



# Stormwater Management Plan

## Lot 51 Wilkinson Road, Tuan

18 February 2025  
J9009 v1.2

**STORM**  
WATER CONSULTING

**Job No:** J9009 v1.2

**Job Name:** Lot 51 Wilkinson Road, Tuan

<b>Report Name</b>	<b>Date</b>	<b>Report No.</b>
Stormwater Management Plan	22 May 2024	J9009 v1.0
Stormwater Management Plan	5 June 2024	J9009 v1.1
Stormwater Management Plan	18 February 2025	J9009 v1.2

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## 1.0 INTRODUCTION

Storm Water Consulting Pty Ltd was commissioned by M & JM Grunske to prepare a Stormwater Management Plan for the proposed development on Lot 51 Wilkinson Road, Tuan.

This report has been prepared to address the following issues associated with the proposed Reconfiguration of Lot (ROL):

- Identify the extent of flooding during a major overland flow event, assess potential impacts on neighbouring properties and set minimum lot levels.
- Address stormwater quality requirements of the State Planning Policy.



## 2.0 SITE CONDITIONS

### 2.1 Existing Site

The site is a vacant lot vegetated by short grass and sparse tree cover. The site is bound by Wilkinson Road to the east, Tuan Forest to the south and west and residential properties to the north. An existing site plan is presented in Figure 1, Appendix A. A locality plan is presented in Figure 2.1 below.



Figure 2.1 – Locality Plan (Source: Google Earth)

### 2.2 Developed Site

It is proposed to subdivide the site into freehold lots (Reconfiguration of Lot). A developed site plan is presented in Figure 2, Appendix A. Development plans are presented in Appendix E.

The site is located within the Great Barrier Reef wetland protection area, as demonstrated in Figure 2.2 on the following page, as well as in Figure 10, Appendix A. The proposed development avoids the wetlands and avoids the direct discharge of stormwater into the mapped wetland area. The proposed development would comply with PO3, PO4 and PO5 of State Code 9 (extract presented in Figure 2.3).

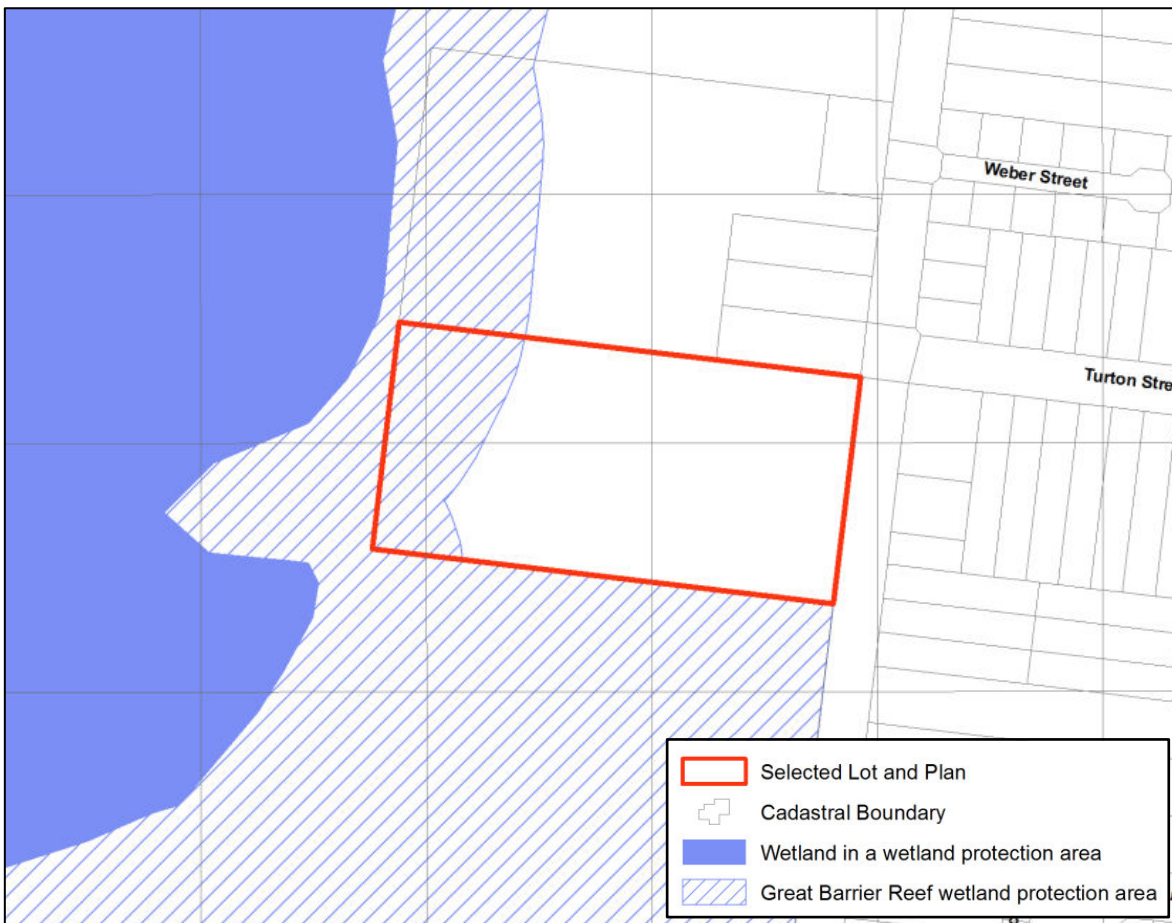


Figure 2.2 – Extract from Map of Great Barrier Reef Wetland Protection Areas

<b>Hydrology</b>
<b>PO3</b> Development maintains or improves the existing surface and groundwater hydrology in a <b>wetland protection area</b> .
<b>Water quality</b>
<b>PO4</b> Development does not unacceptably impact the water quality of the <b>wetland</b> in the <b>wetland protection area</b> and in the <b>wetland buffer</b> .
<b>PO5</b> Development does not use the <b>wetland</b> in the <b>wetland protection area</b> for stormwater treatment.

Figure 2.3 – Extract from State Code 9: Great Barrier Reef Wetland Protection Areas

### 3.0 HYDROLOGIC ANALYSIS

The property is affected by overland flow from a catchment to the west, which flows through the site toward the north-eastern site corner. An open drain is located at the rear of the site, within Tuan Forest. The open drain flows in a northerly direction, before turning to flow in an easterly direction where flows spread out, flowing across bushland before traversing across Wilkinson Road at Point-A, heading toward the Great Sandy Strait. A catchment plan is presented in Figure 3, Appendix A.

Rational Method calculations were undertaken for the catchments flowing to Point-A (in accordance with recommendations contained in QUDM 2016). A summary of the peak flows is presented in Table 3.1 below. Detailed Rational Method calculations are presented in Appendix C.

**Table 3.1 – Rational Method Calculation Summary**

<b>AEP</b>	<b>Point-A Peak Flow</b>
<b>%</b>	<b>m<sup>3</sup>/s</b>
63	4.26
50	5.13
20	7.89
10	9.92
5	12.14
2	15.88
1	18.73
0.5	21.36

URBS hydrologic modelling was undertaken to produce inflow hydrographs for input into the TUFLOW hydrodynamic model. A schematic representation of the URBS model is presented in Figure 4, Appendix A. URBS data files are presented in Appendix D. A summary of the adopted URBS parameters is presented in Table 3.2 below.

**Table 3.2 – URBS Model Parameters**

<b>AEP</b>	<b>Storage Coefficient</b>	<b>Non-Linearity Index</b>	<b>Initial Rainfall Loss</b>	<b>Continuing Rainfall Loss</b>
<b>%</b>	<b><math>\alpha</math></b>	<b>m</b>	<b>mm</b>	<b>mm/hr</b>
63	1.2	0.8	15	2.5
50	1.2	0.8	15	2.5
20	1.2	0.8	15	2.5

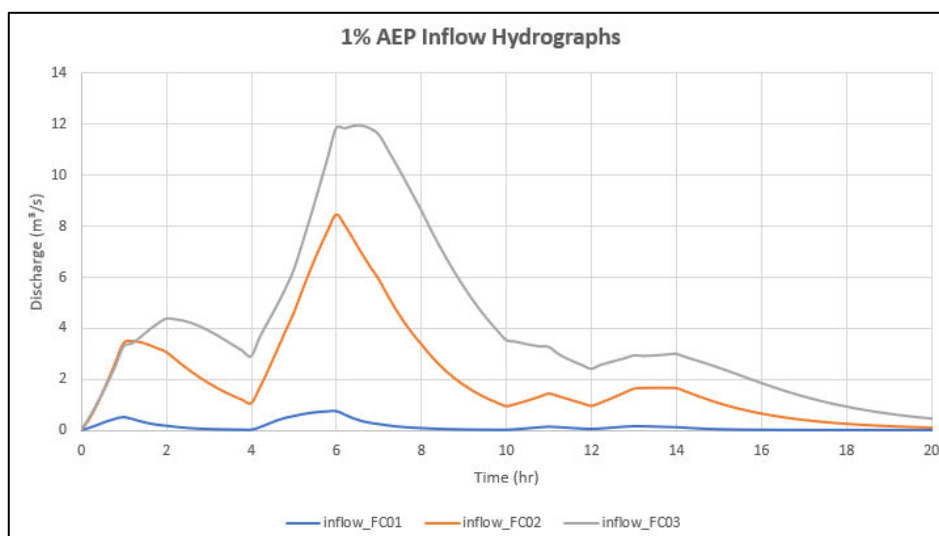
10	1.2	0.8	15	2.5
5	1.2	0.8	15	2.5
2	1.2	0.8	15	2.5
1	1.2	0.8	0	2.5
0.5	1.2	0.8	0	2.5

A comparison of the peak URBS flows and Rational Method flows at Point-A is presented in Table 3.3 below.

**Table 3.3 – Comparison of Flows at Point-A**

AEP	Rational Method Flows	URBS Flows	Difference	Difference
%	m <sup>3</sup> /s	m <sup>3</sup> /s	m <sup>3</sup> /s	%
63	4.26	3.50	0.76	18%
50	5.13	4.33	0.80	16%
20	7.89	7.38	0.51	6%
10	9.92	10.27	0.35	4%
5	12.14	13.07	0.93	8%
2	15.88	17.12	1.24	8%
1	18.73	20.72	1.99	11%
0.5	21.36	24.31	2.95	14%

The results presented above show that the URBS flows compare favourably with the Rational Method flows. The URBS model would therefore generate flows suitable for adoption in the TUFLOW model as boundary conditions. The 1% AEP inflow hydrographs adopted in TUFLOW are presented in Figure 3.1 below.



**Figure 3.1 – Inflow Hydrographs for TUFLOW**

## 4.0 HYDRODYNAMIC MODELLING

TUFLOW 2D hydrodynamic modelling was undertaken to determine the extent of inundation, to assess potential hydraulic impacts and to set minimum lot levels for the proposed development. The model setup and results are discussed below.

### 4.1 Existing TUFLOW Model

A schematic of the existing TUFLOW model is presented in Figure 5, Appendix A. The TUFLOW model was based on a 2m grid size with elevation data assigned from the ALS survey data sourced from the Queensland State Government. The inflow hydrographs presented in Figure 3.1 were input into the model as discharge-time (QT) boundary conditions. The downstream boundary condition was set as a height-discharge (HQ) relationship based on the natural ground slope. Manning's roughness coefficient values of  $n=0.10$  and  $n=0.02$  were used in the model to represent private properties and roads respectively.

The existing 1% AEP overland flow contours, depths, velocities and velocity-depths are presented in Figures 6a to 6d, Appendix A respectively. The model results show that the majority of the property would be inundated during a 1% AEP event. The existing 0.5% AEP overland flow contours are presented in Figure 6e, Appendix A.

### 4.2 Developed TUFLOW Model

A schematic of the developed TUFLOW model is presented in Figure 7, Appendix A. The developed model replicates the existing model and incorporates changes to the site condition based on the proposed development. Filled building pads (20m x 40m) were incorporated as obstructions within each lot (modelled using a 2d\_z layer). All other model parameters and inputs remain the same as the existing model.

The developed 1% AEP overland flow contours, depths, velocities and velocity-depths are presented in Figures 8a to 8d, Appendix A respectively. The developed 0.5% AEP overland flow contours are presented in Figure 8e, Appendix A. An afflux impact plot of the model results is presented in Figure 9, Appendix A. The plot shows that the proposed development would not create any adverse impacts on neighbouring private properties. The majority of the impacts are contained within the road reserve, within the Tuan Forest land, or in a location where no existing buildings or structures exist.

### 4.3 Minimum Lot Levels

Lots are recommended to be set above the highest upstream 1% AEP overland flow level. Figure 4.1 below presents the proposed lot layout. The proposed finished surface levels for each lot are summarised below:

- Lot 1: 2.6 m AHD
- Lot 2: 2.7 m AHD
- Lot 3: 2.9 m AHD
- Lot 4: 3.0 m AHD
- Lot 5: 3.0 m AHD

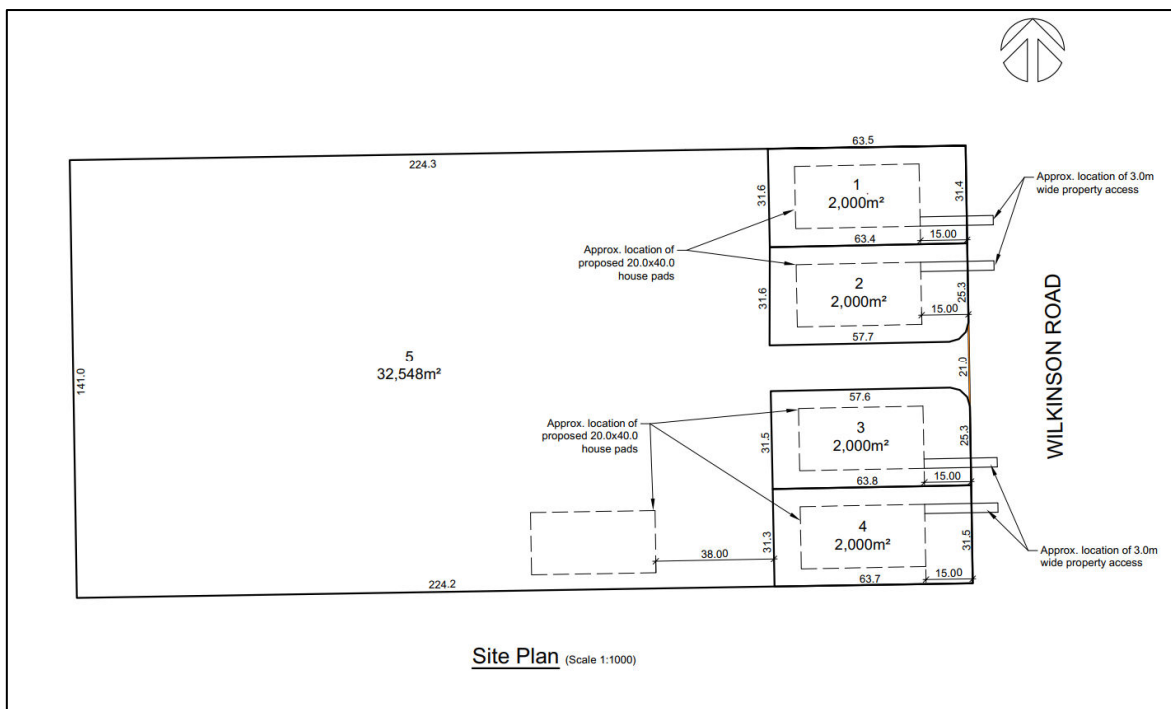


Figure 4.1 – Proposed Lot Layout



## 5.0 STORMWATER QUALITY MANAGEMENT

### 5.1 State Planning Policy (July 2017)

The State Planning Policy (SPP) sets out the requirements for water quality in the interest of the State. Developments which trigger the requirements summarised in Table 5.1 below would need to meet water quality objectives listed in Table B, Appendix 2 of the SPP.

**Table 5.1 – Development Applications affecting Receiving Waters**

State Planning Policy Criteria	Application to Development
(1) A material change of use for urban purposes that involves a land area greater than 2500 square metres that: (a) will result in an impervious area greater than 25 per cent of the net developable area, or	Criterion is NOT applicable to development.
(b) will result in six or more dwellings, or	Criterion is NOT applicable to development.
(2) Reconfiguring a lot for urban purposes that involves a land area greater than 2500 square metres and will result in six or more lots, or	Criterion is NOT applicable to development.
(3) Operational works for urban purposes that involve disturbing more than 2500 square metres of land.	Criterion is NOT applicable to development.

The proposed development would not trigger the requirements of the SPP. General water quality requirements during the construction and operational phases of the development are presented in the following sections.

## 5.2 Water Quality – Construction Phase

During the construction phase of a development, the pollutants listed in Table 5.2 are typically generated. Measures are required during the construction phase to manage each of these pollutants. These measures may include but are not limited to; bins and mini-skips, erosion and sediment control measures (discussed below), wash down and spill containment areas, bunds, spill clean-up kits, street sweeping and chemical agents.

**Table 5.2 – Pollutants Generated during the Construction Phase**

Pollutant	Source
Litter	Paper, construction packaging, food packaging, cement bags, off-cuts
Sediment	Unprotected exposed soils and stockpiles during earthworks and building operations
Hydrocarbons	Fuel and oil spills leaks from construction equipment
Toxic materials	Cement slurry, asphalt primer, solvents, cleaning agents, wash waters (e.g. from tile works)
pH altering substances	Acid sulphate soils, cement slurry and wash waters

### 5.2.1 Erosion and Sediment Control

During the construction phase of the development, an Erosion and Sediment Control Program (E&SCP) is required to minimise water quality impacts. Such an E&SCP should provide complete and detailed instructions on the following procedures;

- Before construction activities begin, sediment fences should be constructed on the downstream site boundaries and at the base of all proposed soil stockpiles;
- Areas for plant and construction material storage should be designated. Runoff from these areas should be directed to small holding ponds in case of spillages;
- Catch drains at the downstream boundary of construction activities should also be created to ensure that any sediment-laden runoff is contained and directed into a sediment basin and not permitted to flow unmitigated to downstream areas;
- Sediment basins should be constructed at appropriate locations to collect sediment at the downstream ends of the catch drains that convey runoff from exposed areas;
- Site personnel should be educated on the sediment and control measures implemented on site; and
- Following rainfall events greater than 20mm, inspection of silt fences, sedimentation basins and other erosion control measures should be carried out. Where necessary, collected material should be removed and damaged equipment should be replaced immediately.

### 5.3 Water Quality – Operational Phase

During the operational (post-construction) phase of the proposed development, the following pollutants are typically generated;

- Sediment,
- Litter,
- Faecal coliforms,
- Hydrocarbons,
- Heavy Metals,
- Thermal Pollution,
- Nutrients (N & P) and
- Surfactants.

## 6.0 CONCLUSIONS

This report has been prepared to address the following issues associated with the proposed Reconfiguration of Lot (ROL) on Lot 51 Wilkinson Road, Tuan:

- Identify the extent of flooding during a major overland flow event, assess potential impacts on neighbouring properties and set minimum lot levels.
- Address stormwater quality requirements of the State Planning Policy.

The TUFLOW model results show that the proposed development would not create any adverse impacts on neighbouring private properties. The majority of the impacts are contained within the road reserve, within the Tuan Forest land, or in a location where no existing buildings or structures exist. Minimum lot level recommendations are presented in Section 4.3.

The proposed development would not trigger the stormwater quality requirements of the State Planning Policy. General water quality requirements during the construction and operational phases of the development are presented in Sections 5.2 and 5.3.

The site is located within the Great Barrier Reef wetland protection area. The proposed development avoids the use of wetlands for stormwater treatment and avoids the direct discharge of stormwater into the mapped wetland area. The proposed development would comply with PO3, PO4 and PO5 of State Code 9.



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BE Civil, MIE Aust, CPEng, RPEQ 16468

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## **LIST OF APPENDICIES**

APPENDIX A – Figures

APPENDIX B – Photographs

APPENDIX C – Rational Method Calculations

APPENDIX D – URBS Data

APPENDIX E – Development Layout

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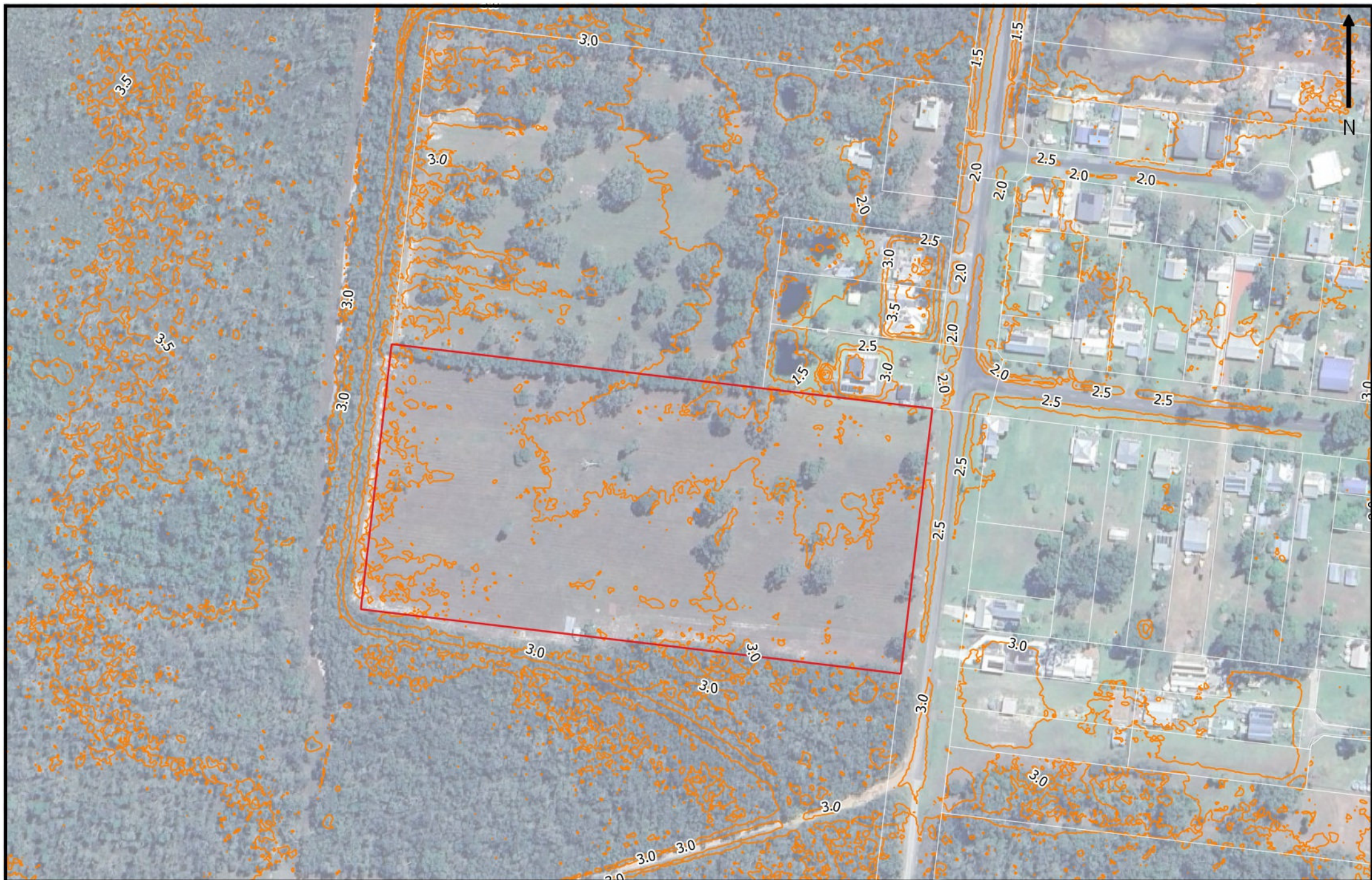
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## **APPENDIX A**

### **Figures**

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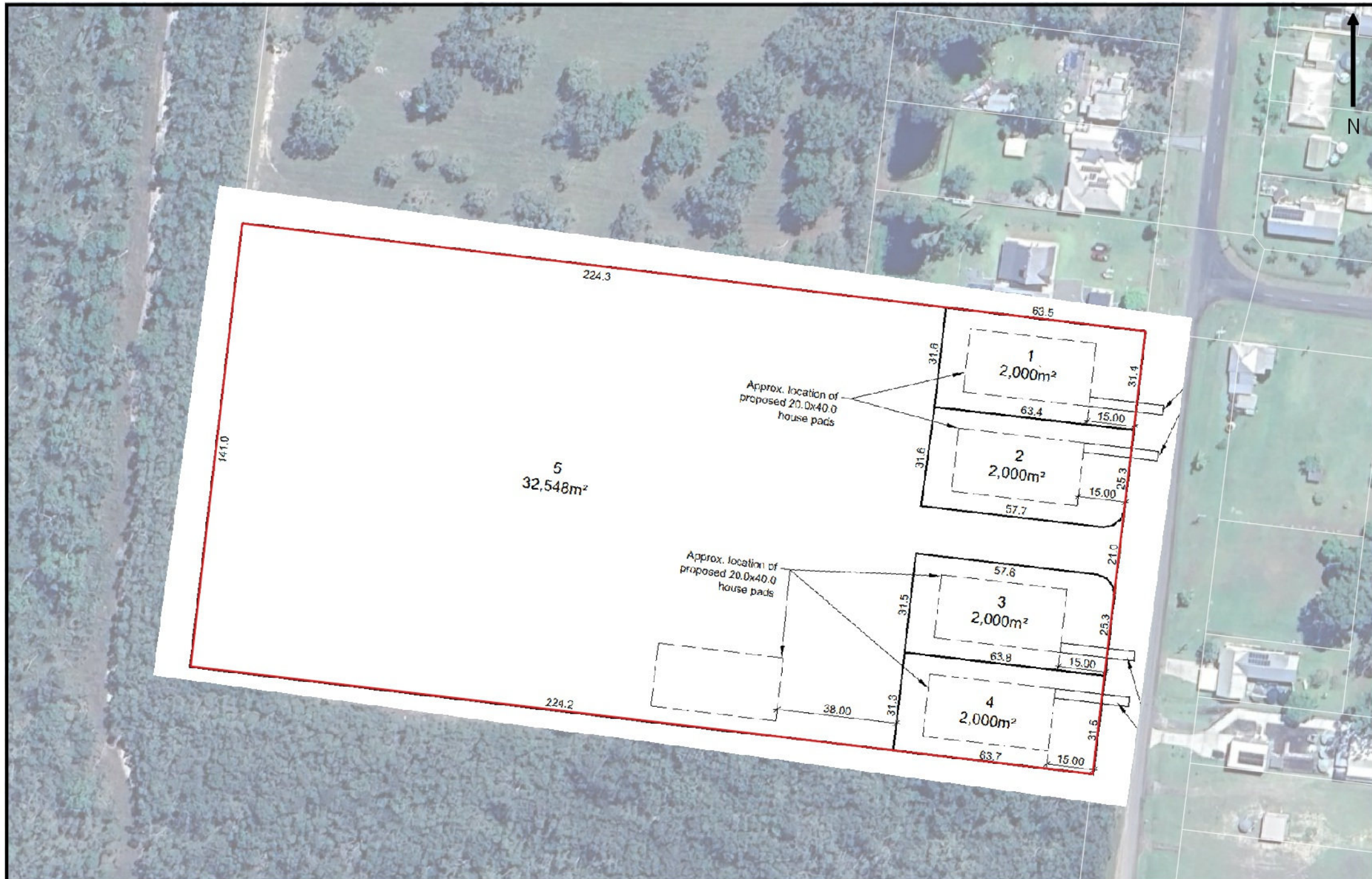
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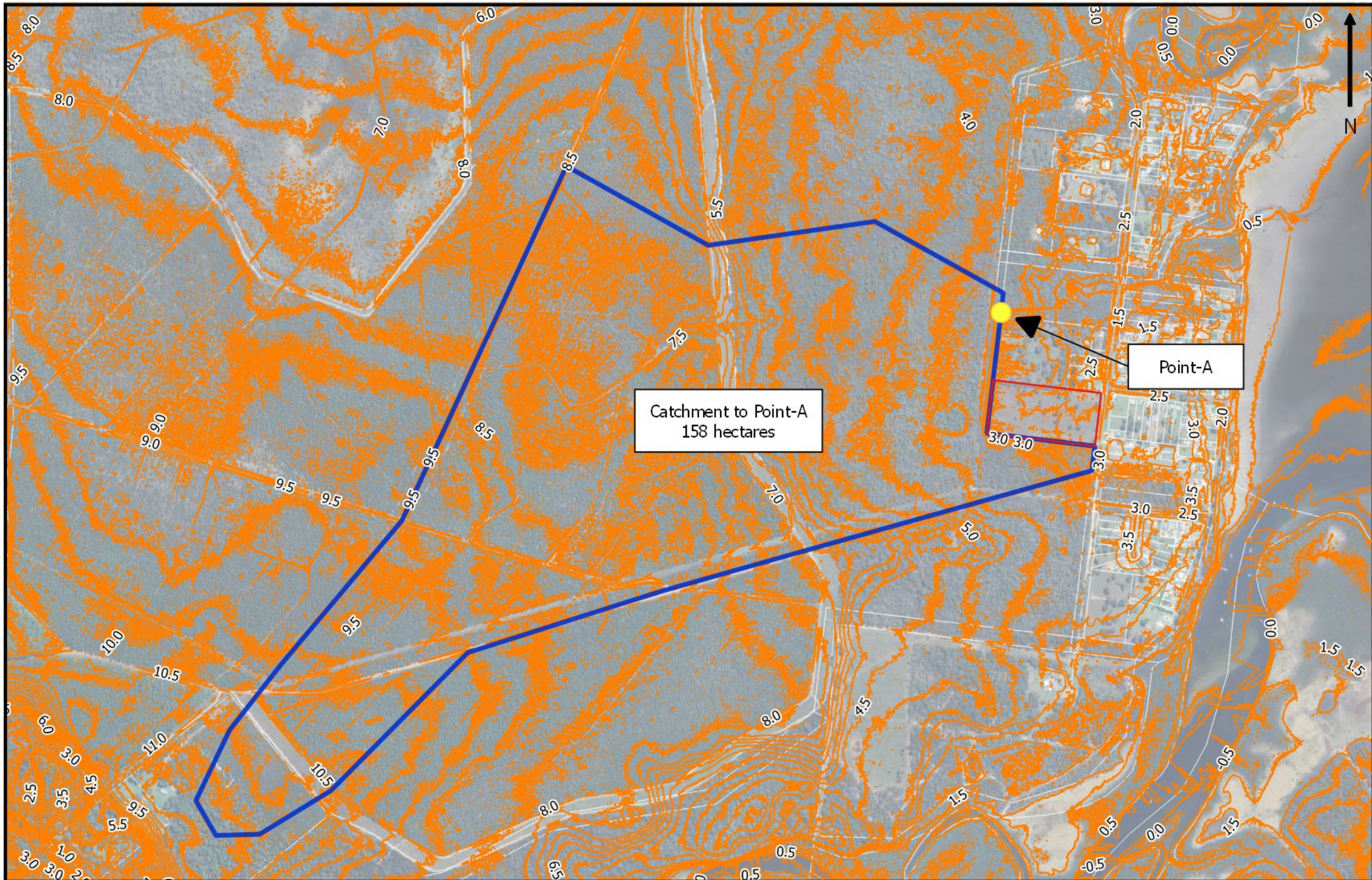
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Figure 1  
Existing Site Plan









Catchment to Point-A  
158 hectares

Point-A



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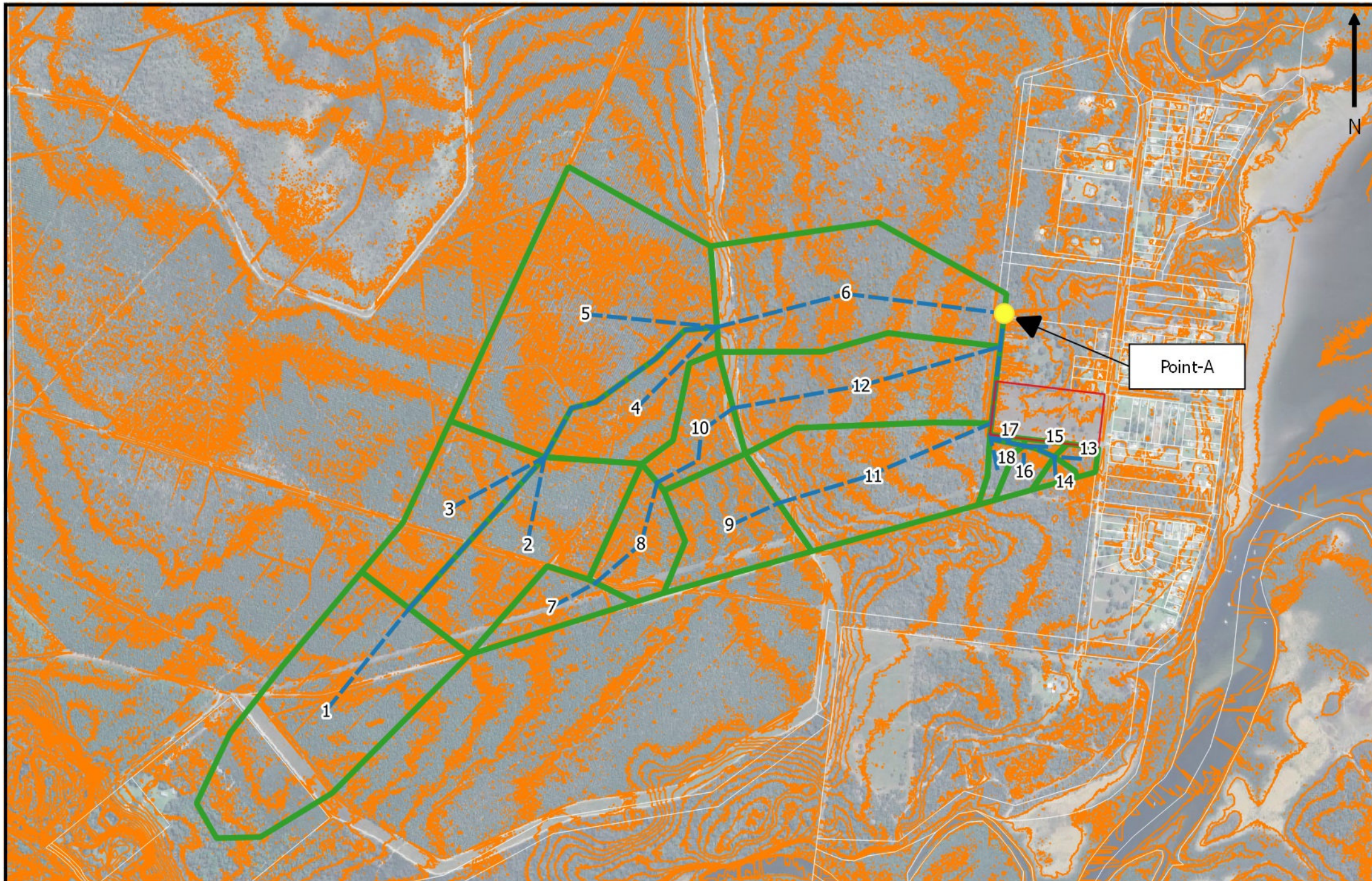
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Lot 51 Wilkinson Road, Tuan

Job No. J9009

Figure 3  
Catchment Plan





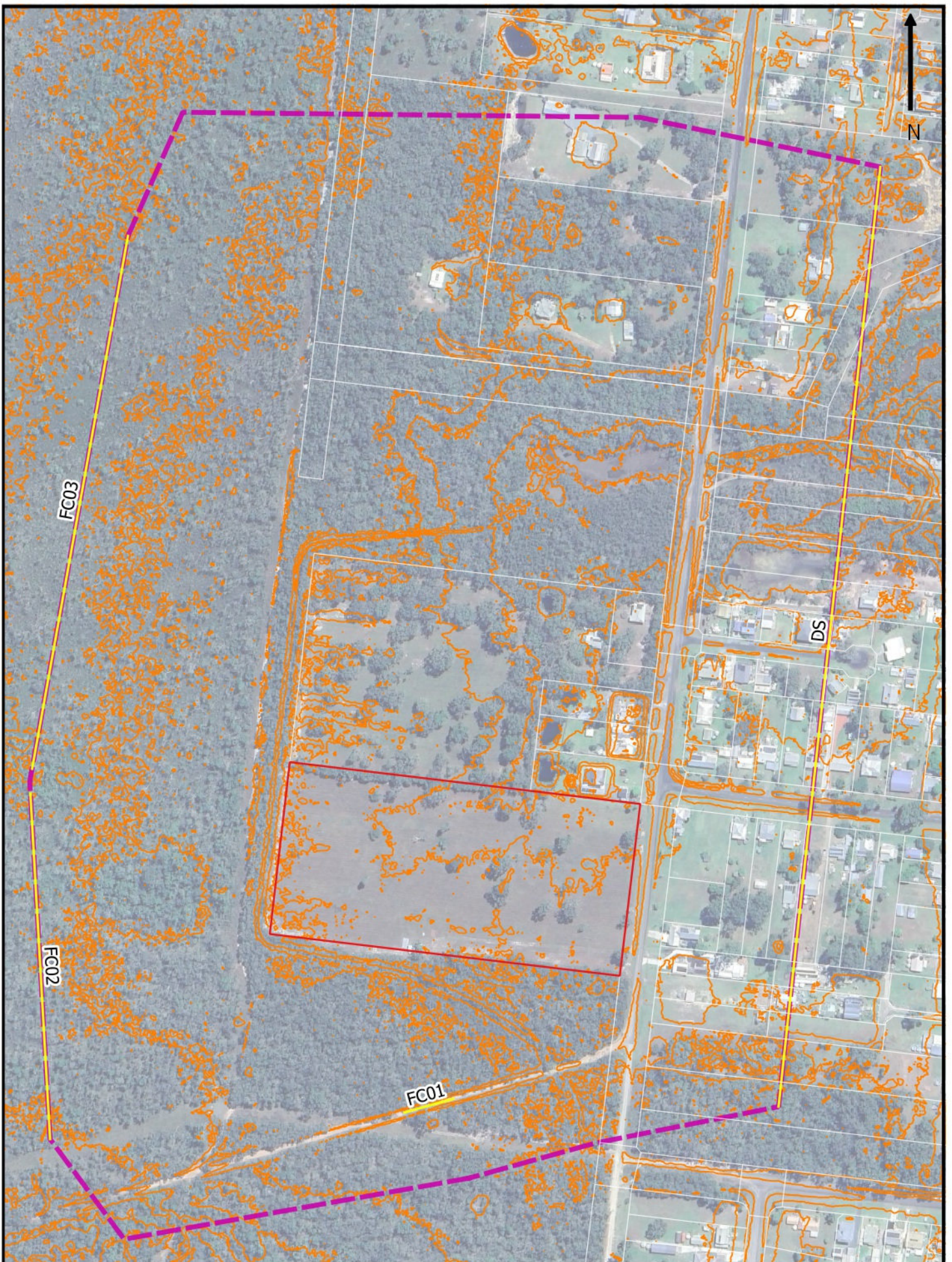
1/820 Old Cleveland Rd, Carina QLD 4152  
Phone (07) 3398 4992


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Lot 51 Wilkinson Road, Tuan  
Job No. J9009

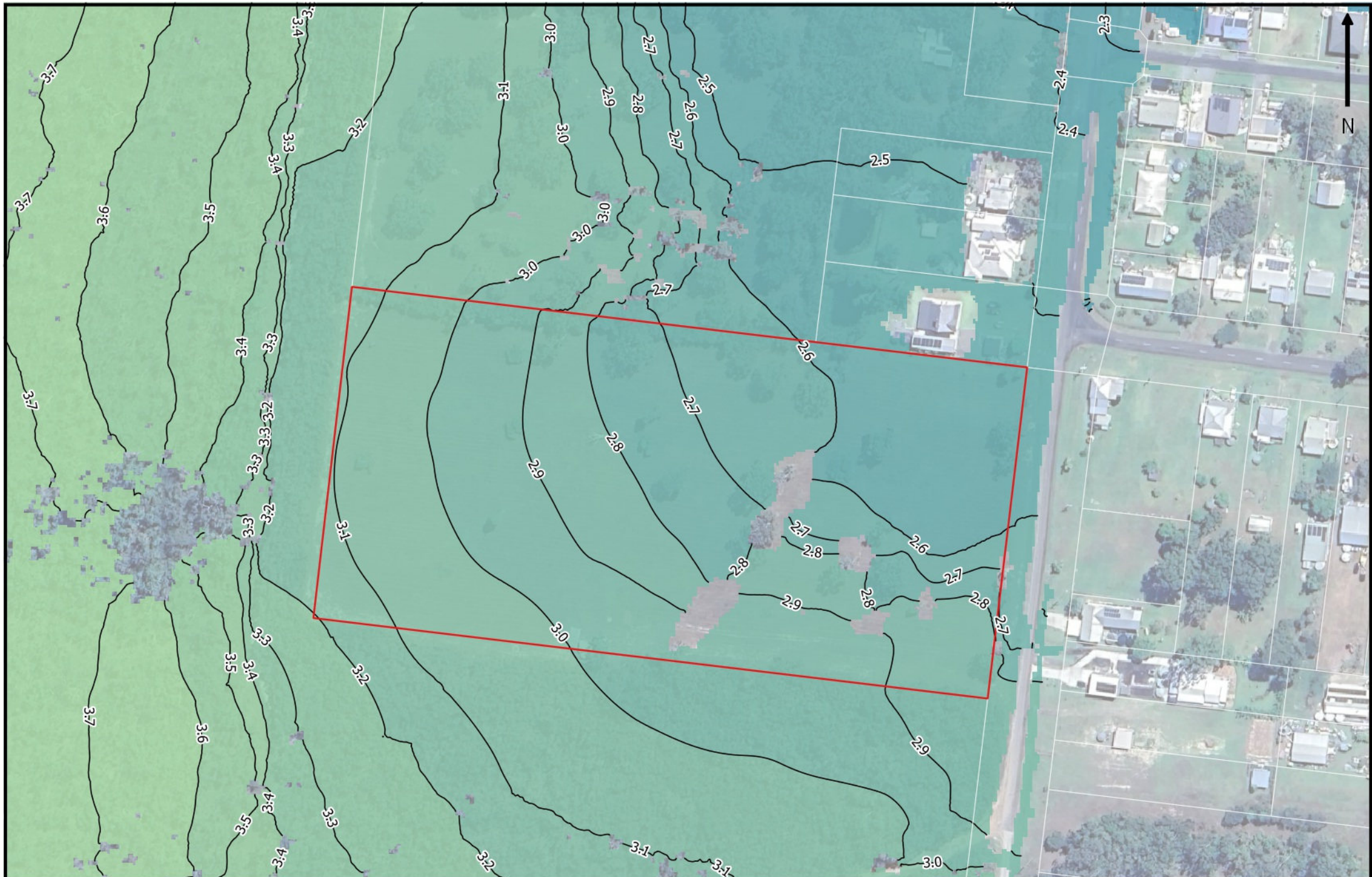
Figure 4  
URBS Model Schematic





 1/820 Old Cleveland Rd Carina QLD 4152 Phone (07) 3398 4992	Drawn	JH	Lot 51 Wilkinson Road, Tuan		Figure 5
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					Existing TUFLOW Model





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Drawn	JH
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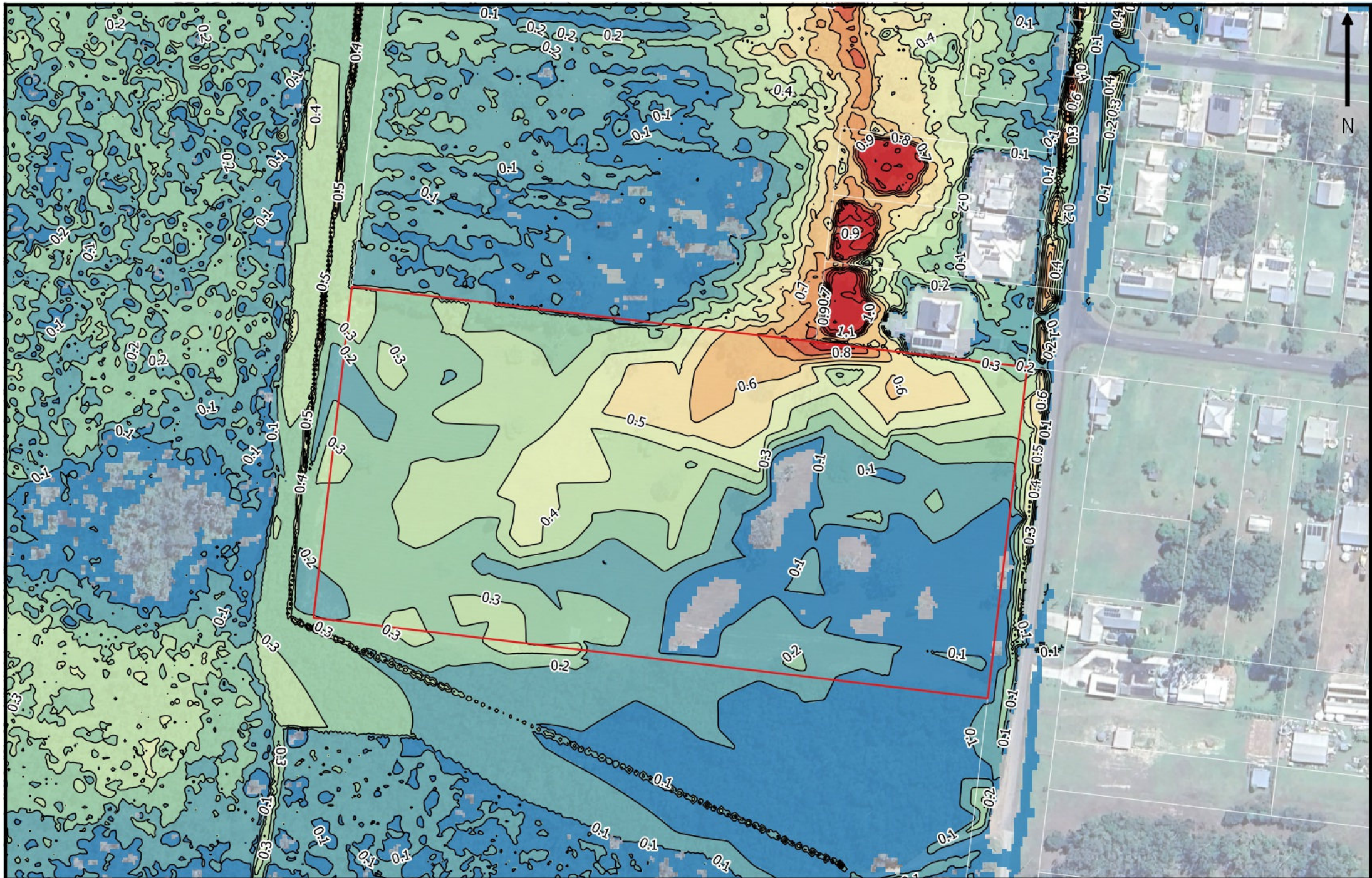
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Figure 6a

Existing 1% AEP Levels (m AHD)





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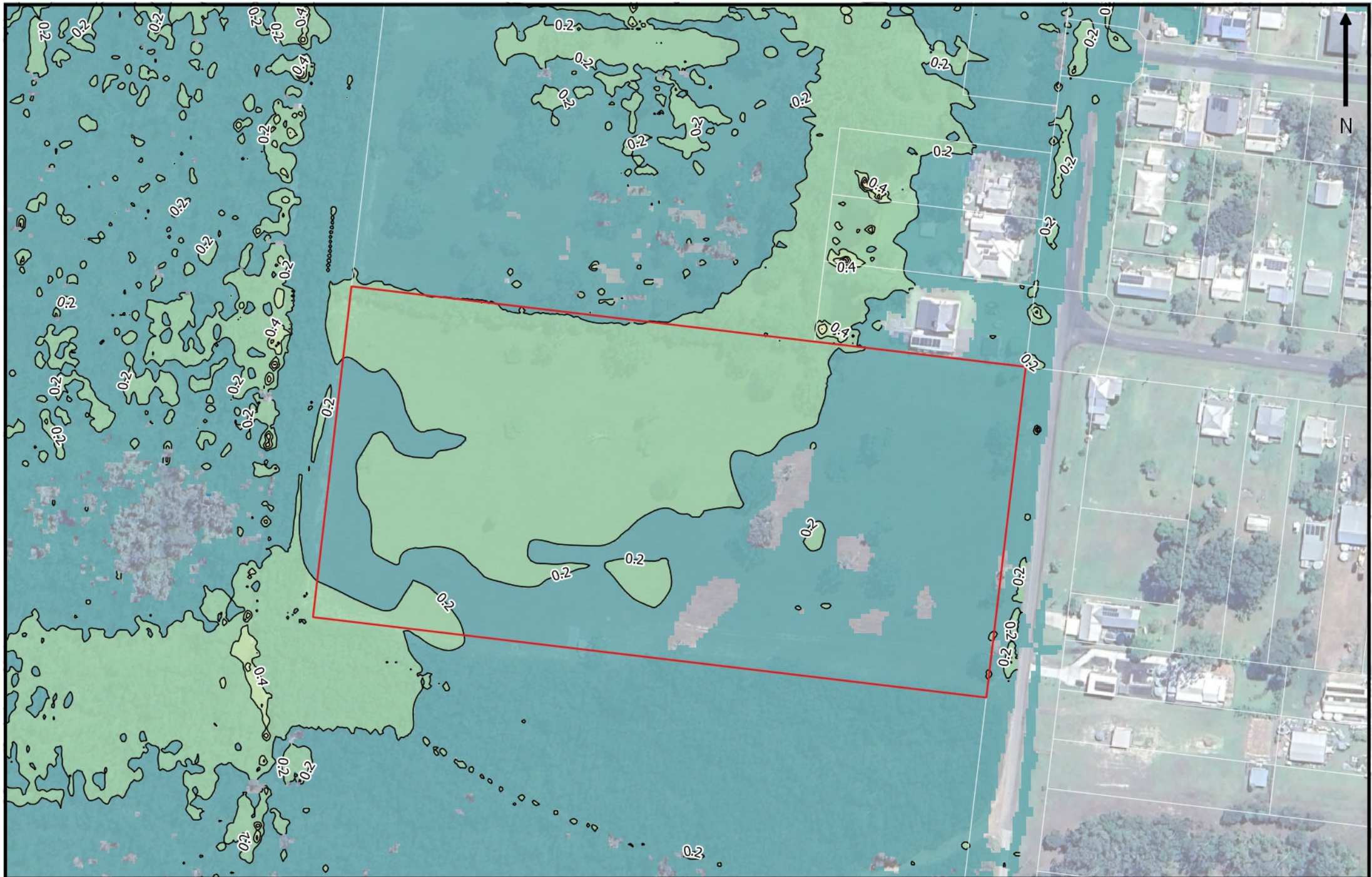
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Figure 6b

Existing 1% AEP Depths (metres)





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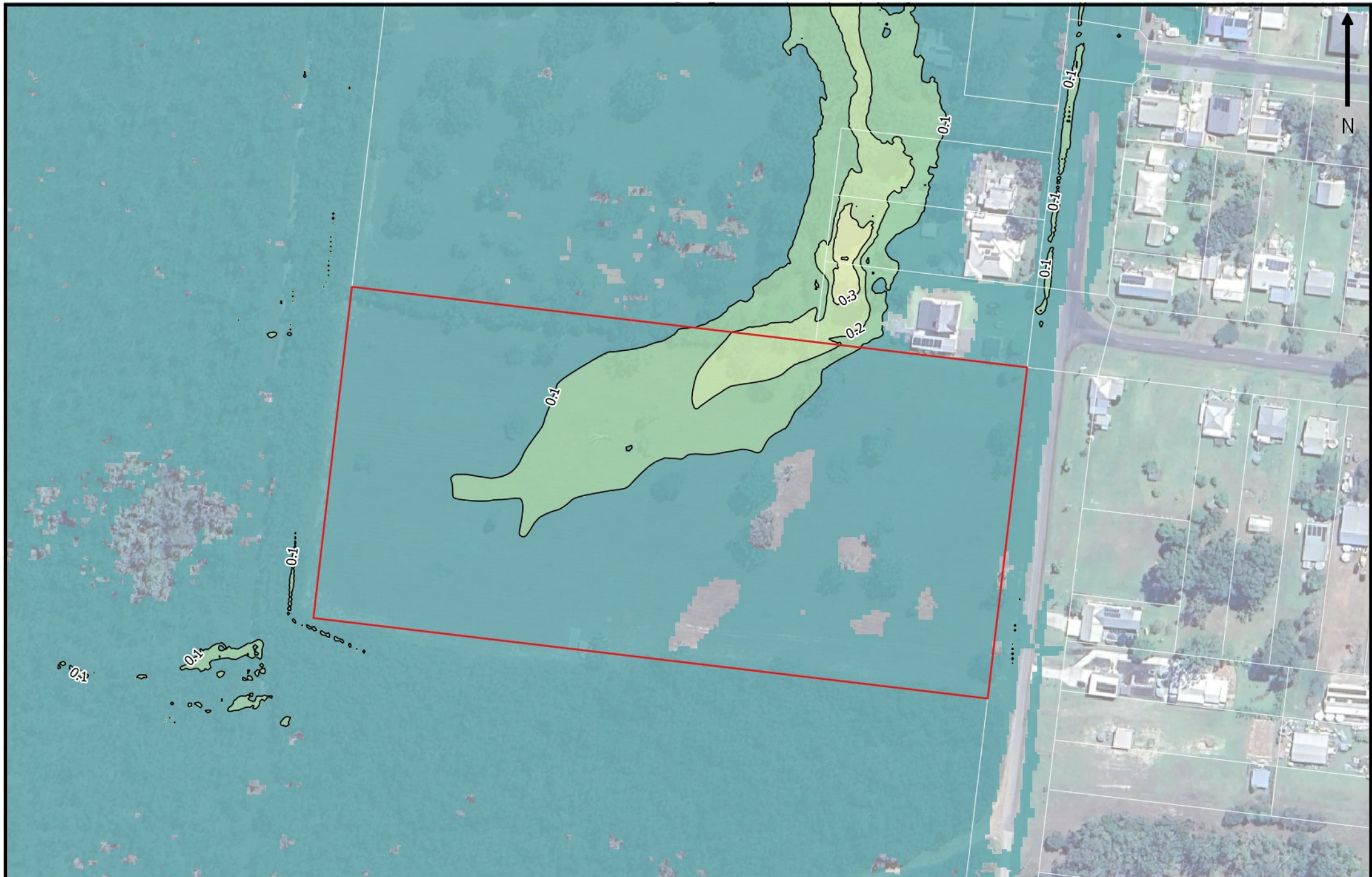
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Figure 6c

Existing 1% AEP Velocity (m/s)





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Drawn	JH
Checked	SNH
Date	22/05/24
Scale	1:2,000 (A4)

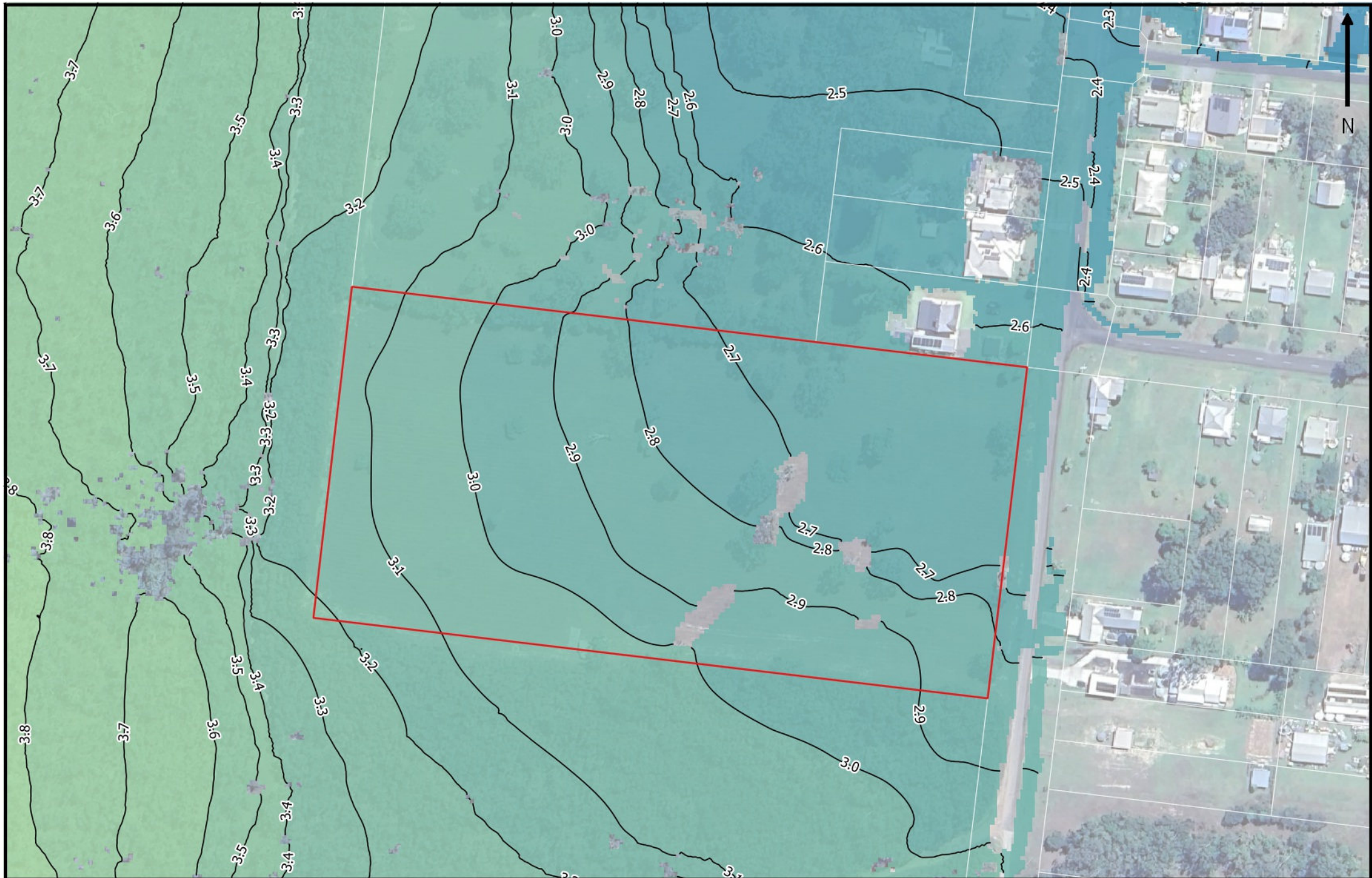
Lot 51 Wilkinson Road, Tuan

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Figure 6d

Existing 1% AEP Velocity-Depth (m<sup>2</sup>/s)





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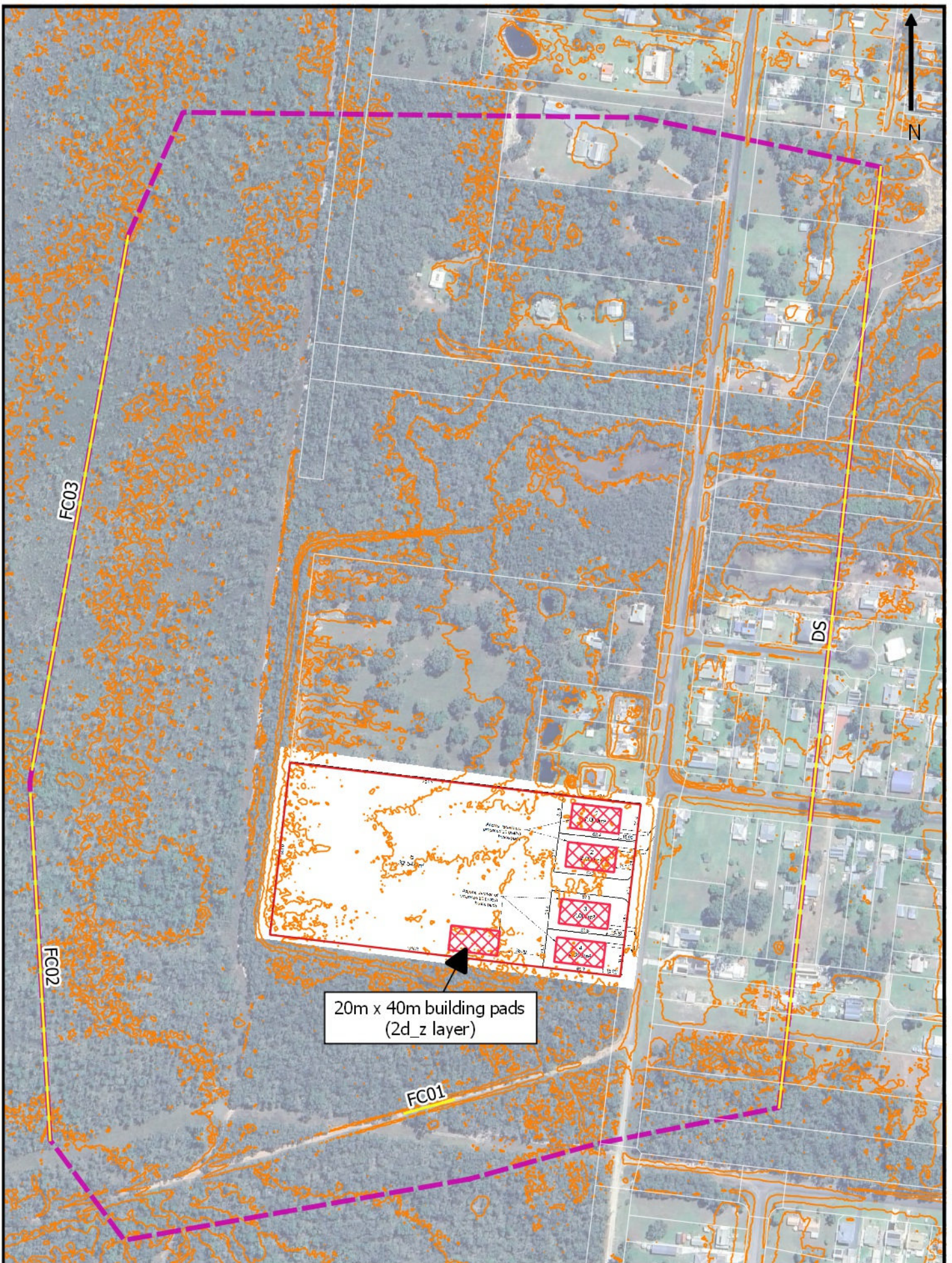
Lot 51 Wilkinson Road, Tuan


Job No. J9009

Figure 6e

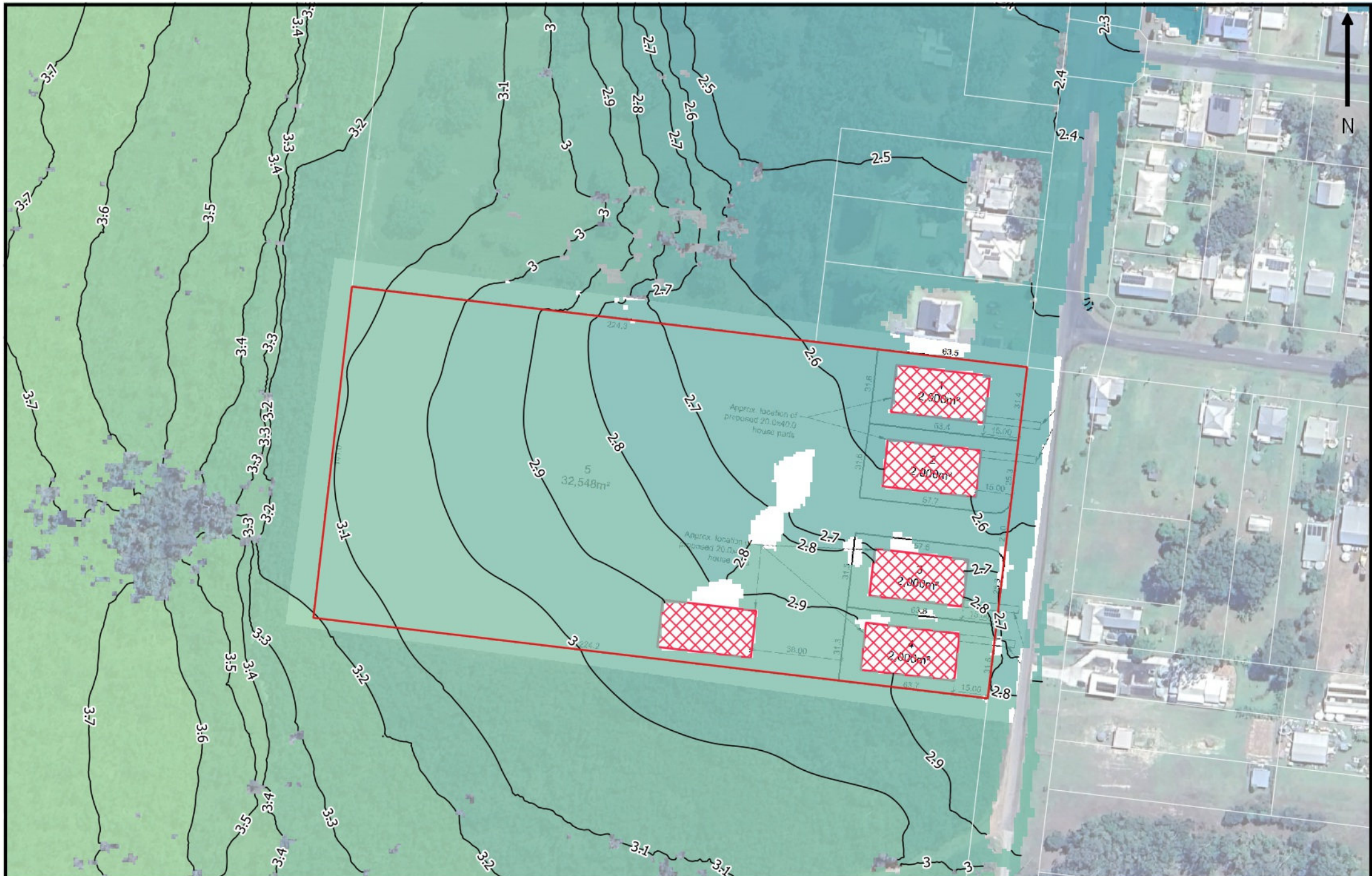
Existing 0.5% AEP Levels (m AHD)





 1/820 Old Cleveland Rd Carina QLD 4152 Phone (07) 3398 4992	Drawn	JH	Lot 51 Wilkinson Road, Tuan		Figure 7
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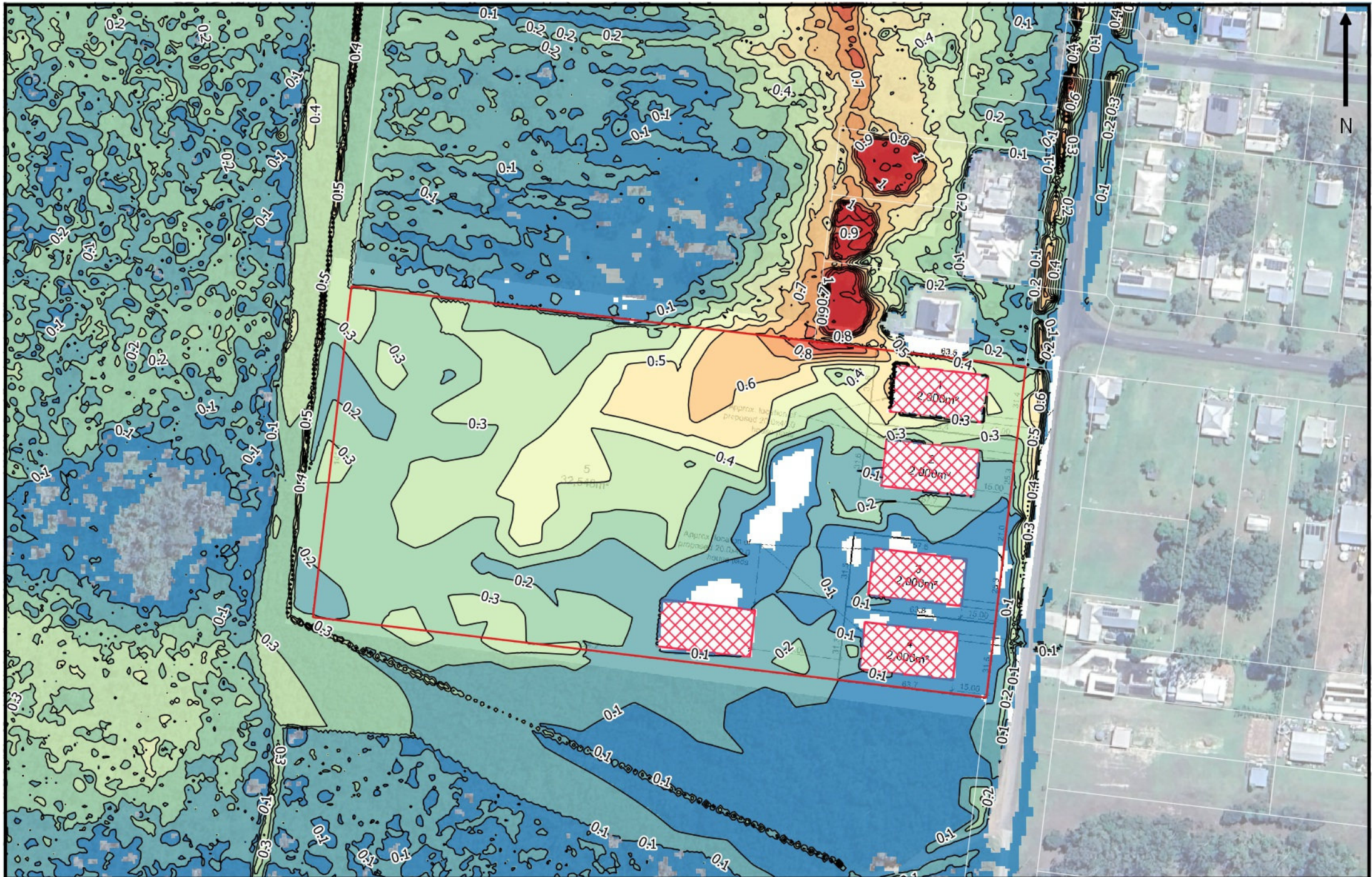
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Figure 8a

Developed 1% AEP Levels (m AHD)





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Figure 8b

Developed 1% AEP Depths (metres)





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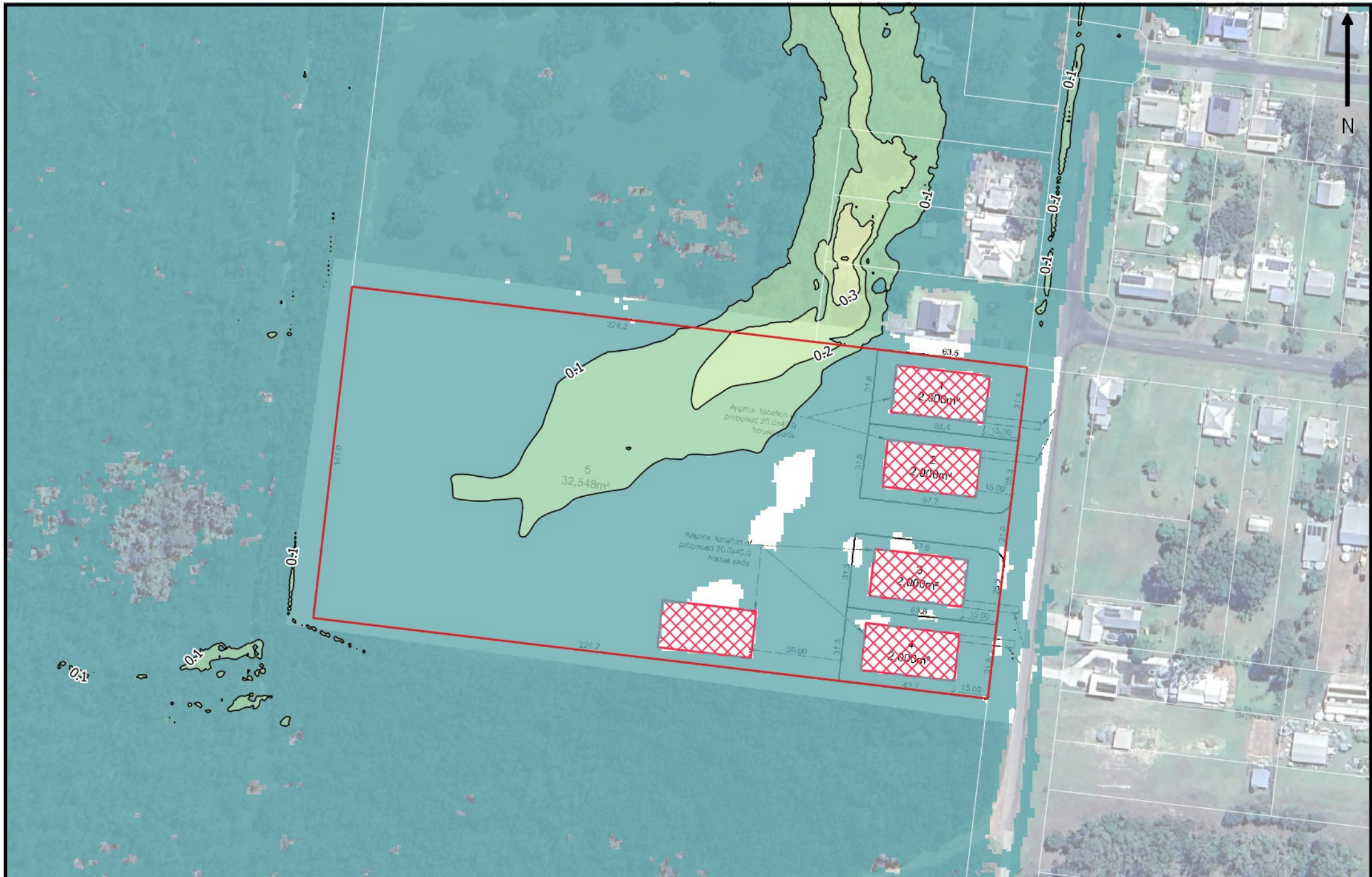
Lot 51 Wilkinson Road, Tuan

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Figure 8c

Developed 1% AEP Velocity (m/s)





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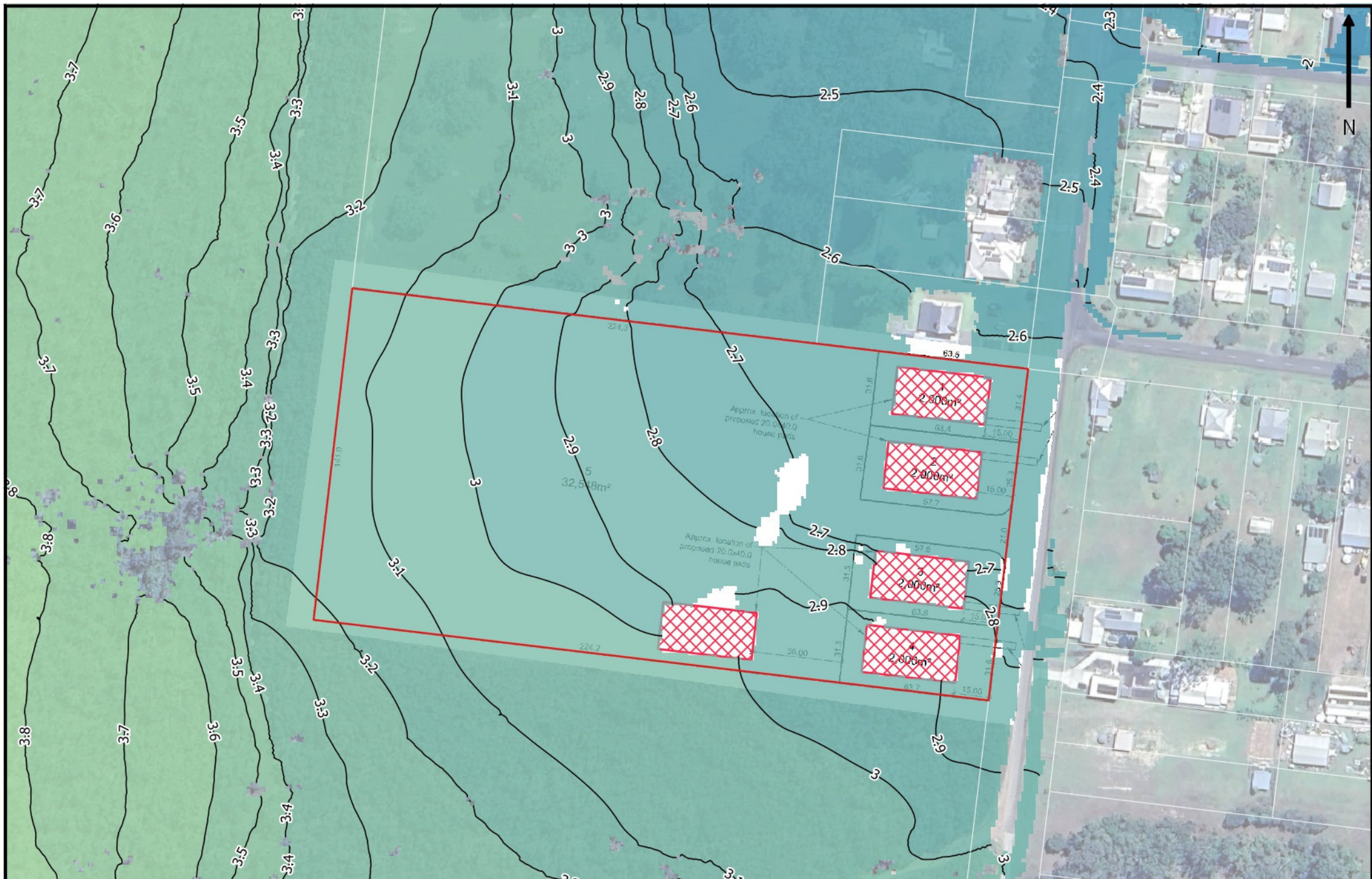
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Figure 8d

Developed 1% AEP Velocity-Depth ( $m^2/s$ )





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Figure 8e

Developed 0.5% AEP Levels (m AHD)





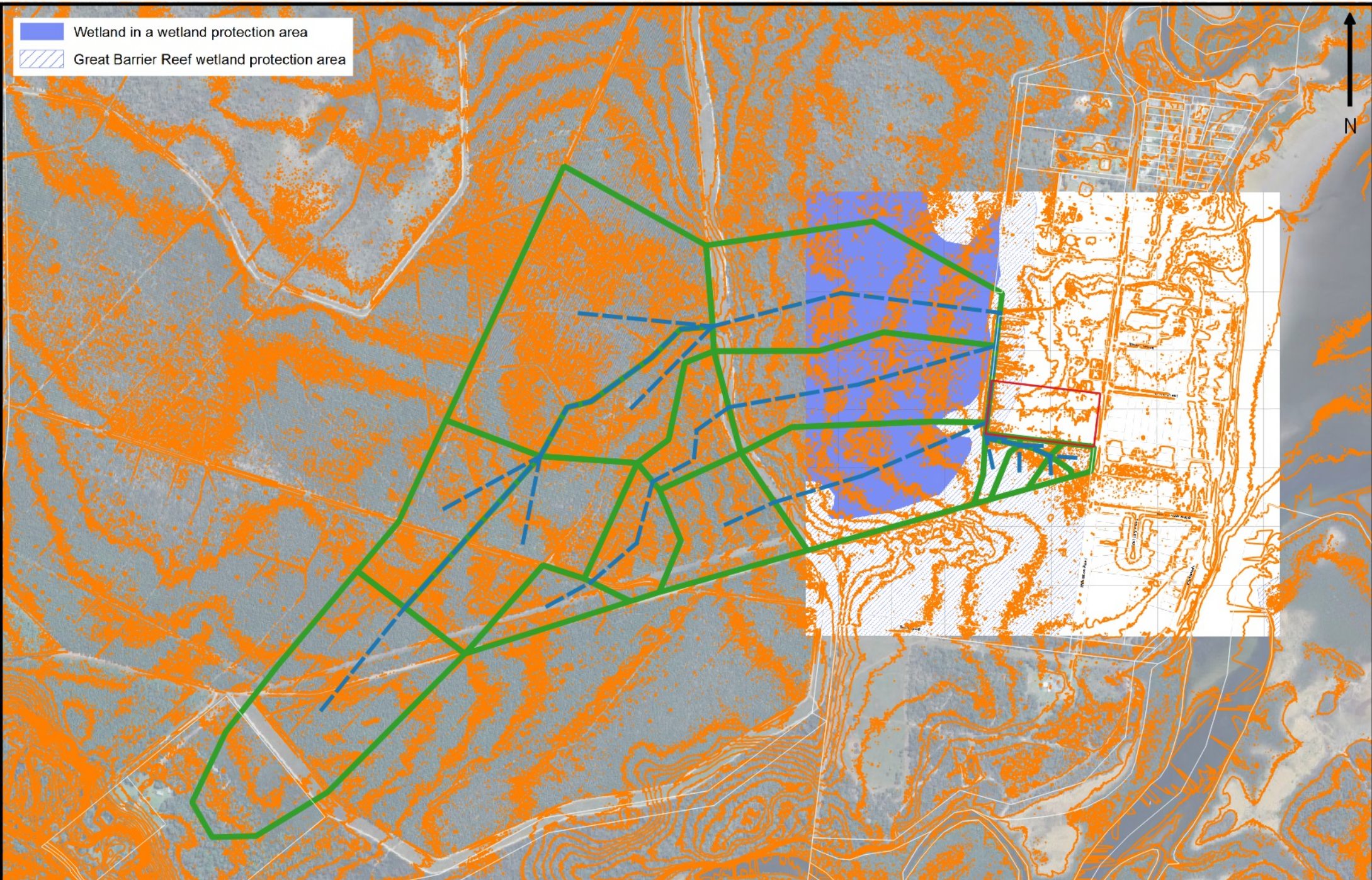
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- 0.05 - -0.02 m
- 0.02 - -0.01 m
- 0.01 - -0.005 m
- 0.005 - 0.005 m
- 0.005 - 0.01 m
- 0.01 - 0.02 m
- 0.02 - 0.05 m
- > 0.05 m

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	Checked	SNH			
	Date	17/02/25	Job No.    J9009		
	Scale	1:2,000 (A4)			Afflux Impact Plot (metres)



Wetland in a wetland protection area  
 Great Barrier Reef wetland protection area



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Figure 10  
 Great Barrier Reef Wetland Protection Areas



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## **APPENDIX B**

### **Photographs**

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**Photograph 1 – Existing site condition (looking west)**



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## **APPENDIX C**

### **Rational Method Calculations**

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## **APPENDIX D**

### **URBS Data**

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**9009\_Ex.U**

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Tuan - Existing
MODEL: Basic
USES: L, U
Default Parameters: alpha=1.20 m=0.8
Catchment File=9009_Ex.dat

Rain #13 L=0.067
Store.
Rain #14 L=0.046
Get.
Route thru #15 L=0.086
Store.
Rain #15 L=0.059
Store.
Rain #16 L=0.067
Get.
Get.
Route thru #17 L=0.097
Store.
Rain #17 L=0.053
Store.
Rain #18 L=0.090
Get.
Get.
Route thru #11 L=0.030
Store.
Rain #9 L=0.140
Route thru #11 L=0.241
Add Rain #11 L=0.356
Get.
Route thru #19 L=0.148
Add Rain #19 L=0.161
Print. P1
Route thru #21 L=0.042
Add Rain #21 L=0.241
Store.
Rain #7 L=0.131
Route thru #8 L=0.157
Add Rain #8 L=0.167
Route thru #10 L=0.200
Add Rain #10 L=0.104
Route thru #12 L=0.344
Add Rain #12 L=0.378
Route thru #20 L=0.153
Add Rain #20 L=0.217
Store.
Rain #1 L=0.346
Route thru #2 L=0.534
Store.
Rain #2 L=0.231
Store.

```

```

Rain    #3      L=0.286
Get.
Get.
Route thru    #4      L=0.599
Store.
Rain    #4      L=0.301
Store.
Rain    #5      L=0.351
Get.
Get.
Route thru    #6      L=0.350
Add Rain    #6      L=0.419
Route thru    #20     L=0.323
Store.
Rain    #22     L=0.412
Route thru    #23     L=0.347
Add Rain    #23     L=0.354
Get.
Get.
Get.
Print. P2
end of catchment details.

```

### 9009\_Dev1.DAT

```

"Index", "Area", "UF", "UR", "I"
#1,0.23117,1.00,0.00,0.05
#2,0.13860,1.00,0.00,0.05
#3,0.09571,1.00,0.00,0.05
#4,0.07232,1.00,0.00,0.05
#5,0.27893,1.00,0.00,0.05
#6,0.20129,1.00,0.00,0.05
#7,0.03762,1.00,0.00,0.05
#8,0.05160,1.00,0.00,0.05
#9,0.08068,1.00,0.00,0.05
#10,0.04885,1.00,0.00,0.05
#11,0.15386,1.00,0.00,0.05
#12,0.15437,1.00,0.00,0.05
#13,0.00655,1.00,0.00,0.05
#14,0.00454,1.00,0.00,0.05
#15,0.00272,1.00,0.00,0.05
#16,0.01157,1.00,0.00,0.05
#17,0.00128,1.00,0.00,0.05
#18,0.00868,1.00,0.00,0.05
#19,0.04047,0.00,1.00,0.31
#20,0.07365,0.00,1.00,0.20
#21,0.00742,0.00,1.00,0.80
#22,0.30520,1.00,0.00,0.05
#23,0.19305,0.80,0.20,0.15

```

### 9009\_Dev1.U

```

Tuan - Development1
MODEL: Basic
USES: L, U
Default Parameters: alpha=1.20 m=0.8
Catchment File=9009_Dev1.dat

Rain    #13     L=0.067
Store.
Rain    #14     L=0.046
Get.
Route thru    #15     L=0.086
Store.
Rain    #15     L=0.059
Store.
Rain    #16     L=0.067
Get.
Get.
Route thru    #17     L=0.097
Store.
Rain    #17     L=0.053
Store.
Rain    #18     L=0.090
Get.
Get.
Route thru    #17     L=0.287
Route thru    #21     L=0.141

```

```
Store.
Rain #19 L=0.161
Get.
Print. P1
Route thru #21 L=0.042
Add Rain #21 L=0.241
Store.
Rain #9 L=0.140
Route thru #11 L=0.241
Add Rain #11 L=0.356
Route thru #12 L=0.203
Store.
Rain #7 L=0.131
Route thru #8 L=0.157
Add Rain #8 L=0.167
Route thru #10 L=0.200
Add Rain #10 L=0.104
Route thru #12 L=0.344
Add Rain #12 L=0.378
Get.
Route thru #6 L=0.088
Store.
Rain #1 L=0.346
Route thru #2 L=0.534
Store.
Rain #2 L=0.231
Store.
Rain #3 L=0.286
Get.
Get.
Route thru #4 L=0.599
Store.
Rain #4 L=0.301
Store.
Rain #5 L=0.351
Get.
Get.
Route thru #6 L=0.350
Add Rain #6 L=0.419
Get.
Route thru #20 L=0.323
Store.
Rain #20 L=0.217
Store.
Rain #22 L=0.412
Route thru #23 L=0.347
Add Rain #23 L=0.354
Get.
Get.
Get.
Print. P2
end of catchment details.
```

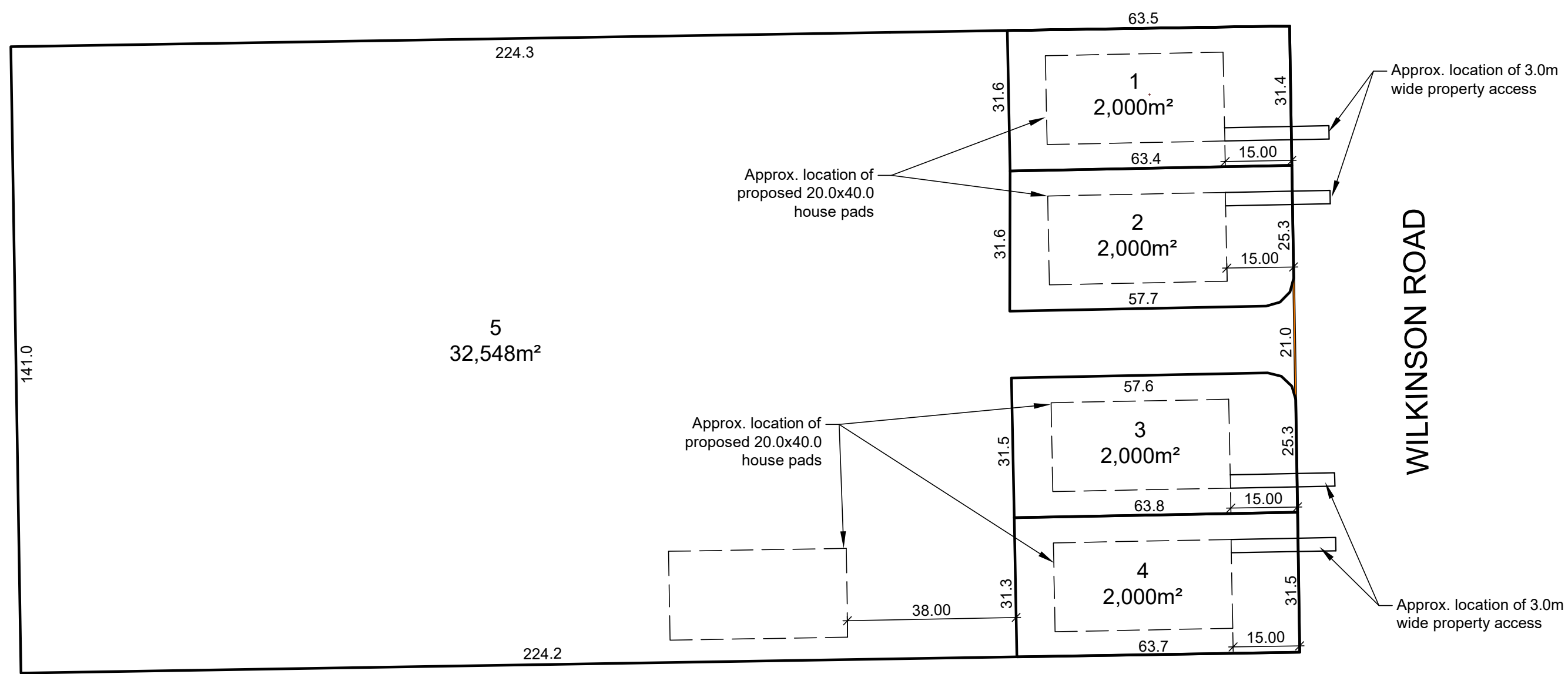
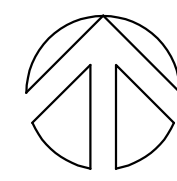
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## **APPENDIX E**

### **Development Plans**

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**Site Plan** (Scale 1:1000)

Lot number 51  
Registered Plan Number MCH567  
Area - 40,560m<sup>2</sup>

C:\Users\Todd\Cooloola Drafting\share - Documents\Drawings\Bolton\Bolton.dwg

<b>ISSUE:</b> Rev. Date Description A 03.02.25 Preliminary	<small>Designer will not be responsible for the structural design of this building unless noted on the plan set. These drawings have been drawn in accordance with Australian Standards, BCA and Local Authority requirements. No amendments to be made without consent of Cooloola Drafting. All dimensions to be verified on site prior to construction. If in doubt, ask. Plans have been supplied on the condition that in the event of an error, Cooloola Drafting is limited to the cost of amendments of plans only. COPYRIGHT: These plans are the property of Cooloola Drafting and shall not be copied or reproduced without the approval of Cooloola Drafting.</small>	<b>PROPOSED RECONFIGURATION OF EXISTING LOT 51 WILKINSON ROAD TUAN</b>	<b>SITE PLAN</b>	Drawn/Checked: T.D. Gluch	Cooloola Drafting ABN 22 945 328 697 Gympie, QLD, 4570 Ph: (07) 5483 6492 Email: design@coolooladrafting.com.au	Orig. Sheet Size: <b>A3</b>
				Signed:		Scale: <b>1:1000</b>
				Date: <b>03/02/2025</b>		No. <b>1</b> of <b>1</b> Plans
				Design Windspeed: <b>N3 (W41N)</b>		Plan No. <b>00-000</b>