissions for referral to LPP). The region is under a lot of development pressure with design of developments not to a high standard. For any development there are likely to be less than 20 people directly impacted, and few would have a detailed enough understanding of the NSW planning system to put forwards a credible unique submission by way of objection. Central Coast communities often rely on community groups to review and comment on DA's, especially regarding neighbourhood character and liveability. It is undemocratic to require more than 20 objections.	It is agreed that NSW planning framework is complex and some applications are not to a high standard. Whilst some people do receive assistance from community groups in making submissions to Development Applications, residents, with little to no experience in planning processes, can still make submissions raising issues in a number of ways (including by email, letter, or via Council online form). Council assessing staff also discuss directly with those wanting to make submissions to provide advice. All matters raised within submissions must be considered as part of the assessment of any Development Application as per s. 4.15(1)(d) of the *Environmental Planning & Assessment Act 1979*, regardless of whether they are prepared by someone with a background in planning or development.
2	Objection	Disappointed that 10 unique objections will not be sufficient to refer matters to LPP. Risk that 20 submissions will see staff dealing with more complicated 'dodgy' builds. Observation that Councillors are less inclined to vote for liveability, the environment and preservation measures, especially pertaining to COSS.	The altered submissions threshold will likely see a small increase in the number of application dealt with by staff under delegation rather than by the Local Planning Panel. Since the constitution of the Central Coast Local Planning Panel (May 2020), the elected Councillors of Central Coast Council do not play any role in the determination of any Development Applications, as per s. 4.8 of the *Environmental Planning & Assessment Act 1979*.

3	Objection	The Central Coast should not depart from the Ministerial Directions (10 submissions). The region is under a lot of development pressure with design of developments not to a high standard. For any development there are likely to be less than 20 people directly impacted, and few would have a detailed enough understanding of the NSW planning system to put forwards a credible unique submission by way of objection. Central Coast communities often rely on community groups to review and comment on DA's, especially regarding neighbourhood character and liveability. It is undemocratic to require more than 20 objections.	It is agreed that NSW planning framework is complex and some applications are not to a high standard. However, this is a matter for the assessment of the application (coting assessing staff can request additional information from applicants and/or amendments). Whilst some people do receive assistance from community groups in making submissions to Development Applications, residents can still make submissions raising issues with little to no experience required in the planning process. Council assessing staff also discuss directly with those wanting to make submission, and Council has an online DA tracker with capability for those to make submission via an online form. All matters raised within submissions must be considered as part of the assessment of any Development Application as per s. 4.15(1)(d) of the *Environmental Planning & Assessment Act 1979*, regardless of the experience, or otherwise, of those making a submission.
4	Objection	There are a large range of factors that impact DA processing times and there is no silver bullet. A previous NSW inquiry into planning system raised issues in DA assessment (staffing resources, process clarity and coordination, technology and digital systems, poor application quality, required better strategic planning and early engagement, need to address 'zombie' DA's, and review 'deemed refusal' appeals). Raising the number of submissions required to trigger LPP referral will make things worse by allowing developers to demand more variations and slow assessment times. Only a small number of DA's would meet the 20 trigger. Better outcomes resulted from Panel determination. CCC will be the only Council increasing submissions. LPP was introduced to reduce corruption, so reducing access to the LPP is not a good look.	Many of the wider issues relating to the complexity of the NSW planning system, deemed refusal provisions, clarity of the planning process and the like are not within the remit of Council to directly impact, as the NSW planning framework is controlled by NSW legislation. It is agreed that there is no 'silver bullet' to improving DA processes. Councils Development Assessment Unit is working through a series of project tasks to improve levels of service. There is no evidence that increasing the unique submission threshold will make DA processing worse or encourage applicants to seek further variations to development controls. The LPP referral criteria still include provision of automatic referral to the Local Planning Panel for applications that seek to vary a Development Standard by more than 10%. In addition, the Ministerial Directions that require referral to the Local Planning Panel contain separate referral requirements for applications where there is a conflict of interest (Council owned land, Council as applicant, applications where land owner is Councillor or staff member involved in assessment processes). Revising the submissions trigger will not alter the requirement to refer applications to Local Planning Panel where there is a potential conflict of interest, as these are separately listed within the Ministerial Directions and Council has no power to vary these.

5	Support	The current trigger of 10 submission is too low. It has become easier to lodge a submission (email, DA tracker) and even straightforward DA's can be referred to the LPP, adding time and cost to the applicant. LPP causes delays.	Matters pertaining to methods to which submissions can be made is noted, although providing a range of options for the lodgement submission to development applications is to the benefit of the community. It is agreed that the Local Planning Panel does slow the process, even if only slightly, through the requirement (at the conclusion of an assessment) to draft and present reports to the Panel, provide agenda, site meetings and briefings to Panel members, facilitation of formal meetings, minutes and maintenance of web content. There are also cost implications for the organisation in running LPP meetings (Council must cover all LPP costs – including the sitting fees of Panel members and all meeting and on costs).
6	Objection	Only a small proportion of DA's make the current 10 submission limit. Council should be listening to residents.	Agreed that only a small proportion of DA's meet the current 10 submission target. All matters raised within submissions must be considered as part of the assessment of any Development Application as per s. 4.15(1)(d) of the *Environmental Planning & Assessment Act 1979*.
7	Objection	A more holistic approach to streamlining DA assessment is required, not 'isolated tinkering'. Council should use its influence to bring about state-wide change. Challenges include lack of experienced staff, process clarity, DCP provisions, need for simplification of legislative framework and better coordination with agencies. Raising the Local Planning Panel (LPP) referral threshold from 10 to 20 submissions would significantly hinder community participation and create a democratic deficit. Many residents and volunteer groups would struggle to meet this higher bar, silencing valid concerns. The LPP exists to ensure independent scrutiny of contentious development applications, and increasing the trigger undermines its purpose. The current 10-submission threshold promotes transparency and accountability. The proposed change prioritises administrative ease over public interest and should be rejected to preserve community engagement in planning decisions.	Many of the wider issues relating to the complexity of the NSW planning system are not within the direct remit of Council, as the NSW planning framework is controlled by NSW government legislation. It is agreed that there is no 'silver bullet' to improving DA processes. Councils Development Assessment Unit is working through a series of project tasks to improve levels of service. The proposed increased threshold of submissions will result in a slightly fewer number of Development Applications being referred to the Local Planning Panel for determination. However, all matters raisd in submissions will be required to be considered in the assessment of any Development Application, as per s. 4.15(1)(d) of the *Environmental Planning & Assessment Act 1979*.

8	Support	Supports raising the LPP referral threshold to improve efficiency in development assessments. Members report delays and resource strain due to limited panel access and high DA volumes. With fewer planning staff, Central Coast Council must optimise processes.	Noted. Agreed the Council needs to continually optimise processes.

Central Coast Council

Regulatory Priorities Statement

xxxx 2025

1. Statement Objectives

1.1. Central Coast Council's (Council) Regulatory Policy (Policy) requires Council to implement a yearly Regulatory Priorities Statement (Statement) that:

1.1.1. promotes Council as a firm but fair regulator to increase compliance with legislation and regulations.

1.1.2. promotes Council as a modern, adaptive regulator, providing clarity on issues through staff expertise and empirical evidence.

1.1.3. Identifies priority areas for audits, campaigns, fines, and prosecutions to drive behavioural change, enhance reputation, and ensure fairness across the Local Government Area (LGA).

1.1.4. Protects human health, the environment, and community assets.

2. Statement Scope

2.1. This Statement applies to all regulatory, compliance and enforcement functions by Council staff in response to alleged offences under Council-administered legislation.

2.2. It does not apply to functions by Federal or State agencies where Council is not the regulatory authority.

3. Our Approach

3.1. This Statement outlines "Enduring Priorities" (routine, stable regulatory priorities) and "Yearly Priorities" (areas needing increased oversight each year).

3.2. Both types of priorities are initially developed by Council staff using knowledge, experience, data and are refined through public consultation.

4. Enduring Priorities

4.1. Parking Accessibility

Our regulatory efforts will primarily be focused on Central Business Districts, disability parking and high use areas to ensure equal and fair access to parking spots as well any issue causing a safety risk or traffic or pedestrian obstruction. Any other parking related issue or complaint will be dealt with as time and resources permit.

4.2. Community Safety

Our regulatory efforts will primarily be focused on responding to and taking action in relation to dog attacks, dog leashing, dog registration and ensuring that people that visit and utilised our Off Leash Areas (OLAs) do so in accordance with the terms of those OLAs.

4.3. Non-compliance with lawful Directions, Notices and Orders

Our regulatory efforts will primarily be focused on penalising people that do not comply with a lawful Direction, Notice and/or Order issued under relevant legislation without a lawful excuse.

4.4. Matters that have the potential to, or do, significantly impact public assets and/or the environment

Our regulatory efforts will primarily be focused on addressing actions that put public assets and/or the environment at risk.

5. 2025-2026 Yearly Priorities

5.1. Illegal Camping in Parks, Reserves and Carparks

Council is committed to managing illegal camping to ensure the safety, well-being and enjoyment of our community and visitors. Our regulatory priorities for the year will focus on preventing unauthorised camping, protecting public spaces and promoting responsible camping practices.

Actions:

- Enforce legislation that prevents illegal camping, utilising Notices, Orders and Penalty Infringement Notices (PINs) where there is sufficient evidence of illegal camping activities.
- Conduct regular patrols and inspections to identify and address illegal camping activities.
- Provide clear signage and information on legal camping areas and regulations.
- Collaborate with other law enforcement agencies to enhance compliance efforts.

5.2. Illegal Land Clearing

Council is dedicated to regulating incidents of large-scale native vegetation and land clearing. Our regulatory priorities for land clearing will aim to protect native vegetation and promote biodiversity.

Actions:

- Enforce legislation that prevents unauthorised land, utilising Notices, Orders and Penalty Infringement Notices (PINs) where there is sufficient evidence of illegal works occurring.
- Conduct regular monitoring and assessments of land clearing activities.
- Conduct inspections in response to reports of land clearing.
- Partner with state and federal agencies to investigate land clearing activities.

5.3. Encroachment on Public Land

Council is committed to managing public land encroachments to protect community assets, ensure public safety and uphold the integrity of public spaces. Our regulatory priorities for the year will focus on preventing unauthorised encroachments, promoting compliance and enhancing community awareness.

Actions:

- Enforce legislation that prevents unauthorised encroachments, utilising Notices, Orders and Penalty Infringement Notices (PINs) where there is sufficient evidence of encroachment onto Public Lands.
- Conduct regular inspections and assessments to identify and mitigate risks associated with encroachments.
- Provide clear guidelines and support for property owners to comply with Orders to remove encroaching items.
- Issue notices and penalties for unauthorised encroachments.

5.4. Illegal waste dumping and unlawful waste activities/facilities

Council is committed to managing illegal dumping and ensuring the effective operation of waste facilities to protect public health, the environment, and community well-being. Our regulatory priorities for the year will focus on preventing illegal dumping, promoting proper waste disposal, and taking regulatory action for illegal activity.

Actions:

- Enforce legislation that prevents illegal dumping and unlawful waste facilities by utilising Notices, Orders and Penalty Infringement Notices (PINs) where there is sufficient evidence of illegal dumping or unlawful waste facilities.
- Conduct regular patrols and surveillance to identify and respond to illegal dumping incidents.
- Collaborate with NSW EPA to enhance compliance efforts for waste facilities.

5.5. Food Business – Food Safety repeat offenders

Council is committed to ensuring the safety of retail food. Council will increase enforcement action (e.g. improvement notices, prohibition orders or penalty infringement notices) where incidents of food safety compliance have been observed to be high risk or a repeat behaviour by the food business.

Actions:

- Enforce legislation under the Food Act 2003 (NSW) and Food Regulation 2015.
- Conduct regular inspections of food businesses to ensure compliance with the Food Standards Code.
- Issue Penalty Infringement Notices to Businesses where there has been a repeat breach of legislation during inspections.
- Monitor and audit food businesses to ensure ongoing compliance with food safety standards.
- Collaborate with NSW Food Authority.

6. Potential Actions

6.1. Our increased regulatory efforts signify a comprehensive approach to ensuring compliance and maintaining high standards. This means there will be more frequent inspections and audits along with an increase in site visits and surveillance activities. As a result, Council will be issuing more Penalty Infringement Notices (PINs), pursuing more prosecutions and seeking more injunctions to enforce regulations effectively.

7. Making Complaints

7.1. In reporting issues to Council that require regulatory action, the Central Coast Community must provide Council with sufficient information to enable staff to adequately investigate an issue as outlined in the Regulatory Policy.

7.2. Complaints can be made in a variety of ways including by phoning Council on 02 4306 7900, by emailing ask@centralcoast.nsw.gov.au or by lodging a self-service complaint via the online Customer Service Centre. Complaints should be made in real time or as close to real time as possible. This assists Council in the preservation and collection of evidence.

7.3. Anonymous complaints will be dealt with if there is an overriding public interest to do so, in accordance with the Regulatory Policy.

8. Statement Administration

Business Group	Environment and Planning
Responsible Officer	Unit Manager Environmental Compliance Services
Associated Procedure (if any, reference document(s) number(s))	Practice Notes and Regulatory Procedures may be developed to guide Council actions and decision making.
Statement Review Date	This Statement will be updated each financial year.
File Number / Document Number	DXXXXXX
Link to Community Strategic Plan	Theme 4: Responsible **Goal G: Good governance and great partnerships** R-G3: Provide leadership that is transparent and accountable, makes decisions in the best interest of the community, ensures Council is financially sustainable and adheres to a strong audit process.
Related Policies / Protocols / Procedures / Documents (reference document numbers)	• Code of Conduct • Regulatory Policy (D15787667) • Information and Records Management Policy (D14025241) • Privacy Management Plan (D15206444) • Unreasonable Complainant Conduct Policy (D14869666) • Complaints and Feedback Management Policy (D14928768)

9. Statement History

Revision	Date Approved / Authority	Description Of Changes
1	TBA	New Statement Adopted

Central Coast Council

Regulatory Priorities Statement

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xxxx 2025

Central Coast Council

Draft Terms of Reference
Coastal, Estuary and Floodplain Risk Management Sub-Committee

Date Adopted: **01/7/2025**
Revision: **1.0 Final**

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a) Coastal, Estuary and Floodplain Risk Management Sub-Committee

1. Purpose

1.1. The Sub-Committee will operate for the term of the current Council (the Council elected via the 2024 NSW Local Government elections) unless otherwise resolved by Council to terminate earlier.
1.2. The purpose of the Sub-Committee is to consider, monitor, and advise on matters relating to the management of coastal areas, estuaries, and floodplains within the Central Coast local government area. It will provide relevant advice for the consideration of Council via the Environment and Planning Committee of Council.
1.3. The Sub-Committee will also serve as a Local Floodplain Risk Management Committee as described in the NSW Government's Flood Risk Management Manual 2023

2. Scope

2.1. The Sub-Committee may provide advice, input, and feedback on matters relating to the management of coastal areas, estuaries, and floodplains within the Central Coast local government area, including:
  2.1.1. Short, medium, and long-term management of coastal, estuarine, and floodplain areas
  2.1.2. Issues related to pollution risks and water quality management.
  2.1.3. Flood risk management and mitigation strategies including Flood Studies and Floodplain Risk Management Plans.
  2.1.4. Environmental health and sustainability of coastal and estuarine ecosystems
  2.1.5. Development and implementation of Coastal Management Programs for the Central Coast.

3. Establishment and Membership

3.1. The Sub-Committee is established under the Environment and Planning Committee of Council and will report to the parent standing committee for consideration of outcomes.
3.2. The voting members of the committee shall be:
  3.2.1. The Mayor.
  3.2.2. Councillors nominated by resolution of Council.
  3.2.3. Independent community representatives (up to a maximum of 3) as nominated by resolution of Council
3.3. The Sub-Committee shall aim to make decisions by consensus when possible, however if voting on a motion put to a meeting of the Sub-Committee is equal, the Chairperson of the meeting shall have a casting vote as well as an original vote.
3.4. In addition to members, the following people shall be permitted to attend and participate in Committee meetings as observers:
  3.4.1. Any other Councillor
  3.4.2. Chief Executive Officer and Council officers as determined by the CEO.
  3.4.3. External representatives listed in section 3.7 of these Terms of Reference.
3.5. Observers will be entitled to sit with members and participate in all aspects of the Sub-Committee with the exclusion of voting on items not determined by consensus.

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3.6. Members are appointed by Council for the duration of the sub-committee (for a period of 2 years from the first meeting).
3.7. Representatives from the following government agencies, academia, research bodies and industry will be invited by the CEO to join the Sub-Committee as subject matter experts and advisors, to provide technical information and advice to the Sub-Committee in relation to agenda items, or for matters that are otherwise more generally within the scope of the Sub-Committee's functions. These bodies will not have voting rights.
3.7.1. NSW State Emergency Service
3.7.2. Transport for NSW (Maritime Division)
3.7.3. Central Coast Local Lands Services (LLS)
3.7.4. NSW Department of Primary Industries and Regional Development, Fisheries Division
3.7.5. Department of Planning, Housing and Infrastructure, Crown Lands Division
3.7.6. NSW Department Climate Change, Energy, Environment and Water – Coast, Estuary and Flooding
3.7.7. National Parks and Wildlife
3.7.8. NSW Environment Protection Authority
3.7.9. University of Newcastle
3.7.10. Other representatives as required at the invitation of the Chairperson

4. Delegation

4.1. The following delegations will apply to the Sub-Committee:
4.1.1. The Sub-Committee may make recommendations to Council on all relevant business presented before it. Such recommendations will be presented to the Environment and Planning Committee of Council for consideration in a report prepared by Council officers.

5. Chairperson

5.1. The Chairperson is to be determined by Council when considering membership of the Sub-Committee.
5.2. The role of chairperson is as described in the Code of Meeting Practice.
5.3. In relation to any procedural matter, the ruling of the Chairperson is final.
5.4. In the absence of the Chairperson the committee will elect a chairperson as the first item of business.
5.5. Should the Chairperson resign from the role of Chairperson, or cease to continue the role of Chairperson for other reasons, appointment of a new Chairperson would occur in accordance with item 5.1
5.6. The Chairperson is to have precedence at meetings and shall determine the order of proceedings, generally as set out in the agenda.

6. Co-ordinator

6.1. The CEO will assign a Council officer to perform the role of Coordinator.
6.2. The Coordinator is responsible for general management of the Sub-Committee and shall review and approve meeting agendas and minutes in consultation with the Chairperson.

7. Secretary

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7.1. The CEO will assign a Council official to perform the role of Secretariat.

8. Meetings

8.1. A suitable meeting place and facilities will be made available by Council for the conduct of meetings.
8.2. Meeting dates are set annually to assist in forward planning. Meetings will generally be held each quarter on a Tuesday during business hours at the Council Administration Building at 2 Hely Street Wyong, unless otherwise notified. Meetings are expected to take approximately 2 hours, however occasionally may take longer.
  8.2.1. Meetings may be held in-person, remotely, or hybrid format as agreed by the members.
  8.2.2. If consensus cannot be met regarding the format of the meeting, the Chairperson and Co-ordinator will decide how the members will meet – in-person, remotely, or hybrid.
8.3. The Committee may call an extraordinary meeting following the process outlined in the Code of Meeting Practice.
8.4. The Sub-Committee will be conducted in accordance with the Code of Meeting Practice and the Code of Conduct.
8.5. Records of the meeting will be made publicly available.

9. Meeting Attendance

9.1. A quorum shall be the majority of Councillor members (excluding the Mayor) and community representative members (i.e., half plus one, rounded down to the nearest whole number)
9.2. Members are expected to attend all meetings and actively participate in discussions where possible.
9.3. Apologies for non-attendance must be submitted to the Civic Support team at least 24 hours before a meeting, otherwise a Sub-Committee member will be recorded as absent.
9.4. Sub-Committee members (other than the Mayor) cease to be a member of the Sub-Committee if:
  9.4.1. The member has been absent from three consecutive meetings of the Sub-Committee without having given reasons acceptable to the Sub-Committee for the member's absences; or
  9.4.2. The member has been absent from at least half of the meetings of the Sub-Committee held during the immediately preceding year without having given to the Sub-Committee acceptable reasons for the member's absences.
9.5. Sub-Committee members may resign from their position at any time by notifying the Chairperson in writing.
9.6. Members must become familiar with the relevant legislation, Code of Meeting Practice and Code of Conduct. The Coordinator can provide support to assist with this process.
9.7. Members are expected to familiarise themselves with the items on the Business Paper and read all material before each meeting.
9.8. Code of Conduct training must be completed by all members prior to attending a meeting.
9.9. Members are required to maintain the security of any confidential or personal information that is shared with them in the performance of their role on the Sub-Committee.
9.10. Individual members (whether Councillor or Community members) are not permitted to make representations on behalf of the group or Council unless otherwise approved by Council.

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9.11. A breach of Council's Code of Conduct may result in the cancellation of membership.

10. Business Paper and Minutes

10.1. The Business Paper will be prepared in a format aligned to Council's Business Paper and as required in the Code of Meeting Practice.
10.2. The Business Paper will be distributed a minimum of three business days prior to the meeting date.
10.3. The minutes and associated recommendations of each meeting shall be submitted to the Environment and Planning Committee of Council for consideration. The parent committee will determine any recommendations to be presented to Council.
10.4. Minutes of all meetings will be retained in the electronic document management system of Council.
10.5. The minutes shall contain:
  10.5.1. Description of the meeting, date, time, and venue at which the meeting was held,
  10.5.2. A list of persons present.
  10.5.3. Notation of adoption of minutes from previous meeting
  10.5.4. Whether there was business arising from the minutes
  10.5.5. Notation of reports, correspondence, and recommendations
  10.5.6. Time meeting closed, date and venue for next meeting.

11. Term

11.1. The Sub-Committee will operate for the term of Council (as also described in item 1.1), unless otherwise resolved by Council to terminate earlier.
11.2. Council may amend the term of the Sub-Committee by resolution.
11.3. All sub-committees will be dissolved at the conclusion of the current term of Council. Meetings will not occur during the caretaker period before a local government election.

12. Criteria for Community Representation

12.1. The Sub-Committee is limited to a maximum of 3 independent community members (non-Councillors) who represent the views of the broader community.
12.2. The appointment of independent community members to the Sub-Committee is for the term of the Sub-Committee as described in item 11.1.
12.3. The Coordinator of the Sub-Committee will prepare a report shortlisting eligible community candidates, ensuring representation from the community reflects geographic diversity, and competence across the range of issues the Sub-Committee addresses, such as flooding, estuary management, coast management.
12.4. Selection of the community representatives is to be determined by the Council members of the committee.
12.5. Selection and Appointment of Community Members:

The community members selected shall be representatives of the Central Coast community. A formal expression of interest and evaluation process will be conducted to identify the preferred nominees.

The selection criteria will be based on skills, knowledge, and experience in one or more of the following:

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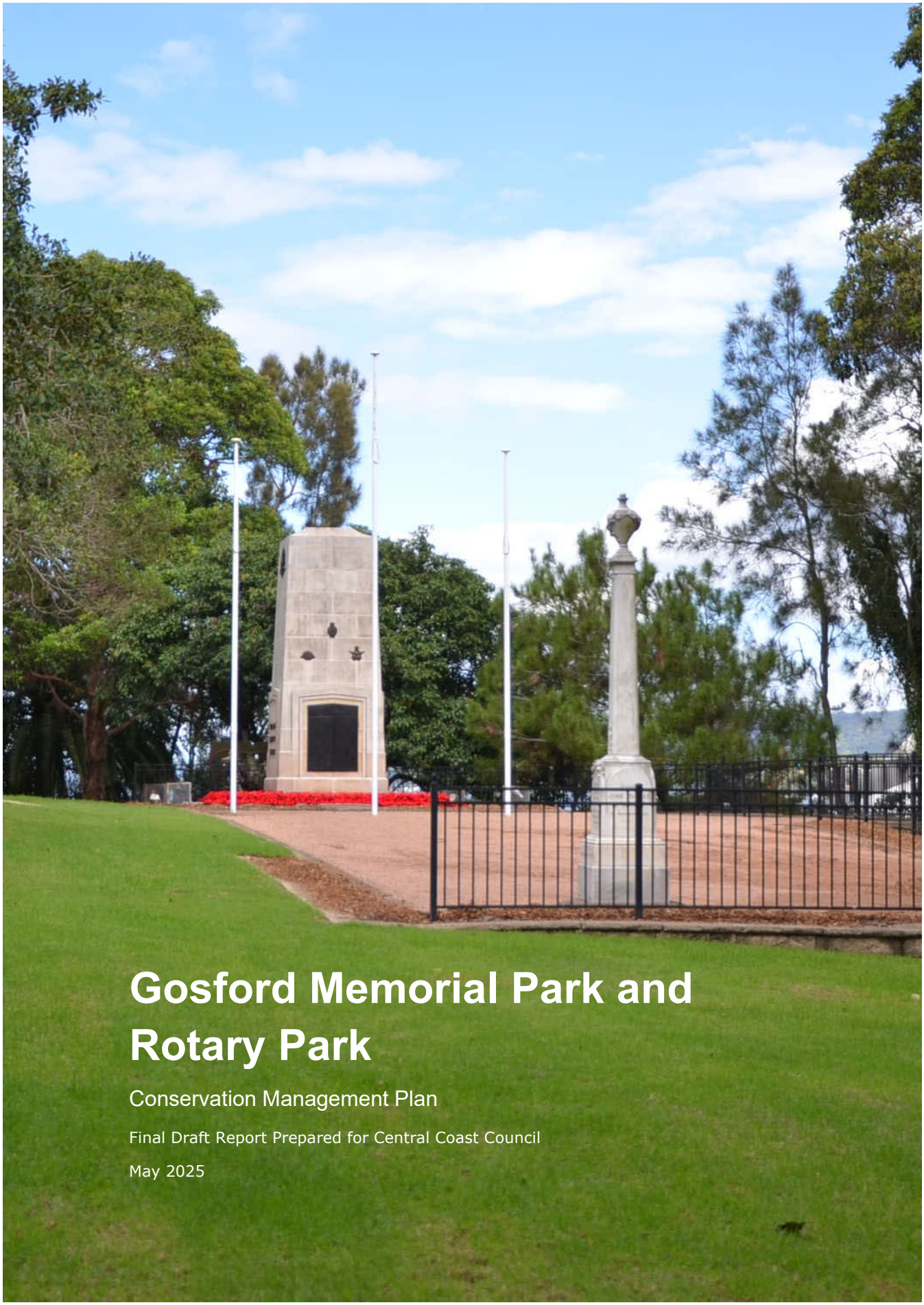
12.5.1. Coastal management and engineering, coastal erosion, and community values of the open coast.
12.5.2. Estuary Management, Water quality, habitat, biodiversity, foreshore and streambank protection, and community values of waterways, including tourism, boating, fishing, and aquaculture.
12.5.3. Flood risk management: hydrology, flood modelling, land use planning, engineering, flood mitigation, emergency response planning, and community values and development on the floodplain.
12.5.4. Community education, awareness, and participation.
12.5.5. Communication, collaboration, governance, and project management.

DRAFT



Gosford Memorial Park and Rotary Park

Conservation Management Plan

Final Draft Report Prepared for Central Coast Council

May 2025

Acknowledgement of Country

We respect and acknowledge the First Nations peoples of the lands and waterways on which we live and work, their rich cultural heritage and their deep connection to Country, and we acknowledge their Elders past and present. We are committed to truth-telling and to engaging with First Nations peoples to support the protection of their culture and heritage. We strongly advocate social, cultural and political justice and support the Uluru Statement from the Heart.

Cultural warning

Aboriginal and Torres Strait Islander readers are advised that this report may contain images or names of First Nations people who have passed away.

GML HERITAGE

Report register

The following report register documents the development of this report, in accordance with GML's Quality Management System.

Job No.	Issue No.	Notes/description	Issue date
24-0025A	1	Draft Report	24 June 2024
24-0025A	2	Preliminary Final Draft	9 December 2024
24-0025A	3	Final Draft Report	9 May 2025
24-0025A	4	Final Draft Report re-issued with minor amendment on page 120 (Gosford CBD Sewer Upgrades)	16 May 2025

Quality management

The report has been reviewed and approved for issue in accordance with the GML quality management policy and procedures.

It aligns with best-practice heritage conservation and management, *The Burra Charter: the Australia ICOMOS Charter for Places of Cultural Significance, 2013* and heritage and environmental legislation and guidelines relevant to the subject place.

Indigenous cultural and intellectual property

We acknowledge and respect the inherent rights and interests of the First Nations in Indigenous Cultural and Intellectual Property. We recognise that Aboriginal and Torres Strait Islander people have the right to be acknowledged and attributed for their contribution to knowledge but also respect their rights to confidentiality. We recognise our ongoing obligations to respect, protect and uphold the continuation of First Nations rights in the materials contributed as part of this project.

Cover image

Gosford Memorial Park. (Source: GML Heritage)

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Executive summary

Gosford Memorial Park, Rotary Park and the adjoining public reserve by the Gosford waterfront, are located adjacent to one another. The sites are owned and managed by Central Coast Council (the Council), which commissioned GML Heritage Pty Ltd to prepare a conservation management plan (CMP) for the study area.

This CMP has been prepared to provide a framework for the sites' ongoing conservation, care, maintenance, use and management by the Council. The CMP includes policies to guide the ongoing public use of the parks, and is a ready reference to manage change and for the assessment of future proposals and applications for works.

Future changes and works at the study area must consider the significance of the place (including the relationship between Gosford Memorial Park and Rotary Park) and the compatibility of uses of the place as a whole and as two different parks. The parks should be managed in conjunction with each other due to their proximity and related maintenance issues. However, uses of and at the parks should be compatible with the unique heritage values of each park.

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Introduction

1 Introduction

Central Coast Council (Council) engaged GML Heritage Pty Ltd (GML) to prepare a conservation management plan (CMP) for Gosford Memorial Park and Rotary Park (the study area) in order to ensure their ongoing conservation, care, maintenance, use and management.

1.1 Study area

Gosford Memorial Park and Rotary Park are located in the southern portion of Gosford, in the Central Coast Local Government Area (LGA) (Figure 1.1). The study area is bounded by Vaughan Avenue to the north, Mann Street to the east, and Dane Drive (Central Coast Highway) to the south and west. Across the highway from the parks is Gosford Public Wharf and the Brisbane Water estuary.

The study area has three distinct zones (Figure 1.2):

- **Gosford Memorial Park** (including its western slopes and stairs, located on a promontory of land);
- **Rotary Park** (built on land reclaimed from the foreshore in the 1930s); and
- **a public reserve**—a long southern extension of lawn (also lying on reclaimed foreshore land and defined by Mann Street and Dane Drive).

The study area contains several allotments, including parts of Vaughan Avenue, Dane Drive and Mann Street (Figure 1.3):

- Lot 7021 DP 1020205;
- Lot 7023 DP 1076182;
- Lot 7038 DP 1020204;
- Lot 7022 DP 1076182;
- Lot 375 DP 755227;
- Lot 20 DP 1113717;
- Lot 19 DP 1113717; and
- Lot 1 DP 629609.

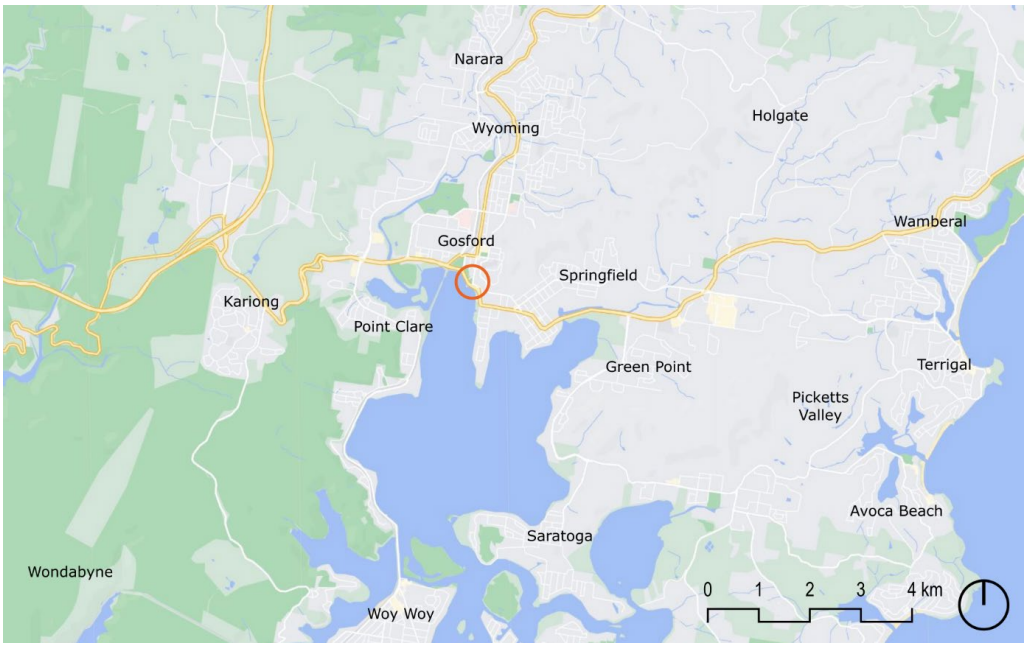

Figure 1.1 Location of the study area (circled in orange) in the Central Coast context. (Source: Google Maps with GML overlay 2024)

Figure 1.2 Aerial image of the study area showing the three zones. (Source: Nearmap with GML overlay 2024)

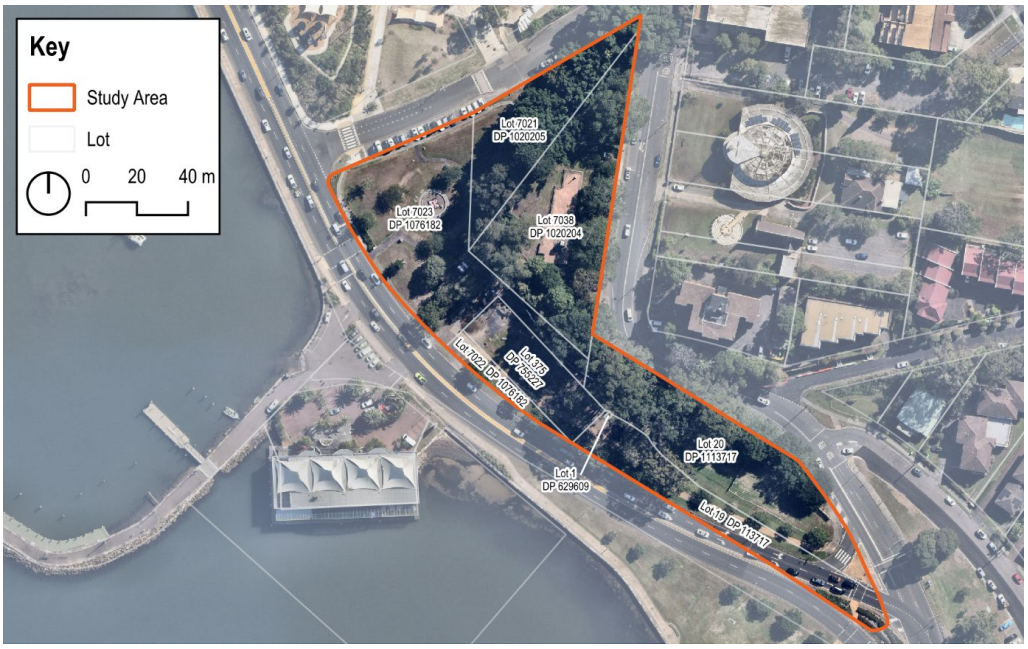

Figure 1.3 Aerial image of the study area showing the lot boundaries. (Source: Nearmap with GML overlay 2024)

1.2 Heritage context

The study area contains the following listed heritage items and archaeological site (**).

Table 1.1 Statutory and non-statutory heritage listings within the study area.

Item name	Address	Listing	Significance	Item No.
Statutory listings				
Gosford City Council Memorial Park, including avenue and feature trees	Mann Street and Vaughan Avenue	*State Environmental Planning Policy (Precincts—Regional) 2021*	Local	31
Rotary Club, fountain, garden and original site of Gosford Wharf	Vaughan Avenue	*State Environmental Planning Policy (Precincts—Regional) 2021*	Local*	A9*
Non-statutory listings				
Gosford Cenotaph	Gosford Memorial Park, Mann Street	National Trust of Australia (NSW)		

* The State Heritage Inventory (SHI) listing notes there is a high potential archaeological resource.

Gosford Memorial Park and several memorials within it are listed on the NSW War Memorials Register, a crowd-sourced database of war memorials in NSW. Further information on the memorials is provided in Section 3.3.

The NSW SHI provides the following Statement of Significance for 'Gosford City Council War Memorial Park':

> The Gosford War Memorial Park is significant aesthetically for its value as open space, and socially for its connections to the military and general communities.
>
> The mature trees within the park and its street boundaries, consisting of *Araucaria cunninghamiana* (hoop pines), *Casuarina cunninghamiana* (River she oaks), *Lophostemon confertus* (Brush box) and *Pinus radiata* (Monterey Pines) provide an 'avenue' landscape of a comfortable scale, and frame streetscape vistas of high aesthetic and natural value, linking the city to the views over Brisbane Water and to the ridges surrounding the city. Full height mature trees, particularly in groups, are a valuable asset to the city.

The NSW State Heritage Inventory provides the following Statement of Significance for 'Rotary Club, fountain, garden and original site of Gosford Wharf':

> The place has high historic and research significance.

An updated assessment of significance is provided in Section 4 of this CMP.

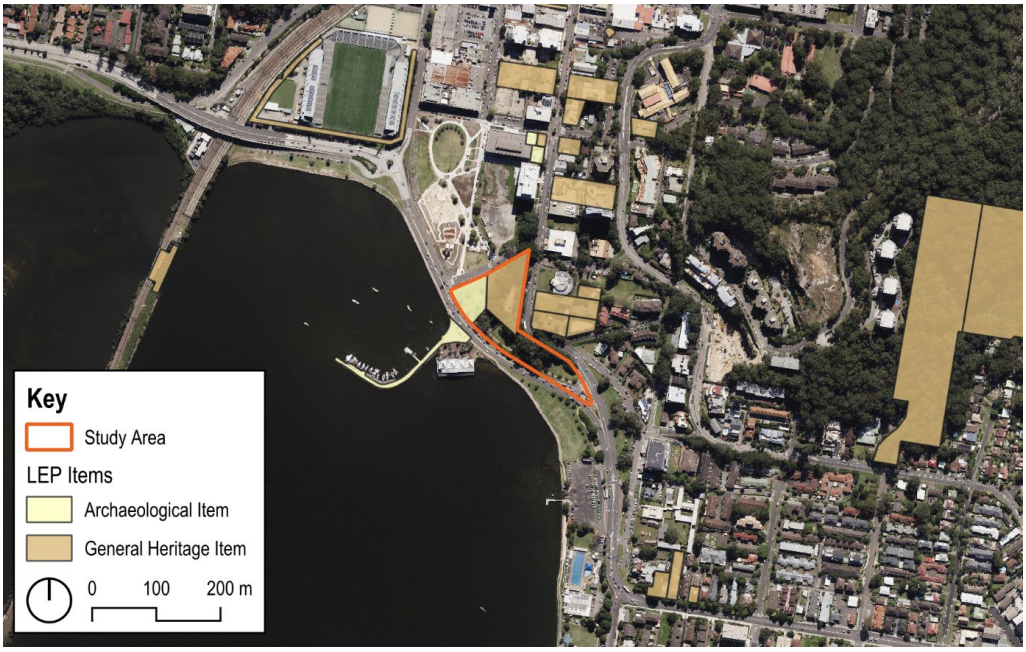

Figure 1.4 Heritage context of the study area (outlined in red). (Source: NSW State Heritage Inventory and Nearmap with GML overlay 2024)

1.3 Key objectives

A CMP details why and how an item has been established to have heritage significance and outlines the policies necessary to retain its significance and enable appropriate conservation, use and management.

The objectives of this CMP include the provision of guidance for managing the conservation of the heritage significance of the place through the following steps:

- understanding the place by investigating its context, history, physical fabric, and research potential;
- establishing a statement of significance for the place that is based on documentary and physical evidence to determine the nature and degree of significance of the two parks and their setting, and of the place as a whole, with regard to comparable public parks; and
- developing conservation policies to guide the current landowner and manager on the conservation of the heritage significance of the place, with consideration of its ongoing use and future changes.

This CMP revises the respective statements of significance by analysing the documentary and physical evidence to determine the nature, extent and degree of significance of the two parks and of the place as a whole. The CMP also provides conservation policies for the conservation and management of the place to allow for its ongoing use, and future changes, without impacting its significance. This report should be used as a practical document when planning any works—both temporary (including events) and permanent—and as a standard against which to assess the heritage impact of future proposals.

1.4 Methodology

This CMP has been prepared in accordance with the following documents and best practice guidelines:

- Heritage Council of NSW guidelines for CMP preparation, including *Statement of Best Practice for Conservation Management Plans*[1] and *Guide on Developing a Conservation Management Plan*;[2] and
- *The Burra Charter*: *The Australia ICOMOS Charter for Places of Cultural Significance 2013* (the Burra Charter).[3]

This CMP is consistent with the principles of *The Conservation Plan*,[4] prepared by James Semple Kerr and originally published by the National Trust of Australia (NSW).

1.4.1 Relevant documentation

The background material reviewed in the preparation of this CMP is collated in Table 1.2.

Table 1.2 Relevant documentation.

Publication details
Long Blackledge Architects, 2022, Gosford Cenotaph Heritage Asset Action Plan, Version B, prepared for Gosford RSL Sub-Branch. History researched and written by Merril Jackson
Jacobs Group, 2020, Gosford Sewer Infrastructure Upgrades, Review of Environmental Factors, Final, prepared for Central Coast Council
Jacobs Group, 2023, Gosford Sewer Infrastructure Upgrades, Statement of Heritage Impact, V2 Final, prepared for Central Coast Council

1.4.2 Limitations

This CMP is subject to the following limitations:

- This report is primarily based on existing documentation. Only limited new historical research has been undertaken.
- Formal consultation with key stakeholders and community groups were undertaken by Council and provided to GML to be incorporated into this CMP. These parties included:
  - Gosford RSL Sub-Branch;
  - Gosford Rotary Club;
  - Central Coast Council Heritage and Culture Advisory Committee;
  - Woy Woy Country Women's Association (CWA); and
  - Guringai Tribal Link (as the only Indigenous group who responded to Council's invitation for consultation).

  No consultation process was directly undertaken by GML. Additional and ongoing consultation may be required.
- The study area description and analysis were prepared following inspection of the two parks and their setting, but without intervention into built or landscape fabric. Visual observation primarily informed this analysis.
- A review of previous documentation that relates to the potential for Aboriginal archaeology in the study area has been undertaken as part of this CMP; however, an assessment of Aboriginal cultural heritage values associated with the study area has not been conducted as part of this CMP.

- Although the Memorial Park site is captured in various photographs from the late nineteenth and early twentieth centuries, photographs do not appear to exist that collectively detail the exact plant selection and composition of the park. Further, an original late 1880s planting-design drawing for the study area has not been found and may not have ever existed.
- A current 'tree-by-tree' survey plan of the study area was not available to GML at the time of the preparation of this CMP—nor was an arboricultural assessment of the parks. Accordingly, the tree and shrub mapping in this report is indicative only.

1.4.3 Terminology

This report follows the Burra Charter in its use of the following terms and definitions:

- Place means site, area, building or other work, group of buildings or other works together with associated contents and surroundings. Cultural significance means aesthetic, historic, scientific or social value for past, present or future generations.
- Cultural significance means aesthetic, historic, scientific, social or spiritual value for past, present or future generations.
- Conservation means all the processes of looking after a place so as to retain its cultural significance. It includes maintenance and may according to circumstance include preservation, restoration, reconstruction and adaptation and will be commonly a combination of more than one of these.
- Fabric means all the physical material of the place.
- Maintenance means the continuous protective care of the fabric, contents and setting of a place, and is to be distinguished from repair. Repair involves restoration or reconstruction and it should be treated accordingly.
- Preservation means maintaining the fabric of a place in its existing state and retarding deterioration.
- Restoration means returning the existing fabric of a place to a known earlier state by removing accretions or by reassembling existing components without the introduction of new material.
- Reconstruction means returning a place as nearly as possible to a known earlier state and is distinguished by the introduction of materials (new or old) into the fabric. This is not to be confused with either re-creation or conjectural reconstruction.
- Adaptation means modifying a place to suit proposed compatible uses.
- Compatible use means a use which involves no change to the culturally significant fabric, changes which are substantially reversible, or changes which require minimum impact.[5]

1.5 Authorship

This report was prepared by Hendry Wan (Senior Associate), Dr Kat McRae (Senior Heritage Consultant), Andie Coulson (Heritage Consultant) and Linda Phung (Heritage Consultant). Leonie Masson (Associate, Historian) provided the historical overview and Ari Anderson (Special Advisor) provided cultural landscape heritage assessment and conservation policies. Julian Siu (Principal) and Dr Tim Owen (Principal) provided strategic oversight and review.

1.6 Acknowledgements

GML gratefully acknowledges the assistance of the Central Coast Council team: Alex Chipchase (Open Space and Recreation Planner), Rebecca Cardy (Senior Heritage Officer), Peta James (Senior Strategic Planner), Rick Gatt (Section Manager, Parks and Reserves) as well as Merril Jackson OAM (Historian), who provided valuable assistance over the course of the project.

1.7 Endnotes

[1] Heritage Council of NSW 2021, *Statement of Best Practice for Conservation Management Plans*, NSW Government Department of Planning and Environment <https://www.environment.nsw.gov.au/research-and-publications/publications-search/statement-of-best-practice-for-heritage-conservation-management-plans>.

[2] Heritage Council of NSW 2021, *Guide on Developing a Conservation Management Plan*, NSW Government Department of Planning and Environment <https://www.environment.nsw.gov.au/research-and-publications/publications-search/guidance-on-developing-a-heritage-conservation-management-plan>.

[3] Australia ICOMOS Inc, *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance 2013*, Australia ICOMOS Inc, Burwood, VIC, 2000.

[4] Kerr, J S 2013, *Conservation Plan*, seventh edition, Australia ICOMOS.

[5] Australia ICOMOS Inc, The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance 2013, Australia ICOMOS Inc, Burwood, VIC, 2000, Articles 1.1 to 1.11.

Understanding the place—historical context

2 Understanding the place—historical context

2.1 Introduction

The following summary history places the development of Gosford Memorial Park and Rotary Park within the context of their natural and cultural setting, including Aboriginal connections to Gosford and the Central Coast in the late nineteenth and early twentieth centuries.

The following history is supplemented with additional primary and secondary information and illustrative material sourced from the National Library of Australia (Trove), NSW Land Registry Services, Central Coast Council and Central Coast Council Library's Local Studies Collection, State Library of NSW (SLNSW), Museums of History NSW—State Archives Collection, and other state and local repositories.

The summary history of the Cenotaph is drawn from *Gosford Cenotaph Heritage Asset Action Plan (HAAP)* prepared by Long Blackledge Architects in 2022. The history was researched and written by Merril Jackson.

2.2 Aboriginal Country: The early colonial period and ongoing connections

The correct names for the Aboriginal people, their territory and the language of the Central Coast region are the subject of ongoing debate. This is a contentious issue for Central Coast Council, the Aboriginal community groups and other residents. It will require further discussion and cannot be resolved in this CMP. The importance for this CMP is to acknowledge the First Nations people's connection to the Central Coast and their continuing role in its development.

This history acknowledges that today Aboriginal people who identify as Guringai, Darkinjung/Darkinoog and/or Awabakal recognise the Central Coast as being part of their Country.

They were fishers, hunters and gatherers of plants and animals of the land, rivers, estuaries and sea. These places, including the hills, valleys, creeks, wetlands, lakes and coastline, provided food, medicines, and raw materials for tools, weapons, shelter and decoration. In her diary describing a trip to the Gosford-Wyong area in 1833, Mrs Felton Mathews referred to the women wrapping themselves in 'blankets, or cloaks of sewed opossum skins'.[1]

There is reliable evidence of Aboriginal people's occupation of the region, namely in a sandstone capped plateau in the Upper Mangrove Creek area west of Gosford, where stone artefacts were dated between 10,000 and 12,000 years old.

For many of the Aboriginal groups in NSW, Baiame is one of the main Creators in the Dreaming. Daramulan (often depicted with one leg) is the son of Baiame and his emu-wife. Daramulan is associated with ceremonies (usually men's). The landscapes around the Central Coast have also been marked, carved and painted with depictions of these beliefs. Sites are connected to each other and retain spiritual and cultural importance to the Aboriginal community today. Rock art along the coastline survives at Point Clare and Ettalong, and within Brisbane Water National Park.

Figure 2.1 Aboriginal axe-grinding grooves in the Ourimbah district, c1920s. (Source: Central Coast Council Library, 000153.JPG)

Figure 2.2 Carvings at Brisbane Water National Park. (Source: NSW National Parks and Wildlife Service)

During the 1780s, the smallpox plague swept into Brisbane Water and Broken Bay ahead of settlers. The impact of the disease on Aboriginal people was devastating but the colonisation of their homeland was more gradual, allowing them to maintain cultural practices and retreat into less-penetrable areas of rugged or swampy country.[2] Despite the impact of European colonisation, Aboriginal people adapted to the new society and negotiated new roles within the economy. James Webb, the earliest settler of Woy Woy, is reported to have employed Aboriginal men and women on his property in 1823 to carry out domestic chores and farm labour.[3] It is likely that Aboriginal people also assisted settlers in early industries such as timber getting.

The 1827–1841 counts of Aboriginal people within the Brisbane Water District did not exceed 75 people. However, it is likely that attendance at blanket returns is an inaccurate source for calculating the local population numbers.

Figure 2.3 Brisbane Water by Conrad Martens, 1848. (Source: SLNSW)

In 1842, John Frederick Mann, explorer and surveyor, visited Brisbane Water, eager to meet the local Aboriginal people.[4] Mann paid an Aboriginal man to demonstrate how to climb a 70- to 80-foot tree, which he did by cutting small notches up a tree. Mann was later guided from his accommodation by local Aboriginal people known as Emu and Mary Anne to Ourimbah, and then to the junction of Wyong Creek and Tuggerah Lake.

At this final location, a corroboree had been planned in honour of an Aboriginal group visiting from Wollombi.[5]

By the 1860s, government reserves in NSW were increasingly established to control the movement of Aboriginal people. The establishment of the NSW Aborigines Protection Board in 1883 legalised the dislocation and removal of Aboriginal people to government reserves and missions. The Darug were granted one of New South Wales' earliest reserves, to be shared with Darkinyung people. It was established by the Aborigines Protection Board at Sackville Reach on the Hawkesbury River in 1889.[6] St Clair was also established in 1891 by Reverend JS White and covered 60 acres. Aboriginal people taken to the reserve included the Wonnarua, the Awabakal, the Worimi and the Darkinyung.

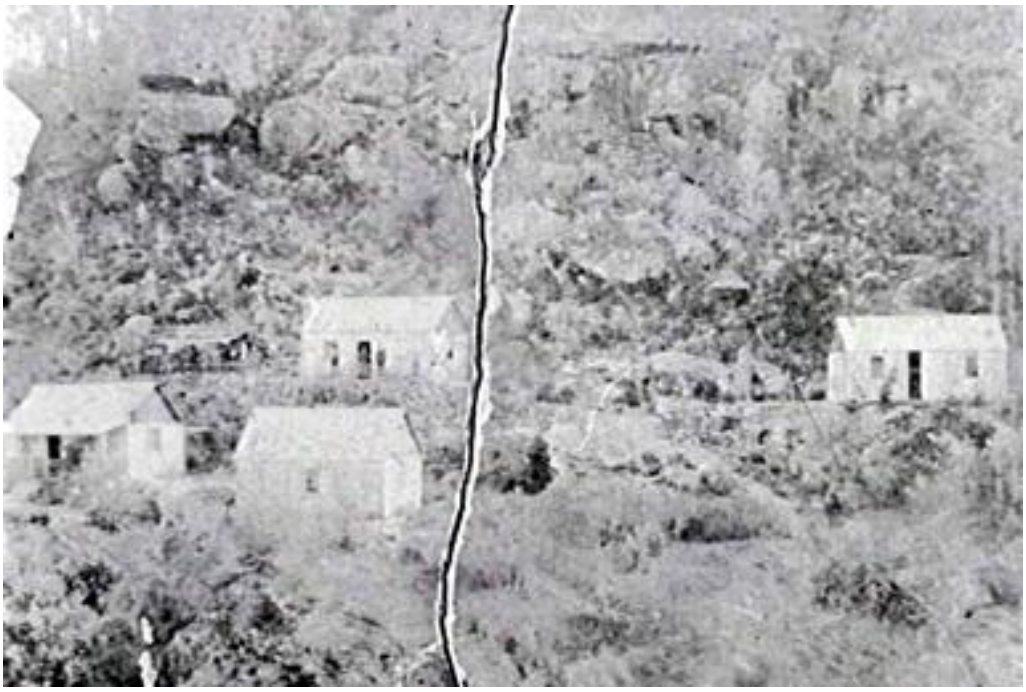

Figure 2.4 Hawkesbury Aborigines Reserve and Mission Station, Sackville Reach, c1890s–1900s. (Source: Hawkesbury Library)

During the 1920s and 1930s, and again in the 1950s and 1960s, many reserves were closed and people moved onto smaller reserves closer to towns where European people and businesses could access Aboriginal labourers while the population remained segregated from the centre. On the Central Coast, Aboriginal people still camped at Terrigal Lagoon and Avoca Lake into the twentieth century. People remained connected to kin, Country and new patterns of seasonal work.

In 1983, the *Aboriginal Land Rights Act* (NSW) saw remaining Aboriginal reserves being handed back to local Aboriginal communities. The same year, the Darkinjung Local Aboriginal Land Council (LALC) was established with a mission to assist the community in health, culture, heritage and economic development.

The Darkinjung LALC boundary extends from 'Catherine Hill Bay to the North, Hawkesbury River to the South, Pacific Ocean to the East and Watagan Mountains to the West'.[7] However, some local Aboriginal community groups and their allies contest that the Central Coast is solely Darkinjung Country.

2.3 Exploration and isolation

The need for productive land to support the burgeoning settlement at Port Jackson led to early expeditions to the inlets and branches of Broken Bay in 1788–1789. Governor Phillip and Captain John Hunter explored Broadwater and the site of Gosford, documenting mostly their experience of navigating the shoals in the waterways, describing 'the land at Broken Bay … in most parts rocky and barren.'[8] The Hawkesbury area was a more attractive prospect to settlers during the 1790s; expansion into Brisbane Water only occurred in the 1820s after the best Hawkesbury land had been taken. As settlers took up tracts of land in the Lower Hawkesbury and Brisbane Water, formal surveys began to investigate the rugged and isolated region.

James Webb was the first known settler of the Gosford area, settling near The Rip in 1823. He was one of the first 22 settlers on the Hawkesbury River at Pitt Town.[9]

By 1825, the waterway between Wagstaffe and Gosford was named Brisbane Water after the incumbent governor. This area was described in *The Sydney Gazette* as containing good land but only in 'small patches, from sixty to one hundred acres', making suitable farms for 'small settlers'.[10] The author noted that 15 miles north of Brisbane Water was land:

> available for large agricultural establishments … a quality *equal to any* in New Holland, *and superior to most* tillage of every description, consisting of thick brush and forest land, heavily timbered.[11]

The government noted this observation. The land around Brisbane Water was granted to small settlers, including free settlers, emancipists, retired military men and native-born people. The land at the northern end of the waterway, such as the heavily timbered lands on Narara and Erina creeks, was granted to settlers of higher standing in the colony.

By 1831, there were only a handful of settlers between today's Gosford and Wyee. The isolation of the area meant that residents depended on waterways, and the boat building economy was established before major roads and rail connected the area.

Several locations around Brisbane Water were singled out as government reserves for future townships. The Gosford site was chosen for the government township at Brisbane Water because it was 'on the best anchorage and at the termination of a straight and flat-topped range'[12] but it was not finally surveyed and named Gosford until 1839. A settler named Samuel Peek established the private township of East Gosford, advertising allotments a few kilometres away.

This was consolidated by Gosford's accessibility to a public wharf and the railway built in 1887–1888. The breakthrough of the railway through rugged country collapsed the distance to Sydney and helped fuel the fishing, timber and, later, recreational industries of Gosford.

Later still, the road bridge built across Brisbane Water at Parks Bay, Woy Woy, in 1941 expanded access to the region around the time that car ownership was on the uptake. A few years later, in May 1945, the opening of Hawkesbury River road bridge on the Pacific Highway dispensed with the need to use the ferry.

2.4 The town of Gosford

In 1830, Surveyor-General TL Mitchell identified land at Point Frederick as the best site in Brisbane Water for a town. This location was to become present-day Gosford. Mitchell described it in a letter to the Colonial Secretary as:

> … the best anchorage in Brisbane Water; and at the termination of a straight and flat topped range which would connect a town on this promising bay with the new road at the head of the Wollombi.[13]

The site was occupied by Thomas A Scott and he was asked to vacate the area. Scott was allowed to select 1,200 acres at Point Clare and he later acquired more land. The suburb of Tascott is named after him.[14]

After the official survey and naming of Gosford as a government town in 1839, two villages developed in parallel, as East Gosford was run as a private town. However, the government village of Gosford overtook the eastern village, and the administrative centre developed along Mann Street.

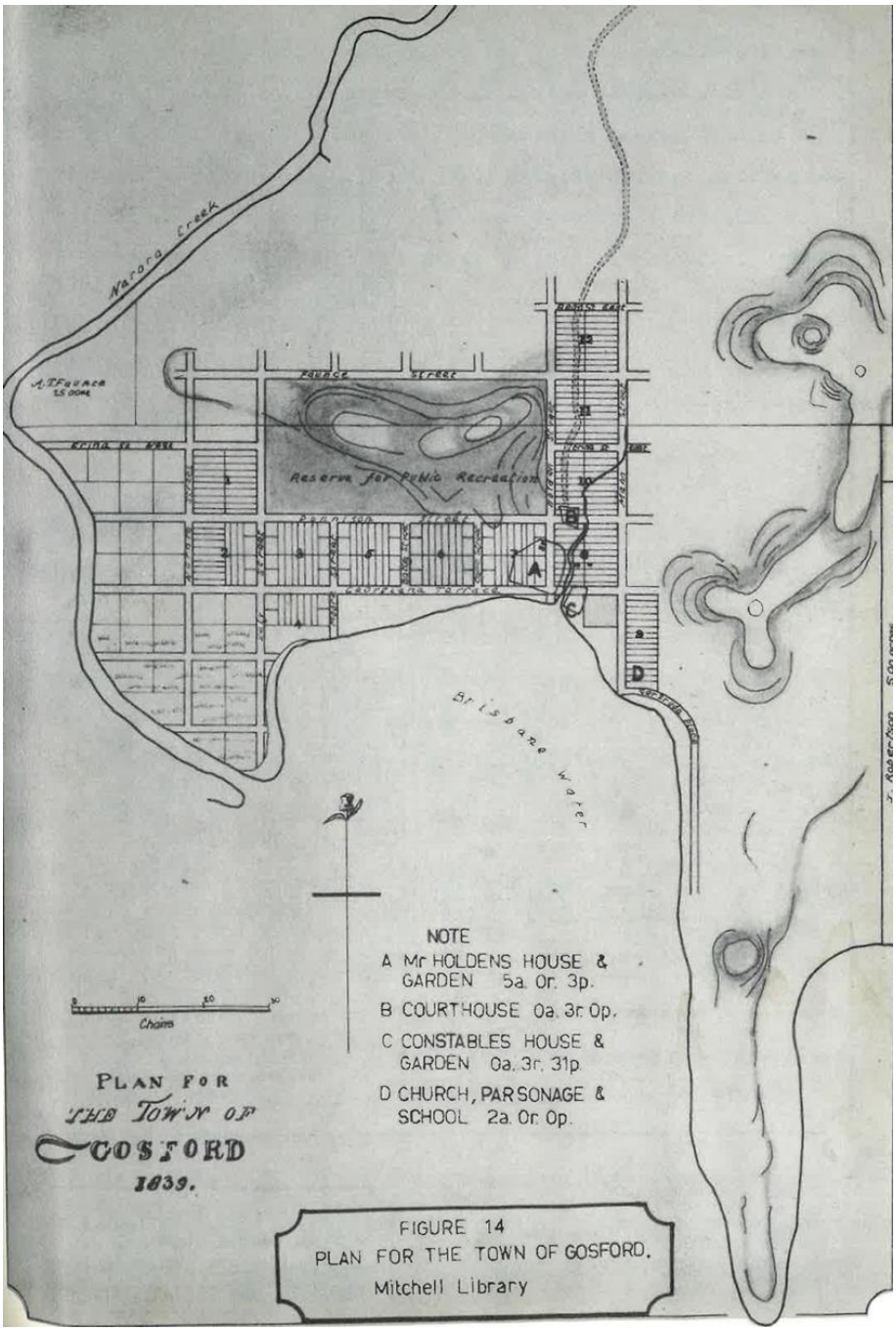

Figure 2.5 Plan for the Town of Gosford, 1839. (Source: Reproduced in Tanttari, K 1976, 'The Historical Development of Gosford', p 67)

In 1840, a *New South Wales Government Gazette* was published on the 'Boundaries of the Police Districts of the Colony'. The Brisbane Water boundary was defined as:

> Embracing the south-eastern portion of the County of Northumberland; bounded on the north by a line from Reid's Mistake across Lake Macquarie, bearing westerly to Dora Creek and by Dora Creek to the Warrawolong Range and to Mount Warrawolong, hence on the west by the crest of the said range to Mount Simpson and the north road, and by this road to Wiseman's Ferry; on the south by the Hawkesbury and Broken Bay roads to Box Head on the sea shore, which forms the eastern boundary to Reid's Mistake aforesaid.[15]

In 1843, the Brisbane Water District Council was established and operated until 1859. It was the forerunner of later shire councils and the present Central Coast Council.

2.5 Historical overview of Gosford Memorial and Rotary Parks

In the following discussion of the history of the Gosford Memorial and Rotary Parks (collectively referred to as the study area), the history is broken into phases, defined by land acquisitions, development stages, and key built and landscape elements.

2.5.1 The Gosford Wharf

Sea and river transport formed the primary means of moving goods and people around the Central Coast region until the development of rail and reliable roads. Water transport remained essential for trade, tourism and general communication well into the twentieth century.

Wharves were built to service Gosford and Brisbane Water, including a wharf erected near the southern end of Mann Street, Gosford, in 1841.[16] *The Australian* reported in December 1840 that 'it is his Excellency's intention to send down a party of men without delay for the purpose of constructing a stone wharf at Gosford'.[17]

The Department of Works invited tenders in May 1864 for the construction of an 'Approach leading from the present roadway to the timber jetty recently erected at Gosford'.[18]

In July 1881, 2 acres 2 roods (1.01 ha) were surveyed at Gosford for a wharf reserve as shown in the plan at Figure 2.6. The annotated text in red indicates that Hugh Campbell, William Irvine Coulter and John Earl Stradling Worley were appointed trustees of the site by notice in the Government Gazette on 26 September 1881.[19] The plan shows a formed road for access to the wharf from Mann Street, depicted in dotted lines, and structures on the wharf, including a shed, designated by cross-hatching. Plan R 121 shows the land was reserved from sale for a public wharf. The land covered by high tide is also shown.

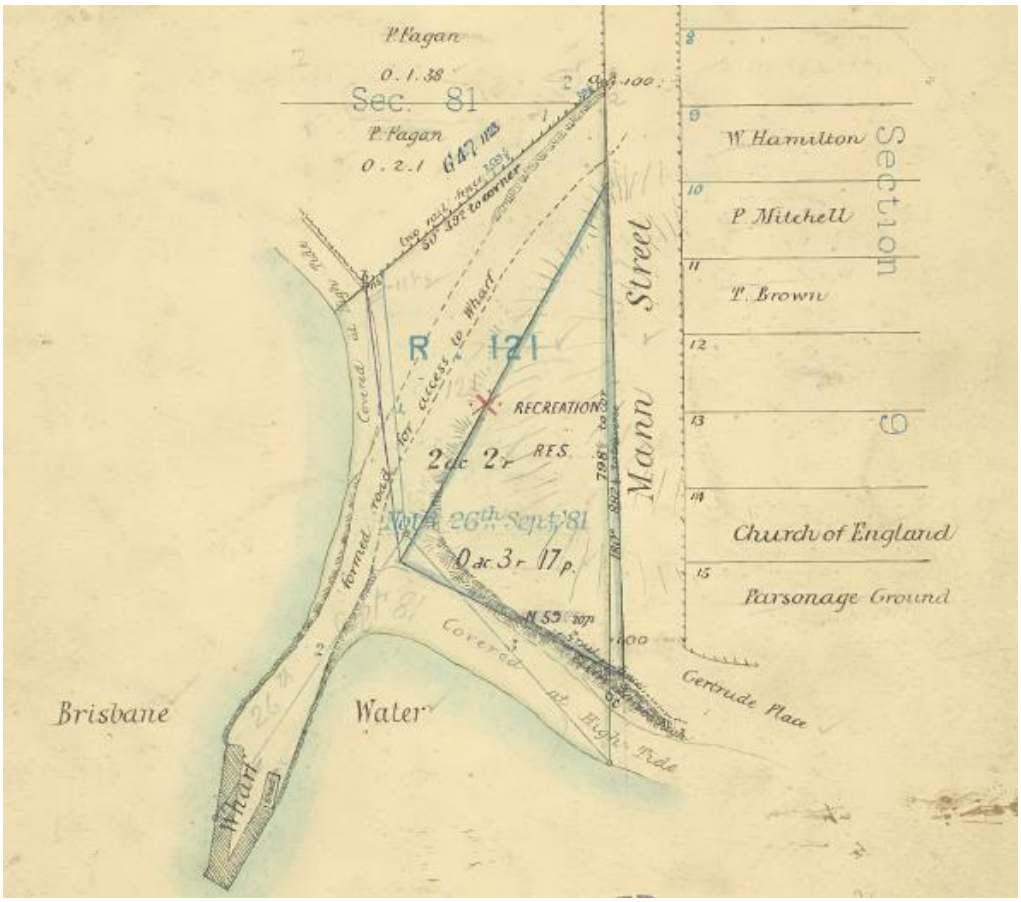

Figure 2.6 Plan of a portion of 2 acres 2 roods in the Parish and Town of Gosford County of Northumberland measured as a site for a wharf reserve, surveyed 26 July 1881. (Source: NSW Land Registry Services, Crown Plan 38-2071)

New trustees for the public wharf and shed were announced in June 1886.[20] In September and October the same year the Department of Public Works invited tenders for extension of the Gosford Wharf.[21] Following completion of the works, management and control of the wharf was handed over to Gosford Borough Council in October 1887.[22] The following year the council passed by-laws that established tolls, rates and dues, among others.[23]

At various times the wharf was repaired and, in some cases, rebuilt. For instance, in 1910 the Department of Public Works approved plans to construct a new wharf. The works were completed in 1911[24] at a cost of £600, which included a grant of £300 from the department.[25] In 1928 the council considered raising a loan of £5000 to reconstruct the wharf and review the proposed design.[26]

This plan was abandoned due to financial constraints and the council instead undertook repairs to the existing wharf decking in 1930. The wharf was inspected in 1932 and two defective piles were found in the wharf that required replacing. At this time the road to the wharf had been scarified and graded, and repairs to walling stonework were estimated to cost £10.[27]

After the reclamation of the Broadwater (Brisbane Water) was completed, a new public wharf was constructed. It is unclear how much of the old wharf remains beneath the present Rotary Park, the public reserve and Dane Drive.

Figure 2.7 Gosford Wharf with steamships, c1885. (Source: Central Coast Council Library Service, 001\001097)

Figure 2.8 View north along the roadway from Gosford Wharf spit towards Mann Street, c1886. (Source: Central Coast Council Library Service, HistoricV0338)

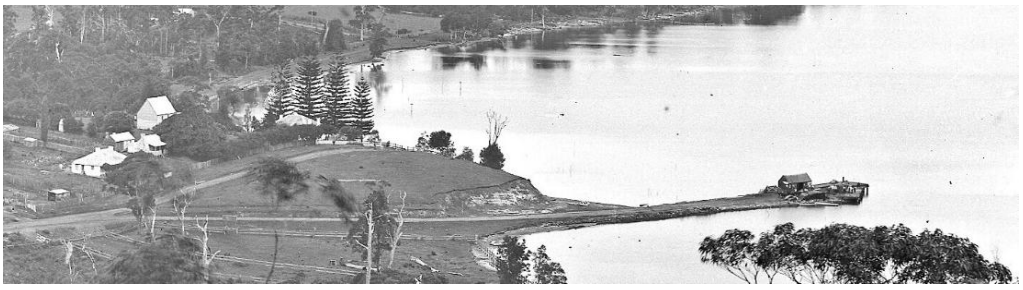

Figure 2.9 Detail from Gosford, NSW, taken on 30 March 1887, showing the original form of the Gosford Wharf and approach roadway from Mann Street (at left). This image, taken before extensive reclamation works along the foreshore, highlights the close spatial relationship between the wharf and the small promontory site that became Gosford Park—seen here completely barren, essentially an open western forecourt to the church and parsonage sites on the opposite side of Mann Street. Photograph by Ralph Snowball. (Source: University of Newcastle, Hunter Living Histories, ASGN0877-B39)

Figure 2.10 Gosford Wharf in centre and Gosford Park at left (surrounded by a timber picket fence and including its original cultural plantings), c1895. (Source: Central Coast Council Library Service, 003\003226)

Figure 2.11 Brisbane Water and Gosford Wharf, c1895. (Source: Central Coast Council Library Service)

Figure 2.12 Boat docked at Gosford Wharf, 1905–1910s. Note the canopy of a maturing cultural planting (foreground) on the lower western slopes of Gosford Park. Image by Broadhurst. (Source: SLNSW, PXA 635/313)

Figure 2.13 Deconstruction of the Gosford Wharf at the Broadwater, August 1969. (Source: Central Coast Council Library Service, https://www.flickr.com/photos/gostalgia/15076226969/)

2.5.2 Establishment and early years of Gosford Park

Land adjoining the Gosford Wharf was dedicated for public recreation on 15 January 1886 and formally proclaimed on 18 March 1887 to be known as 'Gosford Park'. The park comprised 3 roods and 17 perches (0.35 hectares), as shown in the Crown plan N59-2071 (Figure 2.14).

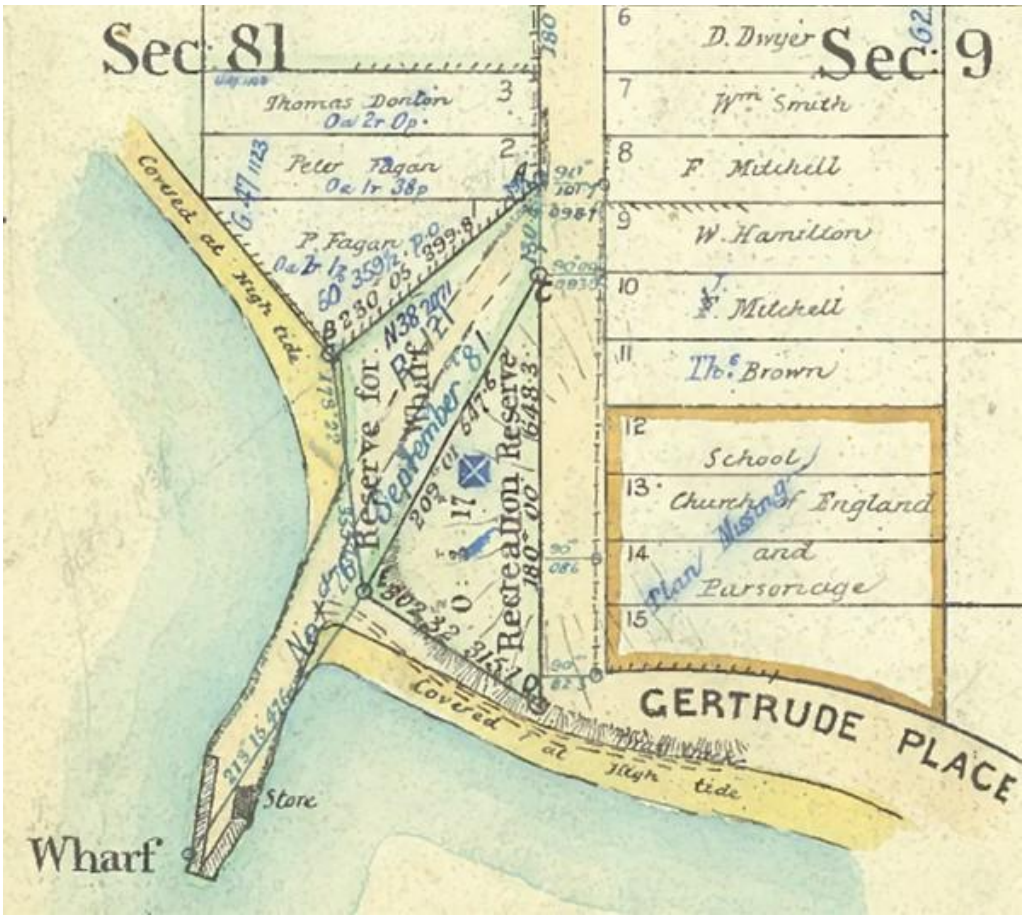

Figure 2.14 Detail from plan of one portion of 3 roods and 17 perches surveyed as a site for a recreation reserve on 20 June 1884, with later annotations. (Source: NSW Land Registry Services, Crown Plan 59-2071)

The nature of the terrain framing the park site is partially indicated on the 1884 Crown plan (Figure 2.14), which includes the land covered by high tide. The dedicated triangular land parcel was broadly in accordance with the topographical form/features of the head of the promontory at the southern end of Mann Street.

According to the New South Wales Government Gazette, the Municipal Council of Gosford was appointed the trustee of Gosford Park in April 1887.[28]

In an early photograph from March 1887 that includes the parkland (Figure 2.9), the study area is barren and devoid of trees, having been clear-felled of its endemic vegetation some decades before.

The only landmark cultural plantings near the site at the time were four already-mature Norfolk Island Pines to the immediate east, in the grounds of a house that was reputedly the property of Governor Brisbane, and one very large canopy tree, possibly a fig, in or abutting the grounds of the Church of England site. What appears to be a small amount of regrowth eucalypt vegetation was present at this time on the southern flank of the headland, south of where the park was laid out.

One of the council's first tasks was to fence the park, which was completed by January 1888 for the sum of £50/9/4. The council simultaneously received a government grant of £50.[29] Government grants were awarded for Gosford Park over successive years including 1887/1888 and 1888/1889. Photographic evidence indicates that that funding went towards the first stage of park beautification and cultural planting, which was carried out in those years. In a Crown plan of streets in the town of Gosford from 1888 records the 'new picket fence' along the Mann Street frontage of the park site.

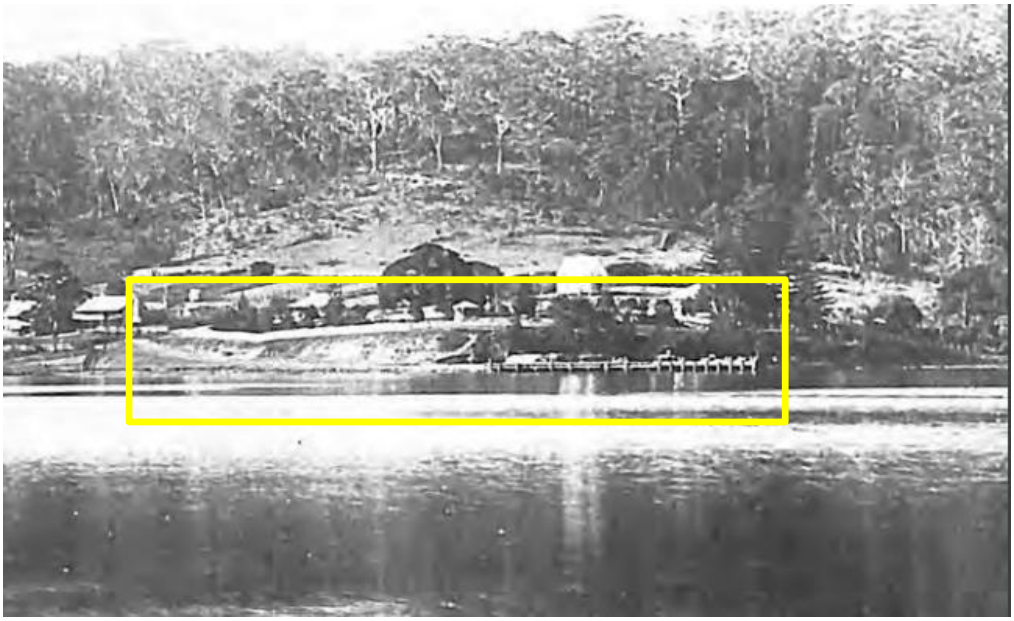

Figure 2.15 View to Gosford from Brisbane Water, about 1895, showing the roadway to the wooden wharf adjoining Gosford Park, which is surrounded by the white picket fence. Note the barren western slopes of the park's promontory and some of the maturing 1887/1889-planted columnar pine specimens toward the northern end of the park (at left). (Source: Central Coast Council Library Service, courtesy Brisbane Water Historical Society, with GML overlay 2024)

No original plan of the park has been found during research for this CMP to confirm, for example, where paths were first laid out, where gates in the boundary fence were located, where flower and shrub beds were sited and which, and how many, tree species were first specified.

In August 1891 the *Sydney Mail and New South Wales Advertiser* reported that the flowerbeds in Gosford Park had been 'cleaned and put in order, and the trees and shrubs are attaining a great height'.[30] However, three months later the same newspaper commented that the popular park:

> is just now in a very untidy state, while the trees, shrubs and flowers are growing wonderfully. The paths, and grass-plots are a mass of long grass and weeds, and sadly need attention.[31]

Evidently the council was made aware of the state of the park, as in January the following year the park had undergone maintenance and the long grass had been mown and trees and flowers pruned and tidied.[32] Further improvements in the park took place in June, when the *Australian Town and Country Journal* noted:

> The flowerbeds and around the ornamental trees have been cleaned of the long grass and weeks, and the palisading is being painted.[33]

The same newspaper reported in January 1893 that the council was to erect a rotunda to accommodate the local brass band.[34] The rotunda is depicted in several photographs such as ones from 1896 (Figure 2.16), 1898 (Figure 2.17) and 1906 (Figure 2.19).

During the 1890s the council was awarded small sums of money to improve public parks as in January 1896 when a sum of £10 was granted.[35] By this time, the park had been comprehensively planted; various conifer and canopy specimens were inset from its boundary fence. The majority of the park appears to have been largely unplanted lawn in its first designed incarnation. The original landmark tree arrangement suggests that council was first and foremost interested in delineating the site with a grand and formal 'frame'.

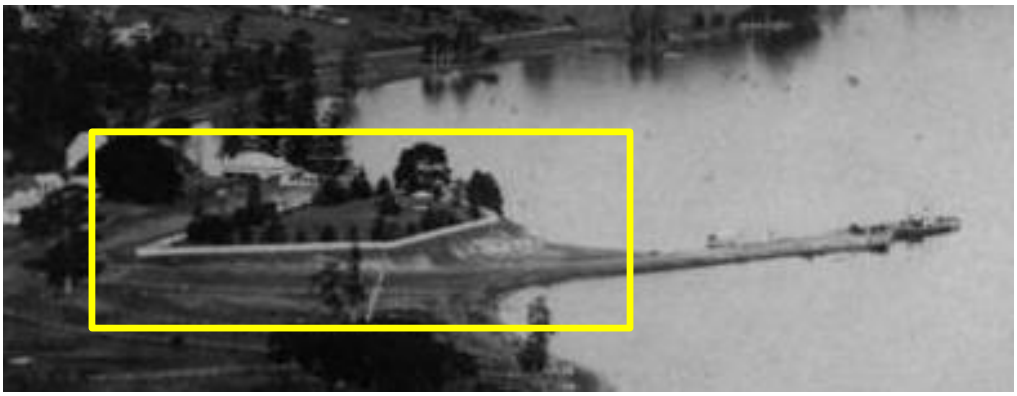

Figure 2.16 Detail from 1896 view from Presidents Hill, Gosford, to the east and southeast, showing Gosford Park outlined in yellow. Note the maturing conifers in the park and the rapidly maturing regrowth eucalypt canopy immediately abutting the southern edge of the park and promontory. (Source: Central Coast Council Library Service, 003\003159 with GML overlay 2024)

Figure 2.17 Gosford Park and its rotunda, which was sited in the vicinity of the existing cenotaph. Note the maturing conifer species around the park boundaries. Does not show the water tower as in Figure 2.19. (Source: *Australian Town and Country Journal*, 23 April 1898, p 19)

Figure 2.18 View along Mann Street with Gosford Wharf and Gosford Park to the right of the roadway and Brisbane Water at the far right, 1903. Note the rapidly maturing sentinel conifer specimens in the park (at centre) and the very large regrowth eucalypt at the end of Mann Street (southern side of park promontory). The park's Boer War Memorial, which is visible in this image, had just been built. (Source: Central Coast Council Library Service, 003\003239)

Multiple local men from the district enlisted and served during the Boer War of 1899–1902. Of the volunteers, three died on active service: Corporal Harcourt Franklin Legge in May 1900; Trooper John Murray in November 1900; and Trooper Sidney S Mayo in March 1902.

Two of Legge's brothers were given a welcome home at the School of Arts in March 1901. On this occasion an appeal was launched to raise funds to erect a war memorial to the fallen soldiers of the district. *The Maitland Daily Mercury* reported:

> Although giving a hearty welcome to her returned soldiers, Gosford has not forgotten those who will return no more, Trooper Murray, who was shot—and Trooper Legge, who died of a fever. Already ten pounds has been raised to erect a memorial of those who may fall in the war.[36]

In November 1902 a 12-foot-high marble monument was erected in the centre of Gosford Park to the memory of the three soldiers from the district who fell during the Boer War.[37] The memorial is visible in a 1903 photograph (Figure 2.19) and the c1908 photograph by Charles Kerry (Figure 2.20).

Figure 2.19 Looking south through the centre of Gosford Park showing the Boer War Memorial and former rotunda and water tower at right. All the trees in this image were planted in the late 1880s. (Source: *Australian Town and Country Journal*, 9 May 1906, p 22)

The Gosford Times and Wyong District Advocate on 31 May 1907 reported on an upcoming visit to Gosford by the Scottish Rifles Band, which was to play a Sunday evening concert at Gosford Park, among other performances.[38] It is assumed that the rotunda was used for this purpose.

The park's original layout looks to have been very rudimentary. Although some paths through the park were reputedly established, it does not appear that a formal pedestrian network through the park was ever completed. As is evident in Figure 2.20, the core of the park was essentially gently sloping grass, which retained the natural levels of the headland.

At regular intervals the council was required to undertake improvements to Gosford Park. For instance, in 1911 the wharfinger was instructed to clean up the park, cut grass and provide chipping around trees in 'his spare time'.[39] Later the same year, vandalism included damage to trees by 'knocking the bark off the best tree in the park'.[40]

Further vandalism was reported in the *Gosford Times* in September 1915 when rope swings erected for the amusement of children were cut down.[41] By this period the fence was described as 'dilapidated'.

Figure 2.20 Gosford Park showing the Boer War Memorial and rotunda, c1908. Note the maturing canopy tree at centre right, between the now non-extant rotunda and the Boer War Memorial. This tree, no longer present (seemingly a Brushbox), was likely positioned to provide some shade for the rotunda and through the middle of the park generally. Note also what appears to be the poor health of a couple of semi-mature pine trees, along the southern boundary of the park, at right. Image by Charles Kerry. (Source: Central Coast Council Library Service)

Figure 2.21 View towards Paul's Corner, Mann Street, early 1900s. Image by Phegan. The picket fence around Gosford Park is visible at centre right. (Source: Mrs Sylvia Coulter, Central Coast Council Library Service)

Figure 2.22 View at the southern end of Mann Street at Paul's Corner, c1905–1910. The picket fence and gateposts to Gosford Park are visible at far right. Image by Broadhurst. (Source: SLNSW, baZJwRJpWpXgP)

In 1915 *The Gosford Times and Wyong District Advocate* described the approach to the Gosford Park site from the south. Reference is made there to the road climbing up Gosford Park Hill and the distinct 'triangular headland' shape of the park site.[42] Until the 1930s reclamation works around the bay and the subsequent development of the waterfront roadway, the only pedestrian and vehicular access to and from Gosford, from the south, was via Mann Street and the eastern side of the park.

Figure 2.23 View from about the early 1900s, facing north toward the Gosford Park site, behind the large eucalypt canopy at centre left of the image. Note the site's proximity to the waters of the bay prior to reclamation works. (Source: Private Collection)

The old fence around the park was partially removed and replaced in 1921 as the Erina Shire Council invited tenders for the purchase of the sawn hardwood palings (5 feet) 'being removed from the Gosford Park'.[43] The council also voted to repair and paint the fence.[44]

Somewhat oddly, there is record of a tender by Mr F Turvos being accepted by the council in 1922 for the erection of a picket fence around Gosford Park.[45] This may have only related to a dilapidated section of the existing picket fence.

Figure 2.24 Gosford Park and Gosford Wharf, c1905–1910. In the early 1900s, the fence along the Mann Street frontage of the park was changed from picket to arris rail, the latter seen at the far left of this photograph. Note the mature pines and conifers near the northern apex of the park, no longer present. Image by Broadhurst. (Source: SLNSW, ZmD5zpGDmomxj)

Figure 2.25 Detail from 'Boat Haven, Gosford', photographed by Charles Kerry. This photograph captures well the park site's former framing by the prominent western fence, and its setting, perched above Brisbane Water. Note the extent to which the western flank of the park is open to views from the west. This depicts the park prior to the existing Hill's Figs having been planted and the failure of some of the first cultural plantings from the late 1880s. The park is enclosed by a picket fence. (Source: Flickr, https://flic.kr/p/U5MCwY)

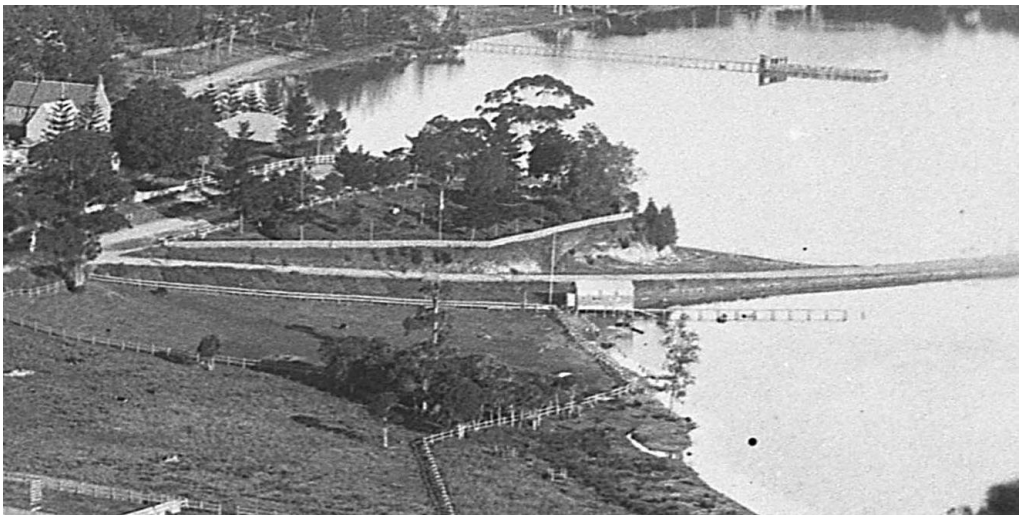

Figure 2.26 Detail from the view of Gosford looking south from Presidents Hill, c1910s. Note that the fence along the Mann Street frontage of the park had been altered to arris rail by this time. Note here also the former proximity of the park to the waters of the bay, before the 1930s reclamation works. (Source: Central Coast Council Library Service)

Figure 2.27 View southeast along the waterfront below Gosford Park, from Gosford Wharf, undated. (Source: SLNSW, reproduced in Long Blackledge Architects 2022, *Gosford Cenotaph Heritage Asset Action Plan*, p 17)

Figure 2.28 View west along the waterfront below Gosford Park, undated. The 1930s foreshore reclamation works filled over the location where this photograph was taken. Views of the southern end of Gosford Park (background right) from the location of this image are no longer possible, due to the scale and density of vegetation around the junction of Dane Drive and Mann Street. (Source: Central Coast Council Library Service)

Figure 2.29 Parsonage Hill, later known as Paul's Corner, Gosford, with Gosford Park at far left, undated. (Source: Central Coast Council Library Service)

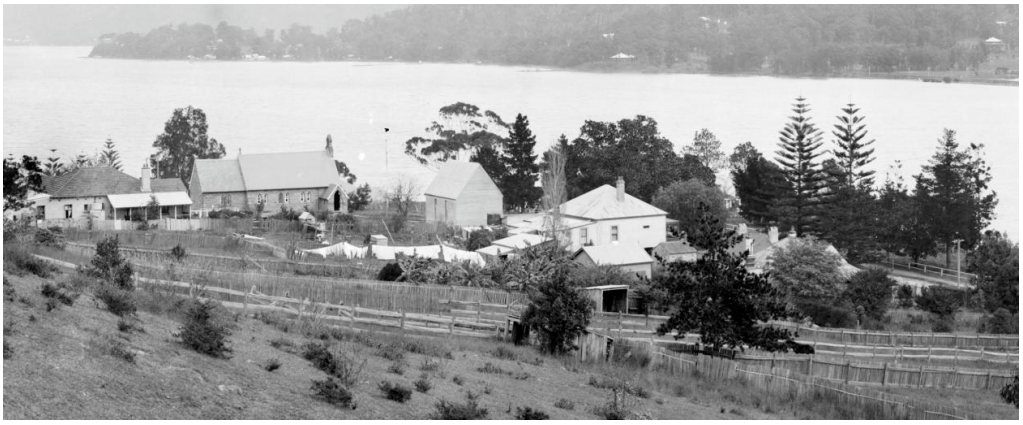

Figure 2.30 View south over the Gosford Park site (at right), circa late 1910s. At that time the park still retained many of its various mature pines and canopy tree plantings from the late 1880s. The park's second fencing typology along Mann Street, an arris rail fence, had been installed by the time this image was taken. This image by Rex Hazlewood highlights the visual prominence of the park site from Brisbane Water. (Source: SLNSW, FL10449)

Figure 2.31 Anzac Day ceremony at Gosford Park, possibly 1925 or 1927. Vehicles parked in Mann Street South adjoining Gosford Park. Its arris rail fence is visible. (Source: Central Coast Council Library Service)

Figure 2.32 Australia Day procession in Mann Street South adjoining Gosford Park, 1915. Image by Rex Hazlewood. The arris rail fence is visible. (Source: SLNSW, https://collection.sl.nsw.gov.au/record/YEG7bwVn)

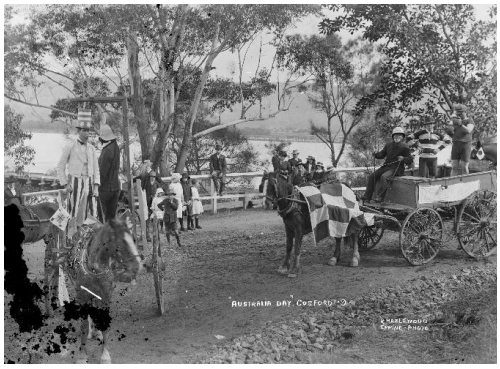

Figure 2.33 Australia Day procession in Mann Street South adjoining Gosford Park, 1915. Image by Rex Hazlewood. (Source: SLNSW, https://collection.sl.nsw.gov.au/digital/AGqxbzkzR7aAR)

Figure 2.34 Australia Day procession, in Mann Street South adjoining Gosford Park, 1915. Image by Rex Hazlewood. A semi-mature fig tree visible in the background at the right of this image is likely a specimen from the original planting design for the park in the late 1880s. (Source: SLNSW, https://collection.sl.nsw.gov.au/digital/2RE8wpOv8moPd)

After the war memorial was unveiled on Anzac Day 1924, Gosford Park generally came to be called Gosford Memorial Park.

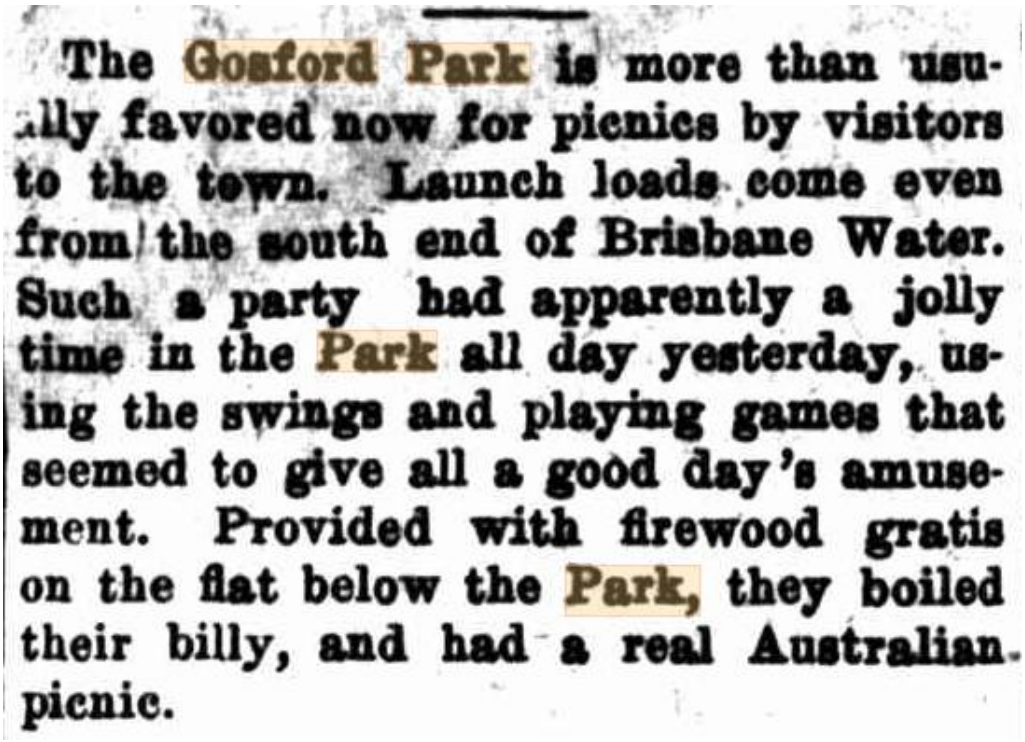
The Gosford Park is more than usually favored now for picnics by visitors to the town. Launch loads come even from the south end of Brisbane Water. Such a party had apparently a jolly time in the Park all day yesterday, using the swings and playing games that seemed to give all a good day's amusement. Provided with firewood gratis on the flat below the Park, they boiled their billy, and had a real Australian picnic.

Figure 2.35 Picnicking at Gosford Park (later Gosford Memorial Park). (Source: *The Gosford Times and Wyong District Advocate*, 23 January 1923, p 7)

In 1923, the local council received a proposal for the development of 'privileged' tennis courts on the Memorial Park site, principally on behalf of the 'Secondary Class' girls. This proposal was not approved.[46]

Also in 1923, *The Gosford Times and Wyong District Advocate* reported on a proposal to erect a soldiers' memorial on the site of the Gosford Park pavilion (rotunda) and water tank due to the 'fine outlook' over Brisbane Water. The author stressed that pulling down the rotunda—then a popular picnic venue—would remove one of the few public comforts in Gosford. The article also mentioned the destruction of old pine trees along both sides of Mann Street, in the vicinity of the park.[47]

The rotunda was nonetheless removed from the park in 1923 to make way for the Gosford Cenotaph. *The Gosford Times and Wyong District Advocate* reported in October 1928 that Inspector Fletcher was opposed to moving the rotunda back to Gosford Park, preferring to leave it beside the road to the wharf where it was used as a shelter for waiting passengers, 'and [instead to] build a new and better one in the park'.[48] The inspector also recommended it should not be moved due to its age and the likelihood of damage if it was moved again; furthermore, it was not large enough for a bandstand.[49]

2.5.3 Construction of the Gosford War Memorial

In December 1918 Henry George Parry wrote to *The Gosford Times and Wyong District Advocate* advocating a soldiers' memorial, citing 'Waterside Park' as a suitable location.[50] Manasseh Ward, former first president of Erina Shire Chamber, wrote in March 1919 urging the community to commence fundraising to erect a 'suitable memorial' to perpetuate the memory of local heroes of the Great War.[51] Richard Henry Creighton and the Gosford wharfinger Richard Henry Clifford proposed Gosford Park as the site of the war memorial, and this location was endorsed by Robert James Baker, proprietor of *The Gosford Times and Wyong District Advocate* and president of the Erina Shire Council (1920–1922).

At a public meeting in November 1919 the Gosford War Memorial Committee was formed and resolved that 'a Public Memorial be erected in or about Gosford in memory of the Great War and in thankfulness to those brave men and women who jeopardised or sacrificed their lives...'[52] The Gosford Branch of the Returned Soldiers and Sailors Imperial League of Australia (RSSILA) and the local Red Cross Society were heavily involved in supporting the proposed memorial and fundraising.

Various forms of memorial suggested for Gosford included a memorial hall with a roll of honour, planting a memorial avenue of trees, building a soldiers' memorial cottage hospital with a memorial tablet or vellum manuscript, a chiming town memorial clock, memorial swimming sea baths located at Waterside Park and a memorial arch erected at the entrance to Waterside Park from Georgiana Terrace. The community rejected most of the proposed schemes; however, the Town Improvement Committee placed its support behind the proposed Waterside Memorial Reserve and Recreational Ground, which could accommodate a memorial arch.

In August 1921 the War Memorial Committee advertised a competition to re-name Waterside Park where the memorial arch was to be erected.[53] Simultaneously, the committee advertised for 'Monumental Masons, etc' to submit designs and prices for a memorial arch to be erected at Gosford.[54] In September the committee considered the two designs submitted, rejecting them due to the high cost and the unsuitability of design without projected costs.[55]

At an impasse, the War Memorial Committee and RSSILA Gosford Sub-Branch contacted Captain Gordon Samuel Keesing, honorary architect of the RSSILA of NSW, in 1922 for his advice for the proposed memorial arch for Waterside Park. Captain Keesing's credentials included studies in built environment architecture and town planning and international qualifications from the Ecole des Beaux-Arts in New York and Paris. He had also worked with distinguished architects in Australia and abroad, and he was an Associate of the Royal Institute of British Architects (ARIBA).

During 1922 and the first half of 1923 the War Memorial Committee, Erina Shire Council and RSSILA Gosford Sub-Branch, in conjunction with Keesing, continued to develop the memorial arch as part of the Waterside Park scheme. This included one of Keesing's proposals for a gum tree-lined Anzac Avenue for Holden Street (the present Dane Drive).

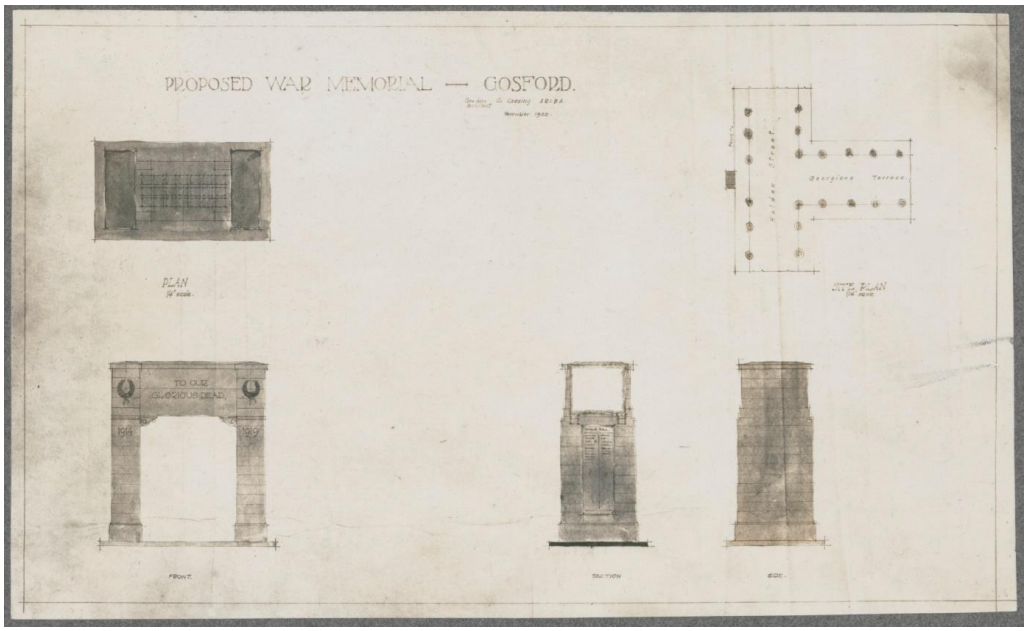

Figure 2.36 Proposed war memorial, Gosford, drawn by Gordon S Keesing, November 1922. (Source: Museums of History NSW (MHNSW)—State Archives Collection, NRS-18195-1-[9/5878]-1-163)

However, the grand utilitarian Waterside Park scheme, including plans for the proposed memorial arch, was abandoned. The War Memorial Committee revived its original plan to erect a symbolic monument in a prominent civic place. In May 1923 the committee was renamed Gosford Soldiers' Memorial Committee to pursue a new soldiers' memorial scheme. Simultaneously in May, Erina Shire Council 'agreed to present a section of Gosford Park to the soldiers' memorial committee for the erection of a monument', costing between £600 and £700.[56]

The new committee asked Keesing to prepare a memorial design costing a maximum of £650, including construction costs. One month later the committee approved Keesing's cenotaph design. According to *The Gosford Times and Wyong District Advocate*:

> The Memorial will stand 17ft 6in height, is to be preferably of local stone, a bronze tablet to be placed on the western face with the names of the men who 'went West', whilst on the eastern side, a bronze rising sun will face the break of day. The whole will stand on the present site of the old Band rotunda, which is to be removed, and will be set on a concrete raft foundation, with steps leading to the upright section of the Memorial, whilst

> it is intended to provide for the construction of footpaths leading from the various gates to the central position, where the Cenotaph will stand. Provision will be made for the addition of the names of enlistments from the district at a later stage, the main objective of the Committee being to get the Memorial up at the earliest, with the principal names inscribed, viz., those of the fallen. The estimated cost is £650, and it is anticipated that the Memorial will be unveiled free of debt, notwithstanding that £60 to £80 will be required to make up the cost. Tenders will be called on the plans being approved by the Central Advisory Board, and a few weeks should see the construction underway.[57]

Owing to tight funding and time restraints the committee elected to list only the names of fallen soldiers. Keesing's design for the proposed landscaping, gates, pathways and fencing to complement the Cenotaph was also deferred for the same reasons.

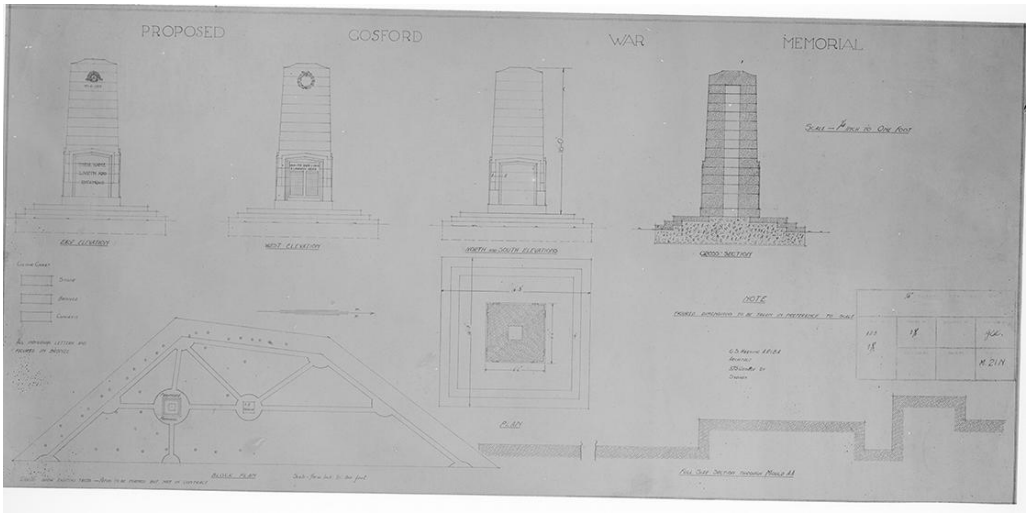

Figure 2.37 Proposed Gosford War Memorial, [1923?]. Attributed to Gordon S Keesing. (Source: MHNSW—State Archives Collection, NRS-4481-4-726-[AF00257474])

The War Memorials Advisory Board approved the Gosford Cenotaph design by Keesing in late August 1923. Tenders for construction of the stone cenotaph were promptly invited the same month.[58] The committee received eight submissions ranging in price from £624 to £950 and selected the tender of Harrison and Elliott Ltd to supply a monument of white freestone for the sum of £624 and 12 shillings.[59] Harrison and Elliott Ltd was a local business operating quarries at Gosford and Flemington. The company was run by returned soldier Thomas Glenroy Harrison.

Stone for the Cenotaph was extracted from the central and northern parts of Gosford Quarry.[60] The construction of Gosford Cenotaph commenced in November 1923, with Harrison & Co. transporting stone down from the hills of Gosford Quarry.

Poor weather coupled with a shortage of stonemasons delayed progress of the Cenotaph. It was completed shortly before Anzac Day in 1924.

On the afternoon of 25 April 1924, large crowds attended the unveiling ceremony of the Gosford Cenotaph.

2.5.4 Beautification and improvements to Gosford Memorial Park

Following completion and unveiling of the Cenotaph, the War Memorial Committee laid out a plan to address deferred site works including, in the short term, fencing off the Cenotaph as a protective measure (which was later to be replaced with more appropriate fencing), and 'the beautifying of the Park, with flower beds, pathways, &c'.[61] In a 1927 photograph of the war memorial (Figure 2.39) one of the two war trophies relocated from Waterside Park in 1926 is visible. The short-term fencing and intended improvement of Gosford Park to accentuate the war memorial had not yet been undertaken.

The Gosford Times and Wyong District Advocate on 1 May 1924 reported the details of local Anzac commemorative ceremonies held on 25 April, including a service at Gosford Memorial Park's cenotaph. The report also mentioned the intention of the War Memorial Committee to construct gates to the park, on which a record of district enlistments would be inscribed.

A resident's letter in *The Gosford Times and Wyong District Advocate* of 18 September 1924 raised the issue of park neglect in Gosford, specifically of the Memorial Park. That letter to the editor noted that the fence along the southern (cliff) side of the park was in disrepair, that there were no rubbish 'baskets' and that the previous swings in the park had not been replaced. It also suggested that at that time there were no pedestrian pathways through the park or to the Cenotaph. The letter stated that in the late nineteenth century, the park contained well-kept gardens of beautiful flowers.

The Cenotaph was initially completed without the formal surrounds and landscape that were originally designed and planned by Keesing and the War Memorial Committee. On 2 May 1927, the War Memorial Committee met to discuss completion of the Cenotaph by the construction of kerbing around it.[62] It was determined that Gordon Keesing, the Cenotaph's architect, be 'interviewed' regarding the work. That article recorded the improved state of the park compared to previous years. The kerbing evidently went ahead, with a 4-foot-wide strip of lawn between it and the cenotaph steps.[63]

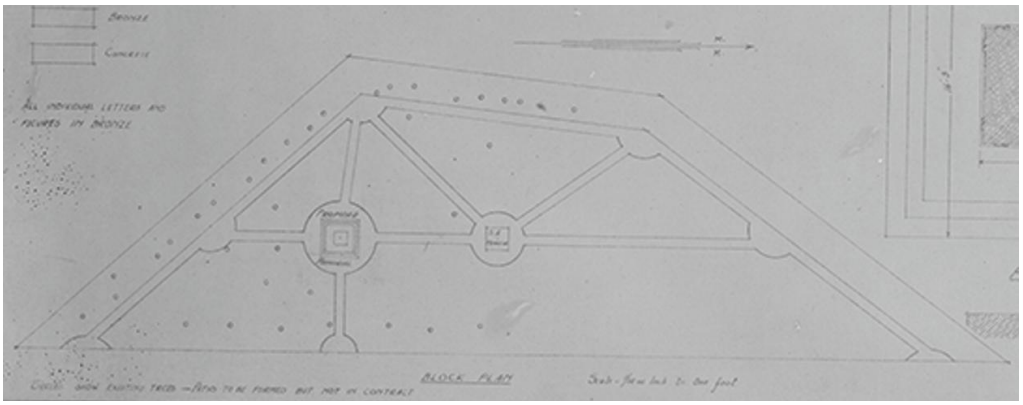

Figure 2.38 Detail from a 1923 plan by Gordon Keesing showing the proposed siting of the Cenotaph on an axis with the Boer War Memorial (which actually sits close to the centre of the park), axial paths and a pathway (with bulb-outs) around the edge of the park. (Source: MHNSW—State Archives Collection, NRS-4481-4-726-[AF00257474])

Figure 2.39 View of Gosford War Memorial prior to kerbing around the monument, 1927. By this date, arris rail fencing had evidently replaced the earlier picket fencing around the southwestern side of the park. Poplar trees (centre background, west of the Cenotaph) appear to have been experimented with on the site during the early 1920s. (Source: National Library of Australia, PIC Row 14/6/5 #PIC/15611/5488, reproduced in Long Blackledge Architects 2022, *Gosford Cenotaph Heritage Asset Action Plan*, p 26)

Figure 2.40 Anzac Day Commemoration Service at War Memorial Park, Gosford, post-1929. Note how devoid of trees the southern surrounds (at left) of the memorial were at that time. (Source: Central Coast Council Library Service, 001\001322)

The committee also requested that Erina Shire Council contribute towards beautifying Gosford Park, inclusive of a 'gate and Memorial, tablets, approaches, seats, enclosure, and new kiosk'.[67] There was no definite outcome of the request, and no action was taken at this time. The committee however remained wedded to erecting war memorial gates, with fundraising continuing in 1925. These appear to have never been built.

One visitor to Gosford Park in June 1925 reported that the overgrowth of trees obscured the Cenotaph, inferring the intention for a memorial to be prominent and not hidden, and suggested the need for electric light to illuminate the Cenotaph at night.[64]

The New South Wales State Trophy Committee allotted Gosford a '77 millimetre field gun, German old type carriage, with 1918 barrel, range six thousand (6,000) yards and a heavy minenwerfer used in trench warfare and which fired a 90lb shell'.[65] The war trophies were handed over to the RSSILA Gosford Sub-Branch in 1921 and erected in Waterside Park.[66] Following the erection of the Gosford War Memorial in Gosford Park in 1924, the War Memorial Committee applied to the council in June 1924 requesting the removal of the gun from Waterside to Gosford Park.[67] The committee repeated this request in April 1926, specifying that the gun and minenwerfer be mounted on concrete bases and painted, and the council granted this request.[68] The following month CK Adrian of the council reported that he had made arrangements for the concrete bases once his labourers completed other work in hand.

Later that year the two war trophies were relocated to Gosford Memorial Park from Waterside Park to flank the Gosford War Memorial, as shown in Figure 2.41 and Figure 2.42.

Figure 2.41 Gosford Cenotaph and one of the war trophies (a trench mortar) on a concrete base, between 1929 and 1939. (Source: SLNSW)

Figure 2.42 Gosford Cenotaph flanked by two war trophies and two floodlight poles, post-1926. Note the expansive open views to the south during that period. (Source: MHNSW—State Archives Collection FL3811970)

Other improvements undertaken in the park in the years following the unveiling of the war memorial included erecting a flagpole and re-erecting swings. In December 1927 the council inspector recommended using:

> material from the old swings, replacing the awnings with substantial white mahogany supports and non-wearing top supports, properly braced, with posts 4ft 6in in ground, and concreted, the whole to be substantial and safe.[69]

In 1927 Erina Shire Development League suggested filling the eastern side of the bay (fronting the study area), and establishing a promenade, public reserve and new wharf.[70]

The next year the Gosford District Sub-Branch of the Returned Sailors and Soldiers Imperial League (later RSL, former RSSILA) instructed Alexander Annandale Gollan (Supervisor of the Gosford State Forest Nursery and trustee of the war memorial) to liaise with others to prepare a 'beautification scheme'.[71] Gollan was to begin the scheme using the £25 funding 'accumulated for the purpose and to request assistance from the Shire Council'.[72] One month later floodlights, funded by Erina Shire Council, were officially switched on at a ceremony in the park arranged by the sub-branch on 4 August 1928, the anniversary of the declaration of the Great War.[73] The first floodlighting of the Cenotaph appears to have been installed in 1928.[74]

The Memorial Park was also the venue for outdoor concerts by Gosford Band in the late 1920s as in November 1928.[75]

Figure 2.43 Gosford War Memorial, 1928. Note a very large pine tree (at left), possibly a Monterey Pine (*Pinus radiata*) or similar, along the Mann Street frontage. This tree is no longer present. (Source: *Erina Shire Holiday and Touring Guide*)

By 1931 the old rotunda from Gosford Park was removed to the reserve opposite Hinemoa Hospital, Point Frederick. The council gave permission to Bert Coulter to relocate the rotunda to the new position on the provision it was re-erected and painted at his own cost.[76]

The Depression halted substantive improvements to the park for several years. In 1932 Gosford District Sub-Branch approved proposals to substitute flower beds for trees.

At the same time a diseased tree and three other trees were replaced by flower beds 'as a matter of urgency'.[77]

The following year a new memorial and tree planting in memory of the late Sister Katherine Sumner, a war nurse of the Australian Imperial Force, were added to the park on 19 March 1933; the council gave the Country Women's Association (CWA) approval to plant a memorial tree. A little stone tablet was placed in front of a newly planted tree, a Red Silky Oak (*Grevillea banksii*). The tree was planted in the far northern corner of the Memorial Park and remains in situ (albeit heavily shaded and dwarfed by an abutting Hill's Fig). Mrs Paul, president of the CWA, officially planted the tree in memory of Sumner.[78]

Figure 2.44 Colourised photograph of Gosford War Memorial, 1924–1928. Note the arris rail fence along the western side of the park at that time. (Source: Central Coast Council Library Service)

Figure 2.45 The Cenotaph at Gosford. Note the recently established kerb around the memorial monument. (Source: *Sydney Mail*, 11 September 1929, p 40)

Figure 2.46 Gosford Park (at left) and the roadway to the jetty and Gosford Wharf, c1930s. Note that arris rail fencing surrounded the western side of the park by this time and a semi-mature Hoop Pine (*Araucaria cunninghamii*) (far left) was present toward the northern corner of the park (Source: Central Coast Council Library Service)

Figure 2.47 Gosford Cenotaph and one of the war trophies, between 1929 and 1939. Image by James Blaxland. The arris rail fence is visible along the Mann Street frontage of the park. (Source: SLNSW, reproduced in Long Blackledge Architects 2022, *Gosford Cenotaph Heritage Asset Action Plan*, p 33)

According to *The Gosford Times and Wyong District Advocate* the Memorial Park and war memorial were a 'neglected asset' by 1934. The war memorial was a place of commemoration and occupied a stately and idyllic location; however, its condition as a parkland honouring Great War soldiers was a public disgrace and deserving of better care. The writer urged landscaping and regular maintenance of the park to assist in conveying 'lasting gratitude' for the local heroes of the district.[79] The 'wonderful setting' of the park is also described in this article, which states that 'there are few vantage points in this State from which so beautiful a panorama of sea, hill and mountain beauty presents itself to the traveller's gaze'.

The council engineer was asked to report in 1935 on a proposal from the RSS&ILA to undertake grading and levelling of the Memorial Park under the Unemployment Relief Scheme.[80] This confirms that the issue of levels through the park is not only a contemporary concern.

In April 1935 *The Gosford Times and Wyong District Advocate* eulogised Henry Charles Wheeler, former mayor of the Shire, stating he was reputedly responsible for planting a Brushbox tree (no longer present) to the immediate north of the Cenotaph prior to the construction of that monument.[81] This should not be confused with the mature Brushbox to the west of the Cenotaph, which was planted sometime later.

Municipal gardener Ernest James Woods secured the stone around the Cenotaph and planted annuals and flowers. In 1936 the council approved Woods' proposal to plant rosemary as a symbol of remembrance.

AJ Brown presented a report on the development of Gosford's foreshores to the Gosford Municipal Council in January 1938. In his report he recommended that trees in the Memorial Park should be preserved.[82] Gosford Municipal Council determined to carry out an extensive scheme of tree plantings through parks in the municipality, including the Memorial Park site, as reported in the *Sydney Morning Herald* in October the same year.[83]

The following year James Woods expressed concern about the state of the fence along the park's Mann Street frontage; he recommended to remove that length of fencing and use the timber to repair the fencing skirting the western side of the Memorial Park.[84] Woods received approval from the council to remove the timber fence on the Mann Street frontage of the park. In 1940 he removed two dead pine trees in the park.

Throughout this period the Cenotaph in Gosford Memorial Park remained the focal point for Anzac Day services in the district.

Figure 2.48 Anzac Day group pictured at War Memorial Park, Gosford, on 25 April 1939. Note how open the view out onto Brisbane Water was at that time. (Source: Central Coast Council Library Service, 001\001758)

2.5.5 Gosford Waterfront Reserve

During Australia's sesquicentenary year (1938) Gosford Municipal Council was engaged in several large-scale town planning and development projects including new reclamation works and seawalls across several sections of the Broadwater, revitalisation of Burns Place near Gosford Railway Station and an extensive scheme of planting of shrubs, trees and flowerbeds throughout the municipality including the Memorial Park within Gosford Memorial Park.

In 1937 the Minister for Works and Local Government approved the council's application to reclaim the foreshores of Brisbane Water from near Duke Street (East Gosford) to the Great Northern Railway line, providing 11 acres (4.4 hectares) of land for recreation purposes. The project was wholly funded as an unemployed relief scheme.[85]

An extract from the council's survey plan in June 1937 (Figure 2.49) depicts the foreshore reclamation in the vicinity of Gosford Memorial Park and shows the new wharf, stone retaining seawall, and built elements in the park comprising the two war memorials and two galvanised iron structures (toilets) at the foot of the embankment.

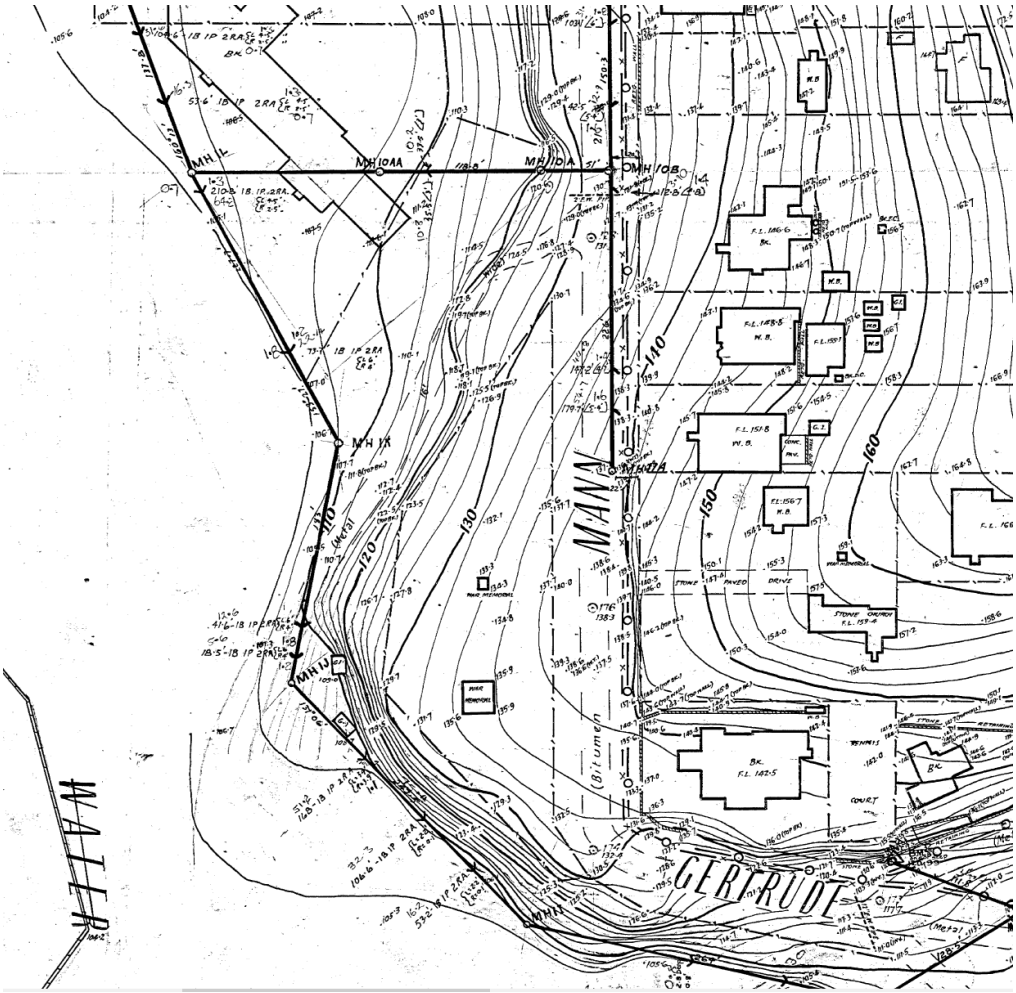

Figure 2.49 Extract from Detail Survey Sheet Gosford, Sheet 8, 8 June 1937. The portion of the retaining wall built during reclamation of the foreshore is shown . (Source: Central Coast Council Library Service)

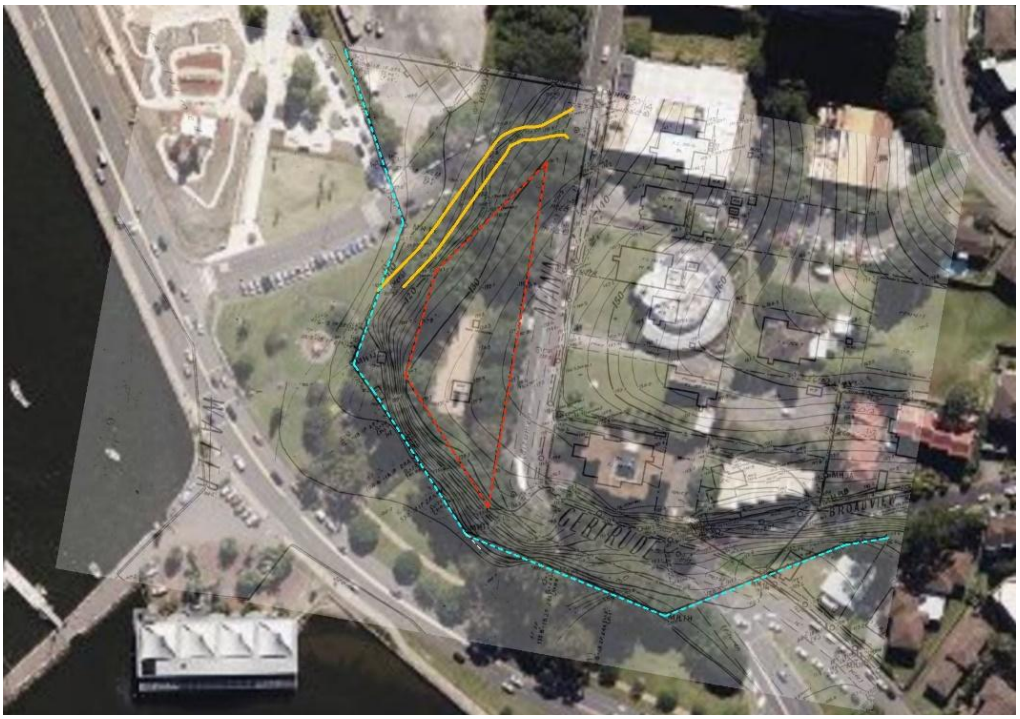

Figure 2.50 The 1937 survey sheet overlaid with a current aerial photograph, showing the location of the park fencing (red) at that time, the location of the wharf road (yellow) and the approximate foreshore line (blue) prior to bay reclamation. (Source: Central Coast Library Service and Nearmap with GML overlay 2024)

The vast seawall along the waterfront was constructed using stone quarried from the hillsides of Gosford. The following year the council was notified that approval was given for construction of a breakwater and tourist wharf at the foot of Mann Street.[86]

Reserve No. 70,467 was reserved from sale for public recreation in January 1942. It comprised the 15 acres (6.07 hectares) of reclaimed lands extending from the original high water mark of the Broadwater (Brisbane Water) to a substantially constructed stone seawall and stretching from the eastern boundary of the railway lands (Main or Great Northern Railway line) at Gosford generally southeasterly to near York Street, East Gosford. This reserve excluded 'any encroaching part of R 121 for Public Wharf' and the Gosford Olympic Pool.[87] The reclaimed land was known as the Gosford Waterfront Reserve.

Following reclamation of the waterfront a small parcel of reclaimed land was removed from the Gosford Waterfront Reserve as notified in the Government Gazette on 16 December 1955 and leased to the Gosford Kindergarten Association.

Two years later a playground and kindergarten were erected on the waterfront reserve adjoining the base of the Gosford Memorial Park, as shown in the 1963 survey (Figure 2.57). 11 Dane Drive, as it was later known, comprised Portion 375 of the Town of Gosford. The community preschool/kindergarten was located on this site (now part of Gosford Memorial and Rotary Parks) until 2003 when it was relocated to its present site. The following year that lease was consolidated with two other portions of land in Reserve No. 78162.

2.5.6 Gosford War Memorial Park,1945–1970s

In March 1949, in response to a request from the Gosford branch of the CWA, the council agreed to construct sandstone steps from the Memorial Park to the toilet located below the park near the Gosford Wharf for the cost of £25.[88] It would seem that until that time, there was no formal access between the Cenotaph memorial section of the park and its later public foreshore addition. It is not clear where those first steps were located, although they may have been built close to the existing stair (approximately the location where gateposts through the boundary fence can be seen in images from the early 1900s).

Aerial images from 1954 (Figure 2.53) confirm that in the several decades leading up to that period, trees were planted across the western slopes of the Memorial Park—possibly in association with the foreshore reclamation works of the 1930s, to help stabilise those slopes. That planting probably included some of the current casuarinas.

Before Anzac Day 1950, a visitor to the district remarked on the attractive appearance of the park, noting the 'brightly painted seats, railing and lamp posts' and also the garden colour presented by the red salvia and the Rosemary edging the war memorial, and the backdrop against the blue of Brisbane Water.[89]

Following the end of World War Two the Gosford RSL Sub-Branch commenced fundraising to attach an additional bronze plaque to the vacant northern face of the Cenotaph recording the names of fallen soldiers of the district from the most recent war. The bronze plaque was unveiled by Governor-General Northcott on Anzac Day 1953.

Figure 2.51 Gosford War Memorial Park, 1948, looking south past the Cenotaph, showing its floodlight poles on either side of the monument and the tree-less outlook of the park to Brisbane Water. The tree at far right, formerly in the centre of the reserve (a Brushbox), is no longer present, having been removed since this date. (Source: MHNSW—State Archives Collection, NRS-4481-3-[7/16128]-St33418)

Figure 2.52 1950 photograph of a ceremony at the Cenotaph, showing what appears to be box hedge or Rosemary and roses around the memorial. Red Salvia was also used around the monument at this time. (Source: *The Gosford Times and Wyong District Advocate*, 28 April 1950)

In 1952, Gosford Shire Council intended to remove an oak and a pine tree from the Memorial Park, due to poor health.[90] This arboricultural work was predated by the removal of two pine trees in 1940, which were nearly dead.[91]

The same newspaper reported in December 1954 that the council planned to replace three dead trees in the Memorial Park.[92]

The 1954 aerial photograph of Gosford (Figure 2.53) shows a dense canopy of trees along the Mann Street park frontage, the former Brushbox specimen between the Cenotaph and Boer War Memorial and a reasonably dense skirt of vegetation across the western slopes of the park. Most of the Hill's Figs along the northwestern boundary of the site had not been planted by this time, with the exception of the specimen in the northern apex of the park. The road to the wharf remains unformalised at this time, as does the 1930s reclaimed foreshore land.

Figure 2.53 Detail from the 1954 aerial survey of Gosford showing the study area. (Source: NSW Spatial Services)

The major change to the study area between 1954 and 1965 was the laying-out of Dane Drive along the foreshore, and Vaughan Avenue, along the northern side of the park. The kindergarten buildings in the reclaimed foreshore zone were developed in this period. Several very tall Norfolk Island Pines off the southern curve of Mann Street were removed prior to 1965. Municipal planting of the foreshore parkland, in the vicinity of the study area, had not commenced by 1965 and a portion of the western slope of the park had been cleared of vegetation between 1954 and 1965.

Most of the Hill's Figs around the northwestern side of the Memorial Park appear to have been planted during this decade.

Figure 2.54 Detail from the 1965 aerial survey of Gosford showing the study area and its state of development. (Source: NSW Spatial Services)

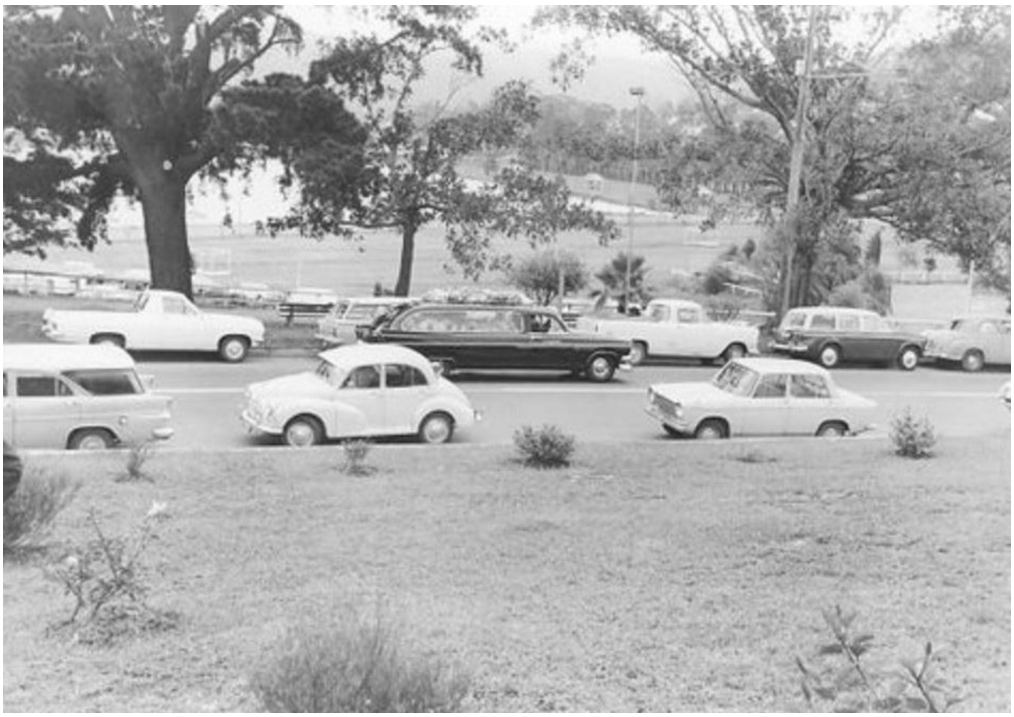

Figure 2.55 Looking west in 1967 from the grounds of St Mary's Anglican Church on Mann Street, showing some of the mature trees towards the northern tip of the Memorial Park (in the middleground). Note that the row of Hill's Figs around the northwestern side of the park had not yet become prominent, meaning that views north through the foreshore zone from the Memorial Park remained available. Note also at far left a very large pine tree (or similar), now removed, which would have been one of the original park plantings from the late nineteenth century. (Source: Central Coast Council Library Service)

Figure 2.56 View from Presidents Hill, Gosford, showing the construction of the waterfront road (Dane Drive), c1960s. (Source: Central Coast Council Library Service with GML overlay 2024)

2.5.7 Construction of Dane Drive and residue of waterfront reserve

In June 1963 Gosford Shire Council prepared a survey plan showing the proposed route of new roads through the waterfront reserve at Gosford and East Gosford. An extract of this plan at Figure 2.57 shows the park, kindergarten, playground and a parking area adjoining two new bitumen roads (now Vaughan Avenue and Dane Drive). This plan contains an approximate footprint of the two memorials, seats, toilets, war trophy guns, lights and an arris rail fence along the southern boundary of the park. The toilets are located at the foot of the embankment of the park in an area described as a parking area.

The proposed new roads and improvements through the waterfront reserve were gazetted on 23 April 1966.

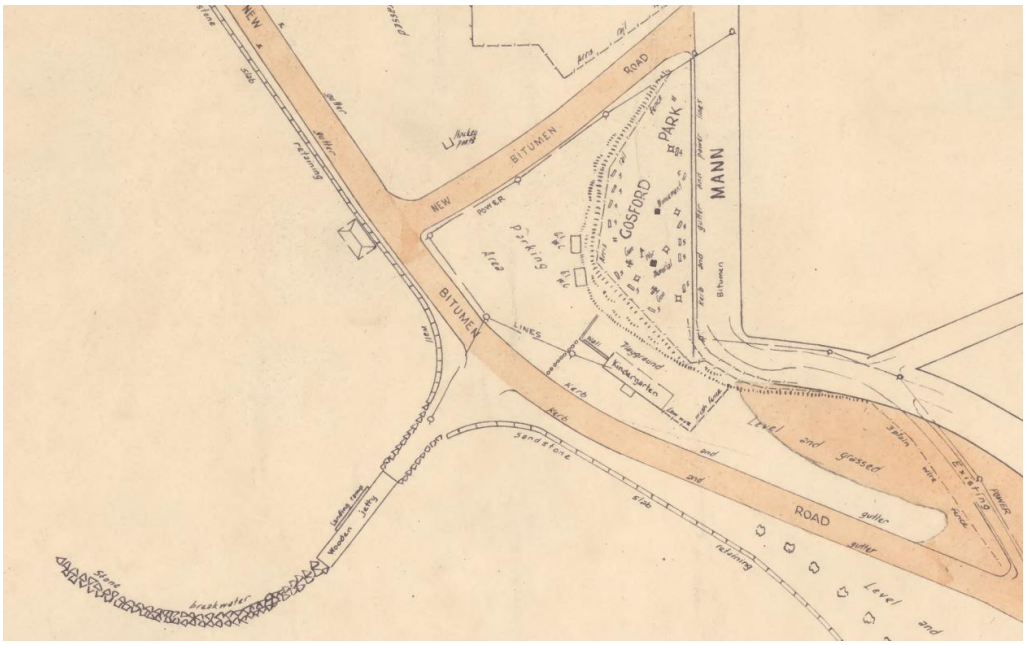

Figure 2.57 Detail from a diagram showing all improvements along the foreshore of the Broadwater between the Main (or Great) Northern Railway line and Java Street, Gosford, and the formed roads (brown tint) through Gosford Waterfront Reserve, dated 21 June 1963. (Source: NSW Land Registry Services, Crown Plan 7159-3070)

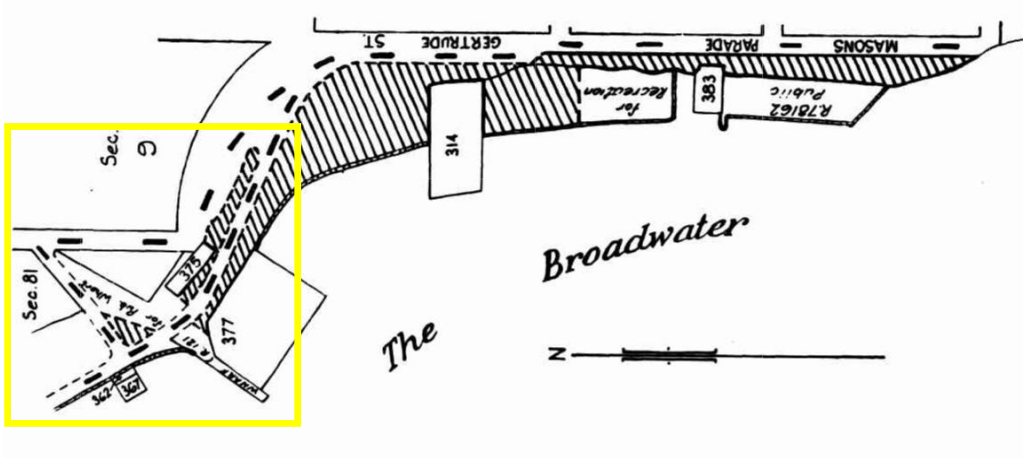

Figure 2.58 Diagram of additions to reserves from sale, Land District and Shire-Gosford. Orientated to east at top. (Source: Government Gazette, 23 June 1972, p 2486, with GML overlay 2024)

In June and December 1972, additional land, forming part of Reserve No. 70,467 (part of 15 acres reclaimed in 1937–1938) was gazetted for public recreation, comprising the present Rotary Park. This land is shown in the diagram at Figure 2.58.

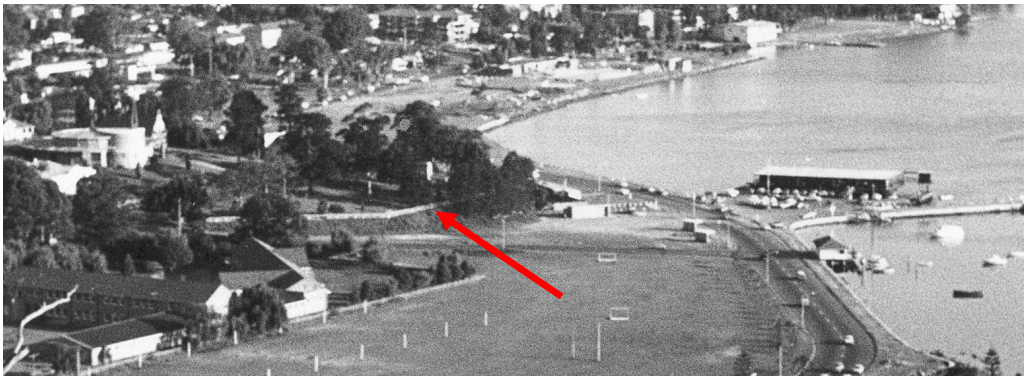

Figure 2.59 View from Presidents Hill, c1970s, showing the park site (arrowed). Fencing around the western side of the Memorial Park can be seen in this image, which appears to have been taken prior to the Rotary Park being laid out. (Source: Central Coast Council Library Service)

Figure 2.60 View from c1970s looking towards Brisbane Water, showing the public wharf and Aquatic Club, Dane Drive, and the preschool/kindergarten and playground in the foreground. (Source: Central Coast Council Library Service, 001\001219)

Figure 2.61 1970s view west along the newly formed Dane Drive, taken from the Gertrude Place public reserve. (Source: Central Coast Council Library Service)

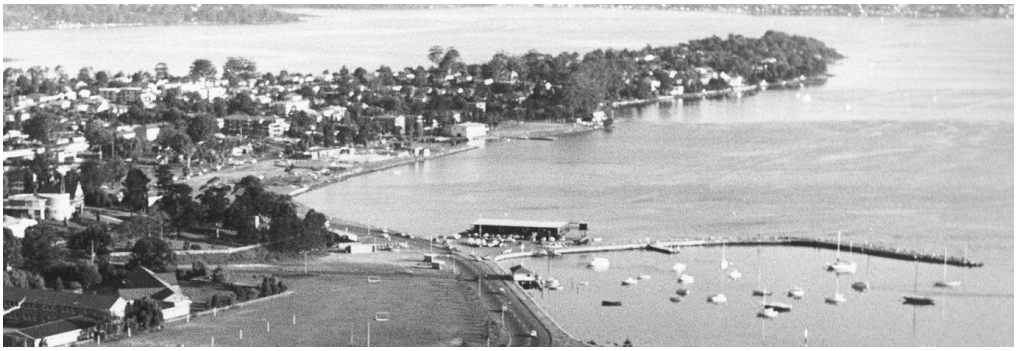

Figure 2.62 Detail from a view from the Presidents Hill Lookout, pre-1973, showing Gosford Park, Vaughan Avenue, the kindergarten, Dane Drive, Aquatic Club and the wharf. Note that the northwestern flank of the Memorial Park remained predominantly open at this time, prior to the maturation of the existing Hill's Figs. (Source: Central Coast Council Library Service)

Between 1965 and 1975 the main consequential change to the parklands was the development of the Rotary Park.

2.5.8 Rotary Waterfront Gardens and Fountain

In July 1972 the Rotary Club of Gosford offered to prepare an outline plan for future development of the waterfront park bounded by Mann Street, Vaughan Avenue and Dane Drive comprising at that date the Memorial Park, Gosford preschool/kindergarten, public toilets and shelter sheds. The southwestern corner of the area was described as 'presently not properly and fully developed'.[93]

The plan proposed removal of the kindergarten, possible relocation of the toilets, removal of the fence around the Memorial Park, stabilisation of the bank in the higher level and removal of vehicle access within the area.

Although Gosford Shire Council did recognise some merit in the project, the Rotary Club was advised that prior to any approval, a development plan was to be prepared by a qualified landscape architect in association with council's town planner, shire engineer, and parks and gardens supervisor.

The Rotary Club applied in November 1972 to the council to 'make a major start in the gardens on the waterfront' and request use of the council's equipment/plant.[94] Less than one month later the club successfully applied to supply and lay turf on the corner of Vaughan Avenue and Dane Drive.[95]

Architect Kevin Winterbottom, a member of the Rotary Club, designed the original concept for the 'Waterfront Fountain and Garden'. Detailed architectural plans were prepared by past president/part district governor George Grenfell (architect and long-time member of the club) and Bob Fraser (past president, Rotary Club of Gosford North).[96]

The Rotary Club notified the council in May 1973 that Stages 1 and 2 (and part of Stage 3) of the 'Waterfront Gardens Project' were completed. The club anticipated full completion of the project in the 'new Rotary year'. To date the project had cost $6,500, and the club expected the balance to complete the park would amount to $3,000. The council considered the works were completed to 'a most reasonable standard and considerable expenditure'. The council recommended as follows:

- that the council reimburse the club an amount of $512 representing plant hire on the project;
- that the council agree to make available a three-phase electric power supply within the existing toilet block to provide power for the operation of the fountain and lighting; and
- that the club be advised that the council requires the retention of the existing picnic shelter shed.[97]

In October 1973 the council president resolved to contribute $1,000 towards lighting of the Rotary Park if the Brisbane Water County Council could not assist.[98]

By this date the central feature of the Rotary Park was a fountain that was installed but not yet operational as it was awaiting a filtration plant. Incomplete works in the gardens included the lighting of the fountain, building of a stairway and concreting of pathways. The memorial steps were reportedly completed in 1973 using the services of non-Rotarian Lodger Horsnell to supervise the concreting and completion of the stairs. The steps were completed on Remembrance Day, 11 November 1973.[99]

The Gosford Rotary Club officially handed over the Rotary Park to the council on 16 December 1973, though some garden works remained unfinished and were expected to cost $6,000. The council agreed to set aside this sum in the 1974 works program to complete the improvements required.[100]

Figure 2.63 Rotary Fountain soon after completion at the end of 1973. (Source: *The History of the The Rotary Club of Gosford 1945–2008*, p 23)

The following year the council's engineer prepared a report regarding ongoing care and maintenance of the new Rotary Park and fountain.

According to Rotary the improvements amounting to $6,000 'were never intended to be the responsibility of Rotary [and] are quite beyond its resources' and the club was disappointed at the council's refusal to take over the fountain and park.[101]

The club had stated it was unable to make any further contributions to the project, which it viewed as a permanent memorial of the 1973 celebrations of the 150th anniversary of the district. In response the council expressed disappointment that no further financial assistance was forthcoming from Rotary to complete the project, yet stated that it would formally take over the project and carry out improvements and continued maintenance from its own resources.[102]

According to the official history of the club, the water pressure pumps were supplied by Rotarian Gordon Martin while past president Jim Kirkness acted as engineer, overseeing installation and operation of the equipment. Other club members and locals supplied materials, labour and equipment. The club history stated:

> The cost of the project was $14,000 and it was necessary to use in excess of 4,000 cubic yards (3,000 cubic metres) of soil to complete the fountain. Many hundreds of hours of labour was given voluntarily to complete the task. At the time the fountain was estimated to be worth $50,000.[103]

After taking over control and maintenance of Rotary Park, the council allocated $1,500 in 1975 for landscaping of the batter, the retaining wall and drainage.

Figure 2.64 Detail of 1975 aerial survey of Gosford showing the study area visible, including the Rotary Fountain, and the kindergarten. (Source: NSW Spatial Services)

Figure 2.65 Rotary Fountain and Park, c1976. (Source: Central Coast Council Library Service)

On 16 December 1978 the Rotary Clubs of Gosford, East Gosford and Gosford North, installed a time capsule, and had a plaque mounted on a plinth in the fountain, to commemorate the construction of the gardens and fountain to celebrate the sesquicentenary celebrations of the first settlement in the shire (1828–1978).

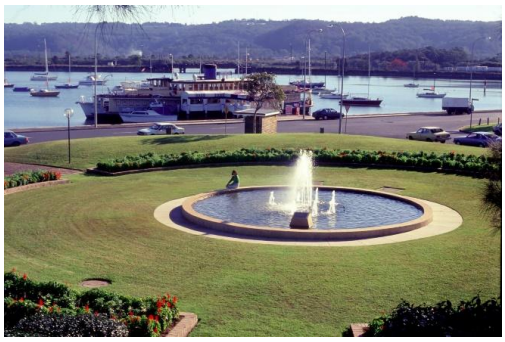

Figure 2.66 Rotary Fountain, Dane Drive and Gosford Wharf beyond with *Karrabee* moored, 1980s. (Source: Central Coast Council Library Service)

Figure 2.67 Rotary Fountain, Dane Drive and Gosford Wharf beyond, 1980s. (Source: Central Coast Council Library Service)

Figure 2.68 Rotary Fountain and Park, viewed from the steps to the Memorial Park, 1980s. (Source: Central Coast Council Library Service)

Figure 2.69 Rotary Fountain, garden beds and slope of the Memorial Park, 1990s. (Source: Central Coast Council Library Service)

Figure 2.70 Rotary Fountain and the commemorative plaque on the plinth, undated. (Source: Central Coast Council Library Service)

2.5.9 Gosford Memorial Park and Gosford War Memorial, 1980s–present

Various phases of re-levelling works have occurred around the Cenotaph since at least the late 1970s.

In about 1988 three additional military emblems were affixed to the northern face of the war memorial above the plaque dedicated to soldiers who lost their life in World War Two. This may have coincided with works on the memorial in April 1988 when a new small brass plaque reading 'restored, upgraded and dedicated as a tribute to all veterans by Gosford RSL Sub-Branch' was affixed to the upper-side step on the northern face of the memorial.

Figure 2.71 Gosford War Memorial and trench mortar, c1981. Image by Gwen Dundon. (Source: Central Coast Council Library Service, 001\001771)

Figure 2.72 The Boer War memorial, set among symmetrical planted garden beds (no longer present in this layout), 1981. Image by Gwen Dundon. (Source: Central Coast Council Library Service, 001\001178)

Figure 2.73 View over the former playing fields to the north of the Rotary and Memorial Parks, c1980s. Note the now non-extant arris rail fence, which was the second phase of fencing formerly defining the Memorial Park. Several large pines framing the eastern side of the park (seen in this image, and part of the original plant palette from the late nineteenth century) are no longer present. (Source: Central Coast Council Library Service)

Figure 2.74 View southeast across the playing fields formerly abutting the Memorial and Rotary Park sites, 1980s. (Source: Central Coast Council Library Service)

Figure 2.75 Detail from the 1984 aerial survey of Gosford showing the development of the waterfront reserve, now part of the study area. The Rotary Fountain and Rotary Park were well developed by this time. (Source: NSW Spatial Services)

The World War One war trophies were removed from the park after 1988; their whereabouts is known to the Gosford Sub-Branch of the RSL. A newer gun was erected in their place. The following year the Harry Newhouse and Gallipoli Veterans memorial plaque was mounted on stone plinth and dedicated.

According to Geoffrey Potter (Local Studies Librarian, Central Coast Council), the Sister Sumner Memorial was a forgotten piece of history in the 1990s. During research on war memorials in the Central Coast, Michael Rooksberry re-discovered the stone lying flat in the gardens and overgrown with ivy.

An additional bronze plaque was affixed to the southern face of the monument acknowledging all conflicts from the Boer War to Vietnam; an additional line was added for Iraq, East Timor and Afghanistan in recent years.

In 2015 the Anzac Centenary was marked at Gosford Memorial and Rotary Parks by the Poppy Project: Never Forgetting the Sacrifices. About 40,000 poppies made from fabric, yarn and clay were installed in a massive display in and around the fountain in Rotary Park below the Gosford War Memorial.

A temporary poppy sculpture by Margrete Erling was placed in the base of the fountain. The following year the poppy sculpture was temporarily removed for maintenance.

Figure 2.76 Liquidambar tree memorial (tree and memorial no longer present). (Source: Central Coast Council Library Service)

Figure 2.77 Poppy Project in Rotary Park showing Gosford Memorial Park in the background (Source: Rotary Club of Gosford)

Substantial works took place at the Gosford War Memorial in 2000, which comprised raising the ground at its base and levelling part of the site, submerging two of the three steps below ground. At this time a level platform area was formed spanning the two war memorials.

In 2021 the Gosford RSL Sub-Branch was awarded a Community War Memorials Fund (CWMF) grant of $4,285 to prepare a conservation management plan for the Gosford Cenotaph. Long Blackledge Architects was commissioned to prepare a heritage asset action plan (HAAP) for the war memorial. Funding for the project was organised by Merril Jackson amid community concerns about its condition and maintenance, including the immediate surroundings and gardens. The HAAP concluded that the war memorial was 'showing signs of incipient deterioration mechanisms that should be addressed as soon as possible'.[104] Conservation work on the war memorial took place in 2022 and 2023 in two stages; Stage One focussed on the upper half of the memorial and Stage Two on the lower half.[105] The Gosford RSL Sub-Branch received $9,999 in Round 2 of the CWMF in 2022/2023 for Stage Two conservation work to the lower section of the Cenotaph.

In May 2023 Merril Jackson nominated the 'Gosford Cenotaph and Cultural Landscape' to the State Heritage Register (SHR). The State Heritage Register Committee did not consider it 'a priority to progress for a full assessment for potential listing on the SHR' and consequently closed the nomination in July.[106]

The Central Coast Council was awarded $10,000 in funding in Round 2, CWMF 2023-2024 to prepare a Conservation Management Plan for the Gosford Memorial Park.[107] Restoration works were completed prior to its centenary on Anzac Day 2024.

2.6 Chronology

The Gosford Memorial and Rotary Parks have been subject to ongoing periods of development spanning over 160 years. Table 2.1 summarises the key changes and development phases to the two parks.

Table 2.1 Timeline summary of the development of Gosford Memorial and Rotary Parks.

Date	Event
1841	Stone wharf and wall established near Vaughan Avenue.
May 1864	Tenders invited for construction of approach leading from the roadway to the timber jetty.
April 1884	Reserve No. 121 surveyed at Gosford to be dedicated for public recreation.
Late 1880s	First phase of cultural plantings made in Gosford Park including various Pine trees.
15 January 1886	Land dedicated for public recreation.
1887	Public park formally named Gosford Park (18 March). Gosford Council appointed trustee of Gosford Park (April). Management and control of the Gosford Wharf was handed over to Gosford Council (October).
July 1889	Gosford Park By-Laws gazetted.
1891–1892	Palisade fence painted.
1893	Rotunda erected.
1902	Marble monument erected as Boer War Memorial.
1910s	Gosford Park retained many of the cultural plantings made in the late 1880s.
1911	Gosford Wharf rebuilt.
1911–1915	Random acts of vandalism.
November 1918	Thanksgiving service held in park.

Date	Event
1920s	Some infill tree planting had occurred around the perimeter of the Memorial Park.
1921	Tenders invited for purchase of hardwood fence palings being removed from park. Council awarded two war trophies. Erected in Waterside Park.
June 1923	State War Memorial Committee approved Keesing's design of the war memorial in Gosford Park.
November 1923	Rotunda relocated from park to foot of hill near Gosford Wharf.
25 April 1924	New war memorial, Gosford Cenotaph, unveiled in park. Gosford Park generally called Gosford Memorial Park from this point forward.
April 1926	Trustees of the War Memorial Committee requested the council relocate war trophy guns to concrete base in Gosford Memorial Park.
1927	Permanent flagpole erected in park.
1928	Swings re-erected in park.
4 August 1928	Floodlights installed and officially switched on at the Cenotaph.
1920s / 1930s	Various mature Pine trees (eg Monterey Pines), from the first phase of Gosford Park cultural plantings, remained along the Mann Street frontage of the site (some of these actually remained extant until c 1960s).
1930s / 1940s	Various tree replacements occurred in the Memorial Park, some as a result of disease.
19 March 1933	Unveiling of memorial tablet and planting of commemorative tree in memory of late Katherine Sumner, a war service nurse in World War One.
1937	Minister for Works and Local Government approved plan to reclaim the foreshores of Brisbane Water from near Duke Street (East Gosford) to the Great Northern Railway line.
1938–1940	Improvements in park, removal of Mann Street fence, and removal of two pine trees.
January 1942	Reserve No. 70,467 (Waterfront Reserve) gazetted for public recreation.
1949	Sandstone steps erected from park to the toilets below park near Gosford Wharf.
1953	Installation of World War Two commemorative plaque on one of the faces of the Cenotaph.
1954	Three dead trees replaced.

Date	Event
1950s	Area of waterfront reserve set aside and leased to Gosford Kindergarten Association. Kindergarten built with adjoining playground.
1960s	Dane Drive constructed through waterfront reserve.
Late 1960s	Hill's Figs around northwestern side of the Memorial Park were planted.
1972	Rotary Club of Gosford proposed plan for Rotary Waterfront Gardens and Fountain on former waterfront reserve (formerly occupied as parking area). Council approved landscape plan.
May 1973	Stages 1 and 2, and portion of Stage 3, of Rotary Waterfront Gardens and Fountain completed.
October 1973	Rotary Fountain installed but not yet connected and operating. Completion of memorial steps from new gardens and fountain to Memorial Park.
16 December 1973	Rotary Club handed over of Rotary Waterfront Gardens and Fountain to Gosford Shire Council.
1975	Council voted funds for landscaping of batter, retaining wall and drainage in Rotary Waterfront Gardens.
Late 1970s	Various phases of re-levelling works have occurred around the Cenotaph from this time onwards
25 April 1998	Dedication of Harry Newhouse and Gallipoli Veterans memorial plaque mounted on stone plinth.
25 April 1999	Plaque mounted on stone plinth commemorating Century of Service unveiled.
2000	Substantial works comprised levelling part of the site and forming a level platform area spanning the Cenotaph and Boer War Memorial. Rededication plaque commemorating Gosford memorial plaque unveiled to commemorate opening of upgraded park (2 December).
22 June 2002	Dedication and blessing of National Servicemen's memorial plaque mounted on stone plinth.
23 June 2003	Dedication of War Widows memorial plaque mounted on stone plinth.
2004	Former site of kindergarten and adjoining land (being part of waterfront reserve) gazetted as addition to Gosford Memorial and Rotary Parks.
11 March 2008	British Commonwealth Occupation Force (BCOF) Australian Component plaque dedicated.
2015	Poppy Project: Never Forgetting the Sacrifices art installation placed in Rotary Park for Anzac Day.

Date	Event
	Poppy sculpture by Margrete Erling installed at base of Rotary Fountain as part of poppy project.
2016	Poppy sculpture temporarily moved for inspections.
2021	Gosford RSL Sub-Branch awarded a CWMF grant to prepare a conservation management plan for the war memorial. Long Blackledge Architects prepared a HAAP for the war memorial.
2023	Merril Jackson lodged an unsuccessful State Heritage Nomination for the 'Gosford Cenotaph and Cultural Landscape'. Gosford RSL Sub-Branch received $9,999 in Round 2 of the CWMF in 2022/2023 from Department of Veterans' Affairs for Stage Two conservation works on the Cenotaph. Conservation works completed. Poppy Sculpture reconditioned and returned to park by Central Coast Council.

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[83] 'Beautifying Gosford', *The Sydney Morning Herald,* 14 October 1938, p 7, Trove, National Library of Australia, viewed 28 May 2024 <http://nla.gov.au/nla.news-article17528050>.

[84] 'Unsightly Fencing', *The Gosford Times and Wyong District Advocate,* 14 February 1939, p 8, Trove, National Library of Australia, viewed 28 May 2024 <http://nla.gov.au/nla.news-article166937915>.

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[86] 'Gosford Wharfage Move', *The Gosford Times and Wyong District Advocate*, 31 March 1938, p 4, Trove, National Library of Australia, viewed 24 April 2024 <http://nla.gov.au/nla.news-article167868312>.

[87] 'Reserve from sale and lease generally', *Government Gazette of the State of New South Wales,* 30 January 1942, p 397, Trove, National Library of Australia, viewed 24 April 2024 <http://nla.gov.au/nla.news-article225118335>.

[88] 'Shire Council News in Brief', *The Gosford Times and Wyong District Advocate*, 1 March 1949, p 1, Trove, National Library of Australia, viewed 17 April 2024 <http://nla.gov.au/nla.news-article167113548>.

[89] 'Uncensored', *The Gosford Times and Wyong District Advocate*, 21 April 1950, p 1, Trove, National Library of Australia, viewed 17 April 2024 <http://nla.gov.au/nla.news-article167113609>.

[90] 'Posts of Oak', *The Gosford Times and Wyong District Advocate*, 28 March 1952, p 1, Trove, National Library of Australia, viewed 17 June 2024 <http://nla.gov.au/nla.news-article167229604>.

[91] 'Briefly', *The Gosford Times and Wyong District Advocate*, 13 June 1940, p 7, Trove, National Library of Australia, viewed 17 June 2024 <http://nla.gov.au/nla.news-article166931758>.

[92] 'New Trees for Park', *The Gosford Times and Wyong District Advocate,* 7 December 1954, p 1, Trove, National Library of Australia, viewed 17 June 2024 <http://nla.gov.au/nla.news-article162871855>.

[93] Item 12, Shire of Gosford Meeting Minutes, 15 August 1972.

[94] Item 5, Engineer's Report, Shire of Gosford Meeting Minutes, 21 November 1972.

[95] Item 3, Engineer's Report, Shire of Gosford Meeting Minutes, 11 December 1972.

[96] Rotary Club of Gosford, *The Rotary Club of Gosford 1945–2008*, p 23.

[97] Item 10, Engineer's Report, Gosford Shire Council Minutes, 15 May 1973.

[98] Presidential Minutes, 1472/73, Gosford Shire Council Minutes, 23 October 1973.

[99] Rotary Club of Gosford, *The Rotary Club of Gosford 1945–2008*, p 23

[100] Item 5, Engineer's Report, Gosford Shire Council Minutes, 18 December 1973.

[101] Item 8, Engineer's Report, Gosford Shire Council Minutes, 26 February 1974.

[102] Item 8, Engineer's Report, Gosford Shire Council Minutes, 26 February 1974.

[103] Rotary Club of Gosford, *The Rotary Club of Gosford 1945–2008*, p 23

[104] Long Blackledge Architects 2022, Gosford Cenotaph Heritage Asset Action Plan, p 4.

[105] '100 years young: Conserving the Gosford Cenotaph for its centenary', NSW Government, Veterans Affairs, Community War Memorials Fund, viewed 22 October 2024 <https://veterans-2024.symbiote.io/heritage/community-war-memorials-fund/successful-grant-projects/100-years-young-conserving-the-gosford-cenotaph-for-its-centenary/>.

[106] Item 5, Preliminary Assessment of New SHR Nominations, Item 5.1 'SHR Nomination-Gosford Cenotaph and Cultural Landscape', State Heritage Register Committee Meeting Minutes, 4 July 2023.

[107] 'More restoration work for Gosford cenotaph', *Coast Community News*, 22 July 2023, viewed 17 April 2024 <https://coastcommunitynews.com.au/central-coast/news/2023/07/more-restoration-work-for-gosford-cenotaph/>.

Understanding the place—physical analysis

3 Understanding the place—physical analysis

A site inspection was undertaken on 22 April 2024 by the GML project team, accompanied by Central Coast Council representatives. The site inspection aimed to identify historic built heritage in the study area, significant landscape elements and archaeological remains.

At the time of inspection, a large portion of the public reserve was undergoing sewerage upgrade works—the area was fenced and GML did not have access to inspect that area.

All photographs were taken by GML on 22 April 2024 unless otherwise stated.

3.1 Site layout

The study area slopes downward to the west from Mann Street with a steep drop between Memorial Park and Rotary Park.

Memorial Park is a trapezoidal shaped area with a central podium where the Gosford Cenotaph is located. Several memorials, varying in size, materials and design, are dispersed around the park. The boundaries of the park are lined with trees and other vegetation.

Due to the topography of the study area and dense cultural planting, Memorial Park is largely separated from Rotary Park and the public reserve both physically and visually. An exception is a stairway that connects Memorial Park and Rotary Park.

The smaller Rotary Park is roughly triangular in shape and has a circular fountain—which has not been in operation for some time—located in its centre. There is a poppy sculpture in the middle of the fountain. The paths of the park follow a circular pattern, providing access to Vaughan Avenue, Dane Drive, and the southern public reserve.

The public reserve is located between Mann Street and Dane Drive. The slope falls steeply from Mann Street to Dane Drive and has dense vegetation. The reserve contains a lawn and concrete pathway.

Figure 3.1 Aerial view of the study area showing the three zones. (Source: Nearmap with GML overlay 2024)

3.2 Site description

3.2.1 Memorial Park

Memorial Park is defined by Vaughan Avenue to the north, Mann Street to the east and the surrounding slopes to the south and west. The park is predominantly a large expanse of lawn, punctuated at its centre by a compacted gravel podium built around the Gosford Cenotaph and the Boer War Memorial. The podium is bordered on its north, west and south by a low stone block retaining wall and metal balustrade fencing.

The mature trees along the Mann Street frontage sit within broad mulched zones contained by timber edging. Due to the density of shade toward the northern apex of the park, the lawns that previously existed in this area did not survive due to insufficient sunlight.

In addition to several memorials, the park contains a Ruwolt 1942 Howitzer field gun that is mounted on concrete plinths to the immediate south of the Cenotaph. A trench mortar, formerly mounted on a concrete plinth to the west of the Cenotaph, has since been removed.

The top of the western slopes of the park are demarcated by a low brick retaining wall that appears to have been inserted in the 1970s, likely at the same time as the staircase to Rotary Park. Matching brickwork can be found at the northern corner of the park, where retaining walls, garden beds and a set of stairs were constructed. At the southern end of the park, sections of low Koppers log pedestrian barriers line the top of the slopes.

Figure 3.2 Looking south through the Memorial Park.

Figure 3.3 Stone block retaining wall and metal fencing to central podium.

Figure 3.4 Broad mulched zones below fig trees along Mann Street.

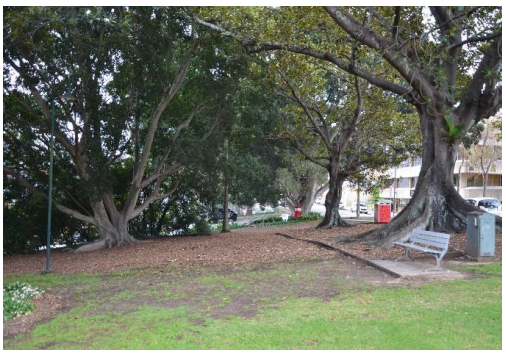


Figure 3.5 Shaded and mulched area at the northern apex of the Memorial Park.

Figure 3.6 Ruwolt 1942 Howitzer field gun.

Figure 3.7 The buckled brick retaining edge at the top of the Memorial Park's western slopes.

Figure 3.8 Brick retaining walls and stairs at the junction of Vaughan Avenue and Mann Street.

Figure 3.9 Koppers log barriers downslope from the Cenotaph.

The Memorial Park contains a substantial number of mature cultural plantings. Many of these likely date from the first phase of park beautification in the late 1880s. They include fig trees (*Ficus macrophylla, rubiginosa* and/or *obliqua*) along the Mann Street frontage and the Hoop Pine to the west of the Boer War Memorial.

Various conifers (like *Pinus* and *Araucaria* species) were also planted as sentinels in the late 1880s around the park boundaries, including along Mann Street. Many of these became prominent landmark features of the park's setting before their removal from the mid-twentieth century onwards, due to poor health.

Photographic evidence suggests that figs and pines may have been interplanted in the original planting arrangement along the Mann Street frontage. The alignment was originally separated from the road corridor, being set behind a timber picket and, later, arris rail fence.

Figure 3.10 View of mature and infill fig plantings along Mann Street from St Mary's Anglican Church. Mature Hoop Pine and dense Hill's Fig canopies in background.

Figure 3.11 Late nineteenth century and infill fig plantings along the Mann Street frontage.

Figure 3.12 The Cenotaph, and a mature Hoop Pine in the background, likely planted in the late 1880s.

Figure 3.13 Southern extent of the park, showing very mature *Ficus macrophylla* at centre background. Semi-mature eucalypt and Brushbox lie between the fig tree and Cenotaph.

Other extant plantings in and around the Memorial Park appear to have been made in the 1930s including the Casuarinas on the western slopes. The alignment of Hill's Figs and the Livistona Palms on the northwestern boundary appears to date from the 1960s/1970s, except for the very large Hill's Fig on the corner of Mann Street and Vaughan Avenue, which was likely planted c1930s.

Other trees, including Brushbox specimens west and south of the Cenotaph, a maturing eucalypt between the Cenotaph and Mann Street and Pecan trees on the northwestern slopes, are all plantings from the second half of the twentieth century. A Phoenix Palm abutting a very large fig specimen at the southern end of the Memorial Park is likely self-seeded.

It is not clear when the Lone Pine abutting the Cenotaph was planted.

The Sister Sumner memorial tree (*Grevillea banksii*) may be the original specimen planted in 1933. Available sunlight to it is severely restricted by the abutting Hill's Fig canopy.

Figure 3.14 The very large c1930s Hill's Fig on the corner of Mann Street and Vaughan Avenue.

Figure 3.15 Dense Hill's Fig canopies (left) framing the northwestern boundary of the Memorial Park.

Figure 3.16 The Hill's Fig canopies around the northwestern side of the Memorial Park, as seen from the western end of Vaughan Avenue.

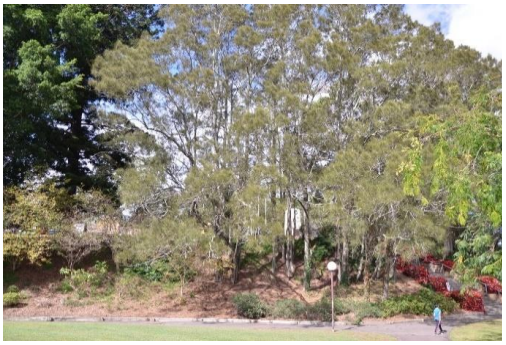


Figure 3.17 Casuarina stands on the western slopes of the Memorial Park.

The northern and southern ends of the Memorial Park and its western slopes contain various shrubs and groundcovers, most of them planted either in lieu of lawn (in heavily shaded spaces) or to help reduce erosion and provide a low vegetative 'finish' on the park's western hill. Such species found in the park include *Clivia,* dwarf Nandina, *Agapanthus, Murraya,* dwarf Cupressus and *Rosa* species. Several small trees or large shrubs have also been used on the park's western slopes, including Crepe Myrtle and Lilly Pilly.

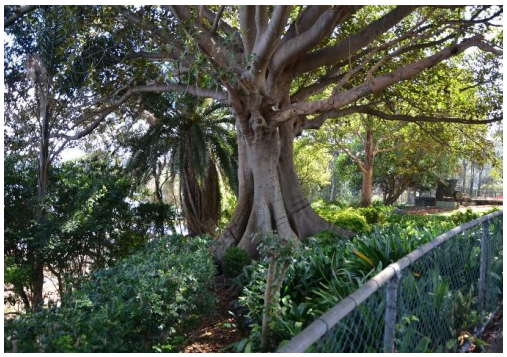


Figure 3.18 Massed groundcovers under the very large Moreton Bay Fig at the southern end of the Memorial Park.

Figure 3.19 Massed Clivia under the very large Hill's Fig at the northern apex of the Memorial Park. The Sister Sumner memorial tree was wrapped in tapestry for Anzac Day commemoration.

Figure 3.20 Massed Agapanthus, dwarf Nandina and other groundcovers on the Memorial Park's western bank.

The Memorial Park contains various utilitarian fixtures and fittings including bench seating, lighting and rubbish bins.

Figure 3.21 Typical aluminium bench facing into the Memorial Park slightly downslope from the Mann Street footpath.

Figure 3.22 Rubbish bins abutting the Mann Street frontage.

Figure 3.23 Typical light posts through the centre of the park with curved arm and reflector plate.

Figure 3.24 One of four caged spotlights, positioned at the corners of the Cenotaph.

Access from Gosford Memorial Park to Rotary Park is via a broad set of stairs that were cut into the western slopes of the site in the early 1970s. The stairs commence directly downslope from the Cenotaph podium steps. The zone between the two contain an Aboriginal midden (site 45-3-4824 described in Section 3.4.2 below). There is no formal pathway across this area and the trunk of a large Brushbox lies within the gravel apron at the top of the stairs. The concrete stairs are framed by tiered brick planter bed walls.

Whilst an axial relationship between the Cenotaph and the Rotary Park fountain and sculpture was evidently a consideration at the latter's time of design and construction, the staircase is not exactly perpendicular to the Cenotaph.

Figure 3.25 The western steps of the Cenotaph podium. Note, however, the three flag poles located between the Cenotaph and the Boer War Memorial, signal the north as the 'front' approach to the Cenotaph.

Figure 3.26 The large Brushbox trunk within the pedestrian apron at the top of the stair. This zone also contains an Aboriginal midden.

Figure 3.27 Looking west down the stairs to Rotary Park, flanked by the hand-knitted poppy tapestry Anzac Day display and mature Casuarinas on the western slopes of the promontory.

Figure 3.28 Looking east up the stairs from Rotary Park to Cenotaph.

Figure 3.29 Stair landing showing metal handrail, cracked and bulging brick wall.

Figure 3.30 Rotary Club insignia set into the centre of the stair landing.

3.2.2 Rotary Park

Rotary Park lies at the junction of Vaughan Avenue and Dane Drive on land reclaimed from the foreshore in the 1930s. It is identified by signage placed near the Norfolk Island Pine at the corner of Vaughan Avenue and Dane Drive.

The main feature of the park is a non-operational fountain lined with small multicoloured tiles and contained by pebblecrete walls. At the centre of the fountain pool is a temporary sculpture (installed in 2015) by Margrete Erling titled *Poppy Sculpture* constructed of aluminium, galvanised steel, sheet metal and fibreglass resin. The base of the sculpture is made of steel plates with a tread pattern and floor lights installed. The entire artwork is mounted on a plasterboard plinth and designed to be moveable. It was originally intended to be erected for commemorative events then disassembled to be moved or stored until needed again. The sculpture was not intended as a permanent or long term feature of the park.

The fountain also contains a commemorative plaque and a time capsule mounted within a stone plinth.

An encircling pedestrian footpath connects to paths that extend along the base of the Memorial Park's western bank (and then to Vaughan Avenue) and to a path that projects through the reserve further east along Dane Drive.

Rotary Park is otherwise quite spartan in composition, only containing several semi-mature Honey Locust trees (planted for shade abutting park benches) and several semi-mature Norfolk Island Pines that appear to have been planted in 1973. Some minor land remodelling occurred on the outer edges of the circular loop path to provide some enclosure for the fountain from the abutting arterial roadway.

Figure 3.31 Rotary Park showing signage near Norfolk Island Pine.

Figure 3.32 Looking south through Rotary Park showing Poppy Sculpture in fountain.

Figure 3.33 View over the Rotary Park fountain to the Cenotaph in the Memorial Park.

Figure 3.34 Looking north through Rotary Park to the carpark on Vaughan Avenue.

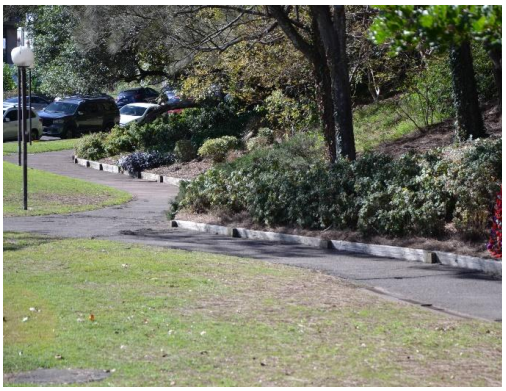


Figure 3.35 The bitumen footpath along the base of the Memorial Park bank.

Figure 3.36 Bench and rubbish bins in Rotary Park.

A collection of small trees is dotted through the lawns and garden beds at the southern end of Rotary Park. These include a Tuckeroo, paperbarks and a eucalypt.

Those plantings and a toilet block form a de facto boundary between Rotary Park and the long stretch of public reserve between that park and the southern end of Mann Street, at Dane Drive.

Figure 3.37 Toilet block on the southeastern side of Rotary Park.

Figure 3.38 Stand of small trees including Tuckeroo and Bottlebrush beside the Rotary Park toilets.

3.2.3 Public reserve

The public reserve between Rotary Park and the southern end of Mann Street along Dane Drive is a reasonably nondescript parcel of land. It contains semi-mature Fig species (*Ficus macrophylla, rubiginosa* or *obliqua*) and Paperbarks abutting Dane Drive, with a large Eucalypt and a large Paperbark more centrally located. Five semi-mature Ficus specimens form an arced alignment near the junction of Gertrude Place and Mann Street.

The dense planted skirt to the main bend in the road at the southern end of Mann Street largely contains adventitious species, including African Olive, Privet, Hibiscus and Lilly Pilly. Five very large Eucalypts, likely regrowth of endemic forest, are situated on the southern slopes of the Memorial Park and have substantial canopies. These trees cast considerable shade over the lawns of this linear public reserve for much of the day.

Figure 3.39 Small native trees at the northern end of the linear public reserve fronting Dane Drive.

Figure 3.40 Looking north toward the Dane Drive-abutting public reserve (partlycordoned off for services works).

Figure 3.41 Looking east along the public reserve between the Memorial Park and Dane Drive.

Figure 3.42 Looking north toward the study area from the southern side of Dane Drive, showing the large Eucalypt canopies that lie along the southern skirt of Memorial Park.

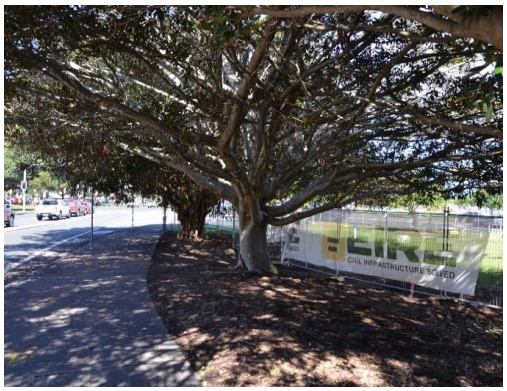


Figure 3.43 The semi-mature Figs around the southern end of Mann Street near Gertrude Place.

Figure 3.44 View down to the public reserve abutting Dane Drive (and Brisbane Water) from Mann Street, as that roadway climbs towards the Memorial Park.

3.3 Memorials and movable items

The following section provides a description of the memorials and movable items in Gosford Memorial Park and Rotary Park using information gathered during the site inspection and from the NSW War Memorials Register.

Movable items are identified with a label in Table 3.1.

This section also lists the memorials and movable items known to have been removed or relocated, for the purpose of conservation policy development regarding possible reinstatement or relocation.

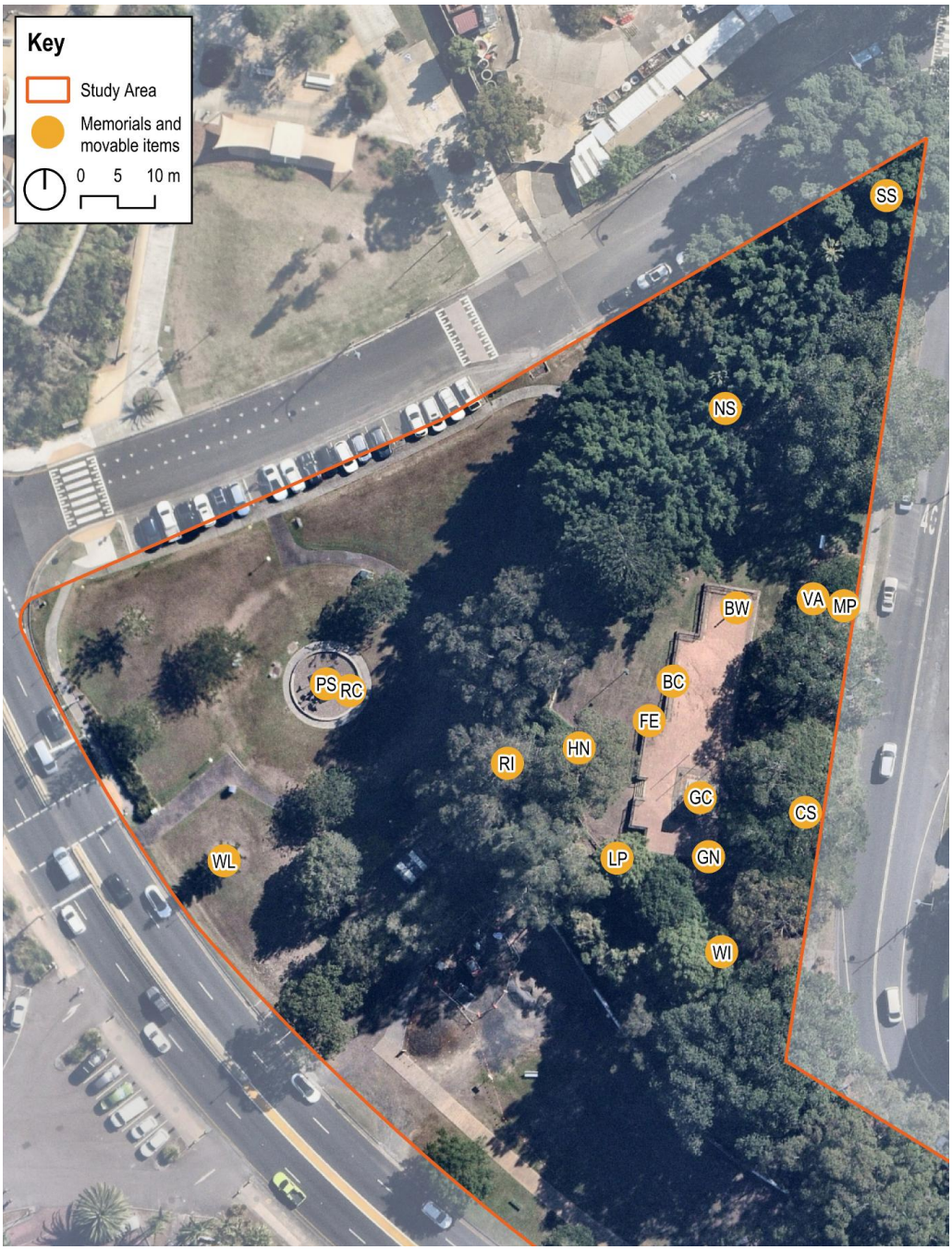


Figure 3.45 Location of memorials and movable items. Reference codes correlate to Table 3.1 below. (Source: Nearmap with GML overlay 2024)

Table 3.1 List and description of memorials and movable items within the study area.

Ref	Name	Description	Inscription
GC	**Gosford Cenotaph**	• Located at the southern end of the podium in Memorial Park, south of and in alignment with the Boer War Memorial. • Rectangular shaft that tapers slightly towards the top, constructed of locally quarried sandstone blocks. • It is set on a concrete base and surrounded by an inner brick kerb and an outer concrete kerb. There are four concrete paths, one leading to each face of the Cenotaph. • Bronze lettering and plaques on each of the faces that are framed by sandstone detailing. • A small bronze plaque is fixed to the top stair riser on the northern elevation. • The top of the northern, eastern and western faces are decorated with laurel wreaths and the emblems of the three service branches of the Australian Defence Force. • Three flag poles erected after the construction of the Cenotaph in front of its northern face. • Good condition. Additions and alterations: • Bronze plaque added to northern face in 1953 and another added to the southern face likely in the 1980s. Additional strip attached to southern plaque in recent years. • Small plaque added to the northern step in 1988 (Cenotaph restoration and upgrade). Historically, there were three steps up to the Cenotaph. Two of these steps were buried as the ground was raised for the podium. • Three military emblems added to the northern face in the 1980s.	*(Lettering) Their name liveth for evermore.* *(Side) Our glorious dead* *Boer War 1899–1902* *World War I 1914–1918* *World War II 1939–1945* *Korea 1950–1953* *Malaya 1948–1960* *Borneo 1962–1966* *Vietnam 1962–1972* *Iraq, East Timor, Afghanistan* *(Honour roll) 1914–1919* *Our glorious dead* *[Names]* *(Honour roll) 1939–1945* *Our glorious dead* *[Names]* *(Plaque) This cenotaph was restored* *upgraded and dedicated* *as a tribute to all veterans by* *Gosford RSL Sub Branch* *April 1988* *Hon. Sec. R. C. Sturgeon Pres.*
BW	**Gosford Boer War Memorial**	• Located at the northern end of the podium in Memorial Park, north of the Gosford Cenotaph.	*Erected in memory of 'Our Soldiers' who, in South Africa, fell in defence of their nation during the Boer War 1899 –*

Ref	Name	Description	Inscription
		• White marble rectangular column on a circular concrete base. The column tapers towards the top and is surmounted by a decorative urn. • The plinth is decorated with floral relief carvings and features an engraved inscription on each face. • Good condition.	*1902. They obeyed their country's call.* *Trooper John Murray of 'Wamberal' 1st November 1900.* *Corporal Frank Marcourt Legge of 'Woodport' 20th May 1901.* *Trooper Sidney S. Mayo of 'Gosford' 11th March 1902.*
FE	**HMA Ships 1955–1971 Far East Strategic Reserve Memorial**	• Located in the northwestern corner of the podium in the Memorial Park. • Low black stone plinth mounted on concrete base. • Inscription on memorial plaque attached to the plinth and to the front of the plinth. • Good condition.	*(Plaque) Dedicated To Those Who* *Served In HMA Ships* *Attached To The FESR* *In South East Asia* *1955 – 1971* *Lest We Forget* *HMA Ships 1955 – 1971 Far East Strategic Reserve* *[Ship names]* *'For Freedom We Served'* *(Front) Far East Strategic Reserve* *Malayan Emergency* *Borneo Indonesian Confrontation*
BC	**British Commonwealth Occupation Force Memorial**	• Located along western fence of the podium in Memorial Park. • Commemorative plaque set into low stone plinth. • Good condition.	*British Commonwealth Occupation Force (B.C.O.F) Australian Component* *In remembrance of 45,000 Australian Service Men and Women who served in Japan 1945–1952 and those who did not come back. Lest we forget.* *Dedicated Tuesday 11 March 2008.*
HN	**Harry Newhouse Memorial Plaque**	• Located on the northern side of the stairs in the garden bed. • Low rectangular memorial plaque mounted on stone. • Good condition.	*Dedicated to the memory of Harry Newhouse 3rd September, 1895 – 24th November, 1996 and all Gallipoli Veterans.* *"Their bodies are buried in peace and the name liveth for 'evermore'".* *ANZAC Day – 25th April 1998.*
CS	**Century of Service Memorial Plaque**	• Located in southern portion of the Memorial Park near a large fig tree along the Mann Street footpath, to the east of the Cenotaph. • Faces east to Mann Street and St Mary's Anglican Church. • A commemorative plaque mounted on a low stone plinth.	*A Century of Service to God and Country 1900–1999* *South African War 1902, Boxer Rebellion 1900–1901, First World War 1914–1918, Second World War 1939–1945, Korean War 1950–1953, Malayan Emergency 1950–1960, Indonesian Confrontation 1963–1966, Vietnam War 1962–1973, Peacekeeping 1947–, Gulf War 1990–1991.*

Ref	Name	Description	Inscription
		• Good condition.	*They answered their Country's call. They paid the price of Freedom. Their names liveth forevermore.* *"Lest we forget"* *Unveiled – 25/4/99 by Gosford Mayor Chris Holstein & R.S.L. President Bob Sturgeon.* *Dedication by – Chaplain Eric Trezise, Venerable John Southwarden and Father Paul Finucane.*
VA	**The Partners Veterans Association of Australia NSW Branch**	• Located along the eastern boundary of the Memorial Park near Mann Street. • Faces west into the Memorial Park. • Stone plinth mounted on concrete. • Oval plaque set into top of the plinth and small rectangular plaque to the western face. • Good condition.	*The Partners Veterans Association of Australia NSW Branch Est. 1999* *For Those Who Stand Beside Them* *The Central Coast sub-branch played an integral part in the formation of the Partners of Veterans Association of NSW.* *The funds for this memorial were kindly provided by the Totally & Permanently Incapacitated Association of NSW.*
MP	**Gosford Memorial Park Plaque**	• Located along eastern boundary of the Memorial Park near Mann Street. • Faces east to Mann Street and St Mary's Anglican Church. • Low stone plinth with commemorative plaque. • Good condition.	*Jim Floyd MP Member for Robertson officially opened the upgrading of* *Gosford Memorial Park* *On 2 December 2000* *Hon. Tony Abbott MP Federal Minister for Employment Services* *Robert Sturgeon President Gosford RSL Sub-branch* *Councillor Chris Holstein Mayor Gosford City Council* *Supported by the Commonwealth as a Centenary of Federation project in conjunction with Work for the Dole Gosford R.S.L Branch and Gosford City Council*
NS	**Gosford National Servicemen's Memorial**	• Located in northern portion of the Memorial Park, adjacent to a flagpole. • Faces south to the podium. • Memorial plaque mounted on vertical block of stone. • Good condition.	*This memorial is dedicated to Australia's 289000 National Servicemen who served in the Armed Forces 1951 – 1972.* *187 were killed in action. 1479 were wounded.* *Erected by their comrades of the National Servicemen's Association of NSW.* *We will never forget.* *Blessed by Rev Fr Paul Evans. Dedicated by Mr Ron Brown State President NSW. 22nd June 2002.* *We gratefully acknowledge the assistance of Gosford City*

Ref	Name	Description	Inscription
			Council in the erection of this memorial.
SS	**Sister Sumner Memorial Tree**	• Located at the northern end of the Memorial Park in a brick-edged garden bed. • An engraved stone tablet located to the south of the memorial tree. • A temporary plastic sign is placed in front of the memorial tree for Anzac Day commemoration. • Poor condition: Cracks in the stone and the inscription is faded. Additions and alterations: • The stone tablet went missing and was later rediscovered. The stone was then placed at its current location. It is not known where its original location was but presumably it was in close proximity to this tree.	*Tree planted in memory of Katharine Sumner, ex-nursing sister AANS, by fellow members of the CWA, 19th March 1933.*
LP	**Gosford Lone Pine**	• Located in southwestern corner of the Memorial Park along a low Koppers log barrier. • A Lone Pine memorial tree marked with a plaque mounted on a low stone plinth. • The plaque describes the history of Lone Pine, its association with Australian servicemen and their families. • Fair condition: Minor damage to stone edges, discolouration to acrylic plaque cover.	*The Lone Pine – Pinus halepensis* *Lone Pine or Plateau 400 was the scene of a major diversionary offensive launched by the 1st Australian Infantry Division on 6 August 1915. The Turks had cut down all but one of the tree that clothed the ridge to cover their trenches. The ridge dominated by the single Allepo Pine (Pinus halepensis) became known as Lone Pine. In three days of fighting the Australians lost more than 2000 men and the Turks losses were estimated at 7000. Seven Victoria Crosses were awarded.* *As far as we know two Australian soldiers souvenired pinecones from the ridge that found their way back to Australia.* *Lance Corporal Benjamin Smith of the 3rd Battalion, whose brother was killed in the battle for Lone Pine Ridge, sent a cone home to his mother, Mrs McMullen of Inverell in New South Wales. Mrs McMullen kept the cone for 13 years before planting the seeds in 1928. She grew two seedlings, one of which she presented to the town of Inverell and the other to the Parks and Gardens section of the Department of the Interior in Canberra. The Duke of Gloucester planted this second tree at the Australian War Memorial in October 1934.*

Ref	Name	Description	Inscription
			Today it stands over 20 metres in height. *SGT Keith McDowell of the 24th Battalion carried a pinecone in his haversack until the end of the war. Upon returning home to Australia he gave it to his aunt, Mrs Emma Gray, who lived as Grassmere near Warrnambool, Victoria. A decade or so later Mrs Gray planted the seeds and four seedlings were grown. One was planted in May 1933 in Wattle Park, Melbourne. Another at the Shrine of Remembrance in Melbourne and another at the Soldiers Memorial Hall at The Sisters. The last was planted in the Warrnambool Gardens.* *In 1990 two trees were taken back to Gallipoli with war veterans' who attended the memorial service to mark the 75th anniversary of the battle of Lone Pine.* *Since the 1980s many trees have been grown by both seed and grafting techniques from the tree at the Australian War Memorial. This tree is one of those trees.*
WI	**War Widows Memorial Plaque**	• Located southeast of the Gosford Cenotaph among low vegetation. • Rectangular memorial plaque mounted on a large unshaped stone. • Good condition.	*Loves Philosophy* *The Fountains mingle with the river, and the rivers with the ocean. The winds of heaven mix forever, with a sweet emotion; nothing in the world is single; all things by a law divine. In one spirit meet and mingle, why not I with thine! Shelley (1819)* *In memory of all women and children who lost loved ones due to wars and conflict in the 20th century.* *"Lest we forget"* *This plaque was unveiled by Mayor Robert Bell – Gosford City Council and dedicated by Rev. Fr. Max Sainsbury and donated by Gosford City War Widows Guild Club 23rd June 2003*
GN	**Howitzer field gun** (movable item)	• Located south of the Cenotaph, abutting the podium and viewable from the podium. • A Ruwolt 1942 Howitzer field gun mounted on two concrete blocks. • Good condition.	*N/A*
RC	**The Rotary Clubs Plaque and Time Capsule**	• Located in the Rotary Park fountain towards the eastern end of the pool.	*These gardens and fountain were constructed and presented to this community on the occasion of the sesqui-centenary celebrations of the first*

Ref	Name	Description	Inscription
		• Two metal plaques mounted on a low stone plinth: one on top and a smaller plaque on the east face. • Good condition. Minor chipping to the edges of the stone plinth.	*settlement in this shire 1823–1973 by* *The Rotary Clubs* *Of Gosford, East Gosford & Gosford North on 16th December 1973* *Rotary Presidents 1972–1975 Gosford: L.J. McCarthy East Gosford: B. Howells Gosford North: C. Williams* *Rotary Presidents 1973–1974 Gosford: A.R. Ghersi East Gosford: C.S. Donovan Gosford North: L. Arndell* *Time Capsule* *Items of interest to the future citizens of Gosford City & West Gosford Rotary Club* *Have been placed in this park as a Bi-Centennial Project* *To be opened by the President of Gosford West Rotary Club & The Mayor of Gosford Australia Day 2088*
RI	**Rotary Club Insignia**	• Located at the centre of the concrete stair landing between Memorial Park and Rotary Park. • Good condition	*Rotary International*
PS	**Poppy Sculpture**	• Located in the centre of the fountain pool in Rotary Park. • Sculpture consists of nine metal poppies rising from a metal base. • Flood lighting installed in the metal base. • Good condition	*Margarete Erling* *Poppy Sculpture* *Never Forgetting the Sacrifices, 2015* *Aluminium, galvanised steel, sheet metal, fibreglass resin, paint* *This temporary sculpture was commissioned as part of a community event for the 100 Year ANZAC Centenary in 2015*
WL	**The Australian Women's Land Army**	• The location is reported as being in Rotary Park adjacent to the southern Norfolk Island Pine. • The plaque was not inspected during the GML site visit as it was likely buried under mulch. • The memorial is not listed on the NSW War Memorials Register. • The condition of the memorial is unknown.	*This tree was presented to the people of Gosford by* *The Australia Women's Land Army* *Who worked in the district during the war years 1941–1943* *On 16.12.73*
Former memorials/movable items			
	WWI trophies (movable items)	• The original location of the war trophies in the park is unknown.	*Unknown*

Ref	Name	Description	Inscription
		• A ’77 millimetre field gun and a heavy minenwerfer taken from the Bullecourt offensive in France. • The trophies were removed from the park post-1988. The current whereabouts of these guns are known to the Gosford RSL Sub-Branch.	

Figure 3.46 Gosford Cenotaph (GC) from the north, showing the flagpoles.

Figure 3.47 Cenotaph (GC) from the northwest, showing the podium and stairs.

Figure 3.48 Northern elevation of the Cenotaph (GC).

Figure 3.49 Western elevation of the Cenotaph (GC).

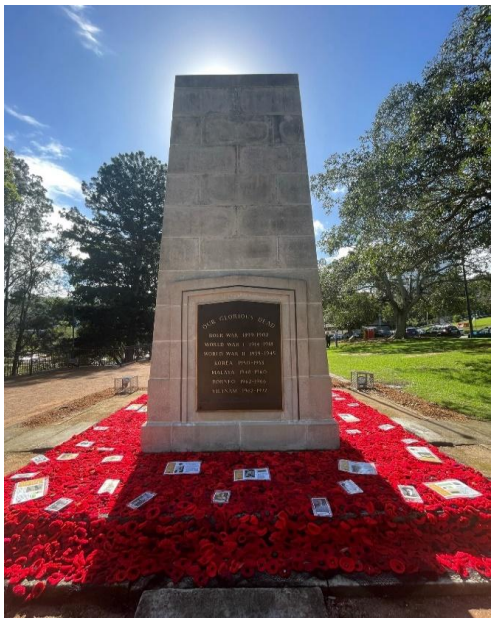


Figure 3.50 Southern elevation of the Cenotaph (GC).

Figure 3.51 Eastern elevation of the Cenotaph (GC).

Figure 3.52 Detail of wreath at the top of the western elevation of the Cenotaph (GC).

Figure 3.53 Concrete path and kerb surrounding the Cenotaph (GC).

Figure 3.54 Plaque on the southern elevation of the Cenotaph (GC).

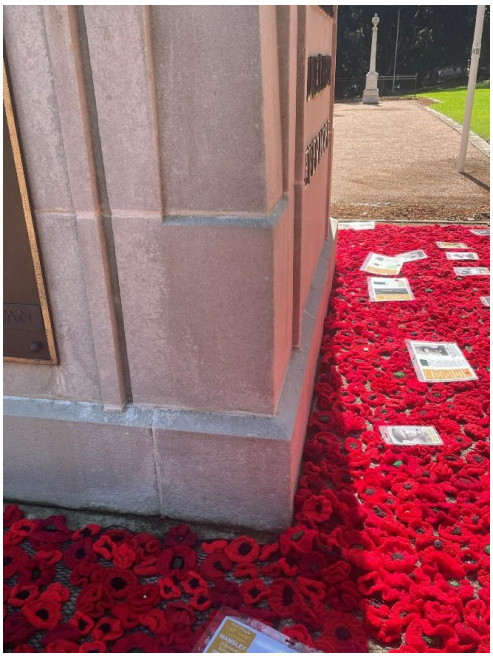


Figure 3.55 Sandstone edge detail of the Cenotaph (GC).

Figure 3.56 Stone block podium and stairs.

Figure 3.57 Stone block podium and metal fencing.

Figure 3.58 Boer War Memorial (BW), viewed from the Cenotaph in the south.

Figure 3.59 Boer War Memorial (BW), viewed from the east.

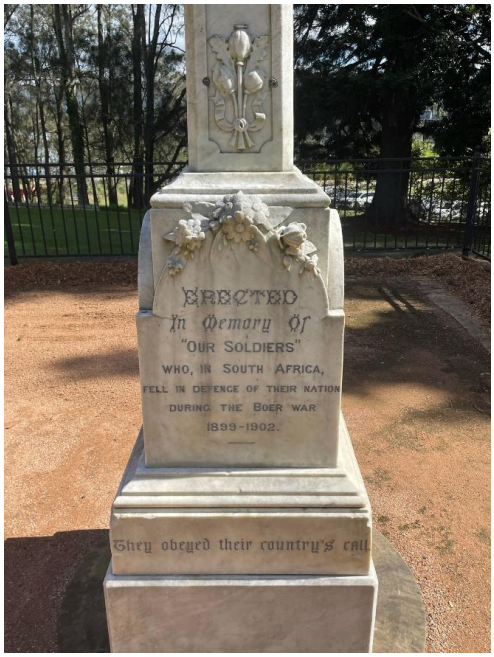


Figure 3.60 White marble column with inscription and floral motifs.

Figure 3.61 Decorative urn at the top of the Boer War Memorial (BW).

Figure 3.62 HMA Ships 1955–1971 Far East Strategic Reserve Memorial (FE).

Figure 3.63 British Commonwealth Occupation Force Memorial (BC).

Figure 3.64 Harry Newhouse Memorial Plaque (HN).

Figure 3.65 Century of Service Memorial Plaque (CS), faces east to Mann Street and St Mary's Anglican Church.

Figure 3.66 The Partners Veterans Association of Australia NSW Branch memorial (VA), faces west into the Memorial Park.

Figure 3.67 Gosford Memorial Park plaque (MP), faces east to Mann Street and St Mary's Anglican Church.

Figure 3.68 Gosford National Servicemen's Memorial (NS), adjacent to a flagpole.

Figure 3.69 Gosford National Servicemen's Memorial (NS), faces south to the podium.

Figure 3.70 Sister Sumner memorial tree (SS), near the corner of Mann Street and Vaughan Avenue.

Figure 3.71 Sister Sumner memorial tree stone tablet with inscription (SS).

Figure 3.72 Gosford Lone Pine and memorial plaque (LP), towards the southwest of the podium.

Figure 3.73 Gosford Lone Pine memorial plaque (LP).

Figure 3.74 War Widows Memorial Plaque (WI).

Figure 3.75 Howitzer field gun (GN), abutting the southern side of the podium.

Figure 3.76 The Rotary Clubs Plaque and Time Capsule (RC), within the now-defunct fountain pool in Rotary Park.

Figure 3.77 Poppy Sculpture (PS) in the centre of the now-defunct fountain pool in Rotary Park.

Figure 3.78 Rotary International insignia (RI) set into landing of concrete stairs.

Figure 3.79 Australian Women's Land Army plaque. (Source: Merril Jackson)

3.4 Aboriginal archaeological analysis

This section considers the study area's potential for Aboriginal 'objects', as defined by the *National Parks and Wildlife Act 1974* (NSW) (NPW Act). This includes consideration of the study area's landscape context, previous studies, predictive statements, and the locations of other sites recorded in the area to assist with spatial patterning.

An absence of 'objects' does not necessarily reflect an absence of cultural significance associated with the area. Consideration should be given to consulting the local First Nations community to determine possible intangible cultural significance and connections.

3.4.1 Aboriginal cultural context

The study area is located within the boundary of the Darkinjung LALC. Both the Central Coast region, and Gosford specifically, have been linked to the Darkinyung (Darkinjung, Darginung), Awabakal and Guringai (Kuringai) peoples. Further information on the Aboriginal cultural context of the study area is presented in Section 2.2 of this CMP.

3.4.2 Aboriginal Heritage Information Management System

A search of the Heritage NSW Aboriginal Heritage Information Management System (AHIMS) database was undertaken on 30 April 2024 (reference number 888306). The search covered a zone from eastings, northings 342474, 348974 to 6296417, 6302917 with no buffer. The results of the search are shown in Table 3.2, Figure 3.80, Figure 3.81 and Figure 3.82. A total of 116 Aboriginal sites and one Aboriginal place were identified.

There is one previously recorded Aboriginal sites are located within the study area, AHIMS site 45-3-4824 (Gosford Memorial Park), a shell (midden) site.

Table 3.2 Results of the AHIMS search.

Site features	Frequency	Percentage
Art (closed context)	18	15.5
Art (closed context) and Artefact	1	0.9
Art (closed context) and Grinding Groove	4	3.4
Art (closed context) and Shell	1	0.9
Art (closed context), Grinding Groove and Shell	1	0.9
Art (open context)	32	27.5
Art (open context) and Grinding Groove	9	7.7
Art (open context) and Shell	1	0.9
Art (open context) and Stone Arrangement	1	0.9
Art (open context), Artefact and Shell	1	0.9
Artefact	6	5.1
Artefact and Grinding Groove	1	0.9
Artefact and Shell	12	10.3
Artefact, Grinding Groove and Shell	2	1.7
Grinding Groove	13	11.2
Modified Tree	1	0.9

Site features	Frequency	Percentage
PAD (Potential Archaeological Deposit)	3	2.6
PAD and Shell	1	0.9
Shell	8	6.9
Total	**116**	**100%**

The Aboriginal place identified in the search is the Kariong Sacred Land site at Kariong, approximately 7 kilometres west of the centre of Gosford. This place is a complex of site types including engravings, and provides evidence of past occupation and ceremonies. Traditional stories identify the site as a traditional meeting place for learning and education.[1]

Art sites, or sites with an art component, are the most common site type returned within the search results, accounting for 58% of the results (n=69). This may be divided into art in closed contexts (rock shelters), comprising 25 sites or 36% of all art sites; and art in open contexts (ie open landforms), comprising 44 or 64% of all art sites. Art in closed contexts comprises pigment or charcoal art, while art in open contexts comprises engraved art.

Other common site features included:

- grinding grooves, comprising all or part of 30 sites (26% of the search results);
- shell (midden) sites, comprising all or part of 27 sites (23% of the search results); and
- artefact sites, comprising all or part of 23 sites (20% of the search results).

The AHIMS sites returned within the search are predominantly located in undeveloped areas, and have a particular concentration to the east of the search zone, within the elevated area west of the Broadwater. The comparative absence of sites within the urban areas around Brisbane Water should not be taken to suggest a lack of use of these areas by Aboriginal people, rather that Aboriginal sites within these areas are likely to have been obscured or destroyed by past urban development.

There are six registered sites within 1 kilometre of the study area:

- As mentioned above, there is one previously recorded site within the study area—shell midden site 45-3-4824 (Gosford Memorial Park).
- The five other sites include another shell (midden) site, one artefact site, one artefact and shell (midden) site, one PAD site, and one PAD and shell (midden) site. The closest of these is PAD site 45-3-3340, Dane Drive PAD.

Figure 3.83 to Figure 3.89 show these Aboriginal sites and their associations with the study area.

The Dane Drive PAD (45-3-3340) is an area of archaeological potential for subsurface objects situated along the predicted edge of the former late Holocene foreshore (refer to Section 3.4.3 below for further detail), approximately 15 metres east of the study area. The PAD was originally mapped as extending into the southeastern portion of the study area, within the public reserve area. However, recent investigation by GML has indicated that the deposit within the public reserve consists of historical fills overlying estuarine sediment. As such, the extent of the PAD has been corrected on AHIMS to exclude this area. Note the PAD location point as given by the AHIMS database for 45-3-3340 is situated approximately 75 metres north of the study area at the time of the AHIMS search. This has been corrected on AHIMS and within the figures below to correspond to the mapped extent of the PAD as shown in Dane Drive and Mason Parade Intersection Upgrade Archaeological Assessment report[2], noting the reduction in the extent of the PAD following investigation of the deposits within the southeast of the study area.

Shell midden site 45-3-4824 is situated on the coastal rock platform / low escarpment within the study area, which would have originally formed a component of the shoreline prior to land reclamation. This site was originally recorded as a midden site in April 2023 when a burst water main, combined with torrential rain, disturbed the land surface and exposed shell within an area approximately 2 metres by 3 metres.[3] In August 2023, a request was submitted to reclassify the site as 'not a site', on the basis that the shell present was small, mostly broken cockle shells, mixed with glass and rubble, which was interpreted as being indicative of fill materials; and no burnt shell, stone tools, animal bones or charcoal were observed, which would have been indicative of use of the site as a shell midden.[4] However, as of April 2024, this site remains a valid registered AHIMS site. Correspondence attached to the site card, accessed via the AHIMS database, indicates that Heritage NSW has ruled that further evidence on the nature of the site, including consultation with Aboriginal stakeholders, would be required to reclassify the site. As such, this CMP treats this site as a valid registration with statutory protection under the NPW Act.

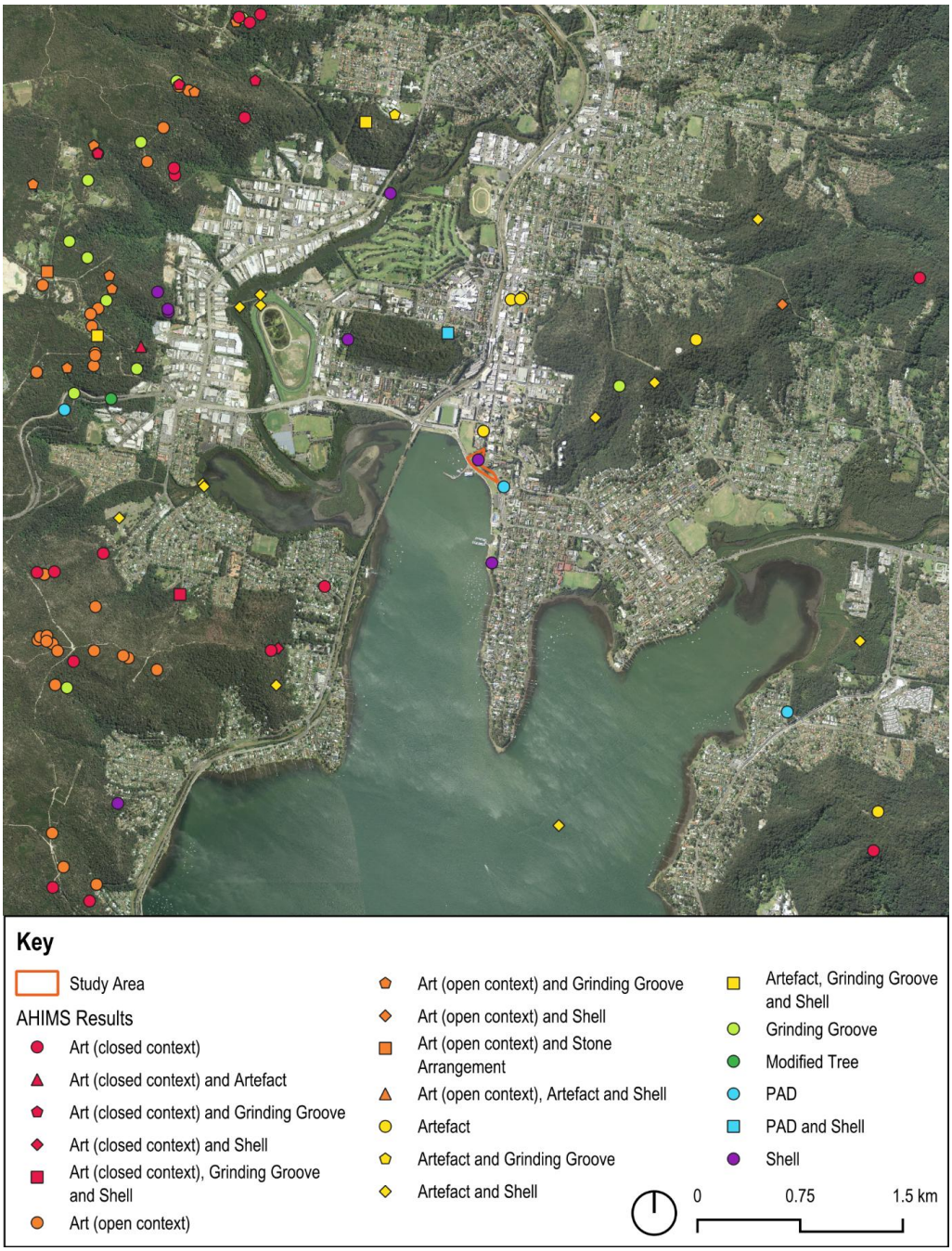


Figure 3.80 Results of the AHIMS search. The study area is outlined in orange. (Source: Heritage NSW AHIMS on a SIX Maps basemap with GML overlay 2024)

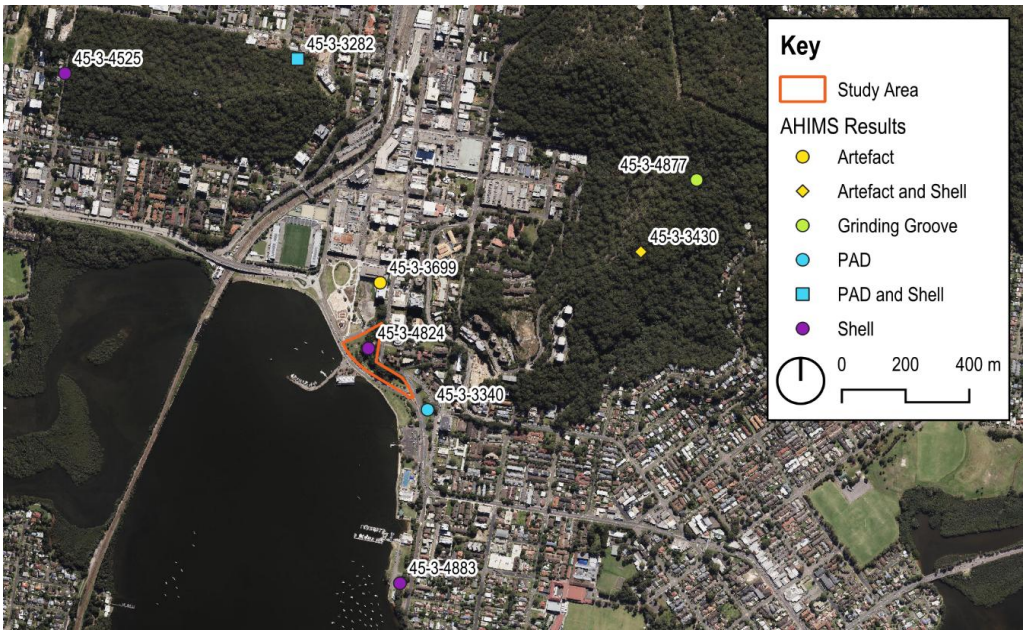


Figure 3.81 AHIMS sites within 1 kilometre of the study area. (Source: Heritage NSW AHIMS on a SIX Maps basemap with GML overlay 2024)

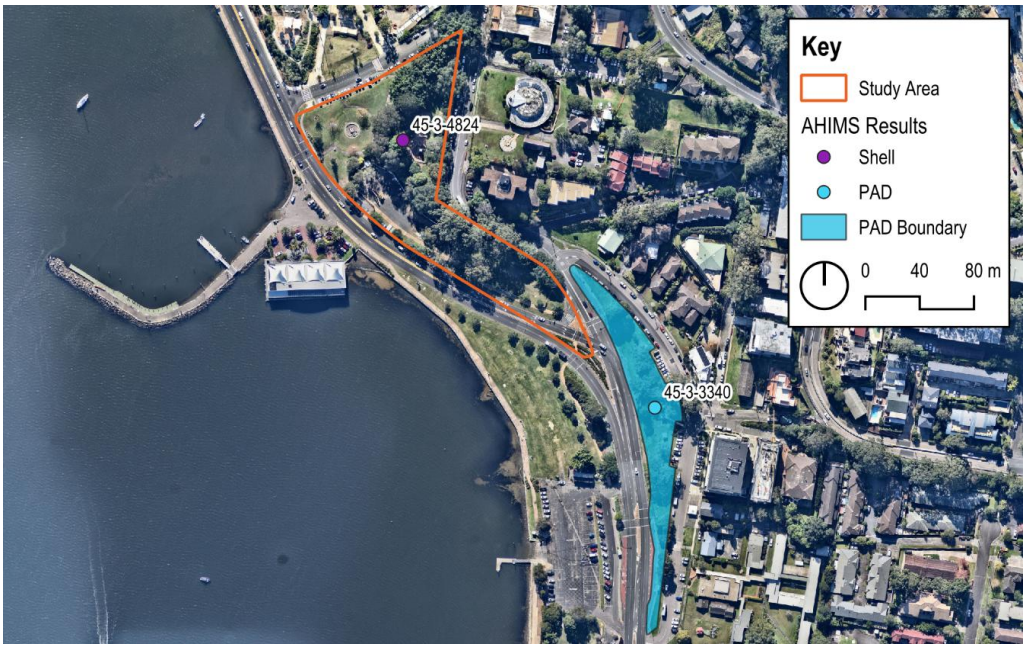


Figure 3.82 Detail of location of AHIMS sites 45-3-4824 and 45-3-3340. (Source: Heritage NSW AHIMS on a Nearmap basemap with GML overlay 2024)

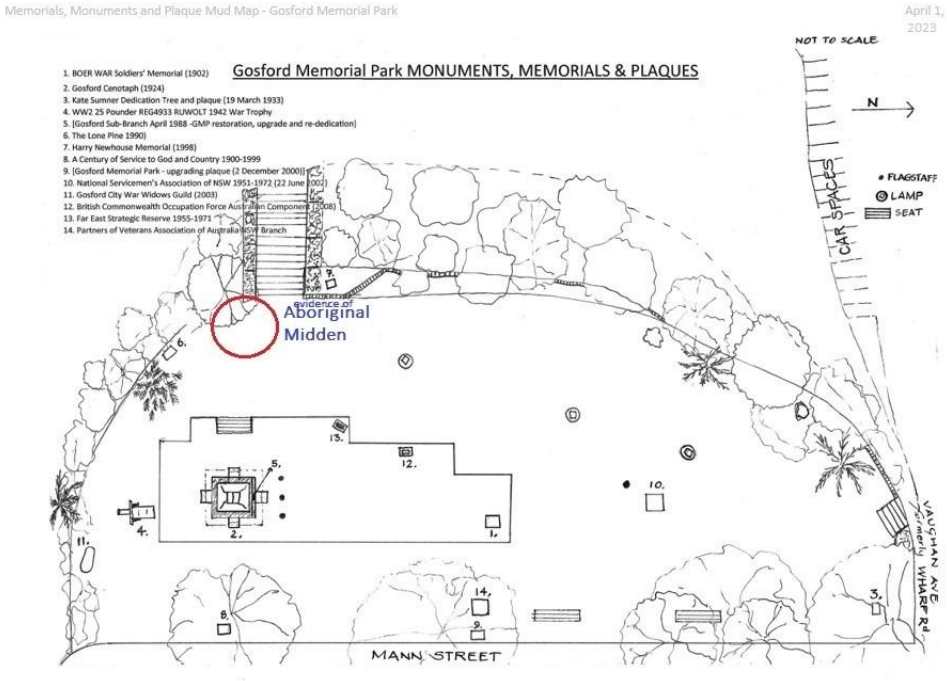


Figure 3.83 Site plan showing the location of AHIMS site 45-3-4824 within the study area. (Source: Merril Jackson, 2023)

Figure 3.84 Facing southwest towards the mapped location of midden site 45-3-4824. (Source: GML, 2024)

Figure 3.85 Facing north towards the mapped location of midden site 45-3-4824, visible in the eroded dirt path. (Source: GML, 2024)

Figure 3.86 Detail of shell exposed in the location of midden site 45-3-4824. Note modern gravel and refuse (ie glass shards). (Source: GML, 2024)

Figure 3.87 Facing southeast across the public reserve, originally mapped as part of Dane Drive PAD, 45-3-3340. (Source: GML, 2024)

Figure 3.88 The public reserve, facing northwest, originally mapped as part of Dane Drive PAD, 45-3-3340. (Source: GML, 2024)

Figure 3.89 The public reserve, facing southeast, originally mapped as part of Dane Drive PAD, 45-3-3340. (Source: GML, 2024)

3.4.3 Relevant studies

Dane Drive and Masons Parade Intersection Upgrade—Archaeological Assessment—AHMS, 2007

AHMS conducted an archaeological assessment, involving desktop assessment and archaeological survey, of the proposed Dane Drive and Masons Parade intersection upgrade. The AHMS investigation area included the southeastern portion of the present study area.

Two distinct soil profiles were identified within the investigation area through geotechnical testing. The first is fill associated with late 1930s land reclamation, comprising layers of silty sand, clayey sand, silty clay and sandy clay. These soils were determined to have extremely low potential for Aboriginal objects. The second soil profile was remnant estuarine foreshore, which was determined to have a low potential for middens, stone artefacts and burials (if deep midden deposits or soft substrates such as sand are present). One borehole intersected this soil unit, located north of Masons Parade, which was found to comprise 220 millimetres of dark brown, fine-grained silty sand over 350 millimetres of orange / brown mottled clayey sand and dark brown silty clay subsoils. These soils were interpreted as the intact remnant shoreline, and categorised as Wyong soils.

Following survey, PAD was assigned to the eastern side of Rotary Park (which included a portion of the study area, and adjacent greenspace along Dane Street), corresponding to the predicted edge of the old foreshore. PAD was assigned on the basis that this area would have provided access to abundant resources, due to the foreshore context and the presence of a low order, since-obscured creek line descending Mount Mouat and running beneath the rotary pergola in the south of Rotary Park (ie just south of the southern extent of the study area; the pergola has since been removed). The extent of the PAD is shown in Figure 3.90 below, and extends into the southwestern corner of the study area. The PAD is listed as site 45-3-3340 (Dane Drive PAD) on AHIMS.

As discussed above, the area of PAD has since been reduced following archaeological investigation of deposits within the public reserve area by GML in 2024. The area of PAD west of the intersection of Mann Street and Dane Drive (ie within the study area) should be considered not to be PAD on the basis that the soil profile in this area comprises historical fills overlying estuarine sediment.

Figure 20. Area of identified PAD (shaded blue). The original shoreline is marked blue.

Figure 3.90 Extent of the Dane Street PAD (shown in blue). (Source: AHMS 2007, Figure 20)

Gosford CBD Sewer Upgrades—Aboriginal Cultural Heritage Assessment Report—McCardle Cultural Heritage, 2020

McCardle Cultural Heritage (MCH) prepared an Aboriginal cultural heritage assessment report (ACHAR) for sewer upgrade works, which extend from the Gosford Leagues Club field to the east of the study area, west to Frederick Street near Creighton Lane. The works alignment extends through the present study area.

MCH's predictive model suggests that within the investigation area, shell middens and stone artefacts may have been present along the original foreshore and within 50 metres of the shoreline. However, MCH concluded that based on examination of historical plans, much of the investigation area—including most of the present study area—comprises fill material associated with reclamation along the Gosford foreshore, and as such would not hold Aboriginal archaeological sensitivity. This included part of the area associated with Dane Drive PAD (45-3-3340), ie the public reserve within the present study area.

No new Aboriginal sites were identified during survey of the sewer upgrade investigation area. Overall, the investigation area was found to have low to no potential for in situ Aboriginal archaeological deposits due to the extent of land reclamation and impacts from modern land use (ie construction of roads, parks, infrastructure and utilities).

The MCH ACHAR noted the discrepancy regarding the location of the Dane Drive PAD (45-3-3340); however, the PAD was found to be outside of MCH's investigation area. No detail of this location was provided.

MCH concluded that no Aboriginal sites were situated within the investigation area, and that no further investigation (ie Aboriginal archaeological test excavation) or Aboriginal Heritage Impact Permit (AHIP) were therefore required for the works to proceed.

Leagues Club Field, Gosford—Heritage Impact Statement and Aboriginal Due Diligence Assessment—GML, 2019

GML prepared an Aboriginal Due Diligence assessment for the Gosford Leagues Club field, located immediately north of the study area, across Vaughan Avenue. The Leagues Club field is situated within a very similar landscape context to the present study area, located on the Brisbane Water shoreline. Despite being mapped as situated within disturbed terrain, geotechnical investigation identified soils consistent with Wyong or Woy Woy soil landscapes. These comprised a dark brown / dark grey to black silty sand deposit, identified at approximately 0.7–0.9 metres Australian Height Datum (AHD), beneath capping fill layers. This deposit was thought to correspond to the former tidal foreshore mudflats. Shell was observed during geotechnical testing in a sandy deposit beneath capping fill (and in some instances beneath the sandy silt layer interpreted as remnant Wyong or Woy Woy soils), which was interpreted as natural shell beds.

The study area was assessed as comprising two areas: the remnant foreshore to the east; and the former foreshore littoral zone (ie periodically inundated) and previously permanent lands that would have been beneath the low tide mark to the west. Within the remnant foreshore area, the study area was determined to have moderate archaeological potential for shell midden and artefact sites below 1 metre AHD depth, within natural soil profiles capped by levelling fills. Within the periodically to permanently inundated zone, archaeological potential was found to be low, because though this area may have been used for resource gathering, it would not have been occupied on a more permanent basis.

26–32 Mann Street, Gosford—Aboriginal Cultural Heritage Assessment Report—AMAC, 2020

AMAC prepared an ACHAR, including test excavation, for the 26–32 Mann Street site, located immediately north of the study area, across Vaughan Avenue. Geotechnical testing was conducted, which indicated that much of the site comprised fill associated with late 1930s land reclamation. Two borehole locations in the southeast of the site encountered intact soils, comprising brown silty clay topsoil overlying dark brown fine to medium grained clayey sand alluvium in the first location, and brown silty clay topsoil overlying grey-brown sandy clay with traces of sand and silt alluvium in the second.

Archaeological test excavation was proposed within the area of the intact soils identified during geotechnical investigation. Testing involved excavation of six 50-centimetre by 50-centimetre test units (TUs) situated within the southeastern portion of the investigation area. Three additional proposed TUs were abandoned due to disturbance. Three of the six excavated TUs comprised fill directly overlying the B horizon. The remaining three TUs encountered disturbed natural soils. All three locations had an overlying historical fill layer. Where present, the A_1 was disturbed or mixed, and tended to comprise a sandy loam. The A_2 tended to comprise a yellow-brown sandy loam, and overlay a brownish yellow to brown sandy clay to heavy clay B horizon.

Overall, the site was found to have been subject to a high level of disturbance. No Aboriginal objects were identified during testing, and the site was determined to hold nil to low archaeological significance.

The western portion of the site was found to be fully reclaimed, with over 1 metre of fill imported for land reclamation. The eastern slope of the site, however, was determined to hold potential for intact natural soils, which may contain Aboriginal objects associated with registered site 45-3-3699.

3.4.4 Local landscape context

The purpose of this section is to provide environmental contextual information for use in developing a predictive model of Aboriginal site locations in or near the study area. Interactions between people and their surroundings are of integral importance in both the initial formation and the subsequent preservation of the archaeological record. The nature and availability of resources, including water, flora and fauna, and suitable raw materials for the manufacture of stone tools and other items had—and continues to have—a significant influence over the way in which people use the landscape.

Alterations to the natural environment also impact on the preservation and integrity of cultural materials that may have been deposited, while current vegetation and erosional regimes affect the visibility and detectability of Aboriginal sites and objects. For these reasons, we consider the environmental context in detail.

Hydrology

The study area is situated on the foreshore of the Broadwater, within the wider Brisbane Water. Brisbane Water is an open entrance estuary dominated by tidal movements, and connected to Broken Bay to the south.

Historical images (see Section 2) indicate that mudflats characterised the shoreline of the late nineteenth and early twentieth centuries. It is likely that prior to development, small first-order streams were present within and in the vicinity of the study area. Based on historical plans and an examination of intact contour lines, it is likely that a first-order

watercourse descended the highpoint adjoining Mount Mouat through the southeastern portion of the study area, while a second low-order watercourse would have entered the Broadwater approximately 260 metres north of the study area (Figure 3.91).

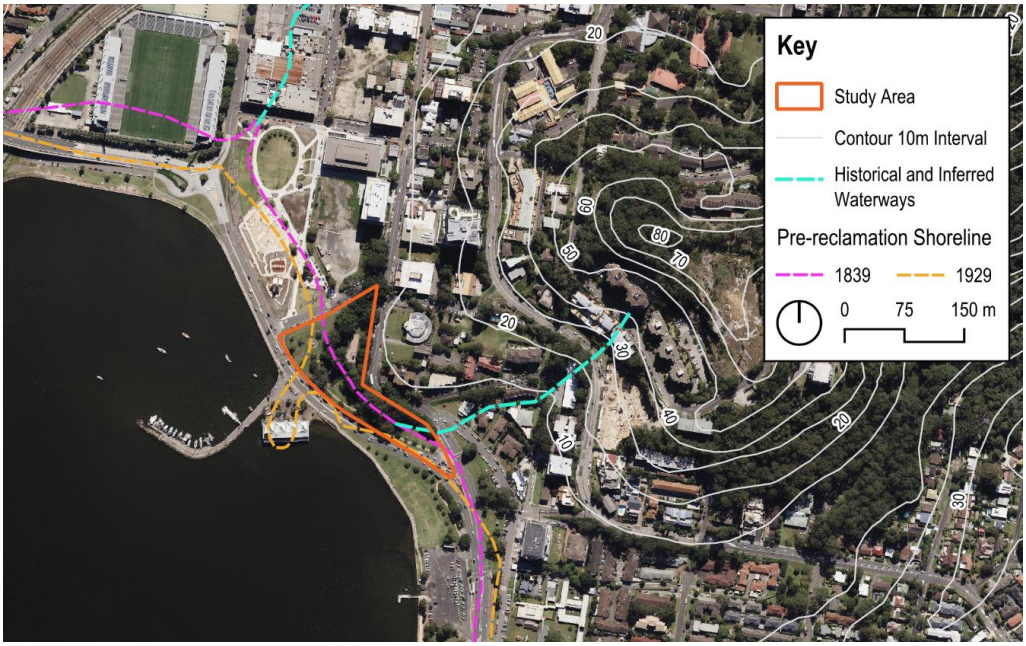


Figure 3.91 Hydrology of the study area and surrounds. (Source: SIX Maps with GML overlay)

Geology and soils

Geological mapping indicates that the study area comprises anthropogenic deposits to the west, associated with 1930s land reclamation. This material likely overlies the estuarine clay, silt and fine-grained quartz lithic sand deposit that underlies the Brisbane Water. The reclaimed land is primarily located at a height of approximately 2 metres AHD. The eastern portion of the study area overlies fine-grained quartz lithic sandstone of the Burralow Formation. Soil landscape mapping[5] indicates that the study area consists entirely of disturbed terrain, in this instance resulting from land reclamation.

Archaeological investigation of adjacent sites (Section 3.4.3) has indicated that areas of remnant natural soils may persist within areas mapped as disturbed terrain. These soils have tended to appear consistent with Wyong soils, and were interpreted as a component of the original shoreline.

The Wyong is an alluvial soil landscape that may be found in association with floodplains and deltas adjacent to Brisbane Water, overlying estuarine deposits.

Where Wyong soils overlie estuarine deposits in or near tidal areas, soils are generally deep (100 centimetres to less than 150 centimetres), very poorly drained Sulphidic Extratidal Hydrosols. Should the study area retain areas of intact or remnant soils, these are likely to be Wyong soils.

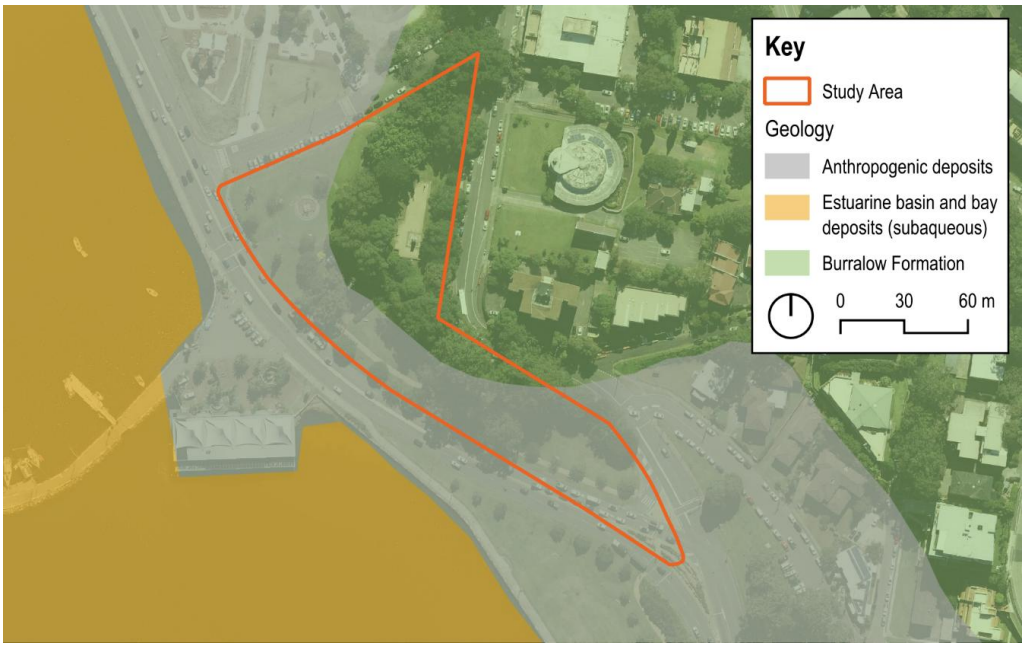


Figure 3.92 Geomorphology of the study area and surrounds. (Source: State of New South Wales and Department of Regional NSW with GML overlay 2024)

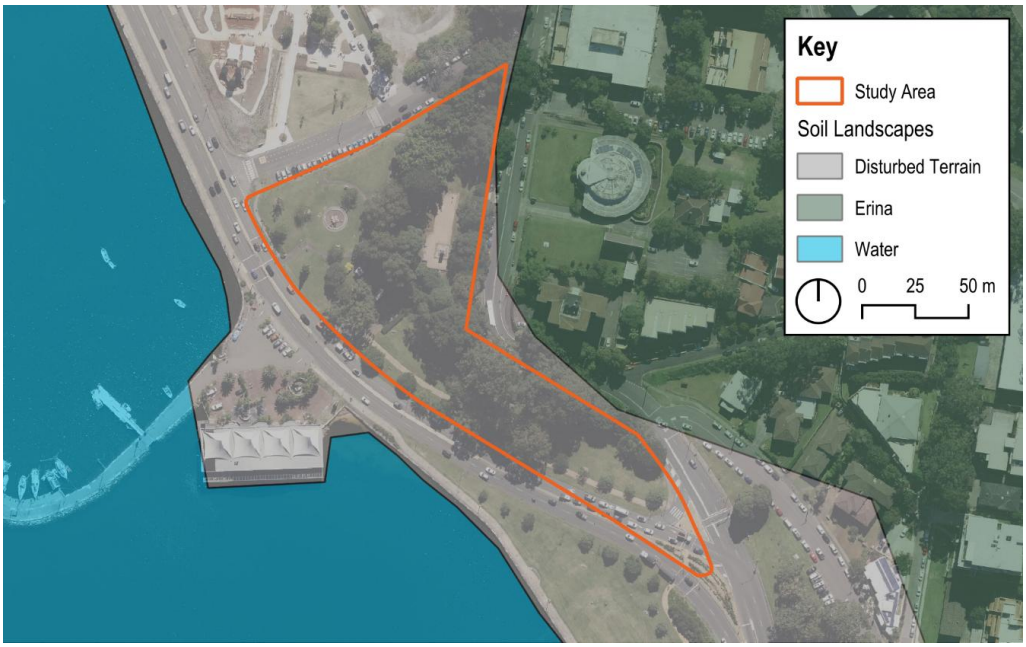


Figure 3.93 Soil landscapes of the study area. (Source: NSW Department of Climate Change, Energy, the Environment and Water with GML overlay 2024)

Landforms

The study area is situated at the base of a local high point to its east, connected to Mount Mouat by a saddle. The study area is situated at the base of the slope of this hillock, where the landform meets the Broadwater. The study area has extremely low relief (2–10 metres AHD). It is partially situated over reclaimed land to the west, which is predominantly flat, with a height of approximately 2 metres AHD, and level (~1%) slope. In the late Holocene (the last 1,000 years) this area would have comprised tidal mudflats, and has since been raised to accommodate the park and adjacent Dane Drive. The study area slopes sharply up to the east along a low cliff line, likely marking the original shoreline above the high water mark. This portion of the study area has a steeper average slope of approximately 8%, forming a gently inclined slope. Contour lines demonstrate these landforms and slopes, as per Figure 3.94.

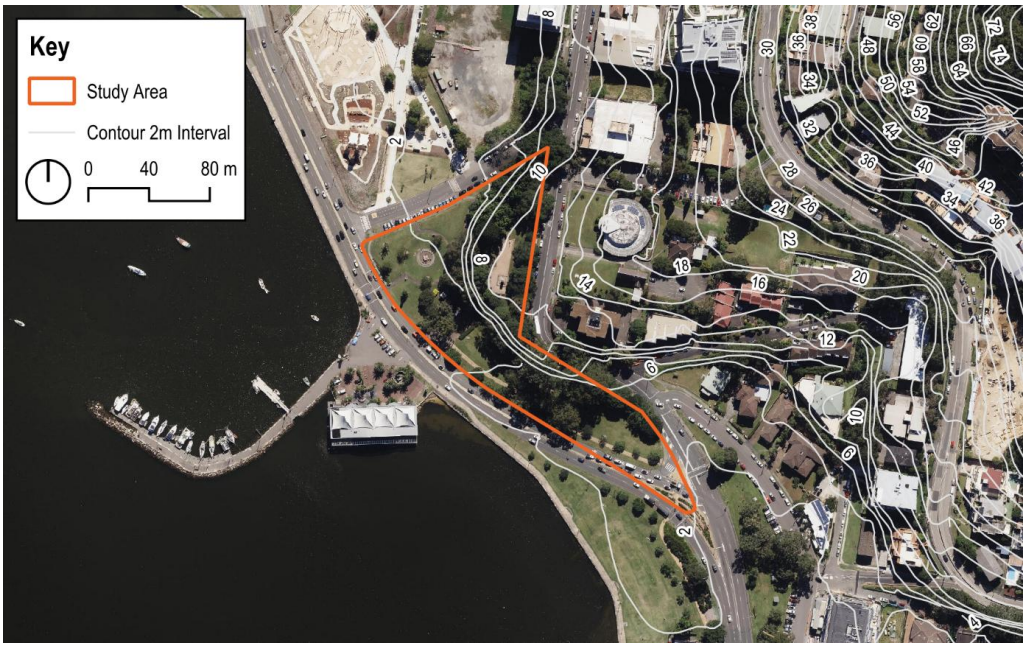


Figure 3.94 Topography of the study area. (Source: NSW Department of Climate Change, Energy, the Environment and Water with GML overlay 2024)

Ecology

Prior to land clearing, it is likely that the study area contained vegetation associated with the Grey Mangrove-River Forest and Coastal Creekflat Layered Grass-Sedge Swamp Forest plant community types (PCTs).[6] The Grey Mangrove-River Forest PCT consists of mangrove swamp saline wetlands on tidal flats, and would have supported mangrove open forest. The Coastal Creekflat Layered Grass-Sedge Swamp Forest PCT comprises coastal floodplain wetlands on low-lying alluvial soils, and would have supported tall sclerophyll open forest. Key vegetation species would likely have included Swamp Mahogany (*Eucalyptus robusta*), Forest Red Gum (*Eucalyptus tereticornis*), Cabbage Gum (*Eucalyptus amplifolia*), and Narrow-leaved Paperbark (*Melaleuca linariifolia*).

Mudflats along the foreshore would have also provided access to marine resources including fish and shellfish within the Broadwater.

The ecological communities present in the study area and surrounds would have provided ample flora and fauna resources utilised by First Nations people for food, medicine, and raw materials.

3.4.5 Predictive statements and summary of Aboriginal archaeological sensitivity

Due to its foreshore setting, the study area is most likely to be associated with artefact (including PAD) and shell (midden) sites. The portion of reclaimed land in the western part of the study area is unlikely to yield Aboriginal objects, and any Aboriginal objects contained within reclaimed deposits would not be in their original contexts. This zone is ascribed very low to no Aboriginal archaeological potential.

The remainder of the study area forms a portion of the original foreshore, and holds sensitivity for artefact sites and shell sites, as indicated by the presence of shell site 45-3-4824. This portion of the study area has been subject to disturbance associated with land/vegetation clearing, installation of subsurface services, and installation of a number of war memorials within the study area, the most expansive being the Gosford Cenotaph. These works would have resulted in localised impacts to the soil profile, reducing the soil integrity and condition within these locations, which may have impacted the potential of these deposits to retain Aboriginal objects. This zone is described as holding low to moderate Aboriginal archaeological potential. The Aboriginal archaeological zoning plan is shown in Figure 3.95.

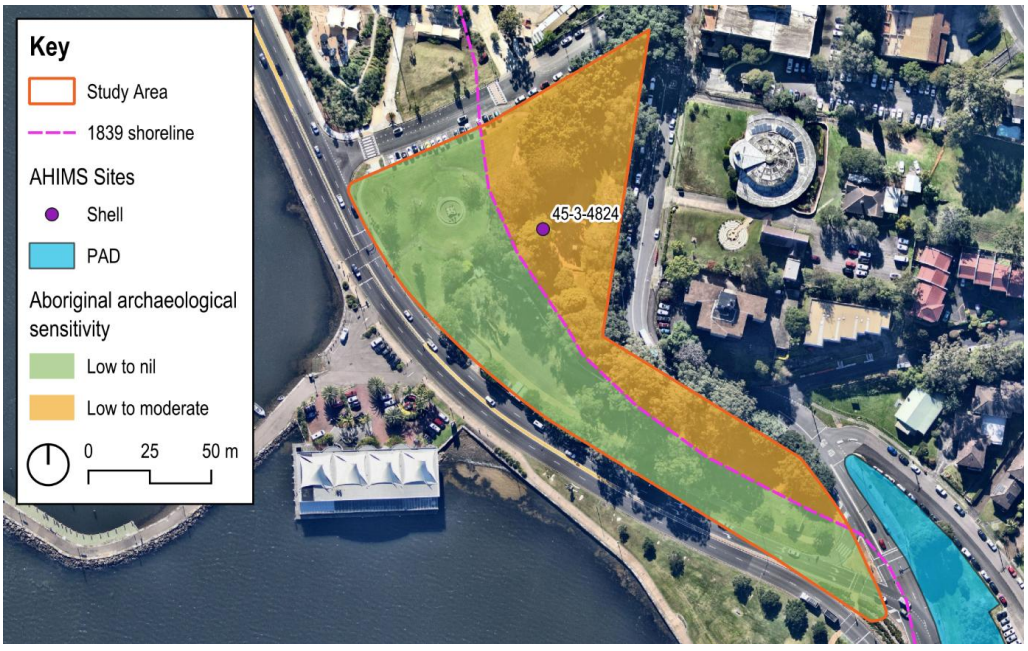


Figure 3.95 Aboriginal archaeological zoning plan, showing the areas with Aboriginal archaeological potential, and associations with AHIMS sites. (Source:Heritage NSW AHIMS, with Nearmap data and GML overlay 2024)

3.5 Historical archaeological potential and significance

The historical archaeological resource of the Gosford Memorial and Rotary Parks relates to material remains, including features, artefact deposits and landscape evidence, that were generated during occupation and use of the study area over the past ~200 years. The following desktop assessment of historical archaeological potential is based on examination of historical information related to the development and occupation of the study area (outlined in Section 2), current site conditions and previous disturbance.

3.5.1 Terminology

The term 'archaeological potential' refers to the likelihood that a site may contain physical evidence, including features, artefact deposits and landscape evidence, related to an earlier phase of occupation, activity or development. This term is different from 'archaeological significance' and 'archaeological research potential', which are more subjective statements related to the value of the archaeological resource in terms of its level(s) of significance.

Archaeological potential is usually assessed as nil, low, moderate or high, which are defined as follows:

- Nil—no known historical activities that would have left an archaeological signature. Previous construction, or other activities, have removed all archaeology.
- Low—it is unlikely that archaeological evidence associated with this historical phase or feature survives. Archaeological remains are likely to have been subject to a high level of previous disturbance.
- Moderate—it is possible that some archaeological evidence associated with this historical phase or feature survives. Archaeological remains may have been subject to some previous disturbance.
- High—it is likely that archaeological evidence associated with this historical phase or feature survives. Archaeological remains are likely to be intact, because the level of site disturbance appears to be minimal.

Archaeological features and 'relics' in NSW are defined as being of either local or state significance.

3.5.2 Historical development of the study area

The following phases of historical development are relevant in understanding the archaeological potential of the study area.

- Phase 1: Early Gosford township, 1839–1880s;
- Phase 2: Establishment of the park and Gosford Wharf, 1886–1920s; and

- Phase 3: Gosford Memorial Park and Rotary Park, 1924–present.

3.5.3 Assessment of historical archaeological potential

Phase 1: Early Gosford township, 1839–1880s

The 1839 plan of Gosford shows the study area as vacant land along the foreshore, approximately half of which was within the intertidal and tidal flats of Brisbane Water (Figure 3.96). By 1841, a government wharf had purportedly been built at the end of Mann Street; however, there are no surviving plans or illustrations that depict this wharf or its location. Plans from the 1880s show that part of Gertrude Place extended into the study area (Figure 3.97, Figure 3.98).

Potential remains associated with the early township of Gosford could include levelling fills associated with the construction of the early government wharf (if located in the study area), early roadways and ephemeral use of and activities in the study area such as land clearance. Structural remains associated with the stone wharf could survive, although these features would have likely been impacted by the subsequent 1880s and 1930s wharf constructions. Early foreshore deposits, if present, have potential for paleoenvironmental data such as fossil pollens that could contribute to an understanding of the former environmental conditions.

Phase 2: Establishment of the park and Gosford Wharf, 1886–1920s

Tenders were called for the construction of a public wharf and shed at Gosford in 1886, and construction was completed the following year. Early plans and photographs (Figure 2.7, Figure 2.9, Figure 2.10) depict a formed dirt track extending through the study area and to the timber wharf (Figure 3.97, Figure 3.98). The edges of the reclaimed roadway were supported by large stone ballast. From the early twentieth century a lamp post is visible along the eastern edge of the roadway (Figure 3.99).

The higher ground adjoining the public wharf was formally proclaimed ‘Gosford Park’ in 1887. Photographs suggest the study area was largely clear of vegetation until the c1890s (Figure 2.9, Figure 2.10), by which time a picket fence had been erected around the park, and several trees and flowerbeds planted. A small rotunda was also erected in the park at this time. In 1921, the original picket fence was partially removed and replaced. Other improvements to the park during this period included the erection of the Boer War Memorial (in 1902), and the new war memorial erected in memory of the Great War (in 1924) on the site of the former rotunda.

Much of the study area (principally what is now Rotary Park and Waterfront Reserve) remained within the intertidal and tidal flats of Brisbane Water until the 1930s.

Remains such as evidence of land clearance, early plantings, former fence lines (postholes), garden beds and paths are likely to have been disturbed by the subsequent development of the park. Archaeological evidence of the former wharf and roadway, including reclamation and levelling fills, as well as other undocumented maritime features (remnant jetties, piling, etc), boats or other watercraft, may survive under later reclamation fills.

Figure 3.96 Undated photo showing Gosford Wharf (red arrow); view to west. The higher ground of 'Gosford Park' is to the left of the image. Much of the study area remained within the intertidal and tidal flats of Brisbane Water. (Source: Central Coast Council, 001\001872, with GML overlay 2024)

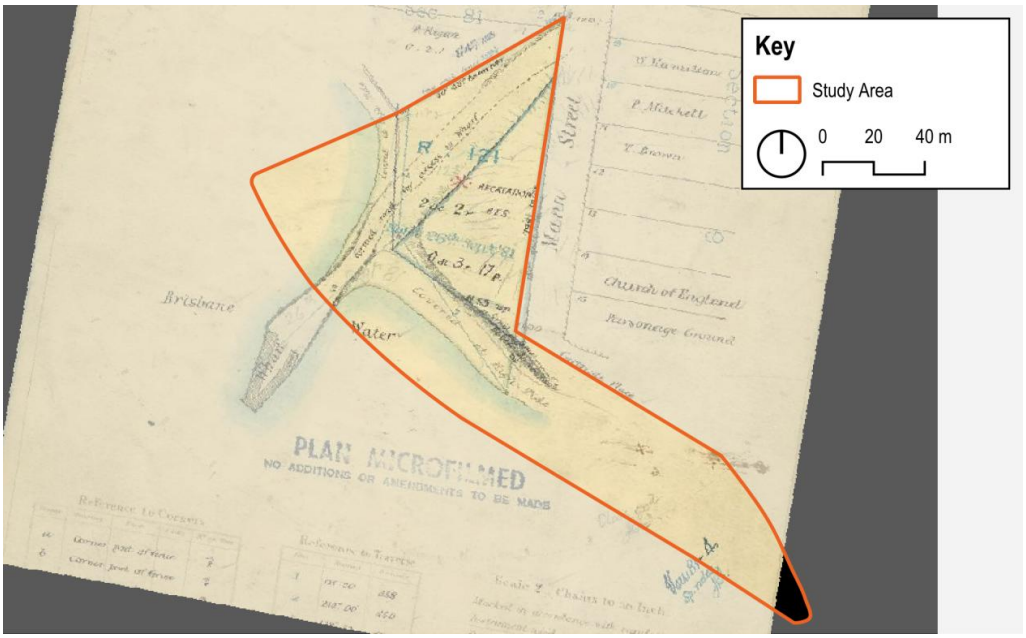


Figure 3.97 Detail of the 1881 plan for the proposed public wharf. (Source: NSW Land Registry Services, Crown Plan 38-2071, with GML overlay 2024)

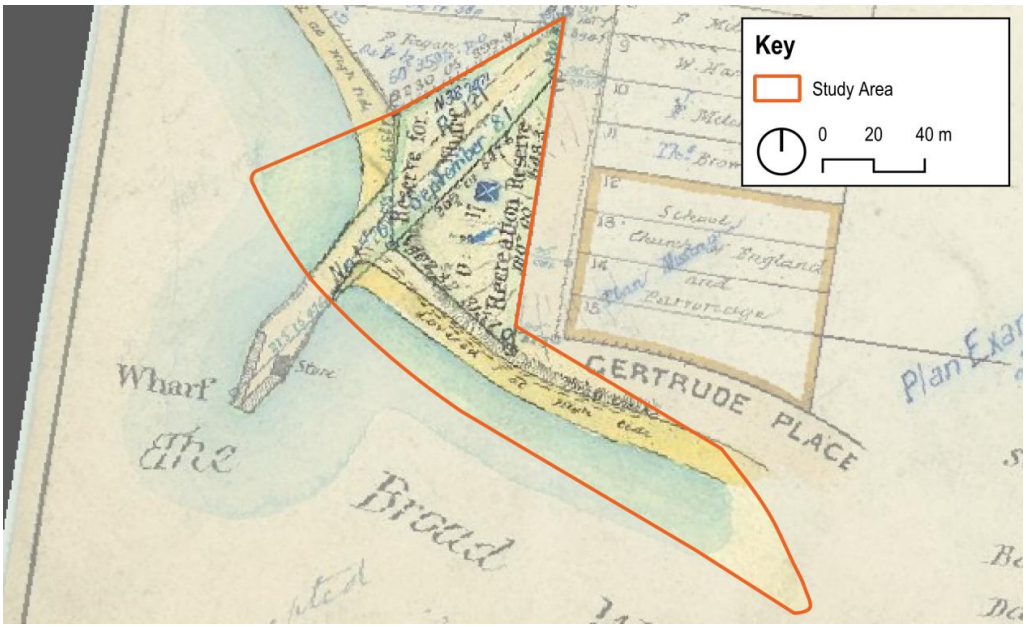


Figure 3.98 Detail of the 1884 plan showing the early foreshore and alignment of Gertrude Place. (Source: NSW Land Registry Services, Crown Plan 59-2071, with GML overlay 2024)

Figure 3.99 Detail from a c1905–1910s photograph by Broadhurst, showing the large stone ballast lining the road leading to the wharf, and a lamp post on one side. (Source: SLNSW, PXA 635/313)

Phase 3: Gosford Memorial Park and Rotary Park, 1924–present

By the 1930s, the wharf had been subject to several repairs, and the road graded. In 1937, the foreshore in the vicinity of Gosford Memorial Park was reclaimed (Rotary Park and Waterfront Reserve), and a new wharf and stone retaining seawall had been constructed (Figure 3.100).

Several other new built elements were added to the park at this time, including two galvanised iron toilets at the foot of the embankment. Sandstone steps were constructed from the memorial park to these toilets in 1949. By the late 1950s, a playground and kindergarten had been erected on the waterfront reserve adjoining the park. The 1963 Crown Plan shows additional improvements to the study area, including the location of former roads through the Gosford Waterfront Reserve and new bitumen roads (now Vaughan Avenue and Dane Drive) along the foreshore (Figure 3.100). The waterfront reserve is marked as 'level and grassed', and the site remained largely cleared of vegetation until the 1970s.

Development started on the new waterfront park (Rotary Park) below the embankment in 1975, including the construction of the foundation and memorial steps.

Archaeological deposits relating to this phase would principally be associated with the improvements to the 1880s wharf as well as its removal, the 1930s reclamation of the foreshore and construction of the extant wharf, as well as the levelling associated with the improvements to Gosford Waterfront Reserve in the 1960s and 1970s. There is some potential for structural remains associated with the construction of the kindergarten. Evidence of the various improvements to the park since the 1920s (former plantings, garden beds, layout etc) may also survive.

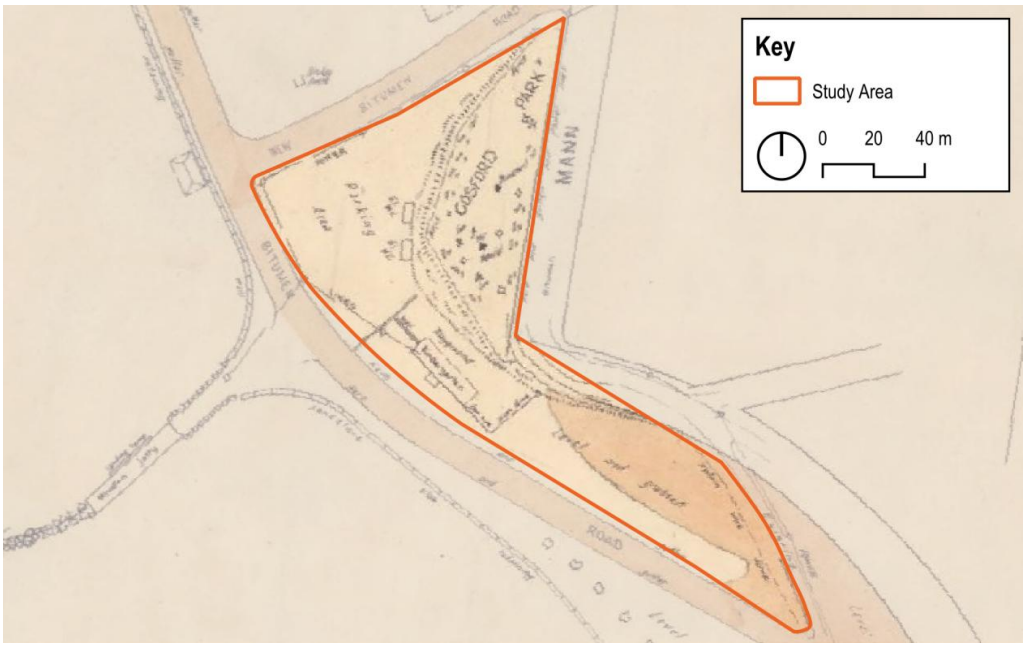


Figure 3.100 Detail of the 1963 plan showing the improvements along the foreshore. The location of former roads (Gertrude Place) through the Gosford Waterfront Reserve is tinted brown. (Source: NSW Land Registry Services, Crown Plan 7159-3070, with GML overlay 2024)

3.5.4 Summary of archaeological potential

The broad historical development of the study area is mapped in Figure 3.101. Overall, there is a low to high potential for historical archaeological deposits within the study area. The former use of the study area as a roadway and public parkland suggests the archaeological deposits relating to it will be limited. The reclamation of the foreshore during the construction of the 1880s wharf and 1930s wharf may, however, have capped earlier archaeological features along the foreshore. Historical archaeological potential is summarised in Table 3.3 and mapped in Figure 3.102.

Table 3.3 Assessed levels of archaeological potential within the study area.

Phase	Possible archaeological remains	Potential
Phase 1: Early Gosford township, 1839–1880s	• Evidence of early alterations to the foreshore. • Paleoenvironmental data such as fossil pollens. • Undocumented maritime features within reclamation fills.	Moderate to high
	• Tree boles (burnt or stumped), patches of burning and levelling fills associated with land clearing. • Structural remains of the c1840s stone wharf, including timber pylons and associated earthworks (unknown location). • Isolated artefacts and artefact scatters.	Low to moderate
Phase 2: Establishment of the park and Gosford wharf, 1886–1920s	• Reclamation and levelling fills associated with the wharf construction. • Former (unsealed) surfaces, stone ballast and other features associated with the early wharf/roadways. • Undocumented maritime features within reclamation fills.	Moderate to high
	• Postholes from 1890s fence lines. • Foundations associated with the rotunda. • Former garden beds and drainage channels. • Archaeobotanical remains (soils and pollen), evidence of improved or introduced soils, changes to soil chemical properties and to the natural topography and paths. • Isolated artefacts and artefact scatters.	Low to moderate
Phase 3: Gosford Memorial Park and Rotary Park, 1924–present	• Reclamation fill from the 1930s. • Structural remains associated with the former kindergarten building and associated gardens. • Evidence of earlier plantings, garden beds, former layout of the park, etc. • Isolated artefacts and artefact scatters.	Low to moderate

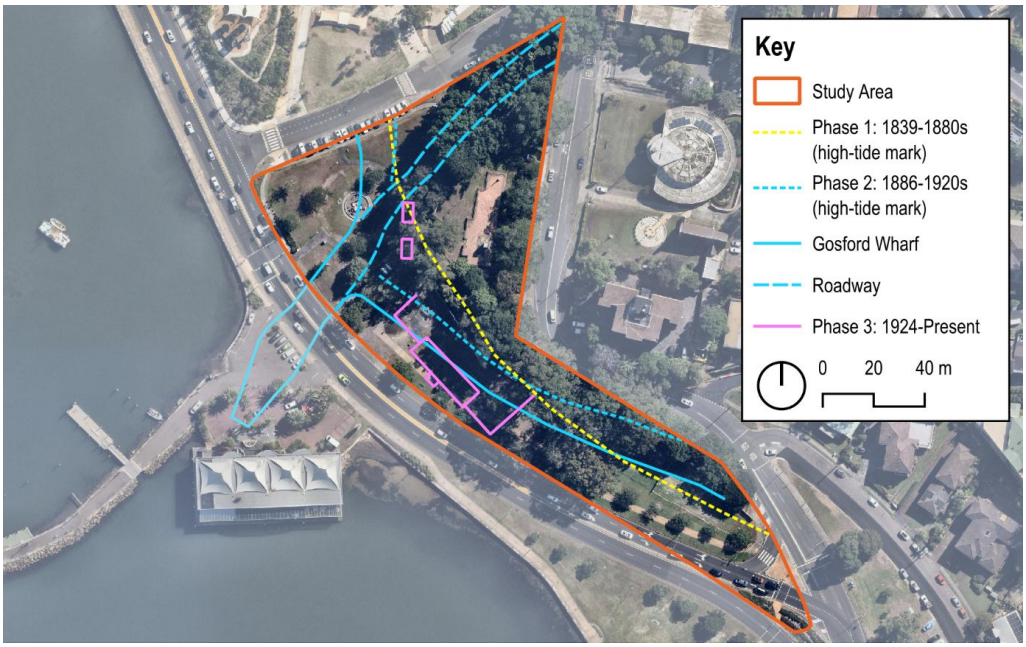


Figure 3.101 Broad sequence of historical development within the study area, showing the 1880s wharf and early shoreline. (Source: Nearmap with GML overlay 2024)

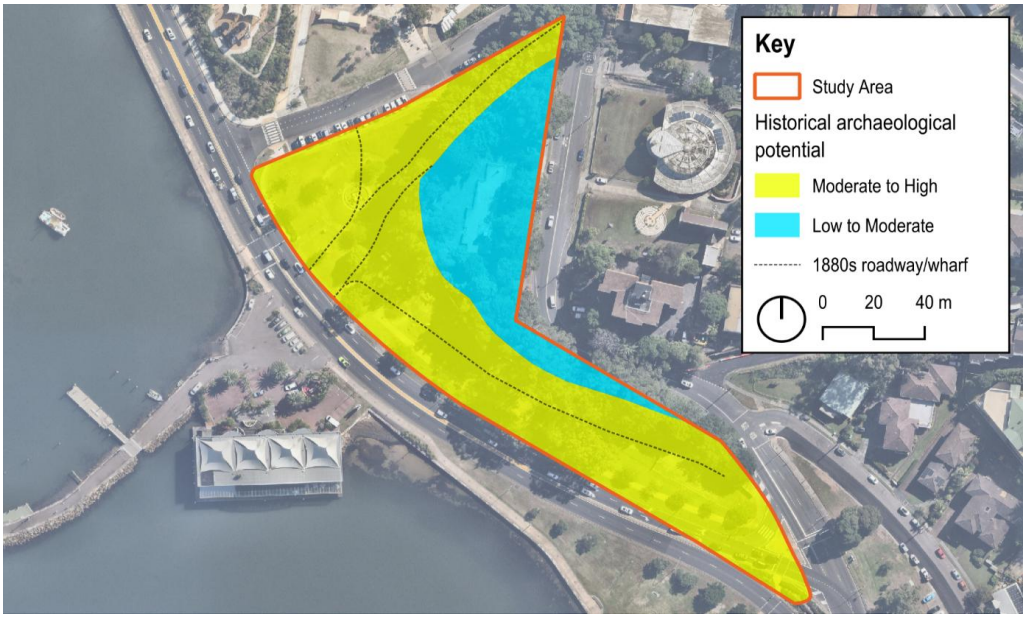


Figure 3.102 Historical archaeological potential mapping. (Source: Nearmap with GML overlay 2024)

3.6 Endnotes

[1] Heritage NSW, State Heritage Inventory, 'Kariong Sacred Land', NSW Government, accessed 1 May 2024 <https://www.hms.heritage.nsw.gov.au/App/Item/ViewItem?itemId=5062940>.

[2] AHMS, Dane Drive & Masons Parade Intersection Upgrade Archaeological Assessment, report prepared for Kellog, Brown & Root Pty Ltd, July 2007.

[3] Jackson, M, *Evidence of Aboriginal Midden within Gosford Memorial Park*, report prepared October 2023.

[4] Heritage NSW AHIMS, Site Card 45-3-4824.

[5] Murphy, C L and Tille P J, 1993, *Soil Landscapes of the Gosford-Lake Macquarie 1:100,000 Sheets map*, edition 1, NSW Department of Conservation and Land Management, Sydney.

[6] NSW Department of Planning and Environment, Trees Near Me, © NSW Government, accessed 1 May 2024 <https://treesnearme.app/info>.

Understanding the place—significance

4 Understanding the place—significance

4.1 Introduction

An assessment of heritage significance is conducted to establish why a place is important. The Burra Charter defines cultural significance as 'aesthetic, historic, scientific, social or spiritual value for the past, present or future generations.'[1] Significance is embodied in the physical fabric of the place, its setting and relationship to other items, the recorded associations with the place, and the response the place evokes in the community or in individuals to whom it is important.

On the *State Environmental Planning Policy (Precincts—Regional) 2021* (Precincts—Regional SEPP 2021), Gosford Memorial Park is listed as a local heritage item and Rotary Park is listed as a local archaeological site. The SHI listing also notes there is a high potential archaeological resource at Rotary Park. The SHI listings contain limited information on the heritage values of the items, particularly Rotary Park.

This section sets out an assessment of the heritage significance of Gosford Memorial Park and Rotary Park in accordance with the standard criteria identified in the Heritage Council guidelines. It provides further investigation of the Gosford Cenotaph, memorials and monuments within the study area, associations with architect Gordon Samuel Keesing, social values and potential archaeological values.

The evaluation includes consideration of the original and subsequent layering of fabric, uses, associations and meanings of the place, as well as its relationship to both the immediate and wider setting.

4.2 NSW heritage assessment guidelines

Assessing Heritage Significance: Guidelines for Assessing Places and Objects Against the Heritage Council of NSW criteria, published by the Department of Planning and Environment in June 2023, provides the framework for the assessment of significance in this report. These guidelines incorporate the five types of cultural heritage values identified in the Burra Charter into a specially structured framework, which is the format required by heritage authorities in New South Wales.

Under these guidelines, items (or 'places' in Burra Charter terminology) are assessed in accordance with a specific set of criteria. To apply the assessment criteria, both the nature and degree of significance for the place need to be identified. This is because items vary in the extent to which they embody or reflect key values and in the relative

importance of their evidence or associations. The assessment also needs to relate the item's values to its relevant geographical and social context, usually identified as either local or state contexts. Items may have both local and state significance for similar or different values/criteria.

4.3 Comparative analysis

This section examines Gosford Memorial Park and Rotary Park in the context of places with which they share key features, characteristics or historical themes, including;

- establishment of town parks;
- historical use of Araucaria species, Hill's Figs, Moreton Bay Figs and Port Jackon Figs;
- fencing of public parks;
- landscape surrounds to war memorials; and
- parks on reclaimed foreshore land.

4.3.1 Key features

Establishment of town parks

Gosford Park was one of a great swathe of public reserves established in NSW (during the second half of the nineteenth century) after the passing of Act 23, subsequently known as the *Public Parks Act 1854*. The Act made provision for the appointment of bodies of Trustees for 'the purpose of holding, managing and protecting lands created for or dedicated to purposes of public recreation convenience health and enjoyment'. Proclamations of Crown land for public recreation occurred steadily following the 1854 Act. There were 31 parks proclaimed between the 1860s and 1884. Thereafter, a period of 'park mania' set in, between 1885 to 1890. In 1885, 14 new parks were proclaimed, 40 in 1886, 98 in 1887, 25 in 1888 (the centennial year), 5 in 1889, and 5 in 1890.[2]

Parks proclaimed in 1887, like Gosford Park, included Victoria Park (Gosford), Bronte Park, Gore Hill Reserve, Lake Macquarie Park, Bulli Park, Armidale Park, Lambton Park (Newcastle) and Victoria Park (Goulburn).

The establishment of Gosford Park on a promontory of land at the end of the town's main street, and in proximity to its wharf, is emblematic of the siting and establishment of pleasure grounds abutting waterways in NSW through the end of the nineteenth century and start of the twentieth century. Many pleasure grounds, like at Clontarf, Bantry Bay and Killarney (Middle Harbour, Sydney) and Como (Georges River, Sydney) were also developed on prominent parcels of land where day-trippers accessed the sites principally by ferry. The former rotunda in Gosford Park, used for picnicking and performances, was a common feature in town parks and pleasure grounds at the end of the nineteenth century.

Many of these pleasure grounds retained a portion of their site's endemic vegetation while cultural plantings like conifers were established in efforts to 'Europeanise' these settings.

Figure 4.1 Bronte Park, Sydney, c1927. (Source: Historic Photos)

Figure 4.2 The fenced Lambton Park, Newcastle, with maturing trees, 1908. (Source: University of Newcastle, Living Histories)

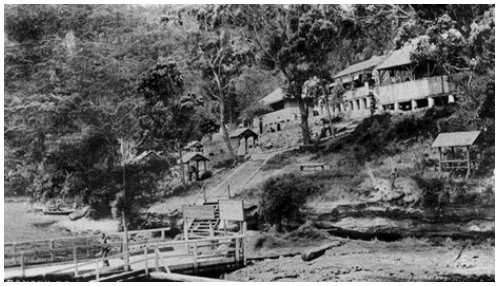


Figure 4.3 The pleasure ground at Bantry Bay, Middle Harbour, in the early 1900s. (Source: *Manly Daily*)

Figure 4.4 Killarney Point pleasure grounds on a promontory in Middle Harbour, 1928. (Source: SLNSW)

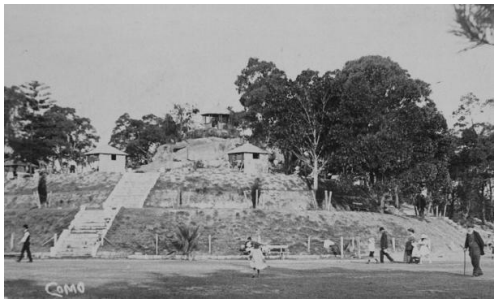


Figure 4.5 A section of Como Pleasure Grounds, c1900. (Source: Sutherland Shire Libraries)

Figure 4.6 Como Pleasure Grounds in the early 1900s, on a peninsula on the Georges River. (Source: Sutherland Shire Libraries)

Historical use of Moreton Bay and Port Jackson Figs

The mature Moreton Bay and Port Jackson Figs in Gosford Memorial Park are representative of similar avenues and landmark individual plantings made along and within prominent Sydney roads and parklands from the late nineteenth century. They are dominant visual components of street and park municipal planting schemes over the last 150 years, and Moreton Bay Figs were commonly used within grand residential estates of the nineteenth century. They were the favoured shade tree and windbreak planting. Many surviving examples of these can be seen skirting Sydney Harbour, vestiges of late Victorian garden design.

Species including Moreton Bay Figs, Norfolk Island Pines and Plane Trees were commonly specified in the first phase of street and park plantings in Sydney, NSW and elsewhere around Australia from the 1870s.

Moreton Bay Figs are found throughout Sydney's Moore Park and Centennial Park, in grand public landscapes including the Domain, and Victoria Park, Glebe, and in suburban parks like Rushcutters Bay Park and Lyne Park in Rose Bay. Moreton Bay Figs originally lined 'Lovers' Walk' in Hyde Park before being replaced by the current Hill's Figs in the 1930s. 'Plantations' of Moreton Bay Figs as per the late circa nineteenth and early circa twentieth century schemes for Anzac Parade and Cleveland Street were relatively common in Sydney, a favoured design usage of these imposing specimens. In 1847 the main public entry to the Sydney Botanic Garden from Macquarie Street was renovated and planted as an avenue of Moreton Bay Figs. A historically significant double plantation row of Moreton Bay Figs also lines Bridge Road at Wentworth Park, Glebe.

Port Jackson Figs (and Holm Oaks) were also historically used en masse as plantations in association with Moreton Bay Figs—for example, to line Federation Way between Anzac Parade and Centennial Park.

Figure 4.7 Moreton Bay Figs and Pines (in planter bays) interplanted as an avenue at Moore Park, c1872. (Source: NLA)

Figure 4.8 Interplanting of Moreton Bay Figs and Pines at Rose Bay, c1913. (Source: Woollahra Libraries, pf005514)

Figure 4.9 New South Head Road, Rushcutters Bay, 1929, showing Moreton Bay Figs (still extant). (Source: City of Sydney Archives)

Figure 4.10 Avenue of late nineteenth-century Moreton Bay Fig trees in Islington Park, Newcastle, 1949. (Source: NLA)

Historical use of Hill's Figs

Hill's Figs were a favoured tree for public landscapes from the 1920s until at least the 1960s. Good representative examples of avenues of Hill's Figs can be found in Sydney's CBD and eastern suburbs—including in Sussex Street (CBD), Art Gallery Road (CBD), Darling Point Road (Darling Point), Kambala Road (Bellevue Hill) and New South Head Road (Rose Bay).

Hill's Figs were planted in association with NSW Government-financed construction of the Manufacturers Hall and Commemorative Pavilion in the (former) Sydney Showgrounds at Moore Park in 1938 (for the NSW sesquicentenary celebrations at that year's Easter Show). Hill's Figs were planted in other locations around Moore Park at roughly the same time and into the 1940s, including Dacey Street.

Lyons Road in Five Dock and Leylands Parade in Belmore in Sydney both contain Hill's Fig avenues from the late 1930s and early 1940s. The Hill's Fig corridors have a high degree of amenity, aesthetic and landmark value.

The high water table level in and around Sydney provided ideal growing conditions for the Hill's Figs' invasive root system. This characteristic of the tree was overlooked during their period of popularity and the plantings thrived to an unexpectedly massive extent. For example, those planted in front of the Mitchell Library in Macquarie Street, Sydney, have been pruned several times to contain their canopy spread. Various local councils have removed avenues of Hill's Figs because of the excessive root damage and canopy spread.

Figure 4.11 Hyde Park, Sydney, in 1930, showing the recent avenue plantings of young Hill's Figs, offset from the central north–south axis. (Source: City of Sydney Archive)

Figure 4.12 Interwar Hill's Fig planting in Wynyard Park. (Source: City of Sydney)

Historical use of Araucaria species

Norfolk Island Pines, Cook Island Pines, Bunya Pines and Hoop Pines were commonly used in large public and private landscapes in NSW from the early decades of the nineteenth century. This may have been in public parks, grand residential estates or prominent institutional settings. These Araucaria specimens were both used as individual landmark specimen trees and also in multiples, sometimes in linear formation as sentinels, say behind a beachscape, or in groves. They were also, and are currently, used as memorial trees.

There are innumerable cultural landscapes in NSW that feature Araucaria plantings. Two prominent sites that contain historic Araucarias on Brisbane Water are Gosford Park and Woy Woy Memorial Park. The single Hoop Pine remaining in Gosford Park is one of what appear to be at least half a dozen Araucarias planted on the site in the late nineteenth century. Fourteen Hoop Pines were planted as memorials at Woy Woy Memorial Park in 1927.

Figure 4.13 One of the remaining 1927-planted Hoop Pines at Woy Woy Memorial Park. (Source: TripAdvisor)

Figure 4.14 Hoop Pine planted in Wynyard Park in the late nineteenth century. (Source: City of Sydney)

Fencing of public parks

Many public parks in NSW were bordered by fences following their proclamation or dedication in the late nineteenth century. This often originally took the form of picket or paling fences (as at Gosford Memorial Park), which were commonly quite high. The purpose of these was to create aesthetic appeal, definition and an 'address', and to restrict wandering livestock.

From the very early 1900s, many local councils removed picket and paling fencing and replaced these boundary typologies with arris rail fencing, which became a standard. This change of model occurred in phases at Gosford Memorial Park during the early 1900s.

Figure 4.15 Picket fencing fronting part of King Edward Park, Newcastle, circa late nineteenth century. (Source: Hyde Family Album, SLNSW, PXA 1445)

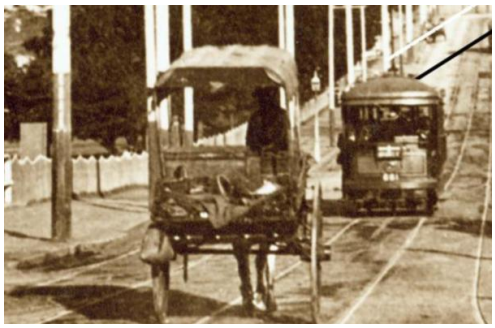


Figure 4.16 Paling or picket fencing along the New South Head Road frontage of Rushcutters Bay Park in 1907, which had been changed to arris rail fencing by the 1940s. (Source: Historic Photos)

Figure 4.17 High picket fence around Islington Park, Newcastle, in 1906. Fencing to the Maitland Road frontage of the park had been removed by the 1930s. (Source: Newcastle Regional Library)

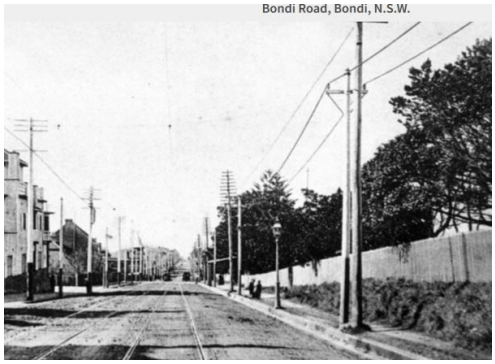


Figure 4.18 Waverley Park frontage to Bondi Road (at right) with high boundary picket / paling fence, c1910. (Source: Waverley Library)

Landscape surrounds to war memorials

There is no standard form, design and detailing for the landscape surrounds of war memorials in NSW. There are a plethora of arrangements and treatments to the immediate setting of built memorials, many of which have been altered since the original establishment of the memorial.

Most war memorials were and are purposefully set on prominent sites, in quite spartan surrounds (as at Gosford Memorial Park), so that visual and physical access to them is not hindered by streetscape, site or other park features.

Expansive paved or lawn zones normally provide the adjacent environs, and are occasionally bordered by feature trees (often columnar in form) and formal herbaceous borders with groundcovers or low shrubberies. Formal axial pathways to war memorials are a common feature of their immediate settings—as was originally planned between the Cenotaph and Boer War Memorial at Gosford Memorial Park.

Figure 4.19 North Sydney war memorial and surrounds in 1920. (Source: Australian War Memorial)

Figure 4.20 Beecroft Cenotaph. (Source: Places of Pride, National Register of War Memorials)

Figure 4.21 Kincumber War Memorial with surrounding rose beds in 1919. (Source: https://www.flickr.com/photos/gostalgia/49102825826)

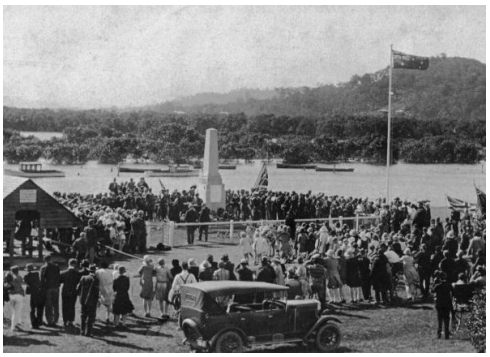


Figure 4.22 Woy Woy War Memorial in 1925. (Source: https://vwma.org.au/explore/memorials/5371)

Figure 4.23 Ballarat Cenotaph (Source: Places of Pride, National Register of War Memorials)

Figure 4.24 Maclean Cenotaph. (Source: Places of Pride, National Register of War Memorials)

Parks on reclaimed foreshore land

The reclamation of land on the Gosford foreshore in the 1930s is representative of harbour and estuarine reclamation works throughout NSW during the nineteenth and twentieth centuries for utilitarian, public convenience and 'beautification' purposes.

Reclamation of Sydney's harbours and waterways began relatively quickly after British settlement and continued throughout the nineteenth and twentieth centuries with urban and suburban expansion. Between the nineteenth and mid-twentieth century the foreshore of Sydney Harbour was transformed from its natural state by successive phases of waterfront development. Allied to waterfront development came the desire to reclaim harbour areas.

Reclamation was initially linked to the development and improvement of port facilities located on the various harbours and rivers around Sydney. The natural harbour was modified through reclamation to provide wharfage and to respond to increased sedimentation. As Sydney urbanised, and commercial trade and the economy grew, so did the rate of reclamation. Birch et al calculated that just 3.3 hectares of the Sydney Harbour estuary was reclaimed by 1835, increasing to 33.39 hectares by 1854, and quadrupling to 124.51 hectares by 1889.[3]

The heads of Blackwattle Bay and Darling Harbour were filled in, and reclamation took place along the Pyrmont peninsula, Woolloomooloo and Rushcutters Bay between the 1850s and 1880s. Reclamation schemes were more often government-initiated in this period and were subject to planning controls. The heads of many bays were filled-in to create public leisure and recreational space (including golf courses), such as at Farm Cove where a major public works program to reclaim the foreshore behind a substantial seawall took place over a 30-year period, finally being completed in the early 1880s. Reclamation of the tidal flats and bay heads was also undertaken for environmental reasons and for the prevention of disease.[4]

An archetypal model in NSW for the reclamation of harbour and river bays was the very large Rushcutters Bay scheme, occurring in the years before the proclamation of Rushcutters Bay Park in 1885 (when the first phase of ballast dyke seawall around the bay was completed). In November 1875, a deputation to the Minister for Lands requested that marsh and the head of the bay be reclaimed and used for public recreation. In 1878 an Act was passed providing for the reclamation of the bay, and 6 acres were set aside for a park. Work commenced in the same year and was completed in 1883.

Other examples include Birchgrove Park, Gladesville Reserve, Timbrell Park, Majors Bay, Meadowbank Park and various reclamation works along Parramatta River, Georges River and Port Hacking.

In the early part of the twentieth century, general 'improvement' of landforms in reclaimed bays commonly occurred to maximise geometry for public recreation grounds. This included the quarrying of and excavation in cliff-faces framing estuarine valleys. Such municipal works also commonly occurred in early road construction to enable access to topographically challenging locations.

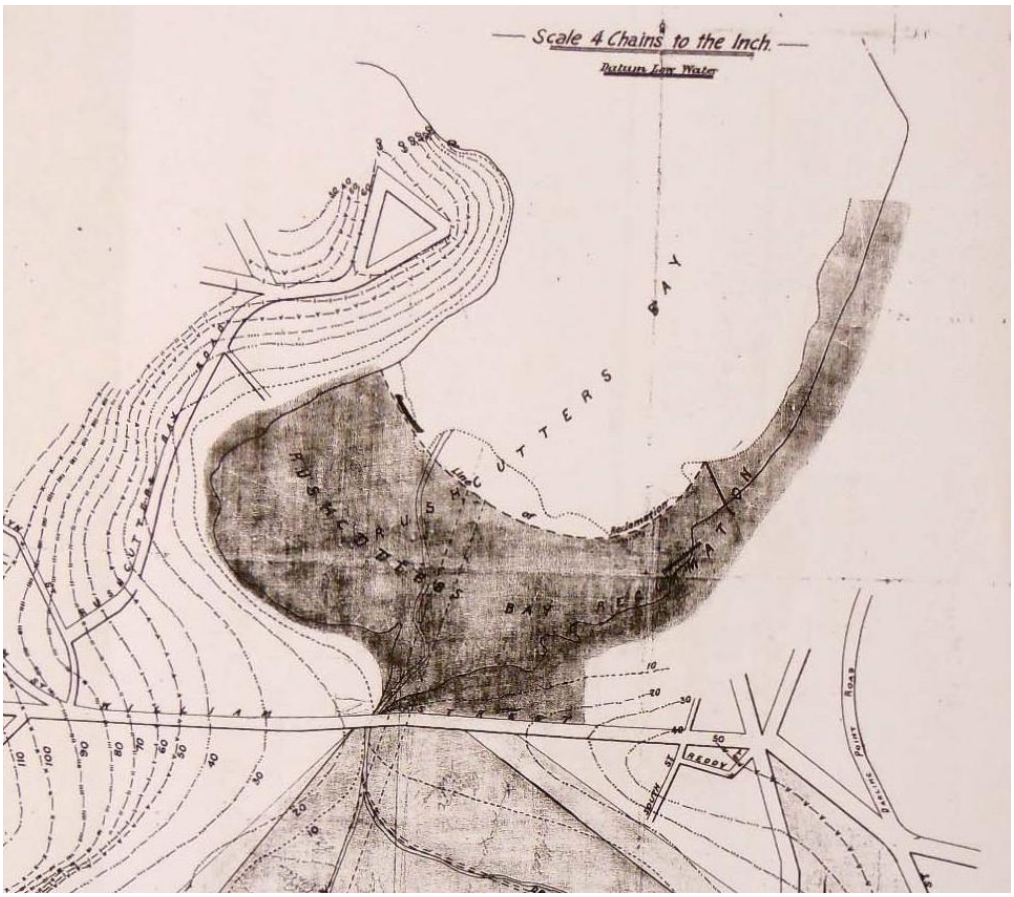


Figure 4.25 Plan c1878 showing the proposed area of reclamation (shaded zone) in Rushcutters Bay. (Source: MHNSW—State Archives Collection, Map number 730, HR250/7)

4.3.2 Local heritage items

Woy Woy Memorial Park

Woy Woy Memorial Park and wall—Brick Wharf Road, Woy Woy, NSW 2256

View of Woy Woy Memorial Park and wall, 2013. (Source: Gosford City Council)

View of one of the remaining Hoop Pines planted in 1927. (Source: Google Street View)

Date of construction: 1925–1932

Designer/maker: LH Webber, Woy Woy Shire Council Engineer (Park)

Heritage significance: Local

Listing: Central Coast Local Environmental Plan (LEP) 2022 (Item 1348)

Statement of significance

The following statement of significance is extracted from the SHI listing sheet.

> The Memorial Park is significant for its commemoration of soldiers killed in various wars, and for its aesthetic landscape qualities. There are significant trees in the Park, including Araucaria heterophylla (Norfolk island pine) and Araucaria cunninghamiana (Hoop pine)

Historical summary

The following historical summary is extracted from the SHI listing sheet.

> In the aftermath of WW1, many communities mourning the loss of so many young men and women turned their minds to permanent memorials to the fallen. In 1922 the Trustees of the Cox Estate worked a land exchange whereby they would give a rectangular block of land about 1000 feet long by 600 feet wide along the waterfront, for a narrow strip of land along Brickwharf Road. On Anzac Day 1925 Brigadier-General Alex Jobson D.S.O., unveiled the war memorial. It was not officially dedicated until 19th October 1932, when Sir Phillip Game, Governor of NSW, proclaimed 'Soldier's Memorial Park'.

Key features

The following description is extracted from the SHI listing sheet.

Woy Woy Memorial Park and wall—Brick Wharf Road, Woy Woy, NSW 2256

The Park is laid out in the form of a huge Australian flag, about 400 ft long and 130 feet wide. The Union Jack is defined as red gravel path and red flower beds; the 7 stars are flower beds edged with stone. Superimposed on the Union Jack is a raised Victoria Cross, upon which stands the memorial obelisk. Trees include Araucaria heterophylla (Norfolk island pine) and Araucaria cunninghamiana (Hoop pine) and a small steel fence line the footpath edge of the park. The remaining three sides are enclosed by a rendered brick wall, with plaques commemorating soldiers.

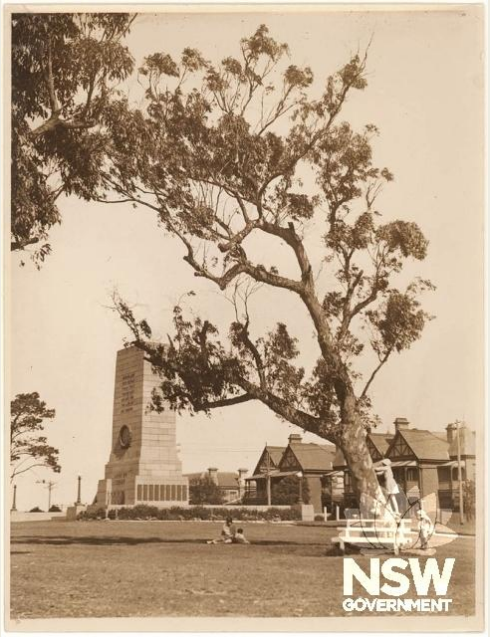
Discussion

- Woy Woy Memorial Park and wall is listed as a local heritage item for its historical, associative, aesthetic and social significance.
- Both Gosford Memorial Park and Woy Woy Memorial Park are set on a prominent site near a water source and in proximity of a town centre. Whereas Woy Woy Memorial Park retains its historical views and planting arrangement, the historical views to and from Gosford Memorial Park are largely obscured by trees.
- The proclamation of Gosford Park followed the trend of public parks established in NSW after the 1854 passing of Act 23, subsequently known as the *Public Parks Act 1854*. Woy Woy Memorial Park was officially dedicated in 1932, eight years after the unveiling of that park's war memorial.
- They both contain significant cultural plantings including Norfolk Island Pine (*Araucaria heterophylla*) and Hoop Pine (*Araucaria cunninghamiana*) that were commonly used in large public and private landscapes in NSW from the early decades of the nineteenth century. Araucaria specimens were both used as individual landmark trees and also in multiples, sometimes in linear formation as sentinels, say behind a beachscape, or in groves. They were / are also sometimes used as memorial trees.
- Woy Woy Memorial Park is laid out in the form of the Australian flag. The Gosford Memorial Park and Rotary Park do not have a distinct/rigid layout; however, there is an axial connection between the Gosford Cenotaph and the Boer War Memorial.
- Woy Woy Memorial Park and Gosford Memorial Park are associated with the commemoration of soldiers from several wars. They share similar memorials:
  - Woy Woy HMA Ships Memorial and HMA Ships 1955–1971 Far East Strategic Reserve Memorial, Gosford, are identical;
  - Woy Woy Lone Pine Memorial and Gosford Lone Pine share a similar history; and
  - Woy Woy War Memorial, a tapered sandstone pillar, and Gosford Cenotaph, a tapered sandstone block pillar, both feature inscriptions and honour rolls.
- Additional memorial plaques are placed along a rendered brick wall enclosing Woy Woy Memorial Park. Gosford Memorial Park's memorials are dispersed around the site.

North Sydney War Memorial

North Sydney War Memorial—Ridge Street, North Sydney NSW 2060

View of the war memorial, 2020. (Source: North Sydney Council)



View of the war memorial, c1935. (Source: SLNSW)

Date of construction: 1924–1926	**Designer/maker:** Frank Thorp (Peddle, Thorp & Walker)
Heritage significance: Local	**Listing:** North Sydney LEP 2013 (Item 1123)

Statement of significance

The following statement of significance is extracted from the SHI listing sheet.

> A prominent and imposing monument which occupies a significant position on Ridge Street, it is an excellent example of the Inter-War Stripped Classical style as expressed in a monumental form. Designed in 1924 by eminent architect Frank Thorp of Peddle Thorp & Walker and built in Bowral Trachyte by masons D B Acton & Co, its simple geometric design echoed Edwin Lutyens' 1917 Stone of Remembrance for the Imperial War Graves Commission and his Whitehall Cenotaph in 1920. Important local landmark that is representative of the many war memorials and monuments that were created in the years after the First World War, it is located in the major central parkland of North Sydney, St Leonards Park. Completed in 1926, the War Memorial occupies a prominent position atop a ridge at the end of Walker Street where it meets Ridge Street. See also under St. Leonards Park Group 2180911.

North Sydney War Memorial—Ridge Street, North Sydney NSW 2060

Historical summary

The following historical overview is summarised from the SHI listing sheet.

> On 11 December 1918, a meeting of North Sydney residents convened at the North Sydney Coliseum to discuss the creation of a war memorial to commemorate all those from the district who had served in the First World War. A Memorial Committee was formed to collect donations for its erection, with pledges coming from Thompson (£250) and the shopkeepers of North Sydney (£82).
>
> The committee undertook several appeals and street-collecting efforts to privately raise funds for the project, and in early 1920 the committee successfully requested North Sydney Council to grant them a site for the memorial in St Leonards Park.
>
> In early 1923 North Sydney Council initiated a public competition for designs of the memorial. Frank Thorp's winning design was for a Cenotaph in the Free Classical style, echoing the simple classical geometry of Edwin Lutyen's 1917 Stone of Remembrance and his Cenotaph in Whitehall London (1920).
>
> Frank Thorp (1903-1968), was an eminent architect most known for his work as a partner in the firm Peddle, Thorp & Walker. He was a recipient of two Sir John Sulman Medals for Public Architecture: in 1932 for his design of Science House (SHR 01578), and in 1952 for his design of the Royal Swedish Legation in Canberra. His other war memorial commission was for the Tamworth War Memorial Town Hall (1934; Tamworth LEP, I374), which was won in a 1928 public competition.

Key features

The following description is extracted from the SHI listing sheet.

> A rectangular cenotaph of lined Trachyte on a three-stepped plinth located at the top of Walker Street in St Leonards Park. This monument, with its simple restrained geometry, was designed in the Inter-War Stripped Classical style. Ornate brass lamps are on each of the four corners of the bottom step and a hedge of rosemary is at the perimeter on the eastern and western sides with two flagstaffs. Wide red bitumen paths and shrub/conifer plantings emphasise the monumentality of the structure and its vista is reinforced by a double row of Canary Island Date Palms (Phoenix canariensis). Constructed using 225 tonnes of Bowral Trachyte sourced from the Mount Gibraltar Quarries (SHR01917). Inscriptions and laurel wreaths attached to the northern and southern faces of the memorial are cast in bronze.

Discussion

- North Sydney War Memorial is listed as a local heritage item for its aesthetic significance, social significance and representativeness.
- The Gosford Cenotaph and North Sydney War Memorial are similarly located in parks near their respective city centres. While the North Sydney War Memorial retains its prominent location at the end of Walker Street, the original setting of the Gosford Cenotaph has been changed due to reclamation of the foreshore and numerous tree plantings.

North Sydney War Memorial—Ridge Street, North Sydney NSW 2060
• Both memorials were designed in the Inter-War Stripped Classical Style by prominent architects and constructed in the 1920s. • Although the North Sydney War Memorial is constructed of trachyte, whereas the Gosford Cenotaph is made of sandstone, both share common characteristics in their form, scale and bronze details. They are both atop a three-stepped plinth; however, two steps of the Gosford Cenotaph were buried during the creation of the existing podium.

Rushcutters Bay Park and Yarranabbe Park

Rushcutters Bay Park and Yarranabbe Park—New South Head Road, Rushcutters Bay NSW 2011	
View of Yarranabbe Park seawall looking south, 2022. (Source: Stuart Read via SHI)	View of Yarranabbe Park looking north, 2022. (Source: Stuart Read vis SHI)
Date of construction: 1878–1899	**Designer/maker:** Frederick Augustus Franklin
Heritage significance: State	**Listing:** NSW SHR (Item 02041)

Statement of significance

The following statement of significance has been summarised from the SHI listing sheet.

> Rushcutters Bay Park and Yarranabbe Park are state significant examples of the reservation of land for public recreation by councils in response to community lobbying. Both demonstrate the importance placed on inalienable and accessible public lands in Sydney from the mid to late-19th century and are amongst the largest harbour reclamation schemes for public recreation undertaken in the history of NSW. This broad expanse of open foreshore land, punctuated with rows of huge Moreton Bay figs form a magnificent southern boundary to this bay-side common, located beside the most densely populated area of Sydney, a place of respite from city life, and an opportunity to enjoy sweeping views of inner Sydney Harbour.
>
> Rushcutters Bay Park was designed by engineer Frederick Augustus (F.A.) Franklin, who also designed Sydney's Centennial Park. Both parks retain their structure and layout, edged by the distinctive late nineteenth-century sandstone seawall, divided in two by the storm-water canal, which formalised a natural water course in the late nineteenth century, and framed by mature Hill's and Moreton Bay Figs.

Rushcutters Bay Park and Yarranabbe Park—New South Head Road, Rushcutters Bay NSW 2011

Both parks have played a central role in the evolving landscape of leisure, sports and sports spectating in this densely-populated quarter of the city over the past 150 years and have strong, state significant associations with several sporting events, including the Sydney to Hobart Yacht Race and international boxing events.

Rushcutters Bay Park and Yarranabbe Park have research potential to inform our knowledge over Aboriginal-settler contact and possible conflict in the early colonial period and 19th century cultural interactions in inner Sydney, shifting camps and settlement, interactions with colonists and increasing suburbanisation.

Yarranabbe Park has a strong association with the Navy, from its early international engagements in the Boer War and Boxers Rebellion in China, formed as the NSW Volunteer Naval Brigade, and across the Great War and WW2, with HMAS Rushcutter stationed in the portion of the park now known as Sir David Martin Reserve from its formation in 1911.

Historical summary

The following historical summary has been summarised from the SHI listing sheet.

Rushcutters Bay has historic significance as a site of some 6000 years of Cadigal occupation and seasonal use. The Cadigal called it Kogerah and its settler name, 'Rushcutters Bay' reflects Aboriginal and settler gathering of rushes here, used respectively for light-weight spears for fishing and thatching settler huts. Yarranabbe Park is thought to be named according to the Eora name for Darling Point (Woollahra LEP), which was and is 'Yarranabbe'.

Market Gardens (1830s–70s)

The area was used for (increasingly after 1850s, Chinese) market gardens from the 1830s to the 1900s as the main source of vegetables for the colonial settlement.

Reclamation & Reservation for a Public Park (1878–83)

In 1875 Thomas Garrett, Minister for Lands, requested that action be taken to reclaim the marshlands at Rushcutters Bay. A petition was signed by 500 residents of Rushcutters Bay urging the Minister to undertake reclamation to the low water mark for the purpose of a public reserve. In 1878 an Act of Parliament reserved and dedicated 6 acres here for public recreation and to allow reclamation work. The park was proclaimed under the Public Works Act 1884 on 11 December 1885.

Park establishment (1878–onwards)

At various times, the Parks contained a cricket ground, grandstand, tennis courts, a fountain, toilets, change rooms, boatshed and kindergarten as well as other amenities.

Aboriginal resilience and occupation

The first recorded settler complaint about Aboriginal people was in Rushcutters Bay in 1895, trying to move Aboriginal people on. It failed. Darling Point Governess Harriet

Baker was part of persuading Aboriginal residents of the bay to move to La Perouse in the 1890s, perhaps in response to further complaints.

Tree plantings

Rushcutters Bay Park's significant tree plantings such as the Moreton Bay figs along New South Head Road contribute to its aesthetic value and reflect increased popular taste for using such rainforest species from the 1860s onward. Other rainforest species used in the park include Port Jackson figs that likely date to the same era. Yarranabbe Park's and Rushcutters Bay Park east's row of Hill's figs along New Beach Road define both parks' edge and reflect periods of interest in providing shade, amenity and beauty in public parks, both prior to 1890 and in the inter-war era of the 20th century.

Rushcutters Bay Ocean Baths (c1902–74)

In the early 1900s, the Sydney Harbour Trust approved construction of a number of public bathing enclosures along the harbour foreshores, reflecting the increased popularity of bathing as a pastime and rising fear of shark attack. This enclosure fell into disrepair and was eventually dismantled in 1974.

Naval associations with Yarranabbe Park (1890s–1984)

What is now called Sir David Martin Reserve in Yarranabbe Park's south has historic associations with the NSW Volunteer Naval Brigade from the 1890s until 1907 and after formation of the Royal Australian Navy (RAN) in 1911, named HMAS Rushcutter it was the Sydney Naval Depot doing reserve training until 1968. The RAN Research Laboratory (RANRL) and RANSA remained occupants of the site, with the RANRL moved out in 1984.

Yarranabbe Park sporting uses (1930s–40s)

During the 1930s various sorts of active recreation activities were proposed and occurred in Beach Road Reserve (Yarranabbe Park). These included a planned golf practice range, hockey fields, several tennis courts, an area reserved for football and provision of a concrete cricket wicket.

Sydney Stadium, Rushcutters Bay (1908–73)

A crowd of 20,000 people attended the 1908 world championship boxing match between Johnson and Tummy Burns. It was also used for music and stage productions and for over half a century was an important part of Sydney's popular culture. The Stadium was demolished in 1973 to make way for the overhead section of the Eastern Suburbs Railway. Its former site is marked by a plaque.

Peace Day, 19 July 1919

The end of World War 1 saw widespread celebration, including 'Peace Day' on 19 July 1919. In the afternoon there was a regatta on the harbour, a naval and military tournament at the Show Ground and various sporting matches at the Cricket and Sports Grounds. In the evening, city and harbour were lit by floodlights. Bonfires were

Rushcutters Bay Park and Yarranabbe Park—New South Head Road, Rushcutters Bay NSW 2011

lit, warships performed a searchlight display and there was a fireworks display from Garden Island. Later that evening, the Stadium at Rushcutters Bay hosted a fund raising carnival with boxing exhibitions, skipping championships, highland dancing, and massed bands.

Sailing activities

Yarranabbe Park is likely held in high regard by a broad cross-section of the sailing community, especially those involved in the Sydney to Hobart races and Sydney Olympic sailing events.

Modern and contemporary uses

On the Woollahra Municipal Council side (Rushcutters Bay Park east), large open, unenclosed spaces remain intact, framed by major mature tree plantings along the perimeters and along key walkways. The harbour wall has been heritage-listed by Woollahra Council. The children's playground, outdoor gym and kiosk are relatively new.

Various upgrades to Yarranabbe Park have occurred in recent years, including provision of and changes to the centrally-located children's playground and extension and improvement of the public footway along the sea wall to the park's northern tip (Heritage Study: Yarranabbe Park, Insite Land Solutions, 2015, 43).

Key features

The following description has been summarised from the SHI listing sheet.

This item has four major components, spread across two local government areas (Sydney City and Woollahra):

A: Rushcutters Bay Park west (Sydney City Council-run, since 1909, taking over from park trustees prior to that);
B: Rushcutters Bay Stormwater Channel (forming the local government boundary line);
C: Rushcutters Bay Park east (Woollahra Municipal Council-run since 1906, taking over from park Trustees prior to that);
D: Yarranabbe Park (Woollahra Municipal Council-run), including the Sir David Martin Reserve (run by the Royal Navy Sailing Association).

Discussion

- Rushcutters Bay Park and Yarranabbe Park are listed as one state heritage item for historic, associative, aesthetic, social and research significance as well as rarity and representativeness.
- Gosford Memorial Park and Rotary Park share some similarity to Rushcutters Bay Park and Yarranabbe Park. They were both established on reclaimed land and are both associated with successive waves of municipal park creation. Their use of Moreton Bay Figs and Port Jackon Figs represent the increased popularity of the species from 1860s onward. Avenues of Hill's Figs are used in both parks to define park edges and reflect periods of interest in

Rushcutters Bay Park and Yarranabbe Park—New South Head Road, Rushcutters Bay NSW 2011
providing shade, amenity and beauty in public parks, both prior to 1890 and in the interwar era. • Rushcutters Bay Park and Yarranabbe Park possess a rich and diverse history of use by the local community, the Navy as well as national and international sporting events. In comparison, Gosford Park and Rotary Park are specifically associated with the local community and local events.

4.3.3 International examples

Lone Pine Memorial

Lone Pine Memorial—Gallipoli, Turkey	
View of Lone Pine Cemetery and Memorial c2000. (Source: Australian War Memorial)	View of Lone Pine Memorial, undated. (Source: New Zealand War Graves Project)
Date of construction: Unknown	**Designer/maker:** Sir John James Burnet, Gordon Samuel Keesing

Historical summary

The following historical overview is extracted from Commonwealth War Graves records.

> Lone Pine was a strategically important plateau in the southern part of Anzac which was briefly in the hands of Australian forces following the landings on 25 April. It became a Turkish strong point from May to July, when it was known by them as 'Kanli Sirt' (Bloody Ridge).
>
> The Australians pushed mines towards the plateau from the end of May to the beginning of August and on the afternoon of 6 August, after mine explosions and bombardment from land and sea, the position was stormed by the 1st Australian Brigade. By 10 August, the Turkish counter-attacks had failed and the position was consolidated. It was held by the 1st Australian Division until 12 September, and then by the 2nd, until the evacuation of the peninsula in December.
>
> The LONE PINE MEMORIAL stands on the site of the fiercest fighting at Lone Pine and overlooks the whole front line of May 1915.

Lone Pine Memorial—Gallipoli, Turkey

It commemorates more than 4,900 Australian and New Zealand servicemen who died in the Anzac area – the New Zealanders prior to the fighting in August 1915 – whose graves are not known. Others named on the memorial died at sea and were buried in Gallipoli waters.

The memorial stands in LONE PINE CEMETERY. The original small battle cemetery was enlarged after the Armistice when scattered graves were brought in from the neighbourhood, and from Brown's Dip North and South Cemeteries, which were behind the Australian trenches of April–August 1915.

There are now 1,167 Commonwealth servicemen of the First World War buried or commemorated in this cemetery. 504 of the burials are unidentified. Special memorials commemorate 183 soldiers (all but one of them Australian, most of whom died in August), who were known or believed to have been buried in Lone Pine Cemetery, or in the cemeteries at Brown's Dip.

Key features

The following description is summarised from the Department of Veterans' Affairs Memorial Search 'CWGC Memorial To The Missing, Lone Pine Cemetery':

- The Lone Pine Memorial is at the east end of Lone Pine Cemetery, on the plateau at the top of Victoria Gully.
- It was designed by the Glasgow architect Sir John Burnet, the Principal Architect of the Gallipoli cemeteries and the Sydney (Auckland-born) architect Gordon Samuel Keesing.
- The memorial is a thick tapering pylon 14.3 metres high on a square base 12.98 metres wide. It is constructed from limestone mined at Ilgardere in Turkey.
- The names of New Zealanders commemorated are inscribed on stone panels mounted on the south and north sides of the pylon, while those of the Australians are listed on a long wall of panels in front of the pylon and to either side. Names are arranged by unit and rank.
- The Memorial stands over the centre of the Turkish trenches and tunnels which were the scene of heavy fighting during the August offensive. Most cemeteries on Gallipoli contain relatively few marked graves, and the majority of Australians killed on Gallipoli are commemorated here.

Discussion

- The Lone Pine Memorial and Gosford Cenotaph were designed in a similar modern aesthetic by Gordon Samuel Keesing (who was an assistant to the architect Sir John James Burnet for the Lone Pine Memorial).
- The Lone Pine Memorial is of a significantly larger scale, being located in the Lone Pine Cemetery at Gallipoli. The memorial stands on the site of the battle at Lone Pine and overlooks the front line of May 1915 as well as the trenches and tunnels of the August offensive. It commemorates both New Zealand and Australian servicemen.
- In comparison, the Gosford Cenotaph is a smaller memorial dedicated to fallen soldiers from the local district. The promontory of land it is situated on is significant for its visual connection to Brisbane Water but is not directly related to any of the conflicts it commemorates.

4.4 Discussion of significance

4.4.1 Criterion A (Historic significance)

An item is important in the course, or pattern, of NSW's cultural or natural history (or the cultural or natural history of the local area).

Item	Existing assessment
Gosford Memorial Park	N/A
Rotary Park	High (wharf, commerce)

Updated assessment for Gosford Memorial Park

Gosford Memorial Park has a high degree of historic significance as the primary public reserve (then known as Gosford Park) dedicated for the township of Gosford in the late 1880s. It is an archetype of the proclamation of Crown lands in NSW for public recreation in the late nineteenth century and significant for the site's proximity to the historical location of Gosford's first wharf.

Considerable historical value resides in the functioning of the park as a commemorative landscape from the early 1900s, with the establishment of the Boer War Memorial and later the Gosford Cenotaph. A selection of mature cultural plantings is of historic significance, dating from the first several decades of the parks' proclamation.

Updated assessment for Rotary Park

Gosford Rotary Park is of historic significance primarily in relation to the land on which it was established. It is part of an extensive municipal bay reclamation project of the 1930s. This significance also relates to the public reserve land farther east along Dane Drive.

Updated assessment (Historical archaeology)

The study area has the potential to contain historical archaeological evidence associated with the nineteenth and twentieth-century reclamation of the Brisbane Water foreshore, including remains associated with the c1840s government wharf (if located within the study area), the c1886 public wharf and the establishment of the public parkland from 1887. The study area and its potential historical archaeological resource is historically significant as the site of Gosford's first public wharf and primary public reserve. Archaeological remains associated with the nineteenth-century development of the study area, particularly evidence of early wharfage—Phase 1 (1839–1880s) and Phase 2 (1886–1920s)—would be of local significance.

4.4.2 Criterion B (Historical association)

An item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history (or the cultural or natural history of the local area).

Item	Existing assessment
Gosford Memorial Park	N/A
Rotary Park	N/A

Updated assessment for Gosford Memorial Park

The landscape establishment of Gosford Memorial Park and its refashioning during the twentieth century does not appear to have any substantial associative significance with a specific person or group. The podium at the centre of the park was built in 2000. Any associative significance of this work is considered relatively minor in terms of the history of the site since 1887.

The Cenotaph (1924) located within the Gosford Memorial Park is associated with Gordon Samuel Keesing, the Principal Australian Architect for the War Graves Unit, who designed several memorials in Australia and overseas. 'Gosford Park' pre-dates the Cenotaph, having been established in the 1880s. Keesing's involvement with the site does not extend past the immediate setting of the Gosford Cenotaph.

Other war memorials and movable items in the park have historical associations with the individuals or groups commemorated therein but not with Gosford Memorial Park as a whole.

Updated assessment for Rotary Park

The establishment of Gosford Rotary Park is associated with the local council's early twentieth-century town planning and with agitation by local progress associations for improvements to and beautification of the town's foreshore.

The design of the site is closely associated with the Rotary Club of Gosford, the oldest of its kind in the Central Coast area, which was responsible for commissioning and constructing the fountain and the connecting stair to the Memorial Park, and for the original flower bed arrangements.

4.4.3 Criterion C (Aesthetic/creative/technical achievement)

An item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW (or the local area).

Item	Existing assessment
Gosford Memorial Park	Significant open space in town centre with relationship to civic buildings and water. The mature trees within the park and its street boundaries provide an 'avenue' landscape of a comfortable scale, and frame streetscape vistas of high aesthetic and natural value, linking the city to the views over Brisbane Water and to the ridges surrounding the city.
Rotary Park	N/A

Updated assessment for Gosford Memorial Park

The aesthetic significance of the study area primarily relates to the park's siting on a prominent promontory of land above Brisbane Water and, historically, the expansive vistas afforded to park users as a result. The scenic benefits of this siting, and its proximity to the main Gosford Wharf, no doubt reflected state-of-the-art municipal planning in the 1880s. Some of this scenic value has been affected by infill plantings around the western fringe of the park since the 1930s.

Aesthetic considerations were also evidently a priority in planning for the park's composition at that time, given the installation of feature canopy and landmark specimen trees around the site's boundaries (some extant), the establishment of handsome boundary fences and deliberation concerning pathways and recreational features (such as the rotunda, now removed). Some of the existing mature trees contribute greatly to the park's aesthetic value, character and amenity.

The group of large and mature eucalypts along the southern edge of the promontory of Gosford Memorial Park are of considerable aesthetic significance due to their scale and association with the underlying landform of the place. These specimens appear to be regrowth of the endemic forest community.

A degree of aesthetic significance relates to the axial association, parallel to Mann Street, of the Boer War Memorial and the Cenotaph. The siting of these monuments on the Gosford town park is also of significance; this site was chosen due to its prominent headland setting and views from the surrounds.

The Gosford Cenotaph features typical characteristics of the Inter-War Stripped Classical style including minimal or occasional use of ornamentation and traditional detailing, symmetry, plain surfaces and blockwork.

Updated assessment for Rotary Park

The current composition of Rotary Park is not of aesthetic merit to the landscape in which it is located, nor is it of any aesthetic significance to the Gosford Memorial Park site. This also relates to the remainder of the public reserve lands along Dane Drive within this study area. While a Waterfront Reserve was gazetted for public recreation in 1942, it was

not until three decades later that the Rotary Waterfront Gardens and Fountain were completed in 1973. Although the Rotary-built stairs linking the two parks were evidently an attempt to establish a visual axis (and pedestrian connection) between the Cenotaph and the Rotary fountain, these two elements—the 'axis' and stairs—are utilitarian and perfunctory in their location, noting however the staircase is not exactly perpendicular to the Cenotaph. The stairs function as a physical connection between the two parks—this axial link directs the visual connection between the Cenotaph in Memorial Park and the Fountain in Rotary Park—however, they interrupt the natural slopes and natural heritage values of the promontory. The fabric (concrete) of the stairs is of little aesthetic or technical significance; however its axial alignment between the Cenotaph and the Rotary fountain was clearly intended.

The Poppy Project artworks which are annually displayed across the two parks (and at the front of St Mary's Anglican Church) have a high degree of aesthetic merit in and of themselves and for their development specifically for the study area.

4.4.4 Criterion D (Social, cultural and spiritual significance)

An item has strong or special association with a particular community or cultural group in NSW (or the local area) for social, cultural or spiritual reasons.

Item	Existing assessment
Gosford Memorial Park	Significant to the military and general communities as a place of memorial to various wars. Gosford War Memorial Park contains the only Boer Way memorial on the Central Coast. Trees have high social significance.
Rotary Park	Plaque commemorating European settlement placed by a service club is socially significant.

Updated assessment for Gosford Memorial Park

Tangible and intangible Aboriginal cultural heritage values contained within the study area associate First Nations people to their past, and are representative of their cultural continuity. The study area contains a registered Aboriginal site, AHIMS 45-3-4824 (Gosford Memorial Park midden). The registered Aboriginal sites within the study area, and the status of the study area as a component of First Nations traditional land, hold social significance to the local Aboriginal community. Further historical research into Aboriginal Anzac soldiers could reveal further links between the memorial and First Nations groups. There is also the potential to commemorate the frontier wars, which could similarly strengthen attachments between Gosford Memorial Park and First Nations groups.

Gosford Memorial Park is a highly valued historic place of passive recreation for local residents and visitors. The park is one of the oldest and most prominent of the LGA's recreation reserves and has a strong, demonstrated association with generations of the local community.

The park is a place of gathering for commemorating and memorialising Australia's role in several wars and is highly regarded as a venue for Anzac Day rituals and functions. The park has resonance for local individuals and groups due to the range of memorials it contains, including but not limited to the Cenotaph and the Boer War Memorial, which commemorate both Anzac soldiers more generally and individual local residents who were either killed, or played an important role, during the war, such as Sister Sumner. The Memorial Park has specific historic associational value with the history and functions of the Gosford RSL Sub-Branch. As such, the park is a part of a story that contributes to Gosford's identity and local military history.

Although these memorials (including the three memorial trees—Lone Pine, Sister Sumner and Land Army—and their associated inscriptions) are historic, such attachments are renewed through commemorative community projects for annual events such as Anzac Day. Community participation in such events strengthens its social significance as a place for communal experiences of loss, mourning and commemoration.

Updated assessment for Rotary Park

Although Rotary Park has recently been part of community memorialisation projects, historically Rotary Park and the public reserve farther east along Dane Drive have functioned as public parks. This area has some historical social value as part of a much larger 'artificial' landscape formed in the early twentieth century after years of discussion between the local council and local progress associations about the improvement and formalisation of Gosford's foreshore.

Rotary Park also has some associations with the Rotary Club for social reasons. The Rotary Club of Gosford has been involved in events at the park and is the custodian of a time capsule placed in the fountain containing items of interest to the local community and the club responsible for commissioning and constructing the fountain and the connecting stair to the Memorial Park, and for the original flower bed arrangements

These reclaimed foreshore lands are important for understanding the dramatic increase in demand for public infrastructure from the late nineteenth century through to the late 1930s, locally and throughout the state.

Contemporary social value

Contemporary social value is further discussed in Section 4.4.9 below.

4.4.5 Criterion E (Research potential)

An item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history (or the cultural or natural history of the local area).

Item	Existing assessment
Gosford Memorial Park	N/A
Rotary Park	High potential archaeological resource.

Updated assessment for Gosford Memorial Park

Gosford Memorial Park contains a registered Aboriginal site, shell (midden) site 45-3-4824. The study area situated inland of the pre-modification shoreline (ie excluding reclaimed land) retains sensitivity for subsurface Aboriginal objects, in the form of artefact and/or shell (midden) deposits. The study area holds research potential associated with the registered Aboriginal site and with areas of Aboriginal archaeological sensitivity. Further archaeological investigation may provide insight into past First Nations occupation and use of the study area, notably as a component of the late Holocene shoreline in Gosford.

Gosford Memorial Park has little potential to yield additional information that would contribute to an understanding of state history. Site investigations and further research may, however, uncover other aspects relevant to local history.

Updated assessment for Rotary Park

The reclamation of the foreshore of Brisbane Water (to establish lands on which the Rotary Park and public reserve was sited) represents a modest technical achievement for the early decades of the twentieth century but is of no particular research significance.

Updated assessment (historical archaeology)

The potential historical archaeological resource within the study area would predominantly be associated with the nineteenth and twentieth-century reclamation and could include fills (with artefacts) and reclamation structures, including evidence of earlier wharves and associated structures/features. These remains could add to our understanding of how reclamation occurred along the Brisbane Water foreshore. Artefacts and other materials contained within the fills, though not easily provenanced, may provide insights into the source of the fill material and the systems by which it was procured, transported and deposited. Remains associated with the c1840s government wharf (if located within the study area) and the c1886 public wharf and roadway could contribute to our understanding of the construction and development of these pieces of transportation infrastructure from a local industry perspective.

Archaeological remains associated with the development of 'Gosford Park' from 1887—including evidence of earlier landscaping/gardening, former structures (such as the rotunda and water tower), and artefact deposits—have the potential to yield information that could contribute to our understanding of the late nineteenth-century / early twentieth-century layout of the public reserve.

These remains are likely to have been disturbed by the subsequent development of the park and may not meet the threshold for significance.

The historical archaeological resource of the Gosford Memorial and Rotary Parks is of local significance for its potential archaeological research values. If present and relatively intact, archaeological remains of the c1840s government wharf, boats or other watercraft could meet this criterion at a local or possibly state level.

4.4.6 Criterion F (Rarity)

An item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history (or the cultural or natural history of the local area).

Item	Existing assessment
Gosford Memorial Park	N/A
Rotary Park	N/A

Updated assessment for Gosford Memorial Park

Gosford Memorial Park is neither uncommon nor rare in terms of the state's history. The park does not appear to possess endangered aspects or elements of Gosford's cultural or natural past.

The park does, however, support a rare Boer War Memorial and Cenotaph, which are exceptionally significant cultural features to the local district.

The Memorial Park's oldest cultural plantings, from the late nineteenth and early twentieth centuries, are becoming rarer in the LGA, as these historical landmark specimens reach senescence. The regrowth endemic eucalypts on the southern banks of the promontory likely have some rarity value, in terms of sites near the Gosford CBD that were subject to complete felling in the nineteenth century.

Updated assessment for Rotary Park

Rotary Park does not possess any uncommon or rare elements.

Updated assessment (historical archaeology)

If present and relatively intact, archaeological remains associated with early wharfage could meet this criterion at a local level.

4.4.7 Criterion G (Representativeness)

An item is important in demonstrating the principal characteristics of a class of NSW's (or a class of the local area's):

- cultural or natural places; or
- cultural or natural environments

Item	Existing assessment
Gosford Memorial Park	N/A
Rotary Park	N/A

Updated assessment for Gosford Memorial Park

Gosford Memorial Park demonstrates many of the principal characteristics of town parks established in the late nineteenth century in NSW. They include siting in relation to high streets, boundary demarcation, original plant palette, phases of planting design, installation of public convenience features and the inclusion of war memorials.

The Cenotaph, Boer War Memorial and other memorial plaques are representative of the many war memorials and monuments that were created in the postwar years to commemorate fallen soldiers from the local area.

Updated assessment for Rotary Park

Gosford Rotary Park and the public reserve lands to the east on Dane Drive are representative of many other foreshore parks around NSW, created partially or totally on top of reclaimed land for the purpose of public recreation. The reclamation in this part of Brisbane Water occurred during the most active period of such municipal work in Sydney and surrounding regions, between 1922 and 1955.

4.4.8 Integrity

In cultural landscape terms, Gosford Memorial Park and Rotary Park would be considered a clearly defined landscape—the former intentionally designed and then modified, and the latter an organically evolved place (its present form associated with past responses to its natural environment).

Although both parks have evolved and been modified, of note is that their broad form in terms of layout and land use has remained relatively uniform since the 1880s (Gosford Memorial Park) and the 1930s (the public reserve on which Rotary Park was established). Their layouts are clearly a product of the physical constraints and opportunities presented by the natural environment and of the modified foreshore.

Updated assessment for Gosford Memorial Park

Gosford Memorial Park's overall proportions from the time of its proclamation remain intact, as does a portion of its initial composition as a designed landscape. This is evidenced principally by the mature cultural plantings along Mann Street.

Some early fabric of the reserve was removed during design modifications to the park such as a rotunda, various forms of boundary fencing and a sandstone staircase on the western slopes.

Minor modifications of the park's composition have occurred since its first layout as a public recreation reserve including placement of additional memorials, removal of some display planting beds, the addition of a central 'podium' and inclusion of new trees. These changes have not materially impacted the ability to interpret the park's original form.

Updated assessment for Rotary Park

Rotary Park has a fair degree of integrity in its form, scale and arrangement. The central fountain remains intact although it is not currently in operation and houses the temporary Poppy Sculpture. The garden beds formerly encircling the fountain and footpaths have been removed. The park retains its sparse tree plantings, allowing reciprocal historical views from the park to the wharf and foreshore.

Updated assessment (historical archaeology)

The former use of the study area as a roadway and public parkland suggests archaeological deposits relating to the site will be limited; however, the reclamation of the foreshore during the construction of the 1880s wharf, and 1930s wharf, may have capped earlier archaeological features.

Archaeological remains associated with the early layout of the 1880s 'Gosford Park' are likely to have been disturbed by the park's subsequent development.

4.4.9 Contemporary social value

Social values are an integral part of heritage assessment and reporting. There is increased understanding that the significance of the historical environment to contemporary communities contributes to a sense of identity, belonging and place, as well as forms of memory and spiritual association. Social values are enshrined in the concept of cultural significance in key best practice heritage frameworks and guidelines, most notably the Burra Charter.

An assessment of social values typically provides information that is missing from the established or recorded understanding of that place. Social values are dynamic, often fluid and contested, elusive and intangible (and often sit in stark contrast to other more

tangible, material values). Sian Jones has called social value 'a process of valuing heritage places' rather than a fixed value category.[5]

Why are social values important?

The nature of our cities and populations are changing. Increasingly diverse communities visit, live and work in NSW. Minorities, First Nations groups, working class groups and other communities can feel underrepresented by national heritage agendas and indifferent to many sites and places on heritage lists while places of minor historical value may be of extreme importance in terms of memory, oral histories and identity.

Methods for social values assessment are drawn from the social sciences and vary depending on the site, place, item or landscape to be assessed, its scale and social context.

Outcomes from community engagement

In order to understand local community aspirations for the study area and how it is valued locally, Central Coast Council undertook meetings with a number of local groups for this CMP: the Woy Woy branch of the CWA; Gosford RSL Sub-Branch; Gosford Rotary Club; and the Heritage and Culture Advisory Committee.

Gosford Memorial Park has significance for community groups both in terms of its role as an ongoing place for commemoration and memorialisation of Australia's role in multiple conflicts, and both the Memorial Park and Rotary Park have value as a public park.

The following aspirations for the study area were noted.

Memorials

- Refurbish the Sister Sumner Memorial (and include a silhouette or photograph).
- Consider the placement of two smaller memorials on the raised gravel area that is on consecrated ground.
- The Land Army Tree plaque should be moved higher up to avoid being covered by mulch.
- Reinstate the original guns (World War I Mortar and the Howitzer).

Use

- Expand the range of uses of the study area for other commemorative events such as Victory in the Pacific Day and a day for contemporary veterans.

Interpretation

- Include more interpretation of the study area's history. Suggestions included the following:
  - QR codes with information/stories about fallen soldiers;
  - listening posts with recorded letters to parents;

- seating with audio interpretation eg stories;
- focus on Keesing and the design of the Cenotaph;
- First Nations stories and connections, such as the midden;
- plantings to symbolise conflicts: rosemary for Gallipoli and poppies for the Somme/Field of Flanders;
- the story of Rotary Park as the original wharf, and the development of the parks in Gosford;
- the story of the time capsule (to be revealed in 2088); and
- because poppies have become synonymous with the parks since the Poppy Project, consider poppies as a theme in future landscaping, events and interpretation at the parks.

First Nations connections

- Acknowledge and foreground First Nations people's connections (such as their relationship to the waterfront and celebrating Aboriginal people who went to war).

Internal development

- Explore lighting opportunities, such as a beacon at the end of Brisbane Water.
- Create more seating in Memorial Park (possibly dedicated to local organisations with a strong connection to the parks) and make current seating more accessible.

Management

- Resolve the issue of custodianship of the Cenotaph between RSL and Council (suggestions include a partnership between RSL and Council, or a clear division of responsibilities).

Maintenance

- Prune trees and vegetation to reinstate views to the south, west and to the water.
- Continue maintenance of the Cenotaph (eg address tree roots).
- Introduce less invasive species that won't damage the monuments, such as camellias.

Rotary Park

- Restore and refurbish the fountain, and reinstate the water (fundraising events to be held to achieve this goal).
- Maintain the visual connection to the water.
- Add more shelter and seating on the waterfront.
- Install a plinth to honour all service people lost from the local community.
- The wall near the steps is failing; trees need to be controlled/maintained.
- Better maintenance of vegetation along the bank is needed.

Activation

- Explore opportunities to replace the poppies with further public art (suggestions include a sculpture on a plinth in the location of the current fountain; see Figure 4.26).
- Undertake further commemorative community projects.

Figure 4.26 Gosford Rotary Club's proposed piece of public art to replace the fountain.

Contemporary First Nations connections

Due recognition of and respect for the rights and interests of First Nations communities in history and heritage are fundamental to good heritage practice. At present, understanding the ways in which First Nations people value and relate to a place typically provides information that is missing from the established or recorded understanding of that place. In NSW, statutory protection of Aboriginal heritage is predominantly focused on tangible heritage, ie archaeology.

The recognition of Aboriginal heritage values more broadly, however, is supported and enshrined in numerous key best practice heritage frameworks and guidelines, most notably in the Burra Charter. In the context of truth-telling and self-determination, it is important for First Nations people that their social and cultural values are considered and integrated into all aspects of place-making and future planning.

Council invited First Nations Groups to partake in consultation during the preparation of this CMP. Only the Guringai Tribal Link accepted the invitation and participated in a site walk in March 2024—it was identified that there were important visual connections between Memorial Park and the Kariong Ridgelines and Brisbane Water long before it was a war memorial site (see Figure 4.36).

There is an opportunity to engage further with First Nations groups to understand the social significance of the study area and the surrounding landscape for local First Nations groups and individuals, to ensure their continued inclusion in decision-making about the study area and to explore opportunities for interpretation, inclusion of native plant and trees, activation of the site and public art.

4.5 Statement of significance

Statement of significance for Gosford Memorial Park

Gosford Memorial Park is a significant cultural landscape associated with the early development of the local government area and its public recreation reserves and with the development of war memorials in the Central Coast region. At a local level, this landmark landscape and some of its features have significant historic, aesthetic and social values.

The site has been in use as a public asset for almost 140 years, and would be held in high esteem by a broad contemporary and historical community of users.

The park's aesthetic significance primarily relates to its siting on a prominent promontory of land above Brisbane Water and, historically, the expansive vistas afforded to park users as a result. Some of the existing mature trees also contribute greatly to the park's aesthetic value, character and amenity.

Gosford Memorial Park contains the Boer War Memorial (1902), the Cenotaph (1924) and many other war memorials. The park has social significance as a place for memorialising and for gathering to commemorate Australia's involvement in several wars and the local residents who were killed and/or who played an important role during those wars.

The park is associated with the Aboriginal Heritage Information Management System registered Aboriginal shell site 45-3-4824 (midden). It is a component of the wider Aboriginal cultural heritage landscape of Gosford, and holds significance to the local Aboriginal community. Future archaeological investigation into the Aboriginal sites could provide new information on the local late Holocene Aboriginal economy through study of midden (and possibly stone) materials.

The study area has the potential to contain historical archaeological evidence associated with the establishment of the public parkland from 1887. Its potential historical archaeological resource is historically significant as the site of Gosford's first primary public reserve.

Gosford Memorial Park has historical, aesthetic and social significance. It is also a fine representative example of its typology.

Statement of significance for Rotary Park

Gosford Rotary Park's significance lies principally with it being a component of an expansive 1930s municipal works project and for its association of over half a century with the Rotary Club volunteer movement and that club's extensive historical sponsorship of the development of public parks throughout Australia.

Archaeological evidence of the natural environment and reclamation of Brisbane Water—including evidence of earlier wharves and associated structures/features—demonstrate the historical evolution and pattern of development of the Gosford foreshore. The historical archaeological resource has the potential to provide new information that would supplement what is known from other documentary sources. Substantial archaeological remains, particularly artefact-bearing deposits, associated with the early maritime development of Gosford Wharf would be of local significance for their historical and potential research values and, if relatively intact, their rarity. If the remains of the c1840s government wharf, boats or other watercraft were found, they could be of local or possibly state significance for historical, technical and research potential value depending on their date of construction, intactness, and level of preservation.

Rotary Park has historical, associative and social significance. It also possesses historical archaeology research potential.

4.6 Significant components

Different components of a place may make a different relative contribution to its heritage value. Loss of integrity of components of the place may also diminish significance. Specifying the relative contribution of an item or its components to the overall significance of the place provides a useful framework for making decisions about the conservation of and/or changes to the place. Table 4.1 sets out terms used to describe the grades of significance for different components of the place, as per the former NSW Department of Planning and Environment guidelines *Assessing Heritage Significance: Guidelines for assessing places and objects against the Heritage Council of NSW criteria*. Although the guidelines do not include a 'neutral' grading, for this CMP one has been included to classify plantings that neither contribute to nor detract from the significance of Gosford Memorial Park and Rotary Park.

Overall, Gosford Memorial Park and Rotary Park have a high level of significance to the local area. Both tangible and intangible values contribute to this grading.

Table 4.1 Standard gradings of significance.

Grading	Justification
Exceptional (E)	Rare or outstanding element directly contributing to a place or object's significance.
High (H)	High degree of original fabric. Demonstrates a key element of the place or object's significance. Alterations do not detract from its significance.
Moderate (M)	Altered or modified elements. Elements with little heritage value, but which contribute to the overall significance of the place or object.
Little (L)	Alterations detract from its significance. Difficult to interpret.
Neutral (N)	An element or zone that has no contributory heritage significance to the site and its environs. Relates to contemporary elements but also to 'old' elements or areas that have no inherent historic, aesthetic, social or technical value—possibly existing in the place purely as a result of periodic accretions or routine municipal upgrades.
Intrusive (I)	Damaging to the place or object's significance.

4.6.1 Components within the study area

Significant elements within the study area are described and illustrated in the following tables and figures.

Landforms

Table 4.2 Significance grading of components within the site.

Element	Comment	Significance
Promontory landform	The landform on which Gosford Memorial Park is situated—not including various phases of relevelling.	Exceptional
Unreclaimed land	Unreclaimed land that formed part of the former Wharf Road off Vaughan Avenue.	High
Reclaimed land	1930s foreshore infill where Rotary Park and the public reserve are located.	Moderate

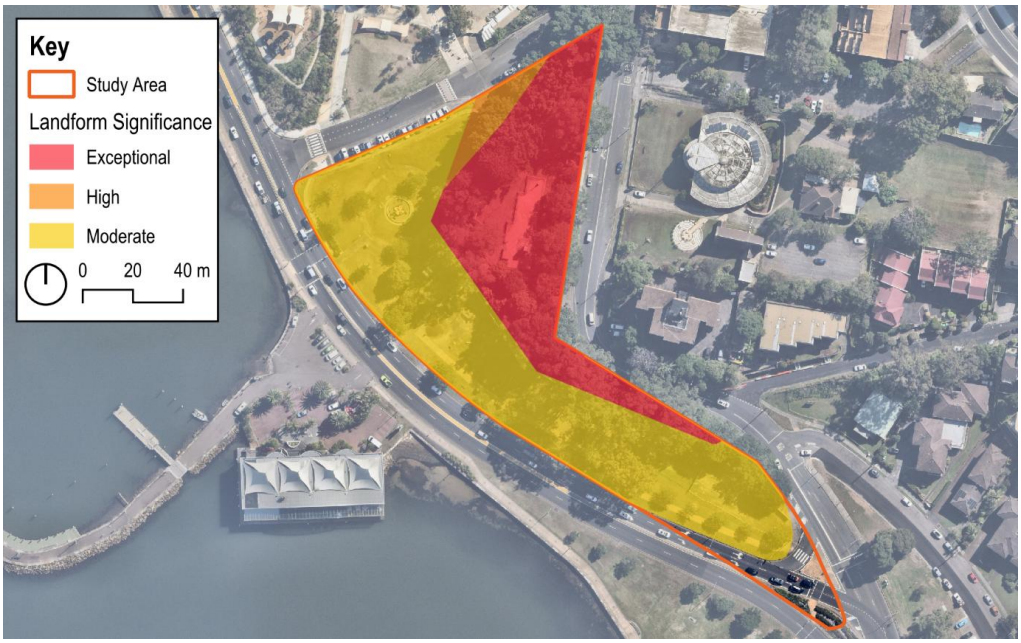


Figure 4.27 Aerial photograph of the study area showing gradings of significance of landforms. (Source: Nearmap with GML overlay 2024)

Plantings

Individual components of Gosford Memorial Park and Rotary Park have been ranked according to their significance as described in the table below.

Table 4.3 Significance grading of plantings in Gosford Memorial Park and Rotary Park.

Element	Comment	Level of significance
T1	Hill's Fig (corner of Vaughan Avenue and Mann Street).	Moderate
T2	Hill's Figs along northwestern side of Memorial Park.	Little
T3	*Livistona australis* palms along northwestern side of Memorial Park.	Little
T4	Sister Sumner Grevillea / Callistemon tree (not original specimen).	Little
T5	Various groundcovers in raised brick beds on Vaughan Avenue and Mann Street.	Neutral
T6	Groundcover zone and species surrounding National Servicemen's Memorial in northern zone of Memorial Park.	Neutral
T7	Hoop Pine (abutting Boer War Memorial).	Exceptional

Element	Comment	Level of significance
T8	Mature fig specimens fronting Mann Street.	Exceptional
T9	Brushbox west of Cenotaph.	Neutral
T10	Brushbox and eucalypt specimens south of Cenotaph.	Neutral
T11	Large shrub south of Cenotaph podium.	Neutral
T12	Lone Pine south of Cenotaph podium.	Exceptional
T13	Large Moreton Bay Fig at southern end of Memorial Park.	Exceptional
T14	Phoenix Palm abutting promontory slopes (southern end of Memorial Park).	Intrusive
T15	Broad planter beds and various groundcovers/shrubs below large southern end of Memorial Park.	Neutral
T16	Adventitious small trees, shrubs and weed overgrowth on southern slopes of promontory (south of Cenotaph).	Intrusive
T17	Casuarina groves on Memorial Park's western slopes.	Moderate
T18	Trees and groundcovers (excluding Casuarina groves) on western slopes.	Neutral
T19	Adventitious species including African Olive, Privet, Lilly Pilly and Hibiscus.	Intrusive
T20	Regrowth endemic eucalypts on southern 'cliff' of promontory.	Exceptional
T21	Jacaranda specimen.	Intrusive
T22	Fig specimens around the southern end of Mann Street.	Neutral
T23	Fig specimens along Dane Drive.	Neutral
T24	Eucalypt in reserve abutting Dane Drive.	Little
T25	Paperbark in reserve abutting Dane Drive.	Little
T26	Fig species along Dane Drive.	Neutral
T27	Paperbark group along Dane Drive.	Neutral
T28	Fig specimens along Dane Drive.	Neutral
T29	Eucalypt abutting Dane Drive.	Neutral
T30	Group of three Bottlebrush and a Paperbark.	Neutral
T31	Tuckeroo.	Neutral
T32	Three Honey Locusts around Rotary feature.	Neutral
T33	Three Norfolk Island Pines.	Neutral

Figure 4.28 Aerial photograph of Gosford Memorial Park and Rotary Park showing tree identification. (Source: Nearmap with GML overlay 2024)

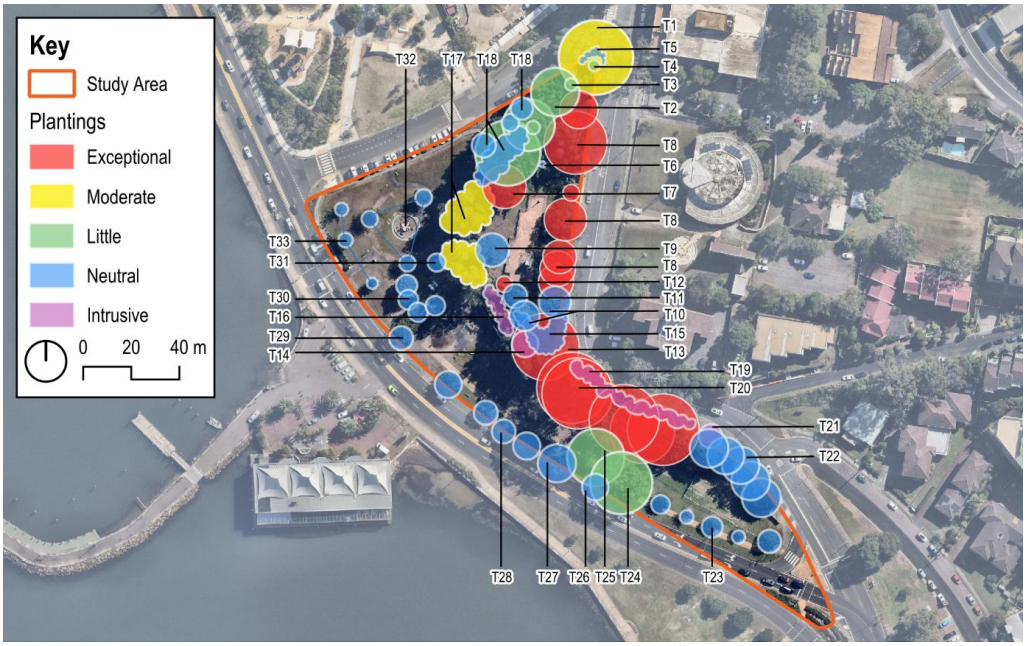


Figure 4.29 Aerial photograph of Gosford Memorial Park and Rotary Park showing gradings of significance of plantings. (Source: Nearmap with GML overlay 2024)

Landscape components

Overall, Gosford Memorial Park and Rotary Park have a high level of significance; however, their component parts have varying levels of significance.

Table 4.4 Significance grading of landscape components of the Gosford Memorial Park and Rotary Park.

Element	Level of significance
Brick stairs, brick edging and brick retaining walls (corner of Vaughan Avenue and Mann Street)	Neutral
Steel handrail to brick steps from Vaughan Avenue	Neutral
Large mulched zone across northern apex of park	Neutral
Brick edge along top of Memorial Park slopes	Neutral
Grassed finish of Memorial Park	High
Memorial Park seating	Neutral
Memorial Park light pole standards	Neutral
Flagpoles in front of the northern face of Gosford Cenotaph and adjacent to Gosford National Servicemen's Memorial (NS)	Neutral
Broad mulched beds and timber edging under figs facing Mann Street	Neutral
Cenotaph and Boer War Memorial podium	Neutral
Crushed gravel surface finish—Cenotaph / Boer War Memorial podium	Neutral
Surface level of podium (regarding original kerbing of Cenotaph)	Intrusive
Gravel surface finish and level immediately offset from Cenotaph	Intrusive
Brick edge immediately offset from Cenotaph	Intrusive
Podium faux sandstone block walls	Intrusive
Podium balustrade material	Intrusive
Brick edges to gravel podium and podium planter beds	Intrusive
Above-ground floodlighting units (and cages) abutting Cenotaph	Intrusive
Concrete footings on which gun is mounted south of Cenotaph	Intrusive
Koppers log edge-of-park barrier, south of Cenotaph	Intrusive
Axial link directing visual connection between the Cenotaph in Memorial Park and the Fountain in Rotary Park	High
Fabric (concrete) of the staircase between Memorial and Rotary parks	Little
Brick walls and planter beds to staircase between parks	Little

Element	Level of significance
Metal handrail to stair between parks	Neutral
A designed central feature (focal point) in Rotary Park	High
A circular-form Fountain	High
Orbital pedestrian path around Rotary fountain	Neutral
Pedestrian pathway along base of western slopes	Neutral
Timber edging along base of western slopes	Neutral
Landforming around sides of Rotary Park	Neutral
Light posts in Rotary Park	Neutral
Seats and concrete slab footings in Rotary Park	Neutral
Sandstone blocks and native grasses along Dane Drive	Neutral
Brick and timber-edged garden bed in front of toilet block	Neutral

Memorials and movable items

Table 4.5 Significance grading of memorial and movable items in Gosford Memorial Park and Rotary Park.

Element	Comment	Significance
Gosford Cenotaph (GC)	The Cenotaph including the three-stepped plinth partially buried, bronze plaques, lettering and insignias.	Exceptional
	The prominent siting of the Cenotaph on the headland.	Exceptional
Gosford Boer War Memorial (BW)	Marble memorial.	Exceptional
	The prominent siting of the war memorial on the headland	Exceptional
Lone Pine Memorial (LP)	The presence and location of the plaque to interpret the tree.	High
	Fabric of the plaque and plinth.	Moderate
Sister Sumner Memorial (SS)	The presence and location of the engraved stone of the Sister Sumner memorial to interpret the tree.	High
Australian Women's Land Army plaque (WL)	The presence and location of the plaque to interpret the tree.	High
	Fabric of the plaque and plinth.	Moderate
	The memorial plaque/s with inscriptions.	High

Element	Comment	Significance
Memorials not associated with cultural plantings in Gosford Memorial Park	Plinth and location.	Moderate
Ruwolt 1942 Howitzer field gun (GN)	Provenance of the field gun is unknown.	High (Moderate?)
Rotary Clubs plaque and time capsule (RC)	The location of the plaque and time capsule as well as its contents.	High
Poppy Sculpture (PS)	The location and fabric of the temporary Poppy Sculpture artwork.	Little

4.7 Views and vistas

Historically, views to Brisbane Water were possible from Gosford Memorial Park and vice versa. The locations for the Gosford Cenotaph and Boer War Memorial were chosen due to their prominence, visibility and promontory setting. Plantings along the boundary of Memorial Park were less prominent, including the Hill's Fig row on the northwestern side of the park near Mann Street allowing for views of the foreshore. Subsequent plantings have largely obscured the parks' inner area and memorials from the street and waterfront. Views to significant cultural plantings are seen from Mann Street and views to the various memorials from Mann Street, Vaughan Avenue and Dane Drive are generally obscured or inconspicuous.

Historical views to and from Rotary Park are largely retained due to the topography of the park and its surrounds as well as the sparse tree plantings. Views of Rotary Park and the public reserve show the extent of the bay reclamation.

Figure 4.30 Detail from 'Boat Haven, Gosford' photographed by Charles Kerry in the early 1900s showing Gosford Memorial Park enclosed by a picket fence, perched above Brisbane Water. The existing Hill's Figs have yet to be planted. (Source: Flickr via Trove / Image No. 34184720860)

Figure 4.31 View along Mann Street with Gosford Wharf and Gosford Park to right of roadway and Brisbane Water at far right, 1903. (Source: Central Coast Council Library Service, 003\003239)

Figure 4.32 Looking west in 1967 from the grounds of St Mary's Anglican Church on Mann Street. Views north to the foreshore zone from the memorial park remained available at the time. (Source: Central Coast Council Library Service)

Figure 4.33 Gosford Cenotaph flanked by two war trophies and two floodlight poles, post-1926. Note the expansive open views to the south. (Source: MHNSW—State Archives Collection FL3811970)

Figure 4.34 1980s view of Rotary Fountain, Dane Drive and Gosford Wharf beyond. (Source: Central Coast Council Library Service)

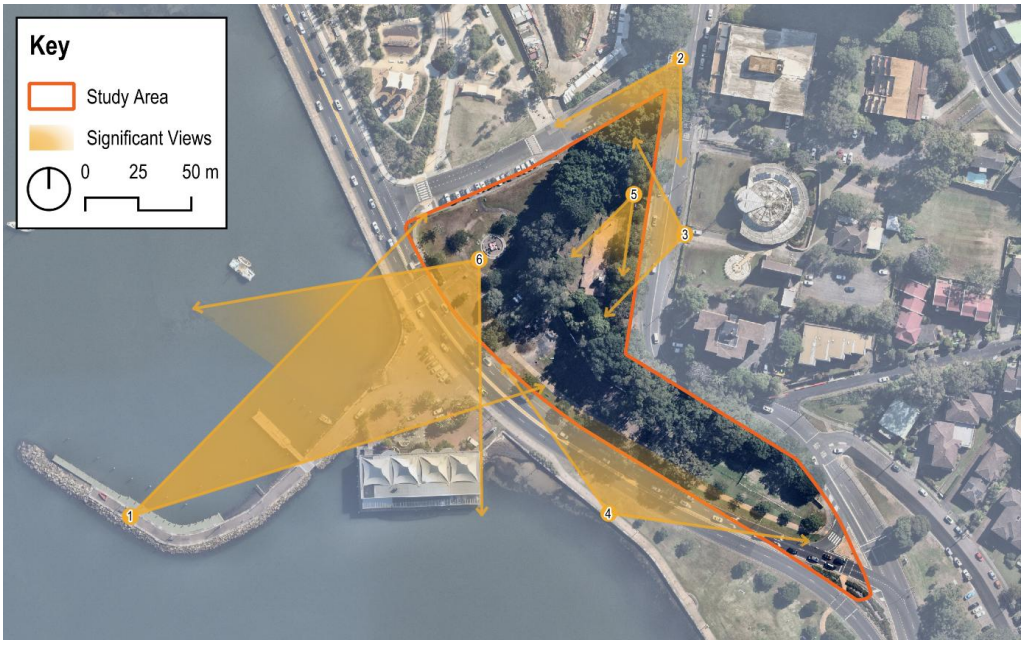


Figure 4.35 Aerial map showing significant views to, from and within the site. (Source: Nearmap with GML overlay 2024)

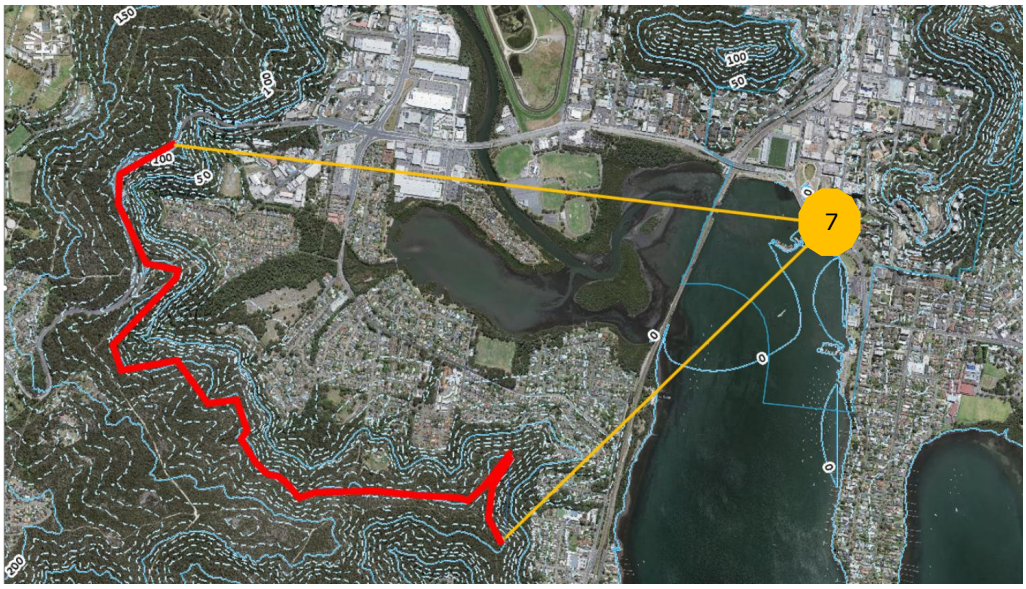


Figure 4.36 Aerial map showing view from the Memorial Park promontory to Brisbane Water and to the Kariong Ridgeline, significant to First Nations People. (Source: Nearmap with GML overlay 2025)

View	Image	Description	Significance
View 1		View of Rotary Park and Memorial Park from Gosford Public Wharf showing the former wharf site, land reclamation and tree canopies. First view of the site when arriving from the water.	High
View 2		View of Memorial Park and Rotary Park from the corner of Mann Street and Vaughan Avenue.	High

View	Image	Description	Significance
View 3		View of Memorial Park and Gosford Cenotaph from St Mary's Anglican Church grounds.	Moderate
View 4		View of the public reserve and plantings from Dane Drive.	Moderate
View 5		Internal view from within Memorial Park of the Boer War Memorial and Gosford Cenotaph, and external view to Brisbane Water partially obscured by plantings.	High
View 6		View from Rotary Park to Brisbane Water estuary and Drifters Wharf.	Moderate

View	Image	Description	Significance
View 7		View from the Memorial Park promontory to Brisbane Water and to the Kariong Ridgeline, significant to First Nations People. (Source: @Google July 2023)	High

4.8 Endnotes

1 Australia ICOMOS Inc, *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance 2013*, Australia ICOMOS Inc, Burwood, VIC, 2000, Article 1.2.

2 Mayne-Wilson, W 2013, *Town Parks of NSW: Past, Present and Future*, Warwick Mayne-Wilson.

3 Casey and Lowe, Archaeological Investigation 2008–2010 Darling Quarter, Darling Harbour.

4 Casey and Lowe, Archaeological Investigation 2008–2010 Darling Quarter, Darling Harbour.

5 Jones, S 2016, 'Wrestling with the social value of heritage: problems, dilemmas and opportunities', *Journal of Community Archaeology and Heritage*, Volume 4, Issue 1, pp 21–37.

Opportunities and constraints

5 Opportunities and constraints

This section of the report discusses the constraints, issues and opportunities that affect the conservation and management of the study area, both now and for the future.

5.1 Issues arising from the statement of significance

The heritage significance of Gosford Memorial Park and Rotary Park gives rise to a range of management obligations. The most fundamental is the obligation to ensure that the heritage values of the place are conserved and managed for present and future users.

Gosford Memorial Park has been assessed as being of local significance for historic significance, aesthetic/creative/technical achievement, social significance, research potential, and representativeness.

Rotary Park has been assessed as being of local heritage significance for historic significance, historical association, research potential and representativeness.

These values encompass its use as a public recreation space and as a site for the development of war memorials in the Central Coast area. The heritage values are also associated with the AHIMS registered Aboriginal site (AHIMS ID 45-3-4824) and the research potential. These values all contribute to the significance of Gosford Memorial Park and Rotary Park and must be conserved.

The implications of significance for Gosford Memorial Park and Rotary Park are provided below. It should be noted the two parks possess different heritage values and Rotary Park should not be memorialised:

- The natural levels of the promontory and its slopes are exceptionally significant to the heritage values and setting of Gosford Memorial Park and should be retained. Any future design treatments to the Gosford Memorial Park and the promontory slopes must take this and the natural landform's continued interpretability into account. Large excavations or infills into or across the promontory, Rotary Park or public reserve sites are not appropriate.
- The mature fig trees along Mann Street and the Hoop Pine are exceptionally significant to the Memorial Park site and should be retained and managed arboriculturally. Impact from their root systems should be planned for in any future park design work.
- The Cenotaph and Boer War Memorial are exceptionally significant to the Memorial Park site and should not be moved. Their ground levels should not be altered.

- The Lone Pine in Memorial Park is of high significance and should not be removed or transplanted.
- Other memorials in the parks not associated with cultural plantings have high significance in regard to their inscription plaque; however, the location and plinth are of moderate significance. If the memorials are to be relocated, the plaque should be retained.
- Built landscape elements and utilitarian elements within the parks are generally graded as intrusive or as having neutral or little significance. These additions and alterations have diminished the original composition of the parks. Consideration should be given to the removal of these elements while maintaining accessibility.
- The five large eucalypts on the southern slopes of the Memorial Park site would appear to be regrowth endemic forest specimens. (This section of the foreshore landscape was clear-felled through the nineteenth century.) They are exceptionally significant to this site in natural heritage terms and should be retained and managed arboriculturally.
- Rotary Park is currently listed as an archaeological site in Part 3 (Archaeological site) of the Precincts—Regional SEPP 2021. The updated assessment of its significance in Section 4 of this CMP identifies Rotary Park as meeting several criteria for listing as a local heritage item. Should the heritage listing of Rotary Park be amended to listing in Part 1 (Heritage item) of the SEPP 2021, the site will be subject to additional heritage statutory regulation and processes as appropriate.
- The historic and research significance of Rotary Park and the public reserve as the site of the former Gosford Wharf should be interpreted.
- Management of the parks, their physical fabric, archaeological resources and intangible values, must be in accordance with statutory processes and industry best practice.

5.1.1 Issues arising from the social values of the place

Besides the community at large, several groups are actively engaged in the parks and have interests in and aspirations for their future. Community involvement in the future of the study area as a whole, and the two parks separately, strengthens community attachment to place and therefore enhances social significance.

Engaging with local groups over the future of the Memorial Park ensures an ongoing sense of local ownership and participation, which contributes to its sustainable preservation and its social significance. One key consideration is the continuing relevance of the site for younger generations. Such sites can have decreasing relevance for younger groups that are unconnected to Anzac stories and histories.

With this in mind, the following opportunities to recognise and further strengthen the relationship between the community and the parks have arisen:

- Engage with local groups in decision-making about the future of the study area while recognising that some related heritage values, including intangible values, may extend outside the boundaries of the study area.
- Engage with First Nations groups such as the Darkinjung LALC to understand the social significance of this site and surrounding landscape for local First Nations groups and individuals, for example:
  - Explore First Nations connections to the waterfront and midden.
  - Explore the memorialisation of the Frontier Wars at the study area.
  - Research the role of First Nations soldiers in conflicts commemorated at the study area.
  - Consider activation projects that will engage younger groups.

5.2 Issues arising from the integrity and physical condition of the place

The overall proportions of Gosford Memorial Park have been retained as well as a portion of its initial composition. Rotary Park has a fair degree of integrity in its form, scale and arrangement. Although there have been additions and alterations, Gosford Memorial Park and Rotary Park retain their integrity as a public recreation reserve.

Due to ground works in the Gosford Memorial Park over the last several decades, including the establishment of the Cenotaph and Boer War Memorial 'podium', the original settings of these principal memorials were covered over. These settings should be reinstated, either within a new design and re-levelling for the podium, or removed. Due to the finished levels of the compacted gravel podium and the drainage particulars of that element, some scouring to the surface has occurred during the last two decades.

Some considerable damage has occurred to the 1970s brick walling and brick edging around the northern apex of the Memorial Park and beneath the Hill's Figs, where the trees' root systems have caused substantial uplift and failure of some fabric.

The memorials within the parks are generally in good condition, though the dispersed arrangement of the memorials requires individual maintenance procedures to cater to each different location; placed in gardens, buried under bark, low to the ground or mounted on large stones. Grouping of memorials by retaining the plaques and relocating them to a central feature should be considered.

Memorial trees such as the Sister Sumner memorial tree, Gosford Lone Pine, and the Australian Women's Land Army Norfolk Island Pine will eventually reach senescence.

Preparation of a Senescence Planting Strategy is recommended to address the significance of the memorial trees and determine next steps.

5.2.1 Landscape maintenance issues

Substantial risk to heritage landscape elements and values at Gosford Memorial Park exists from the application of any existing and future strategies, masterplans, management plans or detailed designs that do not place heritage significance as a core rationale for informing decisions.

Without a unified landscape management plan that approaches the Memorial Park holistically, some risk exists for the retention and interpretability of the place's historic and aesthetic landscape attributes and values.

Lack of maintenance can lead to deterioration of landscape fabric—including the tree stock in the study area—and camouflaging of the place's significant landscape assets and values. Particular emphasis should be placed on the regular arboricultural assessment of the site, as senescence of the Moreton Bay / Port Jackson Figs along Mann Street and the Hoop Pine are risk factors in the management of the Memorial Park's heritage values.

Some risk to heritage landscape elements and values exists from gradual deterioration of the landscape and incremental and uninformed changes made to it.

Impact from roots of the various fig trees in the Memorial Park will continue to cause damage to park fabric, like walls and pathways. Root mapping of the principal trees through the park could be considered, to best inform masterplanning and works in the vicinity of the main trees.

Some park-user risk relates to the western and southern edges of the Memorial Park lawn, as it joins the slopes of the promontory. That edge was historically demarcated by timber fencing (picket then arris rail) before all fencing was removed. The existing brickwork along much of that line (dating from the 1970s) was likely installed as a formal lawn edge—in lieu of a fence—and has lifted badly in places because of the Hill's Fig roots. Low Kopper Log barriers (also a relatively recent addition) line the edge of the park lawn behind the Cenotaph. The typology and condition of this 'edging' pose a trip hazard risk.

5.3 Issues arising from the use of the place

The Burra Charter defines compatible use as 'a use which respects the cultural significance of a place. Such a use involves no, or minimal, impact on cultural significance'.

Rather than the requirement for extensive modification of the place to suit the use, compatible future uses should be selected to suit the significant character of the place including its setting. Continuing use as well as a future use of Gosford Memorial Park and Rotary Park should have consideration for the following:

- The parks should continue to be maintained and used for public recreation and in a way that is consistent with the original purpose and design intent (1880s/1930s) and subsequent significant evolution.
- Appropriate and compatible uses of the parks, as public assets, should be open to all sections of diverse communities.
- The continuing use or new uses (including temporary use and events at one park and not the other) should not compromise or detract from the significance of the place, as identified in the respective statements of significance.
- Significant fabric, spaces/zones and intangible values should be conserved wherever possible.
- The introduction and integration of modern services and facilities for the continuing use or new uses should avoid or minimise damage to significant fabric, landscape and spaces/zones.
- Temporary use and associated works should be reversible without causing incremental and cumulative impact and damage to significant fabric, landscape and spaces/zones.
- Commercial activities should be limited in location, frequency and duration. However, the centrally located memorial platform may limit the availability of sufficient space for community activities and events that are not related to war commemoration gatherings. Fundraising activities (eg street stalls, raffles) and community events (eg moonlight cinema, musical events, cultural events, community carols, food and beverage offerings) of a kind that are consistent with the objects of the Council in relation to Council lands may be permissible and should be subject to the relevant permit applications and a Plan of Management (including accessibility requirements).
- The continuing use or new uses should not result in an unacceptable level of wear and tear of significant fabric, landscape and spaces/zones.

5.4 NSW heritage management framework

In NSW, heritage values, listed places and items of heritage significance, including historical archaeological 'relics', declared Aboriginal places and Aboriginal 'objects', are afforded statutory protection under the following legislation:

- the NPW Act;
- *Heritage Act 1977* (NSW) (Heritage Act); and
- *Environmental Planning and Assessment Act 1979* (NSW) (the EP&A Act).

5.4.1 National Parks and Wildlife Act 1974 (NSW)

The NPW Act provides statutory protection for all Aboriginal 'objects' (consisting of any material evidence of the Indigenous occupation of New South Wales) under Section 90 of the NPW Act, and for 'Aboriginal places' (areas of cultural significance to the Aboriginal community) under Section 84 of the NPW Act. Aboriginal objects and places are afforded automatic statutory protection in New South Wales whereby it is an offence (without the Minister's consent) to harm an Aboriginal object or declared Aboriginal place.

The NPW Act defines an Aboriginal object as:

> any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction and includes Aboriginal remains.

The protection provided to Aboriginal objects and places applies irrespective of the level of their significance or issues of land tenure. Sites of traditional significance that do not necessarily contain material remains may be gazetted as 'Aboriginal places' and thereby be protected under the NPW Act. However, areas are only gazetted if the Minister responsible is satisfied that sufficient evidence exists to demonstrate that the location was and/or is of special significance to Aboriginal culture.

A strict liability offence applies for harm to or desecration of an Aboriginal object or declared Aboriginal place.[1] The definition of 'harm' includes destroying, defacing, damaging or moving an Aboriginal object or declared Aboriginal place. The strict liability offence of harming Aboriginal objects has several defences. The two defences relevant to any proposed development are the statutory defence of due diligence, through complying with an adopted industry code, or compliance with the conditions of an Aboriginal Heritage Impact Permit (AHIP).

Some activities are also classified as 'low impact' acts under Section 58 of the National Parks and Wildlife Regulation 2019.

Known Aboriginal 'objects' as defined by the NPW Act are listed on the AHIMS, administered by Heritage NSW. A search of the AHIMS database was conducted on 30 April 2024. One previously recorded site was found to be present within the study area (Table 5.1). Under the NPW Act, any activities that may harm the registered Aboriginal sites within the study area require approval under Section 90 of the NPW Act (ie an Aboriginal Heritage Impact Permit, or AHIP).

Table 5.1 Aboriginal sites within the study area.

Item No.	Name	Site type
45-3-4824	Gosford Memorial Park	Shell (midden)

5.4.2 Heritage Act 1977 (NSW)

The Heritage Act is a statutory tool designed to conserve NSW's environmental heritage including items of local heritage significance. It is used to regulate the impacts of development on the state's heritage assets. The Heritage Act describes a heritage item as a 'place, building, work, relic, movable object or precinct.'

State Heritage Register

The SHR was established under Section 22 of the Heritage Act. It comprises a list of identified heritage items determined to be of significance to the people of New South Wales. The SHR includes items and places such as buildings, works, archaeological relics, movable objects and precincts.

The study area is not listed on the SHR. Gosford Cenotaph and Cultural Landscape was nominated for listing on the SHR in 2023; however the assessment of the nomination was not progressed by the State Heritage Register Committee of the Heritage Council of NSW.

Relics provisions

Although the study area is not listed on the SHR, archaeological relics are nevertheless protected under the relics provisions (Section 139 to 146) of the Heritage Act. The Act defines 'relic' as any deposit, object or material evidence that:

(a) relates to the settlement of the area that comprises New South Wales, not being Aboriginal settlement, and

(b) is of State or local heritage significance.

Sections 139–145 of the Heritage Act prevent the excavation of a relic, except in accordance with an excavation permit (or an exemption from the need for a permit) issued by the Heritage Council of New South Wales.

Section 139 [1] of the Heritage Act states:

> A person must not disturb or excavate land knowing or having reasonable cause to suspect that the disturbance or excavation will or is likely to result in a relic being discovered, exposed, moved, damaged or destroyed unless the disturbance or excavation is carried out in accordance with an excavation permit.

Approval under these provisions is required to impact or harm archaeological relics.

5.4.3 Environmental Planning and Assessment Act 1979 (NSW)

The EP&A Act is administered by the NSW Department of Planning, Housing and Infrastructure and provides for environmental planning instruments to be made to guide the process of development and land use. The EP&A Act also provides for the protection of local heritage items and conservation areas through listing on LEPs and State Environmental Planning Policies (SEPPs), which provide local councils with the framework required to make planning decisions.

Central Coast Local Environmental Plan 2022

The Central Coast LEP 2022 is a consolidation of Gosford LEP 2014 and Wyong LEP 2013 into one plan for the entire Central Coast.

Gosford Memorial Park and Rotary Park are not listed on the Central Coast LEP 2022 as the Gosford Town Centre remains subject to the Precincts—Regional SEPP 2021, Part 5.8 Gosford City Centre.

State Environmental Planning Policy (Gosford City Centre) 2018

The State Environmental Planning Policy (Gosford City Centre) 2018 was repealed and has been superseded by the Precincts—Regional SEPP 2021 as part of the NSW Department of Planning, Housing and Infrastructure's initiative to consolidate SEPPs to simplify and provide certainty to the planning system.

State Environmental Planning Policy (Precincts—Regional) 2021

The Precincts—Regional SEPP 2021 facilitates a planning framework for special activation precincts (Precinct/s) in regional NSW, streamlining planning processes and guiding the delivery of the precincts. Gosford Memorial Park is listed as a local heritage item and Rotary Park is listed as an archaeological item on the Precincts—Regional SEPP 2021.

The objectives of heritage conservation in Gosford are stated in Chapter 5 Part 5.6 Clause 5.36 (1) of the Precincts—Regional SEPP 2021:

(a) to conserve the environmental heritage of Gosford,

(b) to conserve the heritage significance of heritage items and heritage conservation areas, including associated fabric, settings and views,

(c) to conserve archaeological sites,

(d) to conserve Aboriginal objects and Aboriginal places of heritage significance.

Clause 5.36 (2) outlines the requirements for consent. Development consent is required for any of the following:

(a) demolishing or moving any of the following or altering the exterior of any of the following (including, in the case of a building, making changes to its detail, fabric, finish or appearance)—

(i) a heritage item,

(ii) an Aboriginal object,

(iii) a building, work, relic or tree within a heritage conservation area,

(b) altering a heritage item that is a building by making structural changes to its interior or by making changes to anything inside the item that is specified in Schedule 9 in relation to the item,

(c) disturbing or excavating an archaeological site while knowing, or having reasonable cause to suspect, that the disturbance or excavation will or is likely to result in a relic being discovered, exposed, moved, damaged or destroyed,

(d) disturbing or excavating an Aboriginal place of heritage significance,

(e) erecting a building on land—

(i) on which a heritage item is located or that is within a heritage conservation area, or

(ii) on which an Aboriginal object is located or that is within an Aboriginal place of heritage significance,

(f) subdividing land—

(i) on which a heritage item is located or that is within a heritage conservation area, or

(ii) on which an Aboriginal object is located or that is within an Aboriginal place of heritage significance.

Clause 5.36 (3) outlines when some developments are exempt from these requirements. Development consent is not required if:

(a) the applicant has notified the consent authority of the proposed development and the consent authority has advised the applicant in writing before any work is carried out that it is satisfied that the proposed development—

(i) is of a minor nature or is for the maintenance of the heritage item, Aboriginal object, Aboriginal place of heritage significance or archaeological site or a building, work, relic, tree or place within the heritage conservation area, and

(ii) would not adversely affect the heritage significance of the heritage item, Aboriginal object, Aboriginal place, archaeological site or heritage conservation area, or

(b) the development is in a cemetery or burial ground and the proposed development—

(i) is the creation of a new grave or monument, or excavation or disturbance of land for the purpose of conserving or repairing monuments or grave markers, and

(ii) would not cause disturbance to human remains, relics, Aboriginal objects in the form of grave goods, or to an Aboriginal place of heritage significance, or

(c) the development is limited to the removal of a tree or other vegetation that the Council is satisfied is a risk to human life or property, or

(d) the development is exempt development.

Clause 5.36 (4) refers to the effect of proposed development on heritage significance:

The consent authority must, before granting consent under this section in respect of a heritage item or heritage conservation area, consider the effect of the proposed development on the heritage significance of the item or area concerned. This subsection applies regardless of whether a heritage management document is prepared under subsection (5) or a heritage conservation management plan is submitted under subsection (6).

Clause 5.36(5) outlines when a heritage assessment may be required:

The consent authority may, before granting consent to any development-

(a) on land on which a heritage item is located, or

(b) on land that is within a heritage conservation area, or

(c) on land that is within the vicinity of land referred to in paragraph (a) or (b),

require a heritage management document to be prepared that assesses the extent to which the carrying out of the proposed development would affect the heritage significance of the heritage item or heritage conservation area concerned.

Clause 5.36 (6) outlines when a conservation management plan may be required:

The consent authority may require, after considering the heritage significance of a heritage item and the extent of change proposed to it, the submission of a heritage conservation management plan before granting consent under this section.

Clause 5.36 (7) addresses archaeological sites:

The consent authority must, before granting consent under this section to the carrying out of development on an archaeological site (other than land listed on the State Heritage Register or to which an interim heritage order under the *Heritage Act 1977* applies)—

(a) notify the Heritage Council of its intention to grant consent, and

(b) take into consideration any response received from the Heritage Council within 28 days after the notice is sent.

Clause 5.36 (8) addresses Aboriginal places of heritage significance:

The consent authority must, before granting consent under this section to the carrying out of development in an Aboriginal place of heritage significance—

(a) consider the effect of the proposed development on the heritage significance of the place and any Aboriginal object known or reasonably likely to be located at the place by

means of an adequate investigation and assessment (which may involve consideration of a heritage impact statement), and

(b) notify the local Aboriginal communities, in writing or in such other manner as may be appropriate, about the application and take into consideration any response received within 28 days after the notice is sent.

Clause 5.36 (10) addresses conservation incentives:

The consent authority may grant consent to development for any purpose of a building that is a heritage item or of the land on which such a building is erected, or for any purpose on an Aboriginal place of heritage significance, even though development for that purpose would otherwise not be allowed by this Chapter, if the consent authority is satisfied that—

(a) the conservation of the heritage item or Aboriginal place of heritage significance is facilitated by the granting of consent, and

(b) the proposed development is in accordance with a heritage management document that has been approved by the consent authority, and

(c) the consent to the proposed development would require that all necessary conservation work identified in the heritage management document is carried out, and

(d) the proposed development would not adversely affect the heritage significance of the heritage item, including its setting, or the heritage significance of the Aboriginal place of heritage significance, and

(e) the proposed development would not have any significant adverse effect on the amenity of the surrounding area.

Heritage listings in the study area

Table 5.2 Heritage listings in the study area.

Item name	Address	Listing	Significance	Item No.
Gosford City Council Memorial Park, including avenue and feature trees	Mann Street and Vaughan Avenue	*State Environmental Planning Policy (Precincts—Regional) 2021*	Local	31
Rotary Club, fountain, garden and original site of Gosford Wharf	Vaughan Avenue	*State Environmental Planning Policy (Precincts—Regional) 2021*	Local*	A9*

* The State Heritage Inventory (SHI) listing notes there is a high potential archaeological resource.

Heritage listings in the vicinity

Table 5.3 Heritage listings in the vicinity of the study area.

Item name	Address	Listing	Significance	Item No.
Site of original Gosford Wharf	Dane Drive	*State Environmental Planning Policy (Precincts—Regional) 2021*	Local	A8
Stone street and driveway wall	1 Mann Street	*State Environmental Planning Policy (Precincts—Regional) 2021*	Local	32
Old Christ Church Anglican Church	3 Mann Street	*State Environmental Planning Policy (Precincts—Regional) 2021*	Local	33
Stone street wall	2 Broadview Avenue	*State Environmental Planning Policy (Precincts—Regional) 2021*	Local	26
Anglican rectory	5 Mann Street	*State Environmental Planning Policy (Precincts—Regional) 2021*	Local	34
Part of Gosford South Post Office	23 Mann Street	*State Environmental Planning Policy (Precincts—Regional) 2021*	Local	35

5.4.4 Crown Land Management Act 2016 (NSW)

Gosford Memorial Park and Rotary Park are subject to the *Crown Land Management Act 2016* (NSW) (Crown Lands Act). The Crown Lands Act governs the planning, management and use of Crown land. This includes reservation or dedication for a public purpose, leasing and licensing, the creation of reserve trusts, and vesting of Crown lands to local councils.

5.5 Commonwealth legislation

The following Commonwealth legislative requirements and codes are relevant to Gosford Memorial Park and Rotary Park. Compliance could result in heritage impacts that may require mitigation.

- *Work Health and Safety Act 2011*;

- *Disability Discrimination Act 1992* (DDA); and
- National Construction Code.

Accessibility compliance with the DDA is particularly relevant for the continuing use and enjoyment of Gosford Memorial Park and Rotary Park.

Disability Discrimination Act 1992

Equitable access across the site is limited along Mann Street, between Gosford Memorial Park and Rotary Park, and the northern portion of Vaughan Avenue.

There are dedicated disability parking bays in the southern portion of Vaughan Avenue allowing access to Rotary Park.

The masterplan for Gosford Memorial Park will need to address the lack of equitable access—the site may require modification and upgrades to meet DDA standards. There is also an opportunity to research the location of the original entry gates to Gosford Memorial Park and interpret them as the entry point to an equitable access path to the Cenotaph/Boer War Memorial central podium. The original entry from Mann Street was possibly located in the existing non-mulched zone in Memorial Park and opposite St Mary's War Memorial.

Where modifications are proposed to achieve compliance, they will need to consider the heritage significance of the areas, fabric and landscape. Elements of exceptional and high significance at Gosford Memorial Park and Rotary Park have little tolerance for permanent modifications, though reversible and temporary changes may be acceptable. There is limited scope for accessibility upgrades on the promontory of land and western slopes of Gosford Memorial Park due to this area's exceptional significance.

For areas of moderate or little significance such as Rotary Park and the public reserve, the landscape is more readily modifiable, providing more scope to meet DDA standards.

The grouping of memorial plaques at one accessible location and element (for example, a long linear combined seat / low memorial wall) in Memorial Park ought to minimise the extent of hard-paved compliant accessible path through Memorial Park. Without relocation—ie by maintaining existing memorials in situ—hard-paved DDA-compliant paths may be required to every single memorial currently existing throughout the park. A related consideration is that hard-paved pedestrian paths may encourage skateboarding or rollerblading, which might be viewed as disrespectful at a contemplative and commemoration site. Noting that it is common and appropriate to place memorials on low brick fences, an alternative option for consideration is grouping the memorial plaques along the edge of Memorial Park at Mann Street—this will provide level and equitable access from Mann Street rather than within the park.

5.6 Non-statutory listings

5.6.1 National Trust of Australia

The National Trust of Australia is a non-government organisation that maintains a register of landscapes, townscapes, buildings, and other items or places that the Trust determines have cultural significance and are worthy of conservation. The register is non-statutory and has no legal force but its listings are widely acknowledged as providing authoritative recognition of the cultural significance of the relevant places.

Gosford Cenotaph is listed on the National Trust of Australia (NSW) Register.

5.6.2 NSW War Memorials Register

The NSW War Memorials Register is a crowd-sourced database about war memorials in New South Wales. The register enables members of the public to contribute accurate information about war memorials, provides best practice information about war memorial conservation, and connects memorials and veterans to sustain NSW military and commemorative history.

The register is used for informational purposes only and inclusion is voluntary. It is non-statutory and is not a form of heritage listing. Being listed on the register does not have any legal implications for development processes.

5.7 Approvals

5.7.1 Consent authority for development

Part 5.1, Clause 5.5, of the Precincts—Regional SEPP 2021 addresses the consent authority for development.

> The consent authority for the purposes of this Chapter is—
>
> (a) for development that has an estimated development cost of less than $10 million—the Council, and
>
> (b) for development that has an estimated development cost of not less than $10 million but not more than $75 million—
>
> (i) the Minister for Planning, or
>
> (ii) if the development has an estimated development cost of not less than $40 million and the Council objects to the development—the Independent Planning Commission.

Development in the Gosford city centre that has an estimated development cost of more than $75 million is state significant development.

5.7.2 Conflict of Interest

Central Coast Council Council—Related Development Applications Conflict of Interest Protocol Revision 1 (adopted 30 May 2023) Section 4.2 addresses when management controls may be applied:

> 4.2.1. The assessment and/or determination of a development application for Council-related development
>
> a) The assessment of an application can be undertaken by suitably qualified Council staff under delegation for proposals considered to be a of a low risk level or non-controversial. For assessment of higher than low risk level, or more controversial projects, strict role separation controls are to be imposed or it may be more appropriate to engage an independent consultant.
>
> b) The determination of an application considered to be of a higher than low-level risk should be referred for external determination to either:
>
> i. The Local Planning Panel,
>
> ii. Another council (which may or may not be a neighbouring council),
>
> iii. A suitably qualified independent consultant.
>
> iv. It is noted that any size or value applications may be called up to Council in accordance with Council's Code of Meeting Practice.

5.7.3 Ownership and management

Ownership

At present, Council owns the entire study area including Gosford Memorial Park, Rotary Park and the public reserve. Gosford RSL Sub-Branch and Gosford Rotary Club are key stakeholders. Works impacting Memorial Park and Rotary Park—in particular, the memorials and time capsule—should be carried out in consultation with the relevant stakeholders.

Two parks

Future changes and works at the study area must consider the significance of the place (including the relationship between Gosford Memorial Park and Rotary Park) and the compatibility of uses of the place as a whole and as two different parks. The parks should be managed in conjunction with each other due to their proximity and related parks maintenance issues. However, uses of and at the parks should be compatible with the unique heritage values of each park.

Although the two parks abut each other, are connected by a prominent staircase and are used collectively for Anzac Day artwork ornamentation, they do not share a common history or comparable heritage values.

The Memorial Park site (originally named Gosford Park) was formalised in the 1880s as Gosford's principal town park. The land on which Rotary Park was established (in the 1970s) resulted from reclamation works in the 1930s, the subject site un-planned until the Rotary scheme.

Future changes may include the relocation of some existing memorials, reinstatement of removed memorials and addition of future memorials.

In terms of future use and development, the significance of the promontory of land on which Gosford Memorial Park resides, and of the Gosford Cenotaph, Boer War Memorial and Lone Pine memorial means there is little scope for development to occur in these areas. Any development in these areas would need to be carefully considered to minimise any adverse heritage impacts to key spaces and elements of exceptional and high significance.

There is more opportunity for development in Rotary Park and the public reserve. Appropriate future development in areas of moderate to low significance would seek to retain the place's historical connection to the former wharf site, Aboriginal cultural heritage and interpret a representative section of its fabric.

5.7.4 Consultation and collaboration

Central Coast Council undertook community consultations with several local groups for this CMP: the Woy Woy branch of the CWA; Gosford RSL Sub-Branch; Gosford Rotary Club; and the Heritage and Culture Advisory Committee.

The key outcomes from the consultation are provided in Section 4.4.9 of this CMP. Opportunities and constraints arising from the consultations are identified below.

Gosford RSL Sub-Branch

- There are issues arising from the custodianship of the Gosford Cenotaph. The Gosford RSL Sub-Branch provides input on its management and raises funds for restoration; however, Council is responsible for its maintenance.
- The sub-branch generally supports the grouping of other memorials, subject to support by interested parties and the expansion of commemorative services and events to include Victory in the Pacific, a day for contemporary veterans, etc. There is an opportunity to improve the accessibility to existing memorials and commemorate contemporary events to support the ongoing use of the Memorial Park.
- Reinstatement of former memorials and movable items (guns) would present opportunities and constraints on the development of Memorial Park.
- Suggested memorialisation uses for Rotary Park conflict with the assessed heritage significance of the place.

Rotary Club

- Although Council has ownership of the park, the Rotary Club would like ongoing involvement in decisions and planning around the park.
- There is an opportunity to investigate the link between Rotary Park, Gosford Pool and Gertrude Place onto East Gosford, as was mentioned in the consultation.
- As noted by the sub-branch (above), suggested memorialisation uses for Rotary Park conflict with the assessed heritage significance of the place.
- There is an opportunity to repair the fountain or replace it with new interpretation in collaboration with the Rotary Club.

Other stakeholders

- There is an opportunity to acknowledge Aboriginal connections to the study area through interpretation.
- There is also an opportunity to enhance the amenities in both parks.

5.8 The Burra Charter best practice standard

The Burra Charter is widely accepted nationally as the underlying methodology by which all works to sites and buildings of cultural significance are undertaken. Procedures for managing changes and activities at the study area should be in accordance with the recognised methodology of the Burra Charter.

The principles and processes of the Burra Charter should be followed for all matters concerning the conservation of cultural significance and managing change.

5.9 Opportunities and constraints for managing future changes

5.9.1 Potential for change

Aboriginal cultural heritage

The study area contains one registered Aboriginal site, listed on the AHIMS register as shell (midden) site 45-3-4824 (Gosford Memorial Park).The mapped extent of 45-3-4824 is entirely contained within the study area, in the vicinity of the Gosford Cenotaph. Proposed future works that could impact (harm) the areas and soil horizons associated with the AHIMS site would require assessment through an ACHAR. This report could be used to seek an AHIP under Section 90 of the NPW Act.

Low impact activities (as identified under Section 58 of the NPW Regulation 2019) have a defence against harm and can proceed without an AHIP.

Gosford Memorial Park

The Memorial Park site is fundamental to an understanding of the history of Gosford and the establishment of public reserves around Brisbane Water. The park contains elements that reflect a compendium of phases of landscape development, including trees along Mann Street that date from the late nineteenth century and provide evidence of archetypal municipal plant preferences in that period.

Various additions have been made to and around Gosford Memorial Park since the 1930s that could be considered intrusive to the historic and aesthetic values of the place. These include the foreshore reclamation works of the 1930s (which interrupted the natural association of Brisbane Water with the promontory of land on which Gosford Park was laid out), various tree plantings that have affected the legibility of the place and its scenic relationship with the Gosford CBD and Brisbane Water, and certain finishes of the circa 2000-built central podium. Although the 1930s reclamation work is not removable, other intrusive components are and their removal should be considered in future masterplanning.

Should new memorials be proposed at any point in time, the proposal should be assessed against—and be consistent with—this CMP. It would be advisable that new memorials (including memorial trees or plantings) are not added prior to the preparation and adoption of a masterplan for Gosford Memorial Park—see further discussion in Section 5.9.2 below. Proponents should be made aware that it is not assured the condition or the accessibility to that location will remain the same or that future changes to the park will not impact on the chosen location (eg a tree chosen as a landmark for the scattering of ashes may be removed or that garden bed designs may be altered in the future, potentially rendering the 'memorial site' inaccessible).

Rotary Park and public reserve

There is a considerable opportunity for change in Rotary Park, in terms of its landscape design components and finishes. However, any change at this park should be considered against the impact on the heritage values and scenic quality values of Memorial Park, which existed prior to the gazettal of Rotary Park and is now sited 'behind' and above Rotary Park. Opportunities for change include:

- repair or replacement of the defunct fountain and replacement of the temporary Poppy Sculpture with a new feature or artwork that interprets the significance of the site;
- interpretation of the former garden beds; and
- integration of the public reserve.

New structures on the site

- Retain separation between Gosford Memorial Park and Rotary Park. New structures should reflect the unique historic values of each space.
- New memorial structures should be contained within Gosford Memorial Park.
- New park structures and plantings need to respond to the spatial layout and character of the precinct in which they are sited and avoid intruding on significant view lines.

5.9.2 Masterplanning future changes at the site

Consistent with the cultural significance of these two adjacent parks, the general principle is to facilitate more passive and contemplative uses at Memorial Park and more active uses (including birthday parties, sports and games such as 'backyard cricket', volleyball and the like) at Rotary Park.

A precinct masterplan for Gosford Memorial Park and Rotary Park should be developed to ensure significance is not impacted by future site works and to develop opportunities for the place.

The Gosford Memorial Park and Rotary Park precinct masterplan should be coordinated and interrelated with masterplans for adjacent precincts such as Gosford Waterfront Reserve and Gosford Public Wharf. This broad approach will allow for heritage interpretation that is holistic rather than piecemeal and disjointed (eg Aboriginal cultural values of the area, reclaimed foreshore land, historic connection to the Gosford ferry wharf, etc). This coordinated approach will also allow for infrastructure planning across the wider precinct such as carparking (including accessible parking), a continuous accessible path of travel, a children's playground, etc—all of which have implications for the use and visitation of the Memorial Park and Rotary Park. Such masterplans should provide for the adoption of—where appropriate—a consistent design language, materials palette, signage, etc.

Masterplan for Gosford Memorial Park

The masterplan for Gosford Memorial Park should:

- Be based on this CMP and be consistent with the assessment of cultural significance and conservation policies herein.
- Consider park usage patterns—who (locals, visitors, parents with children); which park is preferred; when (seasonal, weekday, weekend, morning, lunchtime, evening) and why; where (shaded or sunny areas); what (picnic, reading, reflection at memorials, lunch); frequency and duration (how often, how long) etc.
- Consider removal of intrusive elements and ad hoc boundary materials through the Memorial Park including 1970s-built brick walling/edging.

- Resolve the boundary definition between the Memorial and Rotary parks (in accordance with historical site fencing precedents).
- Consider removal of the Memorial Park's central podium and the return of the promontory's natural ground levels. This should be considered in association with options for the annual set-out of temporary platforms between the Cenotaph and Boer War Memorial, to service Anzac Day events. A hard-paved podium may encourage skateboarding or rollerblading—this might be viewed as disrespectful at a contemplative and commemoration site.
- Consider options for the remodelling of the Memorial Park central podium to re-establish the immediate settings and levels of the Gosford Cenotaph and Boer War Memorial. The remodelling should consider lowering the height of its surrounding retaining wall, using sympathetic fabric, incorporating permanent seating, incorporating the Ruwolt gun and resolving drainage issues on the podium.
- Explore options for the construction of a long linear combined seat / low memorial wall directly abutting the eastern side of the central podium where all existing Memorial Park plaques are mounted (excluding location-specific memorials). An expansive integrated feature—at an accessible location in Memorial Park—would provide permanent seating for everyday park users (looking out to Brisbane Water), a utilitarian element for mass gatherings and a unified setting for all existing park memorial plaques and others developed in the future. This integrated feature should be designed with sufficient space to allow for future additions of memorial plaques.
- Consider options for a unified palette of park furniture/materials for Gosford Memorial Park, Rotary Park and the public reserve to avoid ad hoc accretions of elements.
- Consider the method of connectivity between Memorial Park and Rotary Park and options for the removal of the existing 1970s stair and abutting raised planter beds between the parks, and the re-establishment of natural promontory slope levels.
- Consider the inclusion of formalised sympathetic pedestrian pathways through Memorial Park, in association with central podium removal or re-modelling.
- Consider the removal of all existing trees, shrubs and groundcovers on the promontory slopes (with the possible exception of the Casuarina stands) and options for new treatments to these slopes, more in keeping with the natural and cultural heritage values of the Memorial Park site. This may include the option of retaining the slopes unplanted or using a locally endemic low groundcover as a monoculture around the entire promontory.
- Include a lighting strategy to improve security for visitors after sunset and to disincentivise vandalism.
- Consider Council's Parks Maintenance Plan requirements.
- Provide an updated policy for the use, maintenance and management of Council's parks and reserves. This may include prohibition of scattering of ashes; prohibition of lighting of fires or candles; passive use of Memorial Park; etc.

Reinstatement of views surrounding Gosford Memorial Park

The physical and visual relationship between the Memorial Park and Brisbane Water is fundamental to understanding the selection of the site for a town park and, later, for the placement of the Boer War and Cenotaph memorials. This link remains intact, but partially obscured by plantings on the western slopes of the park.

There exists considerable opportunity to re-establish broad view cones from the Memorial Park across Brisbane Water, through the selective removal of adventitious plantings and specimens identified in this CMP as being of little significance, neutral or intrusive.

The aesthetic and local landmark qualities of the Memorial Park should be retained. This includes careful planning for sites nearby, including Rotary Park and the public reserve, to consider heritage values of the Memorial Park and key sight lines to and from it.

Important internal site views through and across the Memorial Park should be conserved and enhanced. Principal among these are the serial views from Mann Street and the broadly north–south views through the park, where the deliberately planned axis of the Boer War Memorial and Cenotaph is identifiable.

Grouping of all memorial plaques in the Memorial Park

The masterplan should consider the opportunity to relocate all memorial plaques (excluding location-specific items) to a new, unobtrusive element in Gosford Memorial Park. It could be incorporated within or abutting the central podium, making the plaques more easily accessible for visitation, contemplation and commemoration.

Rotary Park and public reserve curtilage

Further research is recommended for the public reserve, the location and full extent of the land reclamation and the history of public recreation in the Central Coast area. A masterplan should investigate the consolidation and management of Rotary Park and the public reserve as one entity/site.

Masterplan for Rotary Park and the Dane Drive public reserve

A masterplan for the Rotary Park site and the Dane Drive public reserve should be developed and should:

- Be based on this CMP and be consistent with the assessment of cultural significance and conservation policies herein.
- Consider integrating the Dane Drive public reserve into Rotary Park.
- Consider park usage patterns—who (eg locals, visitors, parents with children, birthday celebration groups); which park has higher usage; when (eg seasonal, weekday, weekend, morning, lunchtime, evening); where (eg shaded or sunny areas,

seats); what and why (eg picnic, reading, sitting around a fountain, lunch); frequency and duration (how often, how long) etc.
- The repair and reinstatement of the Rotary Fountain to working order is the preferred option. A new central feature or artwork that is sympathetic to the significance of Rotary Park would also be acceptable.
- Consider design options for the removal of the timber sleeper edging to the base of the promontory slopes and its replacement with a more visually sympathetic material.
- Consider whether the existing pedestrian paths remain suitable to service the sites.
- Consider the appropriateness of existing trees in this area and their future impact on views to and from the Memorial Park.
- Consider Council's Parks Maintenance Plan requirements.
- Provide an updated policy for the use, maintenance and management of Council's parks and reserves. This may include availability of public amenities, park furniture and picnic tables in Rotary Park, etc.

Arboricultural assessment

Advanced Treescape Consulting has prepared *Arboricultural Impact Assessment includes tree protection plan and tree management plan* (13 August 2024) for Rotary Park. An arboricultural assessment of Memorial Park should also be prepared, if it has not yet been carried out. The respective arboricultural assessments should be referred to in the precinct masterplan, to help inform the phased tree removal to re-establish views to Brisbane Water and improve the ambience of the northern end of the Memorial Park (currently heavily shaded).

It should be noted that arborists have different assessment criteria to heritage professionals, including a retention matrix which can be at odds to 'pure' heritage findings in a CMP. For example, the above arboricultural assessment has determined that several trees in the Rotary Park are of Medium significance in the landscape, whereas this CMP determined that their contributory heritage value is only Neutral—there are various other examples of this variation in grading within each sector of the study area.

5.9.3 Interpretation opportunities

The aim of interpretation is to reveal and retain the heritage significance of a place. Interpretation can contribute to the recognition and retention of a place's cultural significance through understanding, awareness and engagement.

Currently there is little interpretation at the study area aside from the inscriptions found on the memorials. There is the opportunity to provide interpretation of all phases of Gosford Memorial Park and Rotary Park's history, which could enhance engagement with the study area and its history.

The Gosford Memorial and Rotary Parks are archetypal examples of a town park and a passive recreation reserve, respectively, created in the latter decades of the nineteenth century and the middle decades of the twentieth century. In association with the long history of use of the Memorial Park site for commemorative purposes and the significance of its most prominent memorial features, considerable interpretive opportunity exists regarding the history and heritage significance of the sites, as well as First Nations stories and histories.

The history and significance of the parks should be interpreted and accessible to visitors, passersby and others through on and off site engagement and interpretation. Although it is not necessary to provide a front address or front approach and entry to the Memorial Park, it is important from a heritage as well as a wayfinding perspective to signpost the Memorial Park. At the minimum, there should be a 'Gosford Memorial Park' sign to distinguish this park from Rotary Park, which has a sign at the corner of Dane Drive and Vaughan Avenue. The types and locations of the various war memorials throughout Memorial Park should be identified and interpreted on a map or location plan. These interpretation media can be implemented prior to the preparation of the masterplan.

There are also opportunities for public art within the parks, which should be subject to the respective masterplans. Public art should be site-specific and should interpret the site's significance, to avoid turning the parks into sculpture parks in their own right.

As part of a senescence planting strategy for the Memorial Park site, consideration could be given to the re-incorporation of prominent conifer specimens used in the original layout of the park in the late 1880s.

5.10 Endnotes

[1] Department of Environment, Climate Change and Water 2010, *National Parks and Wildlife Act 1974* (NSW), 'Fact sheet 1', September 2010.

Conservation policies

6 Conservation policies

This CMP has included discussion of relevant constraints, including matters that derive from the parks' heritage values, integrity and physical condition (including that of the memorials), use and waterfront setting. The following conservation policy framework will facilitate positive heritage outcomes and provide guidance on managing potentially conflicting objectives. Where a matter falls outside the jurisdiction/scope of the conservation policies, the conservation principles can inform decision-making. The principles focus on the key concepts of significance, compatible use, evolution of the place and stakeholder engagement. Where necessary, the policies are prefaced by a short discussion outlining the reasoning behind the policies.

- **Conservation principles** guide the creation of the policies and decisions in situations outside the scope of the policies.
- **General conservation policies** apply to all decision-makers and outline the best practice management approach to conservation.
- **Specific conservation policies** apply to specific activities, landscapes, elements and materials, and provide specialised and practicable advice 'on the ground'.

The policies seek to:

- retain the cultural significance of the place, including its significant character, landscape elements and fabric, as well as its relationship to its wider setting;
- provide recommendations for the conservation (including adaptation) of areas and elements of the place; and
- identify where and how modification and new works can be carried out to ensure compatibility with the significance of the place and provide for the conservation and long-term security of the place's significant features.

6.1 Conservation principles

Significance and heritage values should be central to the understanding and management of the Gosford Memorial Park and Rotary Park. Best practice heritage standards for the management, conservation and interpretation of heritage values are always to be applied to ensure the maintenance and conservation of the place into the future.

The principles that follow inform the philosophical approach to the policy.

Key principles
Conservation of the primary significance of the site as a public recreation space (Gosford Memorial Park, Rotary Park and the public reserve) and memorial space (Gosford Memorial Park) must be the priority.
Management decisions must be based on an understanding of the significance of Gosford Memorial Park and Rotary Park as individual parks.
Management decisions, new uses and development, works proposals, masterplans, plans of management and proposals (including temporary use and associated works) must be consistent with this CMP.
Professional conservation advice and appropriate professional heritage assessment must be sought in relation to proposals for works, new development or modifications.
Interpretation of Gosford Memorial and Rotary Parks' heritage values should be pursued and implemented holistically.
Records should be kept by the landowner in relation to proposed and implemented changes to the place.

6.2 General conservation policies

The following policies outline the main objectives for managing the heritage place and provide an overarching approach for its conservation and management.

6.2.1 Primary conservation policy

The significance of the place should guide the conservation of significant areas, elements, and fabric and key visual and physical relationships. In this context 'conservation' includes all the activities ascribed to it in the Burra Charter, including maintenance, restoration, reconstruction and adaptation.

The following table sets out in general terms the appropriate treatment of elements and spaces related to their level of significance.

Table 6.1 Appropriate treatment of elements according to significance.

Level of significance	Appropriate treatment
Exceptional	Preservation, restoration, reconstruction. Adaptation and/or interpretation where significant layout, elements or fabric are altered or missing.
High	As for above, with greater allowance for adaptation where this is in accordance with overall significance, intactness/integrity and use.
Moderate	Retention and conservation where possible. Adaptation and/or alteration permissible with heritage advice.
Little	As for moderate, with fewer constraints on removal.

Level of significance	Appropriate treatment
Neutral	Can be freely modified or removed.
Intrusive	Remove/modify to reduce adverse impacts.

The treatment of all site attributes and components (including landscape, areas, elements and fabric) should be directly related to the nature and degree of their significance with priority given to the conservation of attributes and components of highest significance.

Major aspects of significance (including landscape character, aesthetic qualities, areas, elements and fabric) should be given priority and protection in the conservation, adaptation and development of the place.

Policies
Policy 1.1—Best conservation practice The ongoing conservation and development of the place should be carried out in accordance with the principles of the Burra Charter.
Policy 1.2—Relationship to significance The statement of significance and assessments of the significance of individual elements set out in this report should guide all planning and work at the place.
Policy 1.3—Conservation in accordance with significance The components and attributes of Gosford Memorial Park and Rotary Park that contribute to their collective and individual significance (particularly historic, social and research potential significance) should be appropriately conserved and interpreted as part of the use and future changes to the place.
Policy 1.4—Damage to significant components Works that would adversely impact on significant landscape character, aesthetic qualities, areas, elements, fabric or other aspects of significance of the place should only be permitted where: • the work makes possible the recovery of aspects of greater significance; • the work helps ensure the security and continuing public use of the place; • there is no feasible alternative (eg to meet safety or legal requirements); and • the landscape character, aesthetic qualities, area, element, fabric or other aspect of significance is adequately recorded and, where appropriate, interpreted.
Policy 1.5—Statutory obligations Future change and management of Gosford Memorial Park and Rotary Park should have regard to all statutory obligations arising from their inclusion as a heritage item and an archaeological item, respectively, in the Precincts—Regional SEPP 2021.
Policy 1.6—Further research As the opportunity arises, Council should engage suitably qualified professionals to undertake additional social and oral research, to enable diverse communities to gain a better understanding of the social history and significance of Gosford Memorial Park and Rotary Park. These stories could inform future interpretation strategies.

6.2.2 Adoption and review of policies

Policies
Policy 2.1—Adoption of this CMP The conservation policies set out in this document should be adopted by Central Coast Council, as the landowner, and endorsed as a guide to future conservation, management and changes to the place.
Policy 2.2—Regular review of policies The conservation policies should be reviewed by Council at least every five years to ensure they remain responsive and relevant to the continuing evolution of the place, new uses, evolving maintenance regime and new management requirements. The conservation policies should also be reviewed when major works are proposed to ensure heritage issues and constraints are adequately addressed.
Policy 2.3—Update of registers The State Heritage Inventory listings for the parks should be updated in accordance with this CMP and when significance is reassessed. Listings on the NSW War Memorials Register should be updated with current/correct images and following any works or relocation of memorials.
Policy 2.4—Professional advice Appropriate professional advice should be obtained to help review and/or amend specific policies when required.
Policy 2.5—Integrated approach All policies should be considered as interrelated. They should be applied in an integrated rather than an isolated manner.

Specific policies may need to be amended in light of new circumstances. The first review should be carried out within five years, or when there is a proposed new use requiring new types of support infrastructure, or when major works and modifications are proposed.

The CMP should be made available in a toolkit and distributed to all parties concerned with the ongoing management and care of the place.

6.2.3 Conservation advice

The Burra Charter encourages the use of skills and appropriate professional advice from a range of relevant disciplines (Article 4.1).

The involvement of skilled and competent advisors is essential to the successful long-term implementation of this CMP. Consultant advice and contractual work on significant elements and fabric must be carried out by firms or persons with proven expertise in

conservation-related projects in the relevant field(s) such as Aboriginal cultural heritage, historical archaeology, cultural landscapes, materials conservation, etc.

Policies
Policy 3.1—Expert conservation advice Persons with relevant expertise and experience in conservation projects should be involved in the use and implementation of this CMP and the resolution of conservation issues, including the design and supervision of work.
Policy 3.2—Skilled trades Where maintenance or other works are carried out on site, use tradespeople with demonstrated experience in working with heritage fabric and significant cultural plantings.

6.2.4 Development of the place

Policies
Policy 4.1—Precinct masterplan A precinct masterplan incorporating Memorial Park and Rotary Park should be developed based on this CMP and be consistent with its assessment of cultural significance and conservation policies. The one masterplan should acknowledge the two sites/parks have different histories and different significance—the two adjoining sites should be master-planned accordingly to conserve their respective and differing significant values. For both parks it should include consideration of choices for new plantings, succession planting, phased plant removal, removal of self-seeded or inappropriate plants, rationalisation of groundcovers, general landscaping, weed control, and climate change mitigation. For Memorial Park, the masterplan should consider the removal of intrusive elements, the removal or remodelling of the central podium, rationalisation of memorial plaques and the upgrade of park amenities and access. For Rotary Park, the masterplan should consider the repair and reinstatement of the fountain to working order as the preferred option, removal of intrusive elements, and park usage patterns. This masterplan should also consider integrating the Dane Drive public reserve into Rotary Park.

6.2.5 Ownership and approvals

Policies
Policy 5.1—Ownership The ownership of the site should continue to remain with Central Coast Council. The memorials in Gosford Memorial Park should be managed in consultation with Gosford RSL Sub-Branch. The Rotary Club time capsule should be managed in consultation with the Gosford Rotary Club. If the ownership and management requirements of the parks change, the policies of the CMP must be reviewed in accordance with Policy 2.2. New policies will need to be developed to ensure that the significance of the parks is retained and managed in accordance with their respective significance.

6.2.6 Managing change

A competent and coordinated decision-making process is required to develop and maintain the place, and manage change within the place and at adjacent precincts.

Photographic and/or video recording of the place contributes to our understanding of the place and can record its significant values at a moment in time before major change occurs. Before any major change occurs at the parks, an archival recording should be undertaken and catalogued for Central Coast Council as the asset owner, in accordance with Heritage NSW's most recent guidelines.

Policies
Policy 6.1—Flexible approach The management of the parks should be sufficiently flexible to accommodate evolving operations of the continuing use or future compatible use, while maintaining a high standard of conservation management.
Policy 6.2—Professional advice The process for obtaining approval should conform to statutory requirements and processes. Major proposals for change should involve careful design and thorough heritage impact assessment. Where approvals may be needed for works affecting significant landscape features, built elements or distinct areas/zones, early consultation should occur with the relevant approval authorities. Development proposals by Central Coast Council affecting Council-owned properties would still require approval from the relevant consent authorities.
Policy 6.3—Archival recording Major proposals for change should be preceded by a photographic and/or video archival recording, as appropriate, of Gosford Memorial Park and Rotary Park including their setting and immediate environs.
Policy 6.4—Documenting change For any future works, ensure that Council collates, maintains and archives relevant records (digital and hard copies) such as drawings, schedules of work, photographs and all professional reports.

6.2.7 Current and future use

Policies
Policy 7.1—Consistent approach irrespective of use The policies set out in this part of the CMP should be applied irrespective of the uses of the place.
Policy 7.2—Evaluating potential uses In evaluating potential uses for Gosford Memorial Park and Rotary Park, the approach should, where possible, ensure that the parks retain their significance and character.

Policies
Policy 7.3—Compatible uses The primary function of Gosford Memorial Park and Rotary Park should continue to be public open spaces for passive recreation. Gosford Memorial Park has been used as a town park and commemorative location since the late 1880s. Remembrance services held in the park are inherent to its historical and social values and the place should continue to be used for this purpose. Other services, community activities and infrastructure facilities that are consistent with its historical use and do not cause substantive heritage impacts may occur at the place in keeping with the policies in this CMP.
Policy 7.4—Incompatible uses Uses requiring subdivision, permanent partitioning of significant spaces or landscape zones that would have an adverse impact on the significance and character of the place are unacceptable. The merging of Gosford Memorial Park and Rotary Park should not occur due to their unique heritage values and histories.
Policy 7.5—Name of the place Although historically, Gosford Memorial Park was known as 'Gosford Park', the place should be called 'Gosford Memorial Park' to recognise its significant historic use as a place for memorialisation and remembrance. Should there no longer be commemorative uses at the park, the name should be changed back to 'Gosford Park'. The name 'Rotary Park' should remain.
Policy 7.6—Visitor use and experience Any proposals for events, visitor facilities or streams of revenue should be compatible with Gosford Memorial Park and Rotary Park's heritage values. All activities and events should not result in adverse impact to significant fabric, landscape and spaces/zones. Minor temporary impacts from activities and events may be acceptable provided they are reversible without causing unreasonable damage during their removal/reversal.

6.2.8 Heritage interpretation

Policies
Policy 8.1—Interpretation strategy An interpretation strategy should be developed to communicate the history and heritage values of Gosford Memorial Park and Rotary Park to visitors and the community. All visitors should be offered the opportunity to learn about the site's historical cultural heritage values through interpretation.
Policy 8.2—Interpretation plan An interpretation plan should be developed for Gosford Memorial Park and Rotary Park to implement the interpretation strategy (Policy 8.1 above). The interpretation plan should be based on this CMP and be consistent with its assessment of cultural significance and conservation policies. It should draw on documented and oral social histories, cultural plantings, archaeological and other evidence that communicates the development of the parks. The interpretation plan should recommend the most suitable options for interpretation including contemporary interpretive means, innovative technologies (eg light and soundscapes),

Policies
temporary and permanent means, etc. Ensure the interpretation means/media are unobtrusive, designed as part of the landscape and do not clutter the parks. The interpretation plan should be prepared by heritage interpretation specialists with the appropriate skills, knowledge and experience in interpreting comparable heritage places. Signage at the two parks should be integrated with heritage interpretation to enhance public appreciation and visitor experience. The signage should also clearly identify the existence of the two adjoining but different parks.
Policy 8.3—Inclusivity An inclusive and broad range of stories should be presented specific to each of the parks, reflecting their respective significance. Stories related to sensitive topics such as fallen war service personnel and First Nations connections should be developed in consultation with relevant stakeholders.

6.2.9 Maintenance

Policies
Policy 9.1—Maintenance Cyclical maintenance of significant landscapes, plantings and memorials should be undertaken as part of day-to-day site management.
Policy 9.2—Skilled professionals Appropriately skilled heritage personnel (such as materials conservators and stonemasons) should be involved in documenting, supervising and implementing maintenance works on significant fabric.
Policy 9.3—Maintenance plan A maintenance plan should be developed for Gosford Memorial Park and Rotary Park. This plan should include a description of tasks, when or how often they should occur, how they should be done, who is responsible for them and whether specialist expertise is required.
Policy 9.4—Register of works A register should be kept and maintained by Council to record all regular preventative maintenance works, as well as any structural or safety issues as they arise.

6.2.10 Sustainability

Sustainability and risk management involve balancing environmental, cultural, social and economic demands to deliver intergenerational equity—meeting the needs of current generations without compromising the needs of future generations.

Policies
Policy 10.1—Sustainable management of the parks The heritage values of Gosford Memorial Park and Rotary Park should be sustainably managed and used to meet the needs of present and future generations. Continued addition of memorials without a management plan is unsustainable.

Policies
Policy 10.2—Environmental sustainability
Environmentally sustainable initiatives should comply with all relevant statutory approvals and be installed in less significant areas of Gosford Memorial Park and Rotary Park.
Regular park maintenance should be carried out to maintain the condition of significant landscapes, plantings and memorials.
Drought-resistant plantings should be considered for all new additions.
Sustainable water and energy management methods should be considered before considering the repair, reinstatement and operation of the Rotary Park fountain.
The advice of a suitably qualified heritage professional should be sought at an early stage to determine the suitability of proposed initiatives to improve the design.
Policy 10.3—Mitigating the predicted effects of climate change on significant fabric
Assess how predicted changes in the climate may affect the parks' significant elements, especially significant trees, in the medium and long term.
Develop management practices that respond to and mitigate the predicted effects of climate change on the parks' significant elements. This includes, but is not limited to, drought resistance, heat management and response to damaging weather events.

6.3 Specific conservation policies

6.3.1 Existing landscape and built elements

Policies
Policy 11.1—Conservation of physical fabric
Maintain built elements including the Gosford Cenotaph, Boer War Memorial and other memorials in good condition according to a maintenance plan.
Elements of exceptional and high significance should be retained and conserved as far as practicable.
Elements of moderate and little significance may be retained and conserved where possible.
Removal of significant fabric should only occur where it allows for the conservation of fabric of greater significance or is essential for conservation of the parks overall.
Policy 11.2—Conservation of cultural plantings
Cultural plantings should be managed in accordance with their assessed significance.
Policy 11.3—Scheduled monitoring
Gosford Memorial Park and Rotary Park should be monitored and professionally reviewed periodically to ensure that significant cultural plantings, memorials, built and landscape elements are being appropriately maintained.
Policy 11.4—Conservation of original elements
All original and early elements in Gosford Memorial Park and Rotary Park should be retained in accordance with their level of significance and unless stated otherwise in these policies.
Conservation works should be undertaken to ensure the longevity of early and original elements followed by periodic maintenance.

Policies

Damaged or deteriorating elements should be repaired in the first instance, or replaced like-for-like if repair is not possible.

Retain key attributes of significance including but not limited to the:

- promontory of land on which Gosford Memorial Park resides, including the western slopes;
- Gosford Cenotaph and Boer War Memorial; and
- Lone Pine tree, Hoop Pine (near Boer War Memorial), mature fig specimens along Mann Street, the Moreton Bay Fig at the southern end of Memorial Park, regrowth endemic eucalyptus on the southern cliff of the promontory and other plantings of exceptional and high significance indicated in Section 4.

Policy 11.5—Elements of exceptional significance

Elements of exceptional significance are elements that directly contribute to the overall significance of the place. These elements must not be obstructed by new structures or services and must remain clearly visible.

Damaged elements of exceptional significance should be repaired with sympathetic materials.

Policy 11.6—Elements of high significance

Elements of high significance have a high degree of original fabric and demonstrate key aspects of the heritage values of the place. These elements must not be obstructed by new structures or services and must remain clearly visible.

If part removal or part alteration of elements of high significance is crucial for a viable and compatible new use for the parks, this could be considered with appropriate input from heritage professionals.

Policy 11.7—Elements of moderate significance

Elements of moderate significance have been altered or no longer demonstrate key aspects of the heritage values of the place, yet still contribute to the overall significance of the place. Some change is acceptable as long as elements of high or exceptional significance are retained.

Policy 11.8—Elements of little significance

Elements of little significance do not substantially contribute to the heritage values of the place. They may be elements that have been irreversibly altered or may have been added during later phases. Changes to elements and spaces of little significance are acceptable.

Policy 11.9—Elements of neutral significance

Elements of neutral significance do not contribute to the heritage values of the place and do not detract from them. Changes to elements of neutral significance are freely acceptable.

Policy 11.10—Removal of intrusive elements

Intrusive elements identified in this CMP should be removed when the opportunity arises. Essential services could be replaced with more sympathetic materials or technologies.

Policy 11.11—Memorials and movable items in Gosford Memorial Park

Where a memorial plaque is location-specific—for example, it is associated with a memorial tree or similar cultural planting—the plaque should remain in situ. The fabric of the plaque and plinth may be updated and modified provided it is not of high or exceptional significance.

Consider consolidating memorials and movable items not associated with a cultural planting into one area to improve access and ease of management. For these items, the memorial plaques

should be conserved even if they were to be relocated; their plinth, however, may be altered or removed.

Policies

Policy 11.12—Memorials in Rotary Park

The Rotary Club's time capsule, which is to be opened on Australia Day 2088, should remain in situ whether within the existing fountain pool (now defunct), integrated into a new public artwork or, alternatively, relocated to elsewhere within Rotary Park. If proposed to be relocated, this should be done in consultation with the Gosford Rotary Club.

The temporary Poppy Sculpture may be removed and replaced with a new feature or artwork that interprets the significance of the place, if desired.

The Australian Women's Land Army plaque—associated with the Norfolk Island Pine—should remain in situ.

Policy 11.13—Former memorials and movable items

Former memorials and movable items such as war trophies may be reinstated in Gosford Memorial Park. The provenance and significance of these items should be assessed and considered before returning them to an original or new location.

6.3.2 New works to suit existing use or future use

Policies

Policy 12.1—Subdivision of land

The existing Gosford Memorial Park and Rotary Park must not be subdivided.

There are opportunities to consolidate their relevant parcels of land in a deposited plan—to be consistent with their respective heritage curtilages and policies in Section 6.3.3.

Policy 12.2—New buildings

Buildings should not be sited in Gosford Memorial Park.

Likewise, due to matters concerning the setting of Gosford Memorial Park with reciprocal views to Brisbane Water, additional buildings should not be sited in Rotary Park. The existing toilet block may be replaced as long as the proposal complies with other policies in this CMP.

Policy 12.3—New park amenities and structures

Appropriately located park amenities (such as toilets, picnic shelters, shade structures and playground equipment) may be acceptable within Rotary Park and the adjoining public reserve. Such structures should not be visible from the Memorial Park and should not dominate views to the Memorial Park promontory from the south.

The scale, form and materiality of new structures should be sympathetic to the heritage values of the parks and existing fabric. Note that while flagpoles are used occasionally (temporary ceremonial use), they are permanent structures that should also comply with the conservation policies in this CMP.

Policy 12.4—New memorials in Gosford Memorial Park

New memorial plaques and their 'mountings' sited in an ad hoc manner around Gosford Memorial Park should be avoided.

Refer to other policies in this CMP for the consolidation of existing and new memorials at an element and location that has more equitable access.

The addition of new memorials (including memorial plaques to the Cenotaph) requires approval from the consent authority.

Policies
Policy 12.5—New memorials in Rotary Park New memorials not associated with the history and heritage significance of Rotary Park should not be placed in this park. The addition of new memorials requires approval from the consent authority.
Policy 12.6—Conservation and upgrades Appropriately sensitive conservation and new works can be undertaken where they enhance public appreciation of the place and do not impact upon the significance of the place, including: • removal of intrusive elements and plantings; and • introduction of new services to rationalise existing ad hoc services, improve the amenity of the place, and comply with provisions in the Building Code of Australia (in the National Construction Code). Refer to Section 6.3.5 for compliance with DDA requirements. Upgrade works must comply with other policies in this CMP.
Policy 12.7—New services The type, scale, form, materiality, location and reticulation of new services (eg electrical, mechanical, plumbing, drainage, traffic control, etc) should be sympathetic to the heritage values of the parks including their archaeological resource.
Policy 12.8—Reversibility of new work New work should be reversible and should enable subsequent removal with little or no damage to significant fabric and landscape values. New landscape works (including new plantings) must comply with other policies in this CMP—refer to Sections 6.2.10 and 6.3.1 for landscape management.

6.3.3 Curtilage and setting

The setting is the physical environment of a place that contributes to its character.

Policies
Policy 13.1—Curtilage The respective curtilages of Gosford Memorial Park and Rotary Park should be clearly defined. There are opportunities to consolidate their relevant parcels of land in a deposited plan—to be consistent with their respective heritage curtilages. The curtilage of Rotary Park to incorporate the adjacent Dane Drive public reserve should be subject to the recommendation in the masterplan for Rotary Park—refer to Policy 4.1.
Policy 13.2—Landscape New landscaping is acceptable in conjunction with a compatible future use where it is designed to be sympathetic to the significance of the place.
Policy 13.3—Retaining significant views Retain and enhance important views and vistas, visual qualities and landscape character of the site. Avoid tree planting that would conceal significant views. New plantings must be planned to reinforce significant views across and throughout the two parks, and from outside in. The growth habits and forms of all new plantings must be taken into consideration to ensure significant views are not compromised.

Policies
Policy 13.4—Re-establishing significant views Seek to re-establish key significant views by making their recovery part of the pruning/ maintenance regimes and planting plan. Consider preparing a detailed strategy for recovering key views. Measures may include selective pruning or replacement, transplanting vegetation that is blocking views where feasible, changes to garden beds, etc. Appropriate pruning of trees is to be undertaken on a regular basis to maintain significant views into and out of Gosford Memorial Park. Such work should be undertaken by experienced and qualified professional arborists.
Policy 13.5—Parking Carparking should be located along the northern (Vaughan Avenue) and eastern (Mann Street) boundaries of the park and not disrupt the historical view of Gosford Memorial Park to and from Brisbane Water.

6.3.4 Signage and wayfinding

Policies
Policy 14.1—Signage Signage should identify both Gosford Memorial Park and Rotary Park and their boundaries.
Policy 14.2—Identification of memorials and wayfinding Improve identification of memorials and visitor wayfinding for memorials.

6.3.5 Accessibility

Policies
Policy 15.1—Public access to the parks The parks are generally accessible to the public. The social heritage value of the parks relates to their ongoing use by the public. Ensure equitable access to Gosford Memorial Park and Rotary Park is maintained and enhanced. Accessibility solutions should be designed with consideration to minimising impact on significant fabric and values. Accessibility solutions should be informed by a masterplan. The precinct masterplan for Memorial Park and Rotary Park should be coordinated and interrelated with masterplans for adjacent precincts such as Gosford Waterfront Reserve and Gosford Public Wharf.
Policy 15.2—Accessibility upgrades Where necessary upgrades (eg those required to comply with the DDA standards) require physical intervention, heritage professionals should be consulted to identify the least intrusive way of achieving this.

Policies
Policy 15.3—Access to memorials Consider grouping memorials to improve accessibility and minimise the need for hard-paved DDA-compliant paths throughout Gosford Memorial Park.
Policy 15.4—Circulation Ensure accessibility issues around the parks are assessed and solutions are planned rather than implemented in an ad hoc way. Additional methods and interventions to improve site accessibility should continue to be investigated. Accessibility methods should be weighed against heritage considerations.
Policy 15.5—Fences and handrails Haphazard fencing, handrail design and edging fabric should be avoided. New fencing and handrail additions should be informed by a masterplan.
Policy 15.6—Lighting New light poles and floodlighting in the Memorial Park, to suit heritage-significant, utilitarian and amenity items (informed by a masterplan), should be considered. This could include the replacement of the above-ground floodlights and light cages for the Cenotaph (in association with the re-establishment of its original immediate setting) with in-ground recessed lighting units.

6.3.6 Aboriginal cultural heritage

Aboriginal cultural heritage and sites have statutory protection under the NPW Act. Based on the assessment in this CMP, the study area contains one registered Aboriginal site (AHIMS ID 45-3-4824) and holds low sensitivity for subsurface Aboriginal archaeological deposits.

Policies
Policy 16.1—Identification of Aboriginal cultural heritage values Aboriginal people are the primary determinants of their own heritage. Any future investigations into the potential Aboriginal cultural heritage values that may exist at Gosford Memorial Park, Rotary Park and the public reserve should include consultation with the relevant Aboriginal stakeholders and the Aboriginal community with the goal of protecting and conserving known (ie AHIMS site 45-3-4824) and potential Aboriginal sites. Consultation should follow the guidelines presented in *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*.
Policy 16.2—Statutory obligations relating to Aboriginal cultural heritage Any future development involving ground-disturbing works should comply with the relevant statutory requirements and Heritage NSW guidelines relating to Aboriginal objects and Aboriginal cultural heritage. Due to the presence of the registered Aboriginal site within the study area (site 45-3-4824), any ground-disturbing works within the mapped extent of this site must be subject to an AHIP under section 90 of the NPW Act. An ACHAR would need to be prepared for the proposed works. Consultation should occur with relevant Aboriginal stakeholders about any proposed project or works that may impact on areas of Aboriginal archaeological sensitivity or cultural significance. This consultation should follow the guidelines presented in *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*.

Policies
Low impact activities (as identified under Section 58 of the NPW Regulation 2019) can proceed subject to caution, without an AHIP. Works outside the registered AHIMS site 45-3-4824 can proceed subject to caution.
Policy 16.3—Further investigation and reporting Further investigation and reporting of the Aboriginal cultural heritage and Aboriginal archaeological potential of the study area should be undertaken, with a focus on registered site 45-3-4824. The nature of any Aboriginal cultural heritage sites should be investigated to inform heritage management strategies for the study area. Further investigation into the nature and extent of midden site 45-3-4824 is required to ascertain whether the shell material is cultural in nature. A previous attempt to de-register the site on AHIMS has been made, which was rejected by Heritage NSW due to insufficient evidence. Further investigation should be undertaken by a suitably qualified archaeologist, and must involve Aboriginal community consultation, as identified in Policy 16.1 above. This investigation could take the form of an ACHAR for the entirety of the study area, produced in accordance with the relevant Heritage NSW guidelines. This ACHAR could in turn be used as the basis for an AHIP application for any ground-disturbing works associated with archaeological testing and/or future development that may impact site 45-3-4824.

6.3.7 Historical archaeology

Historical archaeological 'relics' have statutory protection under the Heritage Act. Based on the assessment in this CMP, the study area has the potential for relics of local significance associated with former use of the site as a roadway and public parkland. Archaeological deposits relating to the site will be limited; however, the reclamation of the foreshore during the 1880s and 1930s may have capped earlier archaeological features along the foreshore.

Policies
Policy 17.1—Archaeological impact assessment Where substantial impacts to historical archaeological remains ('relics') cannot be avoided in areas of moderate to high potential, an archaeological impact assessment should be prepared by a qualified archaeologist to provide a methodology to manage the potential impacts to any archaeological resource. The State Heritage Inventory listing for the 'Rotary Club Fountain and Garden' (Precincts—Regional SEPP 2021, Item A9) notes there is a high archaeological potential for remains associated with former wharfage. It is noted that: • Approval under Section 140 of the Heritage Act may be required prior to the commencement of works. • Minor excavation works—including works requiring archaeological monitoring and archaeological testing—within Gosford Memorial and Rotary Parks may qualify for a Section 139(4) self-assessed excavation permit exception, providing there is no disturbance to state significant historical archaeological 'relics'. • All contractors and subcontractors should be made aware of their obligations in relation to the potential historical archaeological 'relics'.

Policies
Policy 17.2—Unexpected heritage finds protocol If unexpected or significant archaeological remains are discovered during works at Gosford Memorial and Rotary Parks, all works in this area should cease and Heritage NSW must be notified in accordance with Section 146 of the Heritage Act. Further assessment and approvals may be required.

Implementation plan

7 Implementation plan

This section sets out action plans for implementing the conservation policies discussed in Section 6 of this CMP. The following actions are based upon the principles of the Burra Charter. These actions are not prescriptive but should guide Council in prioritising, implementing and achieving the objectives of the conservation policies.

Table 7.1 Priority levels of actions necessary to conserve Gosford Memorial Park and Rotary Park.

Priority	Timing	Action
High	<1 year	Actions needed to rectify problems that could cause immediate risk of damage, loss or detriment to significant fabric, areas or landscape.
Medium	1–5 years	Actions that should be planned and implemented within 1 to 5 years in order to reduce the risk of damage, loss or detriment to significant fabric, areas or landscape.
Low	5–10 years	Actions forming part of a longer term management or maintenance strategy, to maintain and enhance significance.
Ongoing		Actions to be commenced within the year and implemented cyclically or continuously in line with work programs.

Table 7.2 Action plan for policy implementation.

Action	Priority	Relevant policy
Adopt this CMP as the basis for managing Gosford Memorial Park and Rotary Park.	High	2.1
Following the formal adoption of this CMP by Council, update the NSW State Heritage Inventory listings in line with Policy 2.3.	High	2.3
Establish a coordinated management framework for memorials and movable items with Gosford RSL Sub-Branch and the Rotary Club.	High	5.1, 11.11, 11.12, 11.13
Update Council's significant tree register with further detail about the Memorial Park, including the regrowth eucalypts on its southern fringe.	High	-
Commission an arboricultural assessment of Memorial Park, if it has not yet been prepared.	High	
Review the arboricultural assessment (including safe use life expectancy findings) for all major trees in the parks, based on the	High	-

Action	Priority	Relevant policy
heritage significance findings of this CMP. Such an assessment should provide best practice pruning guidelines for major specimens throughout the parks. This should include root mapping of all major trees in the vicinity of the Memorial Park's central podium.		
Update the photograph of the Sister Sumner memorial tree on the NSW War Memorials Register listing, noting that the existing image is incorrect.	High	2.3
Commission a precinct masterplan incorporating: 1. Gosford Memorial Park; and 2. Rotary Park and Dane Drive public reserve. Masterplanning of each of the two sites should reference each other, consider multiple design options for the Memorial Park podium zone and be principally based on the significance findings, features and fabric uncovered through archaeological investigations, opportunities/constraints, and conservation policies in this CMP.	Medium	4.1
Commission detailed landscape design and specifications for the preferred masterplan options for both parks.	Medium	-
In association with the development of a precinct masterplan (above), commission the preparation of a senescence planting strategy for the parks—chiefly the Memorial Park. This should consider the design proposal for selective tree removal around the northern, western and southern edges of the park, so as to re-establish views to Brisbane Water and the option for reincorporation of prominent conifer specimens used in the original layout of the park in the late 1880s.	Medium	-
Commence selective tree removal within and abutting the Memorial Park site, to re-establish views between the park and Brisbane Water, in accordance with the senescence planting strategy for the parks (above).	Medium	13.4
Commission construction projects in the Memorial Park eg podium upgrade, footpath installation, new stairs to Rotary Park and	Medium	-

Action	Priority	Relevant policy
relocation/consolidation of memorial plaques, in accordance with the Gosford Memorial Park Masterplan (above).		
Prepare an integrated heritage interpretation strategy for Gosford Memorial Park and Rotary Park.	Medium	8.1
Prepare an integrated heritage interpretation plan for Gosford Memorial Park and Rotary Park.	Medium	8.2
Consider physical connectivity options between the Memorial Park and the war memorial in the grounds of St Mary's Anglican Church.	Low	-
Gosford Memorial Park has little potential to yield additional information that would contribute to an understanding of NSW's history. Site investigations and further research may, however, be able to uncover aspects relevant to local history—for example, ground penetrating radar survey may resolve the location of original pathway alignments through the reserve. Exploratory investigations around the Cenotaph and Boer War Memorial may be able to confirm the original finished ground level around these monuments, which could be re-established in a new masterplan.	Low	-
The arboricultural assessment (above) is to be updated at two-yearly intervals.	Ongoing	
Maintain Gosford Memorial Park and Rotary Park in good condition and undertake cyclical maintenance of significant landscapes, plantings and memorials.	Ongoing	9.1, 9.2, 9.3, 9.4
Review and update, if necessary, the conservation policies of this CMP every five years.	Ongoing	2.2
Remove elements identified as intrusive as they are no longer required.	As required	11.10