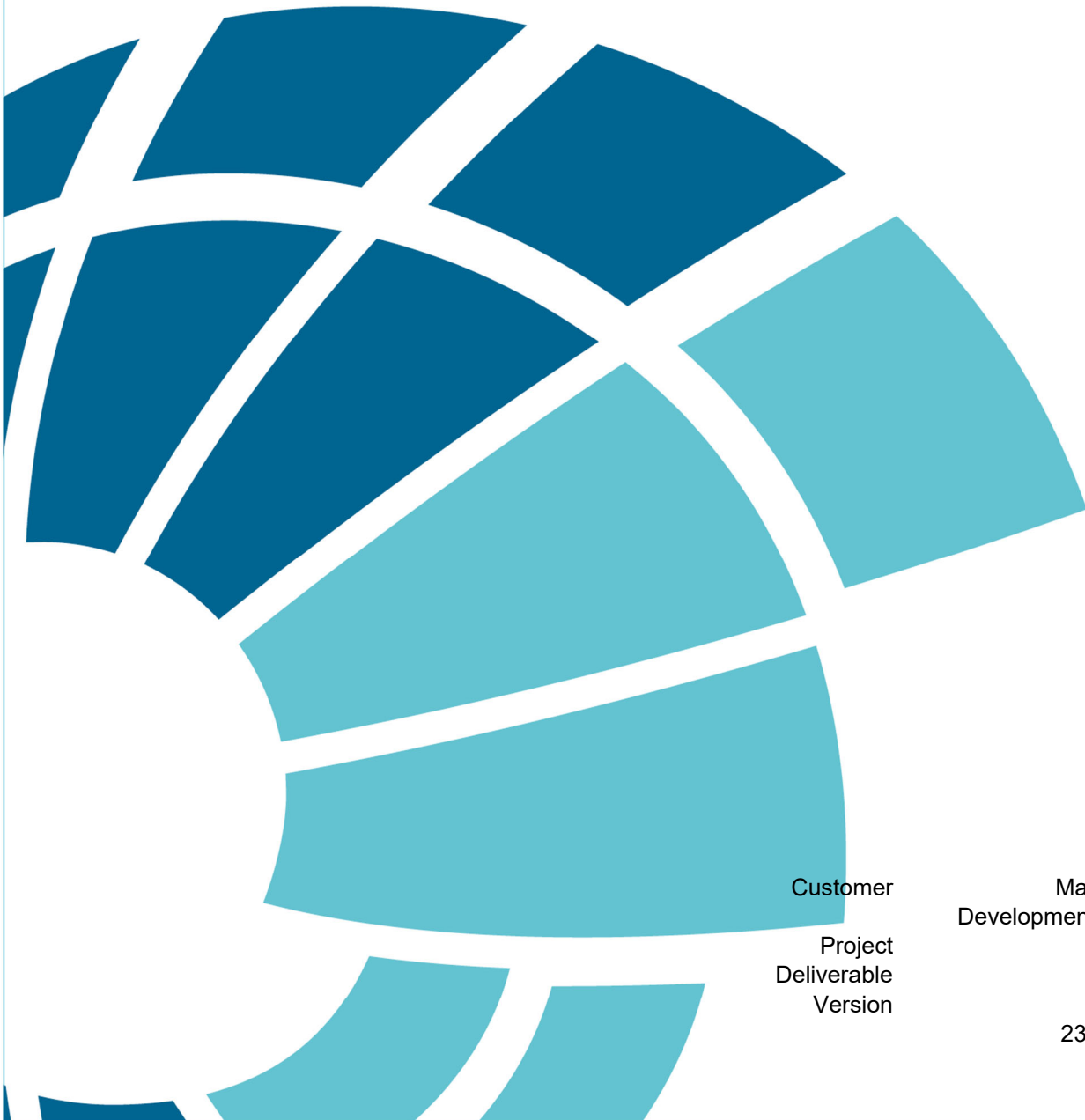


Macquarie Point Overland Flood Assessment



Customer

Macquarie Point
Development Corporation

Project
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1 Introduction

1.1 Purpose of the Report

This report presents the findings of a flood hazard risk assessment to support the development of responses to the Tasmania Planning Commission (TPC) Guidelines: *Macquarie Point Multipurpose Stadium Project of State Significance* (the Guideline). This report specifically responds to the Guideline section: 8.7.1 overland flooding.

The purpose of the report is to develop a better understanding of the exposure of the Macquarie Point Multipurpose Stadium Project Site (Project Site) to flooding under current and future climate scenarios. If hazards are identified, the potential effects on the Project Site, potential effects on public health and measures to manage the risks (including emergency management) are to be reported.

Outcomes of this assessment are presented, based on previous studies and new site-specific analysis.

1.2 Site Description

The Project Site is located at the foreshore of Macquarie Point in Sullivans Cove, bound to the south by Evans Street, west by Davey Street, Hobart Cenotaph to the north, and Port of Hobart to the east and north-east adjacent to the River Derwent forming part of the TasPorts Macquarie Wharf. The Project Site slopes gently south-southeast towards Evans Street and the Port of Hobart. It is understood that the proposed development is to be delivered across three broad stages delivering mixed-use precinct with the Project Site being approximately 9.3 hectares.

The Project Site is currently intermixed with carparking, sheds and cleared surfaces with existing structures including the Goods Shed, The Red Square and The Royal Engineers Building. The Project Site will gain vehicular access via Evans Street and two smaller, unnamed roads connected by both the Tasman Highway and Davey Street, which provides access to the existing facilities. TasPorts Macquarie Wharf is accessed via Hunter Street, which is connected to Evans Street, allowing access to the east of the Project Site.

The Hobart Rivulet traverses the northern boundary of the site from west to east before draining into the River Derwent southward of the Domain Boat Ramp.

The Project Site, boundaries and locality context are provided Figure 1.1.



Figure 1.1 Project Site and immediate locality context (Source: Macquarie Point Development Corporation, 2023)

1.3 Proposed Development

The proposed development involves the remediation, redevelopment and transition of the Project Site into a mixed-use precinct. It is understood that the precinct will include:

- 23,000 seated roofed stadium acting as a multipurpose sporting, arts, events and entertainment facility with an additional capacity for 3,500 standing patrons;
- An Aboriginal culturally informed zone;
- Mixed zoned comprising restaurants, cafes, hotels, medical facilities and commercial office space;
- Antarctic facilities including commercial spaces and connections; and
- Residential area, new public promenade and food and beverage offerings at Regatta Point.

The Project Site will be accessed via active frontages encouraging pedestrian activity, Evans Street and proposed connecting road to the north via the Residential Development and Public Foreshore Zone.

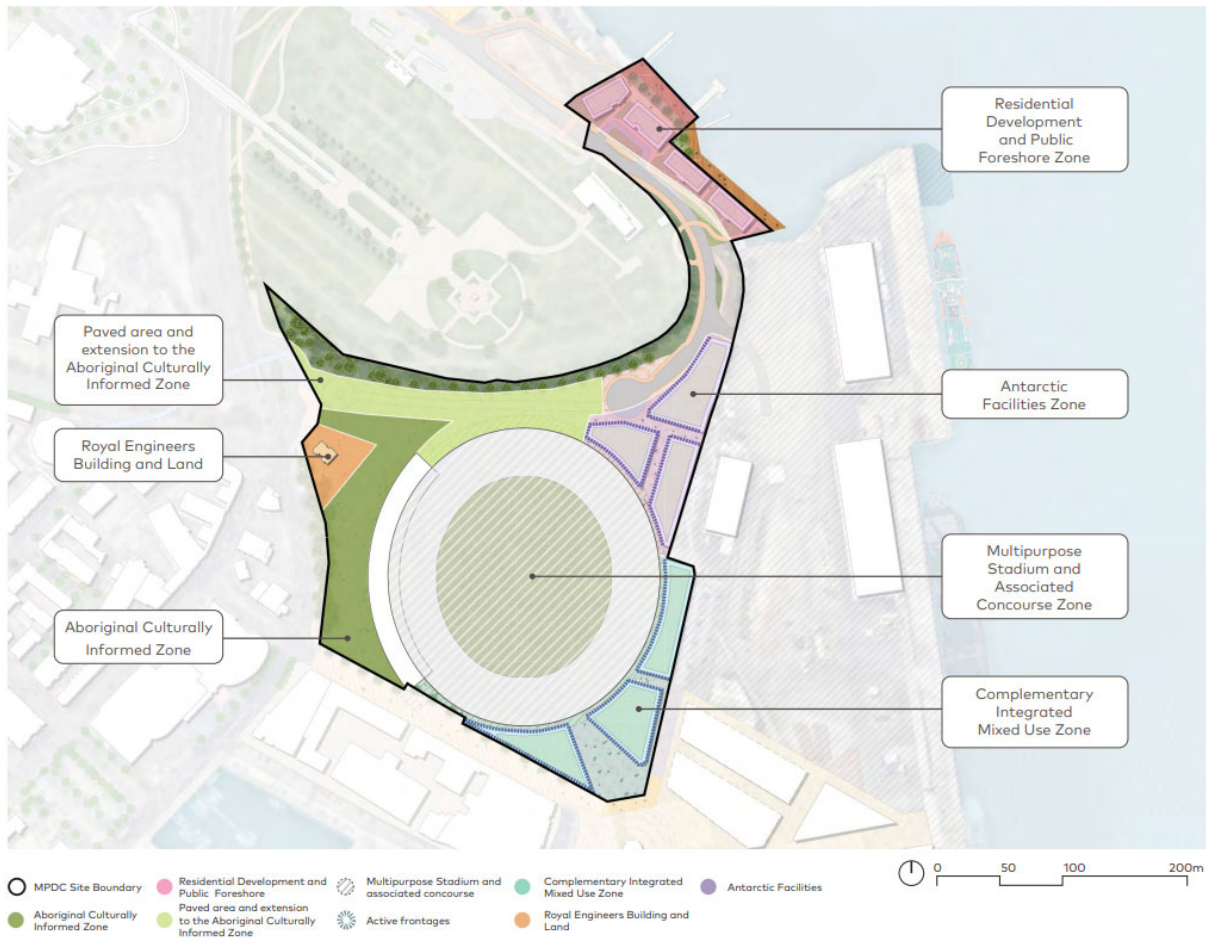


Figure 1.2 Project Site boundary and zones (Source: Macquarie Point Development Corporation, 2023)

2 Existing Flood Conditions

2.1 Overview

Available topographic datasets were combined to create a digital elevation model (DEM) of the Project Site and surrounding area. This is shown in Figure 2.1.

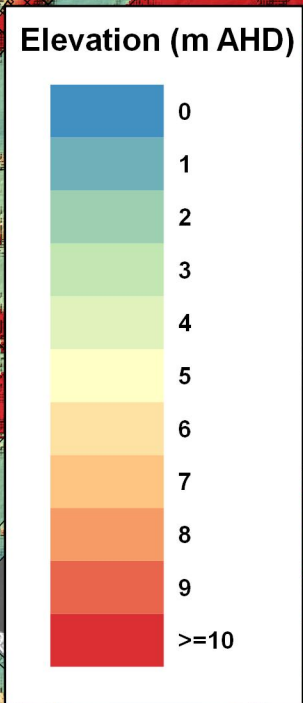
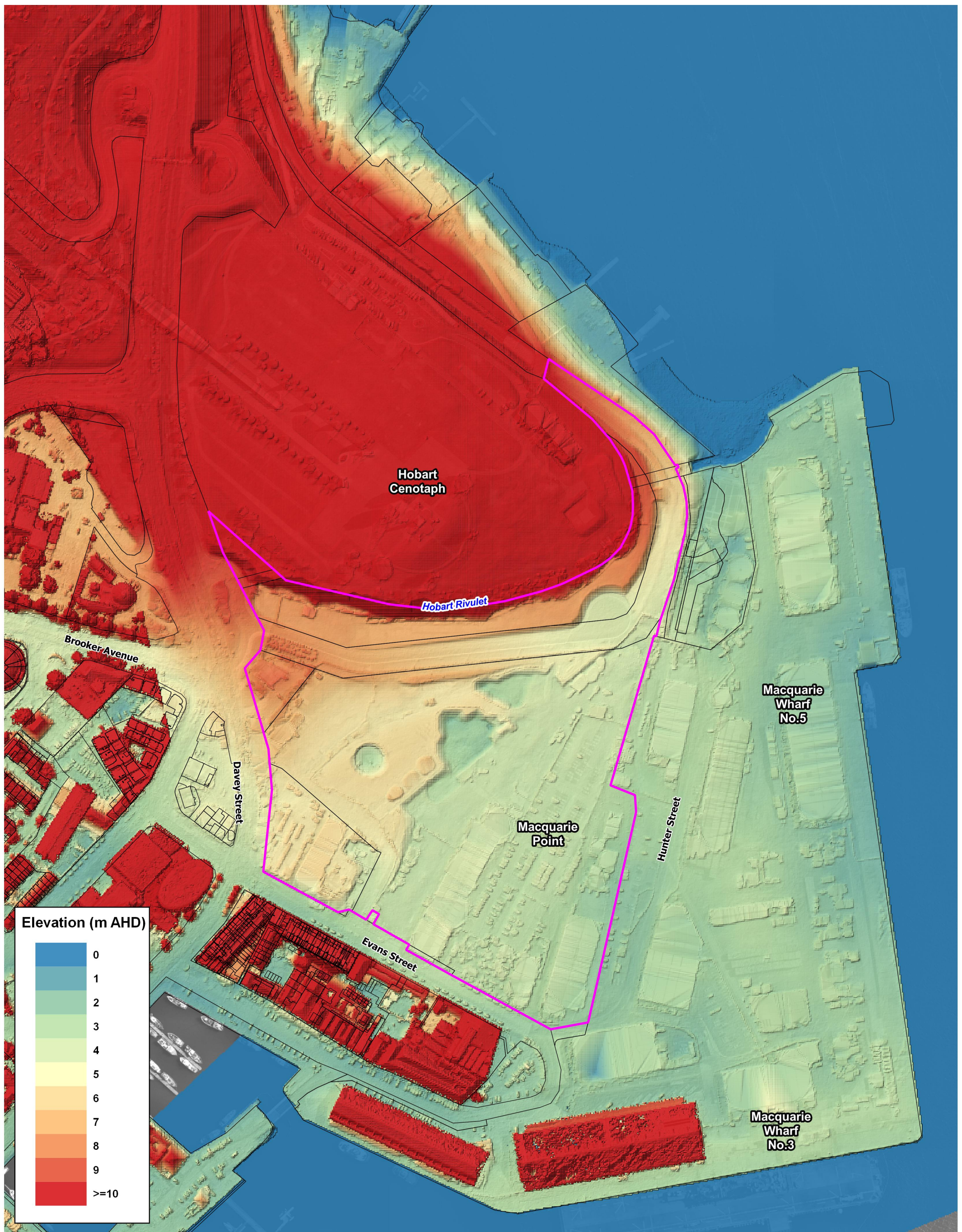
Desktop assessment of existing flood risk within and adjacent the Project Site is discussed in the following sections and was informed by:

- Existing studies including the ‘Greater Hobart Catchment Flood Hazard Study’ (Cardno, December 2019) (herein referred to as the “2019 Study” and the ‘Hobart Rivulet Flood Study (Entura, 2013) (herein referred to as the “2013 Study”).
- Development of a TUFLOW hydraulic model of the Hobart Rivulet utilising inflow conditions from the 2013 Study. The additional model was required to improve on the representation of the Project Site and surrounds, compared to previous studies, and assess hydraulic controls specific to the study location.
- Information attained from Hobart City Council Online Flood Mapping referred to as ‘Potential Inundation Hazard Areas – Modelled 2100 1% AEP Flood Areas. The mapping is described as a consolidation of previous flood studies, including the 2013 Study stated above.
 - Council provides a description of limitations of this resource on their website:
 - *“The modelling has been done at a catchment wide level and provides an indication of potential hazards but may not be accurate at a property level. Seek independent advice for your site-specific flood risk.”*

2.2 Regional River Derwent Flooding

Consideration of riverine flood risk at the Project Site due to extreme catchment flows in the River Derwent has not been included in this assessment. Given the steep topography, associated with the Hobart CBD and surrounding catchments, the Project Site has a higher susceptibility to short duration rainfall events (associated with flash flooding) rather than regional riverine flooding.

It is noted that flooding due to extreme coastal water levels in the River Derwent is considered separately in the Coastal Inundation Assessment report.



<div>Legend</div> <div><div><div></div><div>Project Site Boundary</div></div><div><div></div><div>Cadastre</div></div></div>	<div>Title:</div> <div>Project Site Topography</div>		<div>Drawing:</div> <div>2-1</div>	<div>Rev:</div> <div>A</div>
	<div>BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.</div>	<div><div><div>N</div><div></div></div><div><div>0</div><div>60</div><div>120 m</div></div></div>	<div><div><div><div></div></div><div>BMT</div></div><div>www.bmt.org</div></div>	
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2.3 Local Overland Flooding

Flood Depth, Levels and Velocity

Broad-scale flood behaviour of Hobart Rivulet, which includes the Project Site, is provided as a mapping resource on the Hobart City Council website. As previously described, the mapping surrounding the Project Site is defined by the 2013 Study along with City Wide 1% AEP flood mapping *'used to approximate flood extents through the City's overland flow paths at a whole of catchment scale'*¹.

The results, illustrated in Figure 2.2 below, have been defined utilising a TUFLOW model developed for this assessment. The model development builds on the 2013 Study utilising the inflows and structure details with the latest LiDAR and TUFLOW hydraulic modelling software. The results from this study have been used as the basis for assessing flooding at the Project Site.

Existing peak flood depths and levels, and velocities for 5%, 1% and 1% (with climate change) Annual Exceedance Probability (AEP) events as defined by the TUFLOW modelling outputs are shown in flood maps enclosed in Annex A. Flood behaviour at the Project Site from this study, as shown in the flood maps, is summarised as follows:

- During all modelled flood events, the Project Site is free from inundation aside from minor areas of inundation south of the Site along Hunter Street, between Franklin Wharf and Davey Street.
- During events including the 1% AEP and 1% AEP with climate change, flooding inundates Davey and Hunter Streets south of the Project Site, with modelled depths of less than 0.25 metres.
- The intersection of Davey and Campbell Street is exposed to significantly high velocities before flood water enters the marina. At this location peak modelled velocities can exceed 5 metres per second.
- Inundation of Davey Street results from flow originating from the constructed underground channel of Hobart Rivulet surcharging at Collins Street, at the Royal Hobart Hospital, along with upstream flow surcharging at Liverpool and Barrack Street.

On the basis of the location of the Project Site and these modelled flood results there are no expected impacts on any part of the Project Site.

¹ <https://www.hobartcity.com.au/City-services/Stormwater-and-urban-waterways/Understanding-flood-risk>



Figure 2.2 1% AEP City Wide Flood Mapping (Source: Hobart City Council Online Flood Mapping)

3 Flood-related Considerations

3.1 Flood Emergency Response

The main egress route from the Project Site is via Evans Street, Hunter Street and directly to Davey Street, and then north along Davey Street to high ground out of the floodplain. Understanding of the predicted flood risk around the Project Site and along this evacuation route is required for flood emergency response considerations. In this respect, it is noted that:

- During all modelled flood events, the Project Site is free of inundation. However, Davey Street, at the intersection of Campbell Street is predicted to be inundated by depths of inundation up to 0.5 to 0.75 metres above ground.
- During the 1% AEP event, inundation along Davey Street is contained south of Evans Street. Velocities across Davey Street south of the Site are likely to exceed 5 metres per second within low-lying areas.
- Given the prevailing catchment conditions, in the event of a Hobart Rivulet flood there would typically be limited advance warning due to the rapid onset of these "flash flooding" events. Additionally, flash flood events pass quickly, meaning conditions at Hunter and Davey Streets are likely to improve quickly after floodwaters peak.

It is noted that there is limited warning time available prior to a flood event and limited duration of inundation, primarily in the vicinity of Davey Street and Campbell Street. Impacted areas are outside of the proposed Project Site and subject to requirements of local emergency services.

Whilst there is considered to be potential for occupants of the Project Site to evacuate through flood free routes (or potentially shelter in place) during events up to and including the 1% AEP with climate change, it is recommended that operations at the Project Site cease following the issue of a major or flash flood warning for the catchment until such time that the warning is rescinded and/or flooding has receded following an event to prevent:

- Potential occupants (e.g. workers, event attendees) from attending the Project Site when a flood warning is issued prior to commencement of operation; and
- Additional people and property (e.g. vehicles) being situated on-Site or travelling to the Site (and potentially through floodwaters) during a flood event when a flood warning is issued during operational hours.

4 Conclusion

4.1 Conclusions

On behalf of Macquarie Point Development Corporation, BMT has prepared this flood risk assessment for proposed development of the Macquarie Point Precinct. The assessment defines existing on-Site flood risk based on the outcomes of Council's existing flood studies, as well as a local TUFLOW model developed to assess the Hobart Rivulet.

Key outcomes of the overland flood assessment include:

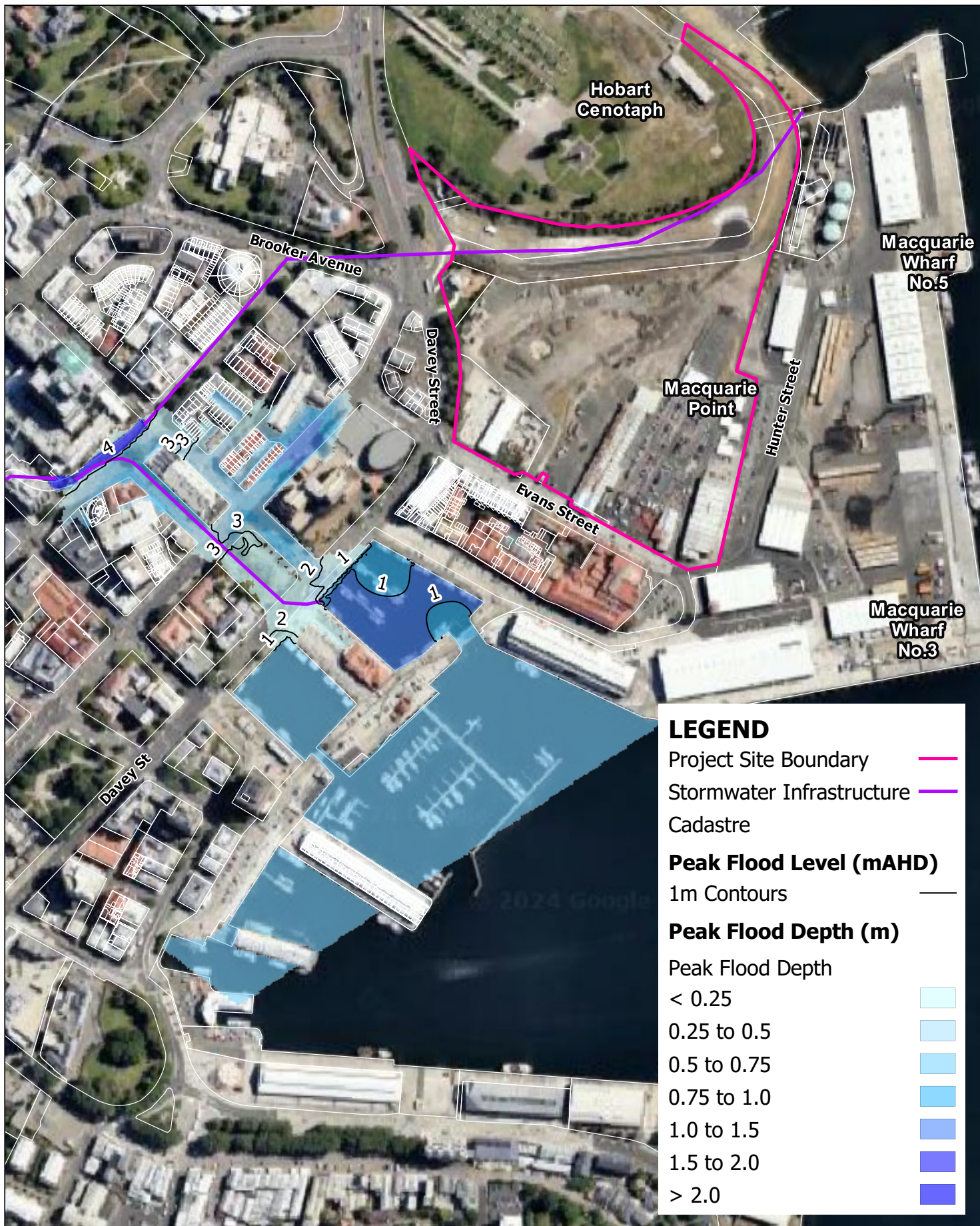
- The Project Site is predicted to be free of flooding from Hobart Rivulet, however the predicted extent of inundation is limited to events up to and including the 1% AEP with climate change flood.
- Inundation of local roads in the vicinity of the Project Site occurs during all modelled events with moderate depths and significant velocities modelled at the intersection of Davey Street and Campbell Street extending to include Hunter Street.
- The onsite flood risks are negligible, and the offsite risks can be managed through appropriate measures and procedures before, during and after a flood (subject to the requirements of local emergency services).
- There are no effects on public health or necessary measures to manage onsite risks associated with overland flooding up to and including the 1% AEP with climate change event.

4.2 Qualifications

The following qualifications and assumptions apply to the desktop flood risk assessment documented herein:

- The assessment is based on information from Council's existing flood studies (including inflow and hydraulic structures) that has been adopted and implemented into a TUFLOW hydraulic model to assess overland flooding at the Project Site. The assessment methodology, standards and tolerable levels of risk considered at the Project Site are consistent with the general floodplain management approaches adopted by Council and informed by the existing flood studies. The accuracy of this assessment is therefore dependent on the accuracy of the information provided to BMT.
- This flood risk assessment does not include any impacts that may potentially arise from the onsite stormwater drainage system. Site design has the potential to modify surface conditions and have the potential to affect previously modelled outcomes as presented in this report.

Annex A Macquarie Point Flood Study Mapping



LEGEND

Project Site Boundary —

Stormwater Infrastructure —

Cadastre

Peak Flood Level (mAHD)

1m Contours —

Peak Flood Depth (m)

Peak Flood Depth

< 0.25

0.25 to 0.5

0.5 to 0.75

0.75 to 1.0

1.0 to 1.5

1.5 to 2.0

> 2.0

Title:

Existing 5% AEP Peak Flood Levels and Depths

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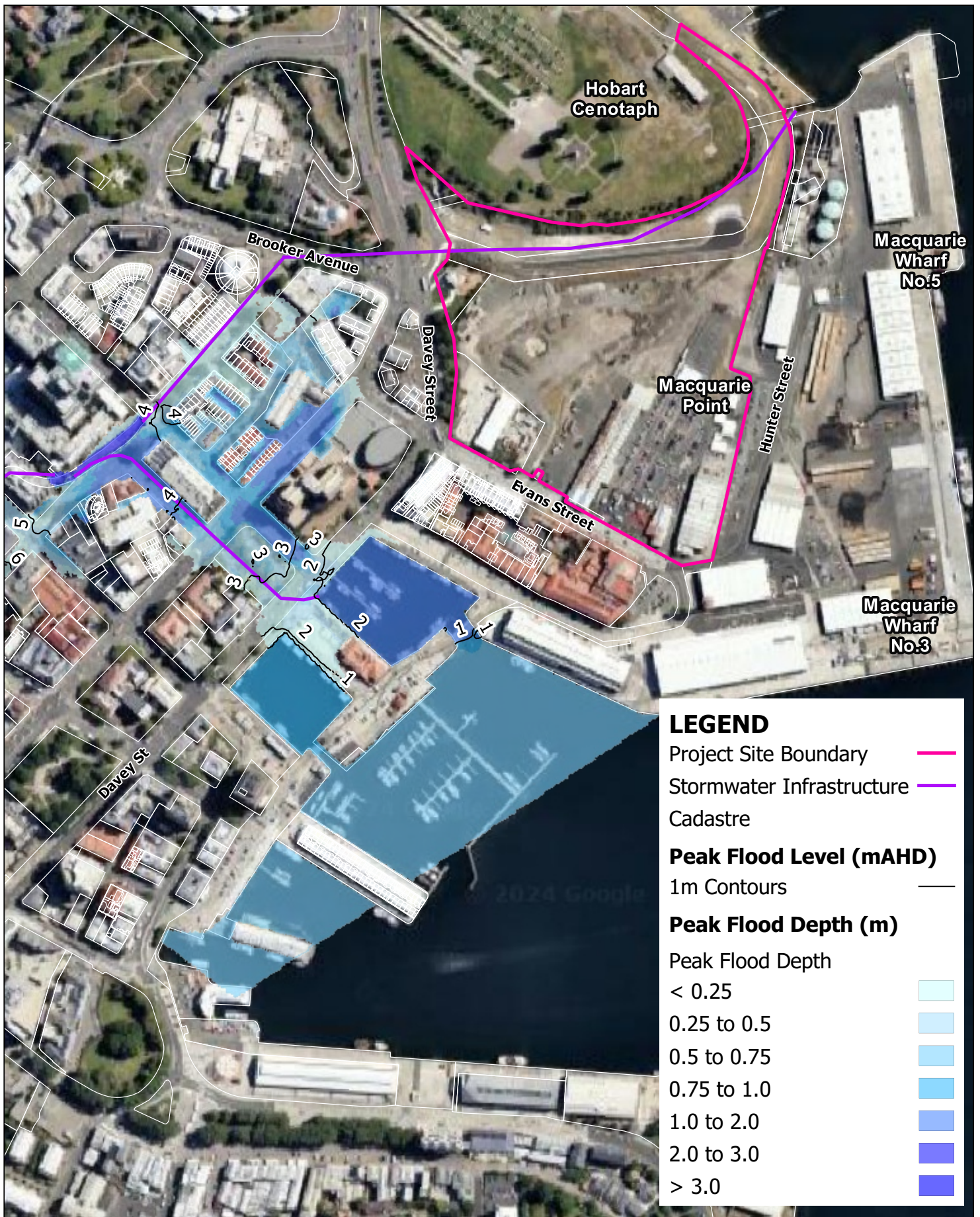
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Title:
Existing 1% AEP Peak Flood Levels and Depths

Drawing:

A2

Rev:

A

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Title:

Existing 1% AEP with Climate Change Peak Flood Levels and Depths

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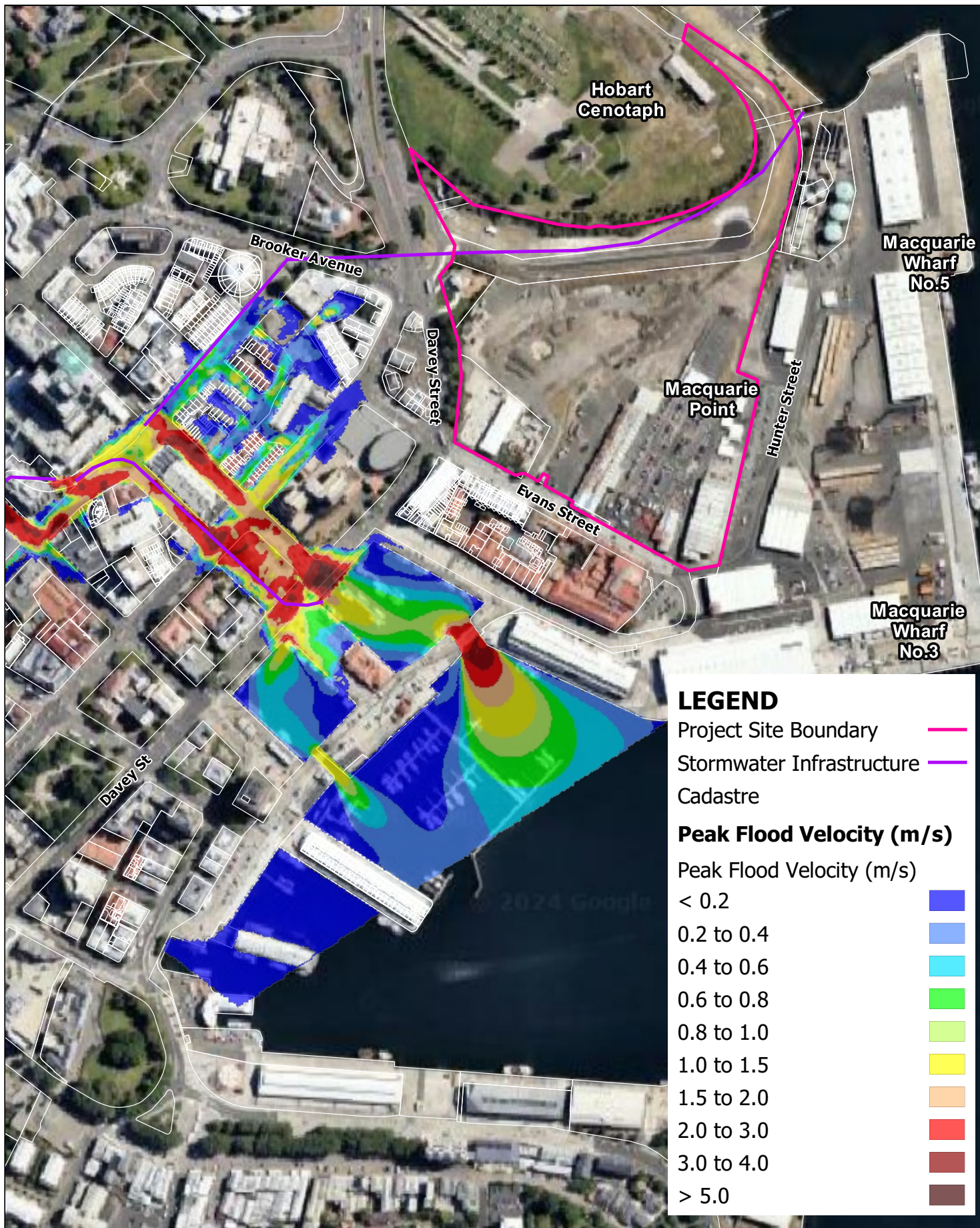
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Title:
Existing 1% AEP Peak Flood Velocities

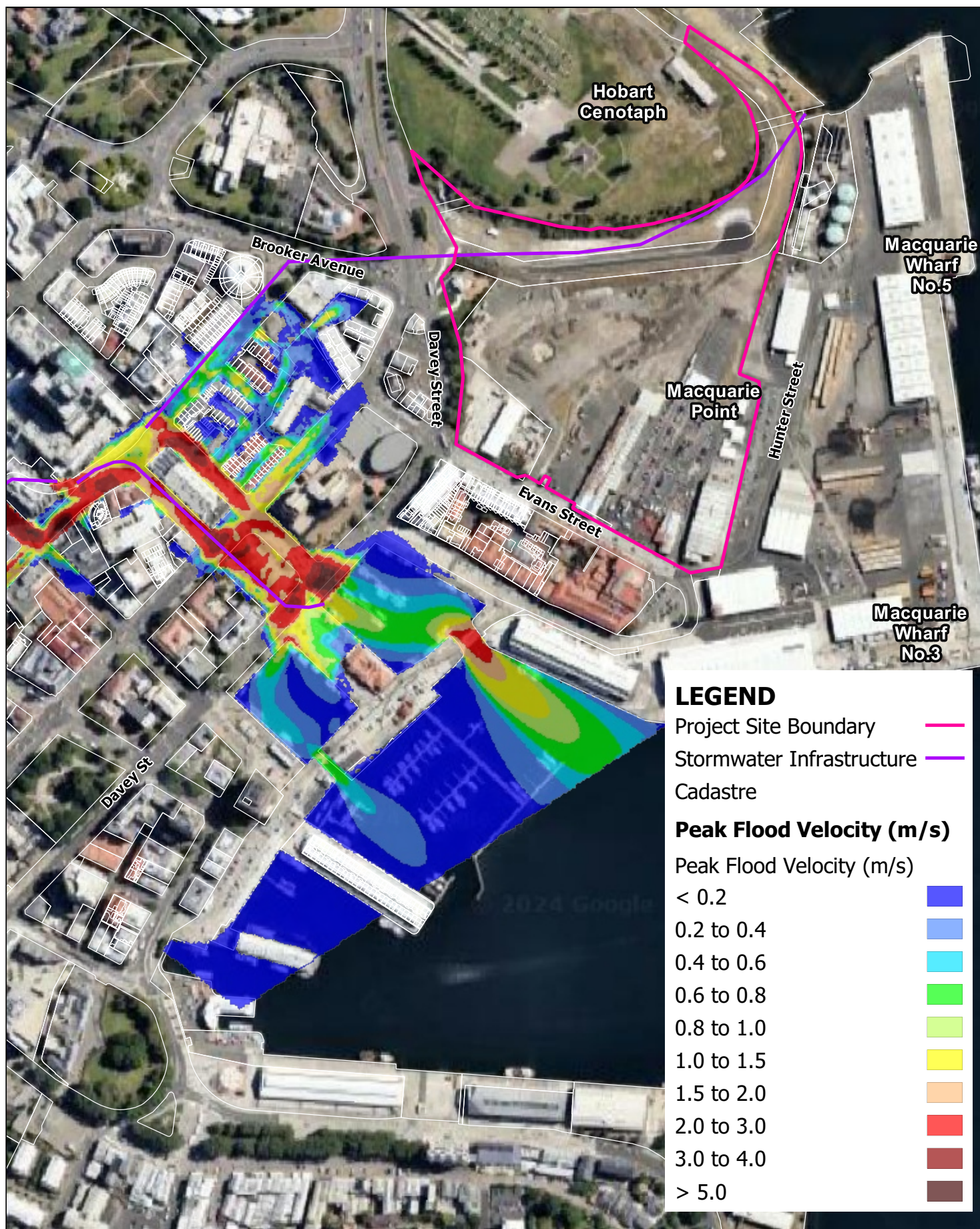
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Existing 1% AEP with Climate Change Peak Flood Velocities

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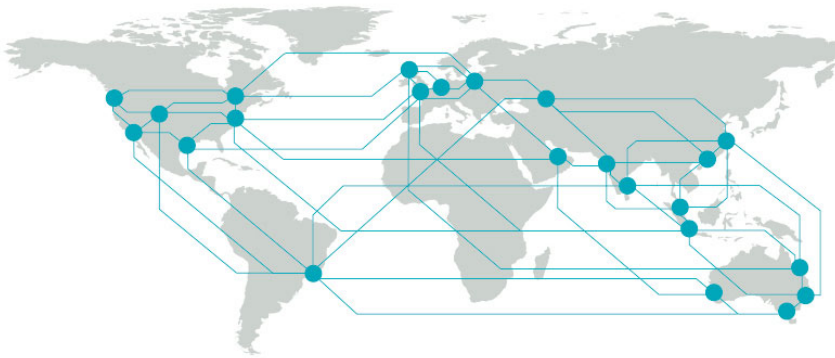
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