



DEVELOPMENT APPLICATION

PDPLANPMTD-2022/032282

PROPOSAL: Three Lot Subdivision (Two New & One Existing)

LOCATION: 61 Mannata Street, Lauderdale

RELEVANT PLANNING SCHEME: Tasmanian Planning Scheme - Clarence

ADVERTISING EXPIRY DATE: 9 May 2024

The relevant plans and documents can be inspected at the Council offices, 38 Bligh Street, Rosny Park, during normal office hours until 9 May 2024. In addition to legislative requirements, plans and documents can also be viewed at www.ccc.tas.gov.au during these times.

Any person may make representations about the application to the Chief Executive Officer, by writing to PO Box 96, Rosny Park, 7018 or by electronic mail to clarence@ccc.tas.gov.au. Representations must be received by Council on or before 9 May 2024.

To enable Council to contact you if necessary, would you please also include a day time contact number in any correspondence you may forward.

Any personal information submitted is covered by Council's privacy policy, available at www.ccc.tas.gov.au or at the Council offices.



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Clarence City Council

APPLICATION FOR DEVELOPMENT / USE OR SUBDIVISION

The personal information on this form is required by Council for the development of land under the Land Use Planning and Approvals Act 1993. We will only use your personal information for this and other related purposes. If this information is not provided, we may not be able to deal with this matter. You may access and/or amend your personal information at any time. How we use this information is explained in our **Privacy Policy**, which is available at www.ccc.tas.gov.au or at Council offices.

Proposal:

2 Lot Subdivision and balance

Location:

Address 61 Mannata Street

Suburb/Town Lauderdale

Postcode

Current Owners/s:

Applicant:

Personal Information Removed

Tax Invoice for application fees to be in the name of: (if different from applicant)

Estimated cost of development

\$

Is the property on the Tasmanian Heritage Register?

Yes

No

(if yes, we recommend you discuss your proposal with Heritage Tasmania prior to lodgement as exemptions may apply which may save you time on your proposal)

If you had pre-application discussions with a Council Officer, please give their name

Current Use of Site:

Residential

Does the proposal involve land administered or owned by the Crown or Council?

Yes

No

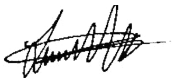
Declaration:

- *I have read the Certificate of Title and Schedule of Easements for the land and am satisfied that this application is not prevented by any restrictions, easements or covenants.*
- *I authorise the provision of a copy of any documents relating to this application to any person for the purposes of assessment or public consultation. I agree to arrange for the permission of the copyright owner of any part of this application to be obtained. I have arranged permission for Council's representatives to enter the land to assess this application*
- *I declare that, in accordance with Section 52 of the Land Use Planning and Approvals Act 1993, that I have notified the owner of the intention to make this application. Where the subject property is owned or controlled by Council or the Crown, their signed consent is attached. Where the application is submitted under Section 43A, the owner's consent is attached.*
- *I declare that the information in this declaration is true and correct.*

Acknowledgement:

- *I acknowledge that the documentation submitted in support of my application will become a public record held by Council and may be reproduced by Council in both electronic and hard copy format in order to facilitate the assessment process; for display purposes during public consultation; and to fulfil its statutory obligations. I further acknowledge that following determination of my application, Council will store documentation relating to my application in electronic format only.*

Applicant's
Signature:


Signature.....Date 11/10/2022

PLEASE REFER TO THE DEVELOPMENT/USE AND SUBDIVISION CHECKLIST ON THE FOLLOWING PAGES TO DETERMINE WHAT DOCUMENTATION MUST BE SUBMITTED WITH YOUR APPLICATION.

Documentation required:

1. **MANDATORY DOCUMENTATION**

This information is required for the application to be valid. An application lodged without these items is unable to proceed.

- Details of the location of the proposed use or development.
- A copy of the current Certificate of Title, Sealed Plan, Plan or Diagram and Schedule of Easements and other restrictions for each parcel of land on which the use or development is proposed.
- Full description of the proposed use or development.
- Description of the proposed operation.
May include where appropriate: staff/student/customer numbers; operating hours; truck movements; and loading/unloading requirements; waste generation and disposal; equipment used; pollution, including noise, fumes, smoke or vibration and mitigation/management measures.
- Declaration the owner has been notified if the applicant is not the owner.
- Crown or Council consent (if publically-owned land).
- Any reports, plans or other information required by the relevant zone or code.
- Fees prescribed by the Council.

Application fees (please phone 03 6217 9550 to determine what fees apply). An invoice will be emailed upon lodgement.

2. **ADDITIONAL DOCUMENTATION**

In addition to the mandatory information required above, Council may, to enable it to consider an application, request further information it considers necessary to ensure that the proposed use or development will comply with any relevant standards and purpose statements in the zone, codes or specific area plan, applicable to the use or development.

- Site analysis plan and site plan**, including where relevant:
 - *Existing and proposed use(s) on site.*
 - *Boundaries and dimensions of the site.*
 - *Topography, including contours showing AHD levels and major site features.*
 - *Natural drainage lines, watercourses and wetlands on or adjacent to the site.*
 - *Soil type.*
 - *Vegetation types and distribution, and trees and vegetation to be removed.*
 - *Location and capacity of any existing services or easements on/to the site.*
 - *Existing pedestrian and vehicle access to the site.*
 - *Location of existing and proposed buildings on the site.*
 - *Location of existing adjoining properties, adjacent buildings and their uses.*
 - *Any natural hazards that may affect use or development on the site.*
 - *Proposed roads, driveways, car parking areas and footpaths within the site.*
 - *Any proposed open space, communal space, or facilities on the site.*
 - *Main utility service connection points and easements.*
 - *Proposed subdivision lot boundaries.*

- Where it is proposed to erect buildings, **detailed plans** with dimensions at a scale of 1:100 or 1:200 showing:
 - *Internal layout of each building on the site.*
 - *Private open space for each dwelling.*
 - *External storage spaces.*
 - *Car parking space location and layout.*
 - *Major elevations of every building to be erected.*
 - *Shadow diagrams of the proposed buildings and adjacent structures demonstrating the extent of shading of adjacent private open spaces and external windows of buildings on adjacent sites.*
 - *Relationship of the elevations to natural ground level, showing any proposed cut or fill.*
 - *Materials and colours to be used on rooves and external walls.*
- Where it is proposed to erect buildings, a plan of the proposed **landscaping** showing:
 - *Planting concepts.*
 - *Paving materials and drainage treatments and lighting for vehicle areas and footpaths.*
 - *Plantings proposed for screening from adjacent sites or public places.*
- Any additional reports, plans or other information required by the relevant zone or code.

This list is not comprehensive for all possible situations. If you require further information about what may be required as part of your application documentation, please contact Council's Planning Officers on (03) 6217 9550 who will be pleased to assist.

SEARCH OF TORRENS TITLE

VOLUME 171959	FOLIO 6
EDITION 2	DATE OF ISSUE 09-Nov-2016

SEARCH DATE : 28-Oct-2022

SEARCH TIME : 03.17 PM

DESCRIPTION OF LAND

City of CLARENCE

Lot 6 on Plan 171959

Derivation : Part of 700 Acres Located to E.S.P. Bedford

Prior CT 23315/33

SCHEDULE 1

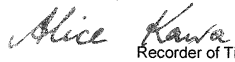
B817950 TRANSFER to GRAEME BERVAN PICKETT and LOUISE MARY
PICKETT Registered 04-Jan-1995 at noon

SCHEDULE 2

Reservations and conditions in the Crown Grant if any
SPD 131 FENCING COVENANT in Schedule of Easements

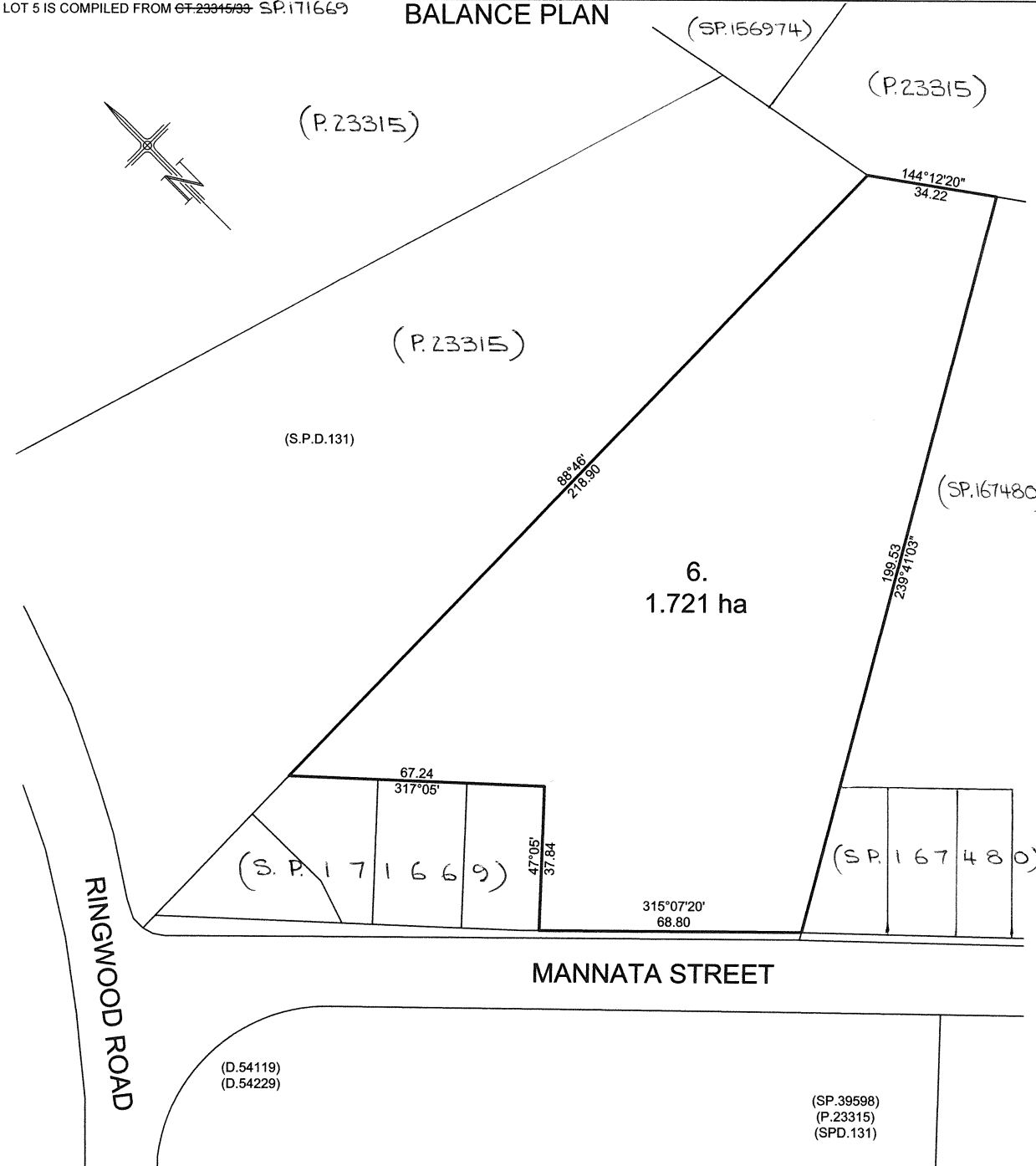
UNREGISTERED DEALINGS AND NOTATIONS

No unregistered dealings or other notations

OWNER: GRAEME BERVAN & LOUISE MARY PICKETT FOLIO REFERENCE: C.T. 23315/33 GRANTEE: Part of 700 Acres Located to E.S.P. Bedford.	<p>PLAN of SURVEY</p> BY SURVEYOR: NICHOLAS GRIGGS of Nick Griggs & Co. 295 Elizabeth Street, North Hobart, 7000 Ph: 6234 5022 Fax: 6231 2412 LOCATION: CITY OF CLARENCE SCALE: 1: 200 1000 LENGTHS IN METRES	REGISTERED NUMBER <p style="font-size: 24pt; font-weight: bold;">P171959</p> APPROVED EFFECTIVE FROM: 13 SEP 2016  Recorder of Titles	
MAPSHEET MUNICIPAL CODE No. 107 (5224)	LAST UPI No.	LAST PLAN No. P.23315	ALL EXISTING SURVEY NUMBERS TO BE CROSS REFERENCED ON THIS PLAN.

LOT 5 IS COMPILED FROM ~~C.T. 23315/33~~ S.P.171669

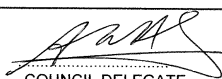
BALANCE PLAN



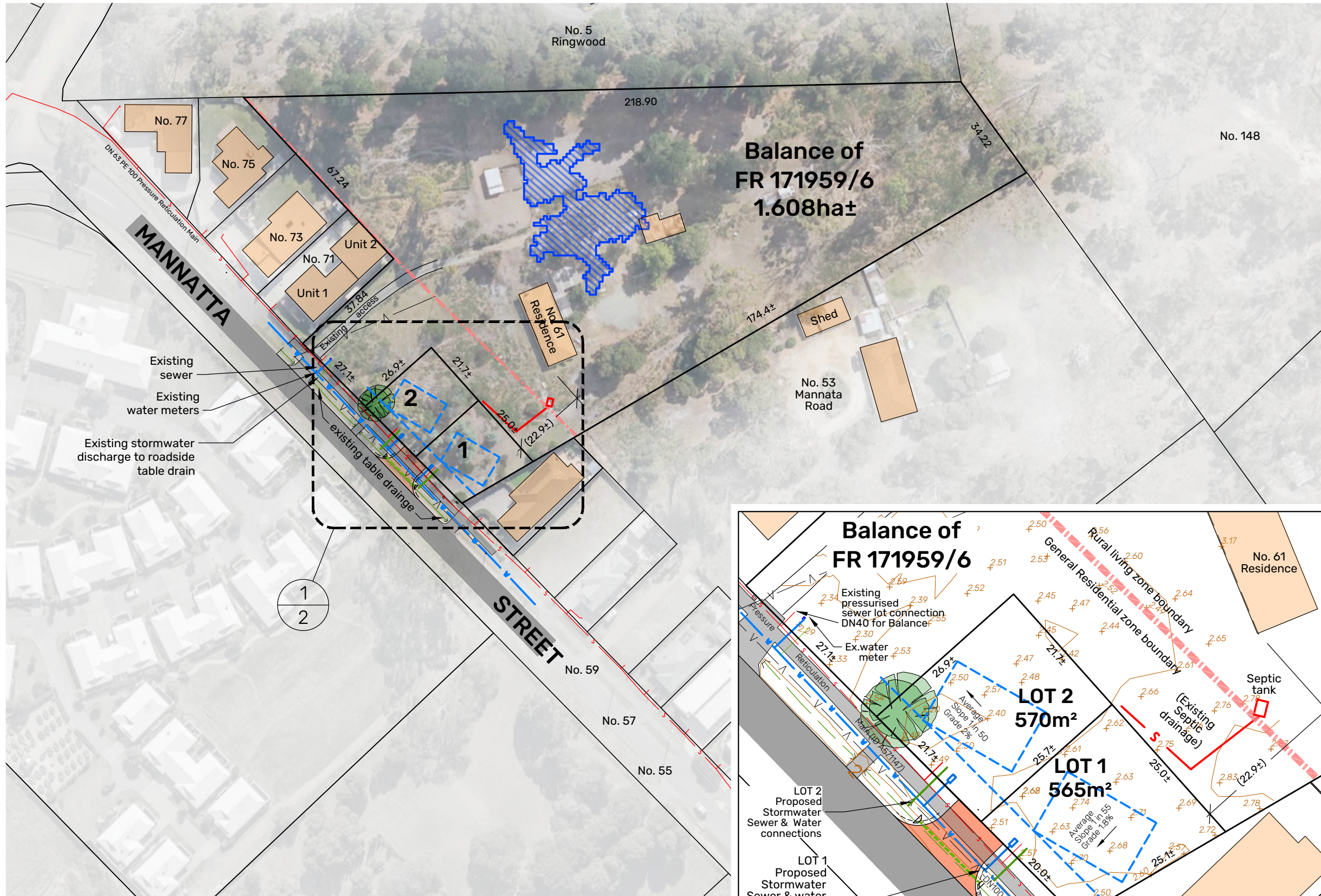
6.
1.721 ha

MANNATA STREET

RINGWOOD ROAD


 COUNCIL DELEGATE

19-8-16
 DATE



PLAN OF SUBDIVISION

Owners
GRAEME BERVAN PICKETT
LOUISE MARY PICKETT

Title References
 FR 171959/6

Address
 61 Mannata Street, Lauderdale

Council
 Clarence City Council

Clarence Local Provisions Schedule
 11 Rural Living Zone B
 8 General Residential

- Code Overlays
- Low and Medium coastal inundation hazard band
 - Airport obstacle limitation area
 - Flood-prone areas

Map reference
 'Taroona' 5224

PID
 3465313

Point of interest GDA2020 MGA55
 539775E, 5249580N

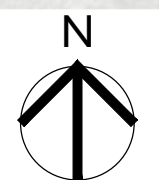
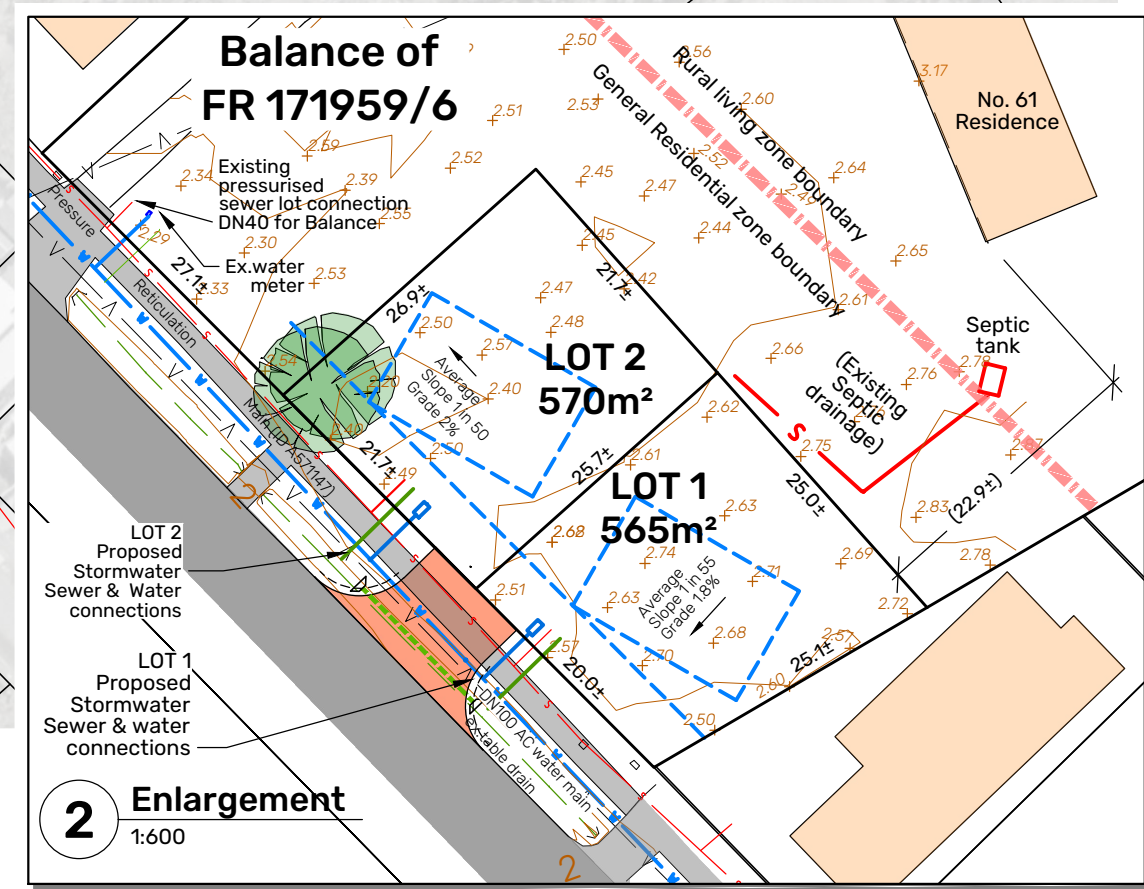
Schedule of Easements
 Nil.

NOTES

1. This plan has been prepared only for the purpose of obtaining preliminary subdivision approval from the Council and the information shown hereon should be used for no other purpose. All measurements and areas are subject to final survey.
2. Entire site is subject to either the Low or Medium coastal inundation hazard band overlay & Airport obstacle limitation area. This isn't shown for plan clarity

LEGEND

- Title/proposed boundary
- Surrounding boundary
- Contour 0.2 interval
- Overhead powerline
- Zone boundary
- - - Existing Sewer
- - - Pressure Reticulation Main
- - - Existing TasWater Water
- - - Roadside table drain
- ▨ Flood-prone area Code overlay
- ▨ Proposed access location for Lots 1 & 2 (To comply with TSD-R03 Rural Road property access)
- + HT Survey Spot heights (AHD 83) Vertical Datum per SPM 8378



1 PLAN OF SUBDIVISION
 1:1250

2 Enlargement
 1:600

REV	AMENDMENTS	DRAWN	DATE	APPR.
D				
C	SHOW FIELD SURVEY SPOT HEIGHTS AND CONTOURS OVER PROPOSED LOT 1 & LOT 2 AREA.	MK	28.08.23	CMT
B	SHOW DOUBLE WIDTH CROSS-OVER FOR NEW LOTS	MK	10.07.23	JB
A	REDUCE LOTS 1 & 2 AREA.	MK	31.08.22	JB
O	FIRST ISSUE.	MK	22.08.22	JB

NOTES:	
SURVEYOR	AC
DRAWN	MK
DATE	28 AUGUST 2022

GEOCIVIL	
CHECKED	JB

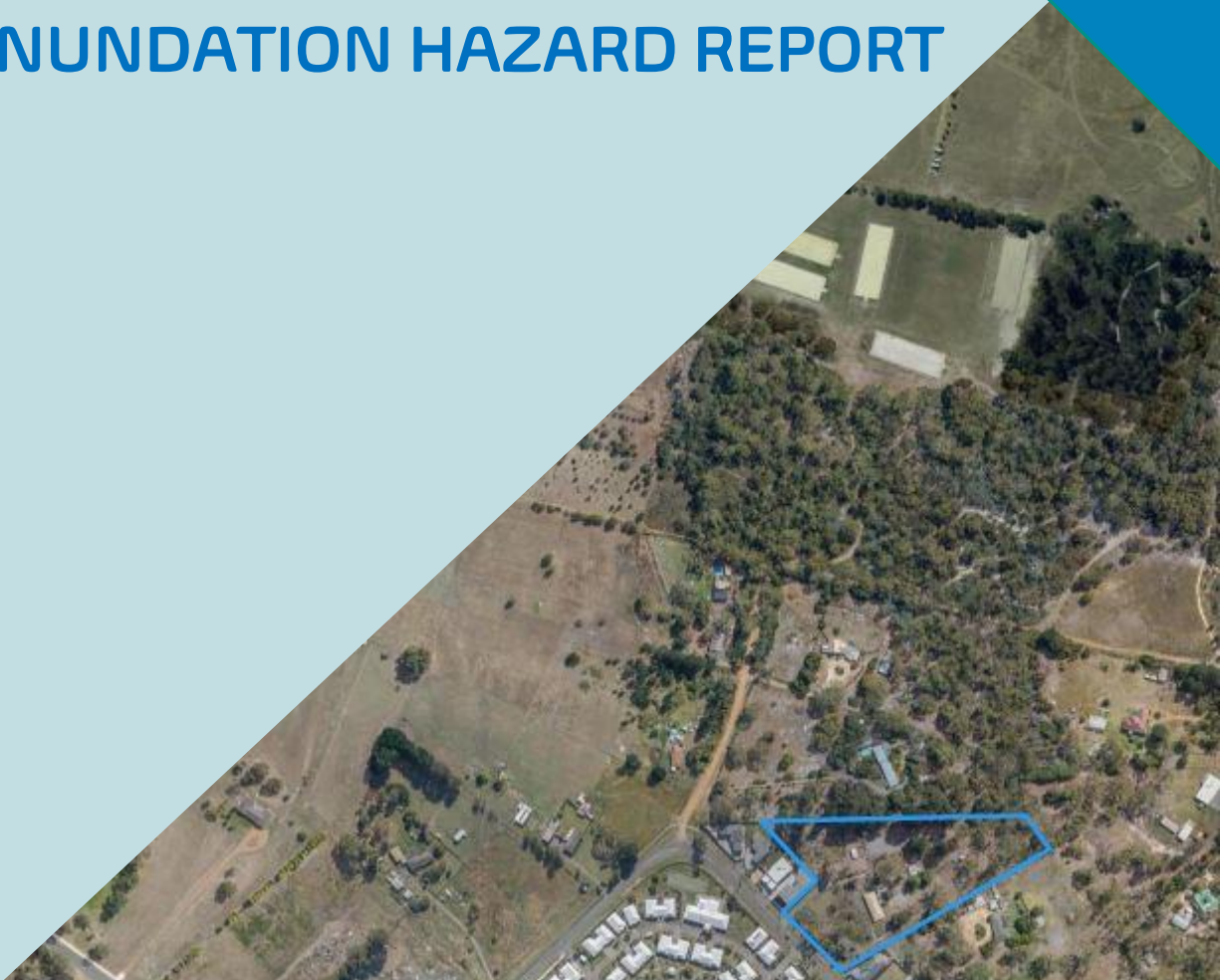
PLAN OF SUBDIVISION
61 MANNATA STREET, LAUDERDALE
for GRAEME PICKETT



127 Bathurst Street Hobart, Tasmania, 7000 PHONE: +61 03 6234 3217 FAX: +61 03 6234 5085 EMAIL: pda.hbt@pda.com.au www.pda.com.au Also at: Kingston, Launceston & Burnie	SCALE As shown	PAPER (A3)
	JOB NUMBER 49055AC-1C	DRAWING

31st July 2023
FE_23068

61 Mannata Street, Lauderdale COASTAL INUNDATION HAZARD REPORT

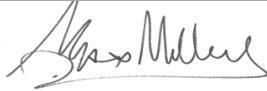



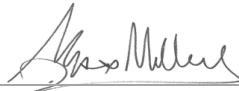


Prepared for: Graeme Pickett

Document Information

Title	Client	Document Number	Project Manager
61 Mannata Street, Lauderdale, Coastal Inundation Hazard Report	Graeme Pickett	FE_23068	Max W. Möller <i>BEng, FIEAust, EngExec, CPEng,NER,APEC Engineer, IntPE(Aus.)</i>

Document Initial Revision

REVISION 00	Staff Name	Signature	Date
Prepared by	Max W. Moller <i>Principal Hydraulic Engineer</i>		15/07/2023
Prepared by	Ash Perera <i>Hydraulic Engineer</i>		15/07/2023
Prepared by	Christine Keane <i>Senior Water Resources Analyst</i>		15/07/2023
GIS Mapping	Damon Heather <i>GIS Specialist</i>		24/07/2023
Reviewed by	John Holmes <i>Senior Engineer</i>		28/07/2023
Authorised by	Max W. Möller <i>Principal Hydraulic Engineer</i>		31/07/2023

Document Revision History

Rev No.	Description	Reviewed by	Authorised by	Date
REV01	Response to Council RFI	MM	MM	24.08.23
REV02	Table and Maps Added	MM	MM	19.01.24
REV03	Risk Matrix Revised	MM	MM	26.02.24

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APPENDIX A: Flood Study Maps

APPENDIX B: Risk Matrix

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1. Introduction

Flüssig Engineers have been engaged by Graeme Pickett to undertake a Coastal Inundation Hazard Report for the development at number 61 Mannata Street, Lauderdale in the **Clarence City Council** municipality. The purpose of this report is to determine the coastal inundation flood characteristics on the existing and post-development hazard scenarios for the 1% AEP plus climate change plus Storm Surge (1% AEP + CC + SS), for the purpose of development.

1.1 Development

The proposed subdivision is a 2-lot subdivision with balance. The current lot at 61 Mannata Street, Lauderdale has an area of 17,215 m². Proposed subdivision consists of lot 1 with an area of 565m², lot 2 with an area of 570 m², and a balance area of 16,108m². This development triggers the Coastal Inundation Hazard Code as the development falls within Clarence City Council medium coastal inundation hazard band.

1.2 Objectives and Scope

This coastal analysis has been written to meet the standards of the C11.0 Coastal Inundation Hazard Code of the Tasmanian Planning Scheme (2021), with the intent of understanding the development's risk regarding flooding. The objectives of this study are:

- Provide an assessment of the site's coastal inundation characteristics under the combined 1% AEP plus climate change (CC) + SS scenario.
- Provide comparison of coastal inundation for post-development against acceptable solution and performance criteria.
- Provide coastal mitigation recommendations for a potential future development, where appropriate.

1.3 Limitations

This study is limited to the objectives of the engagement by the clients, the availability and reliability of data, and including the following:

- The coastal model is limited to a 1% AEP + CC + SS worst case temporal design storm.
- All parameters have been derived from best practice manuals and available relevant studies (if applicable) in the area.
- All provided data by the client or government bodies for the purpose of this study is deemed fit for purpose and has not been checked for accuracy.
- The study is to determine the effects of the new development on coastal inundation flooding behaviour and should not be used as a full coastal study outside the specified area without further assessment.

1.4 Relevant Planning Scheme Requirements

Table 1. Tasmanian Planning Scheme Requirements

Planning Scheme Code	Objective	Document Reference
C11.6.1 Buildings and works, excluding coastal protection works, within a coastal inundation hazard area	building and works, excluding coastal protection works, within a coastal inundation hazard area, can achieve and maintain a tolerable risk from coastal inundation; and buildings and works do not increase the risk from coastal inundation to adjacent land and public infrastructure.	Section 3
C11.7.1 That subdivision within a coastal inundation hazard area does not create an opportunity for use or development that cannot achieve and maintain a tolerable risk from coastal inundation.	Each lot, or a lot proposed in a plan of subdivision within a coastal inundation hazard area must not create an opportunity for use or development that cannot achieve and maintain a tolerable risk.	Section 3

2. Model Build

2.1 Overview of Catchment

The contributing catchment for the site at 61 Mannata Street, Lauderdale is approximately 556 ha. The land use of the catchment is zoned predominantly Rural Living, Landscape Conservation and General Residential, with the immediate areas surrounding the specific site being proposed General Residential. The site is currently zoned Rural Living but will be rezoned as General Residential.

Figure 1 below outlines the approximate contributing catchment for the site at 61 Mannata Street.

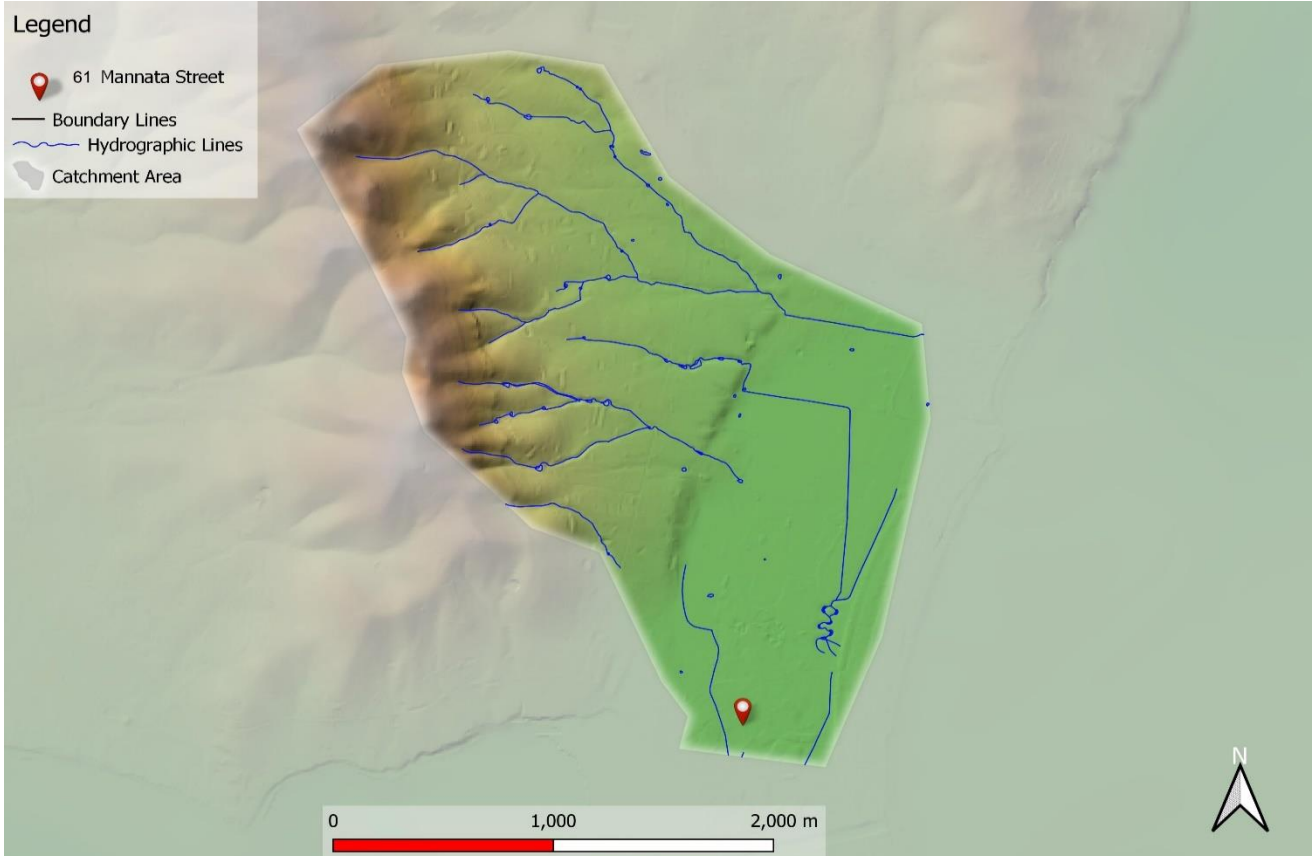


Figure 1. Contributing Catchment, 61 Mannata Street, Lauderdale

2.2 Overview of site

61 Mannata Street, Lauderdale lies 500 m back from Ralphs Bay and the southern edge of Roches Beach. Roches Beach is approximately 3500m long and makes one of many small beaches in the greater Frederick Henry Bay. Lauderdale area is relatively low lying and prone to flooding as per Carley et al. 2008. 61 Mannata Street sits approximately 2.9m AHD falling within the medium hazard band of the Coastal Inundation Code.

Figure 2 below outlines the approximate location for the site at 61 Mannata Street, in relation to the greater Roches beach area.



Figure 2. 61 Mannata Street, Lauderdale

2.3 Hydrology

The following Table 2 states the adopted hydrological parameters for the RAFTS catchment.

Table 2. Parameters for RAFTS catchment

Catchment Area (ha)	Initial Loss Perv/imp (mm)	Continuing Loss Perv/imp (mm/hr)	Manning's N pervious	Manning's N impervious	Non-linearity factor
556	27/1	4.0/0.0	0.045	0.02	-0.285

2.3.1 Design Rainfall Events

Figure 3 shows the box and whisker output of the model run. The model shows that the 1% AEP 4.5 hr storm temporal pattern 2 was the worst-case median storm. Therefore, this storm event was used within the hydraulic model.

Comparison of Storm Ensembles of different durations for AEP = 1%

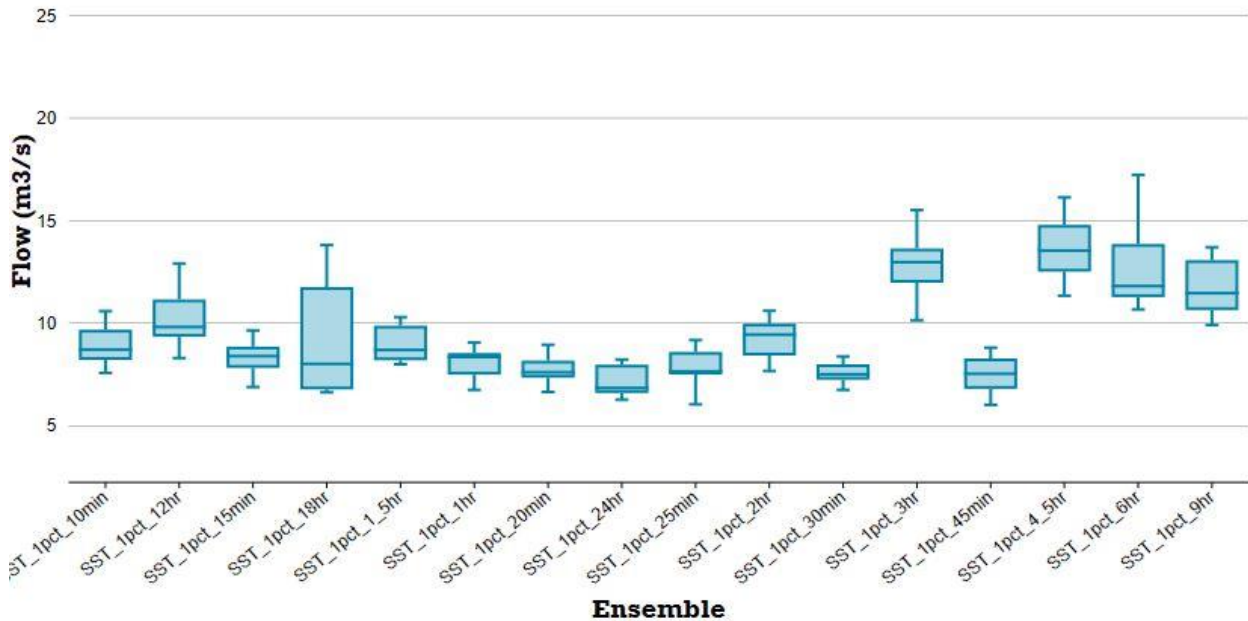


Figure 3. 1% Box and Whisker Plot

2.3.2 Climate Change

As per ARR 2019 Guidelines, for an increase in rainfall due to climate change at 2100, it is recommended the use of RCP 8.5. Table 3 shows the ARR 8.5 increase.

Table 3. Climate Change Increases

Climate Zone	CFT increase @ 2100	ARR 8.5 increase @ 2100
South-East Tasmania	14.6 %	16.3 %

2.4 Hydraulics

A 2D hydraulic model was created to determine the flood level through the target area.

2.4.1 Calibration/Validation

The tidal model was calibrated against Clarence City Council CLA-Table C11.1 Coastal Inundation Hazard Bands AHD Levels, where water levels for the 1% annual exceedance probability 2100 (design Flood Level plus freeboard) has been set to 3.2m AHD.

2.5 Coastal Processes

Coastal inundation events are driven by multiple components including astronomical tide, tide anomalies, barometric setup and extreme wind/wave set-up and run-up. Roches Beach and Ralphs Bay is prone to inundation hazards given its locality and low-lying topography.

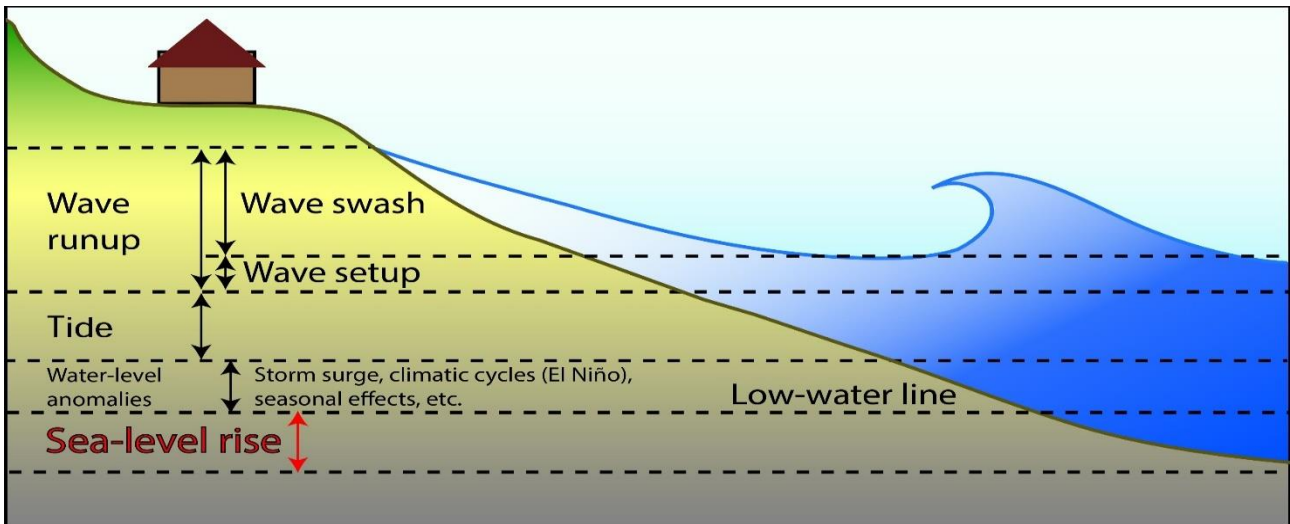


Figure 4. Coastal Processes

Shand et al. (2011) provides an in-depth model of the wind and wave set-up/run-up for the entire length of Roches Beach. Given the scope of this report, and the nature of previous modelling, the supplied information in Table 4 of this report has been used as the profile that is the closest to 61 Mannata Street. The adopted results are summarised below and included in a 2D hydrodynamic model.

2.5.1 Wind and Swell Waves

Table 4 provides an extract from Clarence Local Provisions Schedule for Lauderdale-Ralph Bay. The modelling included ocean and near shore wave modelling. The resultant wave modelling was calibrated for the Low Hazard Band 1% annual exceedance probability 2100 (design Flood Level with freeboard).

As 61 Mannata Street lies approximately 480 m from the Ralph Bay, the levels provided in Table 4 were adopted providing a slightly more accurate height for risk tolerance assessment.

Table 4. CLA-Table C11.1 Coastal Inundation Hazard Bands AHD Levels (Extract)

Locality	High Hazard Band (m AHD)	Medium Hazard Band (m AHD)	Low Hazard Band (m AHD)	Defined Flood
	Sea Level Rise 2050	1% annual exceedance probability 2050 with freeboard	1% annual exceedance probability 2100 (design Flood Level with freeboard)	1% annual exceedance probability 2100
Lauderdale - Ralphs Bay	0.9	2.6	3.2	2.9

2.5.2 Tidal Input

1% AEP wind and swell tidal patterns were derived from Carley et al. (2008) and Shand et al. (2011) and scaled to the 2100 R2% wave run-up height to match CLA-Table C11.1 Coastal Inundation Hazard Bands AHD Levels for the 1% annual exceedance probability 2100 2.9m AHD at 61 Mannata Street. The tide level was applied as a 2D boundary condition to the 2D hydrodynamic model parallel Roches Beach and Ralph Bay.

2.5.3 Sea Level Rise

The CSIRO was commissioned by the Tasmanian government to give the state with updated sea level rise planning allowances. The revised allowances are based on RCP8.5, a high emissions scenario, and the sea level rise forecasts from the IPCC AR5, the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.

The CSIRO's work has provided Tasmania with sea level rise forecasts, planning allowances, and statewide averages for the years 2050 and 2100 (both in relation to sea levels in 2010) for each coastal town in the state.

Planning Allowance for Sea Level Rise by Clarence Council:

- 0.23 m rise by 2050; and
- 0.85 m rise by 2100.

2.5.4 Survey

The 2D surface model was taken from a combination of LiDAR 2019 (Geoscience Australia) to create a 1m and cell size DEM. For the purposes of this report, 1m cells are enough to capture accurate flow paths. The DEM with hill shading can be seen below (Figure 5).

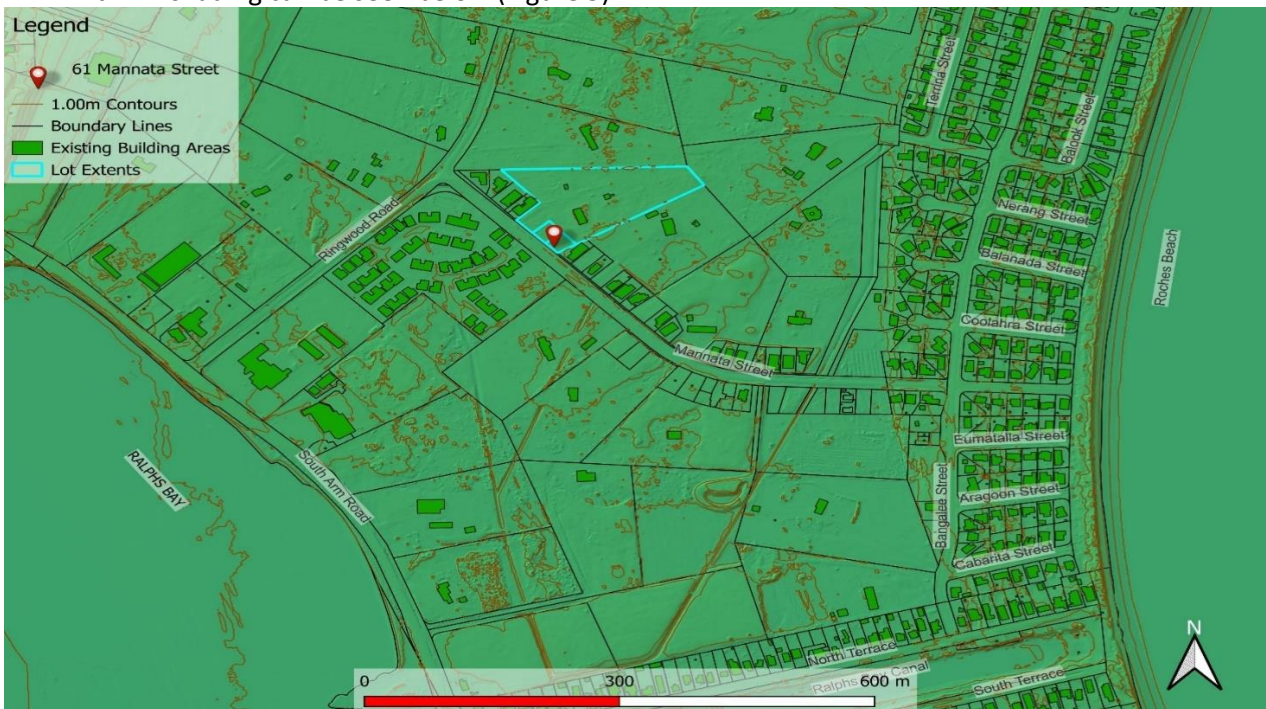


Figure 5. 1.0m DEM (Hill shade) of Lot Area

2.5.5 Roughness (Manning's n)

Roughness values for this model were derived from the ARR 2019 Guidelines. The Manning's values are listed in Table 5.

Table 5. Manning's Coefficients (ARR 2019)

Land Use	Roads	Open Channel	Rural	Residential	Parks	Buildings	Piped Infrastructure
Manning's n	0.018	0.035	0.04	0.045	0.05	0.3	0.013

2.5.6 Walls

All surrounding fences and retaining structures were present within the 2D model.

2.5.7 Buildings

Buildings were represented as mesh polygons with a high Manning's n value within the model. Buildings with unknown floor levels were set with a minimum 300mm above ground.

2.5.8 Fill

Proposed fill for Lot 1 and Lot 2 was raised out of the 2D Zone as per the recommended levels using mesh zones to represent the post fill development model.

3. Model Results

The result of the Coastal Inundation model analysis, were run through the pre-development and post-development model scenarios (including riverine, storm surge and sea level rise scenarios) to compare the changes to flooding onsite and to surrounding properties. It can be seen from the pre-development model runs (Figure 6), that significant flooding occurs over 61 Mannata Street.

Figure 6 shows with combined riverine and storm surge flooding completely inundates 61 Mannata Street to a maximum depth of 0.80 m with a maximum ARR hazard rating of 3 observed in the balance area of the subdivision.

The post-development runs Figure 7, show the minimum influence that the proposed fill has on the lot and on surrounding properties.

The location of the recommended fill is subject to be inundated to <0.60 mm flood depth in the pre-development scenario. The immediate area surrounding the location of the recommended fill is inundated to a maximum depth of 0.66m.

With the inclusion of fill, the surrounding inundation level Figure 7 does not appear to be greatly affected, with a maximum depth of 0.69 m, an increase of only 0.03m from the pre-development scenario. This leaves the entire fill area free from inundation. The impedance of the fill in this instance appears to be mostly localised to the area immediately around the proposed lot subdivision.

It can be seen in Appendix A (coastal inundation maps) that any future development is affected by maximum coastal flood inundation, and any future structures for the purpose of habitable buildings, would be subject to medium hazard coastal inundation code requirements.

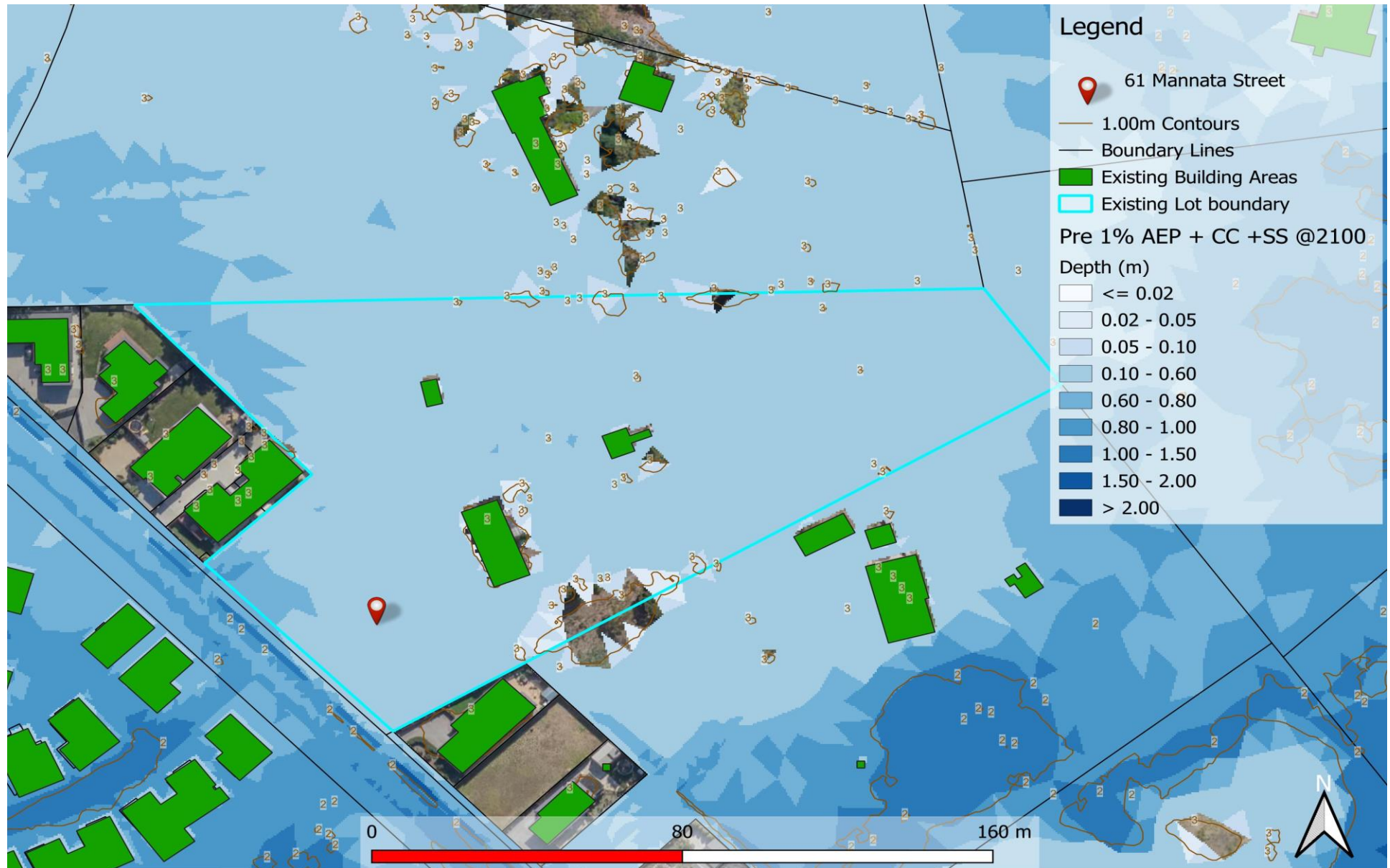


Figure 6. Pre-Development 1% AEP + CC + SS Depth

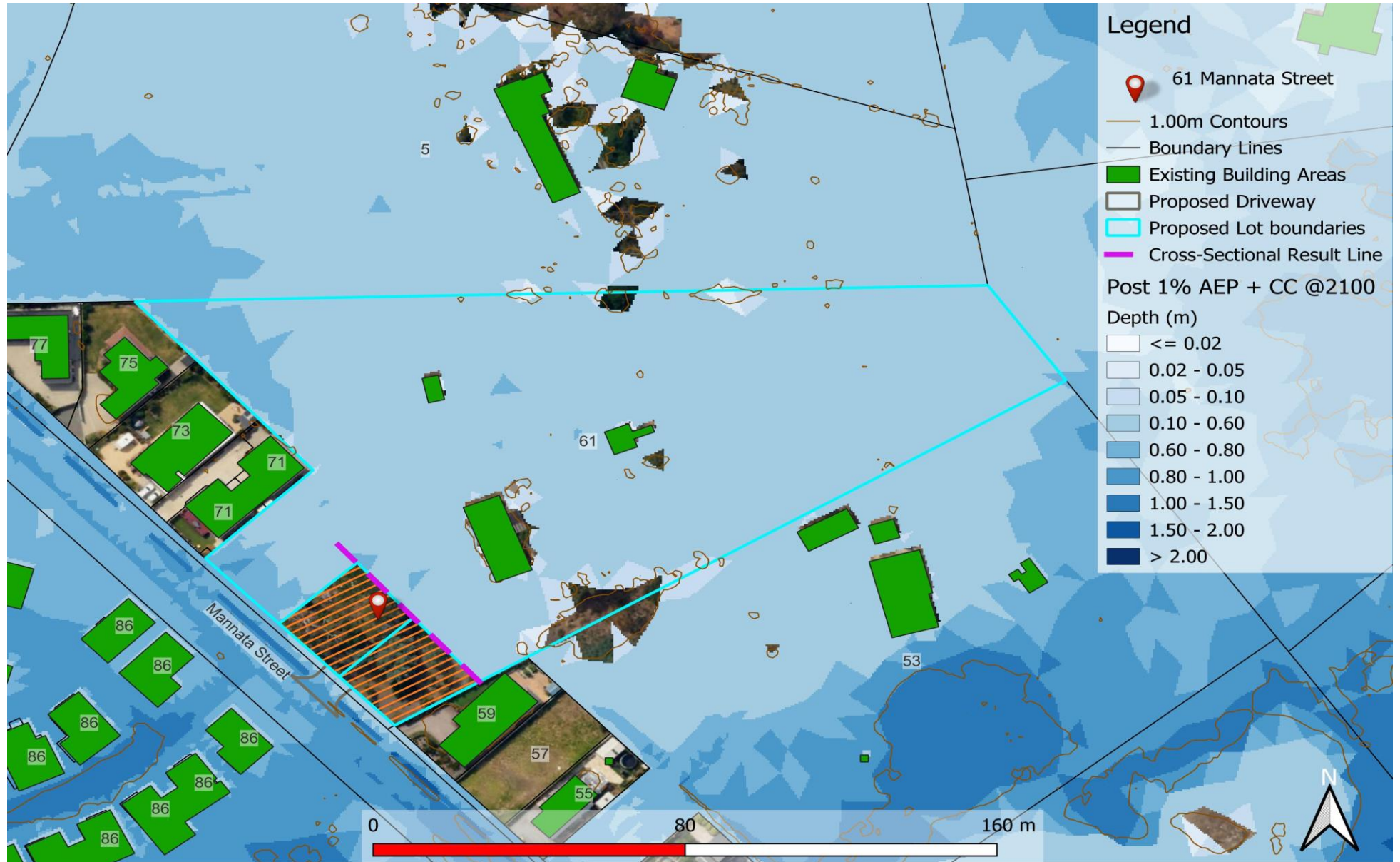


Figure 7. Post-Development 1% AEP + CC + SS Depth

3.1 Displacement of Overland Flow on Third Party Property

Figure 7 shows post-development coastal inundation flood results that, when compared against pre-development, there is a slight increase in depths within the lot boundaries predominately on the northern side of the fill.

The hazard rating on third party property remains at the same levels in both the pre-development and post-development scenario. It is therefore deemed that the coastal inundation post development model does not adversely affect flood flow through surrounding properties with a minimum property flow displacement.

3.2 Development Effects on Flooding

Figure 8 below shows the discharge hydrograph for the coastal inundation flow from development area.

This hydrograph only considered the effect on the coastal inundation included climate change and storm surge.

The graph was captured in the model for both pre- and post-development runs and combined in graph format to demonstrate the change in net discharge.

It demonstrates a negligible decrease in flow hydrograph from the pre-development 0.07 m³/s to the post-development of 0.06 m³/s, as well as a slight increase in velocity from 0.09 m/s to 0.13 m/s. The minor increase in velocity due to the recommended fill has a minimal effect on the flood depth and extent of the pre and post model runs and does not increase the risk rating on surrounding properties or infrastructure. The decrease in discharge can be explained due to the obstruction of the flow path from the recommended fill area.

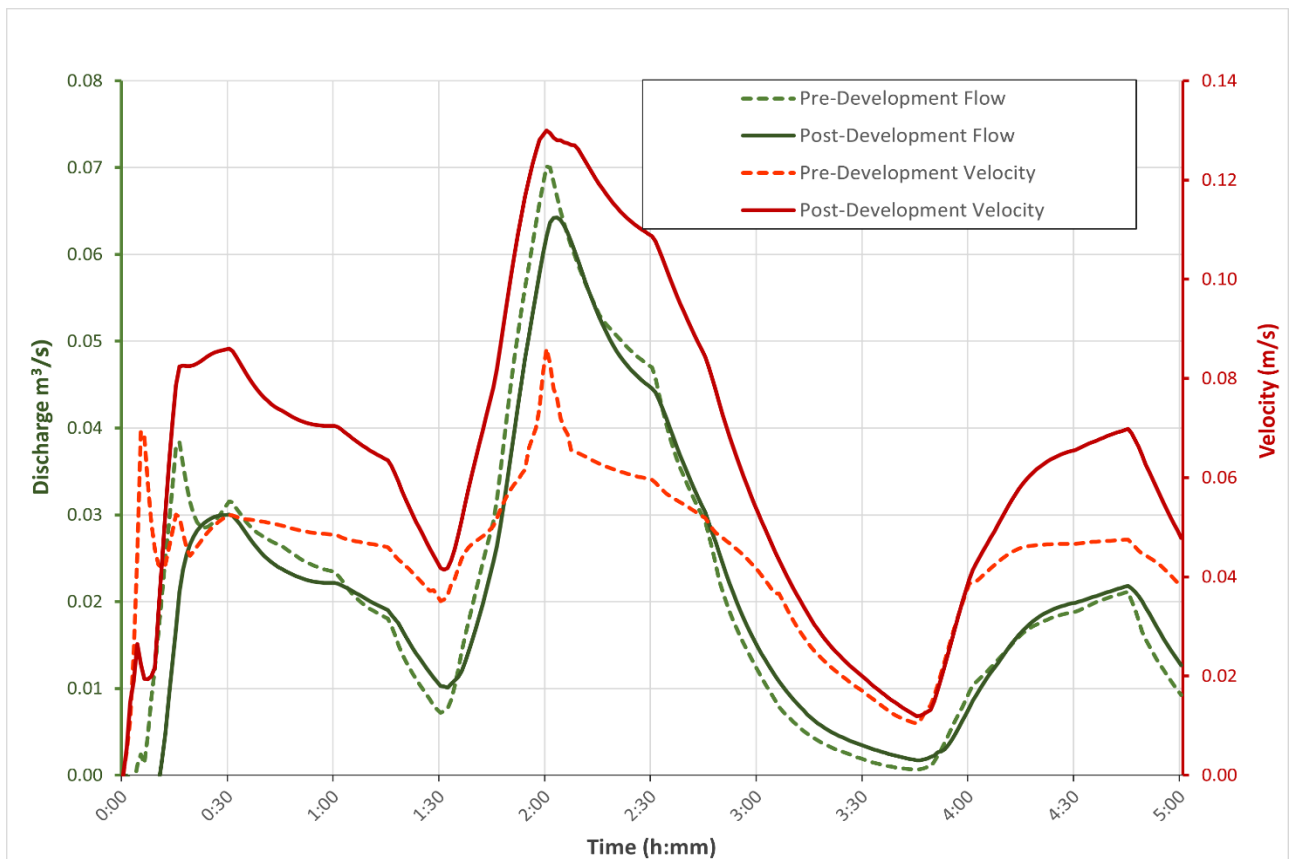


Figure 8. Pre and Post Development Net Discharge 1% AEP + CC + SS

3.3 Medium Hazard Costal Inundation

Coincidental flood and storm surge modelling provides the most conservative levels and was adopted for this report. The land is subject to coastal inundation hazards irrespective to riverine flooding.

Therefore, under the C11.6.1 and C11.7.1, any future works must not impact on surrounding properties.

4. Flood Hazard

As per Clarence City Council Coastal Inundation Levels, the location of the fill is subject to be inundated to <600 mm flood depth and <0.13 m/s velocity (Appendix A) in the predevelopment scenario. This places the hazard rating as adopted by Australian Flood Resilience and Design Handbook as a maximum H3 – *Unsafe for people, vehicles, children and elderly* as shown in Appendix A – Hazard maps. The inclusion of the fill at Lot 1 and Lot 2, raises the ground level area to 2.9m AHD out of the coastal inundation flood level and is therefore not subject to flood hazard inundation. A summary of the hazard ratings is shown in Figure 9.

Therefore, in the event of Coastal Inundation flooding for 2100, Mannata Sreet, would likely to be unsafe levels for emergency evacuation. The future use of the area would be safe within the lot boundaries assuming recommendations of this report are applied within the design.

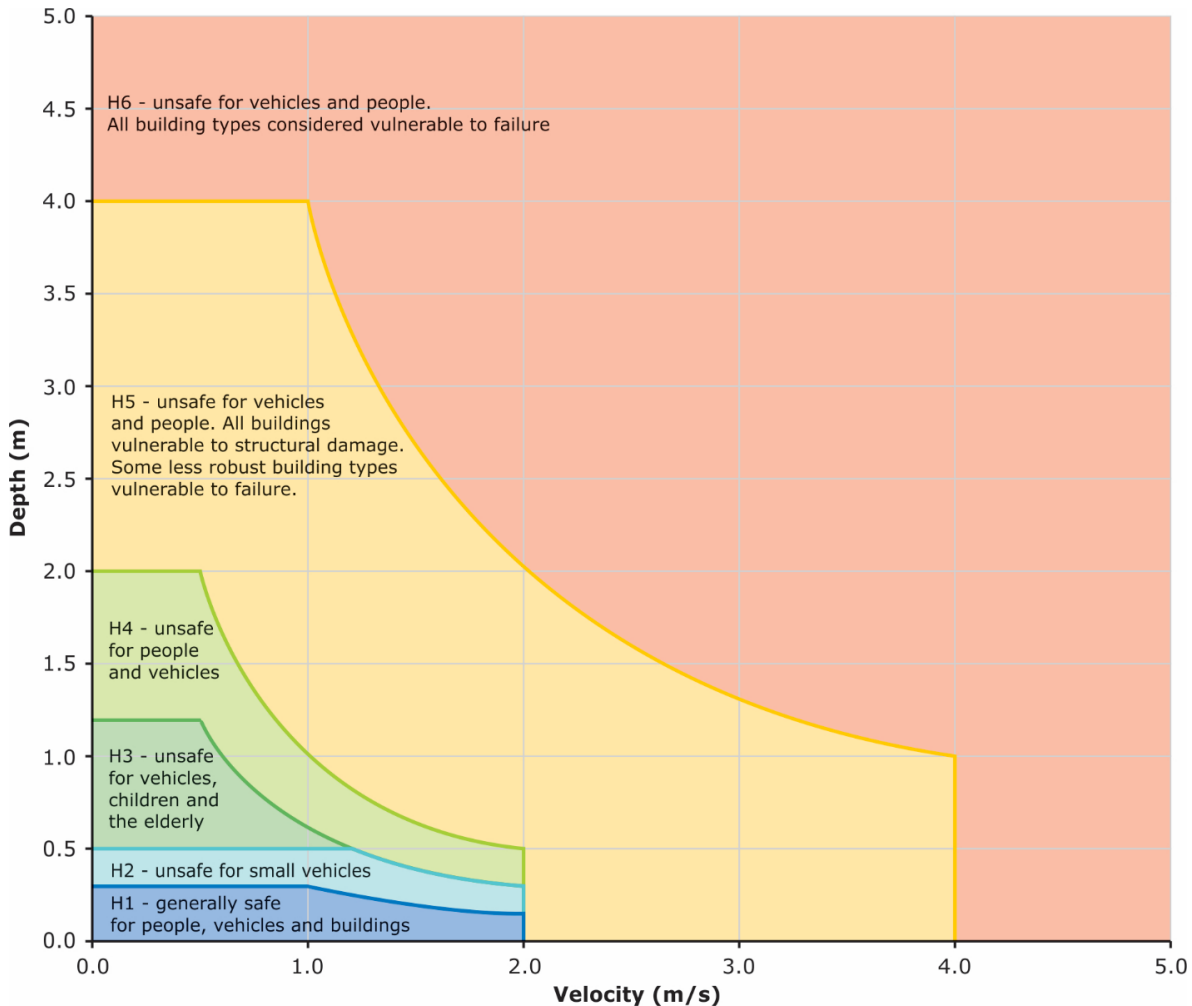


Figure 9. Hazard Categories Australian Disaster and Resilience Handbook

Table 6. Report Summary against TPS(Clarance) C11.6.1

C11.6.1 Buildings and works, excluding coastal protection works, within a coastal inundation hazard area	
<p>Objectives: That:</p> <ul style="list-style-type: none"> a) building and works, excluding coastal protection works, within a coastal inundation hazard area, can achieve and maintain a tolerable risk from coastal inundation; and b) buildings and works do not increase the risk from coastal inundation to adjacent land and public infrastructure. 	
Performance Criteria	
P1.1	P1.1
Buildings and works, excluding coastal protection works, within a coastal inundation hazard area must have a tolerable risk, having regard to:	Response from flood report
<ul style="list-style-type: none"> (a) whether any increase in the level of risk from coastal inundation requires any specific hazard reduction or protection measures; (b) any advice from a State authority, regulated entity or a council; and (c) the advice contained in a coastal inundation hazard report. 	<ul style="list-style-type: none"> (a) The incorporation of the proposed fill areas for Lot 1 and lot 2, eliminates the necessity for any hazard reduction or protection measures. (b) N/A (c) Refer to this report and recommendations.
P1.2	P1.2
A coastal inundation hazard report also demonstrates that the building or works:	Response from flood report
<ul style="list-style-type: none"> (a) do not cause or contribute to coastal inundation on the site, on adjacent land or public infrastructure; and (b) can achieve and maintain a tolerable risk from a 1% annual exceedance probability coastal inundation event in 2100 for the intended life of the use without requiring any specific coastal inundation protection works. 	<ul style="list-style-type: none"> (a) The inclusion of the proposed fill areas for Lot 1 and Lot 2, ensures that there will be no occurrence or contribution to coastal inundation on the site, adjacent land, or public infrastructure. (b) The addition of the suggested fill areas for Lot 1 and Lot 2 does not necessitate any specific coastal inundation protection works for the for the 1% AEP + climate change + storm surge event at 2100

Table 7. Report Summary against TPS(Clarance) C11.7.1

C11.7.1 Subdivision within a coastal inundation hazard area	
<p>Objectives: That subdivision within a coastal inundation hazard area does not create an opportunity for use or development that cannot achieve and maintain a tolerable risk from coastal inundation.</p>	
Performance Criteria	
P1	P1
Each lot, or a lot proposed in a plan of subdivision within a coastal inundation hazard area must not create an opportunity for use or development that cannot achieve and maintain a tolerable risk from coastal inundation, having regard to;	Response from flood report
(a) any increase in risk from coastal inundation for adjacent land;	(a) No increase in risk from coastal inundation for adjacent land
(b) the level of risk to use or development arising from an increased reliance on public infrastructure;	(b) N/A
(c) the need to minimise future remediation works;	(c) Future remediation works not required as the 1% AEP + CC + SS scenario does not show an increase in risk.
(d) any loss or substantial compromise, by coastal inundation, of access to the lot on or off site;	(d) Lot access is subject to hazard rating of H3 as observed in the surrounding areas as well in both pre and post development scenarios.
(e) the need to locate building areas outside the coastal inundation hazard area;	(e) N/A
(f) the advice contained in a coastal inundation hazard report.	(f) Refer to this report and recommendations.

5. Conclusion

The Coastal Inundation Hazard Report for 61 Mannata Street, Lauderdale development site has reviewed the potential development inundation scenario.

The following conclusions were derived in this report:

1. Peak coastal inundation depths of 2.9m AHD show negligible contribution to coastal inundation on the site or on adjacent land.
2. The proposed subdivision development can achieve and maintain a tolerable risk for the intended life of the use, The criteria are based on a risk assessment matrix consistent with Australian Standard AS4360 on Risk Management (AS4360). The qualitative assessment of risk severity and likelihood (Appendix B) were used to help provide a qualitative risk assessment based upon the coastal vulnerability assessment completed for the site shows that development can achieve and maintain a tolerable risk for the intended life of the use or development.
3. A comparison of the post-development peak inundation for the 1% AEP + climate change + storm surge event at 2100 were undertaken C11.6.1 and C11.7.1 of the TPS Coastal Inundation code and shows no increase in risk or ongoing management from coastal inundation.
4. Hazard from inundation in the area remains at the majority category of H2-H3 for pre development coastal flood scenarios. The inclusion of the fill prevents proposed lots 1 and 2 being subject to hazard rating in post-development scenario.
5. Development lies outside coast erosion hazard areas and therefore does not need to consider coastal erosion.
6. Risk from coastal inundation to the proposed 2 lot subdivision is low and therefore the subdivision can meet a tolerable risk for the use.

6. Recommendations

Flüssig Engineers has conducted a thorough evaluation and based on our findings; we recommend the adoption of the following comprehensive engineering design for the proposed subdivision. This design is intended to ensure that the project aligns with the stringent standards set forth in the Coastal Inundation Code:

1. In order to ascertain suitability at various inundation depths, it is imperative that any future buildings foundation undergo a meticulous assessment against hydrostatic and hydrodynamic forces. This assessment should be conducted by an appropriately qualified structural engineer.
2. Lots 1 and 2 should maintain a fill level of 2.9 m AHD, with a crucial stipulation for future buildings to have a minimum finished floor level that is equal to or above 3.20 m AHD. This precaution is vital to safeguard against potential inundation risks.
3. Beyond the boundaries of proposed Lots 1 and 2, any forthcoming works should be subjected to a further flood assessment. This ensures that all elements of the subdivision, even those outside the specified lots, adhere to the standards of flood risk management.
4. A proactive approach to risk mitigation involves a commitment to reviewing and incorporating future changes to coastal studies. This ongoing evaluation is vital to assess their applicability to the site and to proactively address evolving risks.

In adherence to the Coastal Inundation Report requirements, we are confident that the proposed subdivision will not only meet but exceed current acceptable solutions and performance criteria outlined in the Clarence Tasmanian Planning Scheme 2021.

7. Limitations

Flüssig Engineers was engaged by **Graeme Pickett** to conduct a site-specific Coastal Inundation Report for the property located at 61 Mannata Street, Lauderdale, in accordance with C11.0 Coastal Inundation Hazard Code of the Tasmanian Planning Scheme 2021. The study conducted was considered appropriate for its intended purpose at the time of its execution. However, it is imperative to note that if any conditions of the site undergo changes, the report will necessitate a thorough review to ensure its continued relevance and accuracy.

This comprehensive report is intended for use in its entirety and may not be fragmented or utilised to support objectives other than those explicitly outlined within its scope, unless specific written approval to the contrary is granted by Flüssig Engineers. This precautionary measure is in place to maintain the integrity and accuracy of the information provided.

It is important to acknowledge that Flüssig Engineers assumes no responsibility for the accuracy of third-party documents supplied for the purpose of this Coastal Inundation Report. While we strive to ensure the precision and reliability of our own findings, we are not accountable for the content or accuracy of documents sourced from external parties. Any use of such third-party documents should be exercised with due diligence and understanding of their origin and limitations.

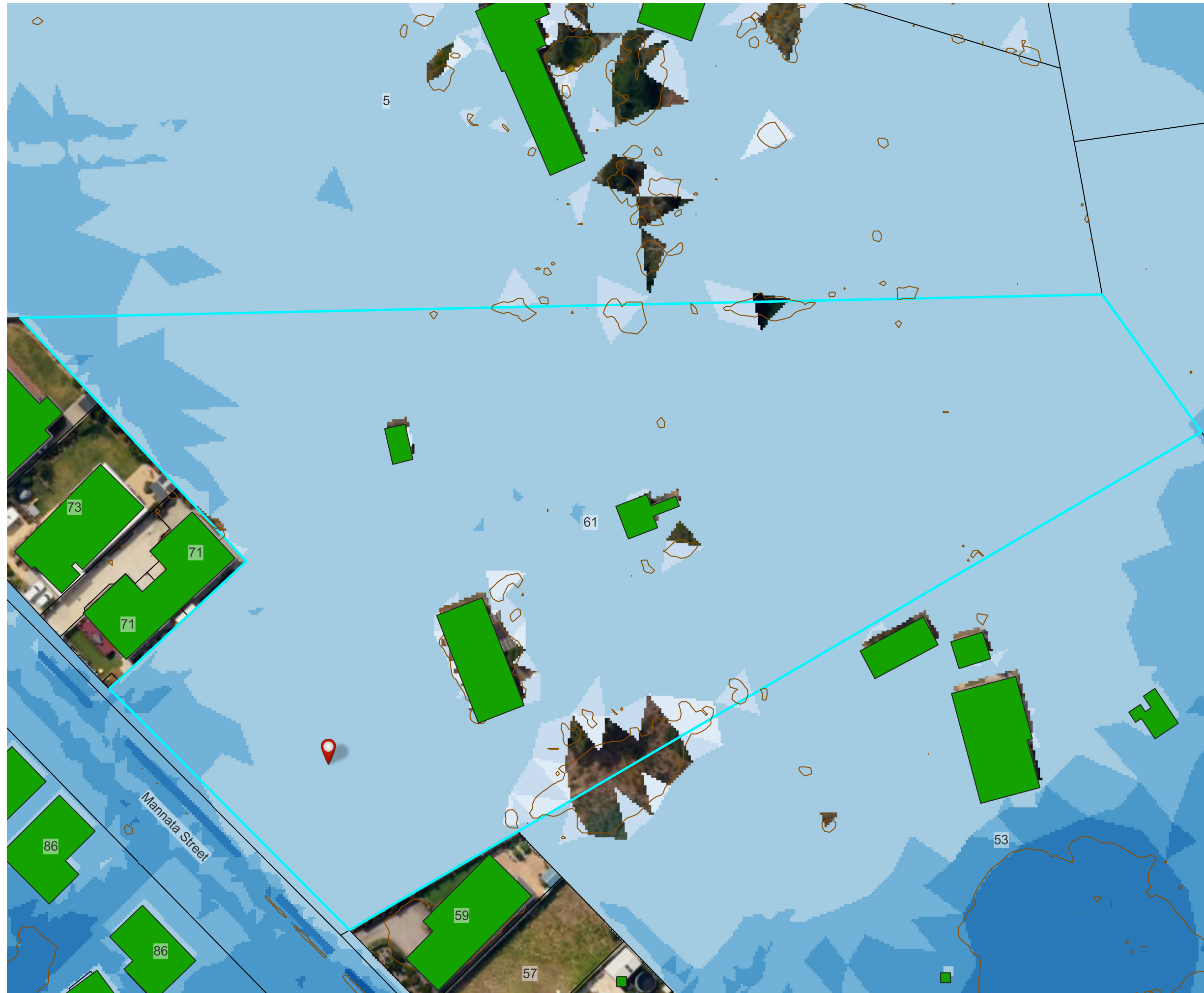
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Appendices

Appendix A: Flood Study Maps

PRE 1% AEP + CLIMATE CHANGE + STORM SURGE @2100



Legend

- 61 Mannata Street
 - 1.00m Contours
 - Boundary Lines
 - Existing Lot boundaries
 - Existing Building Areas
- Pre 1% AEP + CC + SS @2100

Depth (m)

- <= 0.02
- 0.02 - 0.05
- 0.05 - 0.10
- 0.10 - 0.60
- 0.60 - 0.80
- 0.80 - 1.00
- 1.00 - 1.50
- 1.50 - 2.00
- > 2.00



0 meters 20 40 m



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PRE 1% AEP + CLIMATE CHANGE + STORM SURGE @2100



Legend

- 61 Mannata Street
 - Boundary Lines
 - Existing Lot boundaries
 - Existing Building Areas
- Pre 1% AEP + CC + SS @2100
- Velocity (m/s)
- <= 0.50
 - 0.50 - 1.00
 - 1.00 - 1.50
 - 1.50 - 2.00
 - > 2.00



0 meters 20 40 m



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Legend

- 61 Mannata Street
 - Boundary Lines
 - Existing Lot boundaries
 - Existing Building Areas
- Pre 1% AEP + CC + SS @2100
- ### Hazard
- H1
 - H2
 - H3
 - H4
 - H5
 - H6



0 meters 20 40 m



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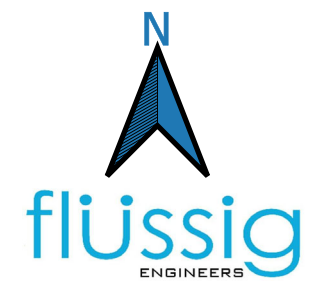
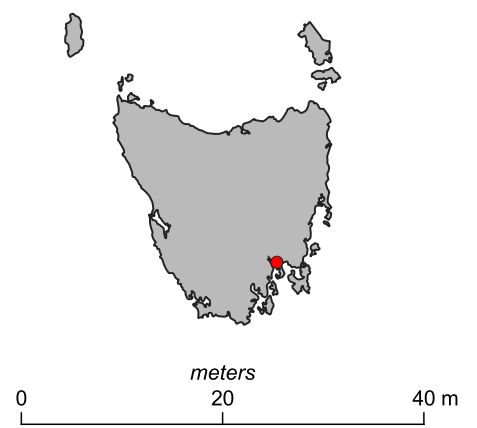
Legend

- 61 Mannata Street
- 1.00m Contours
- Boundary Lines
- Existing Lot boundaries
- Proposed Lots
- Existing Building Areas
- Proposed Driveway
- Proposed Fill

Post 1% AEP + CC + SS @2100

Depth (m)

- <= 0.02
- 0.02 - 0.05
- 0.05 - 0.10
- 0.10 - 0.60
- 0.60 - 0.80
- 0.80 - 1.00
- 1.00 - 1.50
- 1.50 - 2.00
- > 2.00



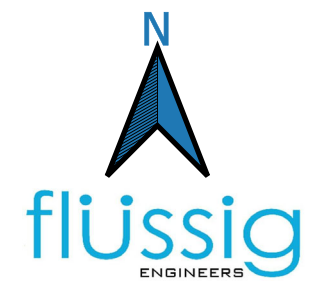
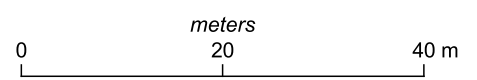
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Legend

- 61 Mannata Street
 - Boundary Lines
 - Existing Lot boundaries
 - Proposed Lots
 - Existing Building Areas
 - Proposed Driveway
 - Proposed Fill
- Post 1% AEP + CC + SS @2100
- Velocity (m/s)
- <= 0.50
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


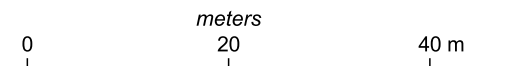
Legend

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-  Boundary Lines
-  Existing Lot boundaries
-  Proposed Lots
-  Existing Building Areas
-  Proposed Driveway
-  Proposed Fill

Post 1% AEP + CC + SS @2100

Hazard

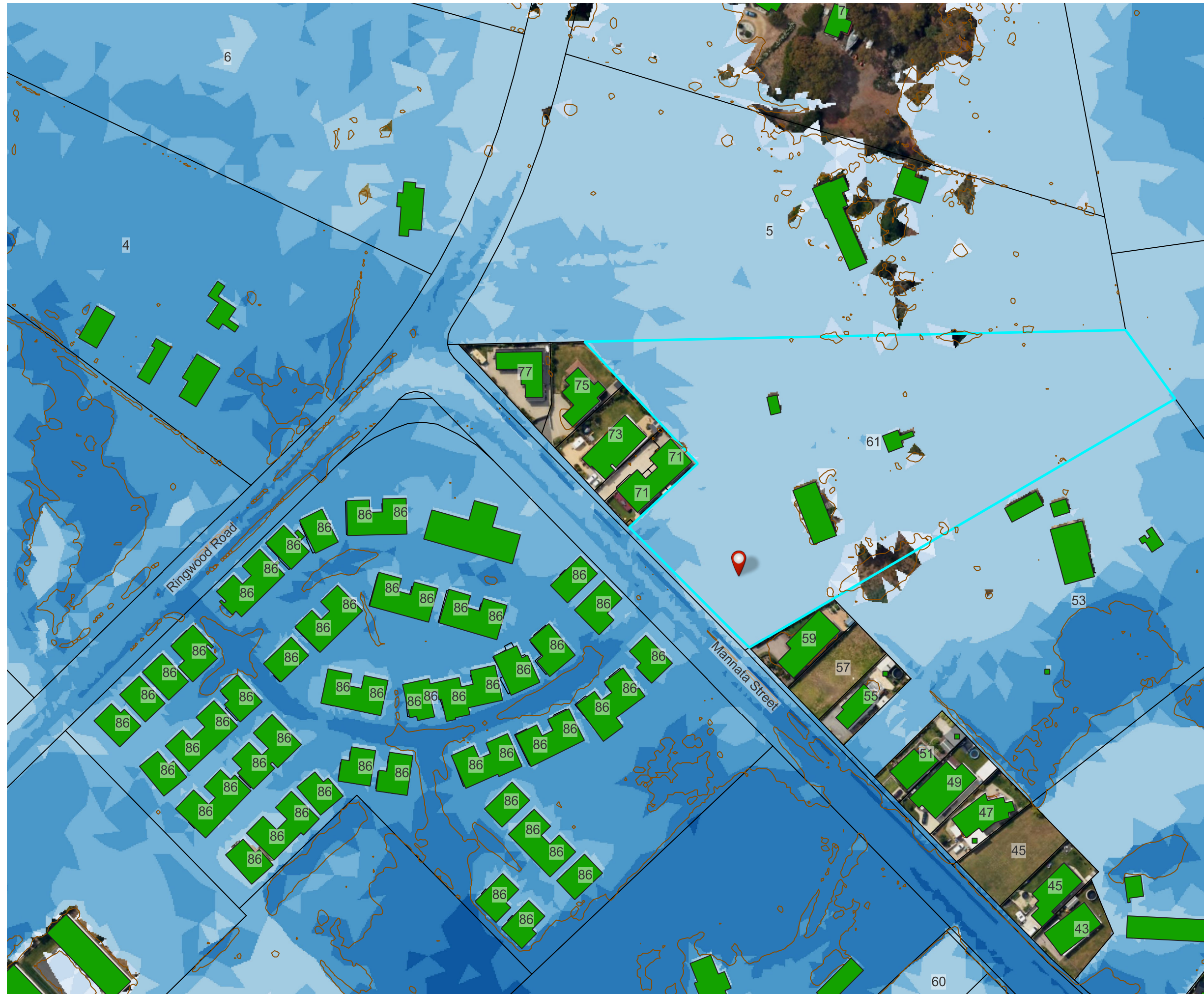
-  H1
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-  H3
-  H4
-  H5
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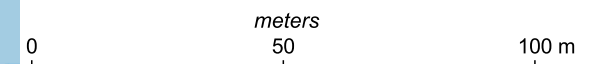


Legend

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 - 1.00m Contours
 - Boundary Lines
 - Existing Lot Boundary
 - Existing Building Areas
- Pre 1% AEP + CC + SS @2100

Depth (m)

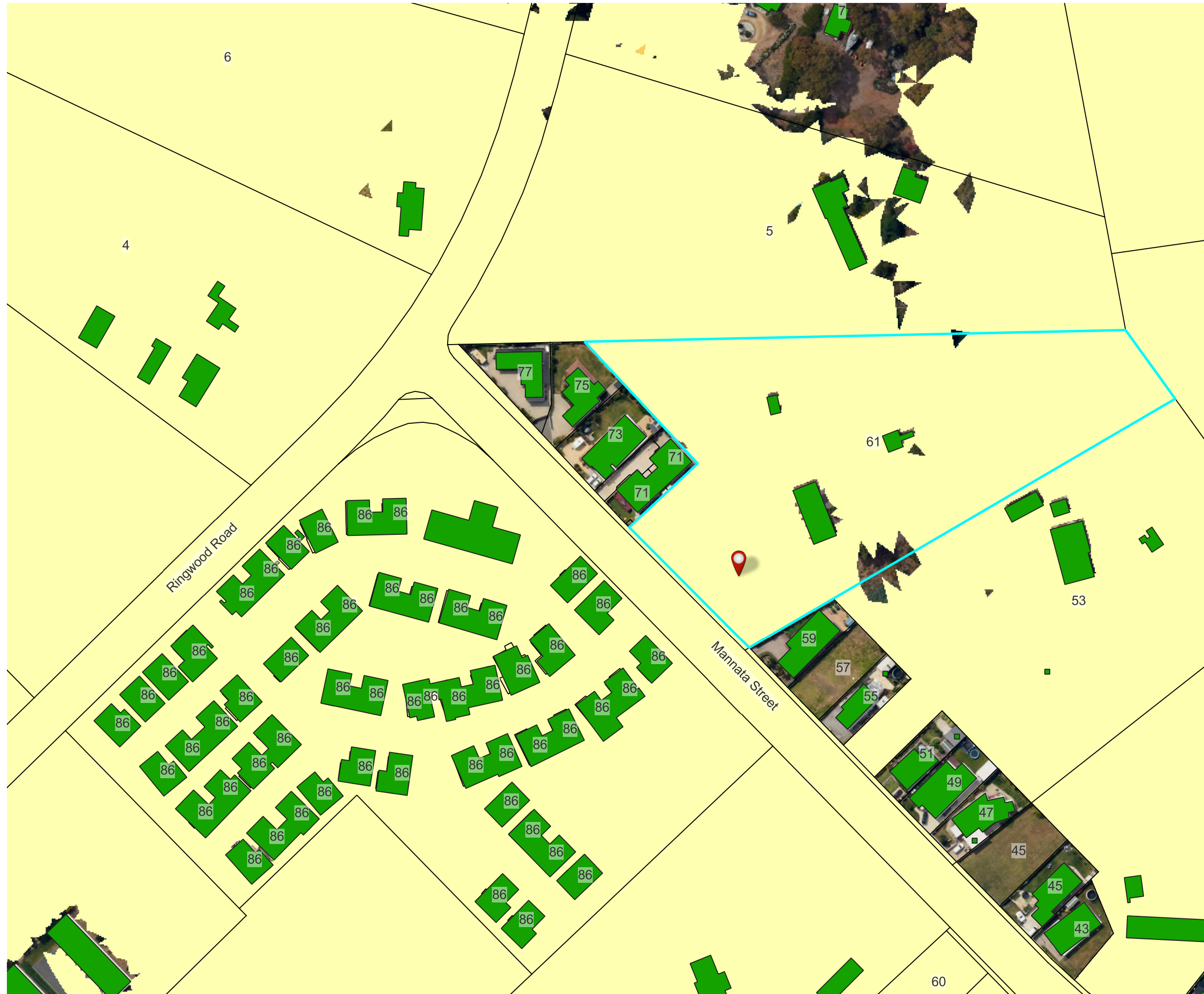
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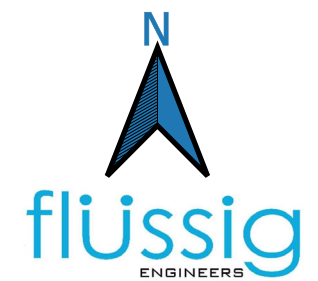


Legend

- 61 Mannata Street
- Boundary Lines
- Existing Lot Boundary
- Existing Building Areas
- Pre 1% AEP + CC + SS @2100
- Velocity (m/s)
 - <= 0.50
 - 0.50 - 1.00
 - 1.00 - 1.50
 - 1.50 - 2.00
 - > 2.00



0 meters 50 100 m



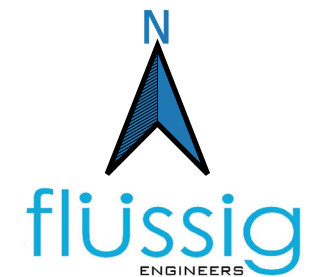
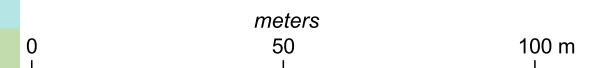
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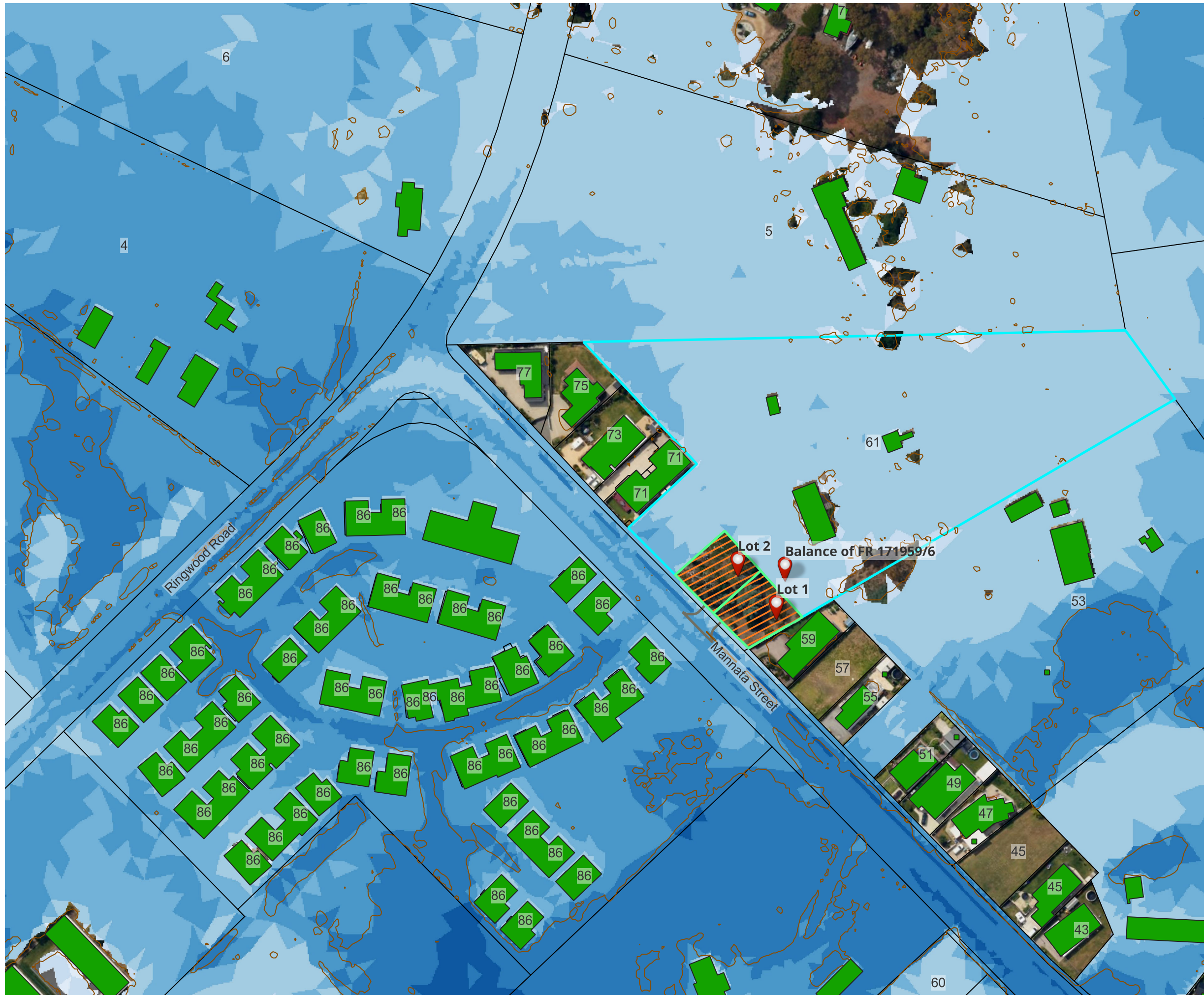
Legend

- 61 Mannata Street
- Boundary Lines
- Existing Lot Boundary
- Existing Building Areas
- Pre 1% AEP + CC + SS @2100**
- Hazard**
- H1
- H2
- H3
- H4
- H5
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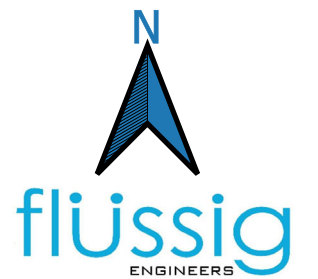
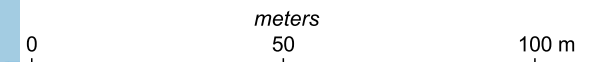


Legend

- 61 Mannata Street
 - 1.00m Contours
 - Boundary Lines
 - Existing Lot boundaries
 - Proposed Lots
 - Existing Building Areas
 - Proposed Driveway
 - Proposed Fill
- Post 1% AEP + CC + SS @2100

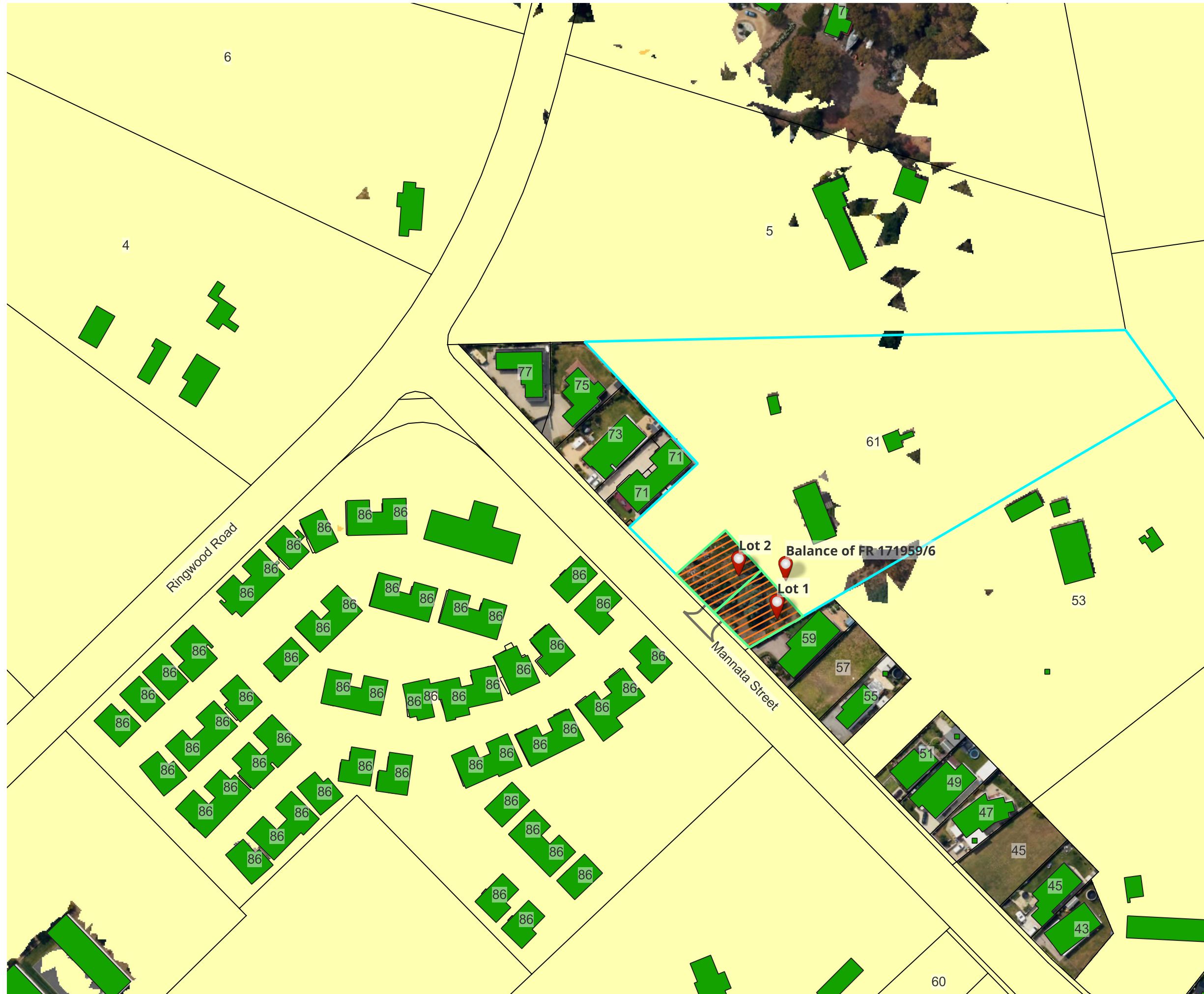
Depth (m)

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- 0.02 - 0.05
- 0.05 - 0.10
- 0.10 - 0.60
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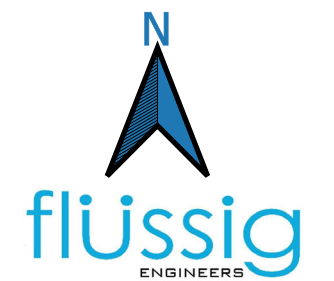
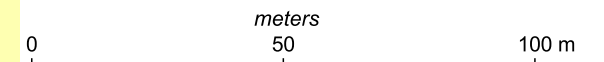
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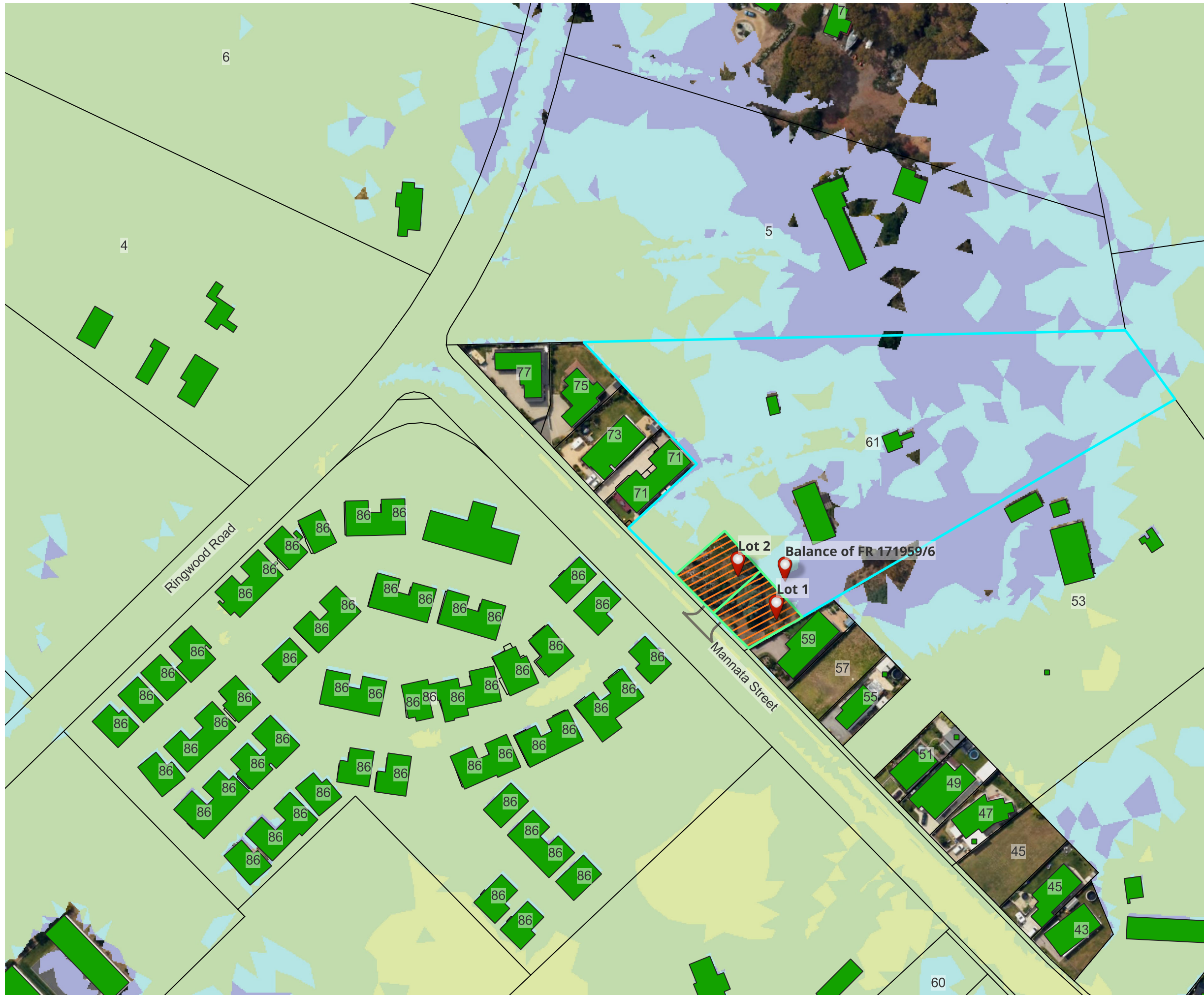
Legend

- 61 Mannata Street
 - Boundary Lines
 - Existing Lot boundaries
 - Proposed Lots
 - Existing Building Areas
 - Proposed Driveway
 - Proposed Fill
- Post 1% AEP + CC + SS @2100
- Velocity (m/s)
- <= 0.50
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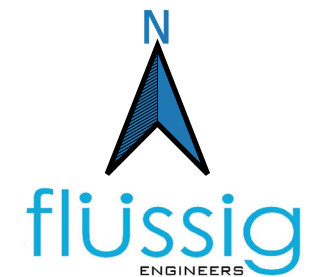
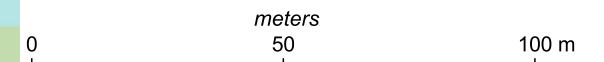
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- 61 Mannata Street
 - Boundary Lines
 - Existing Lot boundaries
 - Proposed Lots
 - Existing Building Areas
 - Proposed Driveway
 - Proposed Fill
- Post 1% AEP + CC + SS @2100
- ### Hazard
- H1
 - H2
 - H3
 - H4
 - H5
 - H6



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Appendix B: Risk Matrix

Pre-Development Risk Identification (1% AEP + CC + SS)				Post-Development			Recommendations			
Risk Ref No	Risk Type A - Asset P - Project F - Financial S - Safety	Risk Description	Conclusions derived from report for the post development scenario	Risk with no Treatment			Treatment	Risk following recommended treatment		
				Likelihood	Consequence	Risk Level		Likelihood	Consequence	Risk Level
P1	A, F, S	Whether the use or development is likely to cause or contribute to coastal inundation on the site or on adjacent land;	No increased displacement of flood waters observed in flood model. No treatment recommended.	Rare	Minor	Low	none required	Rare	Insignificant	Low
P3	A, F, S	To whether the use or development can achieve and maintain a tolerable risk for the intended life of the use or development, having regard to the nature, intensity and duration of the use (a)	The development will achieve and maintain a tolerable risk if the minimum fill levels specified in the report are applied.	Rare	Minor	Low	none required	Rare	Insignificant	Low
P4	A, S	To whether the use or development can achieve and maintain a tolerable risk for the intended life of the use or development, having regard to the type, form and duration of any development (b)	The development will achieve and maintain a tolerable risk if the correct fill material and construction methods specified in the report are applied.	Rare	Minor	Low	none required	Rare	Insignificant	Low
P5	A,S	To whether the use or development can achieve and maintain a tolerable risk for the intended life of the use or development, having regard to the likely change in the risk across the intended life of the use or development (c)	The development will achieve and maintain a tolerable risk if the correct fill material and proposed levels and construction methods specified in the report are applied.	Rare	Minor	Low	none required	Rare	Insignificant	Low
P6	A, F, S	To whether the use or development can achieve and maintain a tolerable risk for the intended life of the use or development, having regard to the ability to adapt to a change in the level of risk (d)	The development will achieve and maintain a tolerable risk if the correct fill material and proposed levels and construction methods specified in the report are applied.	Rare	Minor	Low	should major climate estimates show increase risk to surrounding properties current coastal modelling should be updated to reflect new information.	Rare	Insignificant	Low
P7	A, F, S	To whether the use or development can achieve and maintain a tolerable risk for the intended life of the use or development, having regard to the ability to maintain access to utilities and services (e)	The development will achieve and maintain a tolerable risk including access to utilities and services.	Rare	Minor	Low	none required	Rare	Insignificant	Low
P8	A, F, S	To whether the use or development can achieve and maintain a tolerable risk for the intended life of the use or development, having regard to the need for specific coastal inundation hazard reduction or protection measures on the site (f)	The development will achieve and maintain a tolerable risk without the need for specific coastal reduction or protection measures on the site.	Rare	Minor	Low	none required	Rare	Insignificant	Low

RISKS OF FLOOD BEHAVIOUR ON THE DEVELOPMENT POST CONSTRUCTION


Risk Identification (1% AEP + CC + SS)					
Risk Ref No	Risk Type A - Asset P - Project F - Financial S - Safety	Risk Description	Risk with no Treatment		
			Likelihood	Consequence	Risk Level
D1	A	There is a risk that during a coastal inundation flood event, excessive flow could result in back flow of treatment devices (inc. stormwater and sewer).	Possible	Minor	Medium
D2	S	There is a risk to personal safety when during a coastal inundation flood event, people may become trapped in the vehicles during a storm event inside the lot boundary.	Possible	Minor	Medium
D3	A, F	There is a risk that the flow of a coastal inundation flood event could result in damage to the proposed development due to flood water depth, velocity and debris.	Possible	Minor	Medium
D4	A, S	There is a risk the flow of a coastal inundation flood event could pose a risk to assets and personal safety of the inhabitants of the development.	Possible	Minor	Medium

Appendix C: Coastal Inundation Declaration


Coastal Hazards Report Declaration

Section 1: About the practitioner and methodology

1.1 Practitioner details

Lead / coordinating consultant name (must be an individual)	Max Moller
Academic Qualification/s	<p><i>Bachelor of Engineering.</i></p> <p><i>Post Graduated Certificate in Hydraulic Services Design.</i></p> <p>Introduction to Coastal Processes and Coastal Engineering</p> <hr/> <p><i>FIEAust, EngExec, CPEng, NER, APEC Engineer, IntPE(Aus)</i></p>
Relevant Experience	20 + years of undertaking various Riverine and Coastal inundation Studies that meets the requirements of current legislation.
Business name and address	Flussig Engineers – 4/116 Bathurst Street, Hobart, 7000
Contact phone number	0431 080 279
Email address	max@flussig.com.au
Signature	
Date	24/08/2023

Supporting consultant name (must be an individual)	Max Moller
Academic Qualification/s	<p><i>Bachelor of Engineering.</i></p> <p><i>Post Graduated Certificate in Hydraulic Services Design.</i></p> <p>Introduction to Coastal Processes and Coastal Engineering</p> <hr/> <p><i>FIEAust, EngExec, CPEng, NER, APEC Engineer, IntPE(Aus)</i></p>

Relevant Experience	20+ years of undertaking various Riverine and Coastal inundation Studies that meets the requirements of current legislation.
Business address	Flussig Engineers – 4/116 Bathurst Street, Hobart, 7000
Contact phone number	0431 080 279
Email address	max@flussig.com.au
Signature	
Date	24/08/2023

Professional Indemnity

- Insured Company: Flussig Engineers
- Insurance Period: 17/10/22 to 17/10/23
- Amount: \$10,000,000.00

1.2 Methodology

The Methodology adopted for the 61 Mannata Street, Lauderdale Coastal Inundation study has been prepared in accordance with the *Tasmanian Planning Scheme 2020*, *Building Act 2016* and regulation 51 and *Director Determination - Coastal Inundation Hazard Areas 2021*.

Section 2: Conclusions about the proposal

Likelihood of the proposed use or development to cause or contribute to the occurrence of coastal erosion and/or coastal inundation on the site or adjacent land¹

According to the Flussig Engineers Study 2023 - the proposed subdivision at 61 Mannata Street, Lauderdale does not cause or contribute to the occurrence of coastal inundation on the site or adjacent land is proposed fill is constructed.

Can the proposed use or development achieve and maintain a tolerable risk for the intended life of the use or development, having regard to:

the nature, intensity and duration of the use	The intended future use of the proposed lots are as a habitable class 1a building does not affect its risk for the life of a class 1a building.
the type, form and duration of any development	Under the recommendations of this study the future class 1a building can withstand a tolerable risk to coastal inundation for the life of a class 1a building (50 years).
the likely change in the risk across the intended life of the use or development	Coastal inundation was assessed to include changes up to the year 2100, the intended life of the building puts the dwelling life at the year 2071. Therefore, the building should be able to maintain its risk status for its expected life. Changes to current future climate estimates may change the coastal inundation however given the very low risk currently experienced it is unlikely to have a detrimental effect.

<p>the ability to adapt to a change in the level of risk</p>	<p>Given the extent of inundation risk to the proposed fill areas, any future building it is highly probable to be able to adapt to any additional inundation.</p>
<p>the ability to maintain access to utilities and services</p>	<p>Given the extent of inundation risk to the proposed fill area and future building it is highly probable it will be able to maintain access to utilities and services for its intended life.</p>
<p>the need for specific coastal erosion or coastal inundation hazard reduction or protection measures on the site³</p>	<p>No specific protection measures required.</p>
<p>the need for coastal erosion or coastal inundation reduction or protection measures beyond the boundary of the site³</p>	<p>No broader scale protection measures required.</p>
<p>any coastal erosion or coastal inundation management plan in place for the site or adjacent land³</p>	<p>No specific inundation measurement plan required.</p>

Any advice relating to the ongoing management of the use or development

Assuming future development meets current building code structures no ongoing management is required.

Is the use or development located on an actively mobile landform within the coastal zone?²

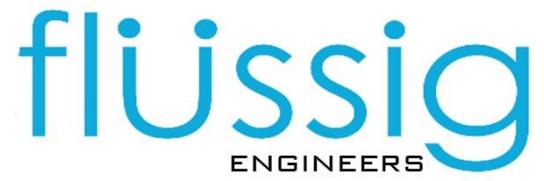
Yes

No

Conclusions relating to any matter specifically required by Performance Criteria in the Coastal Erosion Hazard Code (C10.5 – C10.7) or the Coastal Inundation Hazard Code (C11.5 – C11.7)

Under the Tasmanian Planning Scheme, the proposed development can meet all performance criteria under E11.7.1 for proposed subdivision.

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Appendix 3: Existing and proposed levels and plan of subdivision.

The plan of subdivision below shows proposed fill levels on the subject site. A table showing existing spot levels and proposed additional fill to achieve a ground level of 2.9m is shown below in Table 1. In accordance with the response provided in relation to fill and subject to negotiation, these levels can be specified as a condition of approval.

Table 1: Existing spot levels and proposed additional fill.

Spot level	
Existing	Proposed additional fill
2.2	0.7
2.4	0.5
2.42	0.48
2.45	0.45
2.47	0.43
2.48	0.42
2.49	0.41
2.5	0.4
2.51	0.39
2.57	0.33
2.6	0.3
2.61	0.29
2.62	0.28
2.63	0.27
2.68	0.22
2.69	0.21
2.7	0.2
2.71	0.19
2.72	0.18
2.74	0.16

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Burnie, TAS 7320
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