

HYDRAULIC IMPACT ASSESSMENT & MANAGEMENT REPORT

Multi-Dwelling Housing Development with Basement Carpark

439 Condamine Street, Allambie Heights NSW

Job No. 240803
Issue 01 – 5 June 2025

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DOCUMENT INFORMATION PAGE

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Hydraulic Impact Assessment and Report for a Proposed New Seniors Scheme Development with Basement Carpark at 439 Condamine Street, Allambie Heights NSW Job N° 240803

1.0 INTRODUCTION

This Hydraulic Impact Assessment (HIA) has been prepared to support a Development Application for the proposed development at 439 Condamine Street, Allambie Heights. This HIA is based on:

- Architectural drawings prepared by Walsh Architects (Drawings DA000A to DA900A dated 04.06.2025)
- Clause 5.21 of the Warringah Local Environmental Plan 2011 (WLEP)
- Clauses C4 and C6 of Warringah Development Control Plan 2011 (WDCP)
- Northern Beaches Council “Water Management for Development Policy” 2021
- Building Over or Adjacent to Constructed Drainage Systems and Easements Technical Specification
- the Manly Lagoon Floodplain Risk Management Study (WMA Water - October 2018)
- Reducing the Vulnerability of Buildings to Flood damage: Guidance on Building In Flood Prone Areas (Prepared for the Hawkesbury Nepean Floodplain management Steering Committee – 2007)
- Construction of buildings in flood hazard areas (Australian Building Codes Board – ABCB Standard & NCC of Australia)
- the NSW Floodplain Risk Management Guide (Incorporating 2016 Australian Rainfall and Runoff in studies)
- the NSW Flood Risk Management Manual (2005 & 2023)
- discussions with Council engineers.

2.0 DEVELOPMENT SITE AND HYDRAULIC CONTEXT

This section of the report summaries the development site conditions and hydraulic conditions surrounding the development site.

2.1 SITE DESCRIPTION

The subject site is described as DP369828, 439 Condamine Street, Allambie Heights.

- The site area is approximately 1,125m² and is grading down toward the south-western boundary (toward Condamine Street).
- The site contains a single and double storey dwelling with tile and metal roofs, brick garage, concrete driveways, and various paved paths. Fences, retaining walls, and steps are surrounding the site.
- Site levels range from approximately RL 6.2m AHD at the front of the property to RL 8.9m AHD at the rear.
- The site is accessed via Condamine Street. The existing site appears to discharge stormwater directly

Condamine Street.

2.2 PROPOSED DEVELOPMENT

Based on the supplied information, we understand that the applicant intends to demolish the existing structures and construct a new two-three storey proposed residential multi-dwelling housing development with a shared below ground basement carpark.

- Demolition of the existing structures.
- The enclosed basement carpark level at RL 5.55m AHD.
- The ground, level 1 and level 2 floor levels of units 01 to 03 are proposed at RL 8.40m, 11.50m and 14.60m AHD respectively.
- The ground and level 1 floor levels of units 04 to 06 are proposed at RL 9.00m and 12.10m AHD respectively.

2.3 MANLY LAGOON CATCHMENT SUMMARY

Flooding within the Manly Lagoon catchment can occur as a result of a combination of factors, including:

- Catchment-derived runoff from intense rainfall over the Manly Lagoon catchment, which is the dominant flooding mechanism. Flooding can rise rapidly due to steep catchment response and urbanisation.
- Elevated ocean levels at the lagoon entrance (Queenscliff Beach) due to high tide or storm surge. While this may cause some inundation near the lagoon foreshore, it typically has less impact than catchment-driven events of the same probability.
- Lagoon entrance berm conditions, which affect flood levels. Higher sand berms restrict discharge, causing elevated lagoon levels during storm events. Mechanical opening of the entrance is managed by Council once levels exceed 1.0–1.4m AHD.
- Overbank flooding and ponding along Brookvale Creek, Burnt Bridge Creek, and Manly Creek, particularly when flow capacity in the drainage network is exceeded. Areas around Warringah Mall and Balgowlah Industrial Estate are especially affected by overland flow.

These factors may act independently or in combination. Generally, flooding from catchment rainfall produces the worst flood extents, particularly during short to medium duration storm events (2–9 hours), with critical peak levels often occurring rapidly downstream.

Peak flood levels in Manly Lagoon have been recorded within 30 minutes of upstream peak flows at Brookvale and Burnt Bridge Creek. Four key flood hotspots have been identified:

- Kenneth Road
- Balgowlah Road
- Manly Lagoon North Bank

- Brookvale.

The entrance management protocol aims to reduce flood levels by mechanically opening the sand berm under specific trigger conditions. However, manual opening may not prevent inundation during major flood events.

Climate change and sea level rise are expected to exacerbate flood risk over time, increasing baseline lagoon levels and potentially triggering more frequent inundation of low-lying areas, even outside of storm events.

2.3.1 DEVELOPMENT SITE CATCHMENT LOCATION

The development site is located within the Burnt Bridge Creek sub-catchment, which contributes flow to Manly Lagoon. While the site is not within a formally identified flood hotspot, it lies upstream of the Balgowlah Road and Kenneth Road hotspot area, where overland flow and surcharge of the trunk drainage system can result in significant flood impacts. The site forms part of the contributing catchment to these lower flood-affected areas and may be influenced by trunk drainage capacity constraints during major storm events.

Although no adopted overland flow flood study exists for this location, Northern Beaches Council engineers have confirmed that development applications are assessed on a case-by-case basis by their development engineering team, who are likely to require an overland flow impact assessment to address potential local and downstream flooding effects.

2.4 PRE AND POST DEVELOPMENT

Refer to Appendix A for summary of DRAINS hydrologic and hydraulic results.

2.4.1 PRE DEVELOPMENT OVERLAND FLOW

Predicted Levels:

- 1% AEP Level = 8.80m AHD at rear of building
- 1% AEP Level = 6.30m AHD at new driveway entrance location
- PMF Level = 9.00m AHD at rear of building
- PMF Level = 6.50m AHD at new driveway entrance location

Predicted Velocities:

- 1% AEP Velocity = 0.49 m/s at rear of building
- 1% AEP Velocity = 0.77 m/s at new driveway entrance location
- PMF Velocity = 0.79 m/s at rear of building
- PMF Velocity = 1.02 m/s at new driveway entrance location

2.4.3 POST DEVELOPMENT OVERLAND FLOW

Predicted Levels:

- 1% AEP Level = 8.80m AHD at rear of building
- 1% AEP Level = 6.30m AHD at new driveway entrance location
- PMF Level = 9.00m AHD at rear of building
- PMF Level = 6.50m AHD at new driveway entrance location

Predicted Velocities:

- 1% AEP Velocity = 0.52 m/s at rear of building
- 1% AEP Velocity = 0.81 m/s at new driveway entrance location
- PMF Velocity = 0.85 m/s at rear of building
- PMF w Velocity = 1.08 m/s at new driveway entrance location

3.0 HYDRAULIC IMPACT ASSESSMENT SUMMARY

Overland flood behaviour within the catchment was assessed using DRAINS and TUFLOW hydrologic and hydraulic modelling under both existing and developed site conditions. TUFLOW was used to model surface runoff and flow paths from the upstream catchment contributing to the site, while DRAINS was used to assess pit and pipe performance and quantify peak flows. This modelling formed the basis of the overland flow impact assessment, independent of estuarine flood risk considerations.

The computer models consisted of the following:

- A DRAINS model of existing Council stormwater network was utilised to determine the overland flow hydrographs for the 1% AEP and PMF storm events.
- Hydrographs for the overland flows directed to the development site were input into TUFLOW to determine predicted Pre and Post Development Flood Levels as summarised in Section 2.0 of this report.
- Refer to Appendix A for summary of DRAINS hydrologic and hydraulic results.
- Refer to Appendix C for summary of TUFLOW hydraulic results and comparison of pre and post development impacts.

3.1 HYDRAULIC IMPACTS

As a result of the development the overland flow extent and levels are envisaged to be altered slightly, predominantly within the development site. Council's "Water Management for Development Policy" predominantly requires a design consideration of the 1% AEP storm event. The overland flow levels are not envisaged to be significantly impacted outside of the development site for all storms up to and including the 1% AEP storm event. The extent of exceedance of 11mm is less than 20mm which is considered a minor increase according to WDCP 2011.

4.0 DEVELOPMENT COMPLIANCE SUMMARY

Northern Beaches Council have mandatory requirements for properties located on flood-affected land specified in the following flood risk management controls.

The determined Flood Risk Precincts are:

- Overland Flow component - Low Flood Risk Precinct

4.1 WARRINGAH DCP 2011

Warringah DCP 2011 (Low Flood Risk Precinct):

- No flood requirements according to Flood Prone Land Matrix.

4.2 COUNCIL'S WATER MANAGEMENT POLICY

Applicable Council Trunk Drainage Adjacency Requirements (Section 6.0 of Water Management Policy):

- Invert clearance for adjacent footings ($\geq 300\text{mm}$ below invert and $\geq 1.0\text{m}$ horizontal clearance)
- Connection to system must comply with Council standards.

Applicable Overland Flow Flooding Requirements (Section 11.0 of Water Management Policy):

- 1% AEP overland flow path must be defined and unimpeded
- Flow paths required over pipelines not rated for 1% AEP
- Flow paths must consider velocity x depth hazard
- No obstruction or loose landscaping in flow path (e.g. bark, mulch)
- NER-registered engineer to confirm overland flow affectation.

4.3 FLOOD RISK MANAGEMENT MANUAL

Minimum Flood Risk Management Manual (2023) Requirements:

- No worsening of flood affectation to adjacent or downstream properties
- Habitable floor levels must be at or above the Flood Planning Level (FPL) with appropriate freeboard
- Basements must be flood-protected (e.g. pump-out systems, no direct entry of floodwater)
- Building materials below FPL must be flood-compatible and structurally stable under inundation
- Flow paths must be preserved i.e. no blocking or diverting overland flow unless hydraulically justified
- Evacuation must be safe and practical, with access routes not isolated in the 1% AEP or PMF
- Development must match flood risk level
- Emergency response planning to Council requirements
- Residual risk above PMF must be acknowledged and addressed (e.g. refuge, signage, warning systems)
- Climate change impacts must be considered in flood level estimation and design life.

5.0 RECOMMENDATIONS

This report has been prepared to document a strategy to manage overland flow adjacent to and through the site and to set minimum finished floor levels. The flood impact assessment concludes that the proposed development does not have an adverse impact on the existing flooding at the site or surrounding area.

The key strategies to be adopted for this development include the following:

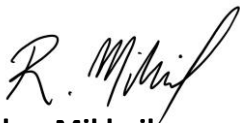
1. All habitable floors for units 01 to 03 proposed at RL 8.40m AHD are located well above the 1% AEP overland flow level within Condamine Street thus providing sufficient freeboard.
2. All habitable floors for units 04 to 06 should be at or above RL 9.00m AHD based on the 1% AEP overland flow level plus appropriate freeboard (200mm) or the PMF level.
3. Basement entry is to be protected by ensuring no points of entry are located below of RL 6.50m AHD including driveway entrance based on the PMF level. Driveway grades must also comply with Council and Australian Standards.
4. All building materials below RL 6.50m AHD should be flood compatible.
5. The design of the structure for any items located below RL 6.50m AHD are recommended to be certified by a structural engineer registered on the National Engineers Register for Structural Engineering (NER-Structural) during the Construction Certificate phase of the project.
6. Appropriate flood warning signage should be installed to warn people of potential flooding at the site.

6.0 CONCLUSION

By implementation of the above recommendations, the proposed development will comply with the intent of Council's flood related development controls. Flood risks to life and property have been mitigated as far as practical through appropriate design and modelling. The development is recommended for Council approval.

We trust that this report meets with Council requirements for flood risk management analysis. Please contact the author if further clarification is required.

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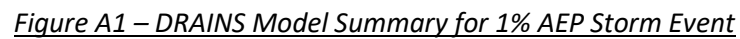


Rhys Mikhail

Director | Principal Engineer | Design Practitioner
BE (Civil) Hons MIEAust CPEng NER RPEQ APEC IntPE(Aus)

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APPENDIX A – CATCHMENT AND COUNCIL INFORMATION



APPENDIX B – FLOOD HAZARD RISK LEVEL

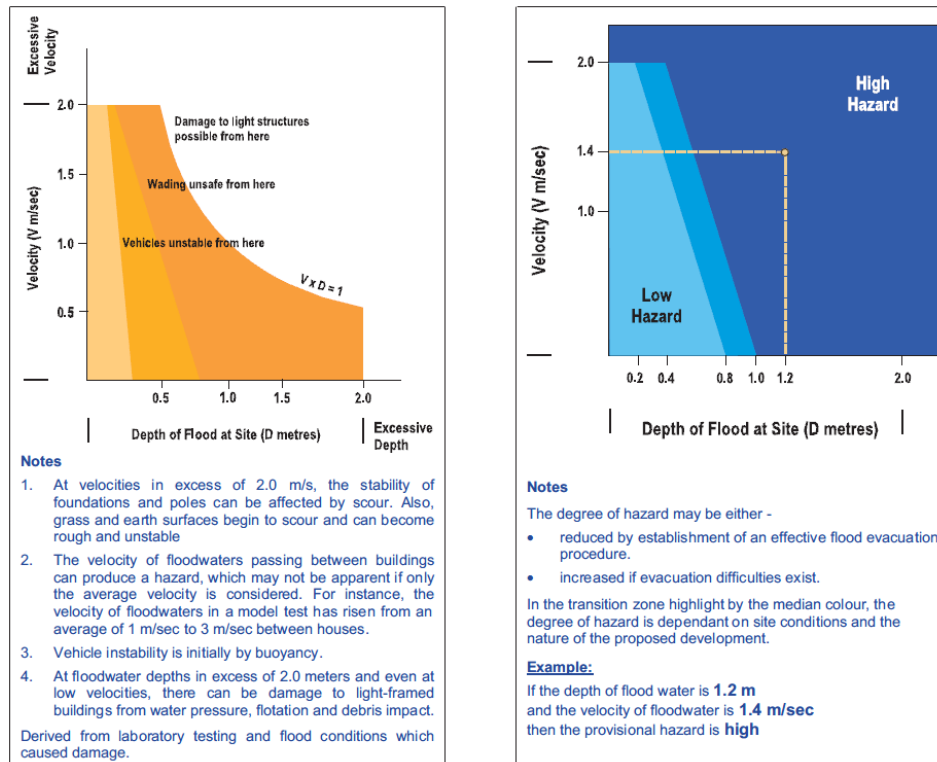


Figure B1 – Flood Hazard Curve Risk Level for the Development

Note: This information is based on the NSW Government Floodplain Management Manual (2005)

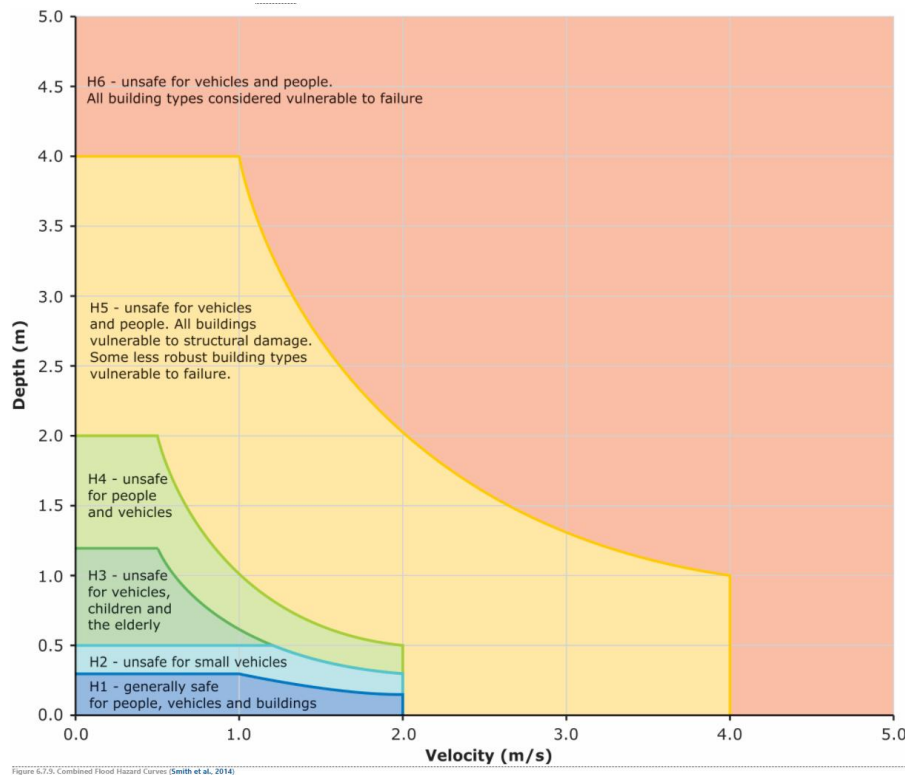
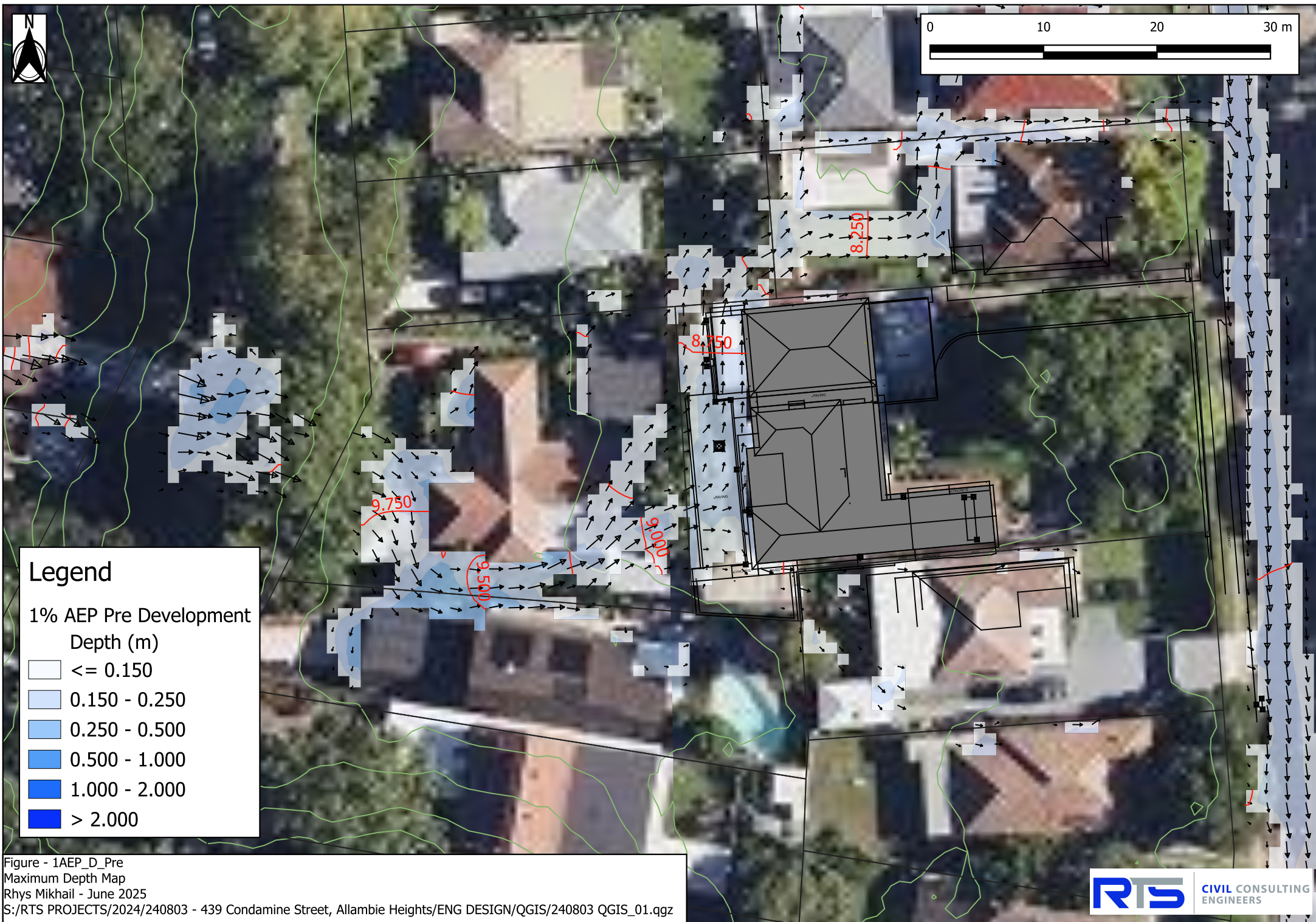
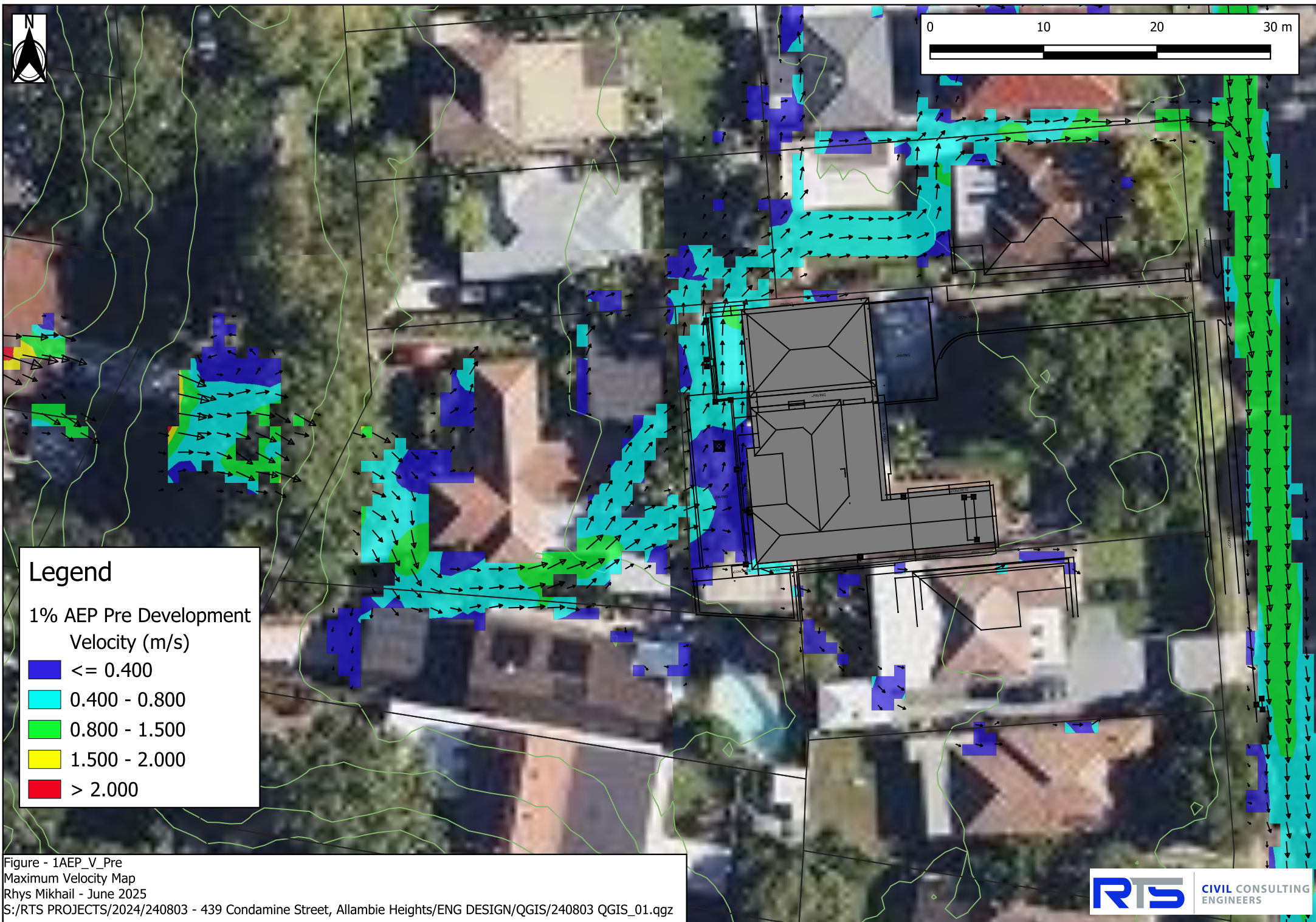


Figure B2 – Combined Flood Hazard Curves

Note: This information is taken from Figure 6.7.9 from Australian Rainfall & Runoff 2019 (Smith et al., 2014)

APPENDIX C – TUFLOW MODEL FLOOD MAPPING PLANS








Legend

1% AEP Pre Development

Risk Hazard

 Flood Fringe

 Low Risk

 Medium Risk

 High Risk

Figure - 1AEP_Risk_Pre
Flood Risk Hazard Map
Rhys Mikhail - June 2025
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Legend

1% AEP Post Development

Risk Hazard





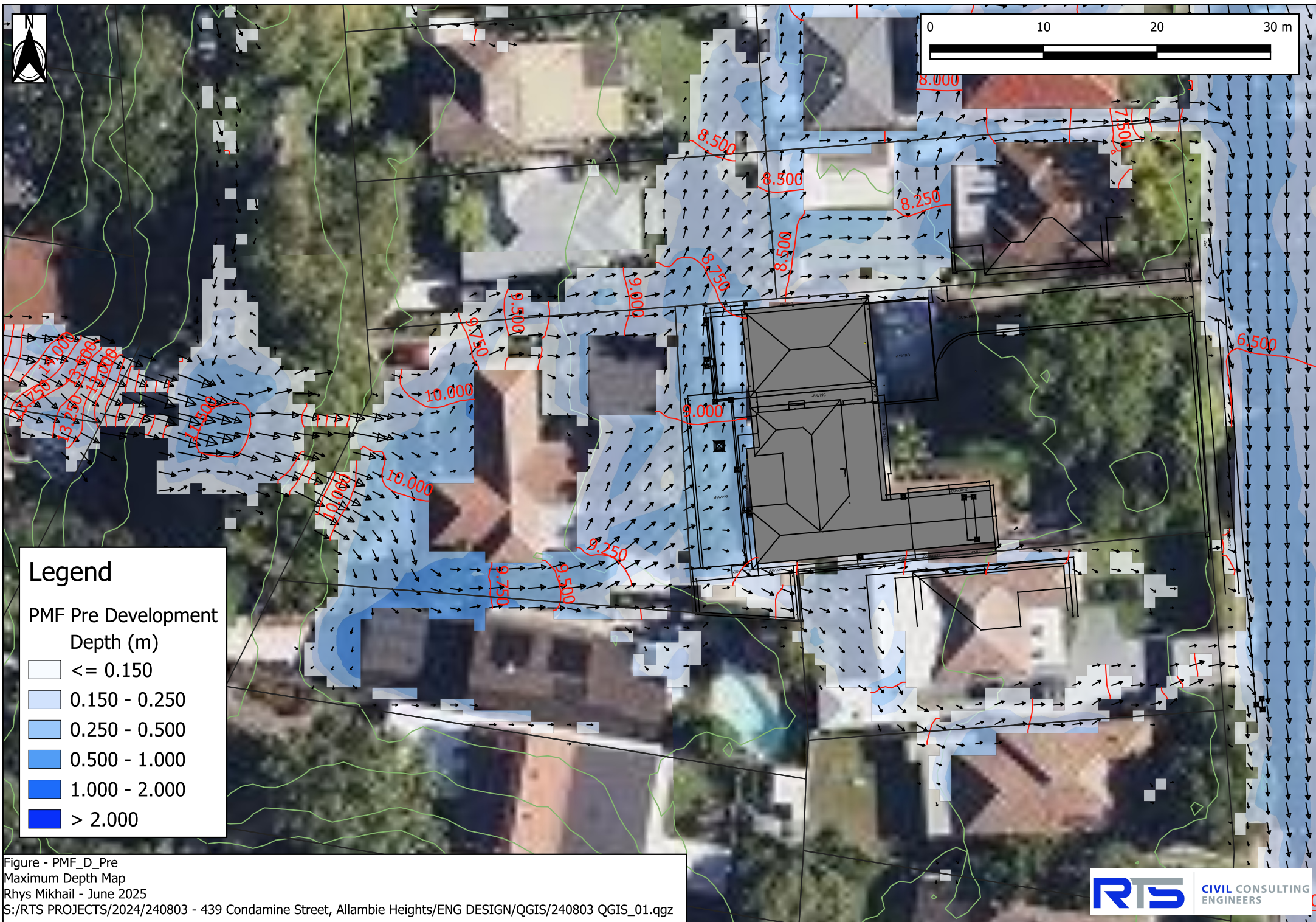
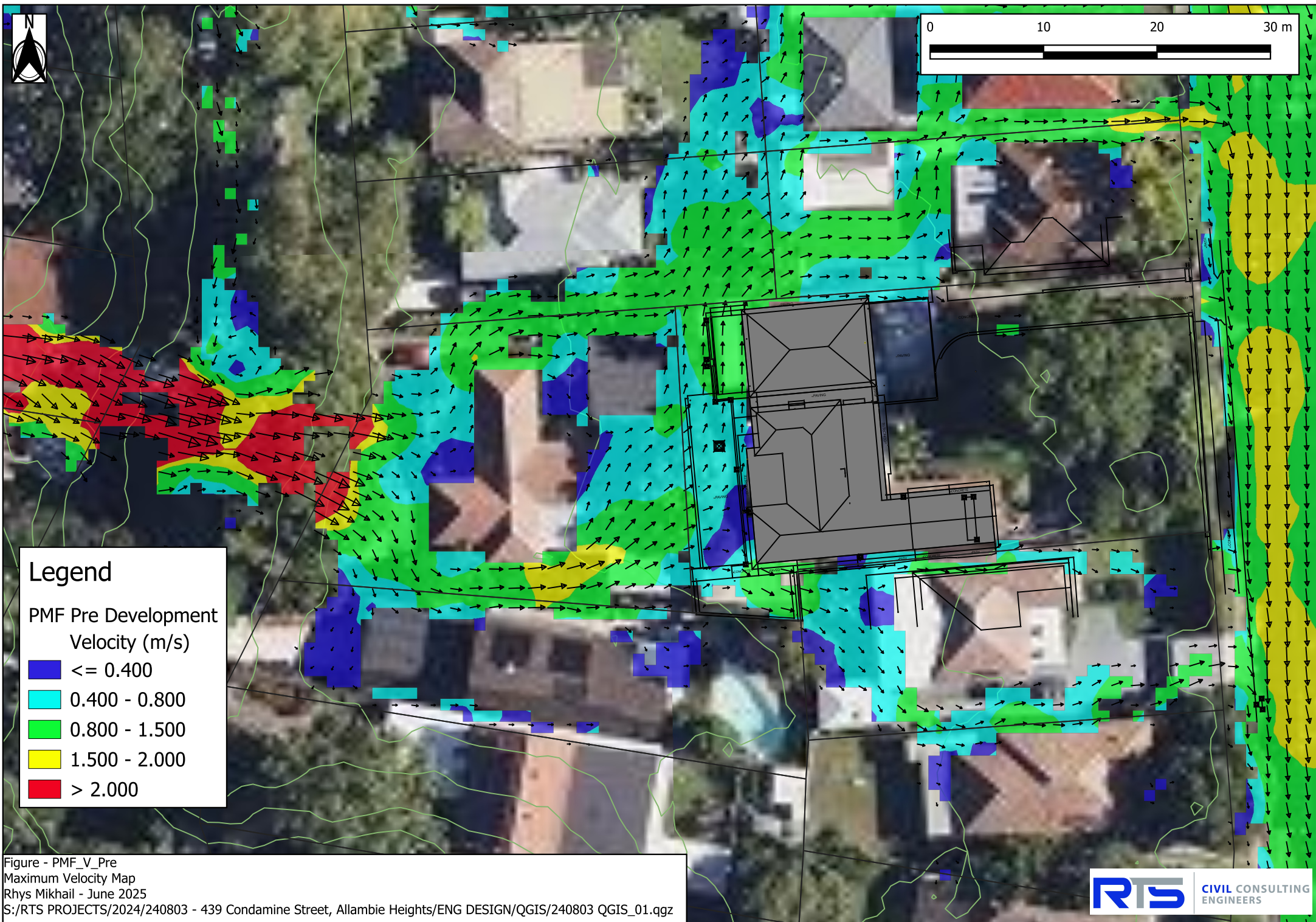
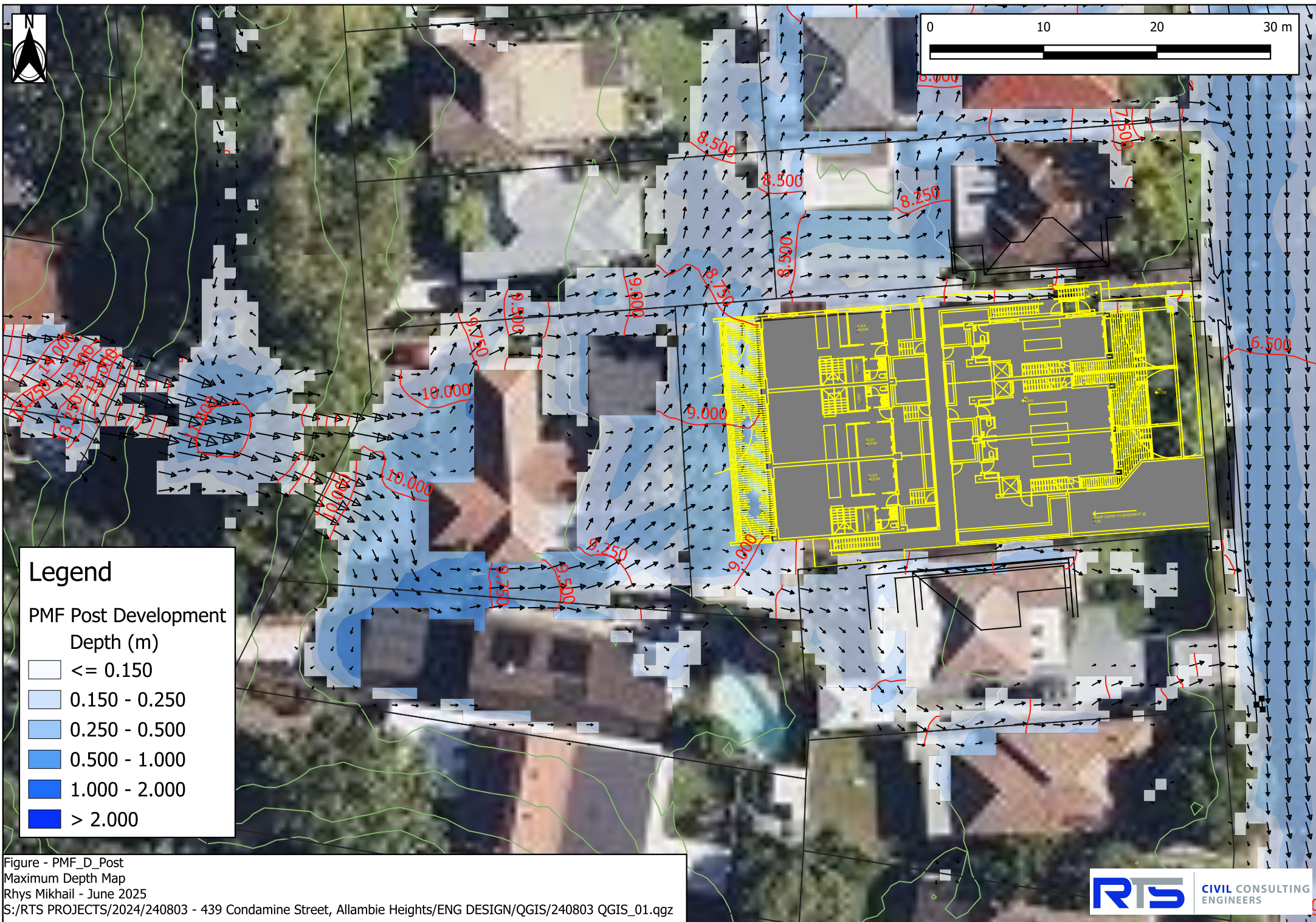
-  Flood Fringe
-  Low Risk
-  Medium Risk
-  High Risk

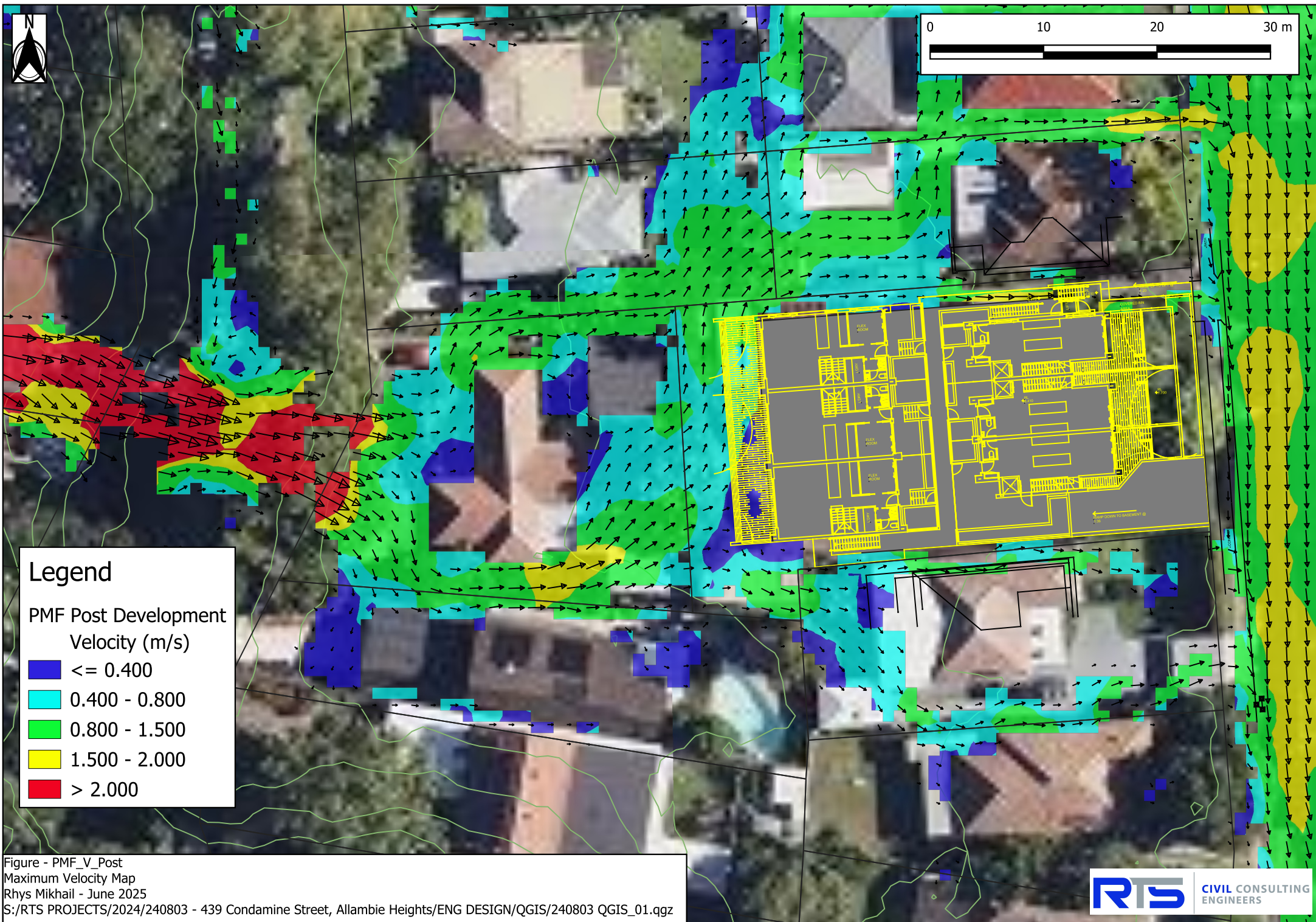
Figure - 1AEP_Risk_Post
Flood Risk Hazard Map
Rhys Mikhail - June 2025
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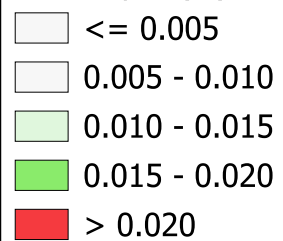






Legend

1% AEP Difference
Depth (m)



Wet/Dry

Cells



Figure - 1AEP_Difference
Level Difference Impact Map
Rhys Mikhail - June 2025
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APPENDIX D – SITE SURVEY AND DEVELOPMENT PLANS

I.S.G.

TRUE NORTH

25

D.P. 1 2 7 6 4

23

STREET

R. 6.41

R. 6.41

R. 6.37

R. 6.42

CONDAMINE

D.P.369828

SITE AREA
1125m²

D.P. 3 6 9 8 2 8

23

NOTES:

- 1) A BOUNDARY IDENTIFICATION HAS BEEN UNDERTAKEN.
- 2) OFFSET DIMENSIONS TO BOUNDARIES HEREON MUST NOT BE USED FOR CONSTRUCTION.
- 3) CAUTION: SHOULD ANY DEVELOPMENT OR CONSTRUCTION BE PLANNED ON OR NEAR THE BOUNDARIES, THE BOUNDARIES SHOULD BE CLEARLY MARKED ON SITE.
- 4) ORIGIN OF LEVELS ON A.H.D. IS TAKEN FROM P.M. 539 RL 6.131 A.H.D.
- 5) TREE SPREADS ARE DIAGRAMMATIC ONLY AND ARE NOT SYMMETRICAL.
- 6) UNDERGROUND (NON VISIBLE) SERVICE LINES HAVE BEEN SHOWN FROM "BEFORE YOU DIG AUSTRALIA" SERVICE AUTHORITY RECORDS & ARE DIAGRAMMATIC ONLY IN REGARD TO THEIR POSITION & WIDTH UNLESS STATED OTHERWISE.
- 7) BEARINGS SHOWN ARE ON I.S.G.-(TRUE NORTH).

D.P.587461

INVESTIGATION OF "BEFORE YOU DIG AUSTRALIA" UNDERGROUND SERVICES HAS BEEN MADE. DETECTION OF UNDERGROUND SERVICES IS NOT AN INTEGRAL PART OF THIS SURVEY. ALL RELEVANT AUTHORITIES SHOULD BE NOTIFIED PRIOR TO ANY EXCAVATION ON OR NEAR THE SITE.

DEVELOPERS & EXCAVATORS MAY BE HELD FINANCIALLY RESPONSIBLE BY THE ASSET OWNER SHOULD THEY DAMAGE UNDERGROUND NETWORKS.

CARELESS DIGGING CAN:

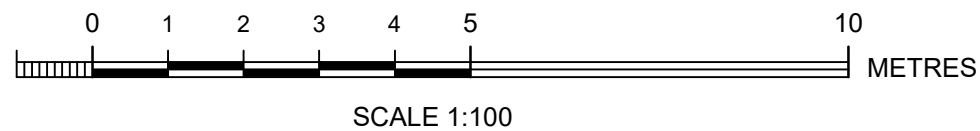
- CAUSE DEATH OR SERIOUS INJURY TO WORKERS AND THE GENERAL PUBLIC
- INCONVENIENCE USERS OF ELECTRICITY, GAS, WATER AND COMMUNICATIONS
- LEAD TO CRIMINAL PROSECUTION AND DAMAGES CLAIMS
- CAUSE EXPENSIVE FINANCIAL LOSSES TO BUSINESS
- CUT OFF EMERGENCY SERVICES
- DELAY PROJECT COMPLETION TIMES WHILE THE DAMAGE IS REPAIRED

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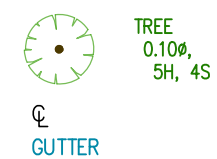
Warren L. Bee
WARREN L. BEE
REGISTERED SURVEYOR N.S.W.
IDENTIFICATION No. SU000448



Bee & Lethbridge
Quality Surveying & Development Solutions

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Email: survey@beeleth.com.au
ABN: 13 003 194 447
www.beeleth.com.au

LEGEND



TREE
0.10m
SH, 4S
DENOTES APPROX. 0.10m DIAMETER OF TREE
DENOTES APPROX. 5m HEIGHT OF TREE
DENOTES APPROX. 4m SPREAD OF TREE

G
DENOTES CENTRE LINE OF ROAD
DENOTES TOP OF GUTTER

UNDERGROUND ELECTRIC LINES
OVERHEAD ELECTRIC LINES
BOARDS SEWER
TELECOMMUNICATION LINES
WATER LINES
GAS LINES

PLAN SHOWING BOUNDARIES, RELATIVE HEIGHTS & PHYSICAL FEATURES OVER LOT A IN D.P. 369828 KNOWN AS No. 439 CONDAMINE STREET, ALLAMBIE HEIGHTS.

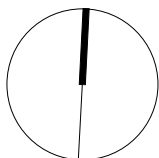
L.G.A.: NORTHERN BEACHES

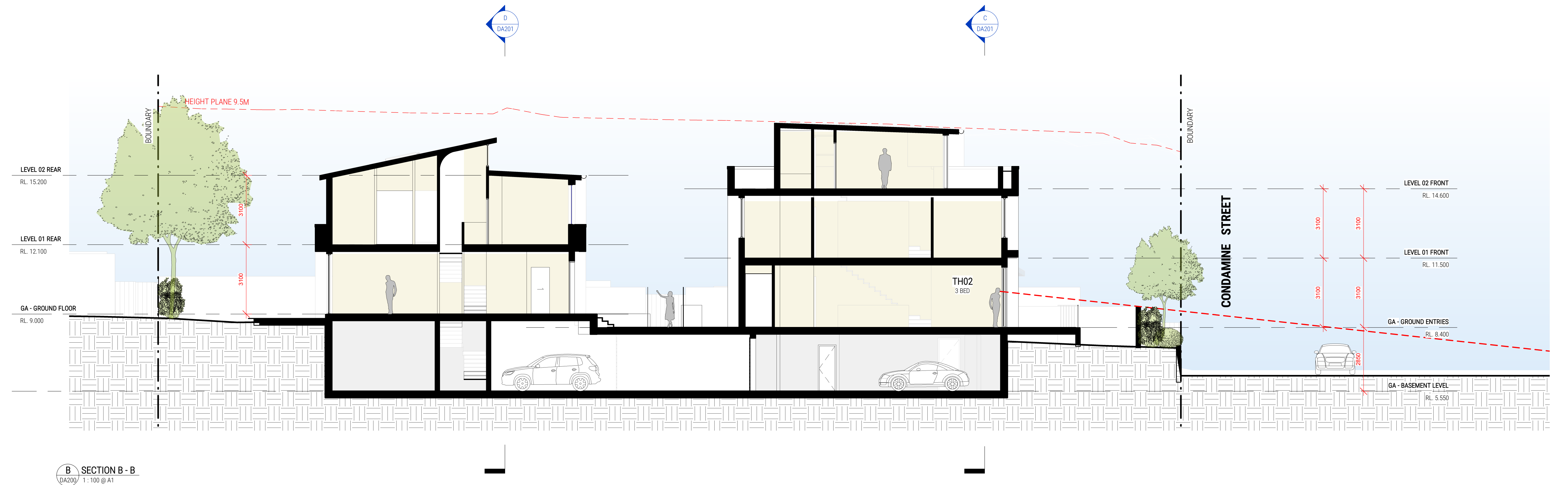
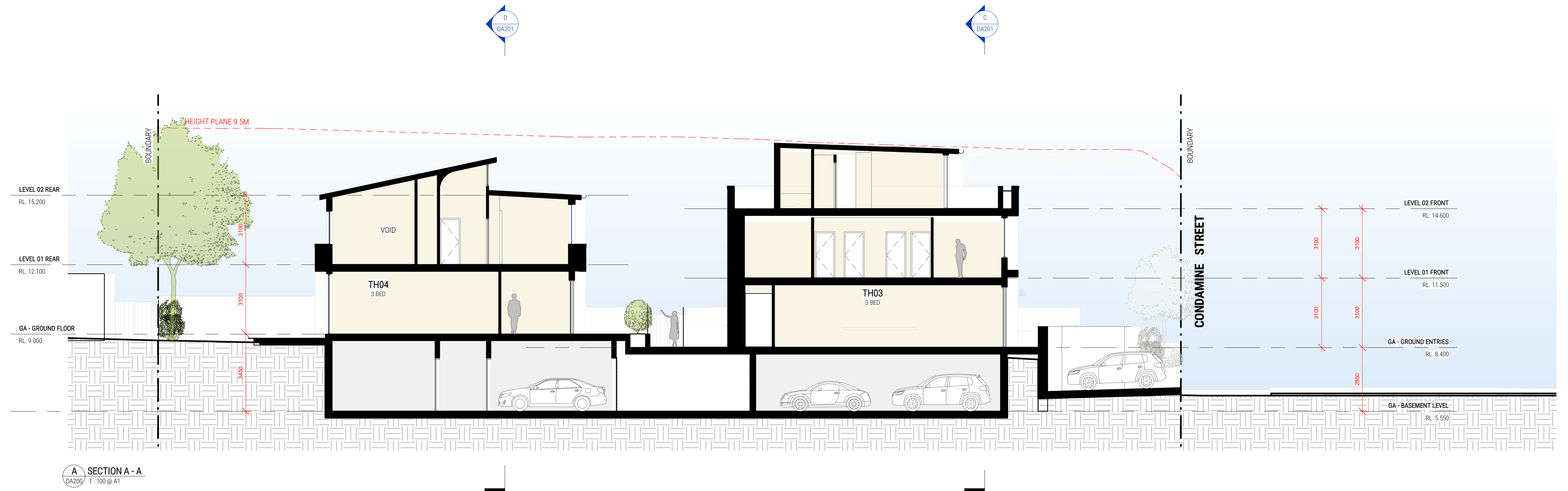
CLIENT	ROHANI INVESTMENTS PTY LTD			REF No.
PROPERTY	No. 439 CONDAMINE STREET, ALLAMBIE HEIGHTS.			23304
DATUM	A.H.D.	SCALE	1:100 @ A1	DATE
SURVEYED	W.B./O.G.	DRAWN	S.C.	28/08/2024
		DWG No.	23304A	SHEET No. 1 of 1
		REV No.	00	



DEVELOPMENT APPLICATION ISSUE

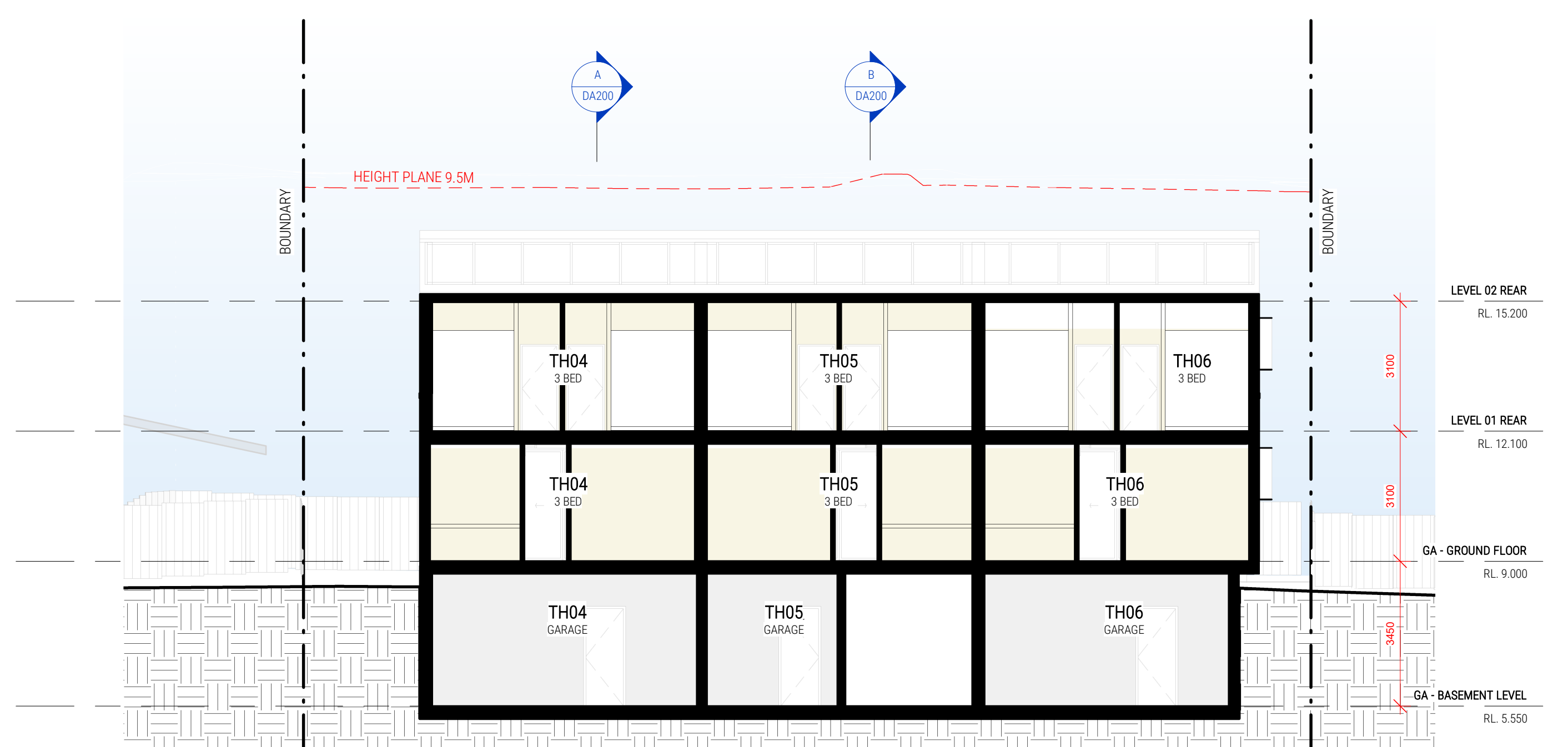
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DA000	COVER PAGE	A
DA010	EXISTING SITE PLAN	A
DA020	SITE ANALYSIS	A
DA030	DEMOLITION PLAN	A
DA040	PROPOSED SITE PLAN	A
DA100	BASEMENT PLAN	A
DA101	GROUND FLOOR PLAN	A
DA102	LEVEL 1 PLAN	A
DA103	LEVEL 2 PLAN	A
DA104	ROOF PLAN	A
DA200	SECTIONS	A
DA201	SECTIONS	A
DA300	ELEVATIONS	A
DA301	ELEVATIONS	A
DA400	AREA CALCULATIONS	A
DA401	LANDSCAPE AREA CALCULATIONS	A
DA500	SHADOW DIAGRAMS - 9AM JUNE 21ST	A
DA501	SHADOW DIAGRAMS - 12PM JUNE 21ST	A
DA502	SHADOW DIAGRAMS - 3PM JUNE 21ST	A
DA600	VIEWS FROM SUN - JUNE 21ST (9AM - 11AM)	A
DA601	VIEWS FROM SUN - JUNE 21ST (12PM - 2PM)	A
DA602	VIEWS FROM SUN - JUNE 21ST (3PM)	A
DA900	EXTERNAL FINISHES	A







C SECTION C - C
DA201/ 1:100 @ A1



D SECTION D - D
DA201/ 1:100 @ A1