



Flood Impact Assessment

20 Heradale Parade, Batemans Bay

Prepared For
Place Studio

Project No.
TEL22500

Issue B September 2024

Telford Consulting Pty Ltd
Sydney + Brisbane

Tel: +61 2 7809 4931
Level 14, 32 Smith Street, Parramatta NSW 2150
info@telfordcivil.com.au



Document Information

Project No: TEL22500				
Report Type: Flood Impact Assessment				
Site Address: 20 Heradale Parade, Batemans Bay NSW 2536				
Document Filename: TEL22500.FIA.DA - 20 Heradale Parade, Batemans Bay_RevB.doc				
Issue A		Position	Date	Comments
Prepared By	Estephan Zakhia	Civil Engineer	23 November 2023	Nil
Reviewed By	Michel Chaaya	Principal Engineer	23 November 2023	Nil
Issue B		Position	Date	Comments
Prepared By	Katrina Salloum	Civil Engineer	2 September 2024	Nil
Reviewed By	Michel Chaaya	Principal Engineer	2 September 2024	Nil

Copyright © 2024 – Telford Consulting Pty Ltd

This report, models and other enclosures have been prepared expressly for the client and for sole purpose as described in the supplied plans herein. This report and models are copyright to Telford Consulting Pty Ltd and no part (including the whole of the same) shall be used for any other purpose or by any other third party without prior written consent by Telford Consulting Pty Ltd. The Client is defined as the person or persons named in this report or the person or persons for whom the named property developer is acting as an agent.

Disclaimer

The advice and information contained within this report relies on the quality of the records and other data provided by the Client and obtained from Council along with the time and budgetary constraints imposed.

TABLE OF CONTENTS

1	INTRODUCTION.....	1
2	SITE DETAILS.....	2
2.1	Location	2
2.2	Proposed Development	3
3	HYDROLOGIC ANALYSIS.....	4
3.1	Previous Studies	4
3.2	Modelling	5
3.3	Topographic data	5
3.3.1	Losses	6
3.3.2	Impervious surface area	6
3.3.3	Rainfall Intensity-Frequency-Duration (IFD).....	6
3.3.4	Roughness.....	7
3.4	Building Obstructions.....	8
3.5	Blockage of Drainage Infrastructure	8
3.6	Downstream Boundary Condition.....	9
4	FLOOD MODELLING RESULTS	10
4.1	Existing Scenario.....	10
4.2	Developed Scenario	13
4.3	Flood Difference Mapping.....	16
4.4	Provisional Flood Hazard Categorisation	19
5	CRITERIA FOR SETTING FLOOR LEVELS.....	25
6	FLOOD SAFETY AND AMENITY ISSUES.....	25
7	FLOOD RESTRICTIONS.....	26
8	FLOOD EVACUATION PROCEDURES.....	26
8.1	Roles and Responsibilities.....	26
8.2	Flood Evacuation Route and Flood Refuge	27
8.2.1	<i>Flooding Up to the 1% AEP Event.....</i>	<i>27</i>
8.2.2	<i>Flooding in Excess of the 1% AEP Event (PMF storm event)</i>	<i>27</i>
8.3	Flood Actions	28
9	CONCLUSION	30
	APPENDICES.....	31

LIST OF APPENDICES

APPENDIX A	SURVEY PLAN	32
APPENDIX B	DEVELOPEMNT LAYOUT PLANS.....	33
APPENDIX C	COUNCIL FLOOD INFORMATION SHEET	34

LIST OF FIGURES

FIGURE 2-1– APPROXIMATE SITE LOCATION	2
FIGURE 2-2 – SITE PLAN	3
FIGURE 3-1 – COUNCIL FLOOD MAPPING – CRITICAL DURATION	4
FIGURE 3-2 – TOPOGRAPHIC DATA	6
FIGURE 3-3 – ROUGHNESS MAPPING.....	7
FIGURE 3-4 – BUILDING OBSTRUCTIONS.....	8
FIGURE 4.1 – EXISTING SCENARIO 1% AEP PEAK FLOOD EXTENT AND ELEVATION (MAINSTREAM)	11
FIGURE 4.2 – EXISTING SCENARIO 1% AEP PEAK FLOOD EXTENT AND ELEVATION (OVERLAND)	12
FIGURE 4-3 – DEVELOPED SCENARIO 1% AEP PEAK FLOOD EXTENT AND ELEVATION (MAINSTREAM)	14
FIGURE 4-4 – DEVELOPED SCENARIO 1% AEP PEAK FLOOD EXTENT AND ELEVATION (OVERLAND)	15
FIGURE 4-5 – FLOOD DIFFERENCE 1% AEP (MAINSTREAM)	17
FIGURE 4-6 – FLOOD DIFFERENCE 1% AEP (OVERLAND)	18
FIGURE 4-7 – HYDRAULIC HAZARD CATEGORIES.....	19
FIGURE 4.8 – EXISTING SCENARIO 1% AEP FLOOD HAZARD MAPPING (MAINSTREAM)	21
FIGURE 4-9 – DEVELOPED SCENARIO 1% AEP FLOOD HAZARD MAPPING (MAINSTREAM)	22
FIGURE 4-10 – EXISTING SCENARIO 1% AEP FLOOD HAZARD MAPPING (OVERLAND)	23
FIGURE 4-11 – PROPOSED SCENARIO 1% AEP FLOOD HAZARD MAPPING (OVERLAND)	24

1 INTRODUCTION

Telford Consulting Pty Ltd have been commissioned to undertake a Flood Impact Assessment for the Proposed Residential Development at 20 Heradale Parade, Batemans Bay.

This report will:

1. Determine the existing Flood characteristics;
2. Define the flood risk for the proposed development in accordance with the *Eurobodalla Shire Council DCP* Flood Risk Management Policy;
3. Set development levels for the proposed development in accordance with Council's guidelines;
4. Discuss risk management in accordance with Council's Flood Risk Management Guidelines; and
5. Provide flood risk management procedures for the proposed development.

This report has been prepared generally in accordance with Eurobodalla Shire Council advice, Council's Flood Risk Management Policies and other reference documents.

2 SITE DETAILS

2.1 Location

The proposed development site is located within the municipality of Eurobodalla Shire Council. The subject site is identified as Lot 1 on DP 1135117 and has a total site area of 8409m². The site is bounded by Bavarde Avenue to the South, and by built up allotments to the North, East and west.

Figure 2-1 below shows the site's location outlined in red.



Figure 2-1– Approximate Site Location

2.2 Proposed Development

The proposed development will see the construction of a 4 storey residential development with an underground basement carpark. Vehicle access to the site shall be via Heradale Parade.

Refer to **Figure 2-2** for the site plan.

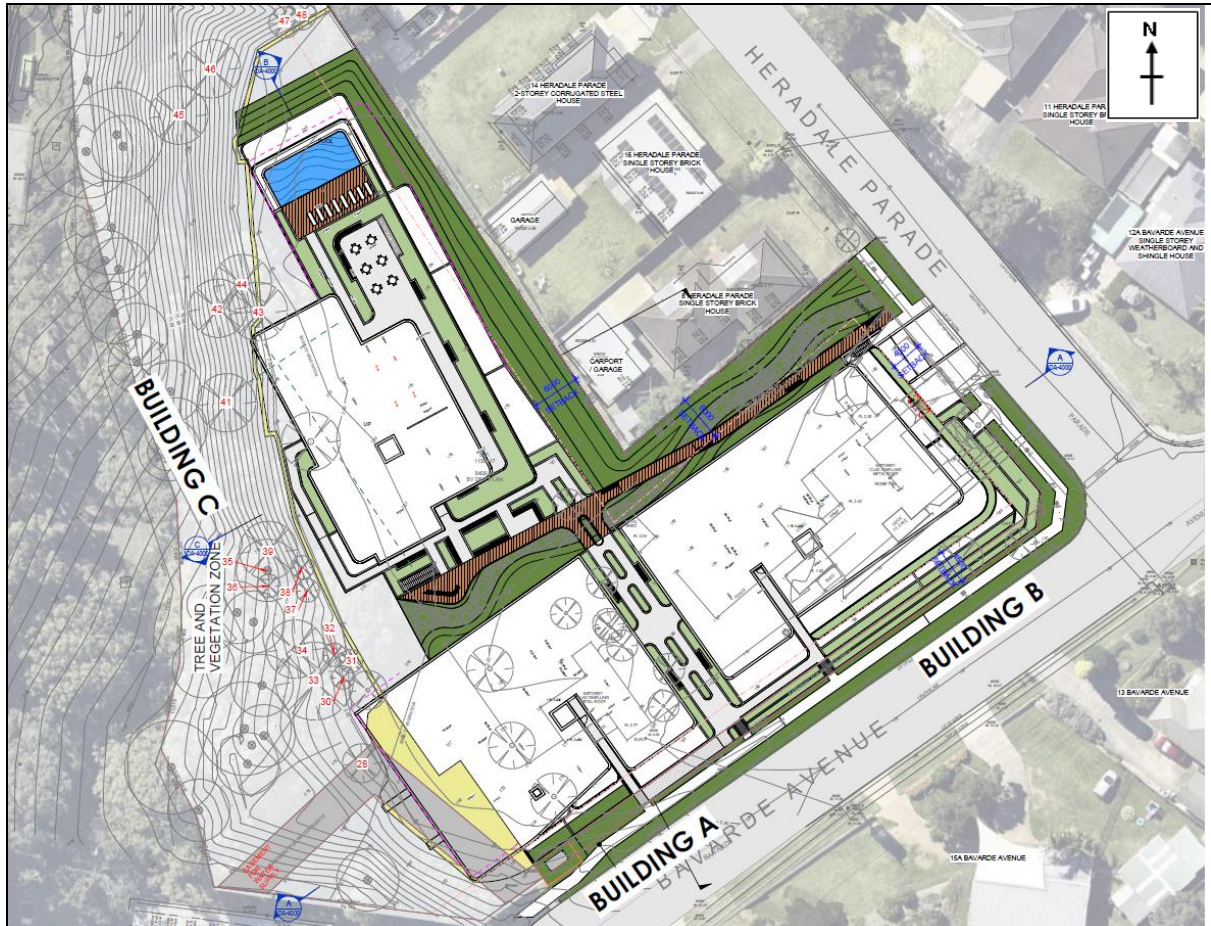


Figure 2-2 – Site Plan

3 HYDROLOGIC ANALYSIS

3.1 Previous Studies

The site is located in the catchment of Clyde River, which discharges to Batemans Bay. Eurobodalla Shire Council engaged Rhelm in 2020 to complete a flood study (*Batemans Bay Urban Creeks Flood Study*) which includes the catchment, which this site is located within, the catchment of Water Gardens.

Hydrologic and hydraulic parameters developed for the 2020 study and subsequent investigations have been utilised for this investigation, with modelling results compared for the investigations.

The results of previous modelling undertaken for Council have been used in the assessment of flood modelling results for this investigation. The critical duration storm event for this site has been identified as the 60-minute event.

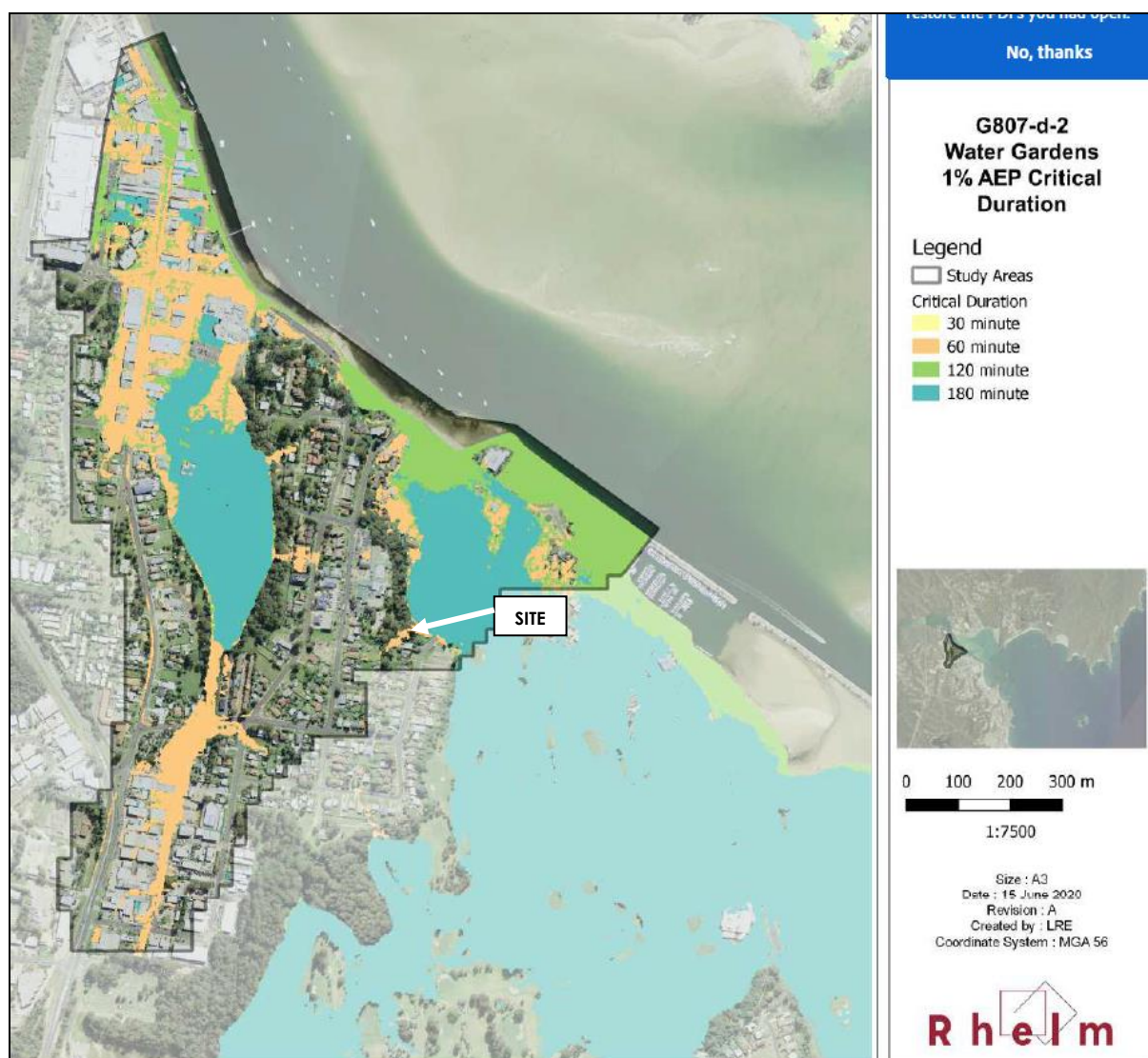


Figure 3-1 – Council flood mapping – critical duration

This event was used in the hydrologic/hydraulic modelling for the site

3.2 Modelling

This investigation used the application of rainfall directly onto the grid of the two-dimensional hydraulic model within the TUFLOW flood modelling software (Build 2013-12-AA), using the SMS interface (Version 11.1). This methodology is known as the direct rainfall approach or 'rainfall on the grid'. This approach removes the need for a separate hydrological modelling package.

In traditional flood modelling, separate hydrological and hydraulic models are constructed. The hydrological model has inputs of rainfall, area losses and roughness within a lumped or partially distributed sub-catchment, calculating runoff hydrographs for modelled storm events. This hydrograph is then applied to the hydraulic model, which performs flow calculations based on hydraulic features to develop estimations of flood behaviour across the study area.

In the direct rainfall approach, the hydrological model is either partially or completely removed from the process. The hydrological routing is undertaken in the distributed two-dimensional model, rather than in a lumped hydrological package.

3.3 Topographic data

Topographic data for the model was obtained from the NSW Department of Land and Property Information, Spatial Data Services. Land and Property Information (LPI) have medium and high resolution orthorectified digital imagery from their Digital Image Acquisition System (ADS40) and Leica ALS50 (Airborne Laser Scanner) as well Digital Elevation Data across NSW using the latest Light Detection and Ranging Systems Technology (LiDAR), ADS40 Imagery, Radar, and or Satellite Technologies. The airborne digital imagery, on tiles *BatemansBay201107-LID1-AHD_2446044_56_0002_0002_1m* and *BatemansBay201107-LID1-AHD_2446042_56_0002_0002_1m* used in this investigation were sourced from the LPI and has a 100-millimetre horizontal and 150-millimetre vertical resolution.

Field survey of the site was included in the hydraulic modelling, in accordance with the requirements of Eurobodalla Shire Council. This survey data has been imported into the TUFLOW model using the earthworks modelling software package 12D to develop a triangulated irregular network (TIN).

The data obtained from LPI, along with the survey TIN was sampled at 1.0 metre grid spacings. This grid spacing was selected in order to allow for cells between buildings, which is a common limitation on the representation of urban flow paths as one or two-dimensional features within flood models, recommended in the TUFLOW manual. A representation of this data, showing contour and relief information is presented on **Figure 3-2**.

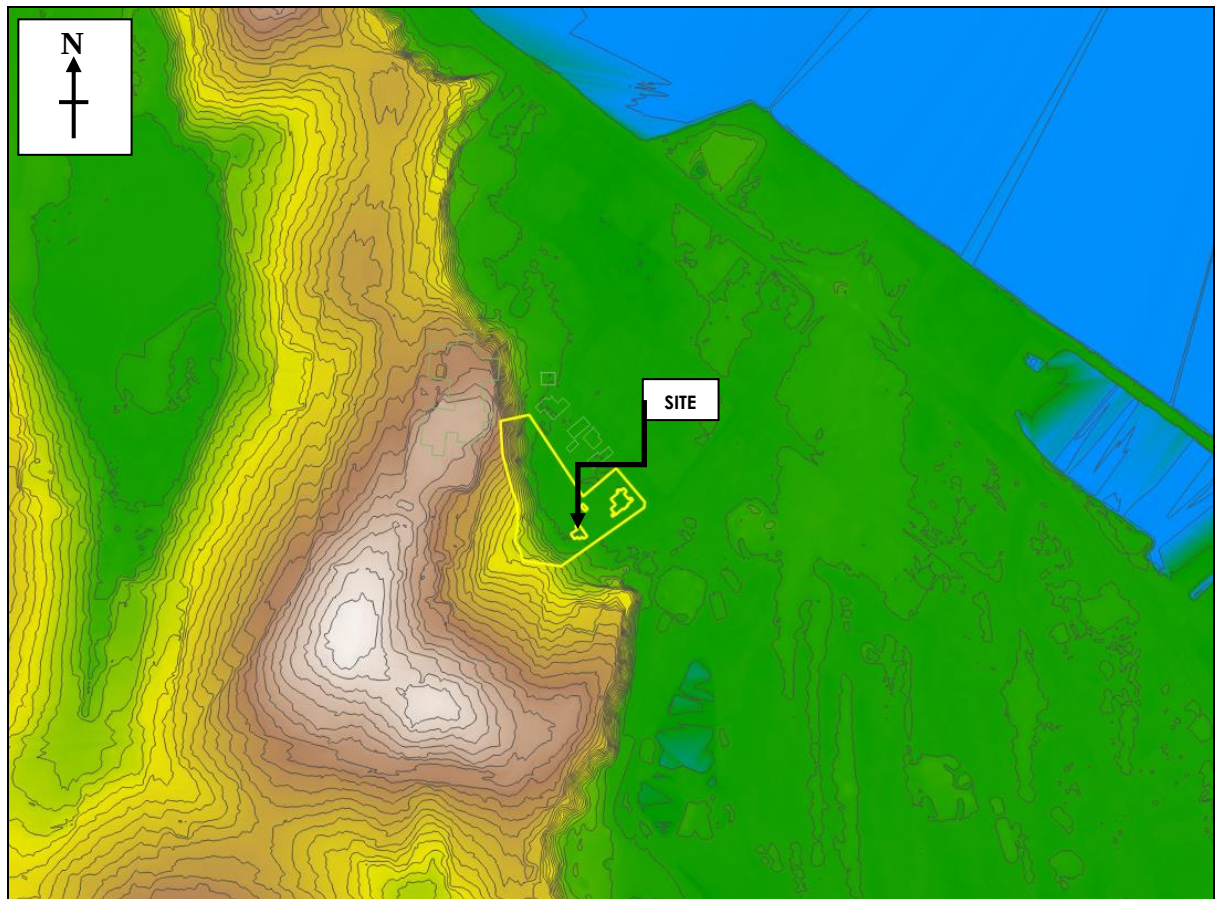


Figure 3-2 – Topographic Data

3.3.1 Losses

The rainfall losses used within the flood model were:

- Impervious area loss – 5.0mm
- Pervious area loss – 1.0mm

3.3.2 Impervious surface area

The impervious percentage of catchments have been approximated from aerial photography.

3.3.3 Rainfall Intensity-Frequency-Duration (IFD)

Intensity-Frequency-Duration (IFD) values and rainfall temporal patterns for ARI storm events were sourced from Australian Rainfall and Runoff 2016. Design rainfall and the Australian Government, Bureau of Meteorology IFD Program website – <http://www.bom.gov.au/water/designRainfalls/revised-ifd/>.

Coordinates entered into the IFD system with values provided for the nearest grid (Latitude 35.7145 (S) Longitude 150.1835 (E)).

3.3.4 Roughness

Catchment roughness parameters have been selected from Table 6.3 of the Rhelm 202 study, mapped for this investigation from aerial photography. Land use type is shown in **Figure 3-3**.

- Low density residential 0.15
- Roads/paved (shown in black)– 0.02
- Grassed (shown in dark green) – 0.08



Figure 3-3 – Roughness Mapping

3.4 Building Obstructions

Buildings and other obstructions were modelled by mapping using aerial photography. Buildings mapped were excluded from the grid.

Buildings identified within the model are shown in **Figure 3-4**.

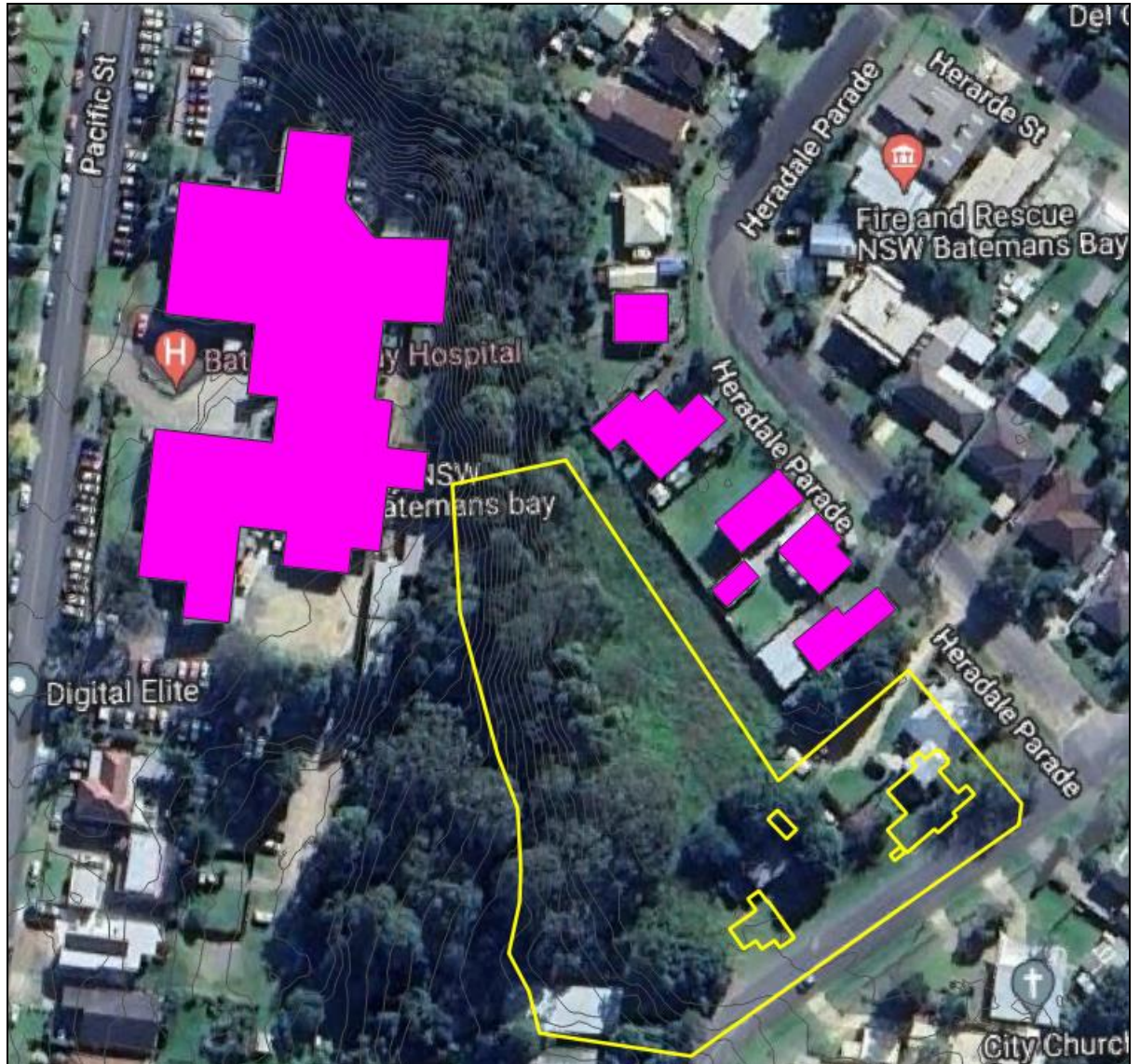


Figure 3-4 – Building Obstructions

Existing buildings on the site were also blocked in the model using this method.

3.5 Blockage of Drainage Infrastructure

The pit and pipe network was assumed to be fully blocked in the hydraulic modelling, with all modelled as flow travelling overland.

3.6 Downstream Boundary Condition

Flood elevations at the downstream boundary condition are influenced by sea levels in Batemans Bay.

Levels from the Rhelm investigation were initially used in this investigation, with updated levels provided by Eurobodalla Shire Council in an email dated 20 October 2023, which provided a range of levels that could be used as boundary conditions for the downstream extent of the model used of this investigation. These levels ranged from 2.45m AHD to 2.93m AHD.

This range of levels was followed by an email from Council which stated that it is "not Council's role to nominate the boundary condition, as the design consultant you need to determine (and justify) the most appropriate level."

As a result of this ambiguity in Council's expectations, the most conservative level within Batemans Bay of 2.93m AHD has been selected as the downstream boundary condition for this investigation.

4 FLOOD MODELLING RESULTS

4.1 Existing Scenario

Peak flood surface elevation and flow depth, along flood hazard for the modelled storm event (60 minutes TP 3) for existing site conditions, with a 1.0m grid size. Peak flood extents and depths of the flood have been mapped on the digital terrain model, using the QGIS geographic information system software package (Version 3.16.7).

Flood extents for the modelled events have been mapped to a minimum depth of 0.15m. This shading of shallow flows is in accordance with the recommended 0.15m nulling from the NSW Floodplain Development Manual. Flood surface elevations for the full extent shown in order to provide guidance on flood planning levels. The peak flood extent and elevation is provided in **Figure 4-1** and **Figure 4-2**.

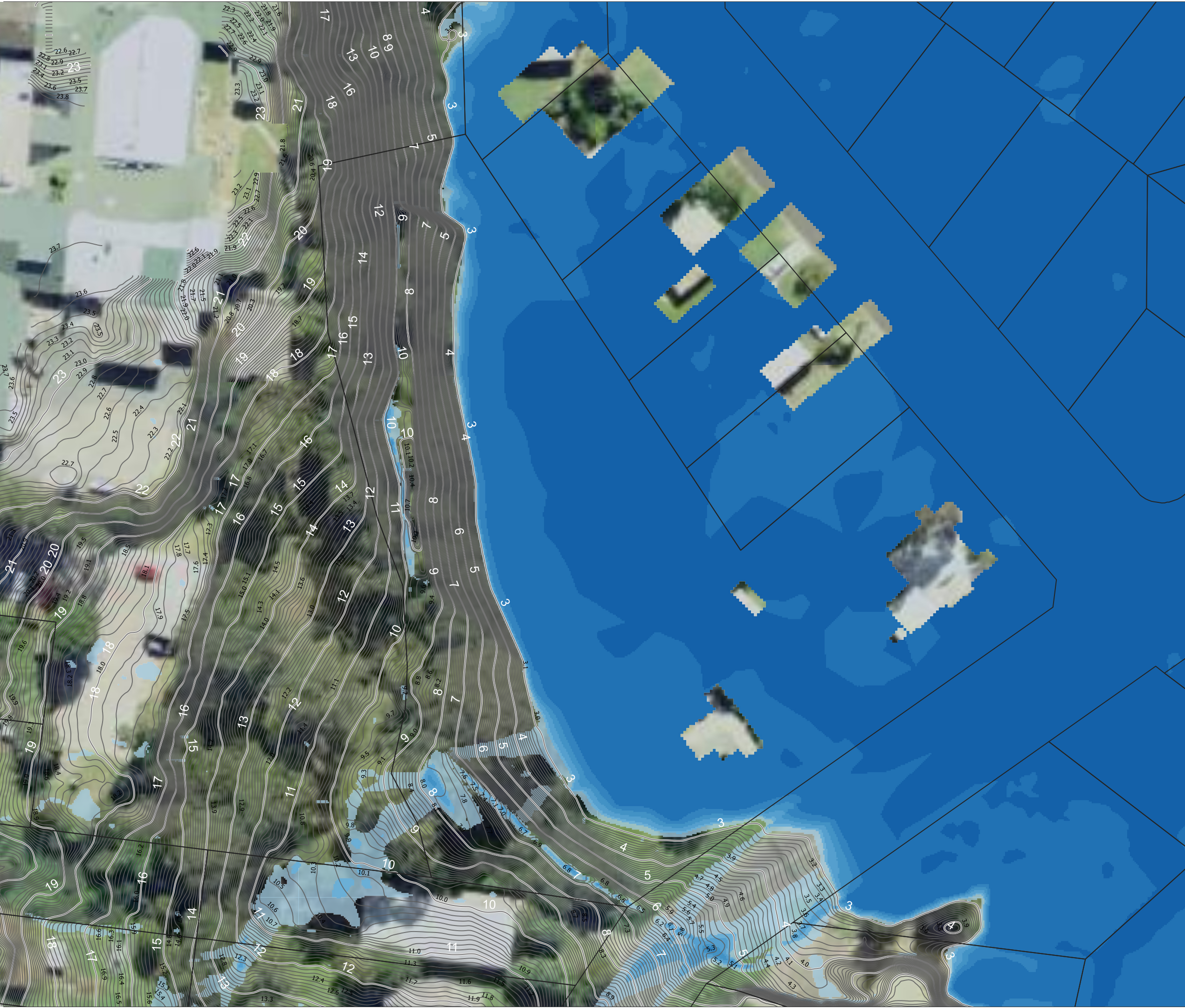
- Mainstream Flooding 1% AEP event
 - The existing site is flooded in the 1% AEP event, with depths surrounding the existing structures generally between 1.1 – 1.2m.
 - The flood levels within the subject site are relatively flat up to 2.93m – 2.94 AHD, with flood levels controlled by ocean levels within Batemans Bay. The site is flood storage on the fringe of the flooded area.

The results of the modelling presented in **Figure 4-1** compare well with the 1% flood mapping undertaken for Council, provided in **Section 3.1**.

Peak flood extent and depths have been also mapped for overland flooding during the 1% AEP storm event. The overland flooding scenario did not assume the downstream boundary condition set in the case of ocean inundation.

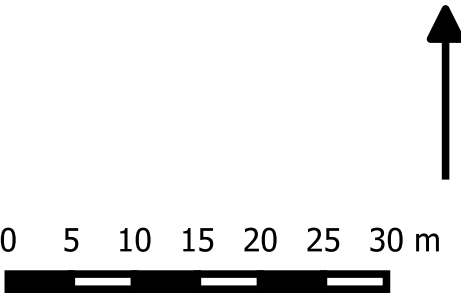
- Overland Flooding 1% AEP event
 - The existing site is partially flooded in the 1% AEP event with depths generally between 0.15m and 0.40m
 - The flood levels within the subject site are RL 9.0m at the western boundary (highest point at the site) and RL 2.0m at the eastern downstream end.

Figure 4.1 – Existing Scenario 1% AEP Peak Flood Extent and Elevation (mainstream)



Legend

- ≤ 0.05
- 0.05 - 0.15
- 0.15 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- 0.5 - 1.0
- 1.0 - 2.5
- 2.5 - 5.0
- 5.0 -



Details

Issue	Amendment	Date
A	DA Submission	Nov 2023
B	Design Update	Aug 2024

Project

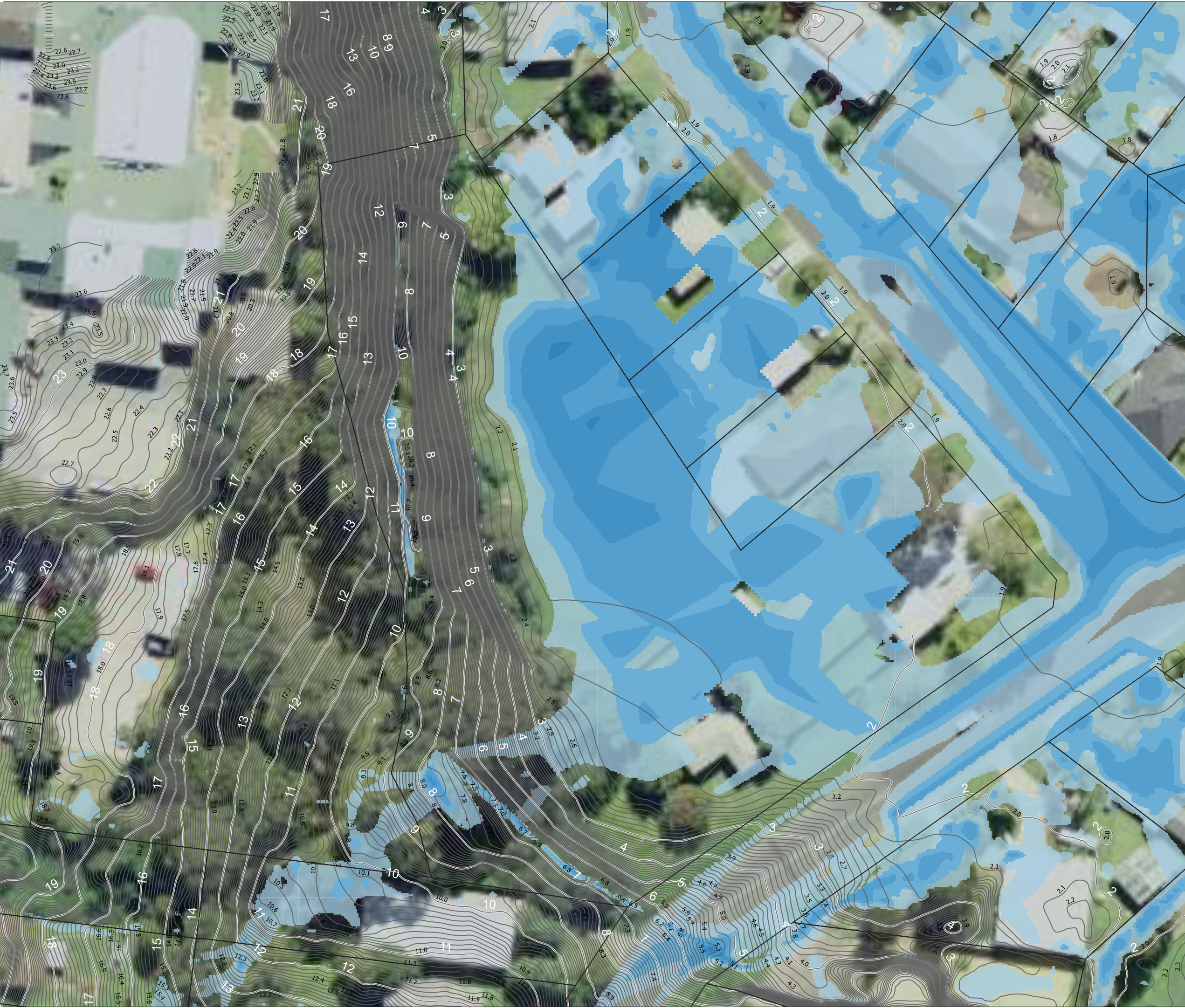
**20 Heradale Parade
Batemans Bay**

Drawing Title

**1% AEP PEAK FLOOD DEPTH &
ELEVATION
EXISTING SCENARIO (SLR)**

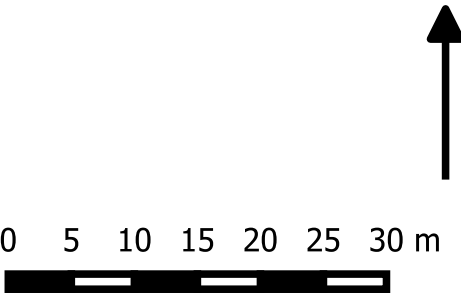
Scale	1:600 @ A3
Drawn	KS
Checked	JB
Job No.	TEL22500
Drawing ID	FIG 4.3

Figure 4.2 – Existing Scenario 1% AEP Peak Flood Extent and Elevation (overland)



Legend

- <= 0.05
- 0.05 - 0.15
- 0.15 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- 0.5 - 1.0
- 1.0 - 2.5
- 2.5 - 5.0
- 5.0 -



Details

Issue	Amendment	Date
A	DA Submission	Nov 2023
B	Design Update	Aug 2024

Project

**20 Heradale Parade
Batemans Bay**

Drawing Title

**1% AEP PEAK FLOOD DEPTH &
ELEVATION
EXISTING SCENARIO**

Scale	1:600 @ A3
Drawn	KS
Checked	JB
Job No.	TEL22500
Drawing ID	FIG 4.1

ISSUE

4.2 Developed Scenario

Peak flood surface elevations and flow depths, along with flood hazard were calculated for the modelled storm event the 1% AEP event (60 minutes TP 3), for site conditions, with a 1.0m grid size. Peak flood extents and depths of the flood have been mapped on the digital terrain model, using the QGIS geographic information system software package (Version 3.16.7).

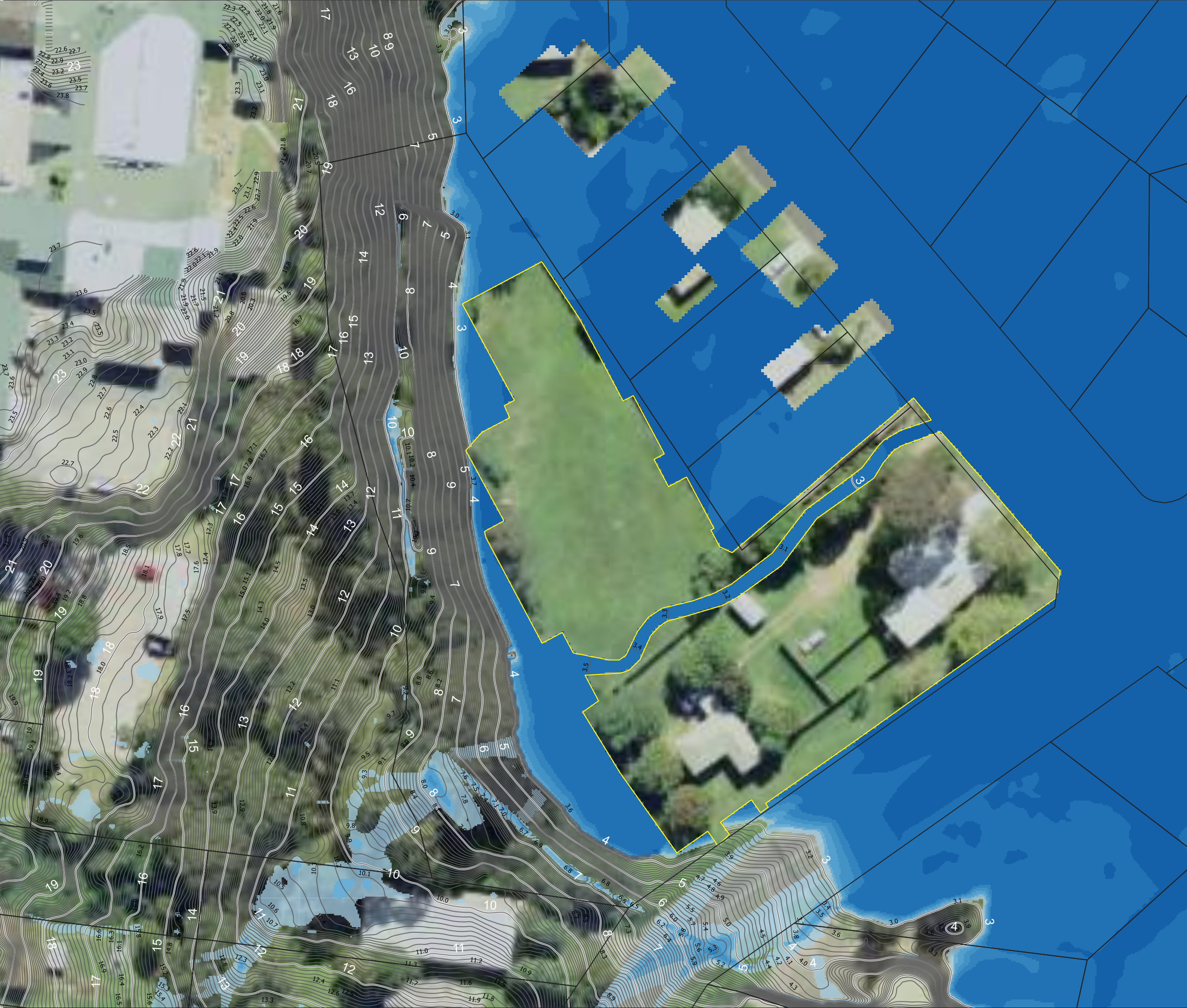
The proposed development building footprints has been included within the post development scenario as complete blockage.

A variable-width channel, ranging from 2.5 meters to 4 meters, is included in the design between Block A and Block C and up to the downstream end of Block B to allow for unobstructed overland flow through the site and prevent building inundation. Refer to **Appendix B** for the architectural plans reflecting the proposed channel location, levels, and horizontal alignment.

The peak flood extent and elevation is provided in **Figure 4-3** and **Figure 4-4**.

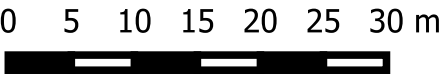
- Mainstream Flooding 1% AEP event
 - The developed site is flooded in the 1% AEP event, with depths within the proposed channel of up to 0.7m on the upstream side and 1.1 on the downstream side.
 - The flood levels within the subject site specifically within the channel are ranging between 3.0m– 3.5m AHD, with flood levels controlled by ocean levels within Batemans Bay. The site is flood storage on the fringe of the flooded area.
- Overland Flooding 1% AEP event
 - The existing site is partially flooded in the 1% AEP event with depths generally up to 0.7 within the proposed through site channel
 - The flood levels within the subject site are RL 8.8m at the western boundary (highest point at the site) and RL 2.0m at the eastern downstream end. Flood levels within the channel are ranging between 2.1m AHD – and 3.5m AHD.
 - It should be noted that, within the model, the flow width through the site opening is limited to the proposed channel width. In reality, however, this flow is wider and shallower because all structures in the proposed through-site opening are raised above the 1% AEP (Annual Exceedance Probability) water level. Consequently, the flood depth mapped in the proposed channel is actually lower. For modelling purposes, the opening was restricted to the channel width to evaluate the maximum potential water depth that could occur

Figure 4-3 – Developed Scenario 1% AEP Peak Flood Extent and Elevation (mainstream)



Legend

- <= 0.05
- 0.05 - 0.15
- 0.15 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- 0.5 - 1.0
- 1.0 - 2.5
- 2.5 - 5.0
- 5.0 -



Details

Issue	Amendment	Date
A	DA Submission	Nov 2023
B	Design Update	Aug 2024

Project

**20 Heradale Parade
Batemans Bay**

Drawing Title

**1% AEP PEAK FLOOD DEPTH &
ELEVATION
DEVELOPED SCENARIO (SLR)**

Scale 1:600 @ A3

Drawn KS

Checked JB

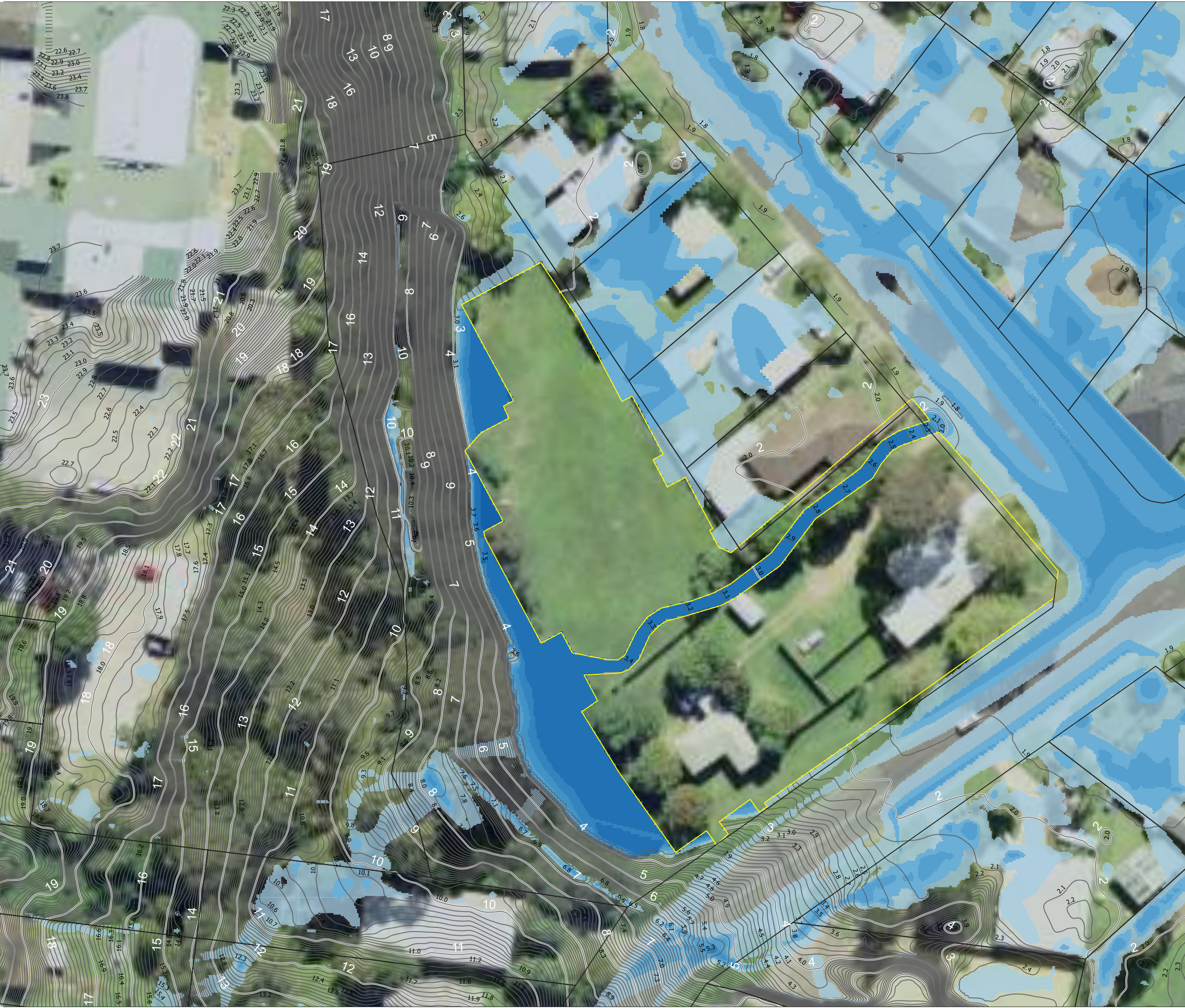
Job No. TEL22500

Drawing ID FIG 4.7

ISSUE

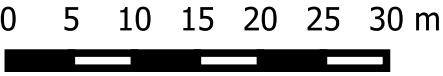
B

Figure 4-4 – Developed Scenario 1% AEP Peak Flood Extent and Elevation (overland)



Legend

- <= 0.05
- 0.05 - 0.15
- 0.15 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- 0.5 - 1.0
- 1.0 - 2.5
- 2.5 - 5.0
- 5.0 -



Details

Issue	Amendment	Date
A	DA Submission	Nov 2023
B	Design Update	Aug 2024

Project

**20 Heradale Parade
Batemans Bay**

Drawing Title

**1% AEP PEAK FLOOD DEPTH &
ELEVATION
DEVELOPED SCENARIO**

Scale 1:600 @ A3

Drawn KS

Checked JB

Job No. TEL22500

Drawing ID FIG 4.5

ISSUE

B

4.3 Flood Difference Mapping

Differences in flood surface elevations between existing and developed flood patterns has been prepared using the QGIS geographic information system software package (Version 3.16.7). Differences in flood elevation can be summarised as:

- Mainstream Flooding 1% AEP event:
 - No increases in flood elevation are encountered within the site or other areas of the site or within surrounding lots or street.
 - No increases in flood levels occur at any external buildings, dwellings or at any locations that could potentially be used as safe harbour or evacuation routes.
 - Enlarging the building footprint doesn't make any material difference to a fringe area of flood storage as it not a significant proportion of the flood storage and does not take flow through the site

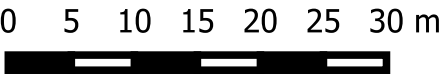
- Overland Flooding 1% AEP event:
 - Increases in flood elevation are at the western, upstream side of the proposed new building site, with water from the upstream catchment ponding against the proposed building
 - Increases in flood elevation at the proposed channel (through site opening) due to the narrower flow width made available for the overland flooding
 - Decreases in flood elevation at the eastern neighbouring properties and Heradale street

Figure 4-5 – Flood Difference 1% AEP (mainstream)



Legend

- 0.1 (reduction)
- 0.05
- 0.025
- 0.01
- 0.01
- 0.025
- 0.05
- 0.1 (increase)



Details

Issue	Amendment	Date
A	DA Submission	Nov 2023
B	Design Update	Aug 2024

Project

**20 Heradale Parade
Batemans Bay**

Drawing Title

**1% AEP PEAK FLOOD
DIFFERENCE
DEVELOPED - EXISTING**

Scale	1:600 @ A3
Drawn	KS
Checked	JB
Job No.	TEL22500
Drawing ID	FIG 4.10

ISSUE

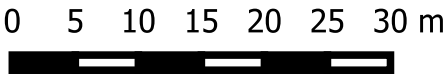
B

Figure 4-6 – Flood Difference 1% AEP (overland)



Legend

- 0.1 (reduction)
- 0.05
- 0.025
- 0.01
- 0.01
- 0.025
- 0.05
- 0.1 (increase)



Details

Issue	Amendment	Date
A	DA Submission	Nov 2023
B	Design Update	Aug 2024

Project

**20 Heradale Parade
Batemans Bay**

Drawing Title

**1% AEP PEAK FLOOD
DIFFERENCE
DEVELOPED - EXISTING**

Scale 1:600 @ A3

Drawn KS

Checked JB

Job No. TEL22500

Drawing ID FIG 4.9

ISSUE

B

4.4 Provisional Flood Hazard Categorisation

Hazard categories were determined in accordance with Council's request to map according to the provisions in Australian Rainfall and Runoff 2019. Flood hazard has been mapped as part of the SMS/TUFLOW hydraulic modelling, using the ZAEM1 flood hazard mapping. This hazard mapping methodology was an earlier pre-cursor to the methodology included in ARR 2016, Book 6, Chapter 7.

Figure 4-7 below shows the Hydraulic Hazard Categories (page 9.47 from TUFLOW User Manual Build 2016-03-AA).

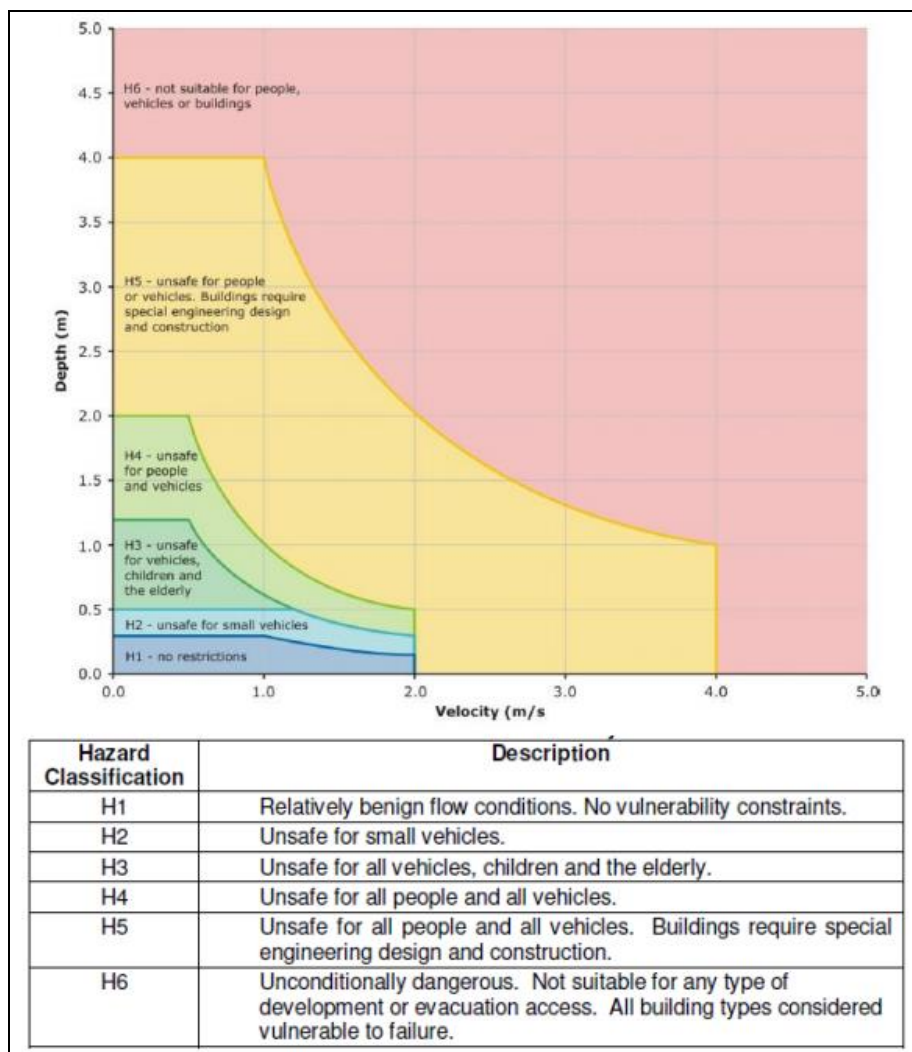


Figure 4-7 – Hydraulic Hazard Categories

Flood hazard is mapped using this methodology by multiplying the flood depth by the velocity of the flow. Maps of provisional flood hazard categorisation at the site for the 1% AEP event are presented in **Section 5** of this report. These maps were developed using the hazard mapping output from the TUFLOW modelling, presented using the QGIS geographic information system software package (Version 3.16.7)3.

Existing Scenario

Mainstream Flood

- The site is classified as being within H1 to H3 categorisation.

Overland Flood

- The site is classified as being within H1 hazard categorisation.

Developed Scenario

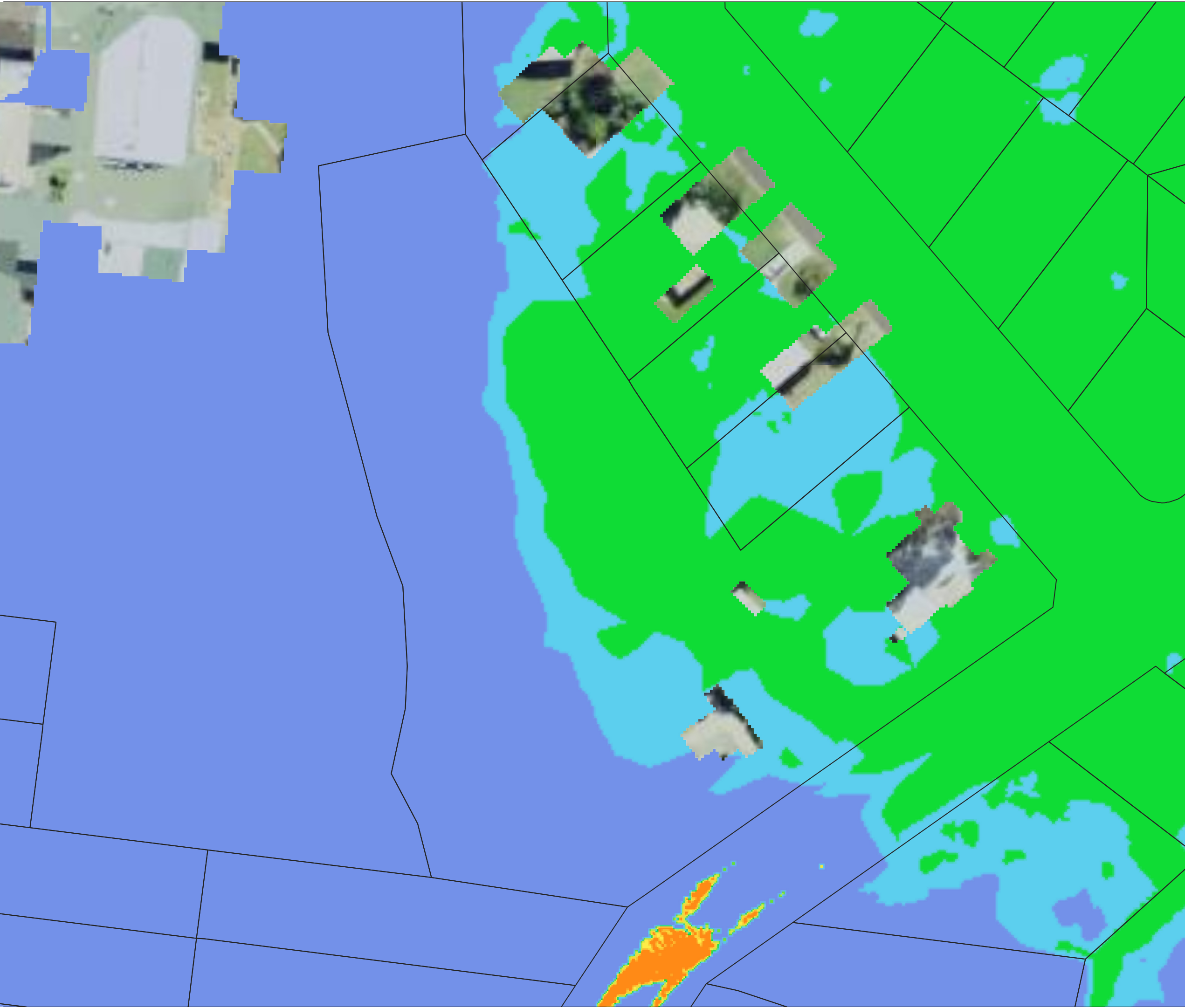
Mainstream Flood

- The site is classified as being within H1 to H3 categorisation. The surrounding area has not been altered.

Overland Flood

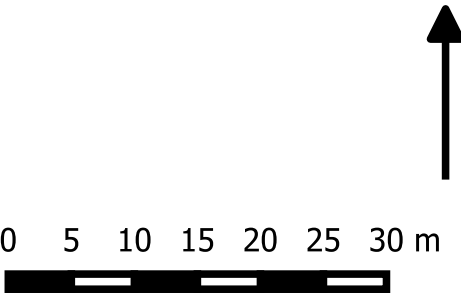
- The site is classified as being within H1 hazard categorisation with minor pockets of H2 and H3 upstream of the proposed building and within the channel.

Figure 4.8 – Existing Scenario 1% AEP Flood Hazard Mapping (mainstream)



Legend

- H1
- H2
- H3
- H4
- H5
- H6



Details

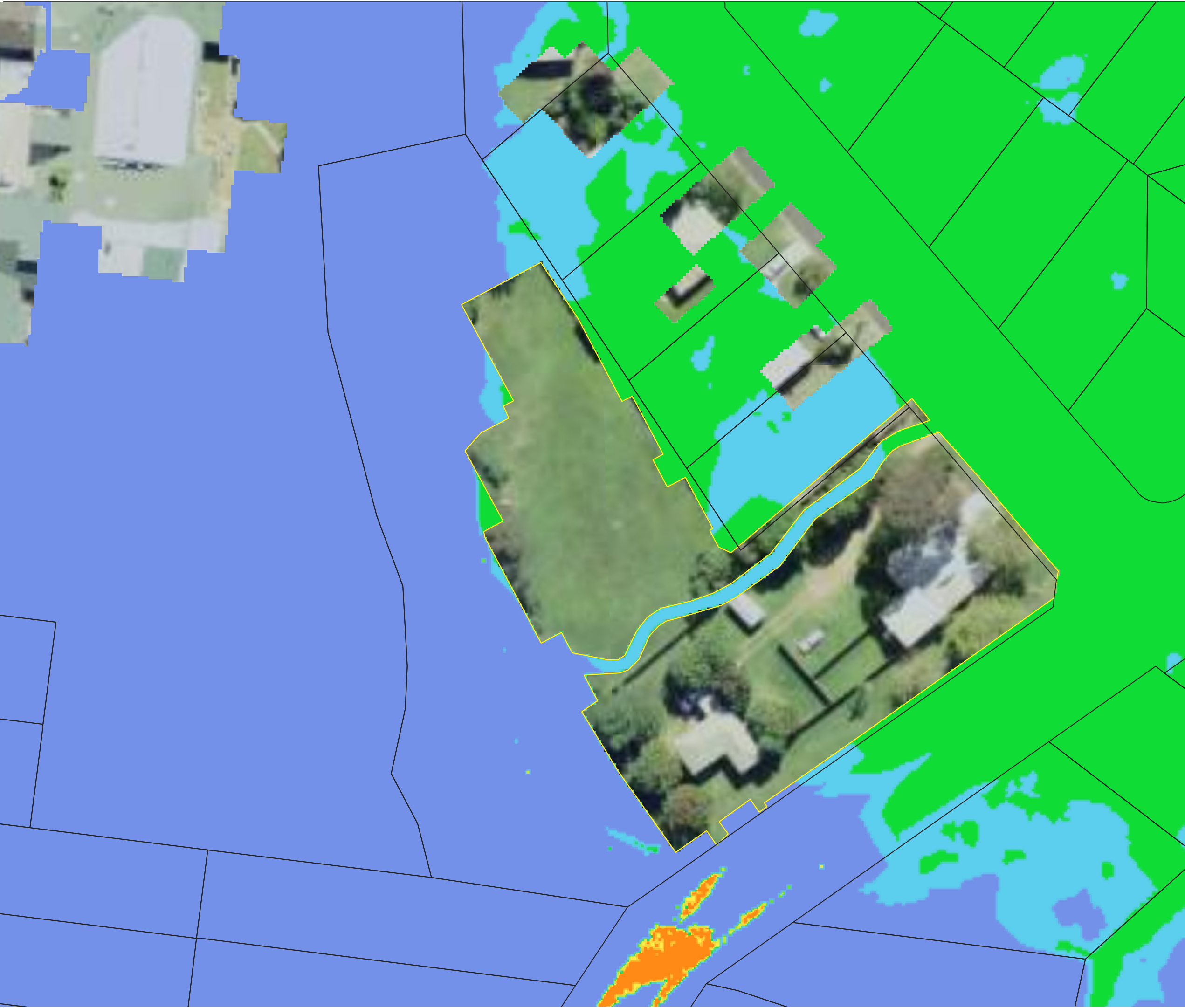
Issue	Amendment	Date
A	DA Submission	Nov 2023
B	Design Update	Aug 2024

Project
**20 Heradale Parade
Batemans Bay**

Drawing Title
**1% AEP PEAK FLOOD HAZARD
EXISTING SCENARIO (SLR)**

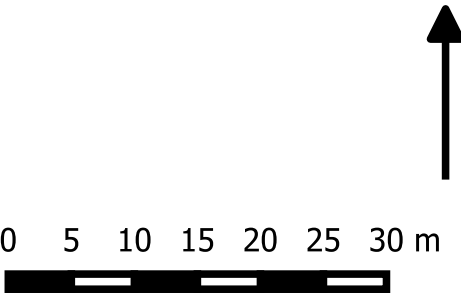
Scale	1:600 @ A3
Drawn	KS
Checked	JB
Job No.	TEL22500
Drawing ID	FIG 4.4

Figure 4-9 – Developed Scenario 1% AEP Flood Hazard Mapping (mainstream)



Legend

- H1
- H2
- H3
- H4
- H5
- H6



Details		
Issue	Amendment	Date
A	DA Submission	Nov 2023
B	Design Update	Aug 2024

Project
**20 Heradale Parade
Batemans Bay**

Drawing Title
**1% AEP PEAK FLOOD HAZARD
DEVELOPED SCENARIO (SLR)**

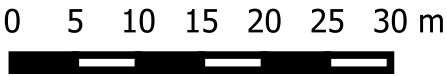
Scale	1:600 @ A3
Drawn	KS
Checked	JB
Job No.	TEL22500
Drawing ID	FIG 4.8

Figure 4-10 – Existing Scenario 1% AEP Flood Hazard Mapping (overland)



Legend

- H1
- H2
- H3
- H4
- H5
- H6



Details

Issue	Amendment	Date
A	DA Submission	Nov 2023
B	Design Update	Aug 2024

Project

**20 Heradale Parade
Batemans Bay**

Drawing Title

**1% AEP PEAK FLOOD HAZARD
EXISTING SCENARIO**

Scale 1:600 @ A3

Drawn KS

Checked JB

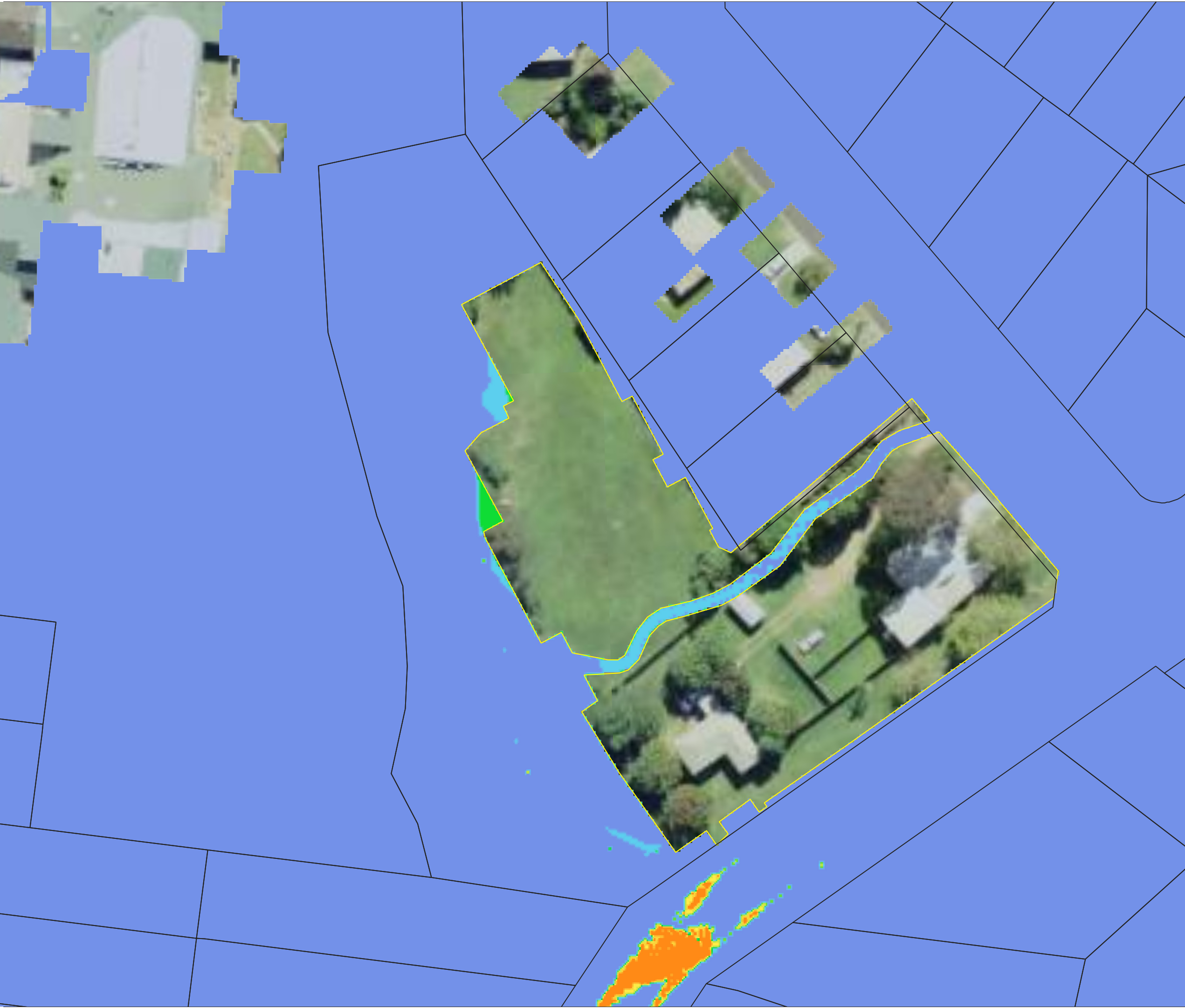
Job No. TEL22500

Drawing ID FIG 4.2

ISSUE

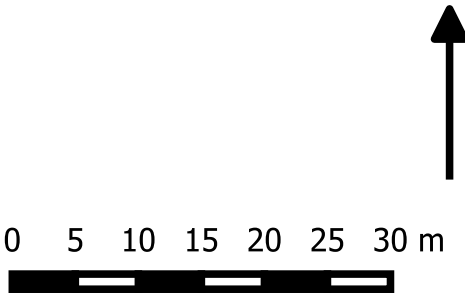
B

Figure 4-11 – Proposed Scenario 1% AEP Flood Hazard Mapping (overland)



Legend

- H1
- H2
- H3
- H4
- H5
- H6



Details		
Issue	Amendment	Date
A	DA Submission	Nov 2023
B	Design Update	Aug 2024

Project
**20 Heradale Parade
Batemans Bay**

Drawing Title
**1% AEP PEAK FLOOD HAZARD
DEVELOPED SCENARIO**

Scale	1:600 @ A3
Drawn	KS
Checked	JB
Job No.	TEL22500
Drawing ID	FIG 4.6

5 CRITERIA FOR SETTING FLOOR LEVELS

All precautions within the planning and design stages of a proposed development should be taken to ensure that the risk of flood impacts are minimised.

Eurobodalla Shire Council's DCP sets the development levels for all developments impacted by flooding.

- Habitable floor level shall be set at the Flood Planning Level (FPL) being 1% AEP flood level plus 0.3m freeboard (for overland flooding agreed with council in pre-da meeting).
- Basement floor level shall be protected up to the FPL.

Minimum Required Habitable floor level

- o Block A and Block B entry: RL 3.43m
- o Block C: RL 3.60m
- o Block A Units A-G03 and A-G04 Balconies: Protected by a wall with a minimum Tow of RL 3.7m

Basement protection

- o The minimum basement crest level and all basement entries shall be set at RL 3.43m AHD

6 FLOOD SAFETY AND AMENITY ISSUES

The subject site is identified as **Medium Flood Risk**. Council has adopted some restrictions for the following:

1. To ensure the proposed development does not result in unreasonable social, economic or environmental impacts upon the amenity or ecology of an area;
2. To minimise the safety risk by ensuring the provision of reliable access from areas affected by flooding;
3. To minimise the damage to private property and council assets;
4. To ensure the proposed development does not have an adverse impact on other properties;
5. To ensure all occupants have a safe refuge within the site or establish evacuation procedures to a safe refuge above the flood levels outside the site;
6. Set all external power points, air conditioning units, hot water systems and pumps for rainwater tanks above the habitable floor levels.

7 FLOOD RESTRICTIONS

Floor Levels: The floor levels of the proposed development are to be in accordance with the advice given in this report (**Section 5**).

Building Components: All proposed structures in the flooded area are to have flood compatible building components below the flood planning level. A structural assessment is advised prior to occupation of building by an accredited Structural Engineer.

Climate Change: It is recommended to review this flood impact assessment every 10 years particularly with the potential effects of climate change and increased rainfall intensities.

8 FLOOD EVACUATION PROCEDURES

8.1 Roles and Responsibilities

Residents must know the flood risk that their property is subjected to and this can be achieved as below:

1. Find out about their local flood history, visit the NSW SES FloodSafe website www.floodsafe.com.au and read the FloodSafe Guides relevant to their area.
2. Be aware of the natural signs of flooding such as heavy rainfall and rushing or pooling water.

Residents should also familiarise themselves with the following emergency contact numbers:

- Metro Zone: 02 4251 6111
- General SES helpline: 132 500
- Critical emergency: 000 for Police or Ambulance.

Sources of flood information

- Observation of Local Rainfall/Floodwater
- The Bureau of Meteorology (Flood Watch, Flood Warning for Eastwood, Severe Weather Warning, Severe Weather Advice)
- The NSW SES
- Local Emergency Management
- Local Television And Radio Stations

Web Addresses:

1. Bureau of Meteorology home page : <http://www.bom.gov.au/>
2. Bureau of Meteorology – flood warnings:
<http://www.bom.gov.au/weathernsw/>
3. Bureau of Meteorology – Sydney radar loop

4. Bureau of Meteorology – NSW Seasonal Rainfall Outlook:
<http://www.bom.gov.au/climate/ahead/rain.nsw.shtml>
5. Bureau of Meteorology – El Nino Wrap-Up:
6. <http://www.bom.gov.au/climate/enso/>
7. Weather zone forecast (supplied by Bureau of Meteorology):
8. <http://www.weatherzone.com.au/marine/nsw>

8.2 Flood Evacuation Route and Flood Refuge

8.2.1 Flooding Up to the 1% AEP Event

Residents/Visitors/Staff Members during the 1% AEP storm event are expected to seek refuge within the building at any floor as all building entries have adequate freeboard above the adjacent 1% AEP water level and thus ensuring a safe shelter on site without the need to evacuate off-site.

8.2.2 Flooding in Excess of the 1% AEP Event (PMF storm event)

As Eurobodalla Shire Council does not consider shelter in place as an appropriate evacuation strategy, early evacuation is the preferred management strategy for the proposed development in this area.

Residents/Visitors/Staff Members should be warned as soon as possible and made aware of rising water levels so they can evacuate early to a place of refuge above the PMF flood waters, in the surrounding area.

Residents shall evacuate to higher ground to the west of Bavarde Avenue (fronting lot 14 Bavarde Avenue).

It is recommended that adequate warning signs be placed in areas, which are visible to ensure occupants are educated with regards to evacuation locations and procedures. Residents should familiarize themselves with the following emergency contact numbers:

- Metro Zone: 02 4251 6111
- General SES helpline: 132 500
- Critical emergency: 000 for Police or Ambulance.

8.3 Flood Actions

Certain management actions must be made before, during, and after a flood.

- Flood actions when a flood is likely:
 1. Trained Personnel/Residents must monitor weather forecasts and flood predictions.
 2. Trained Personnel/Residents must follow the site evacuation recommendations.
 3. Trained Personnel/Residents must ensure that no moveable objects are kept on site to prevent flooding away from site.
 4. Trained Personnel/Residents must move waste containers and poisons well above predicted flood heights.
 5. Trained Personnel/Residents must prepare sandbags to block toilets and drains.
- Flood actions during a flood:
 1. Trained Personnel/Residents must implement the evacuation plan.
 2. Trained Personnel/Residents must be listening to local radio for updates of the situation and further advice.
 3. Trained Personnel/Residents must make sure that power, water, and other utilities (gas, fuel, etc.) are completely turned off.
 4. Trained Personnel/Residents must protect valuable machinery and equipment that cannot be relocated by enclosing in waterproof covers.
 5. Trained Personnel/Residents must inform the emergency services with the flooding situation.
 6. Residents must prohibit their children to play in, or near floodwater.

- Flood actions after a flood:
 1. No visitors are allowed to access the site in the same day of the flooding event.
 2. Residents shall not allow their children to play in or near flood waters.
 3. Residents must keep listening to their local radio station for information, updates and advice.
 4. Trained Personnel/Residents must check for damage to windows, walls and the roof and ensure the structural stability of their property.
 5. Residents shall not eat food which has been in contact with floodwater.
 6. Residents shall drink only boiled or bottled water if there is any chance of flood contamination of their drinking water.
 7. Trained Personnel/Residents shall wear suitable clothing, including boots and gloves, when cleaning up.
 8. Trained Personnel/Residents must not go sightseeing as this may hinder recovery efforts or put themselves and others at risk.
 9. Gas appliances and gas bottles that have been exposed to floodwater should be inspected for safety before use.
 10. Power, water and other utilities must be inspected by professionals before being turned on, and all affected site infrastructures will need to be cleaned and fixed.
 11. A hazard assessment and proper work method must be undertaken to cover all flood affected work.
 12. Trained Personnel/Residents shall take as many photos as possible for all damages for insurance purposes.

9 CONCLUSION

This Flood Impact Assessment has been prepared to support the Proposed Residential Development at 20 Heradale Parade, Batemans Bay.

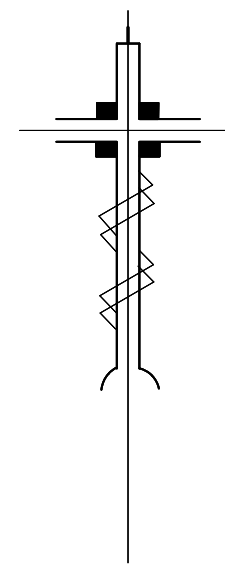
The report concluded the below:

- The report aims to determine existing flood characteristics, define flood risk for the development, set development levels, discuss risk management, and provide flood risk management procedures.
- The report employs the TUFLOW flood modeling software for hydrological analysis. Topographic data, rainfall intensity-frequency-duration values, roughness parameters, and other factors are presented in **Section 3**.
- The report presents existing and developed scenarios for the 1% Annual Exceedance Probability (AEP) flood event. Flood mapping indicates that the site is inundated by ocean levels in Batemans Bay and minorly by overland flow from the upstream catchment. Refer to **Section 4**.
- Development floor levels stated within **Section 5** are set based on Eurobodalla Shire Council's guidelines.
- The site is categorized as Medium Flood Risk. Development restrictions are outlined to minimize social, economic, and environmental impacts. Safety measures include setting floor levels, using flood-compatible building components, and considering climate change effects.
- Residents are advised to stay informed about flood risks and evacuation procedures. Evacuation routes and refuges are identified within **Section 8**, and flood actions are outlined for likely, during, and post-flood scenarios.

The report shows that the proposed development will achieve Eurobodalla Shire Council's DCP requirement for flood control and flood risk management, and therefore recommends that the proposed development to proceed.

APPENDICES

Appendix A SURVEY PLAN



Note:
1. Contour Interval 0.5m Minor And 1m Major
2. Only Visible Services Have Been Surveyed
Refer To Dial Before You Dig
3. Boundary Positions Are Approximate Only
And Should Be Verified By A Cadastral Survey
4. A Title Search Has Not Been Done To Determine
Any Affecting Easements Or Restrictions
5. Datum Level Corsnet (A.H.D.)

DATE	14/05/2021	AMENDMENTS	Survey File
SURVEYOR	LC		Dwg File
DRAWN	MS		
CHECKED	MS		

Appendix B DEVELOPEMNT LAYOUT PLANS



UNIT MIX		
TYPE	NO.	AREA (m²)
3 BED	A-101	115.9 m²
3 BED	A-102	137.4 m²
3 BED - ADA	A-103	145.0 m²
2 BED - ADA	A-104	116.8 m²
4 BED	A-105	174.0 m²
3 BED	A-201	115.9 m²
3 BED	A-202	137.4 m²
3 BED - ADA	A-203	144.9 m²
2 BED - ADA	A-204	116.7 m²
4 BED	A-205	174.0 m²
3 BED	A-301	115.9 m²
3 BED	A-302	137.4 m²
3 BED - ADA	A-303	145.0 m²
2 BED - ADA	A-304	116.8 m²
4 BED	A-305	174.0 m²
1 BED	A-G01	50.8 m²
1 BED	A-G02	73.5 m²
3 BED - ADA	A-G03	145.0 m²
3 BED	A-G04	147.2 m²
3 BED	A-G05	121.5 m²
3 BED	B-101	134.6 m²
2 BED - ADA	B-102	116.8 m²
3 BED - ADA	B-103	145.0 m²
3 BED	B-104	109.3 m²
3 BED	B-105	115.1 m²
3 BED	B-106	115.9 m²
3 BED	B-201	134.4 m²
2 BED - ADA	B-202	116.8 m²
3 BED - ADA	B-203	145.0 m²
3 BED	B-204	109.3 m²
3 BED	B-205	115.1 m²
3 BED	B-206	115.9 m²
3 BED	B-301	134.6 m²
2 BED - ADA	B-302	116.8 m²
2 BED - ADA	B-303	117.1 m²
2 BED	B-304	131.3 m²
4 BED	B-305	184.8 m²
3 BED	B-G01	96.2 m²
3 BED	B-G02	147.2 m²
3 BED	B-G03	120.4 m²
3 BED	B-G04	121.9 m²
3 BED	C-101	137.0 m²
3 BED	C-102	141.1 m²
2 BED	C-103	109.9 m²
3 BED - ADA	C-104	136.3 m²
3 BED - ADA	C-105	136.1 m²
3 BED	C-106	130.7 m²
3 BED	C-201	137.5 m²
3 BED	C-202	134.0 m²
3 BED - ADA	C-203	136.3 m²
3 BED - ADA	C-204	136.1 m²
3 BED	C-205	130.7 m²
3 BED	C-301	137.5 m²
3 BED	C-302	130.7 m²
2 BED	C-G01	114.2 m²
3 BED	C-G02	158.0 m²
2 BED	C-G03	130.3 m²
3 BED	C-G04	164.2 m²
2 BED	C-G05	122.8 m²
3 BED	C-G06	130.7 m²
60		

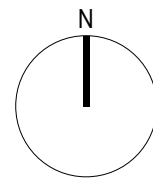
PRELIMINARY
NOT FOR CONSTRUCTION
DEVELOPMENT APPLICATION

Document Notes

Verify all dimensions on site before commencing work. Report all discrepancies to the architect prior to construction. Place Studio shall not be held responsible for any variations to specifications or drawings due to any discrepancies without consultation. Use figured dimensions in preference to scaled dimensions. Drawings made to larger scales and those showing particular parts of the works take precedence over drawings made to smaller scales of for general purposes. All work is to conform to relevant Australian Standards and Codes together with all Author's requirements and Regulations.

REV	DATE	DESCRIPTION	APP
A	21/03/2023	DA SUBMISSION	SK
B	02/06/2023	DA RFI Response	SK
C	24/11/2023	DA RFI Response	JA
D	03/09/2024	DA Submission	BA

ARCHITECT:
PLACE
STUDIO
PLACE STUDIO AU PTY LTD
74 KING ST, NEWTOWN, NSW 2042
T | 61 431 688 834 | J ALEXANDER-HATZPLIS NSW ARB #10535
W | www.PlaceStudio.com.au E | Studio@PlaceStudio.com.au



SCALE: 1 : 250 @ A1

PROJECT:
#2021029
HERADALE
BATEMANS BAY
20 HERADALE PARADE
BATEMANS BAY
DRAWING TITLE:
SITE PLAN

SHEET NUMBER:
DA-2000
DATE: 03/09/2024
REV:
D

COPYRIGHT: This work is copyright and cannot be reproduced or copied by any means without the written permission of Place Studio AU PTY LTD. Any license, express or implied, to use this document for any purpose whatsoever is restricted to the terms of the agreement between Place Studio AU PTY LTD and the instructing party.

9/2/2024 4:47:35 PM



LEGEND

- 1 BED
- 2 BED
- 2 BED - ADA
- 3 BED
- 3 BED - ADA
- 4 BED
- BALCONY
- COMMUNAL
- SERVICE ROOM

Document Notes

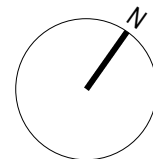
Verify all dimensions on site before commencing work. Report all discrepancies to the architect prior to construction. Place Studio shall not be held responsible for any variations to specifications or drawings due to any discrepancies without consultation. Use figured dimensions in preference to scaled dimensions. Drawings made to larger scales and those showing particular parts of the works take precedence over drawings made to smaller scales of for general purposes. All work is to conform to relevant Australian Standards and Codes together with all Author's requirements and Regulations.

REV	DATE	DESCRIPTION	APP
A	21/03/2023	DA SUBMISSION	SK
B	02/06/2023	DA RFI Response	SK
C	24/11/2023	DA RFI Response	JA
D	03/09/2024	DA Submission	BA

ARCHITECT:

PLACE
STUDIO

PLACE STUDIO AU PTY LTD | 2042
74 KING ST, NEWTOWN, NSW 2042
T | 61 431 688 834 | J ALEXANDER-HATZPLIS NSW ARB #10535
W | www.PlaceStudio.com.au E | Studio@PlaceStudio.com.au



SCALE: 1 : 200 @ A1

PROJECT:

#2021029

HERADALE
BATEMANS BAY

20 HERADALE PARADE
BATEMANS BAY

DRAWING TITLE:

GA - GROUND FLOOR
PLAN

SHEET NUMBER:

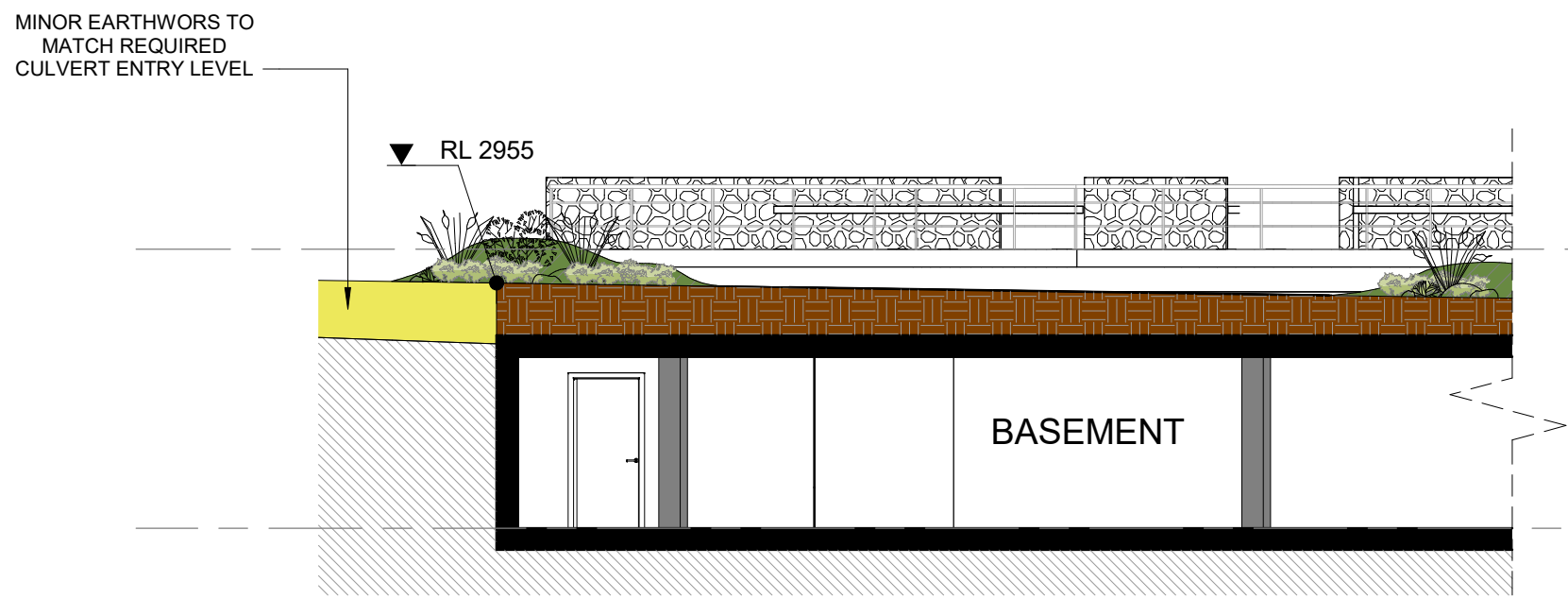
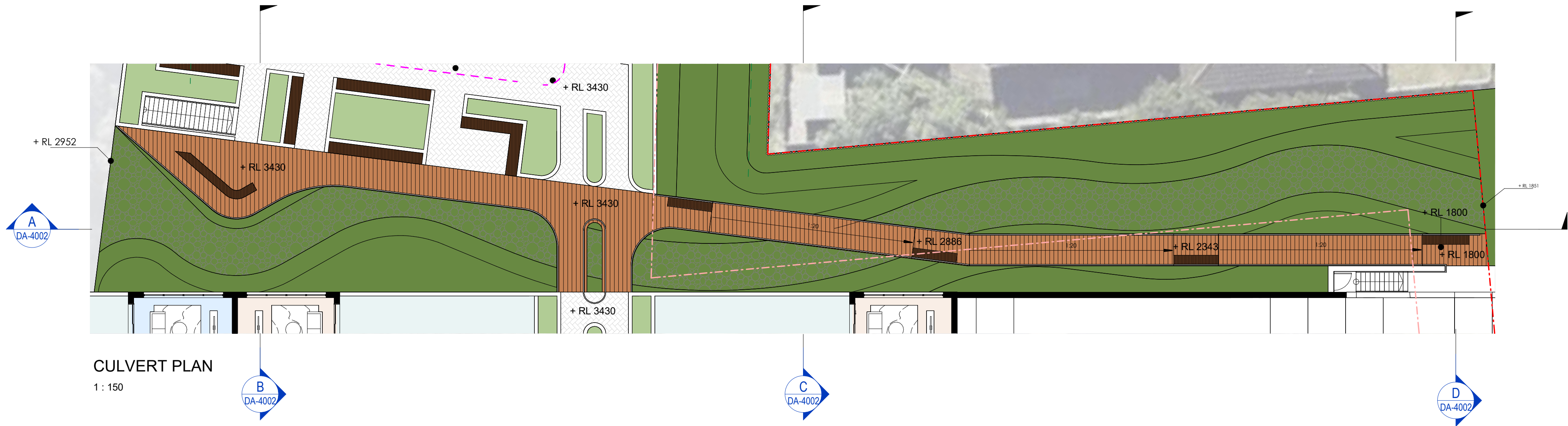
DA-2004

DATE: 03/09/2024

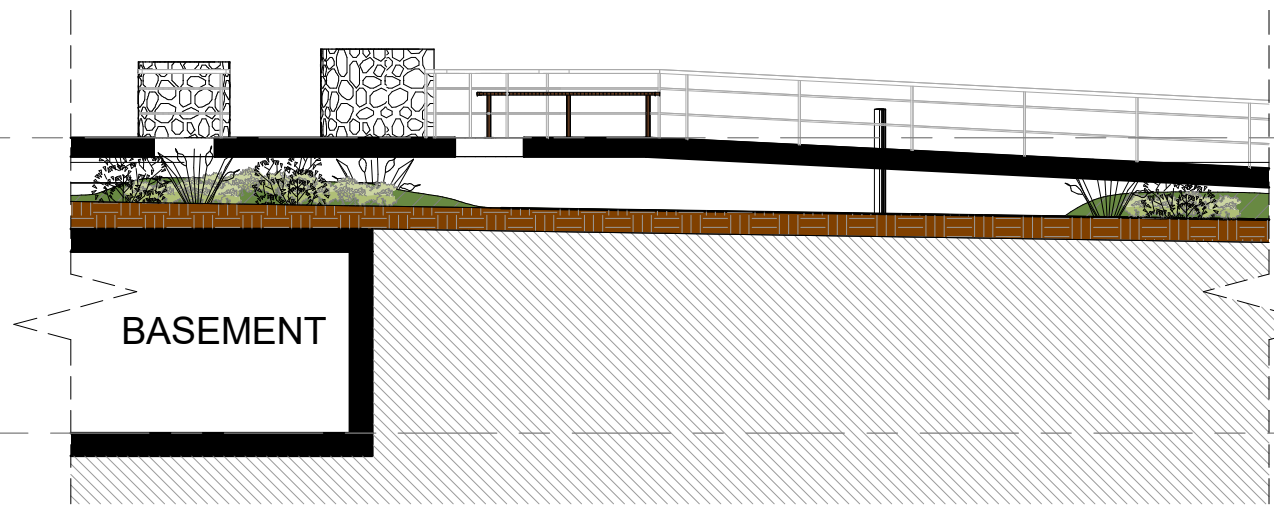
REV: D

COPYRIGHT: All rights reserved. This work is copyright and cannot be reproduced or copied by any means without the written permission of Place Studio AU PTY LTD. Any license, express or implied, to use this document for any purpose whatsoever is restricted to the terms of the agreement between Place Studio AU PTY LTD and the instructing party.

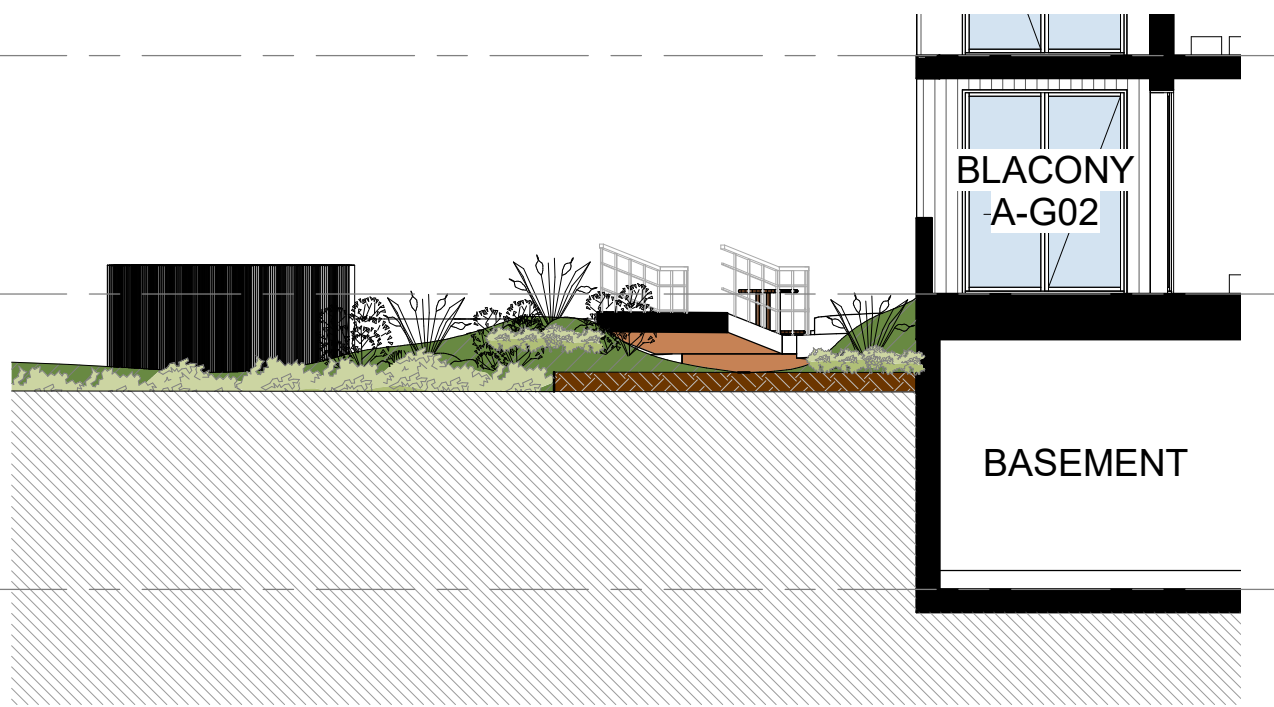
PRELIMINARY
NOT FOR CONSTRUCTION
DEVELOPMENT APPLICATION



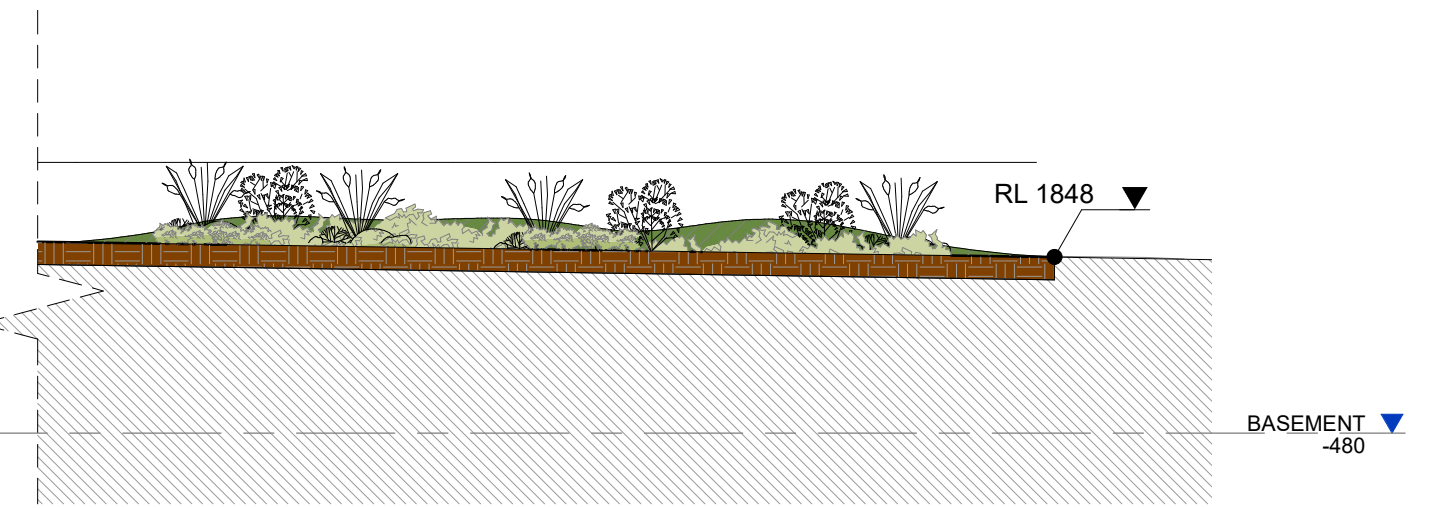
CULVERT SECTION A
1 : 100



CULVERT SECTION B
1 : 100



CULVERT SECTION C
1 : 100



CULVERT SECTION D
1 : 100

Document Notes

Verify all dimensions on site before commencing work. Report all discrepancies to the architect prior to construction. Place Studio shall not be held responsible for any variations to specifications or drawings due to any discrepancies without consultation. Use figured dimensions in preference to scaled dimensions. Drawings made to larger scales and those showing particular parts of the works take precedence over drawings made to smaller scales or for general purposes. All work is to conform to relevant Australian Standards and Codes together with all Authorised requirements and Regulations.

REV	DATE	DESCRIPTION	APP
A	21/03/2023	DA SUBMISSION	SK
B	24/11/2023	DA RFI Response	JA
C	03/09/2024	DA Submission	BA

ARCHITECT:
PLACE
STUDIO
PLACE STUDIO AU PTY LTD |
74 KING ST, NEWTOWN, NSW 2042
T | 61 431 688 834 | J ALEXANDER-HATZIDIS NSW ARB #10535
W | www.PlaceStudio.com.au E | Studio@PlaceStudio.com.au

SCALE: As indicated @
A1

PROJECT:
#2021029
HERADALE
BATEMANS BAY
20 HERADALE PARADE
BATEMANS BAY
DRAWING TITLE:
CULVERT SECTION

SHEET NUMBER:
DA-4002
DATE: 03/09/2024

REV:
C

PRELIMINARY
NOT FOR CONSTRUCTION
DEVELOPMENT APPLICATION

Appendix C COUNCIL FLOOD INFORMATION SHEET

Flooding/ Interim Coastal Hazard Adaption Code

The majority of the site has a flood level of 2.45m AHD. The Flood Planning Level (FPL) for habitable areas is 2.95m inclusive of 500mm freeboard. Please note the FPL is the finished floor level of the proposed habitable areas of the building.

The western sloped portion of the site can experience overland flow of depths up to 150mm.

A Flood Report should be submitted with the development application detailing the impact of the development on the flood behaviour, identifying the hazards and risk mitigation details.

The basement carpark will need to provide flood free access to ensure the safe egress of occupants during the event of a flood. The basement will need to be protected up to the residential FPL (including freeboard). The parking level requires a crest in the driveway at the 1% AEP FPL to prevent ingress of flood water.