

Bulk Earthworks, Rehabilitation and Quarrying

225 – 245 Martin Road, Bradfield, NSW,
2556

SSDA No. 97711727

Flood Impact & Risk Assessment
(FIRA)

Thursday 9th July 2026

Prepared for: Goodman Property Services
(Aust) Pty Ltd

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Acknowledgement of Country

Colliers Engineering & Design (NSW) acknowledges the Darug and Tharawal people as the Traditional Custodians of the lands and waterways upon which this project is located in the Liverpool City Council LGA. We also acknowledge the Wangal people of the Eora national as the traditional custodians of the land upon which our Rhodes Office is located.

We pay our respects to the traditional owners for their care and stewardship of these lands for more than 40,000 years and to all Aboriginal and Torres Strait Islander Peoples and the elders past, present and emerging.

Executive Summary

This Flood Impact & Risk Assessment (FIRA) has been prepared by Colliers Engineering & Design (CED) to address the site-specific Secretary's Environmental Assessment Requirements (SEARs) and associated agency feedback received in respect of the proposed State Significant Development Application (SSDA) No. 97711727.

The proposed development is being undertaken by Goodman Property Services (Aust) Pty Ltd (Applicant) on behalf of Goodman Western Sydney Pty Limited as trustee for the Goodman Western Sydney Trust (Owner). The development is located at 225 – 245 Martin Road, Bradfield, 2556 (the Site).

The report concludes that the proposed preparation and bulk earthworks on the Site is suitable, and meets flood-related DCP, key regulatory agency, and other legislative requirements. As such, the proposed development is deemed sufficient to support the development application from a flooding perspective and warrants approval.

Note this development application does not include any operational components. All proposed warehouse and distribution operation is proposed under SSDA 97688711.

Table of Contents

1	Introduction	6
1.1	<i>Project Overview</i>	6
1.1.1	Project Description	6
1.1.2	Site Context	8
1.2	<i>Objective.....</i>	11
1.3	<i>Guidelines and available data.....</i>	11
1.3.1	Guidelines	11
1.3.2	Data	11
2	Compliance Assessment	13
2.1	<i>Secretary's Environmental Assessment Requirements (SEARs)</i>	13
2.2	<i>Agency Feedback</i>	13
2.2.1	Liverpool City Council	13
2.2.2	Department of Climate Change, Energy, the Environment and Water (DCCEEW).....	14
2.2.3	Western Sydney International Airport (WSIA)	17
2.3	<i>Response to Submission (RTS)</i>	17
2.3.1	Conservation Programs, Heritage and Regulations Group (CPHR).....	17
3	Flood Impact & Risk Assessment (FIRA)	19
3.1	<i>Objectives</i>	19
3.2	<i>Background.....</i>	24
3.2.1	Study Area.....	24
3.2.2	Data Collation and Review.....	24
3.3	<i>Hydrology Assessment</i>	27
3.3.1	Hydrologic Model.....	27
3.3.2	Hydrology Assessment Results and Model Validation	32
3.4	<i>Hydraulic Assessment</i>	34
3.4.1	Approach and Methodology	34
3.4.2	Pre-development Hydraulic Model	34
3.4.3	Developed Hydraulic Model	36
3.4.4	Hydraulic Modelling Results	37
3.4.5	Flood Impact Assessment.....	49
3.4.6	Climate Change Assessment.....	59
3.4.7	Flood Storage Assessment	60

3.4.8	Cumulative Impact Assessment.....	61
3.4.9	Flood Emergency Management Response Strategy	63
3.5	<i>Key Findings and Recommendations</i>	65
4	Conclusion	66
APPENDIX A – XP-RAFTS SUB-CATCHMENT PARAMETERS		67
APPENDIX B – Flood Maps		97

Table of Figures

Figure 1-1	The Site locality (Source: Urbis).....	9
Figure 1-2	Proposed BEW, Rehabilitation and Quarrying General Arrangement Plan (Source: Arcadis).....	10
Figure 3-1	Study Area and Watershed Catchments	24
Figure 3-2	Digital Elevation Model – Existing Conditions	26
Figure 3-3	PMP Calculations.....	29
Figure 3-4	XP-RAFTS Sub-Catchment Delineation	30
Figure 3-5	XP-RAFTS Model – Existing	31
Figure 3-6	XP-RAFTS Model – Developed	32
Figure 3-7	Wianamatta-South Creek 1% AEP Peak Flows at Elizabeth Drive – Pre-Development.....	33
Figure 3-8	Badgerys Creek 1% AEP Peak Flows at Elizabeth Drive - Pre-development.....	33
Figure 3-9	Model Validation Afflux Map	35
Figure 3-10	1% AEP Flood Depths – Pre-Development Scenario	38
Figure 3-11	1% AEP Flood Velocities - Pre-development Scenario	39
Figure 3-12	1% AEP Flood Hazards - Pre-development Scenario.....	40
Figure 3-13	General Flood Hazard Curves (AR&R 2019).....	40
Figure 3-14	1% AEP Flood Hydraulic Category - Pre-development Scenario	41
Figure 3-15	Wianamatta-South Creek Flow Hydrograph at Upstream of Site (36 hour critical storm duration).....	43
Figure 3-16	Badgerys Creek Flow Hydrograph at Upstream of Site (9 hour critical storm duration)	44
Figure 3-17	1% AEP Flood Depths – Developed Scenario	45
Figure 3-18	1% AEP Flood Velocities - Developed Scenario	46
Figure 3-19	1% AEP Flood Hazards - Developed Scenario	47
Figure 3-20	1% AEP Hydraulic Category - Developed Scenario	48
Figure 3-21	1% AEP Developed Afflux Map – Site	50
Figure 3-22	1% AEP Developed Afflux Map – Elizabeth Drive to Confluence of Creeks.....	51
Figure 3-23	10% AEP Developed Afflux Map – Site	52

Figure 3-24 10% AEP Developed Afflux Map – Elizabeth Drive to Confluence of Creeks	53
Figure 3-25 PMF Developed Afflux Map – Site.....	54
Figure 3-26 PMF Developed Afflux Map – Elizabeth Drive to Confluence of Creeks	55
Figure 3-27 Locations of PO Lines – Site.....	56
Figure 3-28 Locations of PO Lines – Elizabeth Drive to Confluence of Creeks.....	56
Figure 3-29 Wianamatta-South Creek Flow Hydrograph Comparison Downstream of Site (36 hour critical storm).....	58
Figure 3-30 Badgerys Creek Flow Hydrograph Comparison Downstream of Site (9 hour critical storm).....	58
Figure 3-31 Confluence of Creeks Flow Hydrograph Comparison Downstream of Site (36 hour critical storm).....	59
Figure 3-32 1% AEP Flood Depths – Developed Climate Change Scenario.....	60
Figure 3-33 Potential Flood Emergency Evacuation Routes	63

Table of Tables

Table 1-1 Site Context	8
Table 2-1 Project Specific SEARs	13
Table 2-2 Liverpool City Council Agency Feedback	13
Table 2-3 DCCEEW Agency Feedback.....	14
Table 2-4 Western Sydney International Airport Requirements	17
Table 2-5 CPHR RTS Comments.....	17
Table 3-1 Compliance Objectives against Flooding & Environmental Resilience Management Performance Outcomes and Benchmark Solutions (Source: Aerotropolis DCP 2022).....	20
Table 3-2 Adopted Design Intensity-Frequency-Duration (IFD) Data	28
Table 3-3 Comparison of Peak 1% AEP Flows at Elizabeth Drive	32
Table 3-4 Mannings 'n' roughness values	36
Table 3-5 Critical Storm Peak Flow Comparison	57
Table 3-6 Climate Change Factors - SSP3-7.0 Year 2090 (Source: AR&R Datahub)	59
Table 3-7 1% AEP Flood Storage Comparison	60
Table 3-8 SSDA's around the site	62

1 Introduction

This Flood Impact & Risk Assessment (FIRA) has been prepared by Colliers Engineering & Design (CED) to address the site-specific Secretary's Environmental Assessment Requirements (SEARs) and relevant Agency feedback received in respect of the proposed State Significant Development Application (SSDA) No. 97711727. The proposed development includes Rehabilitation, Quarrying and Bulk Earthworks and is being undertaken by Goodman Property Services (Aust) Pty Ltd (Applicant) on behalf of Goodman Western Sydney Pty Limited as trustee for the Goodman Western Sydney Trust (Owner). The development is located at 225 – 245 Martin Road, Bradfield, 2556 (the Site).

1.1 Project Overview

1.1.1 Project Description

This SSDA seeks approval for the following;

- Site Preparation works only (i.e no buildings, retaining walls or other infrastructure works)
- Rehabilitation of areas disturbed by historic mining and brick-making operations under major project approval MP10_0014 and MP10_0033.
- Bulk Earthworks to the site to align with the Connecting to Country and Precinct Plan principles including both the disturbed and undisturbed portions to capture the following proposed works:
 - Rehabilitation of Pits 1 & 2 using predominantly on-site fill (Engineered fill import required).
 - Preparation of the remaining site area to Bulk Earthwork Levels (BEL) (not including detailed trimming) for the proposed industrial development as considered under SSDA 97688711.
- Quarrying and Export of Bringelly Shale and Clay from select areas of Pit 1 & 2 to rectify the previous approved pit designs to ensure they are geotechnically stable to suit the proposed industrial masterplan.
- Vegetation Removal of 6.97Ha over land that is not certified under the Growth Centre SEPP.
 - Species being cleared involve species protected under both the BC Act and EPBC Act.
 - EPBC Act Referral completed on a precautionary measure given small amount of EPBC listed communities.
- Demolition of any remaining structures on the site.
- Rehabilitation of identified and unidentified contamination and, if required, the construction of a containment cell in the proposed northeastern corner of the site (currently identified as Lot 55 of DP 3050). The containment cell is proposed to trigger Designated Development threshold due to the proposed upper limit storage volume of 100,000m³.
- Relocation of the Jemena Gas main predominantly burdening Lot 3 of DP127878
- If required through an Aboriginal Cultural Heritage Assessment Report (ACHAR), relocation and reburial of artefacts.

Additionally, this SSDA application seeks to rely on already existing authority approvals issued under MP10_0014 (subject to any applicable modifications). These are as follows:

- Mining Lease 1771
- Environmental Protection Licence 684
- Ground Water Access Licence WAL24346
- Ground Water Supply Works Approval No. 10WA109463

It is important to note that a number of the proposed activities being sought for approval under this SSDA have previously been assessed and approved under MP10_0014. The existing DA relates to approximately 70Ha of Net Developable Area (NDA), with the new portion of site approx. 36ha NDA. Cumulatively the area is approx. 116ha NDA.

This is outlined further in Engeny Surface Water Impact Assessment report BNTL02053_0001_REP-001-0-SWIA.

Related Applications/Activities

SSDA 97688711 – 14 warehouse buildings, Active Open Space & amenities precinct (including a café) and internal site infrastructure works

The SSDA seeks approval for the construction, fit-out (including office and standard warehouse racking) and operation of 14 warehouse buildings, Active Open Space & amenities precinct (including a café) and internal site infrastructure works.

This application assumes the bulk earthworks are completed under SSDA 97711727.

Part 5 Activity – External Works Lead in Roads and Services

The Applicant is proposing access to the Site via the following route which will be upgraded to be in accordance with the Precinct Plan

Part 1 Martin Road / Elizabeth Drive intersection upgrades

- It is expected that these works will be approved by way of amendment to the existing Part 5 approval by Transport for New South Wales ('TfNSW')
- It is understood that Transport for NSW will construct the work with a target completion date of December 2029;

Part 2 - 4 Martin Road / East West Collector Road / Lawson Road Upgrades

- Further to Part 1, access to the site is proposed to be constructed concurrently as follows:
 - Part 2 – Access from the Martin Road / Elizabeth Drive intersection will continue down Martin Road and join the future East / West Collector road identified within the Precinct Plan through Lot 36 DP 3050.
 - The portion of road between the Intersection and future East / West Collector road will be upgraded with a temporary access strategy that is consistent with Condition DS5 of the Precinct Plan.
 - Part 3 – The East / West Collector road through Lot 36 DP 3050 is proposed to be delivered in ultimate form consistent with the Precinct Plan., connecting Martin Road and Lawson Road;
 - Part 4 – From the East / West Collector Road connection on Lawson Road, the portion of Lawson Road South through to the Site will be upgraded in ultimate form consistent with the Precinct Plan.
- It is expected that these works are completed by December 2029, based on a commencement date of June 2028

It is the Applicants expectation that the above-mentioned works (Part 1-4) are completed prior to the receipt of the first building Occupation Certificate (expected December 2029).

Notwithstanding the above, the Applicant notes that access to the site under SSD 97711727 will continue to be via Martin Road based on the intersection upgrades completed under MP10_0014.

1.1.2 Site Context

The Site is identified as 225-245 Martin Road Bradfield. The key features of the Site are as follows in Table 1-1:

Table 1-1 Site Context

Description	Site Detail
Land Configuration	Lot 1 DP 1278780 Lot 2 DP 1278780 Lot 3 DP 1278780 Lot 55 DP 3050 Lot 56 DP 3050
Existing land use(s)	The Site is currently an operational Quarry and historically had a Brickmaking Facility. The structures and hardstand areas used for the quarry operations are located in the central portion of the Site, connected by an internal road network. In addition, three pits are located along the southern and southeast portion of the Site.
Surrounding Land Use	Surrounding land uses include: North: Land to the north is predominantly characterised by a mix of rural, agricultural, landscape industries and, residential properties accessed by Lawson and Martin Roads. It is noted that several sites are subject to existing SSDAs for industrial / warehouse developments. Both Martin and Lawson Roads intersect with Elizabeth Drive, a major Arterial Road that provides access to the WSI site and the broader regional road network including the M7, Northern Road and the future M12. South: The land to the south is currently rural however is subject to the IPG Master Plan which was approved on 11 July 2025. The approved Master Plan covers 184 hectares and aims to support over 12,400 jobs. Inghams Property Group has allocated around 625,467 sqm for employment space, focusing on advanced manufacturing, logistics, and community services. The plan includes a mix of industrial and commercial zones, a local centre, and accessible public green spaces near the Western Sydney International Airport. Further to the south-west of the Site, is Bradfield City Centre, a 114-hectare planned urban development adjacent to Western Sydney International Airport. Designed to be a hub for innovation, advanced industries, and economic growth, it has the potential to create 20,000 jobs and provide 10,000 homes, including affordable housing. The Bradfield City Master Plan prioritises sustainability, integrating green spaces, climate-resilient infrastructure, and a commitment to achieving net-zero emissions. East: Further east of the Wianamatta-South Creek which bounds the site, is the suburb of Kemps Creek. This land is characterised by a mix of open space, rural, agricultural, emerging urban development, and residential properties that are non-initial precincts under the WSAP but intended for employment generating uses

West: To the immediate west of the Site, bound by Badgerys Creek, is Western Sydney International Airport (WSI). Located in Badgerys Creek, WSI is a major federal infrastructure project designed to accommodate Sydney's future aviation needs. Set to commence operations in 2026, WSI will initially handle 10 million passengers annually and operate 24/7. Badgerys Creek Road also travels in a north-south direction to the west of the site. It provides a north-south connection between Elizabeth Drive and the Northern Road.

Site Access and road network

The Site is currently accessible from Martin Road which is located at the north-eastern boundary.

The Site aerial imagery is illustrated in Figure 1-1 below.



Figure 1-1 The Site locality (Source: Urbis)

The general arrangement plan for the bulk earthworks, rehabilitation and quarrying works is shown in Figure 1-2.

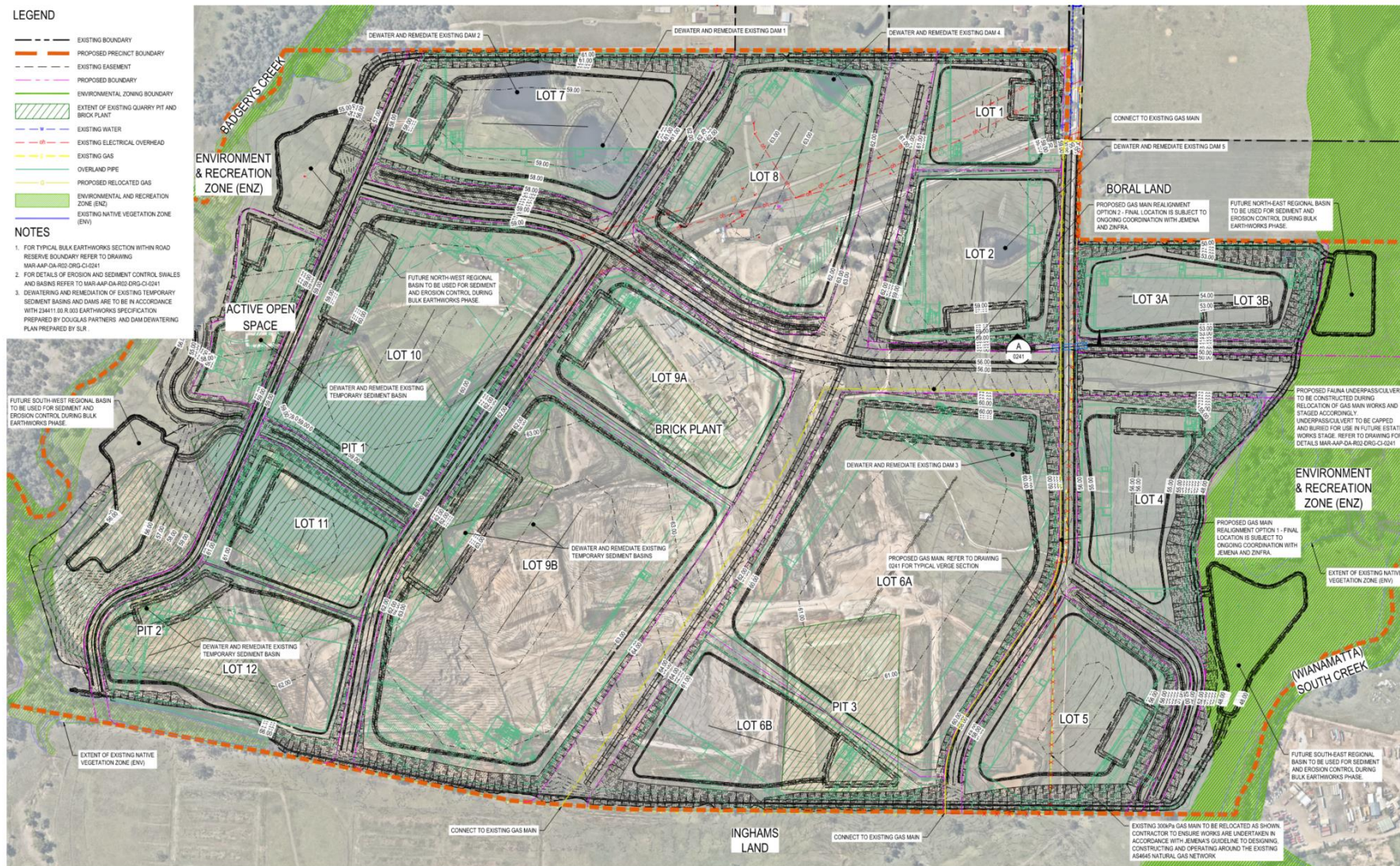


Figure 1-2 Proposed BEW, Rehabilitation and Quarrying General Arrangement Plan (Source: Arcadis)

1.2 Objective

The purpose of this report is to:

- Review existing Council data, guidelines, planning requirements, SEARs, and agency feedback;
- Prepare a hydrologic model to identify the critical storm event at the subject site;
- Prepare a base case assessment that incorporates development in the Aerotropolis that is approved, under construction or constructed;
- Prepare a hydraulic model for the 4EY, 10%, 5%, 1% and 0.2% AEP, 1% with climate change and Probable Maximum Flood (PMF) critical storm events to gain an understanding of the existing conditions flow regime;
- Build in the proposed development conditions and run the hydraulic model for the same storm events to identify flood behaviour for the proposed development;
- Prepare a Flood Impact and Risk Assessment Report in support of the proposed development that includes an outline of approach and methodology, key assumptions, results and recommendations.

1.3 Guidelines and available data

1.3.1 Guidelines

The following Guidelines were reviewed as background information to this project:

1. Australian Rainfall and Runoff, Commonwealth of Australia (2019)
2. Draft NSW MUSIC Modelling Guideline, NSW Government (2010)
3. Flood Risk Management Manual, Department of Planning and Environment (2023)
4. Handbook for Drainage Design Criteria, Liverpool City Council (2003)
5. Liverpool City Council WSUD Technical Guidelines, Liverpool City Council (2016)
6. Liverpool Development Control Plan (DCP), Liverpool City Council (2008)
7. Liverpool Local Environmental Plan (LEP), Liverpool City Council (2008)
8. MUSIC Modelling Toolkit for Wianamatta-South Creek (2022), Department of Planning and Environment
9. NSW Flood Prone Land Policy, Department of Planning and Environment (2021)
10. On-site Stormwater Detention Policy, Liverpool City Council (2004)
11. On-site Stormwater Detention Standard, Liverpool City Council (2021)
12. Stormwater Scheme Infrastructure Design Guideline DRAFT Western Sydney (2024), Sydney Water
13. Technical guidance for achieving Wianamatta-South Creek stormwater management targets (2022)
14. Western Sydney Aerotropolis Development Control Plan – Phase 2, Department of Planning, Housing and Infrastructure (2022)
15. Aerotropolis Integrated Stormwater Schemes (Wianamatta Badgerys & Cosgroves) (2026)

1.3.2 Data

The following data was reviewed and utilised for flooding and stormwater assessments:

1. The BEW, Rehabilitation and Quarrying SSDA drawings (MAR-AAP-DA-R02-DRG-CI-0001 to 0241) prepared by Arcadis dated 24/06/2026
2. NSW Government Spatial Services Topographic and Cadastral Data that included for example road and rail centrelines, cadastral lot boundaries, suburb and LGA boundaries etc.
3. Concept design contours and digital elevation model (DEM) provided by Arcadis dated 05/03/2026.
4. LiDAR DEM data obtained from ELVIS dated July 2019.
5. Detailed site survey by LTS Surveyors dated 06/03/2026
6. A request for the 2022 Advisian flood study model was submitted to Infrastructure NSW, but no model was provided. As such, the Liverpool Overland Flow Path Study for Rural Catchment Area St2 (2021) was obtained from Liverpool City Council for the flood assessment of the site

-
7. Publicly available reports and drawings from approved developments within the Aerotropolis were sourced to inform the existing conditions scenario. This includes the adjacent IPG site, the Aldi Automated Distribution Centre, the Elizabeth Enterprise Precinct Stage 1, the Western Sydney International Airport (WSIA), and the M12.

2 Compliance Assessment

2.1 Secretary's Environmental Assessment Requirements (SEARs)

This report responds to the NSW Planning Secretary's Environmental Assessment Requirements (SEARs) issued by the NSW Department of Planning, Housing and Infrastructure on 24 November 2025. Table **2-1** below summarises all key water and flood risk items raised in the SEARs and how they have been addressed in this report.

Table 2-1 Project Specific SEARs

Requirement	Comments
Flooding – including a flood impact and risk assessment (FIRA), that considers the relevant provisions of the NSW Flood Risk Management Manual and associated guides.	Refer to FIRA in Section 3

2.2 Agency Feedback

2.2.1 Liverpool City Council

Table 2-2 Liverpool City Council Agency Feedback

Item	Comment
2. Flooding The site is traversed by overland flow paths and is affected by mainstream flooding from Wianamatta South Creek to the east and Badgerys Creek to the west.	Noted
External stormwater runoff from upstream catchments running through the site must not be obstructed and is to be appropriately conveyed and managed within the site.	No external stormwater runoff from upstream catchments running through the Site will be obstructed
The proposal should include details of stormwater strategy, including drainage design plans for the proposed work.	Refer to Engeny Surface Water Impact Assessment report BNTL02053_0001_REP-001-0-SWIA
A detailed flood impact assessment must be undertaken using 2D hydraulic modelling for both pre- and post-development conditions. The assessment must demonstrate that the proposed work will not result adverse flooding impacts on adjoining upstream and downstream properties for a range of storm events up to and including the 1% AEP event.	Refer to FIRA in Section 3
Post-development stormwater discharges from the site must not exceed pre-development discharge rates at site boundaries for storm events up to the	Results of the flood impact assessment in Section 3.4.5.2 show that post-development discharge from the site does not exceed pre-development levels.

1% AEP event. On site detention system will require to be incorporated into the proposed work to control post-development flows. Flood modelling that incorporates the detention system and site drainage facility must be provided to confirm compliance with this requirement. Relevant flood mapping for pre-and post-development conditions also be included.	
ENZ corridors within the site must be preserved and excluded from the proposed work.	Noted. Addressed by others
Detailed cut and fill plans must be provided, ensuring consistency with the site's intended future land use.	Noted. Addressed by others
Soil erosion and sediment control measures, including sedimentation basins, must be implemented in accordance with Managing Urban Stormwater: Soils and Construction (The Blue Book). These measures should ensure effective collection and treatment of sediment and pollutants during and after construction, prior to discharge into downstream receiving waters.	Erosion and sediment control measures including the provision of sediment basins have been implemented and have been shown to achieve the construction phase stormwater management objectives contained in Technical guidance for achieving Wianamatta-South Creek stormwater management Targets (NSW DPE, 2022). Refer to Engeny Surface Water Impact Assessment report BNTL02053_0001_REP-001-0-SWIA for further details
Future subdivision proposals for the site must include detailed stormwater plans and a comprehensive stormwater management report addressing both quantity and quality controls. The report is to be supported by hydrologic and hydraulic modelling, as well as MUSIC modelling for water quality treatment facilities.	Noted. To be considered in any future subdivision.

2.2.2 Department of Climate Change, Energy, the Environment and Water (DCCEEW)

Table 2-3 DCCEEW Agency Feedback

Item	Comment
Flood Risk Management 11. The EIS must include a flood impact and risk assessment (FIRA) prepared in accordance with the Flood Risk Management Guideline LU01 Flood impact and risk assessment. The FIRA is to be prepared by suitably qualified engineers with experience in flood risk management in NSW. As a minimum the FIRA must:	Refer to FIRA in Section 3

Address the relevant provisions of the NSW Flood Risk Management Manual (2023) and toolkit, and include existing flood mapping, existing council and government studies, information and requirements including the Wianamatta South Creek Flood Study - Existing Conditions (Advisian, 2022); the provisions of the Western Sydney Aerotropolis Development Control Plan 2022 and the State Environmental Planning Policy (Precincts – Western Parkland City) 2021.	Refer to FIRA in Section 3
Identify and describe existing (base case scenario) flood behaviour, constraints and risk on the site and its surrounding areas for the full range of events, including 10% Annual Exceedance Probability (AEP), 5% AEP, 1% AEP, 0.5% AEP or 0.2% AEP and probable maximum flood (PMF).	Refer to Section 3.4.4.1
The hydrological and hydraulic models developed by the consultant must be compatible with the Wianamatta South Creek Catchment Flood Study - Existing Conditions (Advisian, 2022). The consultant should verify their models against this study for the full range of flooding, and consider the following:	The hydrological model has been developed based on the Advisian Flood Study (2022) and verified in Section 3.3.2 . The hydraulic model has been developed using the Liverpool Overland Flow Path Study for Rural Catchment Area St2 (2021) obtained from Liverpool City Council with inflows from the hydrological model. The model was then calibrated to the Advisian Flood Study (2022) results as noted in Section 3.4.2.1 .
- the study area should be extended to the confluence of South Creek with Badgerys Creek downstream of Elizabeth Drive.	The study area extends to the confluence of South Creek and Badgerys Creek downstream of Elizabeth Drive. Refer to Section 3.2.1 for the study area.
- to account for the impacts of the development exclusively, the existing condition model should include approved development within the Badgerys Creek Precinct of the Western Sydney Aerotropolis	The approved, under construction and completed developments have been considered in the TUFLOW hydraulic model pre-development scenario through 2d_zsh terrain modifications and hydrologic catchment parameter adjustments in the XP-RAFTS model. The modifications made for each development was based on publicly available reports and drawings. Refer to Sections 3.2.2.1 , 3.3.1.5 , and 3.3.1.6 .
Identify and describe post development scenario(s) for flood behaviour, constraints and risk on the site and its surrounding areas. Details of the development components must be included in the verified models, including Sydney Water stormwater and drainage infrastructure in accordance with the Sydney Water	Refer to Section 3.4.4.2

Draft Stormwater Scheme. The developed scenario should also include the Bulk Earthworks development (SSD-97711727) as these works would prepare the site for this Internal Works application (SSD-97688711) and identify post-development flood characteristics for the full range of abovementioned events.	
Identify and describe the flood constraints on the land (floodways, flood storage, flood hazard and emergency response issues) for the full range of abovementioned events, for both regional flooding and local flooding	Refer to Section 3.4.4 flood behaviour and constraints, Section 3.4.7 for flood storage, and Section 3.4.9 for emergency response strategies.
Assess the appropriateness of the development or development types for the location based on the flood constraints on the land.	The development is set to be generally above and outside the 1% AEP and PMF levels
Identify the impacts of the development on flood behaviour and risk for the full range of abovementioned flood events.	Refer to Section 3.4.5
Identify and assess the adequacy of management measures and controls to: - effectively address flood constraints to ensure the flood risks to the proposed development and its users are acceptable	Refer to Section 3.4.5
- manage flood and associated emergency management impacts due to the development on existing communities and individual property owners and occupiers.	Refer to Section 3.4.5
Address potential cumulative impacts in the catchment.	Refer to Section 3.4.8
consider climate change impacts in accordance with the Australian Rainfall and Runoff version 4.2.	Refer to Section 3.4.6
Note: Flood modelling is to be undertaken by a suitably qualified engineer consistent with Council's requirements and Australian Rainfall and Runoff. Flood behaviour includes flood volume, extent, depth, level, velocity, duration, rate of rise, flood function and hazard. Flood risk is a function of flood behaviour, exposure and vulnerability for each element at risk. Impacts of flooding include changes to flood behaviour and risks to the community	Noted

including emergency management response for the community.

2.2.3 Western Sydney International Airport (WSIA)

Table 2-4 *Western Sydney International Airport Requirements*

Item	Comment
Consideration of any impacts to the WSI owned land adjoining the site, including in relation to stormwater runoff / flooding, water quality, odour, air quality, and noise. This is to include an assessment for both during construction and operation to ensure there are no adverse impacts to WSI operations.	Refer to Section 3.4.5

2.3 Response to Submission (RTS)

This report has been updated to Revision C to address the flooding related comments received during the RTS. Table **2-5** below summarises all flood risk items raised in the RTS and how they have been addressed in this report.

2.3.1 Conservation Programs, Heritage and Regulations Group (CPHR)

Table 2-5 *CPHR RTS Comments*

Item	Comment
Verification of FIRA Models for existing scenario The Flood Impact and Risk Assessment (FIRA) report should provide a section to show compatibility with the Wianamatta South Creek Flood Study – Existing Conditions (Advisian, 2022). The FIRA modelling must maintain the hydraulic function as identified in the Wianamatta South Creek Flood Study – Existing Conditions (Advisian, 2022) as set in the Benchmarks in the Aerotropolis DCP. The FIRA Figure 3-13 show significant inconsistency between the flood function categories identified by the FIRA and the abovementioned Wianamatta South Creek flood study. <u>Recommended action:</u> - Verify the existing case scenario with the Wianamatta South Creek Flood Study – Existing Conditions (Advisian, 2022). - Provide amended maps for flood function that are consistent with the Wianamatta South Creek Flood Study – Existing Conditions (Advisian, 2022).	The flood model has been shown to be compatible and validated against the Wianamatta South Creek Flood Study – Existing Conditions (Advisian, 2022). Refer to Sections 3.3.2 and 3.4.2.1. Amended flood function maps have been provided in the updated FIRA report (Rev D). The flood storage and flood fringe extents have been mapped based on the parameters noted in the Advisian (2022) flood study. The floodway has been adopted from the results of the Advisian (2022) flood study to be consistent.

Base case scenario

A base case scenario that incorporates the development in the Aerotropolis that is constructed, under-construction and development that is already approved, including but not limited to the upstream adjacent to the Ingham Property Group (IPG) Badgerys Creek Masterplan site at 475 Badgerys Creek Road should be provided.

The FIRA must clearly provide information on the development and infrastructure included in the Aerotropolis for this base case scenario, and this scenario should be used for the assessment of the development impact.

Recommended action:

Amend the verified existing condition to provide a base case scenario including the Aerotropolis development that is constructed, under-construction and development that is already approved.

The base case scenario has been updated to incorporate approved developments in the Aerotropolis. This includes the adjacent IPG site, the Aldi Automated Distribution Centre, the Elizabeth Enterprise Precinct Stage 1, the Western Sydney International Airport, and the M12. Details have been provided in Sections **3.2.2.1**, **3.3.1.5**, and **3.4.8**.

Developed case scenario and points of comparisons

The developed case scenario should be modelled by incorporating the proposed works as identified in section 1.1 of the FIRA to the base case scenario.

Modelling should report at the critical point downstream of the junction of Badgerys Creek and Wianamatta-South Creek. This is a critical point identified by DPHI's Wianamatta-South Creek Cumulative Impact Assessment Policy.

Recommended action:

- Incorporate the proposed works components as identified in section 1.1 of the FIRA to the base case scenario to represent the developed case scenario.
- Address the impacts of the development on flooding.
- Peak flow hydrographs should be provided for both the base case scenario and developed scenario downstream of the confluence of Badgerys Creek and South Creek for the longer durations to ensure flow from Badgerys Creek at the confluence does not coincide with South Creek flooding.

The developed case scenario has already been modelled with the bulk earthworks/rehabilitation as part of this SSDA. Other works related to the internal warehouses have been addressed in a separate report for the internal works under a separate SSDA.

The model extent has been extended to the confluence of Badgerys Creek and Wianamatta-South Creek. The FIRA in Section **3** has been updated to report at the critical point downstream of the junction of Badgerys creek and Wianamatta-South Creek

3 Flood Impact & Risk Assessment (FIRA)

3.1 Objectives

The Western Sydney Aerotropolis Development Control Plan (DCP) 2022 outlines objectives and performance outcomes that proposed developments are required to achieve. The proposed site has been designed in accordance with the Flooding and Environmental Resilience Management objectives and performance outcomes highlighted as per below in Table **3-1**.

- O1. Ensure development in the floodplain is consistent with the NSW Flood Prone Land Policy and the principles of the NSW Floodplain Development Manual.
- O2. Embed Aboriginal cultural knowledge and caring for Country practices to minimise the impact of development on flood behaviour and function of the floodplain and avoid adverse impacts to the existing flora, fauna and community.
- O3. Minimise the flood risk to life and property, including to uses downstream, associated with the use of land considering the full range of flooding.
- O4. Enable key community services and infrastructure that respond to flood threats to function during flooding.
- O5. Allow development on land that is compatible with the flood function and behaviour on the land, taking into account projected changes as a result of climate change.
- O6. Consider areas within the floodplain for amenity and recreation use where compatible with flood function and flood risk.
- O7. Development is not intensified in a floodway or flood storage area.
- O8. Avoid adverse or cumulative impacts on flood behaviour and the environment.
- O9. Enable the safe occupation and efficient evacuation of people in the event of a flood.

Table 3-1 Compliance Objectives against Flooding & Environmental Resilience Management Performance Outcomes and Benchmark Solutions (Source: Aerotropolis DCP 2022)

Performance Outcome		1% AEP Floodway and Critical flood Storage Areas (defined in Appendix A) Unsuitable for urban land uses	Between 1% AEP Floodway / Critical Flood Storage and Flood Planning Area (defined in Appendix A) Unsuitable for Critical and Sensitive Land Uses	Outside Flood Planning Area to Probable Maximum Flood (defined in Appendix A) Unsuitable for Critical Land Uses
PO1	Conveyance and storage of floodwaters through the floodplain is managed. The siting and layout of development considers flood constraints, including risks to personal safety during the full range of floods. The site layout and built form of the development is compatible with flood constraints and potential risk.	1. Except for concessional development, development is not permissible in this area – refer to clause 4.24 of the Parkland City SEPP. 2. For concessional development, the applicant is to demonstrate that the structure can be undertaken in accordance with a Flood Impact and Risk Assessment (FIRA). 3. The FIRA is undertaken by a suitably qualified professional engineer and considers the impacts of: a. Flooding on the development; b. The development on flooding; c. Flooding and the development on property and the existing and future community; and d. Climate change consistent with the objectives of this DCP. 4. The FIRA has considered the impacts on flooding due to encroachment of structures and the associated collection of debris and potential for blockage. 5. The FIRA assesses flood constraints for both pre and post development cases to ensure there are no significant detrimental impacts on flood behaviour or the	1. Applicant to demonstrate that development as a consequence of a subdivision or development proposal, can be undertaken in accordance with a FIRA. 2. The FIRA is undertaken by a suitably qualified professional engineer and considers the impacts of: a. Flooding on the development; b. The development on flooding; c. Flooding and the development on property and the existing and future community; and d. Climate change consistent with the objectives of this DCP. 3. The FIRA assesses flood constraints for both pre and post development cases with and without climate change to ensure there are no significant detrimental impacts on flood behaviour or to the community upstream, downstream, or adjacent to the site. 4. The FIRA considers: a. Car parks; b. The type of car park; c. For open car parks, the restraints used to secure and	1. Applicant to demonstrate that development as a consequence of a subdivision or development proposal, can be undertaken in accordance with a FIRA. 2. The FIRA is undertaken by a suitably qualified professional engineer and considers the impacts of: a. Flooding on the development; b. The development on flooding; c. Flooding and the development on property and the existing and future community; and d. Climate change consistent with the objectives of this DCP. 3. The FIRA assesses flood constraints for both pre and post development cases with and without climate change to ensure there are no detrimental impacts on flood behaviour or to the community upstream, downstream, or adjacent to the site. 4. Critical and sensitive land uses are to have floor levels equal to or greater than the PMF level, where intended to be utilised during flooding.

		community within and outside the development site.	prevent floating vehicles from leaving the car park; and d. For enclosed carparks, how floodwaters will be stopped from entering the enclosed car park. 5. For all zones, any development that includes a residential component has Habitable Floor Levels equal to or greater than the 1% AEP flood level plus 500mm freeboard. 6. Building Floor Levels are equal to or greater than the 1% AEP flood level plus 500mm freeboard in the following areas: a. Enterprise Zone; b. Agribusiness Zone; and c. Mixed Use Zone.	
PO2	Development has minimal impact on flood behaviour.	1. In addition to concessional development, the only structures to be considered in this area are for the purposes of creek crossings (pedestrian bridges and road bridges). 2. The FIRA demonstrates that the structure will not increase flood affectation to existing and proposed development within and outside the development site. 3. The FIRA considers the cumulative impact of potential future development from the upstream hydraulic control to the downstream hydraulic control. 4. The FIRA demonstrates that the peak flow at the downstream hydraulic control is maintained with development and that the shape of the flood hydrograph is generally maintained for events up to and including the 1% AEP flood event.	1. The FIRA demonstrates that development will not increase flood affectation to existing and proposed development within and outside the development site. 2. The FIRA demonstrates the cumulative impact of potential future development from the upstream hydraulic control to the downstream hydraulic control. 3. The FIRA demonstrates that the peak flow at the downstream hydraulic control is maintained with development and that the shape of the flood hydrograph is generally maintained for events up to and including the 1% AEP flood event.	1. The FIRA demonstrates that development will not increase flood affectation to existing and proposed development within and outside the development site. 2. Except for single detached dwellings and alterations and additions to existing dwellings, an engineer's report is required to certify that the development will not increase flood affectation to existing and proposed development.

P03	Structures are designed and constructed so that they remain structurally sound for the life of the development considering flood and debris forces.	1. In addition to concessional development, the only structures to be considered in this area are for the purposes of creek crossings (pedestrian bridges and road bridges). 2. In addition to concessional development, the only structures to be considered in this area are for the purposes of creek crossings (pedestrian bridges and road bridges). 3. All structures are of flood-compatible building components below or at the flood planning level. 4. An engineer's report is submitted to certify that the structure can withstand the forces of floodwater including debris and buoyancy up to and including the flood planning level (based on the 1% AEP flood plus 500mm freeboard).	1. All structures are of flood-compatible building components below or at the flood planning level. 2. An engineer's report is submitted to certify that the structure can withstand the forces of floodwater including debris, immersion, and buoyancy up to and including the flood planning level. 3. The FIRA demonstrates that all new electrical equipment, power points, wiring, fuel lines, sewerage systems or any other service pipes and connections can be waterproofed and/or located above the flood planning level.	1. Critical and sensitive land uses are of flood-compatible building components below or at the PMF level, where intended to be utilised during flooding. 2. An engineer's report is submitted to certify that the structure can withstand the forces of floodwater including debris and buoyancy up to and including the PMF level for sensitive development or essential community facilities intended to be utilised during flooding.
P04	All fill ensures the long-term stability of the development site and is not affected by erosion.	1. The FIRA demonstrates that any fill as a result of the development will not be impacted by erosion and will have long term stability.		
P05	The safety of users of developed areas located on the floodplain for the full range of flooding is ensured.	1. Applicant demonstrates that evacuation of the proposed development can be undertaken in accordance with the Local Flood Plan or SES flood emergency management strategy for the area. 2. The FIRA demonstrates that evacuation can be undertaken consistent with the Local Flood Plan or SES flood emergency strategy for the area.	1. Vehicular and pedestrian access ensures access /egress is provided to above the predicted peak level of the PMF. 2. The FIRA demonstrates that evacuation can be undertaken consistent with the Local Flood Plan or SES flood emergency strategy for the area.	1. Vehicular access to precincts is designed to ensure rising road access/egress is provided to above the predicted peak level of the PMF. 2. FIRA for sensitive and critical development demonstrates that evacuation can be undertaken consistent with the Local Flood Plan or SES flood emergency strategy for the area.

PO6	Public safety and the environment are not adversely affected by the detrimental impacts of floodwater on hazardous materials manufactured or stored in bulk.	1. No external storage of materials which may cause pollution or be potentially hazardous during any flood.	1. No external storage of materials which may cause pollution or be potentially hazardous during any flood.	1. No external storage of materials which may cause pollution or be potentially hazardous during any flood.
PO7	Fencing is designed and constructed so that it does not impede and/or direct the flow of floodwaters, add debris to floodwaters or increase flood affectation on surrounding land.	1. Use open type fencing. 2. Fencing is not permissible unless it can be shown, through a FIRA, not to impact on flood conveyance or behaviour.	1. Fencing is constructed in a manner that does not obstruct the flow of floodwaters. 2. Fencing of flow paths is limited to permeable open type fences.	N/A
PO8	Earthworks including cut and fill do not impact flood storage areas.	1. The FIRA demonstrates earthworks will not affect flood storage capacity or flood behaviour for the full range of flood events.	1. The FIRA demonstrates that earthworks will not affect flood storage capacity or flood behaviour for the full range of flood events.	1. The FIRA demonstrates that earthworks will not affect flood storage capacity or flood behaviour for the full range of flood events. 2. Any fill platform associated with development does not create a local site-specific flood island isolating the user from safety during flooding

3.2 Background

3.2.1 Study Area

The development lies within the catchments of Badgerys Creek and Wianamatta-South Creek. The site falls within the flood study of Wianamatta-South Creek conducted by Advisian (2022), which was used to validate approaches to modelling in the region. The study area extends down to the confluence of Badgerys Creek, Wianamatta-South Creek and Kemps Creek. The site development area and the extent of the hydrological and hydraulic assessment can be seen below in Figure 3-1. Note the 2d_sa boundaries within the lots are shown for information only. Runoff from the lots based on the catchment areas shown have been entered into the post-development TUFLOW model using 1d_bc as described in Section 3.4.3.

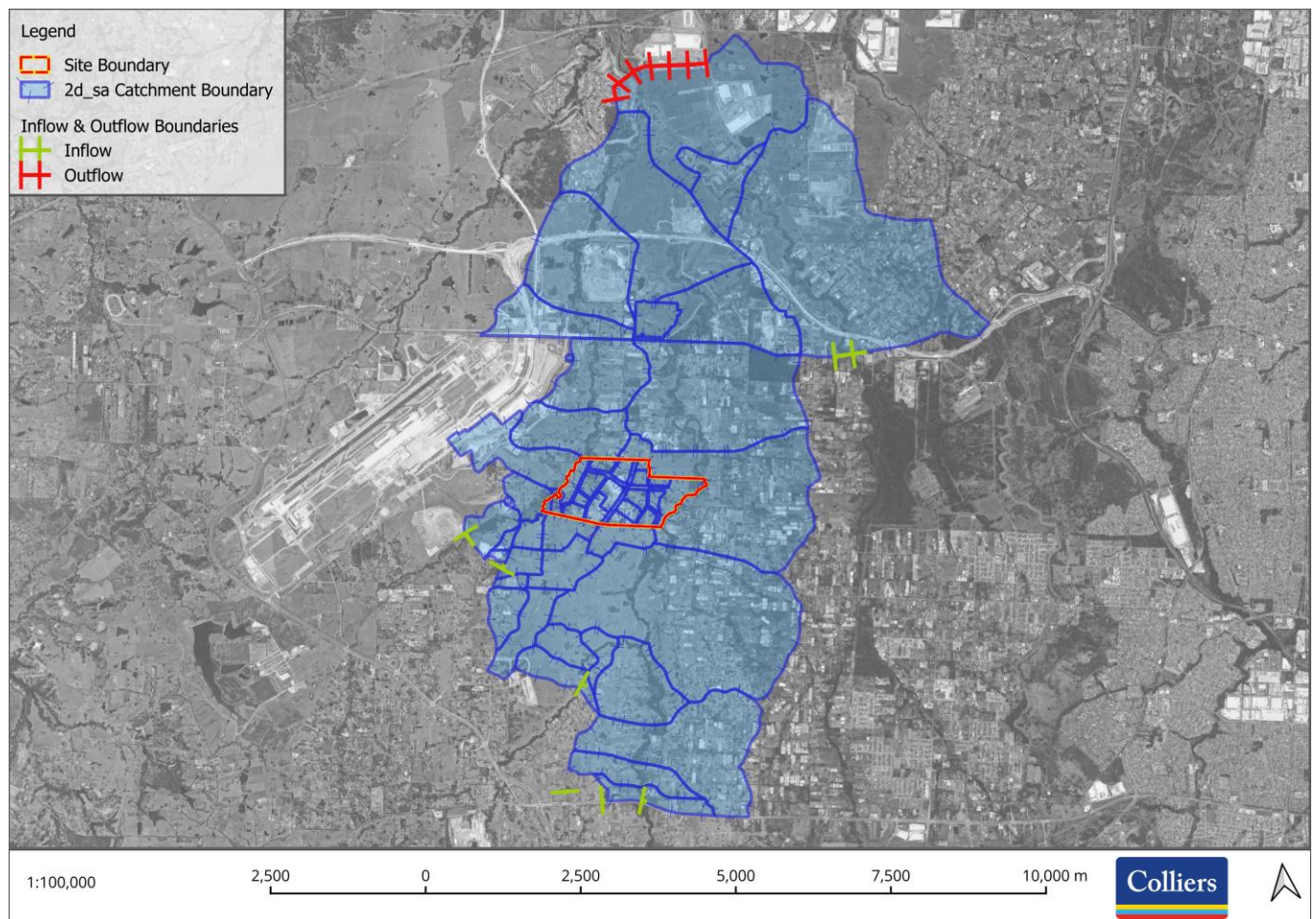


Figure 3-1 Study Area and Watershed Catchments

3.2.2 Data Collation and Review

The general data collated for this flood study included cadastral, topographic and LiDAR data. Additional data collated specifically for the flood study is outlined below.

- Catchment polygon GIS shape files and results from the Advisian flood study (2022) were provided by Infrastructure NSW.
- A request for the 2022 Advisian flood study model was submitted to Infrastructure NSW, but no model was provided. As such, the Liverpool Overland Flow Path Study for Rural Catchment Area St2 (2021) was obtained from Liverpool City Council for the hydraulic assessment of the site.
- 1m LiDAR data was obtained from Elvis (GeoScience Australia, 2021) for the entire study area

- A 1m resolution design surface of the rehabilitated quarry pits developed by Egis (260305_Egis_Pit1 & 2_Rehab_1m_GDA94.asc)
- A 1m resolution design surface of the development (BEW levels) was developed by Arcadis (260305_Arcadis_BEW01_1m_GDA94.asc)
- Publicly available reports and drawings from approved developments within the Aerotropolis were sourced to inform the existing conditions scenario. This includes the adjacent IPG site, the Aldi Automated Distribution Centre, the Elizabeth Enterprise Precinct Stage 1, the WSIA, and the M12.

3.2.2.1 *Digital Elevation Model*

A digital elevation model was prepared from the 1m LiDAR obtained from Elvis (GeoScience Australia, 2021). A detailed site survey was conducted by LTS Surveyors with the data surveyed provided to Colliers on the 06/03/2026. The data obtained from the survey was overlaid on the LiDAR DEM to further refine the terrain information for analysis. In addition, the rehabilitated quarry pit design by Egis, which is expected to be constructed prior to the development of this site, was overlaid onto the LiDAR and Survey DEM to form the existing conditions scenario.

Information obtained from publicly available reports and approved development drawings within the Aerotropolis was used to model to establish the existing conditions scenario outside of the site. In particular, the civil engineering drawings from IPG site, the Aldi Automated Distribution Centre, and the Elizabeth Enterprise Precinct Stage 1 provided road and pad level information that was incorporated into the model using 2d_zsh layers to represent the surrounding developments.

Where development level information was not publicly available, including those within the WSIA and the M12, assumptions were made to represent the developments.

For the WSIA, without road and pad levels, it would be impossible to accurately model the site. Therefore, the model extent was cut upstream of the WSIA detention basins with the hydrology updated to consider the WSIA development. To model these detention basins, a combination of the WSIA site layout, aerial imagery, street view and the Western Sydney Airport EIS Surface Water Hydrology and Geomorphology report by GHD (2016) was used.

Similarly, for the M12, road levels are not publicly available. Therefore, to represent the development, a 2d_zsh layer was used to raise the terrain along the M12 alignment. Bridge locations identified from aerial imagery were modelled as openings to represent the bridge structures.

The resultant Digital Elevation model is illustrated below in Figure 3-2 below.

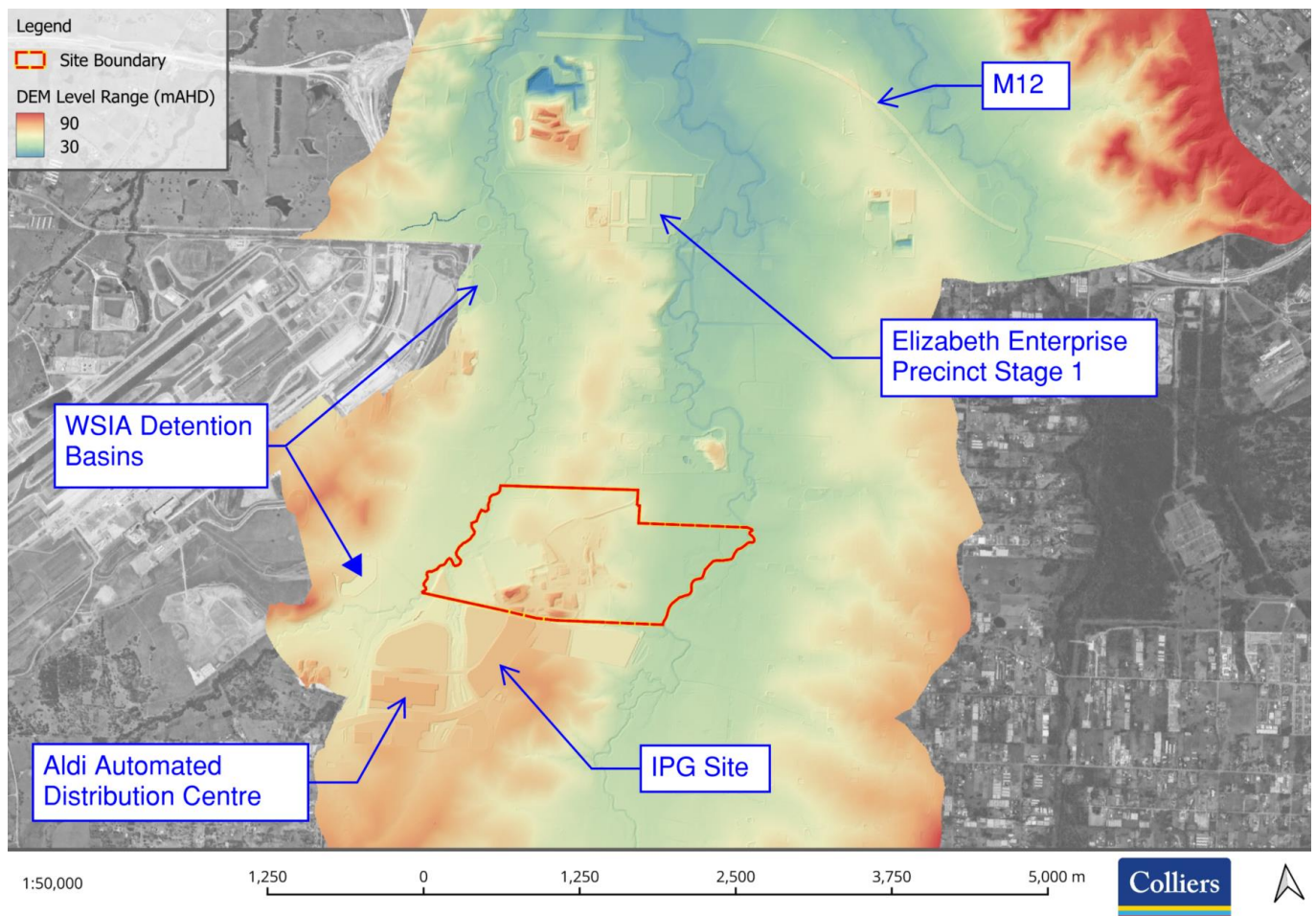


Figure 3-2 Digital Elevation Model – Existing Conditions

3.2.2.2 Existing Farm Dams

Existing farm dams present within the study area were assumed to not function as detention basins and as such, were filled to the dam spillway level. This approach is conservative and ensures that dams do not unnecessarily act to attenuate overland flows. This was done by applying an initial water level up to the spillway for the farm dams within the hydraulic (TULFOW) model.

3.3 Hydrology Assessment

3.3.1 Hydrologic Model

XP-RAFTS modelling software was used to perform the hydrological analysis of the Site area and external catchment. XP-RAFTS modelling is a modelling tool used for hydrological modelling and flood prediction. It simulates the hydrological processes of a catchment via rainfall patterns, catchment characteristics and land use information.

In absence of the original XP-RAFTS model used for the flood study, the hydrologic model has been replicated in accordance with the Advisian flood study (2022). The purpose of the model is to estimate the magnitude of the flows acting on the site in existing conditions and assess the impact of the post development flow rates.

3.3.1.1 *Simulated Storm Events*

As per the Advisian Flood Study (2022), the XP-RAFTS flood model was used to simulate the catchment hydrology for the following design events:

- 4 EY
- 10% AEP;
- 5% AEP;
- 1% AEP;
- 1% AEP with climate change;
- 0.2% AEP; and,
- Probable Maximum Flood (PMF)

Storm durations of 2-hours, 9-hours, and 36-hours were simulated for all storms except for the PMF which was simulated for 6-hours. A 36-hour critical storm duration was adopted for Wianamatta-South Creek for all events except the PMF, which adopted a 6-hour critical storm duration. A 9-hour storm duration was adopted for Badgerys Creek for events up to the 1% AEP. These critical storm durations were adopted based on the Advisian flood study (2022)

3.3.1.2 *AR&R 1987 IFD Parameters*

In the Advisian flood study (2022), a comparison of flows generated from AR&R 1987 vs AR&R 2019 methodologies were assessed against nearby at-site Flood Frequency Analysis (FFA) to determine which methodology would be used for the study. It was concluded that AR&R 1987 modelling generated a peak flow for the 1% AEP event that matches more closely to the FFA than the modelling based on AR&R 2019. As such, AR&R 1987 IFD data were used for the flood study. This conclusion is also supported by Sydney Water as per Section 6.2.2.1 of the Stormwater Scheme Infrastructure Design Guidelines. Therefore, CED have also adopted the same parameters in the XP-RAFTS modelling.

The design IFD data for the flood study is summarised in Table **3-2** below. Given the size of the flood study, nine different IFDs were originally used. For the purposes of this study, the nine different IFDs were tested and was found that Bringelly IFDs produced 1% AEP flows that closely matched the results provided in the Advisian flood study (2022). As such, Bringelly IFDs were adopted across the model for the hydrology assessment of the site.

Table 3-2 Adopted Design Intensity-Frequency-Duration (IFD) Data

Location	Geographical Factors		IFD Coefficients (mm/hr)					
	F ₂	F ₅₀	² I ₁	² I ₁₂	² I ₇₂	⁵⁰ I ₁	⁵⁰ I ₁₂	⁵⁰ I ₇₂
Narellan	4.29	15.8	31.6	6.0	1.80	50.9	12.0	4.0
Bringelly	4.29	15.8	30.0	6.1	1.88	59.3	12.3	4.0
Elizabeth Drive	4.29	15.8	30.0	6.15	1.90	59.3	12.3	4.1
Badgerys Creek	4.29	15.8	30.0	6.46	1.93	59.1	12.6	4.2
Glenfield	4.29	15.8	35.0	7.0	2.25	65.0	15.0	4.7
Mt Vernon	4.29	15.8	31.3	6.2	1.9	59.4	12.6	4.15
Penrith	4.29	15.8	30.0	6.8	1.97	59.7	12.9	4.7
St Marys	4.29	15.8	30.0	6.42	1.86	59.1	12.8	4.4
Riverstone	4.29	15.8	30.0	6.5	1.92	59.2	13.0	4.5

AR&R 1987 IFD's provide rainfall intensities for a return period of 1 to 100 years, i.e., 63.21% AEP to 1% AEP. The 0.2% AEP IFD curves were obtained by scaling the 1% AEP using a 'growth factor' of 1.344 in accordance with the Advisian flood study. Furthermore, due to limitations of AR&R 1987 in regards to more frequent events, the 4EY design storm was simulated using AR&R 2019 methodologies in XP-RAFTS.

3.3.1.3 Climate Change

Climate change factors were adopted based on the Shared Social Pathways (SSP), high warming scenario (SSP3-7.0) for the year 2090, as outlined in Book 1 of the AR&R Version 4.2 guidelines. Climate change factors were obtained from the AR&R Datahub. The 1% AEP rainfall data for the 2 hour, 9 hour and 36 hour storms were increased by 49%, 35%, and 29% respectively.

3.3.1.4 Probable Maximum Precipitation (PMP)

To model the PMF storm events for pre and post developed conditions, the Probable Maximum Precipitation (PMP) was calculated using the Generalised Short-Duration Method GSDM in accordance with AR&R procedures. The PMF event was then simulated with a 6-hour critical duration in accordance with the Advisian Flood Study (2022).

The detailed calculations for the PMP are shown in Figure 3-3.

Location Information				
Catchment	Bradfield		NSW	
Area (km ²):	104			
4.1 PMP Method Selection - Refer to Figure 2 on Worksheet 1.				
Duration Limit	6 Hours	hrs	By interpolation between 3 & 6 (Intermediate Duration Zone)	
Latitude	33.942	degrees	033° 56' 31.20" E	Latitude
Longitude	159.747	degrees	159° 44' 49.20" N	Longitude
4.2 Selection of Terrain Category				
For durations of longer than 1 hour - 'Rough' terrain is classified as that in which elevation changes of 50m or more within horizontal distances of 400m are common. Terrain within 20km of generally 'rough' terrain should also be classified as 'rough'.				
Portion of Area Considered:				
Approximate Area Rough, R	0.0			
Rough, R =	1.00	(0.0 - 1.0)		
Smooth, S =	0.00	(0.0 - 1.0)		
Elevation Adjustment Factor (EAF)				
Maximum Elevation	152	mAHD		
Minimum Elevation	45	mAHD		
Mean Elevation	98.5	m		
Adjustment for Elevation (-0.05 per 300m above 1500m)				
EAF =	1	(0.85 - 1.00)		
Moisture Adjustment Factor (EAF)				
MAF =	0.69	(0.4 - 1.00)		From Figure 3 - Interpolate between
PMP Values (mm)				
Duration (hours)	Initial Depth - Smooth (Ds)	Initial Depth - Rough (Dr)	PMP Estimate = (Ds * S + Dr * R) * MAF * EAF	Rounded PMP Estimate (nearest 10 mm)
0.25	165	165	113.85	110.00
0.50	245	245	169.05	170.00
0.75	315	315	217.35	220.00
1.0	375	375	258.75	260.00
1.5	430	485	334.65	330.00
2.0	485	555	382.95	380.00
2.5	515	630	434.70	430.00
3.0	555	680	469.20	470.00
4.0	615	770	531.30	530.00
5.0	665	840	579.60	580.00
6.0	710	895	617.55	620.00

Figure 3-3 PMP Calculations

3.3.1.5 Sub-Catchment Delineation

The catchment delineation was undertaken by Advisian for the Wianamatta-South Creek flood study (2022). Infrastructure NSW provided the sub-catchment polygon GIS shape files to CED for use in this flood study. The catchment delineations were updated to reflect approved developments within the Aerotropolis based on public available reports and drawings. The catchment delineation can be seen below in Figure 3-4.

Sub-catchment parameters were taken from the Advisian flood study (2022) and publicly available reports and drawings for the approved developments within the Aerotropolis. These parameters can be seen in Appendix A.

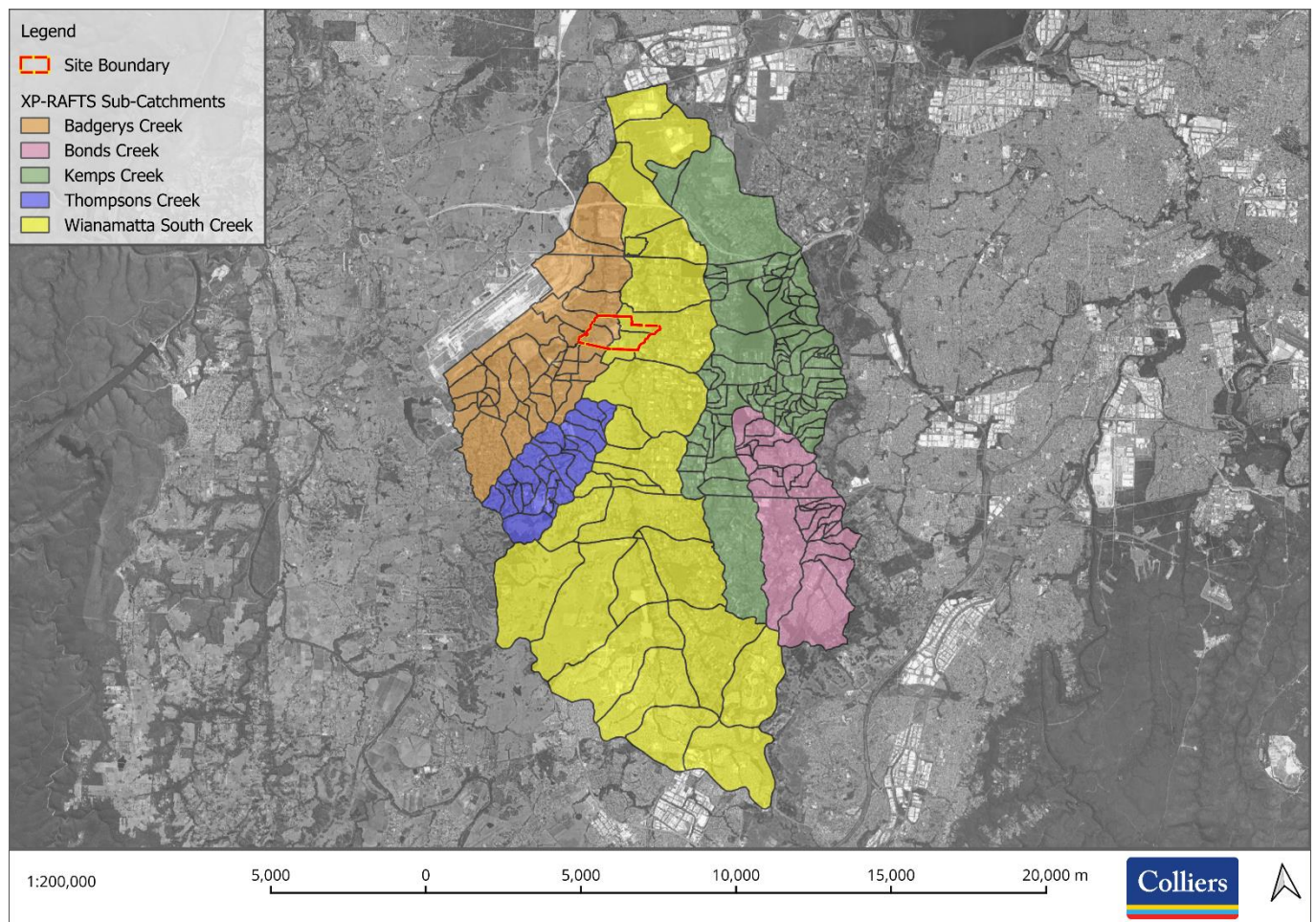


Figure 3-4 XP-RAFTS Sub-Catchment Delineation

3.3.1.6 Pre-development Hydrologic Model

The pre-development XP-RAFTS was built to replicate the model used in the Advisian flood study (2022), using the same catchment nodes, routing and parameters. Sub-catchment nodes around the site were split along the boundary and updated using the same parameters. Sub-catchment nodes for approved developments within the Aerotropolis were also split based on catchment delineation and parameters as per their respective reports and drawings. The XP-RAFTS model can be seen below in Figure 3-5.

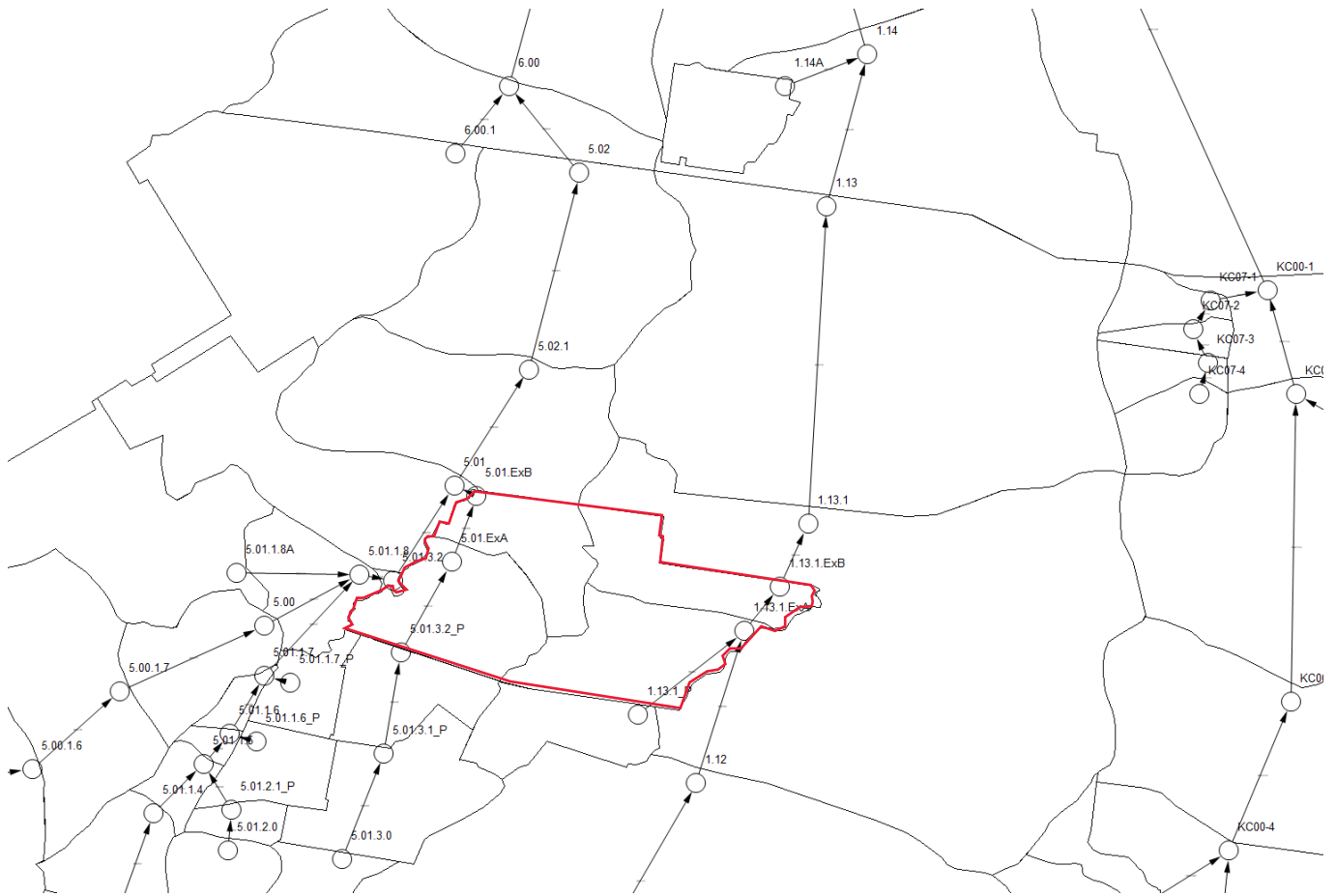


Figure 3-5 XP-RAFTS Model – Existing

3.3.1.7 Developed Hydrologic Model

The model was updated with appropriate routing to represent the impact of development. Mannings roughness was updated to represent the earthworks throughout the proposed development. Other parameters were consistent with the existing model as the BEW surface does not consist of any additional impervious development area. The developed XP-RAFTS model can be seen below in Figure 3-6.



3.3.2 Hydrology Assessment Results and Model Validation

Table 3-3 Comparison of Peak 1% AEP Flows at Elizabeth Drive

The results from the hydrology assessment show that the critical storm durations are in line with the Advisian Flood Study (2022). Wianamatta-South Creek exhibits a critical storm duration of 36 hours. Meanwhile, Badgerys Creek exhibits a critical storm duration of 9 hours. Furthermore, the peak flows in comparison to the Advisian Flood Study (2022) show minor discrepancies of 1.2% in Wianamatta-South Creek and up to 7.6% in the Badgerys Creek. As such, the model is suitable for use in the current study.

Flow hydrographs were extracted from the XP-RAFTS model results for each event at each sub-catchment and was used to provide inflows into the TUFLOW model for hydraulic assessment.

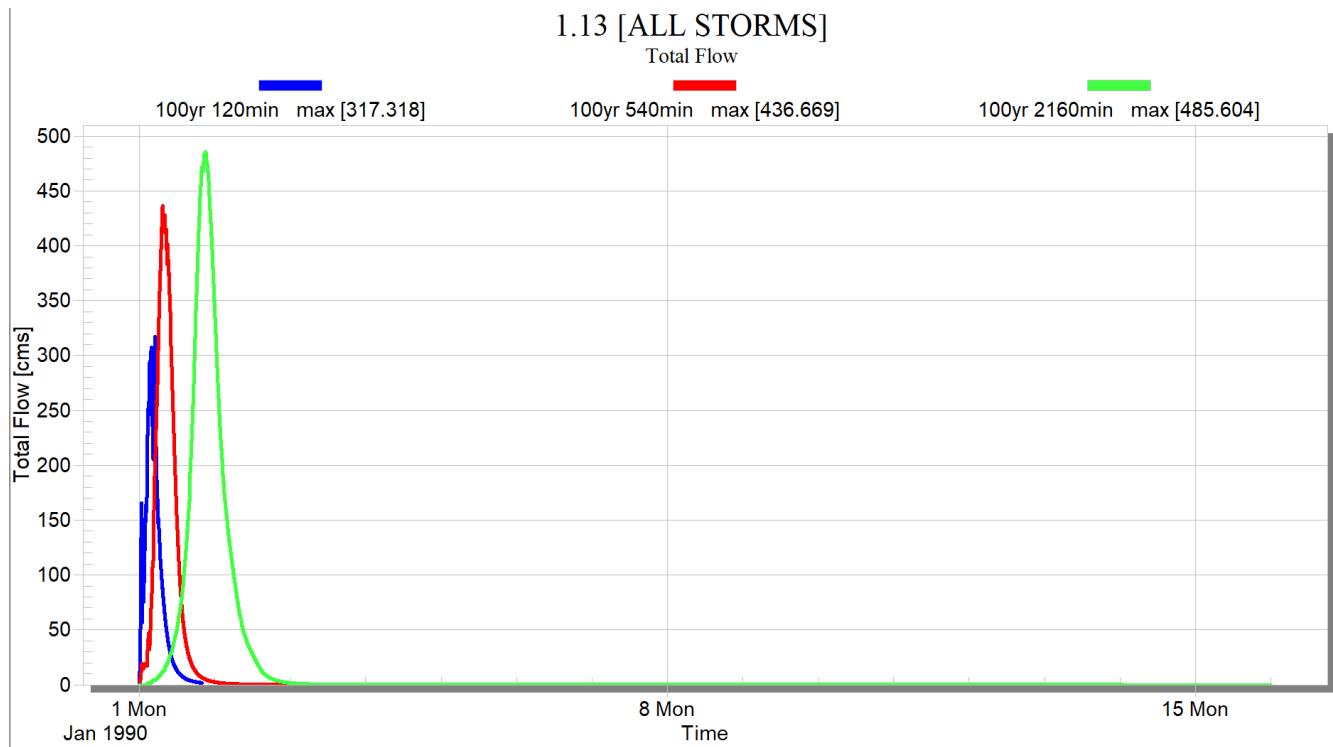


Figure 3-7 Wianamatta-South Creek 1% AEP Peak Flows at Elizabeth Drive – Pre-Development

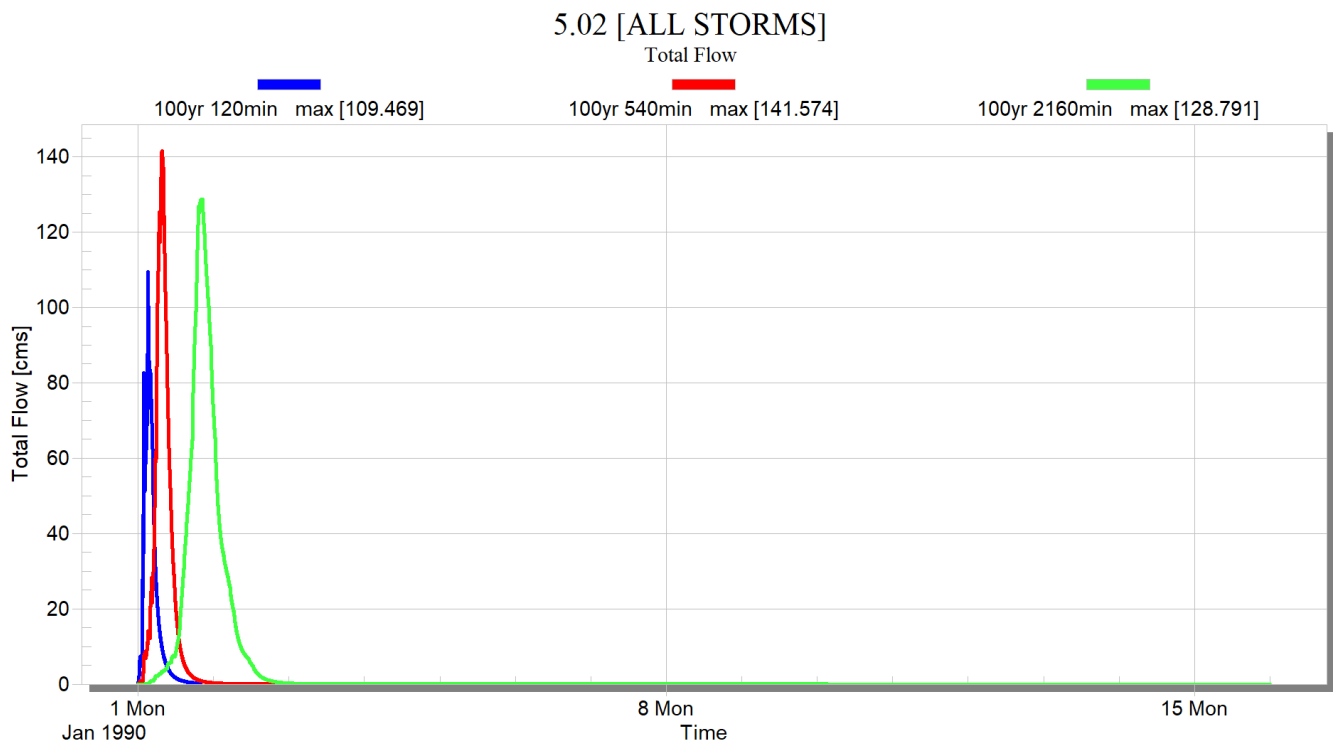


Figure 3-8 Badgerys Creek 1% AEP Peak Flows at Elizabeth Drive - Pre-development

3.4 Hydraulic Assessment

3.4.1 Approach and Methodology

The site's flood behaviour for the 4EY, 10% AEP, 5% AEP, 1% AEP 1% AEP with climate change, 0.2% AEP and PMF design storm events under pre and post developed conditions have been modelled using a two-dimensional TUFLOW hydraulic model. TUFLOW is a computational engine that provides one dimensional (1D) and two dimensional (2D) solutions for free-surface flow equations to simulate flood and tidal wave propagation.

The hydraulic modelling was undertaken with user defined inflows from the XP-RAFTS model to assess the existing flows and the potential flood impacts resulting from the proposed development. The assessed critical storm durations were run across the entire hydraulic model, with the results then being post-processed to obtain the maximum envelope.

3.4.2 Pre-development Hydraulic Model

The TUFLOW modelling for the pre-development flood study was built upon the model used for the Liverpool Overland Flow Path Study for Rural Catchment Area St2 (2021) by Liverpool City Council, and was updated using the following model parameters:

- TUFLOW version 2023-03-AE was adopted using the HPC explicit solver. This is an updated version compared to Council's TUFLOW model to reflect contemporary flood modelling techniques.
- A 1m topographic grid was used in the model construction based on available LiDAR (2019) data sourced from ELVIS. Detailed site survey obtained from LTS Surveyors was overlaid on top of the LiDAR data to refine the topographic layer. In addition, the rehabilitated quarry pit design by Egis, which is expected to be constructed prior to the development of this site, was overlaid onto the LiDAR and Survey DEM to form the existing conditions scenario DEM.
- 2d_zsh layers were used to represent approved developments in the Aerotropolis based on publicly available reports and drawings. Refer to Section **3.2.2.1** for further details.
- A 2D cell size of 5m was used to the hydraulic assessment due to the scale of the flood study
- The model domain was defined from Bringelly Road approximately 4.5km south of the site's southern boundary. At the downstream end, the domain has been set approximately 600m north of the confluence of Wianamatta-South Creek, Badgerys Creek and Kemps Creek.
- PO lines were placed at the site downstream boundary and within the development to assess flows leaving the site and flows contributing the overland flow paths, respectively.
- Source Area (SA) inflow boundary conditions based on the critical duration hydrographs from the XP-RAFTS model for pre-development conditions were used to discharge runoff from the sub-catchments into the model
- 2D_BC HT tailwater boundary conditions were adopted at the downstream model extent using peak flood levels from the Advisian Flood Study (2022) existing flood condition results to be consistent with the study
- 2D_BC QT inflow boundary conditions were adopted at locations as per Figure **3-1**, with critical duration hydrographs of the total upstream catchment from the XP-RAFTS model for pre-development conditions used to discharge runoff from the catchments into the model
- Mannings n roughness values were adopted from Council's TUFLOW model. The adopted values are specified in Section **3.4.2.1**.

3.4.2.1 Model Validation

The TUFLOW model was developed using the Liverpool Overland Flow Path Study for Rural Catchment Area St2 (2021) by Liverpool City Council with inflows from the XP-RAFTS model, replicated from the Advisian Flood Study (2022). As such, it is expected that the results from the TUFLOW model would not be fully consistent with the Advisian Flood Study (2022) without calibration.

Flood modelling results from the Advisian Flood Study (2022), including the 1% AEP flood levels, were supplied by Infrastructure NSW. The TUFLOW model was calibrated to match the Advisian 1% AEP levels by adjusting manning's roughness values across relevant zones within the model.

A comparison between the Advisian outputs and the calibrated TUFLOW results for the 1% AEP storm event, illustrated in Figure 3-9, generally showed flood level variations of up to approximately ± 200 mm within the creeks. Areas where differences are greater than 200mm are located in smaller areas typically outside of the creeks. In general, water levels in Wianamatta-South Creek and Badgerys Creek were found to be higher than Advisian's and thus more conservative for assessment. Based on the available information, these differences were considered acceptable.

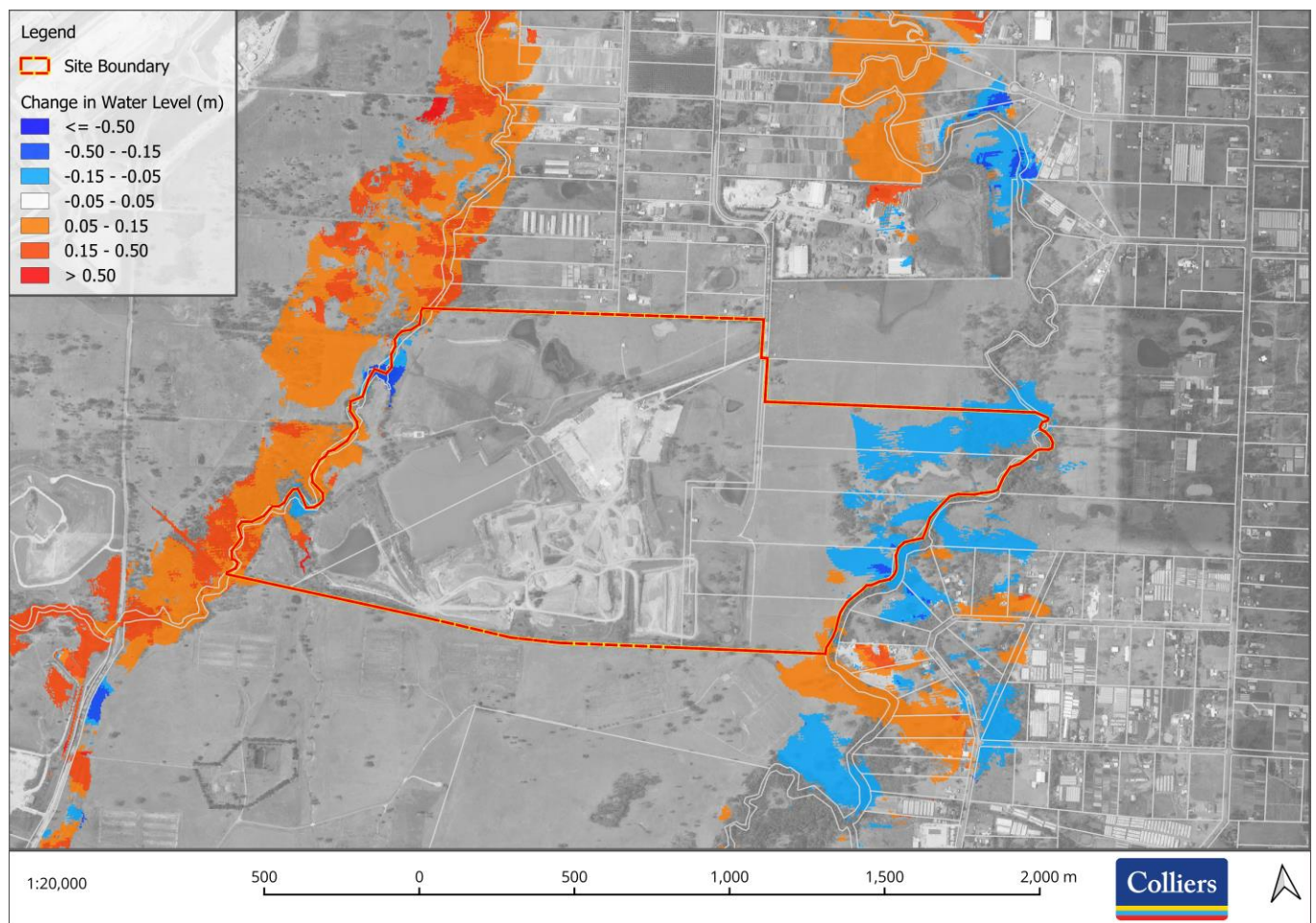


Figure 3-9 Model Validation Afflux Map

3.4.2.2 Mannings 'n' Roughness (Materials Definition File)

A materials definition file was used to define the mannings roughness of the terrain surface. A mannings roughness grid map from the Liverpool Overland Flow Study was used to delineate the specific roughness regions. The grid map was created using aerial imagery and SixMaps land use data. Defined mannings coefficients are outlined below in Table 3-4.

Table 3-4 Mannings 'n' roughness values

Id	Material	'n' Value
1	Buildings	1.0
2	Water	0.03
3	Trees	0.1
4	Grass / Open Space	0.035
5	Concrete	0.015
6	Roadways	0.02
7	Open Channels with Veg	0.05
8	Green Houses	0.12
9	Sydney Water Trunk Drainage Channels	0.08
10	BEW Surface	0.03

3.4.3 Developed Hydraulic Model

The developed hydraulic model for the BEW scenario was prepared to account for the proposed changes in land use under post-development conditions as per the masterplan. Note that this BEW scenario includes development of earth levels to near the ultimate surface but excludes roads, buildings, retaining walls, the Eastern Ring Road and East West Arterial Road. The following model elements were modified for proposed conditions:

- The post-development topographic surface including the BEW levels developed by Arcadis were layered on top of the LiDAR data, detailed site survey, and rehabilitated quarry pit design by Egis. The BEW surface by Arcadis includes collection swales, on-lot sediment basins, and regional level sediment basins over the footprint of the future Sydney Water regional basins (BC_BC01, BC_BC02, BC_SC01, and BC_SC02 as per Sydney Water's Aerotropolis Integrated Stormwater Scheme Plans for Wianamatta-Badgerys and Cosgroves). The regional basins have been designed and will be developed under a separate SSDA (97688711) for the internal works, in accordance with the Sydney Water's Stormwater Scheme Infrastructure Design Guideline.
- The site's manning's roughness zones within the site were updated to present the proposed design surfaces.
- The inflows for the SA boundary conditions for proposed development sub-catchments were updated and modelled as 2D_SA_ALL to evenly distribute runoff into the BEW surface and riparian corridors.

All other modelling elements remained unchanged from the pre-development scenario model.

3.4.4 Hydraulic Modelling Results

The results of the existing case and developed case modelling are detailed in sections **3.4.4.1** & **3.4.4.2**, with the impact of the proposed development on flood conditions discussed in section **3.4.5**.

3.4.4.1 Pre-development Flooding Results

The pre-development TUFLOW modelling was undertaken to simulate the 4EY, 10% AEP, 5% AEP, 1% AEP 1% AEP with climate change, 0.2% AEP and PMF events with storm durations as per Section **3.3.1.1**. Peak maximum envelope flood depths, levels, velocities, and hazard mapping for these results are presented in Appendix **B**.

The hydraulic category mapping has been prepared using the floodway extents from the Advisian flood study (2022), supplied by Infrastructure NSW. The flood storage and fringe areas were identified based on the Advisian flood study (2022) which defines flood storage and flood fringe as:

- Flood storage – areas outside of the floodway and depths over 0.3m
- Flood fringe – areas outside of the floodway and depths up to 0.3m

Major 1% AEP Storm Event

The results of the 1% AEP pre-development conditions flood modelling are discussed below:

- The primary flood mechanism on the site is mainstream flooding from Badgerys and Wianamatta-South Creeks and other overland flow paths.
- Wianamatta-South Creek
 - At the upstream end of the site, flood depths for the 1% AEP event can be considered shallow at 0-0.5m depth along the edges of the flood extent and increase up to 6m within the creek. At the downstream end of the site, flood depths within the creek raise up to 4.8m.
 - 1% AEP event flood levels range from 49.4m AHD at the upstream end of the site to 47.5m AHD at the downstream end of the site.
 - Flood velocities in the creek are generally moderate (0.5 to 1.5m/s) throughout the majority of the site, with some areas reaching up to 2.3m/s in the 1% AEP event
 - The flood hazards (based on the flood hazard definitions in Figure **3-13**) within the creek are relatively high (generally H3 to H6) due to the depth of flooding in these areas. The hazards taper out to lower levels (generally H1 to H2) along the flood extents. It is not expected that these hazardous areas will be trafficked by any people or vehicles within the boundary of the site, hence there is little risk to life or property.
 - It is predicted that the peak of the 1% AEP flow will reach the site approximately 21 hours after the onset of the 36 hour critical storm event.
- Badgerys Creek
 - At the upstream end of the site, flood depths for the 1% AEP event can be considered shallow at 0-0.5m depth along the edges of the flood extent and increase up to 4.4m within the creek. At the downstream end of the site, flood depths within the creek raise up to 4.4m.
 - 1% AEP event flood levels range from 57.5m AHD at the upstream end of the site to 53.5m AHD at the downstream end of the site.
 - Flood velocities in the creek are generally moderate (0.5 to 1.5m/s) throughout the majority of the site, with some areas reaching up to 2.5m/s in the 1% AEP event
 - The flood hazards within the creek are relatively high (generally H3 to H6) due to the depth of flooding in these areas. The hazards taper out to lower levels (generally H1 to H2) along the flood extents. It is not expected that these hazardous areas will be trafficked by any people or vehicles within the boundary of the site, hence there is little risk to life or property.
 - It is predicted that the peak of the 1% AEP flow will reach the site approximately 6 hours after the onset of the 9 hour critical storm event.

- On Site
 - Within the site, flood depths for the 1% AEP event can be considered shallow at 0-0.5m along overland flow paths, and up to 1.2m within dams
 - Flood velocities within the site are generally low (up to 1m/s), with overland flow paths producing the higher range of velocities.
 - Flood hazards are generally low (H1 to H2) across overland flow paths within the site, with farm dams experiencing higher hazards (H3 to H6) due to the depth of water within the dams. However, it is not expected that these hazardous areas will be trafficked by any people or vehicles, hence there is little risk to life or property.

The flood mapping representing the depths, velocities, hazards, and hydraulic category experienced in a 1% AEP flood event in pre-development conditions can be seen in Figure 3-10 to Figure 3-14 below.

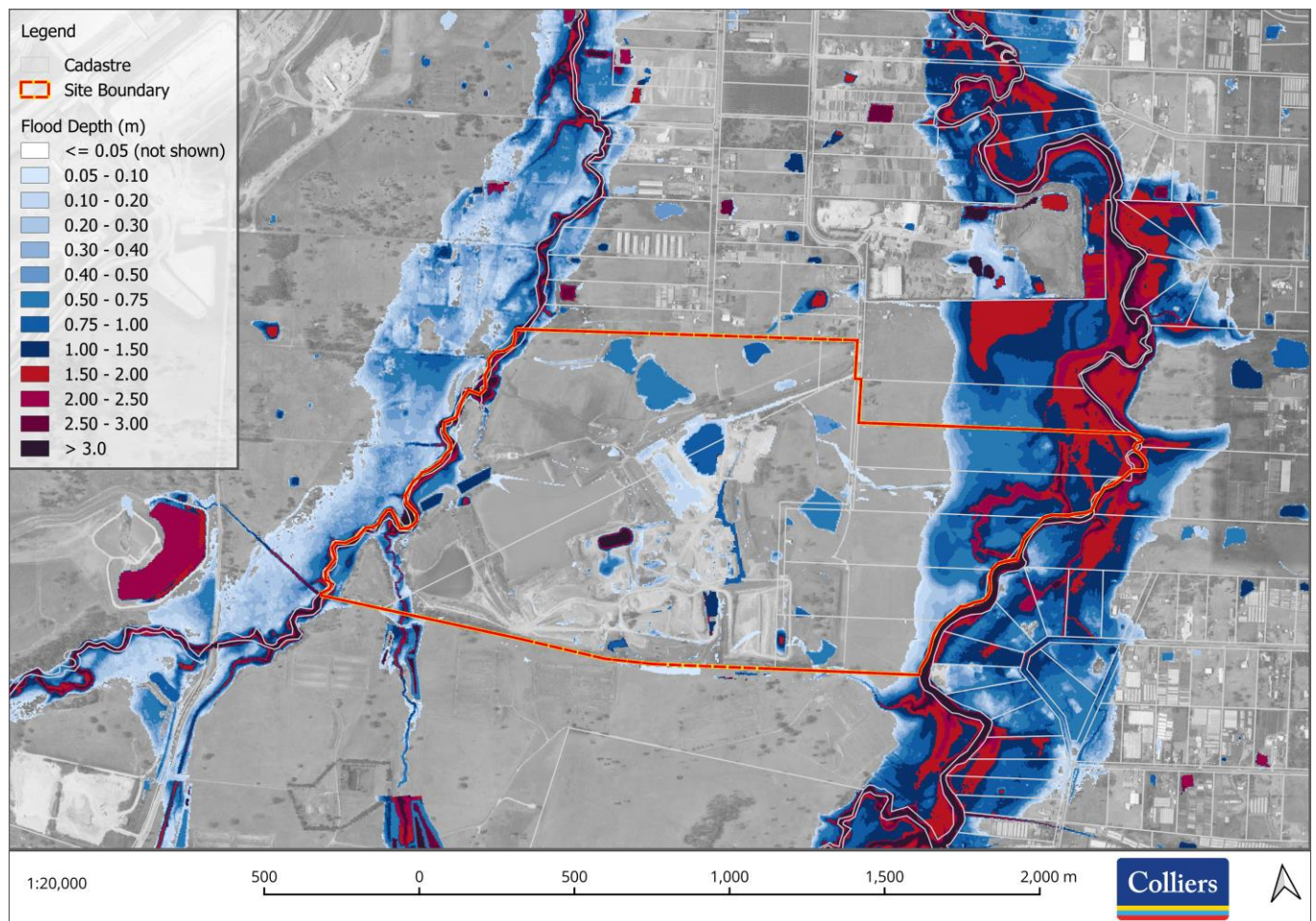


Figure 3-10 1% AEP Flood Depths – Pre-Development Scenario

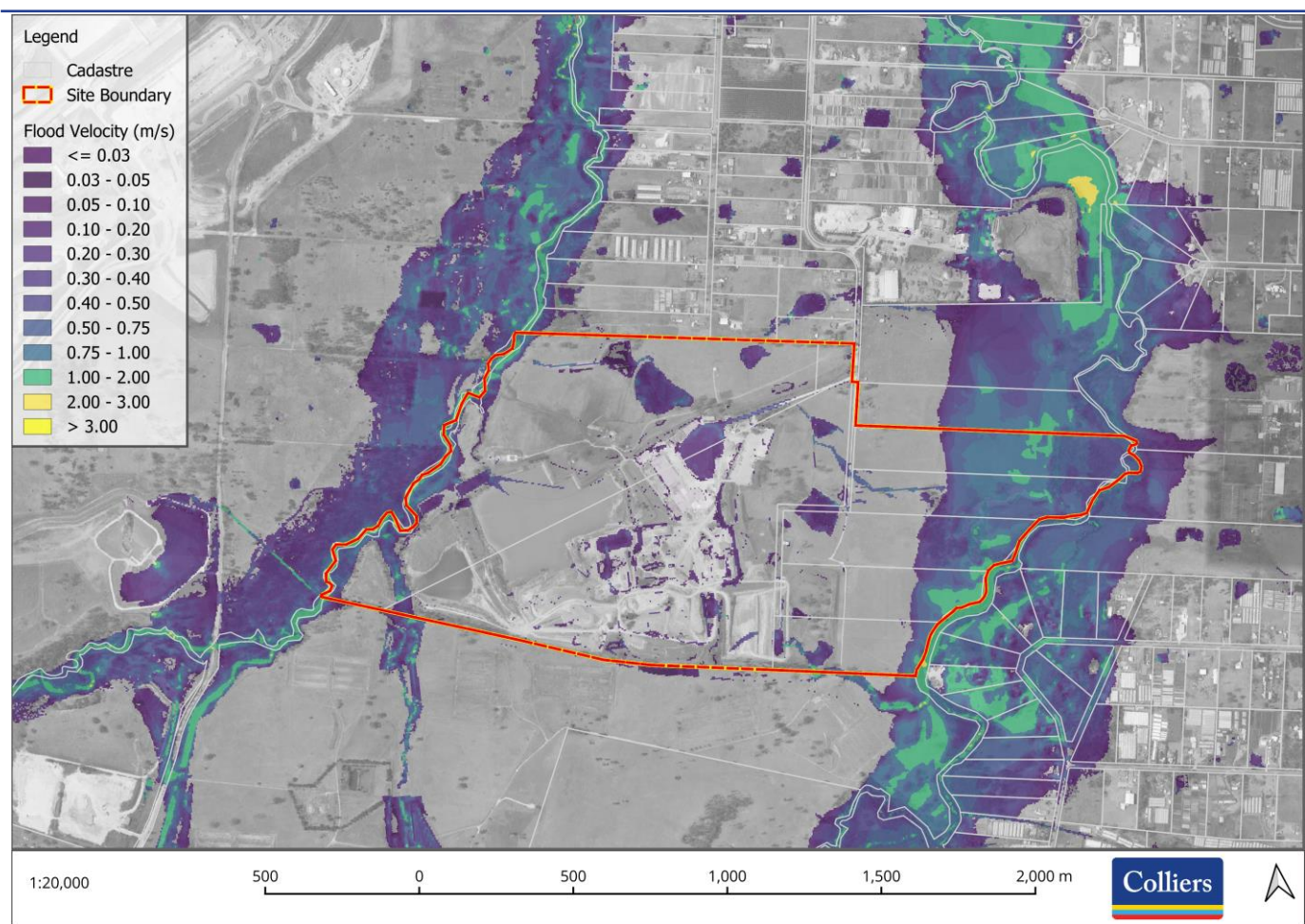


Figure 3-11 1% AEP Flood Velocities - Pre-development Scenario

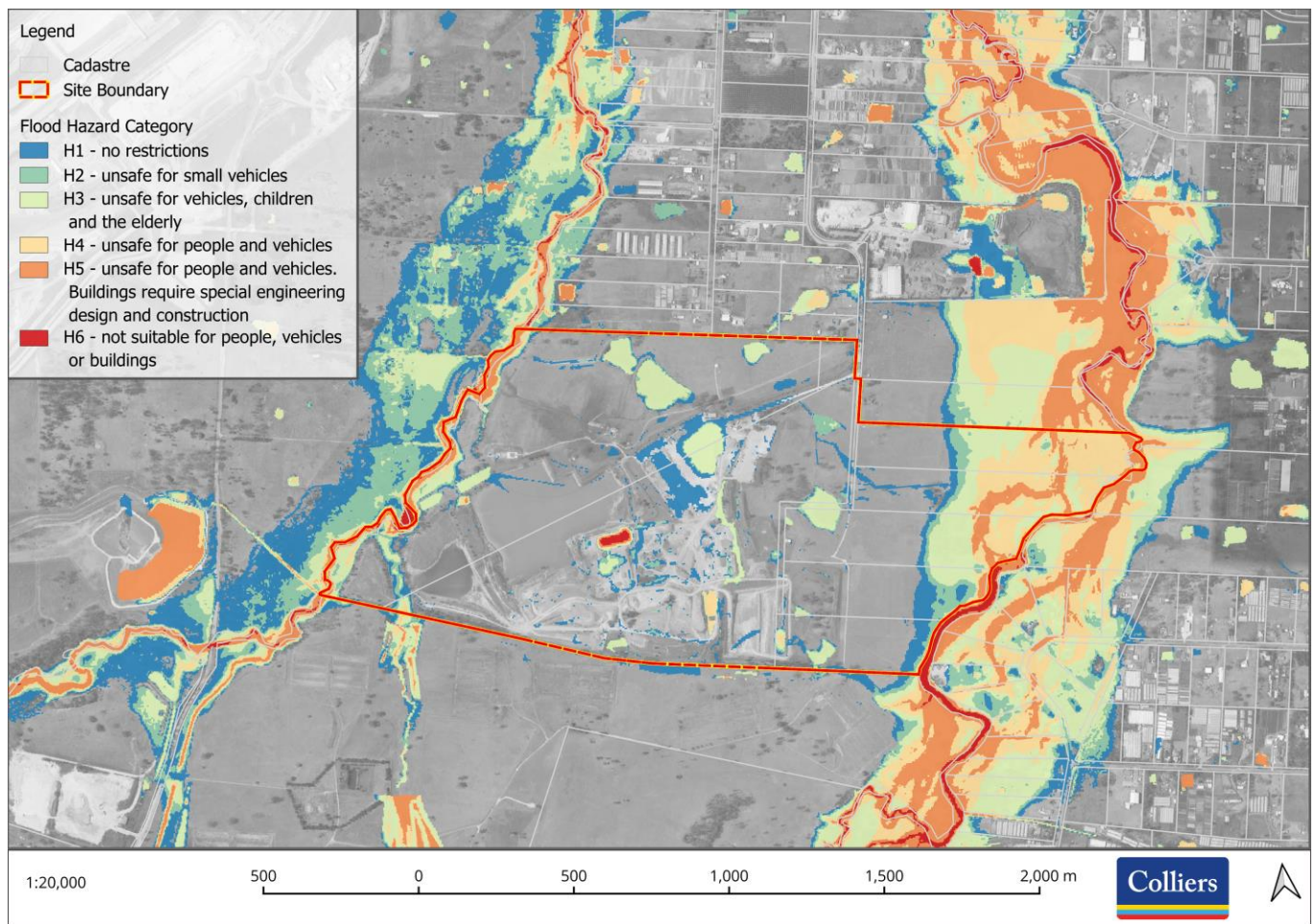


Figure 3-12 1% AEP Flood Hazards - Pre-development Scenario

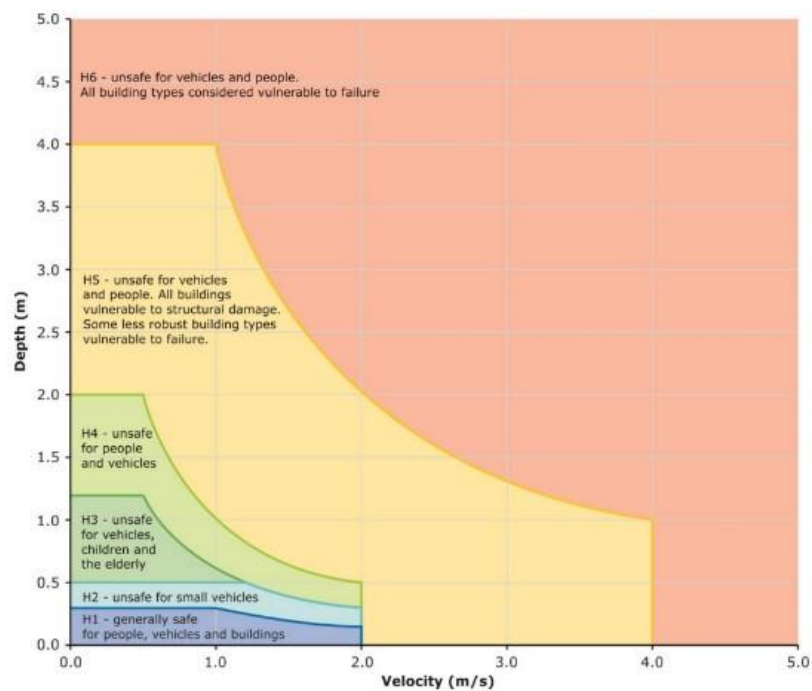


Figure 3-13 General Flood Hazard Curves (AR&R 2019)

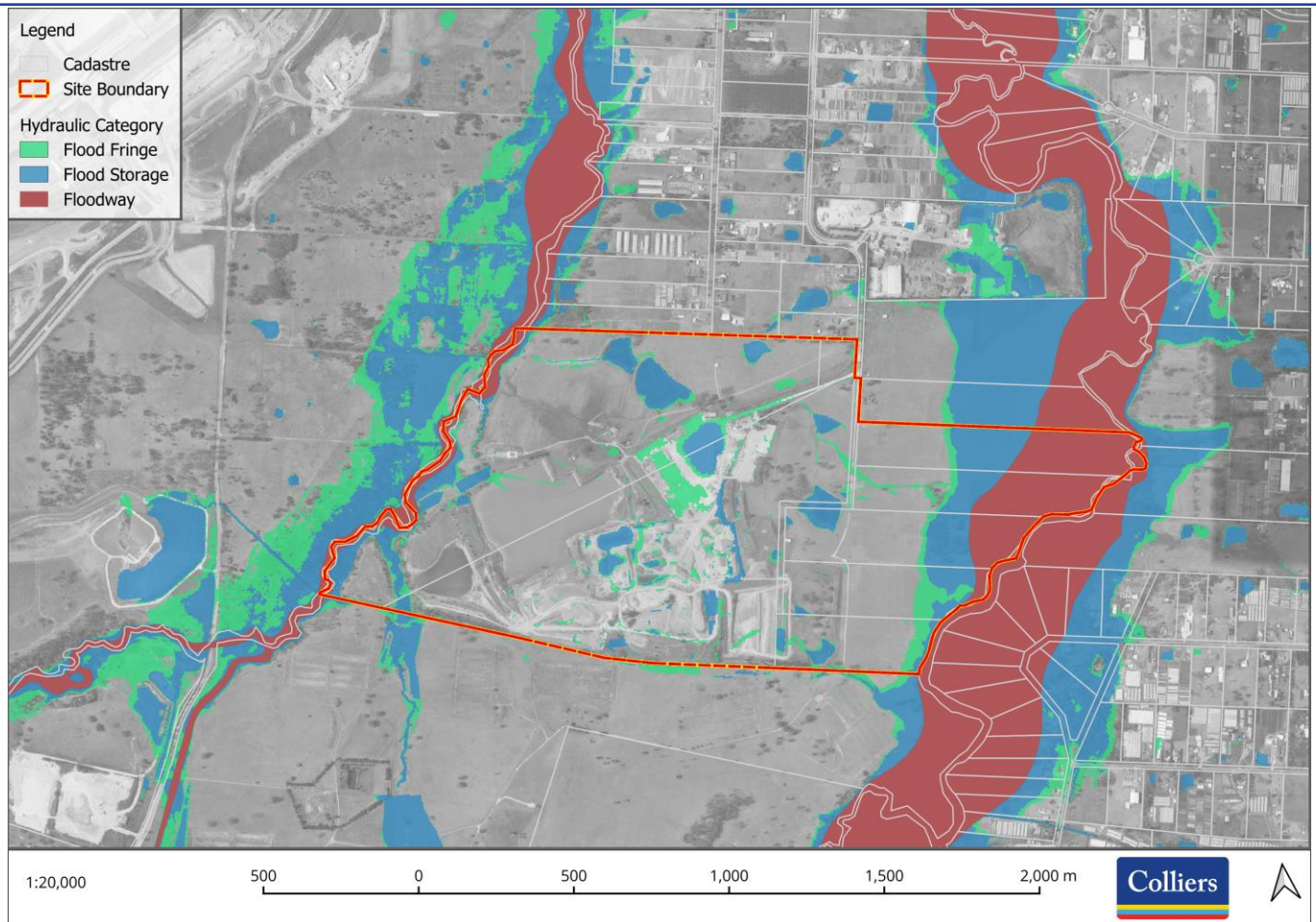


Figure 3-14 1% AEP Flood Hydraulic Category - Pre-development Scenario

Minor 10% AEP Storm Event

The results of the 10% AEP pre-development conditions flood modelling are discussed below:

- The primary flood mechanism on the site is mainstream flooding from Badgerys and Wianamatta-South Creeks and other overland flow paths.
- Wianamatta-South Creek
 - At the upstream end of the site, flood depths for the 10% AEP event can be considered shallow at 0-0.5m depth along the edges of the flood extent and increase up to 5.7m within the creek. At the downstream end of the site, flood depths within the creek raise up to 4.4m.
 - 10% AEP event flood levels range from 49.1m AHD at the upstream end of the site to 47.2m AHD at the downstream end of the site.
 - Flood velocities in the creek are generally moderate (0.5 to 1.5m/s) throughout the majority of the site, with some areas reaching up to 2.1m/s in the 10% AEP event
 - The flood hazards (based on the flood hazard definitions in Figure 3-13) within the creek are relatively high (generally H3 to H6) due to the depth of flooding in these areas. The hazards taper out to lower levels (generally H1 to H2) along the flood extents. It is not expected that these hazardous areas will be trafficked by any people or vehicles within the boundary of the site, hence there is little risk to life or property.
 - It is predicted that the peak of the 10% AEP flow will reach the site approximately 21 hours after the onset of the 36 hour critical storm event.

- **Badgerys Creek**
 - At the upstream end of the site, flood depths for the 10% AEP event can be considered shallow at 0-0.5m depth along the edges of the flood extent and increase up to 3.9m within the creek. At the downstream end of the site, flood depths within the creek raise up to 4.3m.
 - 10% AEP event flood levels range from 57.1m AHD at the upstream end of the site to 53.4m AHD at the downstream end of the site.
 - Flood velocities in the creek are generally moderate (0.5 to 1.5m/s) throughout the majority of the site, with some areas reaching up to 2.5m/s in the 10% AEP event
 - The flood hazards within the creek are relatively high (generally H3 to H6) due to the depth of flooding in these areas. The hazards taper out to lower levels (generally H1 to H2) along the flood extents. It is not expected that these hazardous areas will be trafficked by any people or vehicles within the boundary of the site, hence there is little risk to life or property.
 - It is predicted that the peak of the 10% AEP flow will reach the site approximately 6 hours after the onset of the 9 hour critical storm event.
- **On Site**
 - Within the site, flood depths for the 10% AEP event can be considered shallow at 0-0.5m along overland flow paths, and up to 1.2m within dams
 - Flood velocities within the site are generally low (up to 1m/s), with overland flow paths producing the higher range of velocities.
 - Flood hazards are generally low (H1 to H2) across overland flow paths within the site, with farm dams experiencing higher hazards (H3 to H6) due to the depth of water within the dams. However, it is not expected that these hazardous areas will be trafficked by any people or vehicles, hence there is little risk to life or property.

Extreme PMF Storm Event

The results of the PMF pre-development conditions flood modelling are discussed below:

- The primary flood mechanism on the site is mainstream flooding from Badgerys and Wianamatta-South Creeks and other overland flow paths.
- **Wianamatta-South Creek**
 - At the upstream end of the site, flood depths for the PMF event can be considered shallow at 0-0.5m depth along the edges of the flood extent and increase up to 7.5m within the creek. At the downstream end of the site, flood depths within the creek raise up to 6.8m.
 - PMF event flood levels range from 50.8m AHD at the upstream end of the site to 49.6m AHD at the downstream end of the site.
 - Flood velocities in the creek are generally moderate (0.5 to 1.5m/s) throughout the majority of the site, with some areas reaching up to 2.4m/s in the PMF event
 - The flood hazards (based on the flood hazard definitions in Figure 3-13) within the creek are relatively high (generally H3 to H6) due to the depth of flooding in these areas. The hazards taper out to lower levels (generally H1 to H2) along the flood extents. It is not expected that these hazardous areas will be trafficked by any people or vehicles within the boundary of the site, hence there is little risk to life or property.
 - It is predicted that the peak of the PMF flow will reach the site approximately 5 hours after the onset of the 6 hour critical storm event.
- **Badgerys Creek**
 - At the upstream end of the site, flood depths for the PMF event can be considered shallow at 0-0.5m depth along the edges of the flood extent and increase up to 6m within the creek. At the downstream end of the site, flood depths within the creek raise up to 5.5m.

- PMF event flood levels range from 59.1m AHD at the upstream end of the site to 55.0m AHD at the downstream end of the site.
- Flood velocities in the creek are generally moderate (0.5 to 1.5m/s) throughout the majority of the site, with some areas reaching up to 2.5m/s in the PMF event
- The flood hazards within the creek are relatively high (generally H3 to H6) due to the depth of flooding in these areas. The hazards taper out to lower levels (generally H1 to H2) along the flood extents. It is not expected that these hazardous areas will be trafficked by any people or vehicles within the boundary of the site, hence there is little risk to life or property.
- It is predicted that the peak of the PMF flow will reach the site approximately 5 hours after the onset of the 6 hour critical storm event.
- On Site
 - Within the site, flood depths for the PMF event can be considered shallow at 0-0.5m along overland flow paths, and up to 1.8m within dams
 - Flood velocities within the site are generally moderate (0.5 to 1.5m/s), with overland flow paths producing the higher range of velocities.
 - Flood hazards are generally low (H1 to H2) across overland flow paths within the site, with farm dams experiencing higher hazards (H3 to H6) due to the depth of water within the dams. However, it is not expected that these hazardous areas will be trafficked by any people or vehicles, hence there is little risk to life or property.

The full range of flood mapping representing the depths, velocities, hazards, and hydraulic category experienced in pre-development conditions can be seen in Appendix B.

Pre-development Condition Flow Hydrographs

Pre-development condition flow hydrographs immediately upstream of the site for the 0.2% AEP, 1% AEP, 5% AEP, and 10% AEP storm events are shown in Figure 3-15 and Figure 3-16.

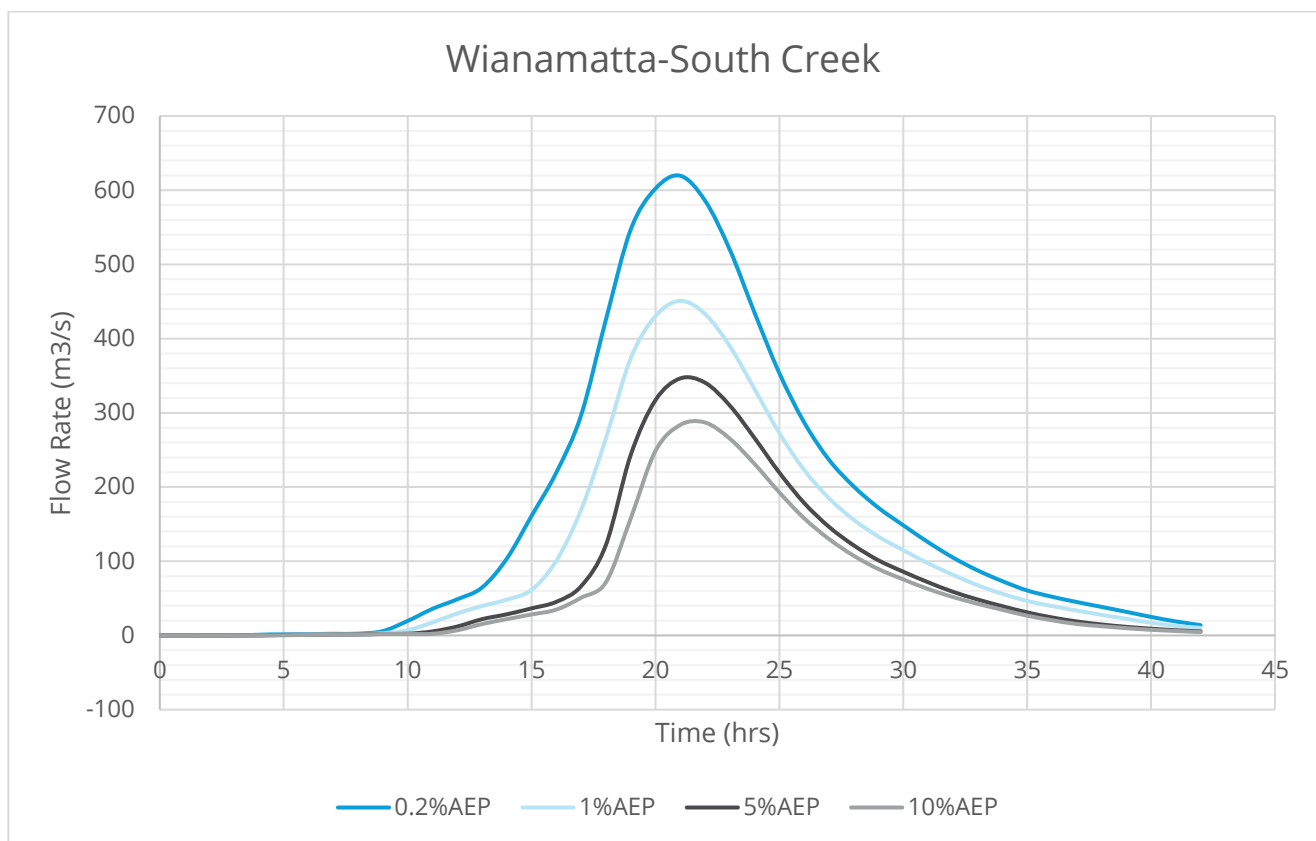


Figure 3-15 Wianamatta-South Creek Flow Hydrograph at Upstream of Site (36 hour critical storm duration)

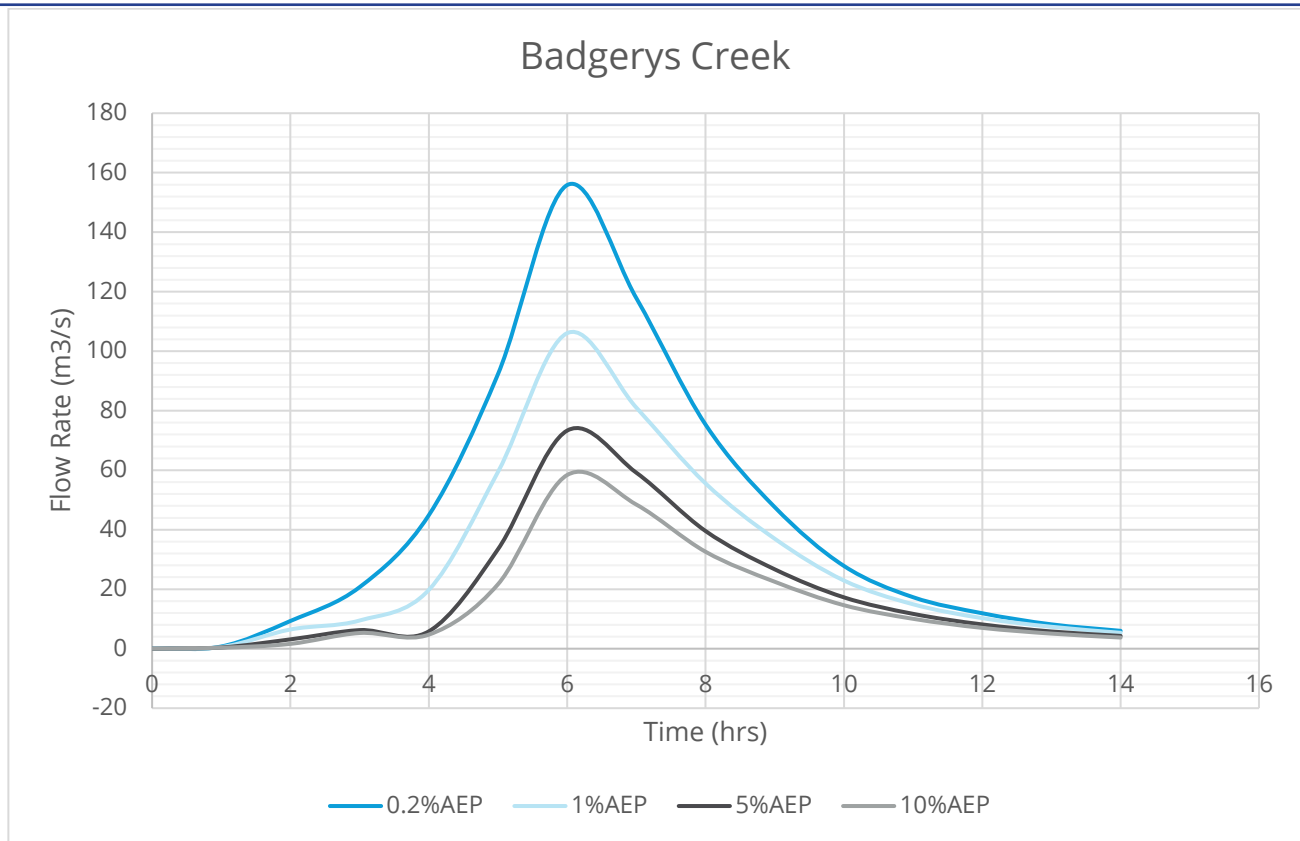


Figure 3-16 Badgerys Creek Flow Hydrograph at Upstream of Site (9 hour critical storm duration)

3.4.4.2 Developed Flood Results

The developed TUFLOW modelling for the BEW scenario was undertaken to simulate the 4EY, 10% AEP, 5% AEP, 1% AEP 1% AEP with climate change, 0.2% AEP and PMF events with storm durations as per Section 3.3.1.1. Note that this BEW scenario includes development of earth levels to near the ultimate surface but excludes roads, buildings, retaining walls the Eastern Ring Road and East West Arterial Road. Peak maximum envelope flood depths, levels, velocities, hazard mapping, and hydraulic category for these results are presented in Appendix B.

The hydraulic category mapping has been prepared using the floodway extents from the Advisian flood study (2022), supplied by Infrastructure NSW. The flood storage and fringe areas were identified based on the Advisian flood study (2022) which defines flood storage and flood fringe as:

- Flood storage – areas outside of the floodway and depths over 0.3m
- Flood fringe – areas outside of the floodway and depths up to 0.3m

The flood planning map was also presented in Appendix B identifying the flood planning level (based on the 1% AEP flood plus 500mm freeboard).

Major 1% AEP Storm Event

The results of the 1% AEP post-development conditions flood modelling are discussed below:

- The proposed BEW site has been set above the mainstream 1% AEP levels with over 500mm freeboard
- In the 1% AEP storm event, the flood depths are generally moderate (50-1000mm) around the overland flow paths and sag locations. Flood depths within the channels around the site reach up to 3m with

sediment basin flood depths reaching a maximum of approximately 3.7m. Nuisance stormwater flows of up to 50mm were filtered out from the site.

- Flood velocities are generally low to moderate (0.1 to 1.5m/s) within the site in the 1% AEP storm event, with only some localised areas reaching up to 3m/s
- In the 1% AEP storm event, the flood hazards are generally low (H1 to H2) within overland flow paths on the site. Areas reaching relatively high hazards (H3 to H5) are contained within sag locations, swales and sediment basins due to depth of flooding. However, it is expected that these hazardous areas can either be manoeuvred around or will not be trafficked by any people or vehicles during the bulk earthworks phase, hence there is negligible risk to life or property

The flood mapping representing the depths, velocities, and hazards experienced in a 1% AEP flood event in post-development conditions can be seen in Figure 3-17 to Figure 3-20.

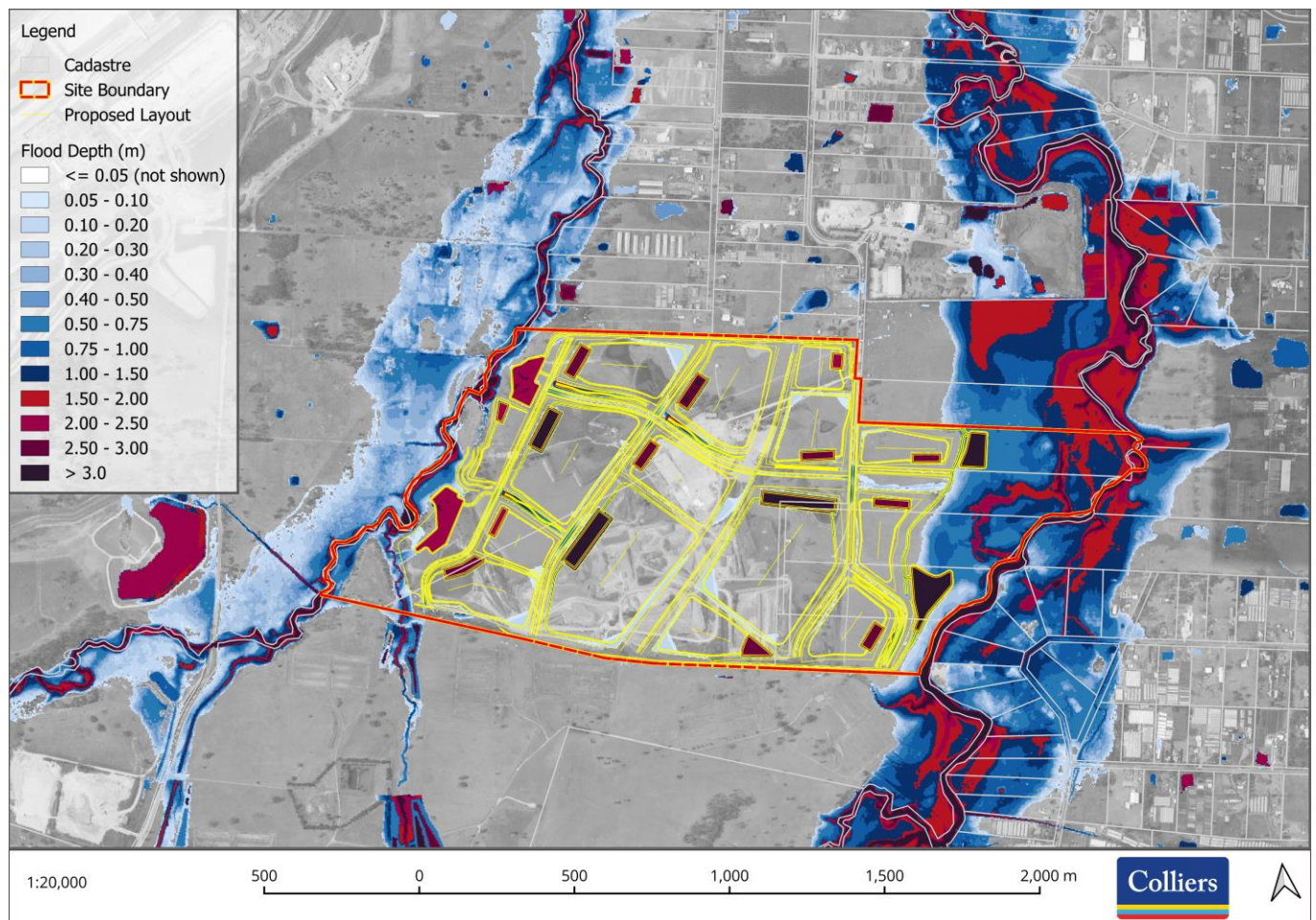


Figure 3-17 1% AEP Flood Depths – Developed Scenario

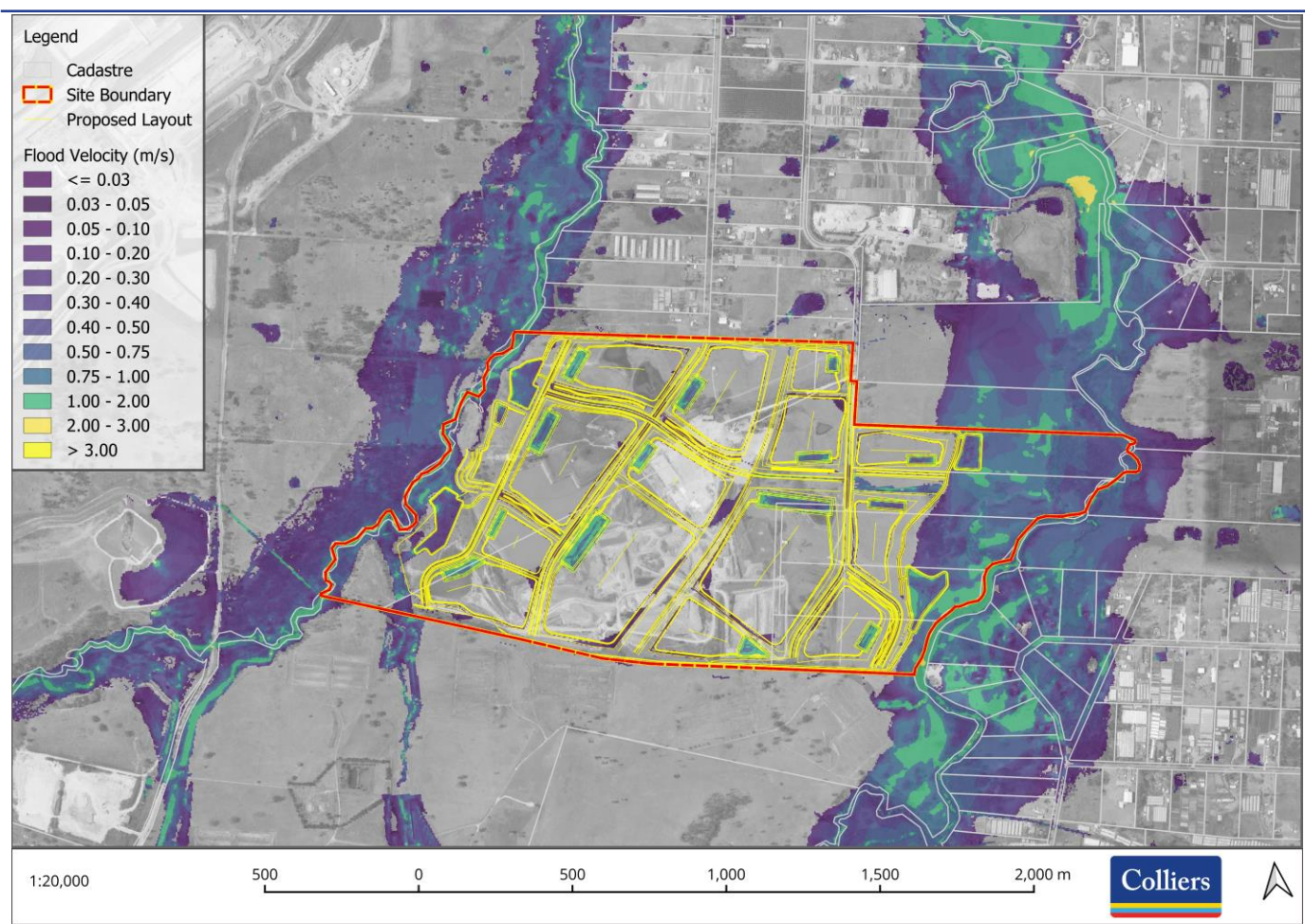


Figure 3-18 1% AEP Flood Velocities - Developed Scenario

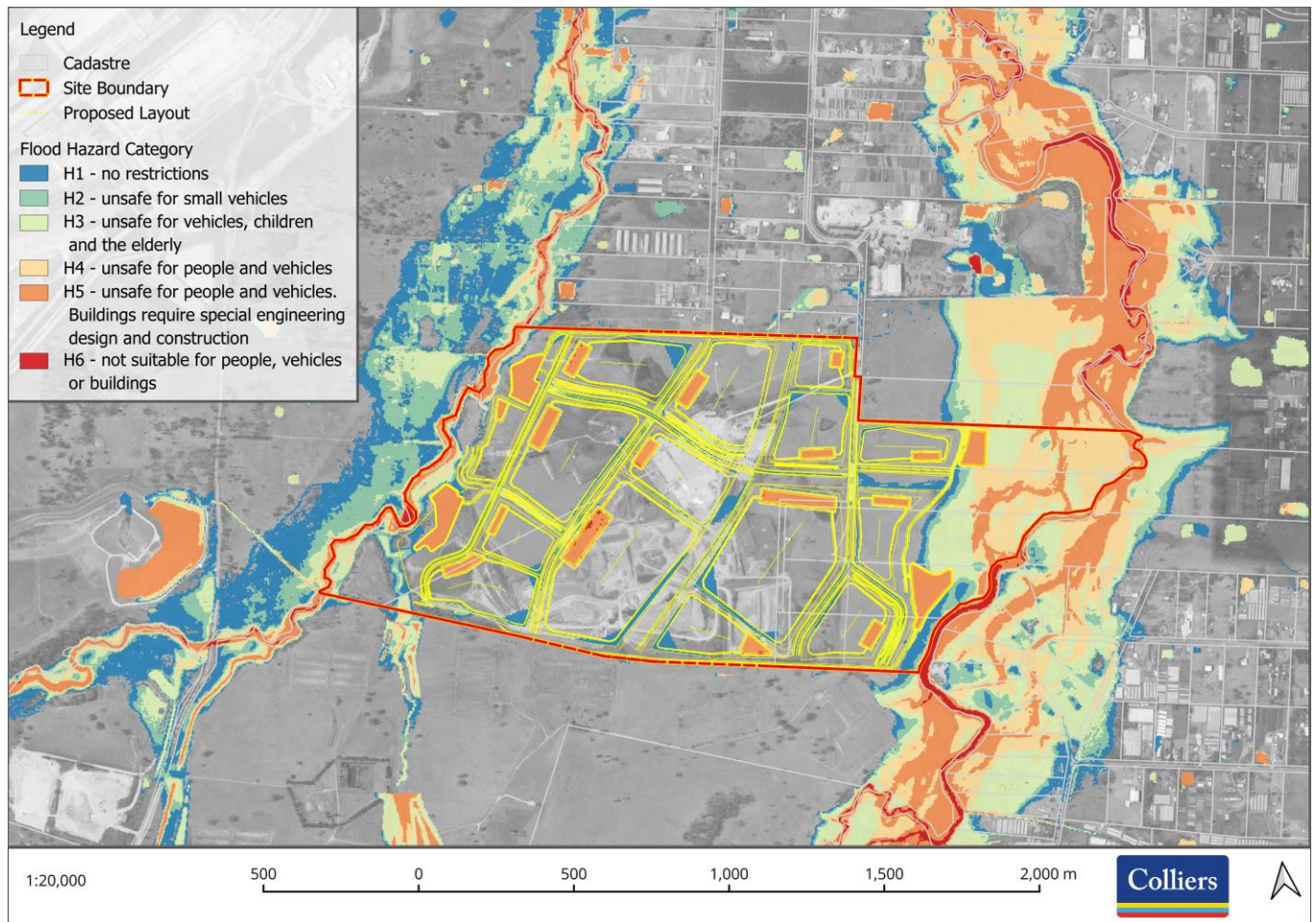


Figure 3-19 1% AEP Flood Hazards - Developed Scenario

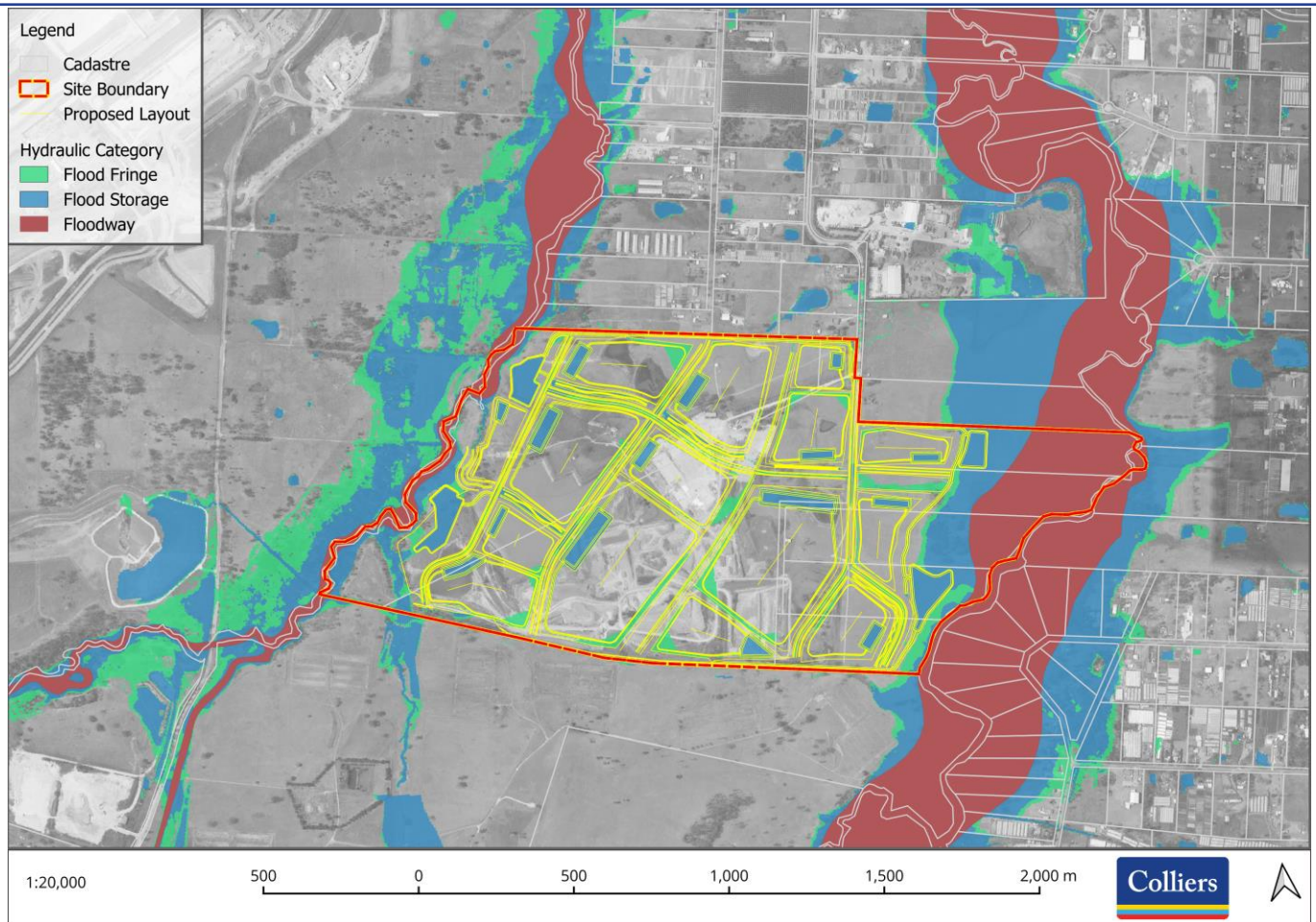


Figure 3-20 1% AEP Hydraulic Category - Developed Scenario

Minor 10% AEP Storm Event

The results of the 10% AEP post-development conditions flood modelling are discussed below:

- The proposed BEW site has been set above the mainstream 10% AEP levels
- In the 10% AEP storm event, the flood depths are generally moderate (50-1000mm) around the overland flow paths and sag locations. Flood depths within the channels around the site reach up to 2.6m with sediment basin flood depths reaching a maximum of approximately 3.7m. Nuisance stormwater flows of up to 50mm were filtered out from the site.
- Flood velocities are generally low to moderate (0.1 to 1.5m/s) within the site in the 10% AEP storm event, with only some localised areas reaching up to 3m/s
- In the 10% AEP storm event, the flood hazards are generally low (H1 to H2) within overland flow paths on the site. Areas reaching relatively high hazards (H3 to H5) are contained within sag locations, swales and sediment basins due to depth of flooding. However, it is expected that these hazardous areas can either be manoeuvred around or will not be trafficked by any people or vehicles during the bulk earthworks phase, hence there is negligible risk to life or property

Extreme PMF Storm Event

The results of the PMF post-development conditions flood modelling are discussed below:

- The proposed BEW site has been set above the mainstream PMF levels
- In the PMF storm event, the flood depths are generally moderate (50-1300mm) around the overland flow paths and sag locations. Flood depths within the channels around the site reach up to 3.4m with sediment basin flood depths reaching a maximum of approximately 3.8m. Nuisance stormwater flows of up to 50mm were filtered out from the site.
- Flood velocities are generally low to moderate (0.1 to 1.5m/s) within the site in the PMF storm event, with only some localised areas reaching up to 3m/s
- In the PMF storm event, the flood hazards are generally low (H1 to H2) within overland flow paths on the site. Areas reaching relatively high hazards (H3 to H5) are contained within sag locations, swales and sediment basins due to depth of flooding. However, it is expected that these hazardous areas can either be manoeuvred around or will not be trafficked by any people or vehicles during the bulk earthworks phase, hence there is negligible risk to life or property

The full range of flood mapping representing the depths, velocities, hazards, and hydraulic category experienced in post-development conditions can be seen in Appendix B.

3.4.5 Flood Impact Assessment

3.4.5.1 Afflux

Afflux is the difference between water surface elevation levels from the developed case to the existing case.

Major 1% AEP Storm Event

The 1% AEP developed flood impacts identified due to the development of the BEW surface are as follows.

- Generally, the increased or reduced flood levels within the site and immediately adjacent of the site boundary, including north and south access roads, are due to changes within the topographic levels caused by filling of the site which elevates the water level on the surface. This does not represent any actual flood impacts and are considered to be acceptable.
- At the north-eastern basin, there are increased flood levels of up to 65mm in a localised area along the northern boundary. This is due to the concentration of flows from the collection swales into the north east corner of the site. This is a localised increase and is offset by reductions along South Creek. Furthermore, this increase is temporary and will be resolved once the site has been developed as the proposed trunk drainage corridors will appropriately convey overland flows. Thus, it is considered to be acceptable in its current state. In the next design phase, it is anticipated that mitigation measures involving a tail-out swale to relocate the discharge location can be implemented to reduce or eliminate the impacts.
- There are no material adverse changes in flood levels downstream of the site in both Badgerys and Wianamatta-South Creeks downstream of the site all the way to the confluence of creeks, demonstrating the development of the BEW surface is not adversely impacting flood conditions downstream.

The 1% AEP post-development afflux mapping within the site and downstream to the confluence of creek is illustrated below in Figure 3-21 and Figure 3-22.

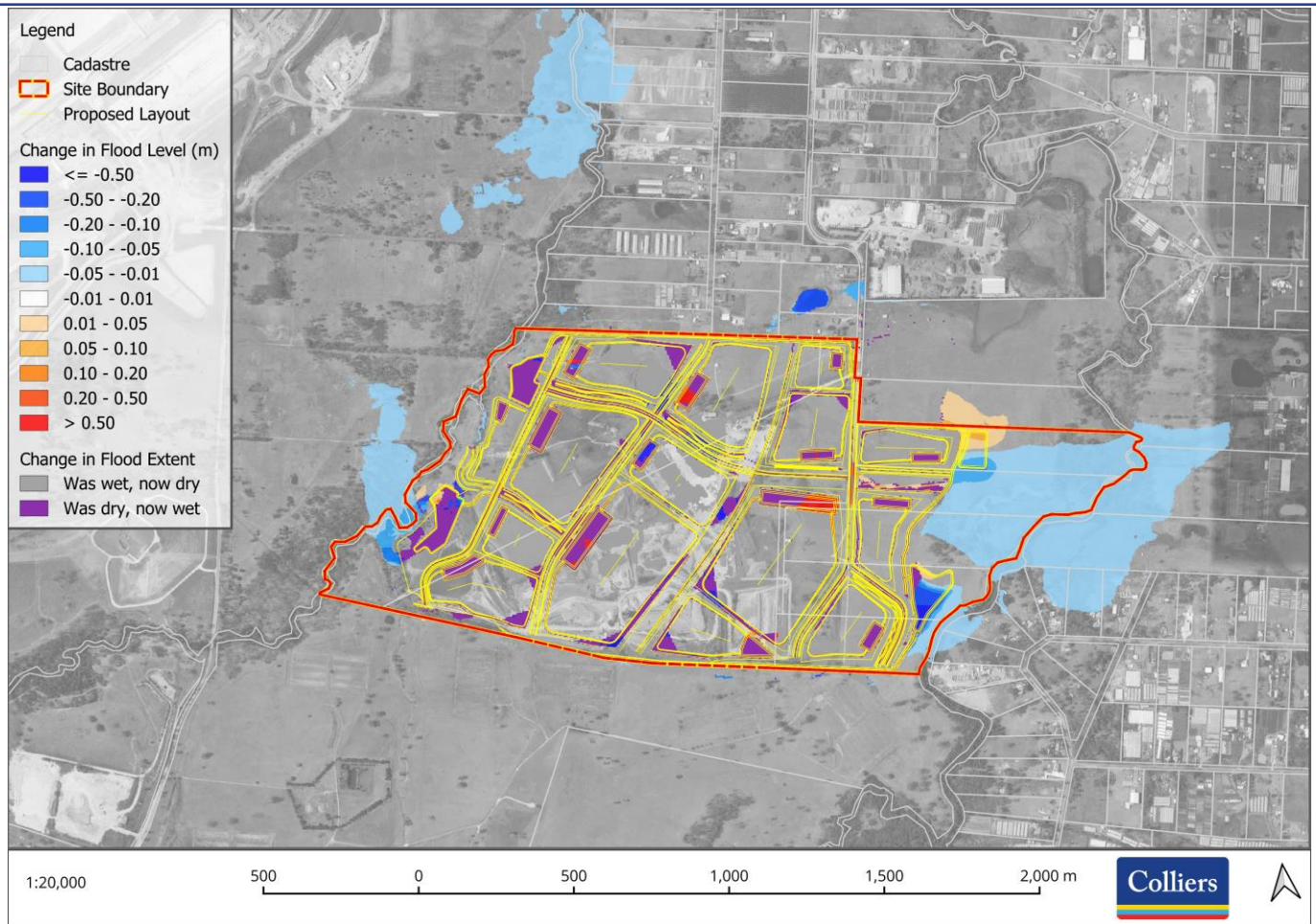


Figure 3-21 1% AEP Developed Afflux Map – Site

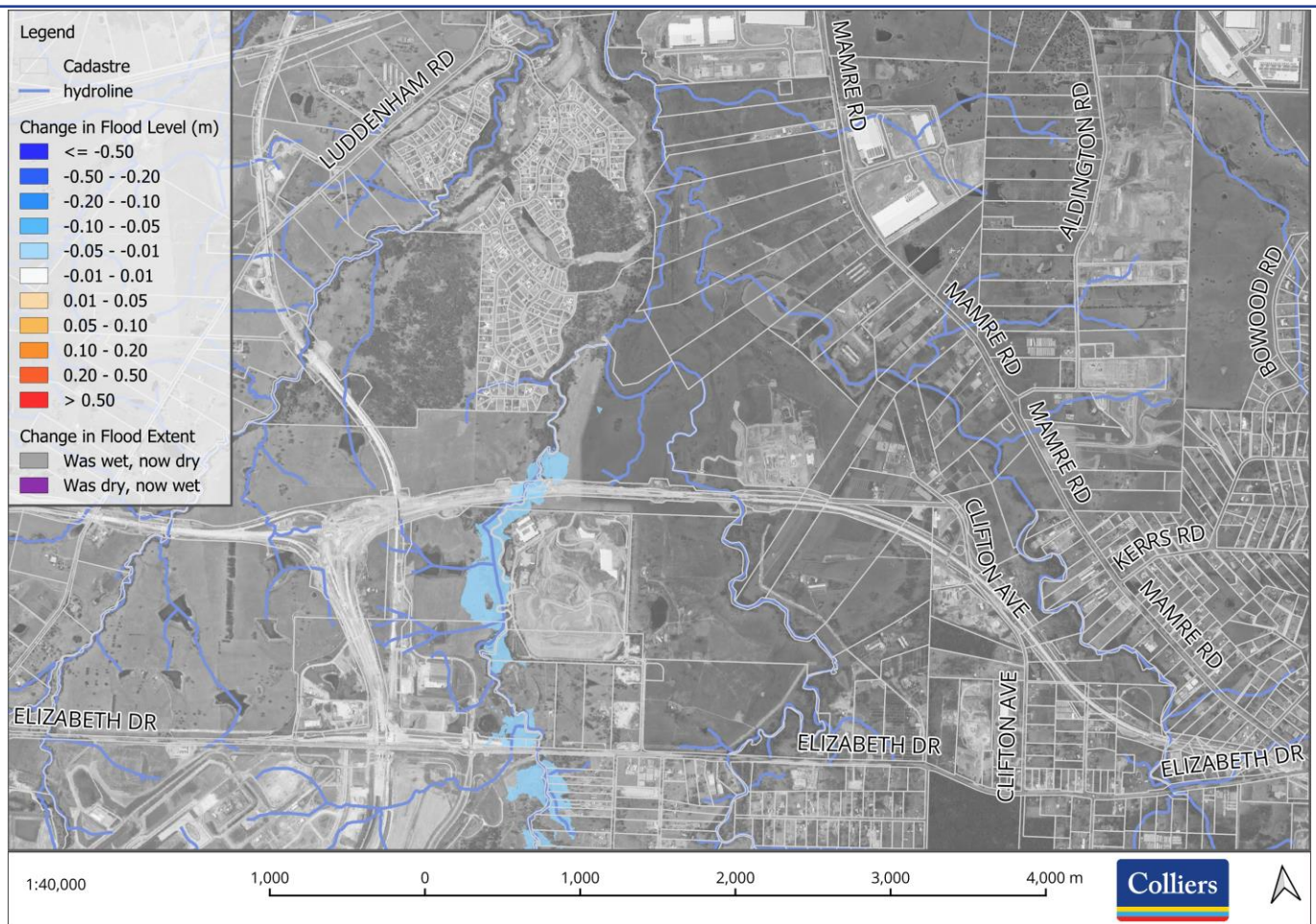


Figure 3-22 1% AEP Developed Afflux Map – Elizabeth Drive to Confluence of Creeks

Detailed 1% AEP flood modelling for the BEW site demonstrates that there are no material adverse offsite impacts due to the development of the site. Changes in flood behaviour within the site are due to the changed terrain which was designed to contain flooding within designated overland flow paths. It is demonstrated that the BEW surface will produce no adverse impacts downstream to the confluence of Wianamatta-South Creek and Badgerys Creek. Thus, the proposed development is considered acceptable from a flood impact perspective.

Minor 10% AEP Storm Event

The 10% AEP developed flood impacts identified due to the development of the BEW surface are as follows.

- Generally, the increased or reduced flood levels within the site and immediately adjacent of the site boundary, including north and south access roads, are due to changes within the topographic levels caused by filling of the site which elevates the water level on the surface. This does not represent any actual flood impacts and are considered to be acceptable.
- At the north-eastern basin, there are increased flood levels of up to 60mm in a localised area along the northern boundary. This is due to the concentration of flows from the collection swales into the north east corner of the site. This is a localised increase and is offset by reductions along South Creek. Furthermore, this increase is temporary and will be resolved once the site has been developed. Thus, it is considered to be acceptable in its current state. In the next design phase, mitigation measures involving a tail-out swale will be implemented to reduce or eliminate the impacts.

- There are no material adverse changes in flood levels downstream of the site in both Badgerys and Wianamatta-South Creeks downstream of the site all the way to the confluence of creeks, demonstrating the development of the BEW surface is not adversely impacting flood conditions downstream.

The 10% AEP post-development afflux mapping within the site and downstream to the confluence of creek is illustrated below in Figure 3-23 and Figure 3-24.

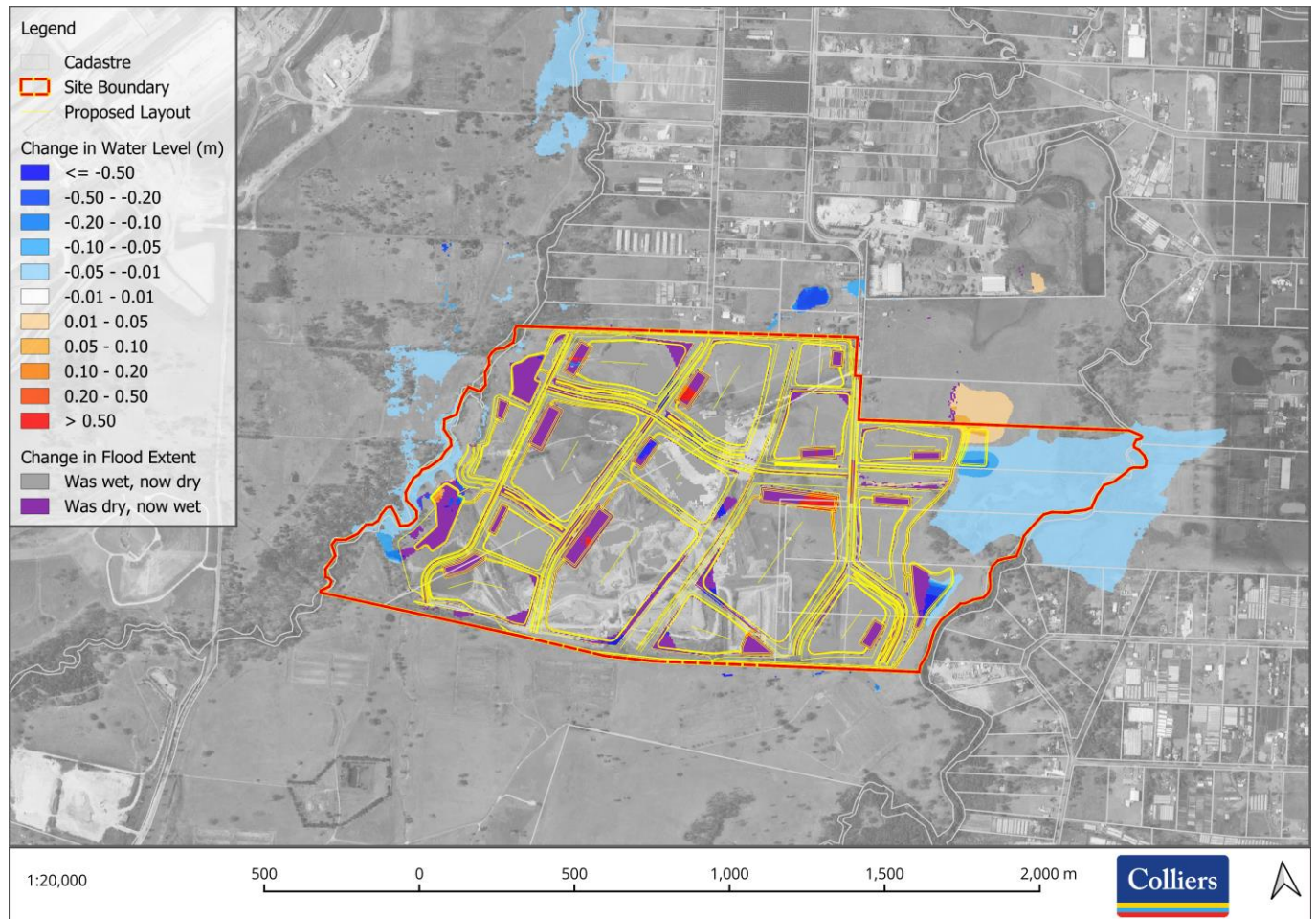


Figure 3-23 10% AEP Developed Afflux Map – Site

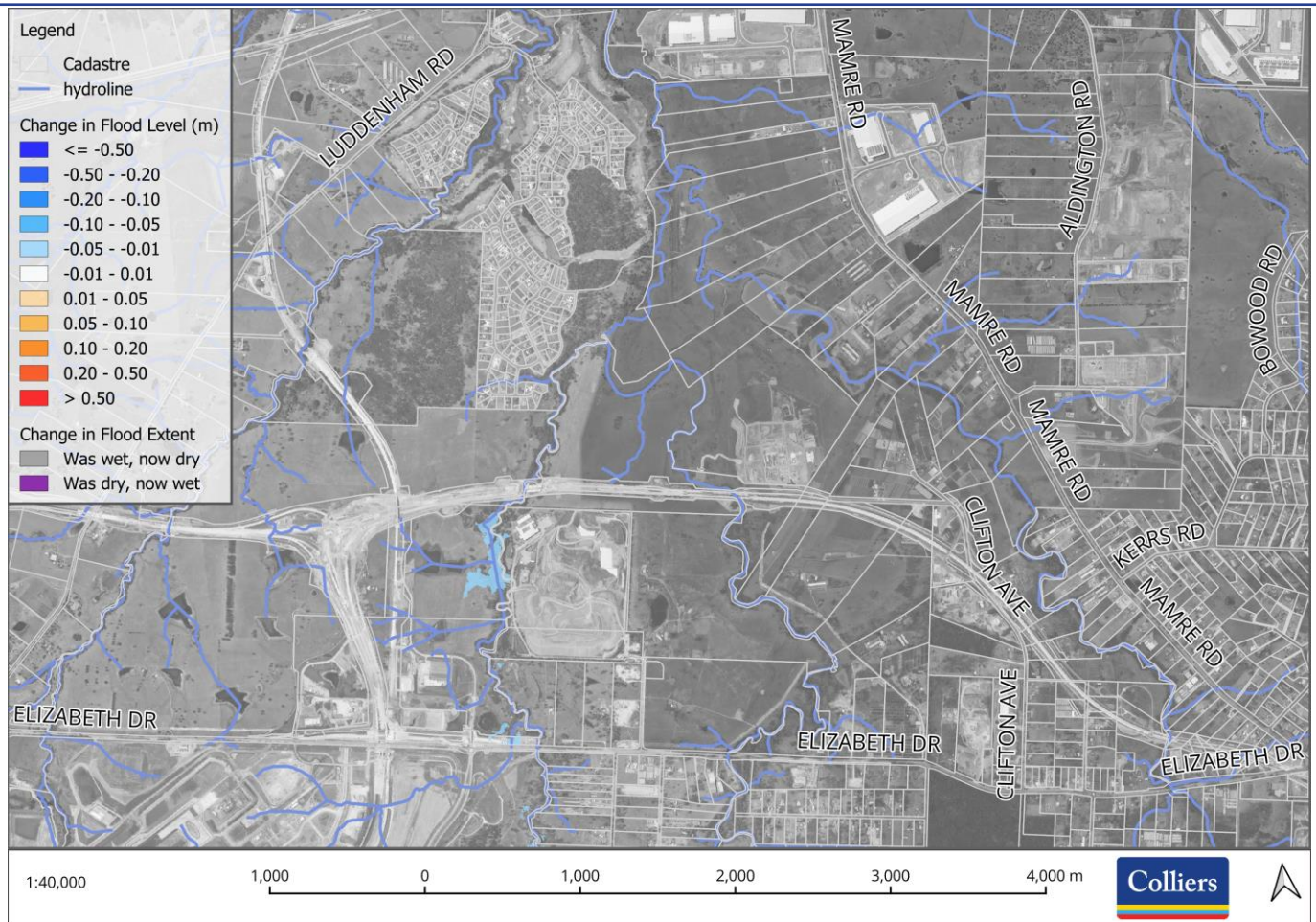


Figure 3-24 10% AEP Developed Afflux Map – Elizabeth Drive to Confluence of Creeks

Extreme PMF Storm Event

The PMF developed flood impacts identified due to the development of the BEW surface are as follows.

- Generally, the increased or reduced flood levels within the site and immediately adjacent of the site boundary, including north and south access roads, are due to changes within the topographic levels caused by filling of the site which elevates the water level on the surface. This does not represent any actual flood impacts and are considered to be acceptable.
- At the south-eastern boundary, there are increased flood levels of up to 40mm in a localised area along the southern boundary.
- At the eastern boundary, there are increased flood levels of up to 15mm in a localised area within the Wianamatta-South Creek
- At the western boundary, there are increased flood levels of up to 90mm in a localised area within Badgerys Creek
- There are increased flood levels of up to 11mm in a localised area downstream of the site in Badgerys Creek prior to the M12
- Given the likelihood of a PMF event, these flood level impacts are considered to be negligible.

The PMF post-development afflux mapping within the site and downstream to the confluence of creek is illustrated below in Figure 3-25 and Figure 3-26

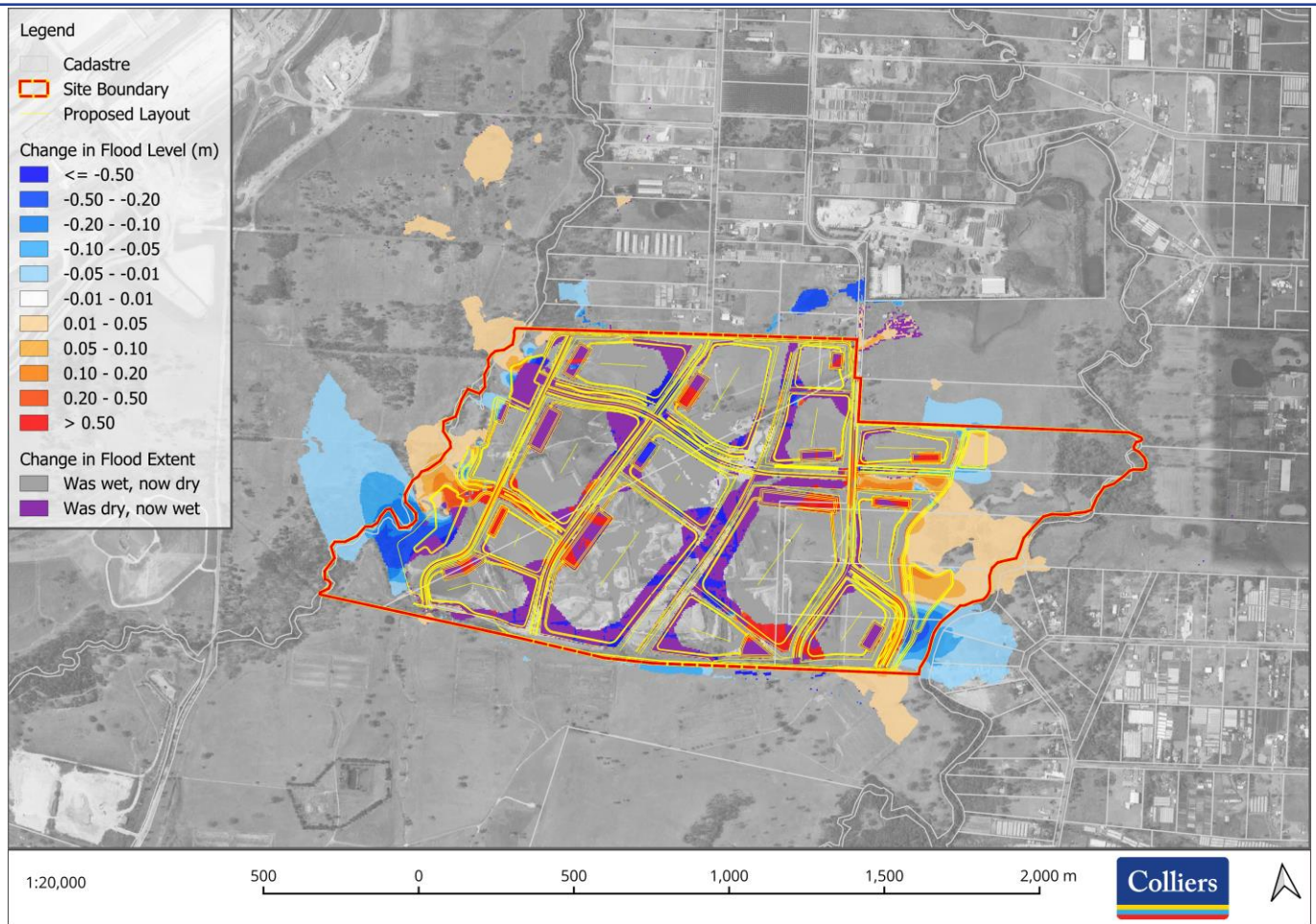


Figure 3-25 PMF Developed Afflux Map – Site

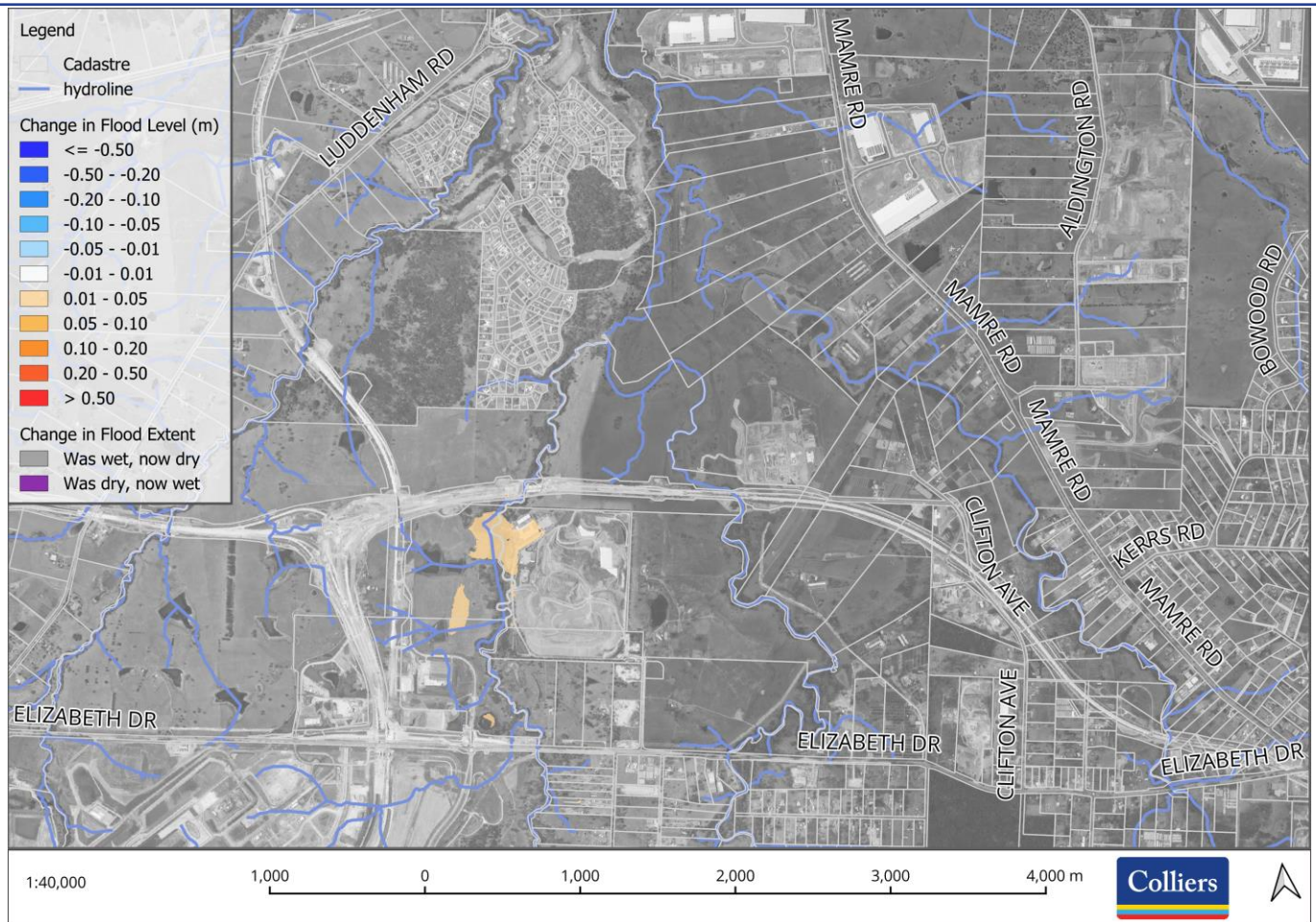


Figure 3-26 PMF Developed Afflux Map – Elizabeth Drive to Confluence of Creeks

3.4.5.2 Peak Flow Hydrograph Comparison

Flow hydrographs were observed at various locations throughout the site using 2d_PO lines in both pre and post development scenarios. See Figure 3-27 and Figure 3-28 for reporting locations.

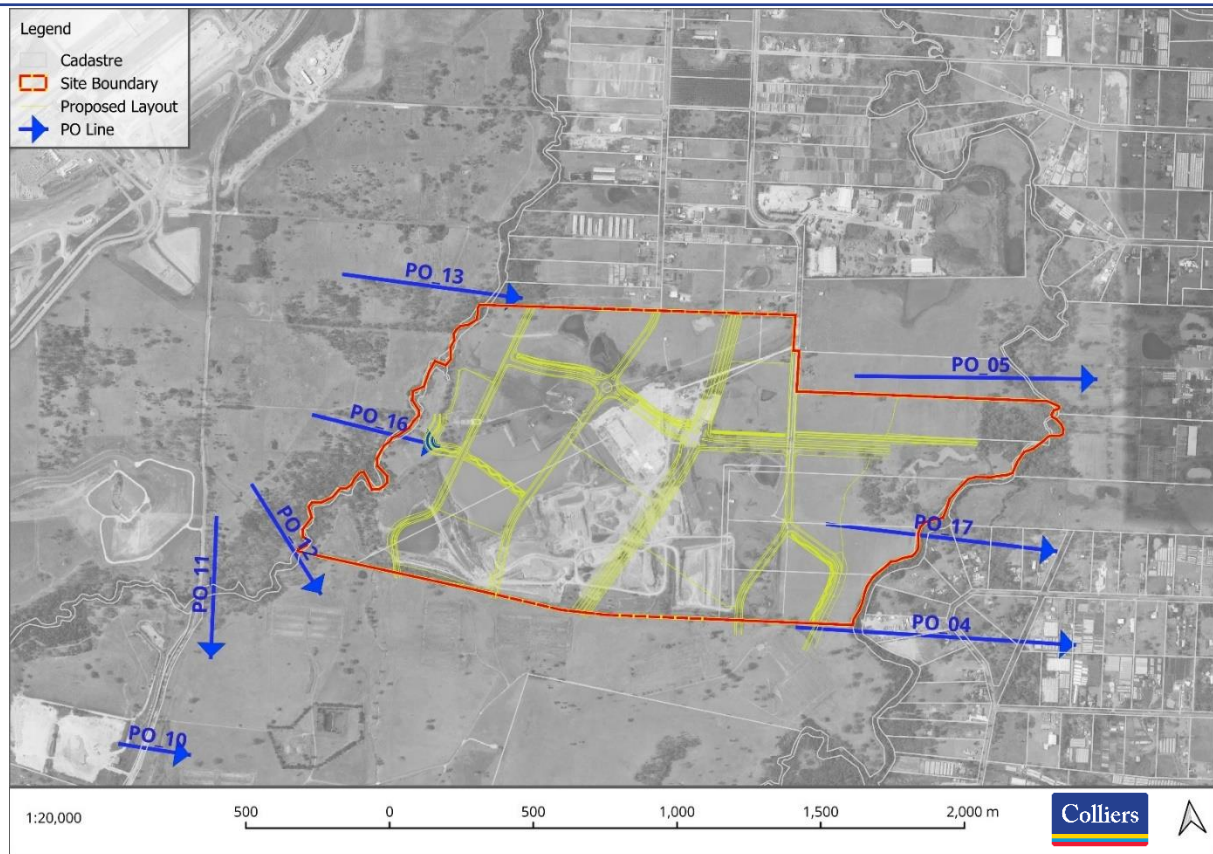


Figure 3-27 Locations of PO Lines - Site

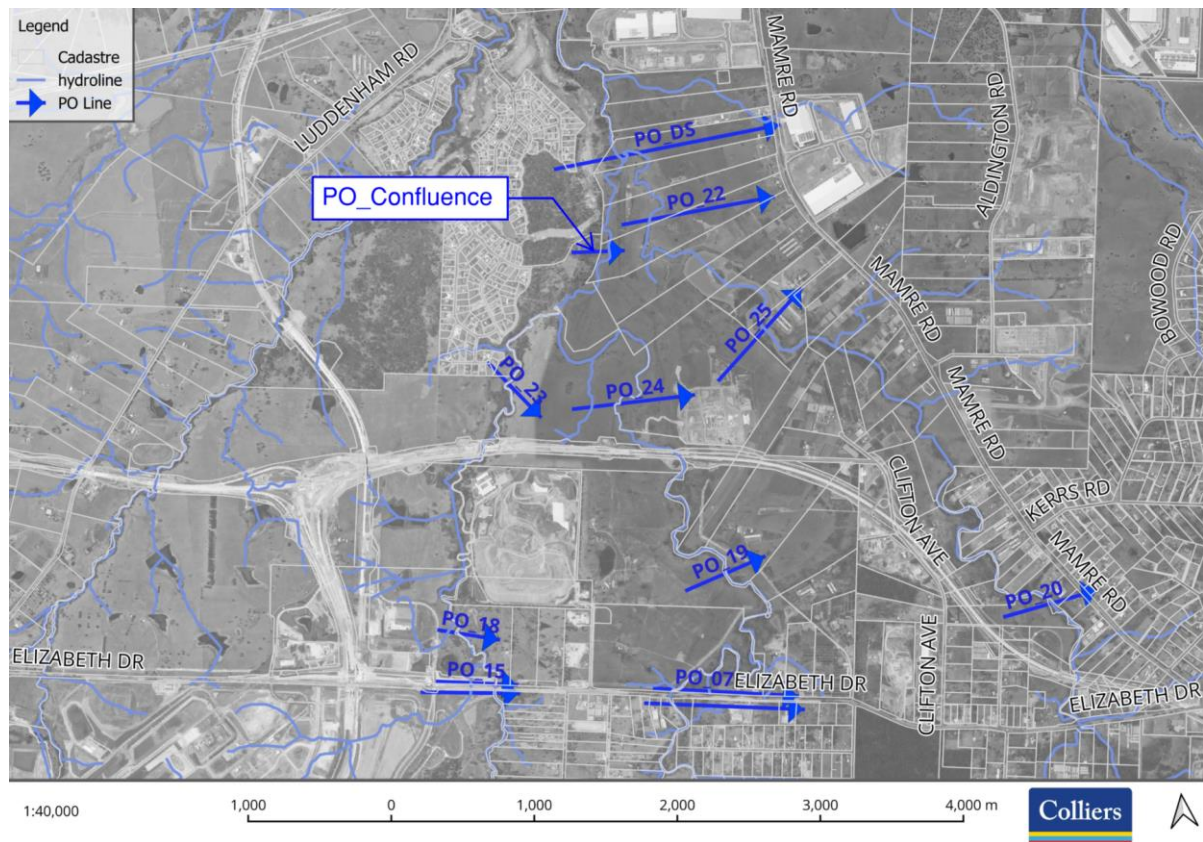


Figure 3-28 Locations of PO Lines - Elizabeth Drive to Confluence of Creeks

Flow hydrographs for pre and post development conditions were compared downstream of the site at Wianamatta-South Creek and Badgerys Creek (specifically PO_05 for Wianamatta-South Creek and PO_13 for Badgerys Creek) and at the confluence of Wianamatta-South Creek and Badgerys Creek (specifically PO_Confluence). This was done to ensure that post-development peak flow and timing of peaks were consistent with pre-development conditions. Table 3-5 compares the peak flows for each creeks critical storm (36 hours for Wianamatta-South Creek and 9 hours for Badgerys Creek) immediately downstream of the site and at the confluence of creeks for the 0.2% AEP, 1% AEP, 5% AEP, and 10% AEP storm events. Figure 3-29 and Figure 3-30 show the compared hydrographs between pre and post development scenarios for each creeks critical storm immediately downstream of the site and at the confluence of creeks for the 0.2% AEP, 1% AEP, 5% AEP, and 10% AEP storm events.

Table 3-5 shows that peak flows are typically lower by up to 2.7% in the post-development scenario for all events other than the 0.2% AEP storm event which show a negligible increase at the confluence of creek. Figure 3-29 to Figure 3-31 shows the consistency between peak flows and timing of peaks between scenarios. Therefore, it has been demonstrated that the proposed development will not cause adverse impacts and is compatible with the existing flood behaviour of Wianamatta-South Creek and Badgerys Creek. Thus, the proposed development is considered acceptable from a flood impact perspective.

Table 3-5 Critical Storm Peak Flow Comparison

Storm Event	Scenario	Critical Storm Peak Flows (m ³ /s)		
		Wianamatta-South Creek PO_05	Badgerys Creek PO_13	Confluence PO_Confluence
0.2% AEP	Pre-development	624.459	203.645	554.473
	Post-development	624.170	201.209	554.557
1% AEP	Pre-development	451.297	128.542	508.645
	Post-development	451.013	125.193	508.510
5% AEP	Pre-development	347.431	88.986	445.353
	Post-development	347.128	87.376	444.292
10% AEP	Pre-development	290.776	70.546	378.831
	Post-development	290.423	69.158	377.729

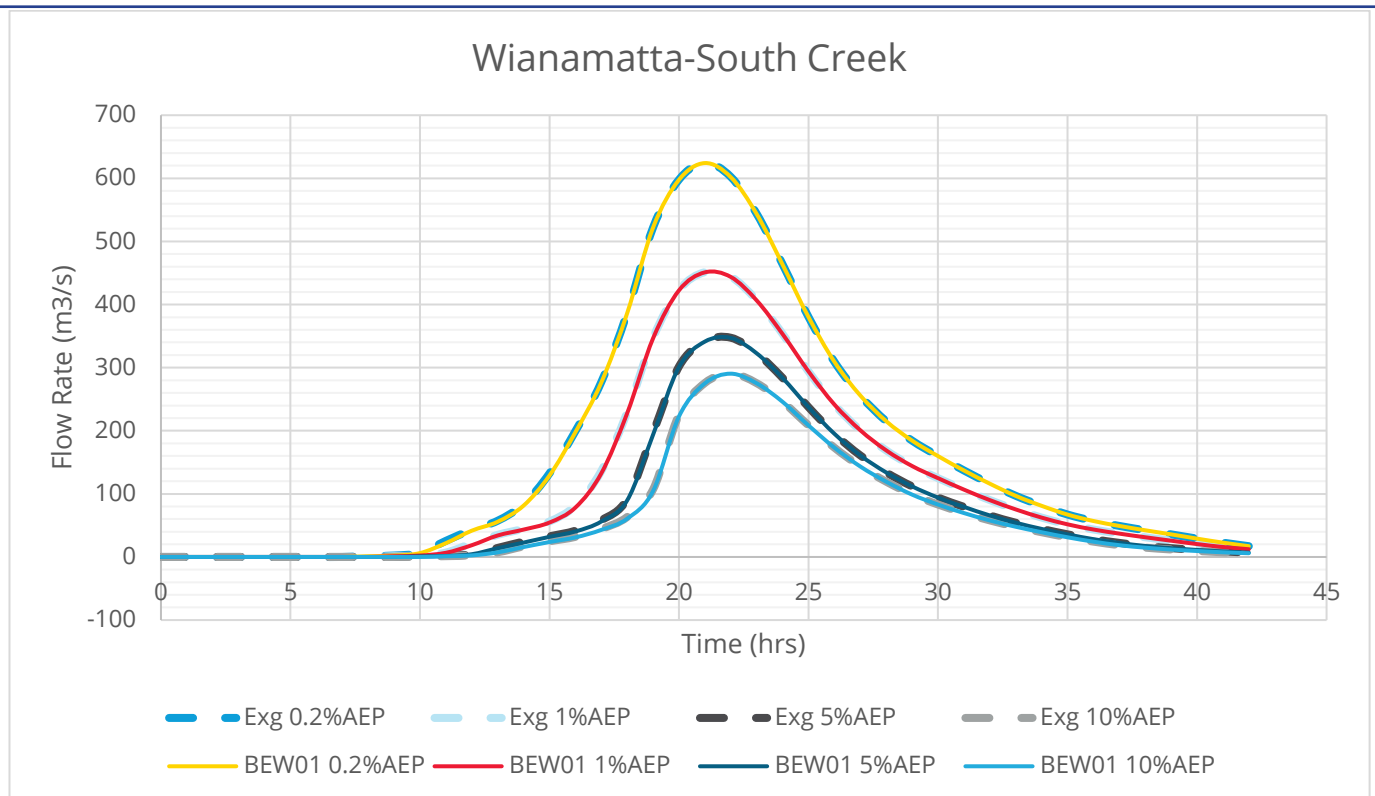


Figure 3-29 Wianamatta-South Creek Flow Hydrograph Comparison Downstream of Site (36 hour critical storm)

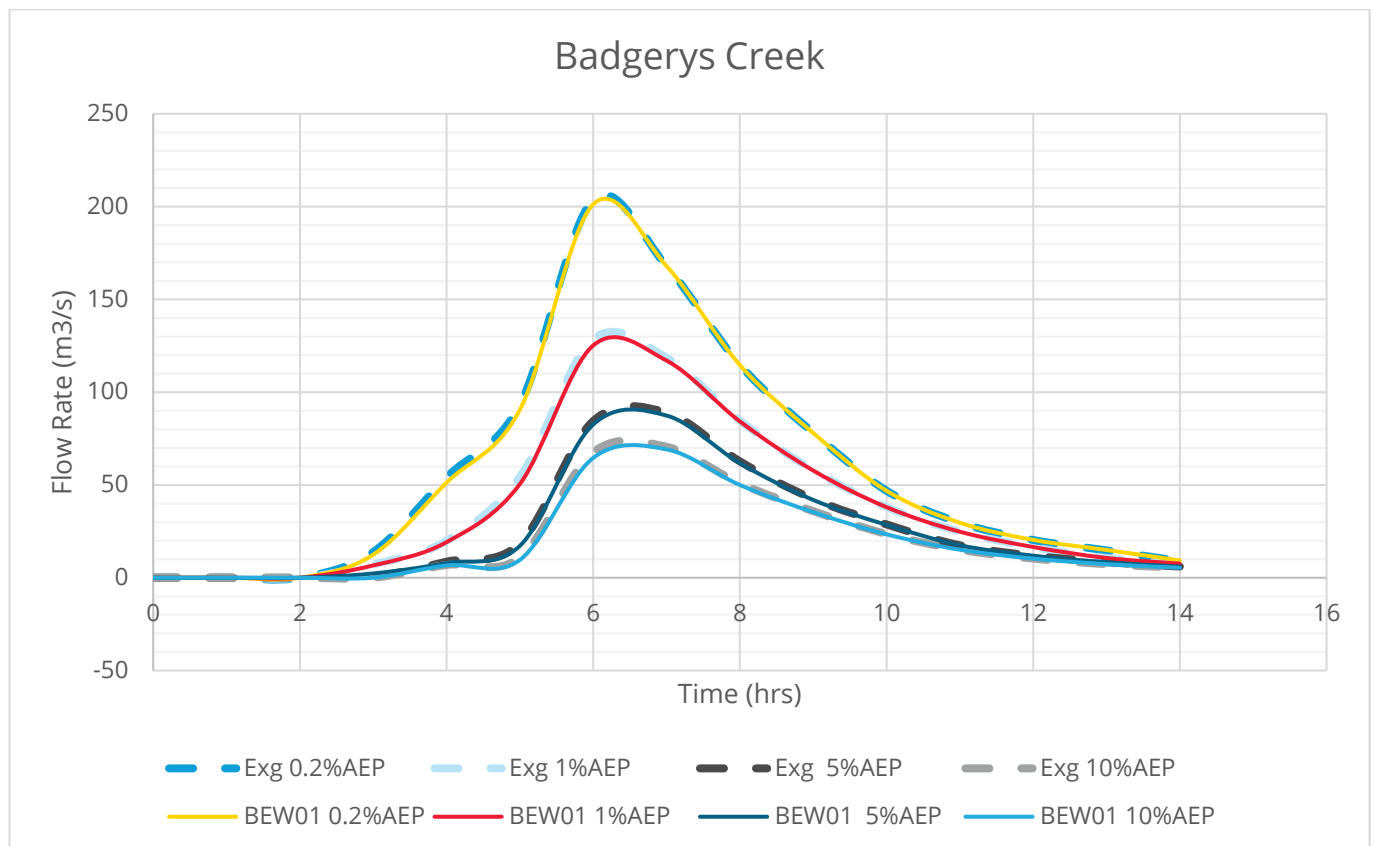


Figure 3-30 Badgerys Creek Flow Hydrograph Comparison Downstream of Site (9 hour critical storm)

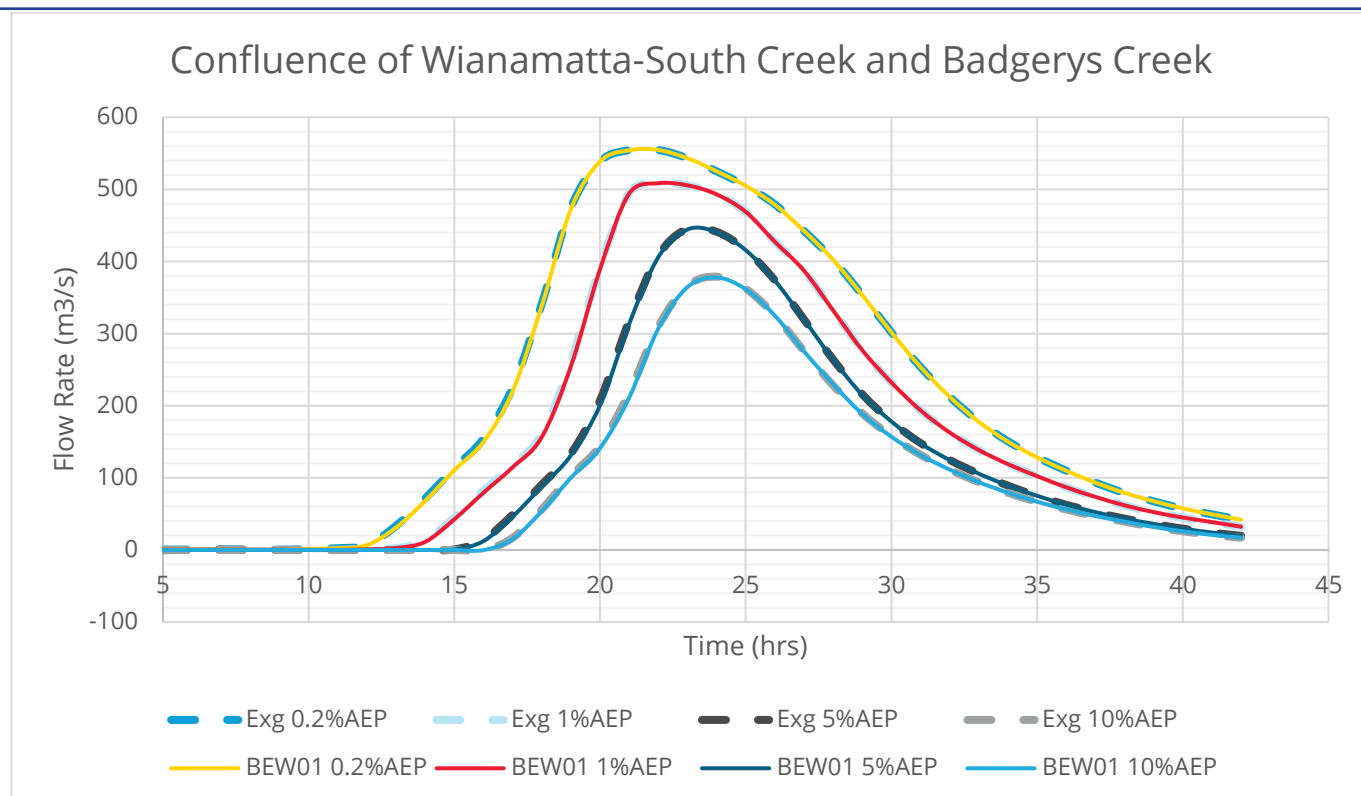


Figure 3-31 Confluence of Creeks Flow Hydrograph Comparison Downstream of Site (36 hour critical storm)

3.4.6 Climate Change Assessment

Climate change has the potential to influence future flood behaviour through increases in rainfall intensity, sea levels, and catchment runoff. Current best-practice flood planning requires consideration of possible future conditions to ensure development remains resilient over its design life. As such, a climate change scenario was ran using the Shared Socioeconomic Pathways (SSPs) which include five pathways, each representing different global futures. In particular, SSP3-7.0 was used with a long-term consideration up to the year 2090. See Table 3-6 for the climate change factors used to scale the rainfall hydrology for each critical storm duration in the 1% AEP event.

Table 3-6 Climate Change Factors - SSP3-7.0 Year 2090 (Source: AR&R Datahub)

Year	<1 hour	2 hours	9 hours	>24hours
2090	1.59	1.49	1.35	1.29

The climate change scenario with increased rainfall intensity was run for the 1% AEP storm event. The rise in water level in the BEW surface and both creeks (Badgerys and Wianamatta-South) due to the increased rainfall intensity in these events did not cause an unacceptable increase in flood inundation of the proposed development. Overland flow paths within the site still have sufficient space contain the 1% AEP with climate change flood extents. Therefore, climate change is not considered to be a risk to the development.

The flood mapping representing the depths experienced in a 1% AEP flood event in post-development climate change scenario can be seen in Figure 3-32.

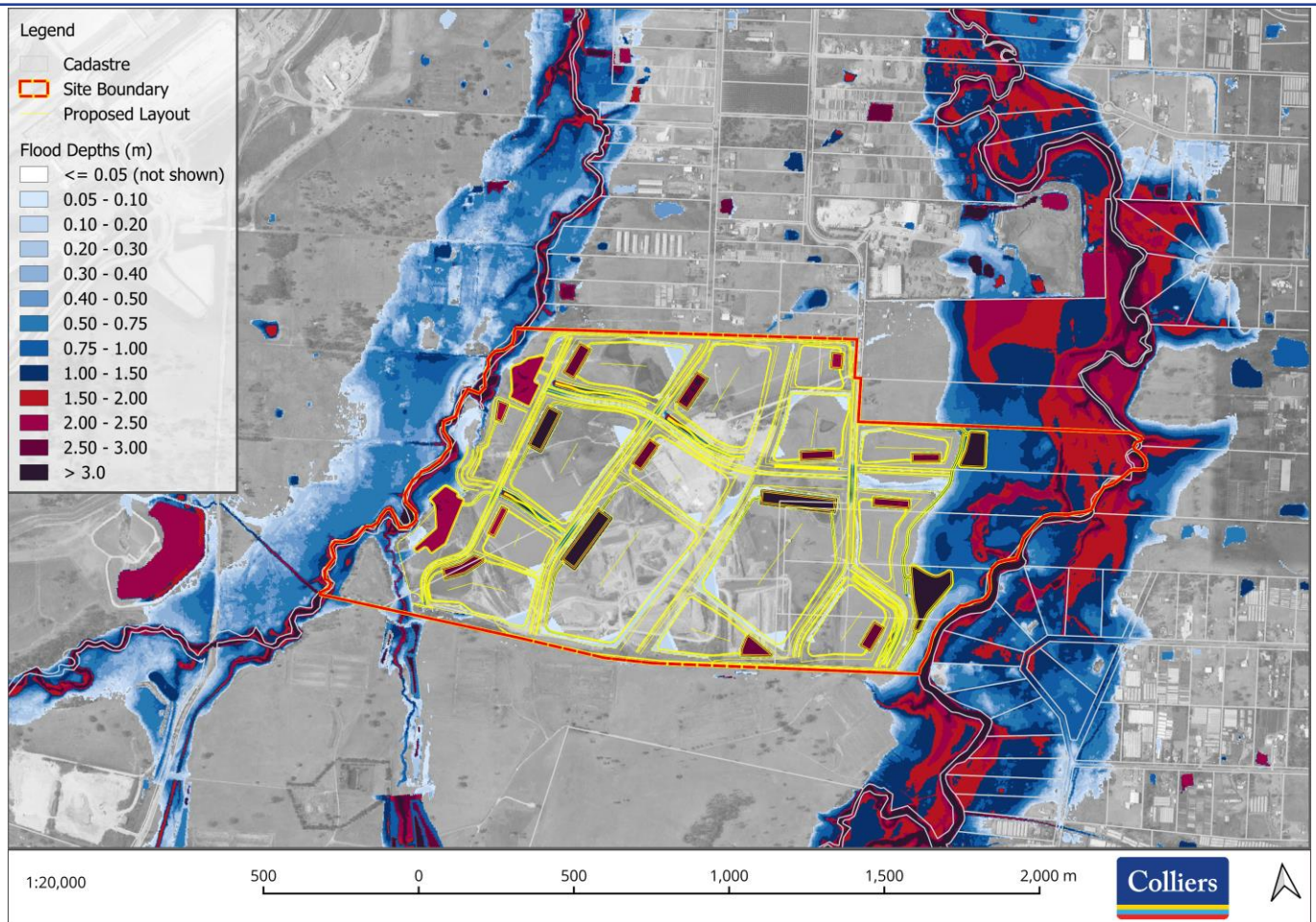


Figure 3-32 1% AEP Flood Depths – Developed Climate Change Scenario

3.4.7 Flood Storage Assessment

The mainstream flood volumes have been determined by calculating the difference between flood and surface levels within the Site's boundary. An assessment of the approximate 1% AEP flood storage volumes in pre and post development conditions are shown in Table 3-7.

The results indicate that there is a negligible increase in storage in Badgerys Creek and an additional 53,102 m³ of flood storage available largely due to the regional sediment basins located within the floodplain. Therefore, there will be no loss of flood storage or adverse impacts on flood behaviour in the post-development scenario.

Table 3-7 1% AEP Flood Storage Comparison

	Pre-development	Post-development	Difference
Wianamatta-South Creek	225,467 m ³	278,569 m ³	+53,102 m ³
Badgerys Creek	98,719 m ³	100,846 m ³	+2,127 m ³

3.4.8 Cumulative Impact Assessment

Cumulative impacts caused by the project site and other existing and proposed developments within the area should be considered as these impacts can significantly alter the flood behaviour of the creeks and watercourses within the catchment.

Advisian have already conducted a cumulative impact assessment (RevE 2023) as part of the Wianamatta-South Creek Flood Study which encompasses the Site. The cumulative impact assessment by Advisian (RevE 2023) finds that planned urbanisation associated with the Aerotropolis, Western Sydney Airport, and Southwest Growth Centre will increase peak flood levels across the catchment. Therefore, it is essential that each development within the catchment manages flood behaviour on-site to prevent adverse off-site impacts and to ensure that surrounding creeks and waterways continue to function in a manner consistent with pre-development conditions.

In the design development of the Site, considerations have been made of the existing and proposed developments within the Aerotropolis precinct that may impact the site. Table **3-8** outlines SSDA's within the study area that have been considered for cumulative impact on the site. The approved, under construction and completed developments have been considered in the TUFLOW hydraulic model pre-development scenario through 2d_zsh terrain modifications and hydrologic catchment parameter adjustments in the XP-RAFTS model. The modifications made for each development was based on publicly available reports and drawings.

Each of these individual developments would be required to implement measures to mitigate the flood impacts associated with their development up to and including the 1% AEP storm event. As such, no significant changes in the flood conditions of Badgerys Creek and Wianamatta-South Creek would be expected.

As discussed in Section **3.4.5**, the Site does not produce any adverse off site impacts in the 1% AEP storm event. Although there are increases in flood levels in more extreme storm events, the flood behaviour of Wianamatta-South Creek and Badgerys Creek remain consistent with pre-development conditions all the way up to and including the confluence of creeks, as discussed in Section **3.4.5.2**. Thus, the potential for cumulative impacts on flood behaviour caused by the site and surrounding developments are expected to be minor.

Table 3-8 SSDA's around the site

DA Reference	DA Description	Project Status
Elizabeth Enterprise Precinct - Stage 1 1669 – 1723 Elizabeth Drive, Badgerys Creek SSD-19618251	Staged development of warehousing facilities	Approved
Inghams Property Group (IPG) Masterplan 475 Badgerys Creek Road, Bradfield	Development of warehousing and logistic estate, with a commercial centre	Approved
Aldi Automated Distribution Centre 475 Badgerys Creek Road SSD-76913969	Construction and operation of an automated warehouse and distribution centre	Approved
Badgerys Creek Industrial Park 85 Martin Road, Bradfield SSD-74191717	Development of a warehouse and distribution centre	Under assessment
Elizabeth Drive Upgrades	Upgrade of Elizabeth Drive between the M7 motorway at Cecil hills to the Northern Road	In planning
M12	Construction and operation of a new motorway connecting the M7, the Western Sydney International Airport, and The Northern Road	Completed
Western Sydney International Airport	Construction and operation of a new airport	Under construction

3.4.9 Flood Emergency Management Response Strategy

Currently, the site topography in conjunction with the proposed earthworks grading locates the site outside the mainstream PMF extent. However, Elizabeth Drive experiences high hazard flooding (up to H6) caused by Wianamatta-South Creek and Badgerys Creek. As such, evacuation via Lawson Road or Martin Road towards Elizabeth Drive may not be currently available.

It is noted that there are plans to upgrade Elizabeth Drive by December 2029. It is assumed that the new road levels along Elizabeth Drive may be lifted above PMF levels to allow for evacuation of future residents in the precinct. Therefore, evacuation via Elizabeth Drive may become available.

If evacuation via Elizabeth Drive is required prior to the completion of road upgrade works, the peak of the PMF storm event is expected to occur approximately five hours after its onset. This lead-time means that early warnings issued by the Bureau of Meteorology (BoM) or as part of the NSW SES Total Flood Warning System can provide a critical window for occupants to safely evacuate the site before floodwaters along Elizabeth Drive rise to levels that are unsafe or impassable.

The evacuation routes discussed are shown in Figure 3-33.

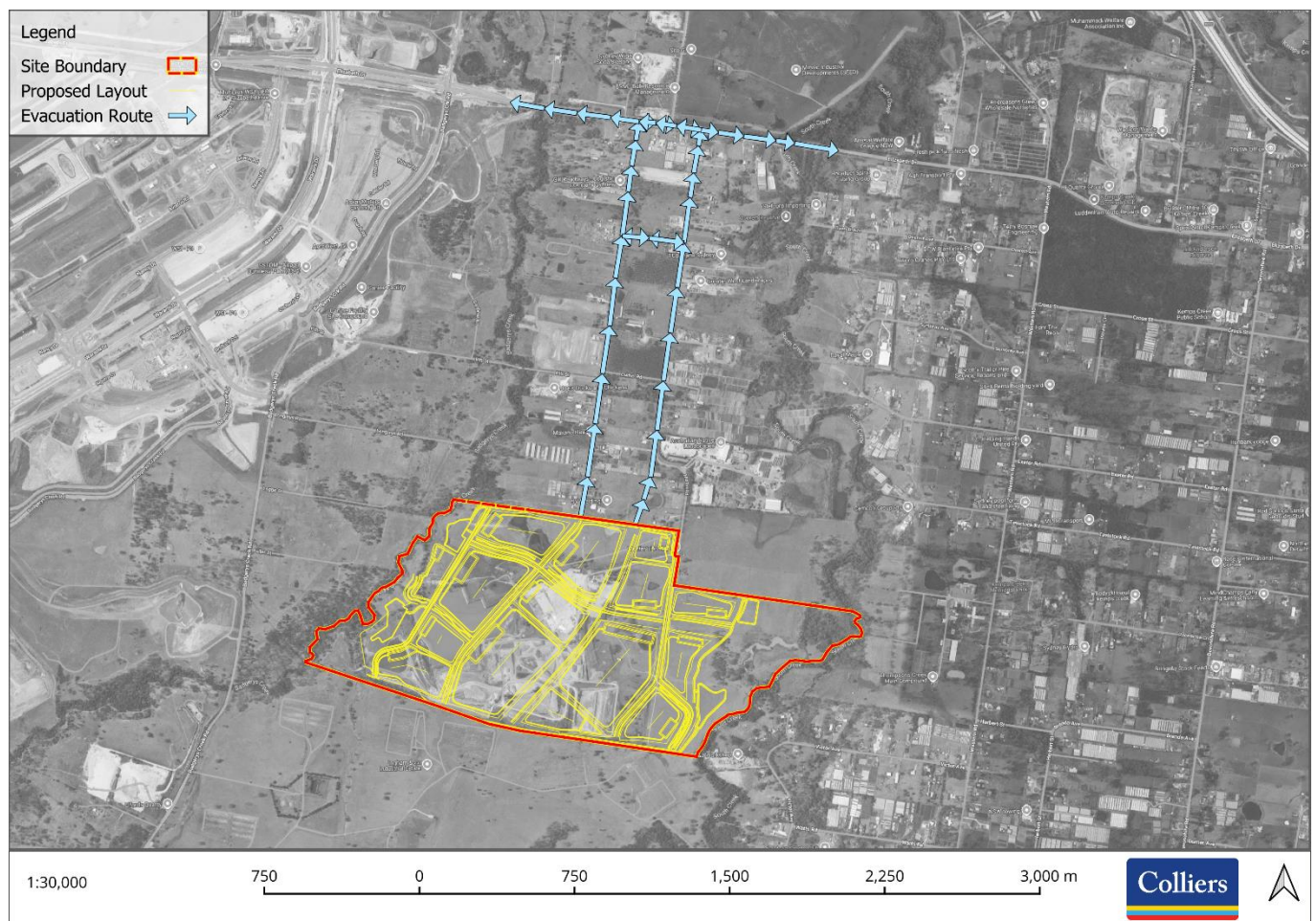


Figure 3-33 Potential Flood Emergency Evacuation Routes

The proposed buildings pads are expected to be outside of the PMF extents, and it is also not expected for the buildings pads to become uninhabitable in a flood event. Therefore, if evacuation presents a risk or is deemed unnecessary, it is advised that occupants remain within their respective building pad. The building pads are not affected by flooding up to the PMF, with only local runoff ponding occurring around the building pads. This enables a secure environment where individuals can safely wait inside their vehicles or temporary shelters without exposure to hazardous conditions until the storm has subsided. Occupants should alert emergency responders to their location to ensure swift medical intervention if required.

The Shelter-in-Place Guideline for Flash Flooding (DPHI, January 2025) defines sheltering in place as the internal movement of a building's occupants to an area within the building above the PMF level before the property becomes inundated by flood waters. The above outlined flood emergency response plan is not considered to be shelter in place as there will be no buildings developed in the BEW stage.

3.5 Key Findings and Recommendations

The key findings of the stormwater management plan and flood assessment, and proposed recommendations are discussed below:

- The proposed BEW and associated civil design are found to be compatible with the existing floodplain environment and is adequate to support the SSDA from a stormwater and flooding perspective. The flood impact assessment demonstrates that the site can be developed in accordance with Council's flood planning requirements.
- Although there some localised flood level increases at the north-eastern boundary in the 1% AEP storm event, these are temporary in nature and will be resolved once the development is in place. Therefore, it is not representative of any material adverse offsite impacts to water levels
- Peak flow hydrographs downstream of the site and up to and including the confluence of Wianamatta-South Creek and Badgerys creek remain consistent between pre and post developed scenarios.
- It is recommended that residents evacuate prior to the onset of the storm. The entry and exit vehicular routes via Elizabeth Drive will be inundated by flooding in the PMF storm event. If inhabitants are unable to evacuate in time, occupants of the site will need to remain within their vehicles or temporary shelters until flood levels are safe to evacuate. In the ultimate scenario, Elizabeth Drive and the East West Arterial Road may provide safe evacuation routes.

4 Conclusion

This Flood Impact & Risk Assessment report for the state significant development application for the Bulk Earthworks, Rehabilitation and Quarrying at 225-245 Martin Road, Bradfield, has been undertaken in accordance with the requirements outlined in the SEARs, the relevant agency bodies, and Aerotropolis and Liverpool DCP policies.

Based on the results of the study, it is concluded that the proposed preparation and bulk earthworks for the site, including its network of stormwater management features (collection swales and sediment basins), are effective in ensuring there would be no material adverse flooding impacts in the overall Badgerys Creek and Wianamatta-South Creek catchments as a result of the proposed development.

Overall, the proposed BEW design is deemed sufficient to support the state significant development application from a stormwater and flooding perspective and warrants approval.

APPENDIX A – XP-RAFTS SUB-CATCHMENT PARAMETERS

Existing

Catchment ID	Subcatchment Number	Total Area [ha]	Vectored Slope [%]	Percentage Impervious [%]	Catchment Mannings 'n'
1.00	1	300	1.9	0	.055
	2	300	1.9	100	.02
1.01	1	223.2	1.1	0	.055
	2	148.8	1.1	100	.02
3.01	1	376.6	1.6	0	.045
	2	66.4	1.6	100	.02
1.02	1	252.6	1.25	0	.055
	2	168.4	1.25	100	.02
1.03	1	519.75	.73	0	.055
	2	173.25	.73	100	.02
3.02	1	522	1.05	0	.045
	2	58	1.05	100	.02
1.04	1	307	.95	8	.045
1.06	1	13	.31	5	.025
2.01	1	726	1	5	.045
2.00	1	625	1.3	7	.045
3.03	1	425.7	.96	0	.045
	2	47.3	.96	100	.02
1.08	1	446	1.75	0	.045
	2	49.5	1.75	100	.02
1.09.1	1	233.8	2.05	3	.045

4.00.2.00	1	118.5	2.8	5	.045
4.00.2.01	1	8	1.5	5	.045
4.00.4.00	1	7.8	1.5	0	.045
	2	3.4	1.5	100	.02
1.09.2	1	55.6	2.15	5	.045
1.09.3	1	45.4	.85	5	.045
1.09.4	1	66.1	.85	0	.045
	2	7.3	.85	100	.02
1.09	1	275.1	.9	0	.045
	2	30.6	.9	100	.02
1.10	1	124.7	.65	0	.045
	2	13.9	.65	100	.02
1.12	1	524.3	1.35	0	.045
	2	132.4	1.35	100	.02
1.13.1	1	328.6	.8	0	.045
	2	106.8	.8	100	.02
1.13	1	337.8	.8	0	.045
	2	84.4	.8	100	.02
1.14	1	210.9	1.45	0	.045
	2	23.4	1.45	100	.02
4.00.1.00	1	36.7	3.3	5	.045
4.00.1.01	1	40.3	4.7	5	.045
4.00.1.02	1	6.8	3.2	5	.045
4.00.1.03	1	19.9	2.4	5	.045
4.00.1.04	1	24.2	4.1	5	.045
4.00.1.05	1	23.4	3.2	5	.045

4.00.1.06	1	54	2.5	5	.045
4.00.1.07	1	41.9	1.3	0	.045
	2	4.7	1.3	100	.02
4.00.2.02	1	10	2.1	5	.045
4.00.3.00	1	34.2	2.3	5	.045
4.00.2.03	1	16.12	.3	5	.045
4.00.1.08	1	19.2	4.1	5	.045
4.00 D	1	0.001	0.001		0.025
4.01.1.0	1	51.8	1.05	5	.045
4.01.1.1	1	62.3	.95	5	.045
4.01.2.0	1	51.5	2.05	5	.045
4.01.2.1	1	27.9	1.65	5	.045
4.01.2.2	1	46.5	1.5	5	.045
4.01.2.3	1	12.7	1.45	5	.045
4.01.1.2	1	33.8	1.15	5	.045
4.01	1	63.1	1.2	5	.045
4.02.1	1	50	1.05	5	.045
4.02.2	1	43.9	1.2	5	.045
4.02	1	28.7	1.2	5	.045
5.00.1.0	1	230.3	.8	0	.055
	2	76.8	.9	100	.02
5.00.1.1	1	17.9	1	5	.045
5.00.1.2	1	9.5	1.4	5	.045
5.00.2.0	1	47.2	1	5	.045
5.00.3	1	30.5	1.1	5	.045
5.00.2.1	1	10.4	1	5	.045

5.00.4	1	76.6	1.3	5	.045
5.00.1.4	1	22.2	1.6	5	.045
5.00.1.5	1	114.3	.8	0	.045
	2	16.9	.8	100	.02
5.00.1.6	1	59.5	1.2	0	.045
	2	10.5	1.2	100	.02
5.00.1.7	1	109.1	1.4	5	.045
5.01.1.0	1	77.6	1.05	0	.055
	2	13.7	1.05	100	.02
5.01.1.1	1	17.2	1.4	5	.055
5.01.1.2	1	41.6	2.55	0	.045
	2	4.6	2.55	100	.02
5.01.1.3	1	45.3	1.2	0	.045
	2	5	1.2	100	.02
5.01.1.4	1	29.7	2.15	0	.045
	2	5.2	2.15	100	.02
5.01.2.0	1	36.2	.85	0	.045
	2	6.4	.85	100	.02
5.01.2.1_P	1	4.3	1.45	0	.045
	2	6.4	1.45	100	.02
5.01.1.5	1	12.5	2.25	5	.045
5.01.1.6	1	4.9	1.1	5	.045
5.01.1.7	1	7	1.6	5	.045
5.00	1	46.5	5.8	5	.055
5.01.3.0	1	64	1.2	5	.045
5.01.3.1_P	1	21.5	1	0	.045

	2	38.2	1	100	.02
5.01.3.2	1	1.4	1.05	5	.045
5.01.1.8	1	37.2	.85	5	.055
5.01	1	115	.9	5	.055
5.02.1	1	126.9	1.2	5	.055
5.02	1	134.3	.75	0	.055
	2	14.9	.75	100	.02
6.00	1	107	1.1	5	.045
6.00.1	1	155.7	1.05	0	.045
	2	27.5	1.05	100	.02
1.11D	1	.001	.001	0	.02
5.00.1.3	1	15.9	1.2	5	.045
1.05D	1	.001	.001	0	.045
1.07D	1	.001	.001	0	.045
4.00	1	12.971	1.5	5	.045
1.13.1.ExB	1	37.88	1.5	0	.045
	2	2.03	1.5	100	.02
5.01.3.2_P	1	11.6	1.05	0	.045
	2	26.6	1.05	0	.02
5.01.ExA	1	42.05	1.6	0	.045
	2	13.79	1.6	100	.02
5.01.ExB	1	25.95	1.2	0	.045
	2	11.97	1.2	100	.02
1.13.1.ExA	1	44.57	1.9	0	.045
	2	11.59	1.9	100	.02
BC00-19	1	272	2.2	0	0.06

	2	181.3	2.2	100	0.02
BC00-18	1	60.2	2.41	0	0.055
	2	10.6	2.41	100	0.02
BC00-17	1	61.4	2.4	0	0.045
	2	10.8	2.4	100	0.02
BC00-16	1	39.1	2.3	0	0.045
	2	6.9	2.3	100	0.02
BC00-15	1	10.3	2.22	0	0.045
	2	5.6	2.22	100	0.02
BC00-14	1	3.9	4.21	0	0.045
	2	3.1	4.21	100	0.02
BC00-12	1	16.4	3.25	0	0.045
	2	8.9	3.25	100	0.02
BC00-11	1	36.4	2.19	0	0.045
	2	1.9	2.19	100	0.02
BC00-10	1	10.3	2.05	0	0.045
	2	1.1	2.05	100	0.02
BC00-9	1	20.4	1.87	0	0.045
	2	6.8	1.87	100	0.02
BC00-8	1	10.4	4.18	0	0.045
	2	2.6	4.18	100	0.02
BC00-7	1	70.3	1.93	0	0.055
	2	12.4	1.93	100	0.02
BC00-6	1	24.9	2.59	0	0.045
	2	10.7	2.59	100	0.02
BC00-5	1	23	1.88	0	0.045

	2	9.9	1.88	100	0.02
BC00-4	1	104.5	2	0	0.05
	2	26.1	2	100	0.02
BC00-3	1	44.2	2.5	0	0.045
	2	4.9	2.5	100	0.02
BC00-2	1	41.1	1.81	0	0.045
	2	4.6	1.81	100	0.02
BC00-1	1	53.1	1.4	0	0.065
	2	13.3	1.4	100	0.02
KC00-5	1	48.3	1.67	0	0.055
	2	7.2	1.67	100	0.02
KC00-4	1	80.8	1.94	0	0.06
	2	43.5	1.94	100	0.02
KC00-3	1	160.9	1.5	0	0.065
	2	40.2	1.5	100	0.02
KC00-2	1	170.1	1.15	0	0.065
	2	39.6	1.15	100	0.02
KC00-1	1	72.51	1.2	0	0.065
	2	8.06	1.3	100	0.02
1.15	1	332.1	0.15	0	0.045
	2	36.9	0.15	100	0.02
1.16D	1	0.001	0.001		0.025
TOTAL OUT	1	0.001	0.001		0.025
5.04	1	303	0.41	5	0.045
9.06	1	727	1.35	0	0.045
	2	181.8	1.35	100	0.02

9.07	1	71.4	0.65	0	0.045
	2	30.6	0.65	100	0.02
BC00-13	1	11.2	2.5	0	0.045
	2	4.8	2.5	100	0.02
BC00-20	1	28.9	2	0	0.065
	2	3.2	2	100	0.02
SC00-4	1	376.3	1.55	0	0.045
	2	94.1	1.55	100	0.02
SC00-3	1	33.1	2.85	0	0.045
	2	22	2.85	100	0.02
SC00-2	1	29.4	2.43	0	0.045
	2	12.6	2.43	100	0.02
SC00-1	1	6.3	3.04	0	0.045
	2	4.2	3.04	100	0.02
BC08-3	1	6.7	2.6	0	0.045
	2	20	2.6	100	0.02
BC08-2	1	9.7	2.6	0	0.045
	2	2.4	2.6	100	0.02
BC08-1	1	8.3	1.88	0	0.045
	2	0.6	1.88	100	0.02
KC00-10	1	512.7	1.08	0	0.055
	2	69.9	1.08	100	0.02
KC00-9	1	437	1.79	0	0.045
	2	145.7	1.79	100	0.02
KC00-8	1	64.4	1.96	0	0.045
	2	16.1	1.96	100	0.02

KC00-7	1	52.9	1.35	0	0.055
	2	13.2	1.35	100	0.02
KC00-6	1	15.3	1.56	0	0.055
	2	1.7	1.56	100	0.02
9.01.1.0	1	47.3	1.3	0	0.045
	2	11.8	1.3	100	0.02
9.01.1.1	1	33.3	1.4	0	0.045
	2	11.8	1.4	100	0.02
KC01-4	1	18	2.09	0	0.055
	2	6	2.09	100	0.02
KC01-3	1	25.8	3	0	0.045
	2	8.6	3	100	0.02
KC01-2	1	32.9	1.06	0	0.045
	2	8.2	1.06	100	0.02
KC01-1	1	12.8	1.9	0	0.045
	2	3.2	1.9	100	0.02
KC02-2	1	8.4	4.95	0	0.055
	2	8.4	4.95	100	0.02
KC02-1	1	16.3	3.43	0	0.055
	2	8.8	3.43	100	0.02
KC03-2	1	20.3	2.58	0	0.055
	2	5.1	2.58	100	0.02
KC03-1	1	23.9	2.5	0	0.055
	2	4.2	2.5	100	0.02
KC08-13	1	19.1	2	0	0.045
	2	3.4	2	100	0.02

KC08-12	1	19.3	2	0	0.045
	2	3.4	2	100	0.02
KC08-11	1	18.6	2	0	0.045
	2	3.3	2	100	0.02
KC08-10	1	33.8	2	0	0.045
	2	6	2	100	0.02
KC08-9	1	13	1.5	0	0.045
	2	2.3	1.5	100	0.02
KC08-8	1	14	1	0	0.045
	2	2.5	1	100	0.02
KC08-7	1	4.3	1	0	0.045
	2	0.8	1	100	0.02
KC08-6	1	6	3	0	0.045
	2	1.1	3	100	0.02
KC08-5	1	15.8	2	0	0.045
	2	2.8	2	100	0.02
KC08-4	1	19.3	2	0	0.045
	2	3.4	2	100	0.02
KC08-3	1	13.1	2	0	0.045
	2	2.3	2	100	0.02
KC08-2	1	15.9	2	0	0.045
	2	2.8	2	100	0.02
KC08-1	1	16.1	1	0	0.045
	2	2.8	1	100	0.02
KC11-6	1	11.3	3.32	0	0.055
	2	1.3	3.32	100	0.02

KC11-5	1	7.5	4.48	0	0.055
	2	1.3	4.48	100	0.02
KC11-4	1	8.4	2.99	0	0.045
	2	1.5	2.99	100	0.02
KC11-3	1	5.8	2.87	0	0.045
	2	0.4	2.87	100	0.02
KC11-2	1	11.4	3.1	0	0.045
	2	2	3.1	100	0.02
KC11-1	1	7	2.14	0	0.045
	2	0.4	2.14	100	0.02
KC13-5	1	25.7	2.06	0	0.055
	2	8.6	2.06	100	0.02
KC13-4	1	13.9	3.26	0	0.055
	2	1	3.26	100	0.02
KC13-3	1	9.8	2.93	0	0.045
	2	0.5	2.93	100	0.02
KC13-2	1	5.9	1.6	0	0.045
	2	0.3	1.6	100	0.02
KC13-1	1	10.1	4.09	0	0.045
	2	1.1	4.09	100	0.02
KC14-14	1	14.4	3.5	0	0.05
	2	6.2	3.5	100	0.02
KC14-13	1	9	3.5	0	0.04
	2	4.8	3.5	100	0.02
KC14-12	1	11.1	3.5	0	0.05
	2	6	3.5	100	0.02

KC14-11	1	16.2	2.27	0	0.045
	2	6.9	2.27	100	0.02
KC14-10	1	24.7	3.07	0	0.045
	2	4.4	3.07	100	0.02
KC14-9	1	20.8	3.8	0	0.055
	2	25.5	3.8	100	0.02
KC14-8	1	18.9	2.66	0	0.05
	2	12.6	2.66	100	0.02
KC14-7	1	11.4	2.9	0	0.055
	2	7.6	2.9	100	0.02
KC14-6	1	55.5	2.13	0	0.055
	2	18.5	2.13	100	0.02
KC14-5	1	28.9	3.02	0	0.055
	2	1.5	3.02	100	0.02
KC14-4	1	48	2.75	0	0.065
	2	2.5	2.75	100	0.02
KC14-3	1	17.6	1.93	0	0.065
	2	0.9	1.93	100	0.02
KC14-2	1	60.7	1.72	0	0.065
	2	3.2	1.72	100	0.02
KC14-1	1	40.8	1.06	0	0.065
	2	10.2	1.06	100	0.02
KC19-7	1	9.9	6.39	0	0.045
	2	1.1	6.39	100	0.02
KC19-6	1	4.5	2.87	0	0.045
	2	1.5	2.87	100	0.02

KC19-4	1	5	5	0	0.045
	2	2.2	5	100	0.02
KC19-3	1	1.2	3.61	0	0.045
	2	0.5	3.61	100	0.02
KC19-2	1	1.1	3.15	0	0.065
	2	0.1	3.15	100	0.02
KC19-1	1	6.1	2.31	0	0.065
	2	0.7	2.31	100	0.02
KC17-5	1	13.4	4.5	0	0.045
	2	5.7	4.5	100	0.02
KC17-4	1	4.1	3.04	0	0.045
	2	2.7	3.04	100	0.02
KC17-3	1	8.2	3.5	0	0.055
	2	4.4	3.5	100	0.02
KC17-2	1	10.6	2.24	0	0.055
	2	0.6	2.24	100	0.02
KC17-1	1	5.2	6.54	0	0.055
	2	0.3	6.54	100	0.02
KC23-2	1	35.7	6.39	0	0.065
	2	1.9	6.39	100	0.02
KC23-1	1	7.5	2.71	0	0.065
	2	0.4	2.71	100	0.02
KC24-3	1	19	5.18	0	0.055
	2	1	5.18	100	0.02
KC24-2	1	8.6	3.1	0	0.065
	2	0.5	3.1	100	0.02

KC24-1	1	8.2	2.34	0	0.055
	2	0.4	2.34	100	0.02
KC24-5	1	47.2	4.26	0	0.055
	2	2.5	4.26	100	0.02
KC24-4	1	16.1	2.55	0	0.055
	2	1.8	2.55	100	0.02
KC27-6	1	14.6	6.7	0	0.065
	2	0.8	6.7	100	0.02
KC27-5	1	8.4	3.23	0	0.055
	2	0.4	3.23	100	0.02
KC27-4	1	9.4	1.62	0	0.055
	2	1	1.62	100	0.02
KC27-3	1	28.5	1.95	0	0.065
	2	7.1	1.95	100	0.02
KC27-2	1	7.7	2.31	0	0.065
	2	1.4	2.31	100	0.02
KC27-1	1	16.6	2.11	0	0.065
	2	0.9	2.11	100	0.02
KC07-4	1	23.5	2.27	0	0.065
	2	2.6	2.27	100	0.02
KC07-3	1	16.6	2.54	0	0.045
	2	0.9	2.54	100	0.02
KC07-2	1	8.3	2.42	0	0.045
	2	2.1	2.42	100	0.02
KC07-1	1	16.1	2.68	0	0.055
	2	0.8	2.68	100	0.02

1.13.1_P	1	11.4	1	0	.045
	2	26.6	1	100	.02
5.01.1.6_P	1	8.2	1.1	0	.045
	2	17.3	1.1	100	.02
5.01.1.7_P	1	10.4	1.6	0	.045
	2	10.8	1.6	100	.02
1.14A	1	26.3	1.45	0	.045
	2	8.8	1.45	100	.02
5.00.4A	1	48.9	1.3	0	.045
	2	8.6	1.3	100	.02
5.01.1.8A	1	158.5	.85	0	.045
	2	28	.85	0	.02
1.17	1	376.6	.53	0	.045
	2	41.8	.53	100	.02

BEW

Catchment ID	Subcatchment Number	Total Area [ha]	Vectored Slope [%]	Percentage Impervious [%]	Catchment Mannings 'n'
1.00	1	300	1.9	0	.055
	2	300	1.9	100	.02
1.01	1	223.2	1.1	0	.055
	2	148.8	1.1	100	.02
3.01	1	376.6	1.6	0	.045
	2	66.4	1.6	100	.02
1.02	1	252.6	1.25	0	.055
	2	168.4	1.25	100	.02
1.03	1	519.75	.73	0	.055
	2	173.25	.73	100	.02
3.02	1	522	1.05	0	.045
	2	58	1.05	100	.02
1.04	1	307	.95	8	.045
1.06	1	13	.31	5	.025
2.01	1	726	1	5	.045
2.00	1	625	1.3	7	.045
3.03	1	425.7	.96	0	.045
	2	47.3	.96	100	.02
1.08	1	446	1.75	0	.045
	2	49.5	1.75	100	.02
1.09.1	1	233.8	2.05	3	.045
4.00.2.00	1	118.5	2.8	5	.045
4.00.2.01	1	8	1.5	5	.045

4.00.4.00	1	7.8	1.5	0	.045
	2	3.4	1.5	100	.02
1.09.2	1	55.6	2.15	5	.045
1.09.3	1	45.4	.85	5	.045
1.09.4	1	66.1	.85	0	.045
	2	7.3	.85	100	.02
1.09	1	275.1	.9	0	.045
	2	30.6	.9	100	.02
1.10	1	124.7	.65	0	.045
	2	13.9	.65	100	.02
1.12	1	524.3	1.35	0	.045
	2	132.4	1.35	100	.02
1.13.1	1	328.6	.8	0	.045
	2	106.8	.8	100	.02
1.13	1	337.8	.8	0	.045
	2	84.4	.8	100	.02
1.14	1	210.9	1.45	0	.045
	2	23.4	1.45	100	.02
4.00.1.00	1	36.7	3.3	5	.045
4.00.1.01	1	40.3	4.7	5	.045
4.00.1.02	1	6.8	3.2	5	.045
4.00.1.03	1	19.9	2.4	5	.045
4.00.1.04	1	24.2	4.1	5	.045
4.00.1.05	1	23.4	3.2	5	.045
4.00.1.06	1	54	2.5	5	.045
4.00.1.07	1	41.9	1.3	0	.045

	2	4.7	1.3	100	.02
4.00.2.02	1	10	2.1	5	.045
4.00.3.00	1	34.2	2.3	5	.045
4.00.2.03	1	16.12	.3	5	.045
4.00.1.08	1	19.2	4.1	5	.045
4.00 D	1	0.001	0.001		0.025
4.01.1.0	1	51.8	1.05	5	.045
4.01.1.1	1	62.3	.95	5	.045
4.01.2.0	1	51.5	2.05	5	.045
4.01.2.1	1	27.9	1.65	5	.045
4.01.2.2	1	46.5	1.5	5	.045
4.01.2.3	1	12.7	1.45	5	.045
4.01.1.2	1	33.8	1.15	5	.045
4.01	1	63.1	1.2	5	.045
4.02.1	1	50	1.05	5	.045
4.02.2	1	43.9	1.2	5	.045
4.02	1	28.7	1.2	5	.045
5.00.1.0	1	230.3	.8	0	.055
	2	76.8	.9	100	.02
5.00.1.1	1	17.9	1	5	.045
5.00.1.2	1	9.5	1.4	5	.045
5.00.2.0	1	47.2	1	5	.045
5.00.3	1	30.5	1.1	5	.045
5.00.2.1	1	10.4	1	5	.045
5.00.4	1	76.6	1.3	5	.045
5.00.1.4	1	22.2	1.6	5	.045

5.00.1.5	1	114.3	.8	0	.045
	2	16.9	.8	100	.02
5.00.1.6	1	59.5	1.2	0	.045
	2	10.5	1.2	100	.02
5.00.1.7	1	109.1	1.4	5	.045
5.01.1.0	1	77.6	1.05	0	.055
	2	13.7	1.05	100	.02
5.01.1.1	1	17.2	1.4	5	.055
5.01.1.2	1	41.6	2.55	0	.045
	2	4.6	2.55	100	.02
5.01.1.3	1	45.3	1.2	0	.045
	2	5	1.2	100	.02
5.01.1.4	1	29.7	2.15	0	.045
	2	5.2	2.15	100	.02
5.01.2.0	1	36.2	.85	0	.045
	2	6.4	.85	100	.02
5.01.2.1_P	1	4.3	1.45	0	.045
	2	6.4	1.45	100	.02
5.01.1.5	1	12.5	2.25	5	.045
5.01.1.6	1	4.9	1.1	5	.045
5.01.1.7	1	7	1.6	5	.045
5.00	1	46.5	5.8	5	.055
5.01.3.0	1	64	1.2	5	.045
5.01.3.1_P	1	21.5	1	0	.045
	2	38.2	1	100	.02
5.01.3.2	1	1.4	1.05	5	.045

5.01.1.8	1	37.2	.85	5	.055
5.01	1	115	.9	5	.055
5.02.1	1	126.9	1.2	5	.055
5.02	1	134.3	.75	0	.055
	2	14.9	.75	100	.02
6.00	1	107	1.1	5	.045
6.00.1	1	155.7	1.05	0	.045
	2	27.5	1.05	100	.02
1.11D	1	.001	.001	0	.02
5.00.1.3	1	15.9	1.2	5	.045
1.05D	1	.001	.001	0	.045
1.07D	1	.001	.001	0	.045
4.00	1	12.971	1.5	5	.045
5.01.3.2_P	1	11.6	1.05	0	.045
	2	26.6	1.05	0	.02
BC00-19	1	272	2.2	0	0.06
	2	181.3	2.2	100	0.02
BC00-18	1	60.2	2.41	0	0.055
	2	10.6	2.41	100	0.02
BC00-17	1	61.4	2.4	0	0.045
	2	10.8	2.4	100	0.02
BC00-16	1	39.1	2.3	0	0.045
	2	6.9	2.3	100	0.02
BC00-15	1	10.3	2.22	0	0.045
	2	5.6	2.22	100	0.02
BC00-14	1	3.9	4.21	0	0.045

	2	3.1	4.21	100	0.02
BC00-12	1	16.4	3.25	0	0.045
	2	8.9	3.25	100	0.02
BC00-11	1	36.4	2.19	0	0.045
	2	1.9	2.19	100	0.02
BC00-10	1	10.3	2.05	0	0.045
	2	1.1	2.05	100	0.02
BC00-9	1	20.4	1.87	0	0.045
	2	6.8	1.87	100	0.02
BC00-8	1	10.4	4.18	0	0.045
	2	2.6	4.18	100	0.02
BC00-7	1	70.3	1.93	0	0.055
	2	12.4	1.93	100	0.02
BC00-6	1	24.9	2.59	0	0.045
	2	10.7	2.59	100	0.02
BC00-5	1	23	1.88	0	0.045
	2	9.9	1.88	100	0.02
BC00-4	1	104.5	2	0	0.05
	2	26.1	2	100	0.02
BC00-3	1	44.2	2.5	0	0.045
	2	4.9	2.5	100	0.02
BC00-2	1	41.1	1.81	0	0.045
	2	4.6	1.81	100	0.02
BC00-1	1	53.1	1.4	0	0.065
	2	13.3	1.4	100	0.02
KC00-5	1	48.3	1.67	0	0.055

	2	7.2	1.67	100	0.02
KC00-4	1	80.8	1.94	0	0.06
	2	43.5	1.94	100	0.02
KC00-3	1	160.9	1.5	0	0.065
	2	40.2	1.5	100	0.02
KC00-2	1	170.1	1.15	0	0.065
	2	39.6	1.15	100	0.02
KC00-1	1	72.51	1.2	0	0.065
	2	8.06	1.3	100	0.02
1.15	1	332.1	0.15	0	0.045
	2	36.9	0.15	100	0.02
1.16D	1	0.001	0.001		0.025
TOTAL OUT	1	0.001	0.001		0.025
5.04	1	303	0.41	5	0.045
9.06	1	727	1.35	0	0.045
	2	181.8	1.35	100	0.02
9.07	1	71.4	0.65	0	0.045
	2	30.6	0.65	100	0.02
BC00-13	1	11.2	2.5	0	0.045
	2	4.8	2.5	100	0.02
BC00-20	1	28.9	2	0	0.065
	2	3.2	2	100	0.02
SC00-4	1	376.3	1.55	0	0.045
	2	94.1	1.55	100	0.02
SC00-3	1	33.1	2.85	0	0.045
	2	22	2.85	100	0.02

SC00-2	1	29.4	2.43	0	0.045
	2	12.6	2.43	100	0.02
SC00-1	1	6.3	3.04	0	0.045
	2	4.2	3.04	100	0.02
BC08-3	1	6.7	2.6	0	0.045
	2	20	2.6	100	0.02
BC08-2	1	9.7	2.6	0	0.045
	2	2.4	2.6	100	0.02
BC08-1	1	8.3	1.88	0	0.045
	2	0.6	1.88	100	0.02
KC00-10	1	512.7	1.08	0	0.055
	2	69.9	1.08	100	0.02
KC00-9	1	437	1.79	0	0.045
	2	145.7	1.79	100	0.02
KC00-8	1	64.4	1.96	0	0.045
	2	16.1	1.96	100	0.02
KC00-7	1	52.9	1.35	0	0.055
	2	13.2	1.35	100	0.02
KC00-6	1	15.3	1.56	0	0.055
	2	1.7	1.56	100	0.02
9.01.1.0	1	47.3	1.3	0	0.045
	2	11.8	1.3	100	0.02
9.01.1.1	1	33.3	1.4	0	0.045
	2	11.8	1.4	100	0.02
KC01-4	1	18	2.09	0	0.055
	2	6	2.09	100	0.02

KC01-3	1	25.8	3	0	0.045
	2	8.6	3	100	0.02
KC01-2	1	32.9	1.06	0	0.045
	2	8.2	1.06	100	0.02
KC01-1	1	12.8	1.9	0	0.045
	2	3.2	1.9	100	0.02
KC02-2	1	8.4	4.95	0	0.055
	2	8.4	4.95	100	0.02
KC02-1	1	16.3	3.43	0	0.055
	2	8.8	3.43	100	0.02
KC03-2	1	20.3	2.58	0	0.055
	2	5.1	2.58	100	0.02
KC03-1	1	23.9	2.5	0	0.055
	2	4.2	2.5	100	0.02
KC08-13	1	19.1	2	0	0.045
	2	3.4	2	100	0.02
KC08-12	1	19.3	2	0	0.045
	2	3.4	2	100	0.02
KC08-11	1	18.6	2	0	0.045
	2	3.3	2	100	0.02
KC08-10	1	33.8	2	0	0.045
	2	6	2	100	0.02
KC08-9	1	13	1.5	0	0.045
	2	2.3	1.5	100	0.02
KC08-8	1	14	1	0	0.045
	2	2.5	1	100	0.02

KC08-7	1	4.3	1	0	0.045
	2	0.8	1	100	0.02
KC08-6	1	6	3	0	0.045
	2	1.1	3	100	0.02
KC08-5	1	15.8	2	0	0.045
	2	2.8	2	100	0.02
KC08-4	1	19.3	2	0	0.045
	2	3.4	2	100	0.02
KC08-3	1	13.1	2	0	0.045
	2	2.3	2	100	0.02
KC08-2	1	15.9	2	0	0.045
	2	2.8	2	100	0.02
KC08-1	1	16.1	1	0	0.045
	2	2.8	1	100	0.02
KC11-6	1	11.3	3.32	0	0.055
	2	1.3	3.32	100	0.02
KC11-5	1	7.5	4.48	0	0.055
	2	1.3	4.48	100	0.02
KC11-4	1	8.4	2.99	0	0.045
	2	1.5	2.99	100	0.02
KC11-3	1	5.8	2.87	0	0.045
	2	0.4	2.87	100	0.02
KC11-2	1	11.4	3.1	0	0.045
	2	2	3.1	100	0.02
KC11-1	1	7	2.14	0	0.045
	2	0.4	2.14	100	0.02

KC13-5	1	25.7	2.06	0	0.055
	2	8.6	2.06	100	0.02
KC13-4	1	13.9	3.26	0	0.055
	2	1	3.26	100	0.02
KC13-3	1	9.8	2.93	0	0.045
	2	0.5	2.93	100	0.02
KC13-2	1	5.9	1.6	0	0.045
	2	0.3	1.6	100	0.02
KC13-1	1	10.1	4.09	0	0.045
	2	1.1	4.09	100	0.02
KC14-14	1	14.4	3.5	0	0.05
	2	6.2	3.5	100	0.02
KC14-13	1	9	3.5	0	0.04
	2	4.8	3.5	100	0.02
KC14-12	1	11.1	3.5	0	0.05
	2	6	3.5	100	0.02
KC14-11	1	16.2	2.27	0	0.045
	2	6.9	2.27	100	0.02
KC14-10	1	24.7	3.07	0	0.045
	2	4.4	3.07	100	0.02
KC14-9	1	20.8	3.8	0	0.055
	2	25.5	3.8	100	0.02
KC14-8	1	18.9	2.66	0	0.05
	2	12.6	2.66	100	0.02
KC14-7	1	11.4	2.9	0	0.055
	2	7.6	2.9	100	0.02

KC14-6	1	55.5	2.13	0	0.055
	2	18.5	2.13	100	0.02
KC14-5	1	28.9	3.02	0	0.055
	2	1.5	3.02	100	0.02
KC14-4	1	48	2.75	0	0.065
	2	2.5	2.75	100	0.02
KC14-3	1	17.6	1.93	0	0.065
	2	0.9	1.93	100	0.02
KC14-2	1	60.7	1.72	0	0.065
	2	3.2	1.72	100	0.02
KC14-1	1	40.8	1.06	0	0.065
	2	10.2	1.06	100	0.02
KC19-7	1	9.9	6.39	0	0.045
	2	1.1	6.39	100	0.02
KC19-6	1	4.5	2.87	0	0.045
	2	1.5	2.87	100	0.02
KC19-4	1	5	5	0	0.045
	2	2.2	5	100	0.02
KC19-3	1	1.2	3.61	0	0.045
	2	0.5	3.61	100	0.02
KC19-2	1	1.1	3.15	0	0.065
	2	0.1	3.15	100	0.02
KC19-1	1	6.1	2.31	0	0.065
	2	0.7	2.31	100	0.02
KC17-5	1	13.4	4.5	0	0.045
	2	5.7	4.5	100	0.02

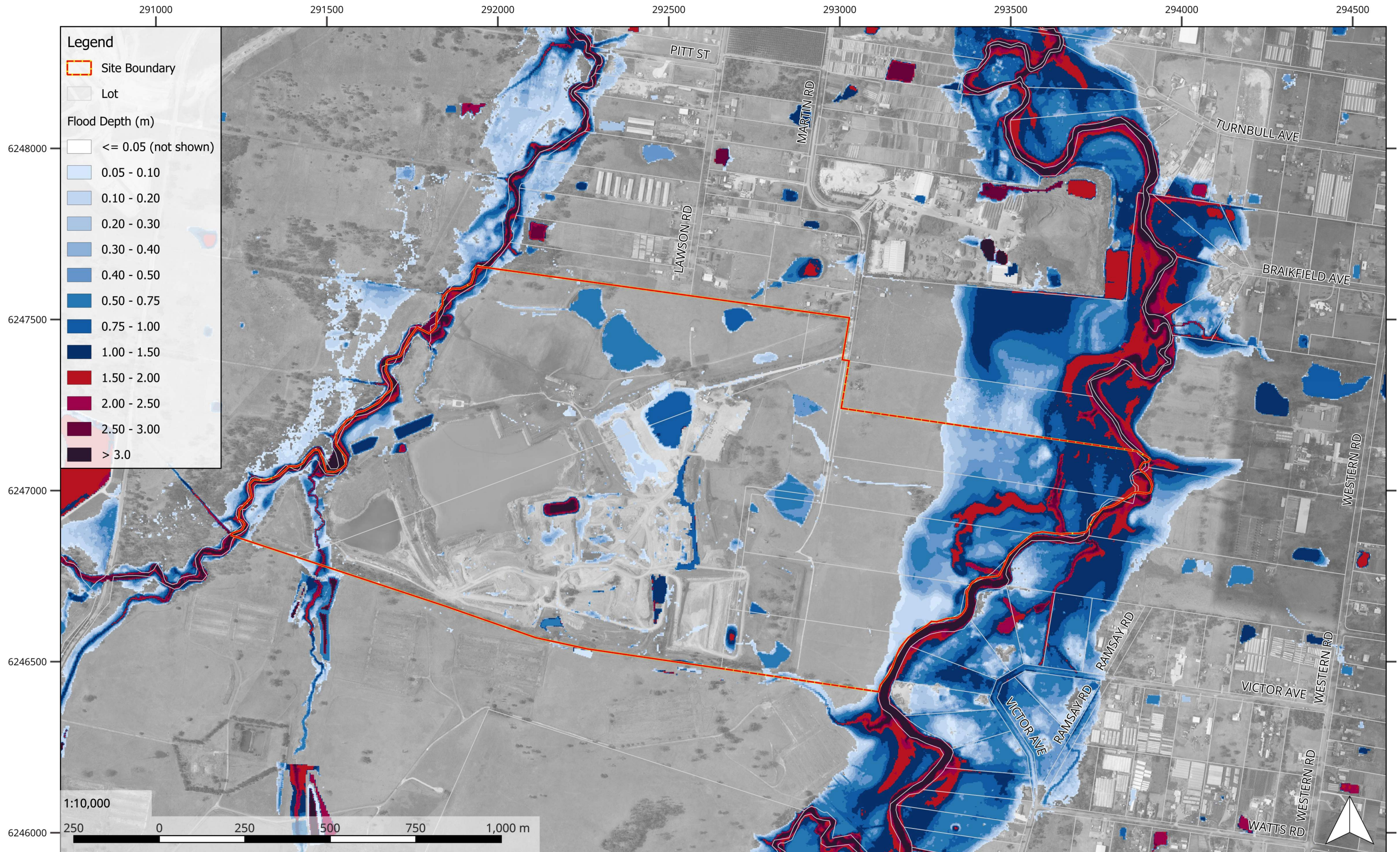
KC17-4	1	4.1	3.04	0	0.045
	2	2.7	3.04	100	0.02
KC17-3	1	8.2	3.5	0	0.055
	2	4.4	3.5	100	0.02
KC17-2	1	10.6	2.24	0	0.055
	2	0.6	2.24	100	0.02
KC17-1	1	5.2	6.54	0	0.055
	2	0.3	6.54	100	0.02
KC23-2	1	35.7	6.39	0	0.065
	2	1.9	6.39	100	0.02
KC23-1	1	7.5	2.71	0	0.065
	2	0.4	2.71	100	0.02
KC24-3	1	19	5.18	0	0.055
	2	1	5.18	100	0.02
KC24-2	1	8.6	3.1	0	0.065
	2	0.5	3.1	100	0.02
KC24-1	1	8.2	2.34	0	0.055
	2	0.4	2.34	100	0.02
KC24-5	1	47.2	4.26	0	0.055
	2	2.5	4.26	100	0.02
KC24-4	1	16.1	2.55	0	0.055
	2	1.8	2.55	100	0.02
KC27-6	1	14.6	6.7	0	0.065
	2	0.8	6.7	100	0.02
KC27-5	1	8.4	3.23	0	0.055
	2	0.4	3.23	100	0.02

KC27-4	1	9.4	1.62	0	0.055
	2	1	1.62	100	0.02
KC27-3	1	28.5	1.95	0	0.065
	2	7.1	1.95	100	0.02
KC27-2	1	7.7	2.31	0	0.065
	2	1.4	2.31	100	0.02
KC27-1	1	16.6	2.11	0	0.065
	2	0.9	2.11	100	0.02
KC07-4	1	23.5	2.27	0	0.065
	2	2.6	2.27	100	0.02
KC07-3	1	16.6	2.54	0	0.045
	2	0.9	2.54	100	0.02
KC07-2	1	8.3	2.42	0	0.045
	2	2.1	2.42	100	0.02
KC07-1	1	16.1	2.68	0	0.055
	2	0.8	2.68	100	0.02
1.13.1_P	1	11.4	1	0	.045
	2	26.6	1	100	.02
5.01.1.6_P	1	8.2	1.1	0	.045
	2	17.3	1.1	100	.02
5.01.1.7_P	1	10.4	1.6	0	.045
	2	10.8	1.6	100	.02
1.14A	1	26.3	1.45	0	.045
	2	8.8	1.45	100	.02
5.00.4A	1	48.9	1.3	0	.045
	2	8.6	1.3	100	.02

5.01.1.8A	1	158.5	.85	0	.045
	2	28	.85	0	.02
1.17	1	376.6	.53	0	.045
	2	41.8	.53	100	.02
5.01.1.8.1	1	2.51	1	0	.045
5.01.3.2B	1	5.295	1	0	.045
M.U12	1	7.547	1	0	.03
M.U11	1	4.065	1	0	.03
M.WRd	1	10.151	1	0	.03
M.OS	1	3.436	1	0	.03
M.U10	1	11.084	1	0	.03
M.U7	1	7.613	1	0	.03
M.U8	1	8.953	1	0	.03
M.U9A	1	6.432	1	0	.03
M.U9B	1	18.149	1	0	.03
M.U1	1	3.237	1	0	.03
M.U2	1	5.811	1	0	.03
M.ERd	1	14.829	1	0	.03
M.U3	1	4.586	1	0	.03
M.U6A	1	17.601	1	0	.03
M.U4	1	5.8	1	0	.03
M.U6B	1	6.977	1	0	.03
M.U5	1	6.203	1	0	.03
1.13.1.M.A	1	27.571	1	0	.045
5.01.M.A	1	11.55	1	0	.045

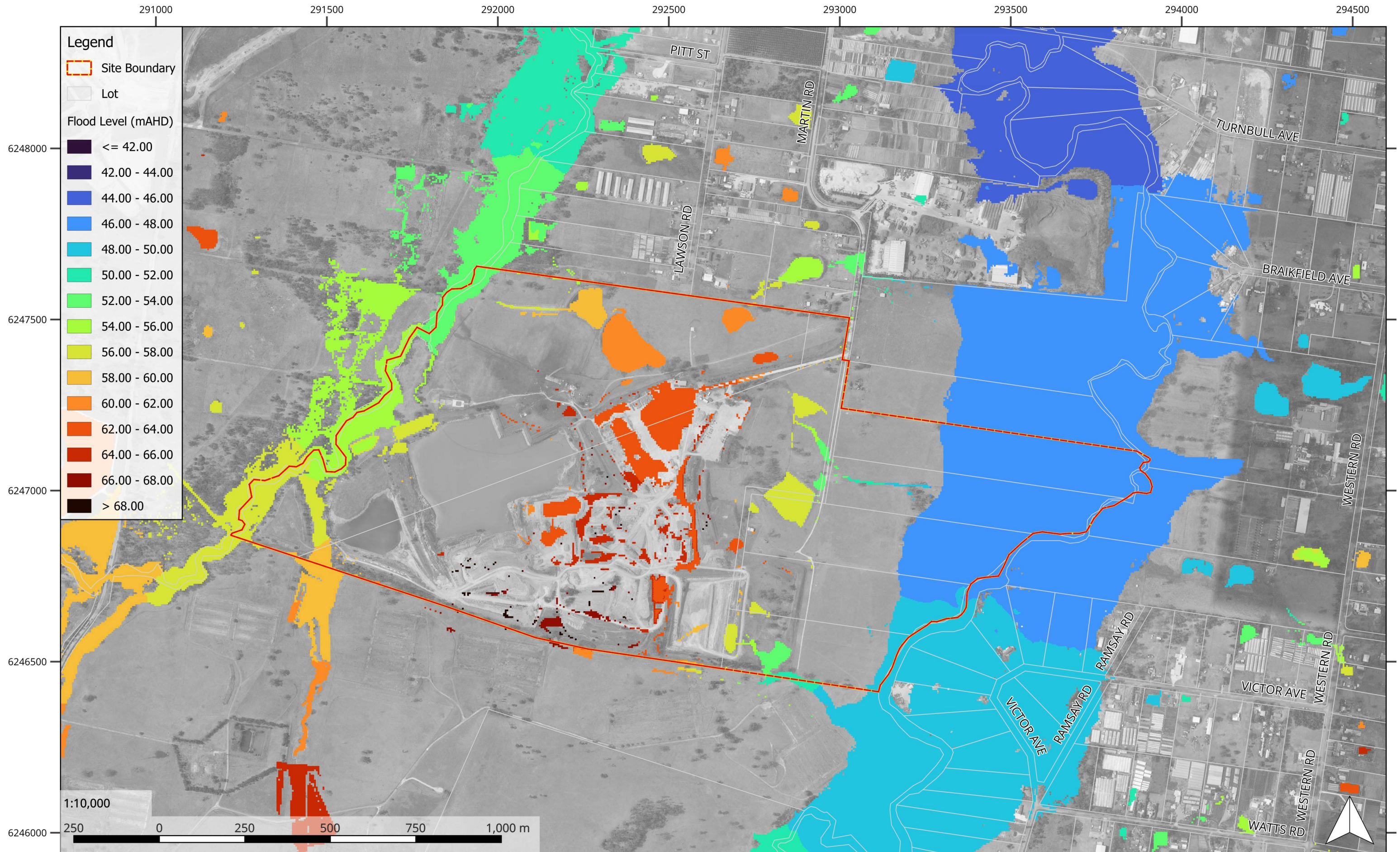
APPENDIX B - FLOOD MAPS

Map No.	Map Title	Map No.	Map Title
1	10% AEP Existing Depth	41	0.2% AEP Existing Depth
2	10% AEP Existing Water Level	42	0.2% AEP Existing Water Level
3	10% AEP Existing Velocity	43	0.2% AEP Existing Velocity
4	10% AEP Existing Hazard	44	0.2% AEP Existing Hazard
5	10% AEP Existing Hydraulic Category	45	0.2% AEP Existing Hydraulic Category
6	10% AEP BEW Depth	46	0.2% AEP BEW Depth
7	10% AEP BEW Water Level	47	0.2% AEP BEW Water Level
8	10% AEP BEW Velocity	48	0.2% AEP BEW Velocity
9	10% AEP BEW Hazard	49	0.2% AEP BEW Hazard
10	10% AEP BEW Hydraulic Category	50	0.2% AEP BEW Hydraulic Category
11	5% AEP Existing Depth	51	PMF Existing Depth
12	5% AEP Existing Water Level	52	PMF Existing Water Level
13	5% AEP Existing Velocity	53	PMF Existing Velocity
14	5% AEP Existing Hazard	54	PMF Existing Hazard
15	5% AEP Existing Hydraulic Category	55	PMF Existing Hydraulic Category
16	5% AEP BEW Depth	56	PMF BEW Depth
17	5% AEP BEW Water Level	57	PMF BEW Water Level
18	5% AEP BEW Velocity	58	PMF BEW Velocity
19	5% AEP BEW Hazard	59	PMF BEW Hazard
20	5% AEP BEW Hydraulic Category	60	PMF BEW Hydraulic Category
21	1% AEP Existing Depth	61	4 EY Existing Bed Shear Stress
22	1% AEP Existing Water Level	62	4 EY BEW Bed Shear Stress
23	1% AEP Existing Velocity	63	5% AEP Existing Bed Shear Stress
24	1% AEP Existing Hazard	64	5% AEP BEW Bed Shear Stress
25	1% AEP Existing Hydraulic Category	65	1% AEP Existing Bed Shear Stress
26	1% AEP BEW Depth	66	1% AEP BEW Bed Shear Stress
27	1% AEP BEW Water Level	67	1% AEP CC Existing Bed Shear Stress
28	1% AEP BEW Velocity	68	1% AEP CC BEW Bed Shear Stress
29	1% AEP BEW Hazard	69	10% AEP BEW Flood Afflux
30	1% AEP BEW Hydraulic Category	70	5% AEP BEW Flood Afflux
31	1% AEP CC Existing Depth	71	1% AEP BEW Flood Afflux
32	1% AEP CC Existing Water Level	72	1% AEP CC BEW Flood Afflux
33	1% AEP CC Existing Velocity	73	0.2% AEP BEW Flood Afflux
34	1% AEP CC Existing Hazard	74	PMF BEW Flood Afflux
35	1% AEP CC Existing Hydraulic Category	75	Flood Planning Areas
36	1% AEP CC BEW Depth		
37	1% AEP CC BEW Water Level		
38	1% AEP CC BEW Velocity		
39	1% AEP CC BEW Hazard		
40	1% AEP CC BEW Hydraulic Category		



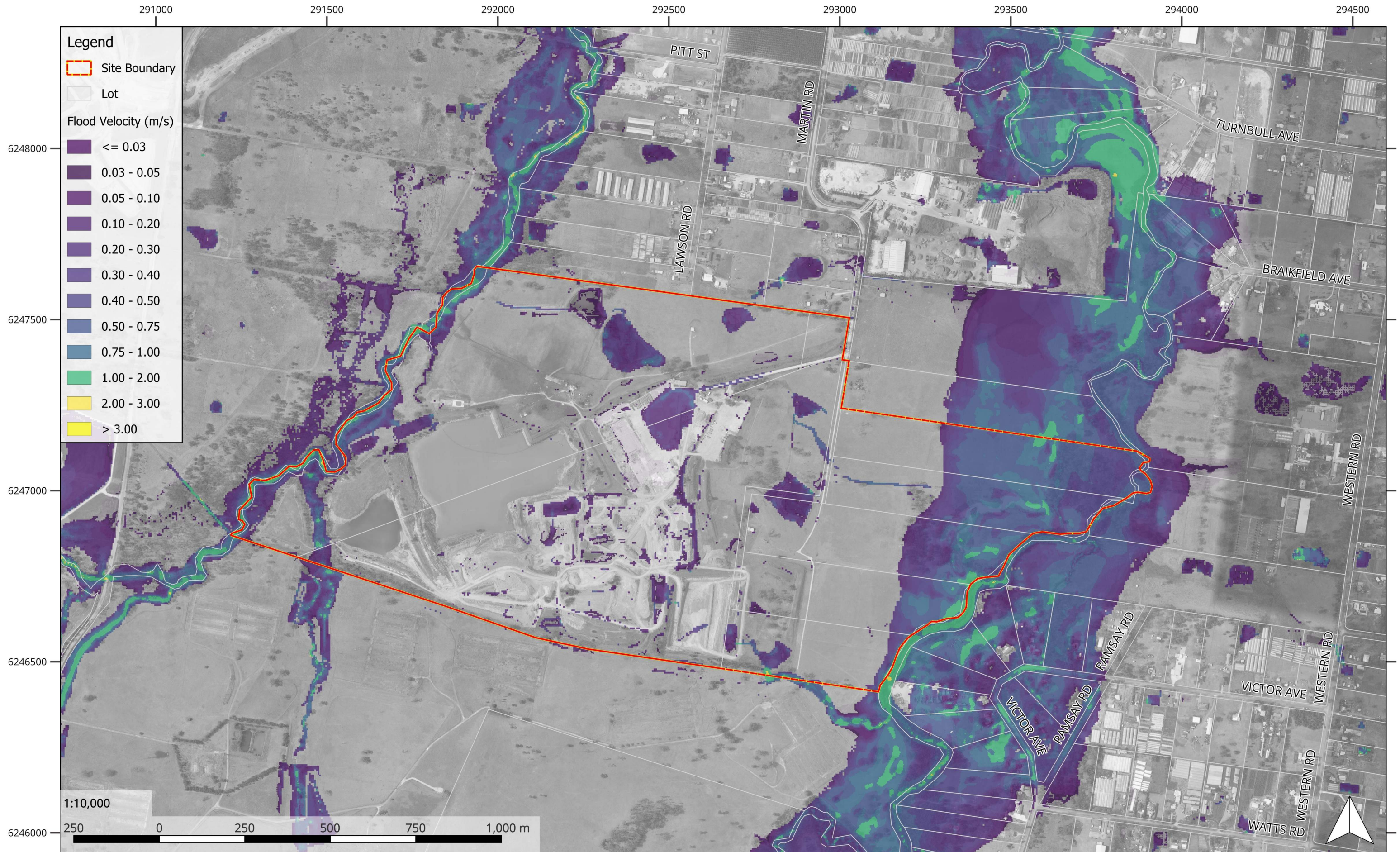
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Map 01: FLOOD DEPTH MAP EXISTING 10% AEP
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



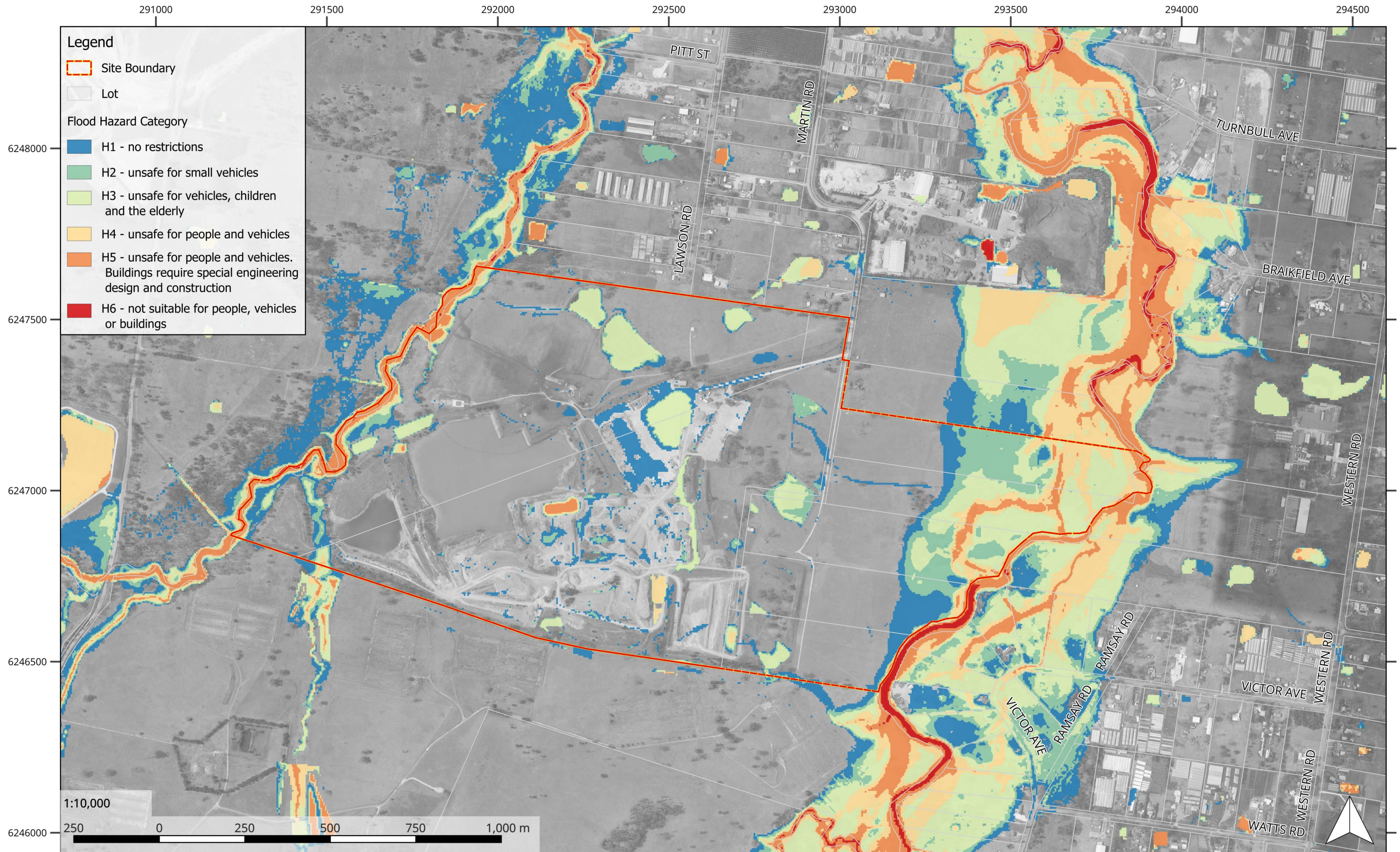
Colliers Engineering & Design (NSW) Pty Ltd endeavours to ensure that the information provided in this map is correct at the time of publication. Colliers Engineering & Design (NSW) Pty Ltd does not warrant, guarantee or make representations regarding the currency and accuracy of information contained within this map.

Map 02: FLOOD LEVEL MAP EXISTING 10% AEP
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



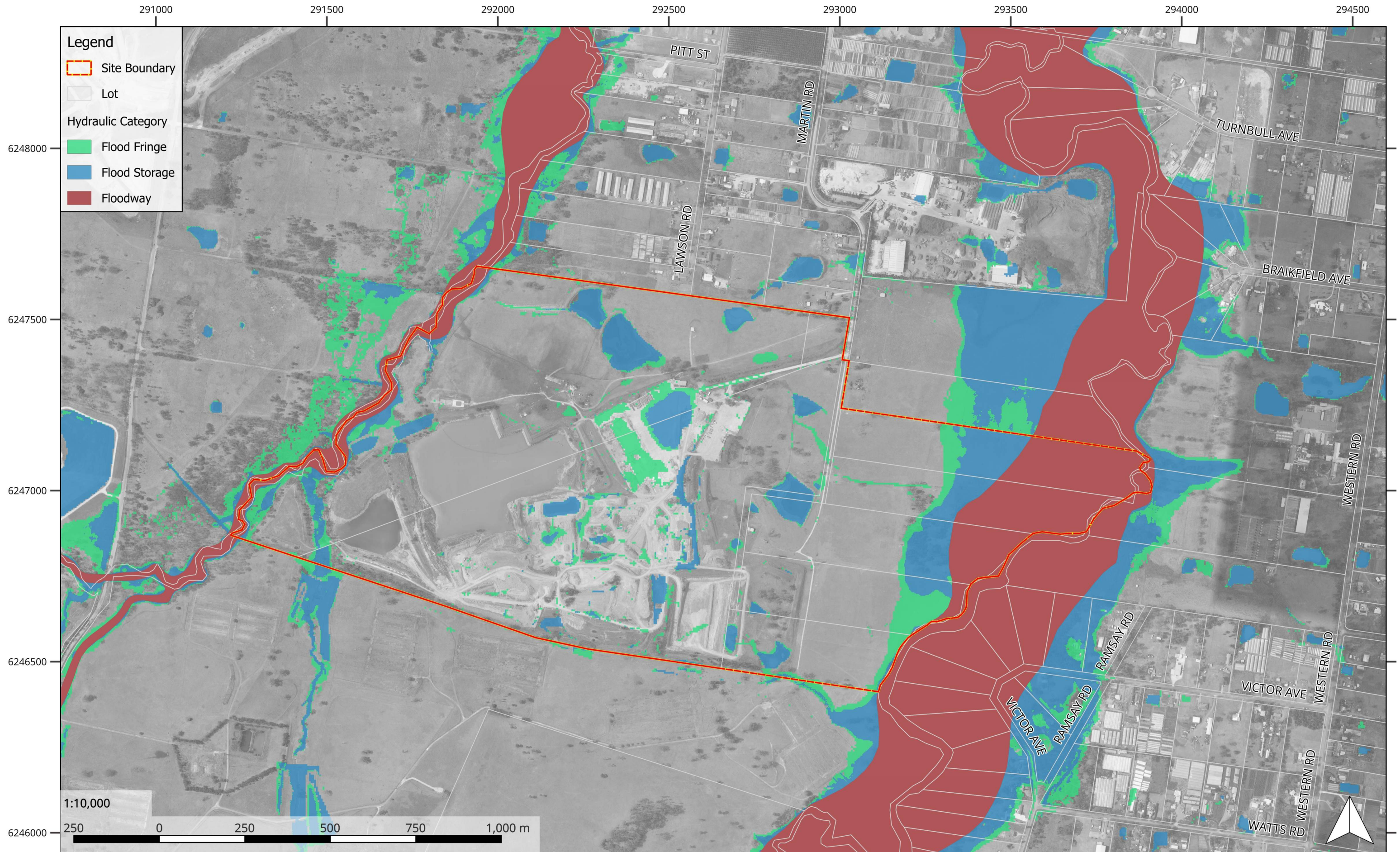
Colliers Engineering & Design (NSW) Pty Ltd endeavours to ensure that the information provided in this map is correct at the time of publication. Colliers Engineering & Design (NSW) Pty Ltd does not warrant, guarantee or make representations regarding the currency and accuracy of information contained within this map.

Map 03: FLOOD VELOCITY MAP EXISTING 10% AEP
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



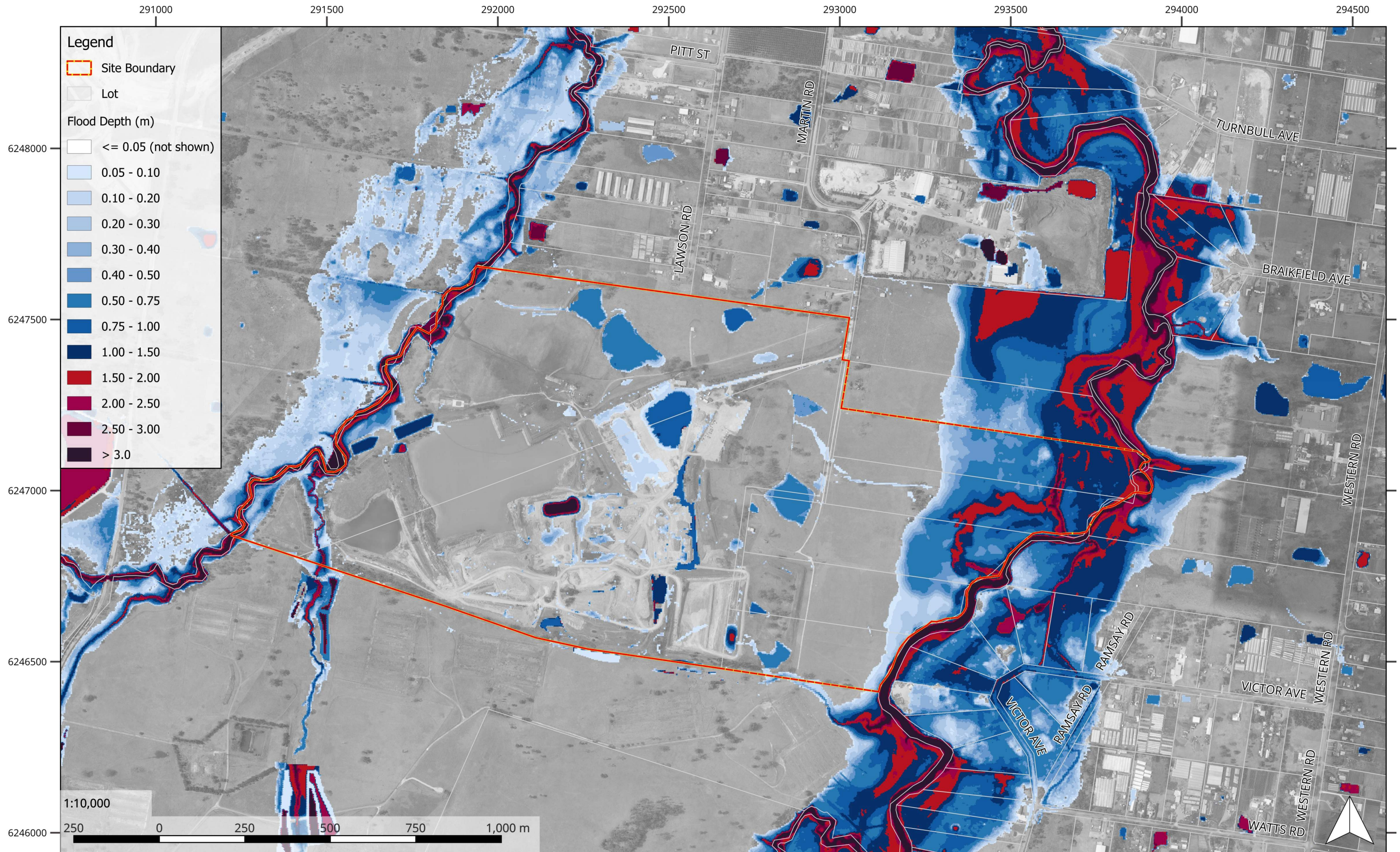
Colliers Engineering & Design (NSW) Pty Ltd endeavours to ensure that the information provided in this map is correct at the time of publication. Colliers Engineering & Design (NSW) Pty Ltd does not warrant, guarantee or make representations regarding the currency and accuracy of information contained within this map.

Map 04: FLOOD HAZARD CATEGORY MAP EXISTING 10% AEP
Project Maverick - BEW SSDA No.97711727
Project Number: 25-0141
Client: Goodman Property Services (Aust)



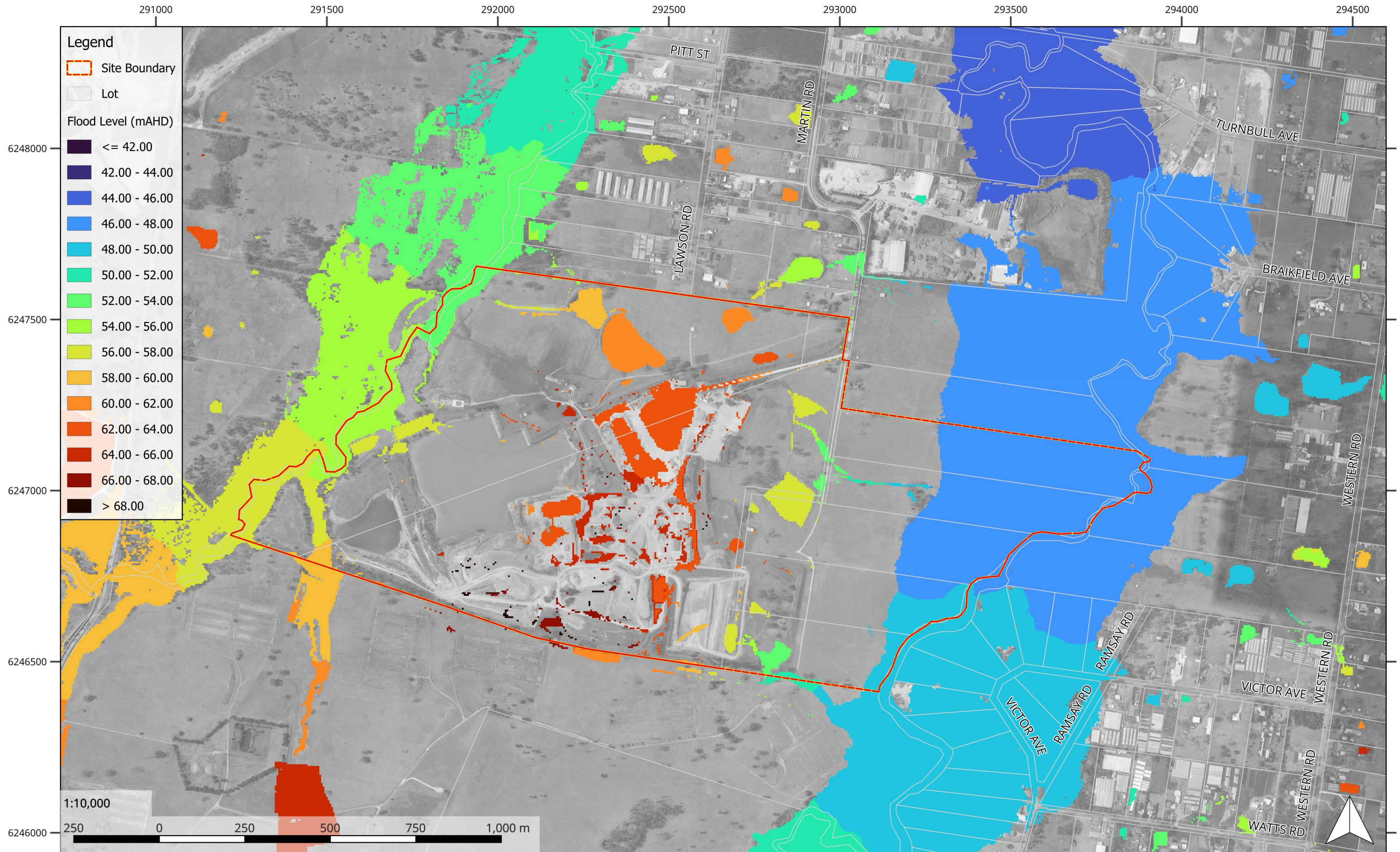
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Map 05: FLOOD HYDRAULIC CATEGORY MAP EXISTING 10% AEP
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



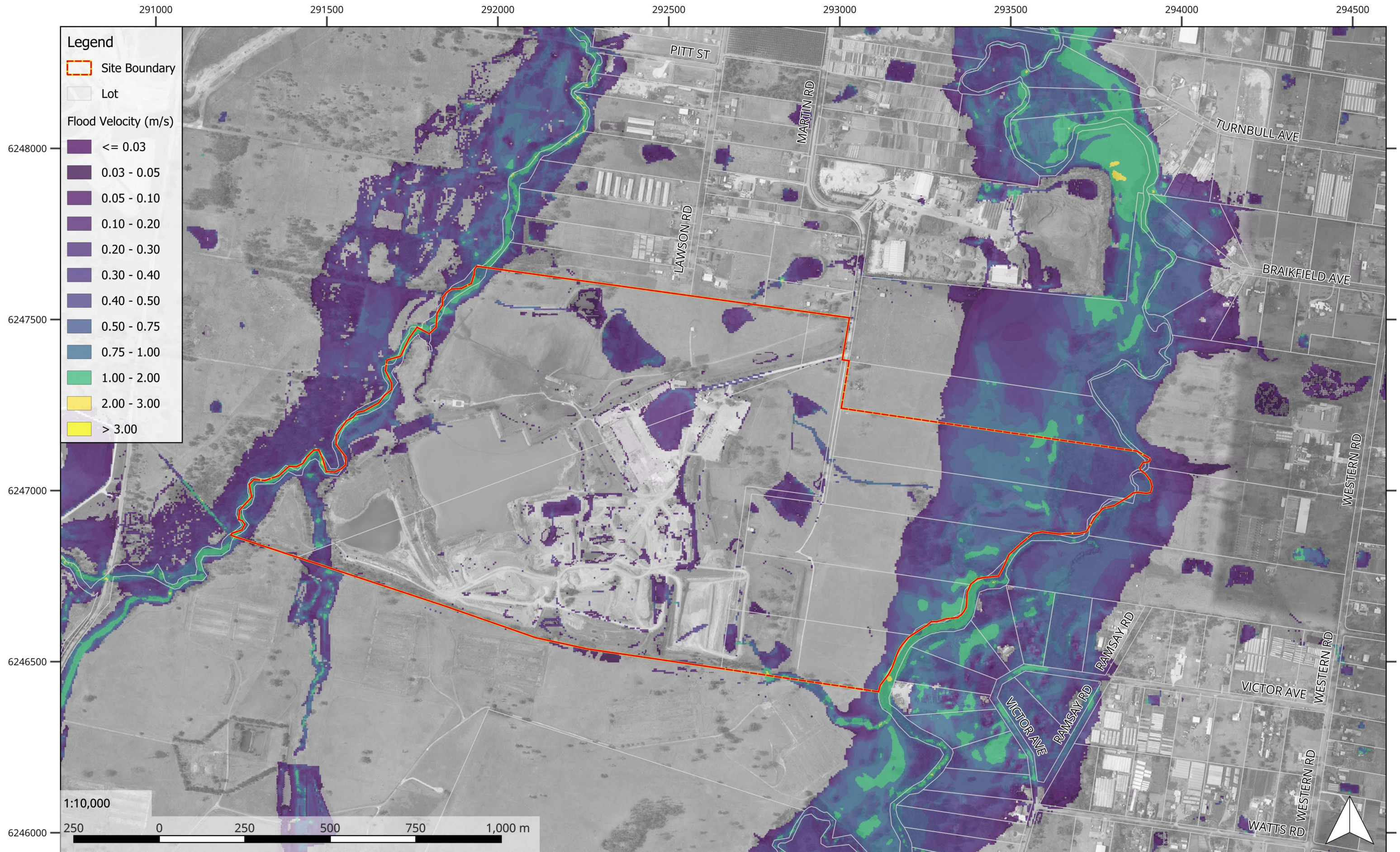
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Map 06: FLOOD DEPTH MAP EXISTING 5% AEP
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



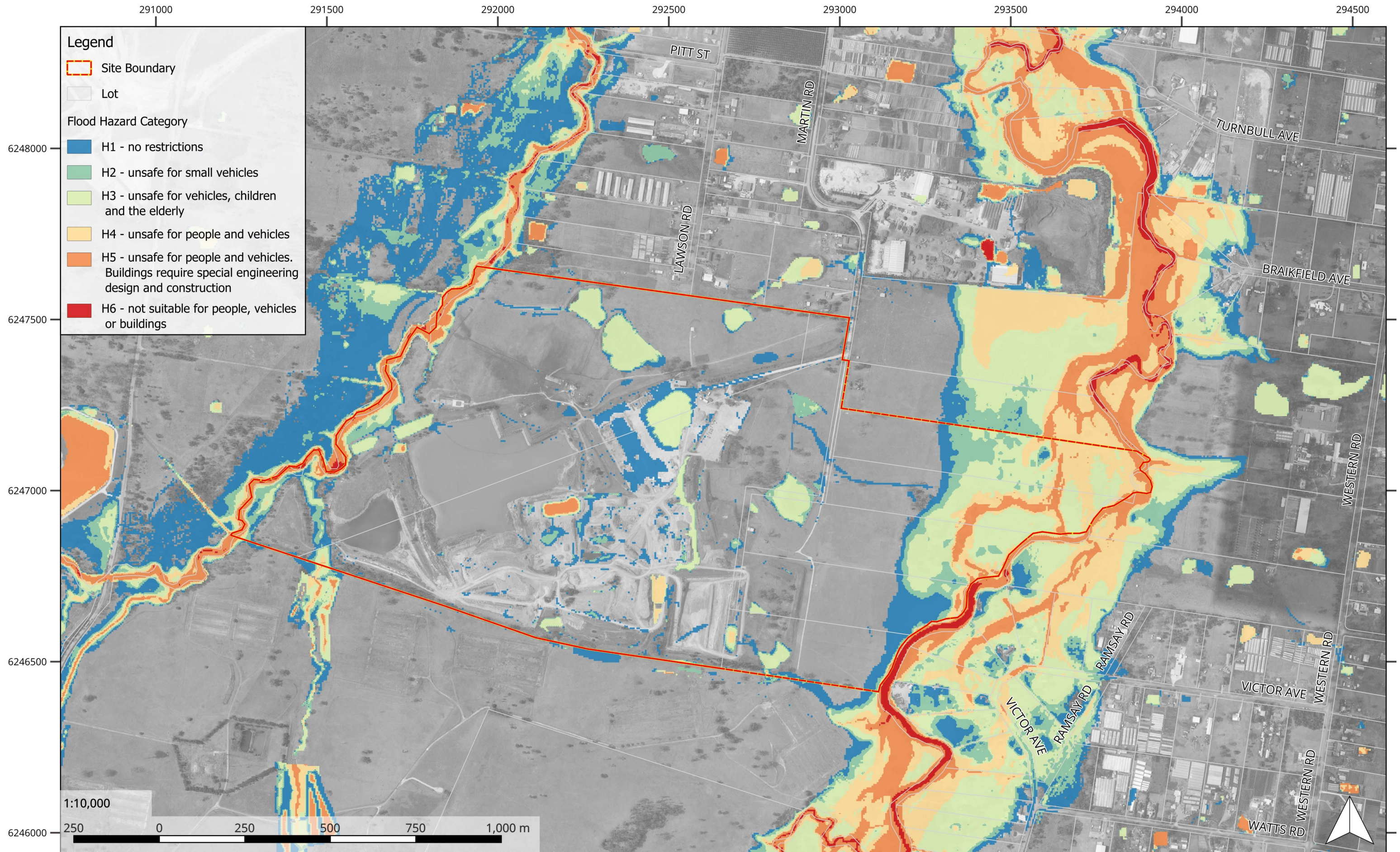
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Map 07: FLOOD LEVEL MAP EXISTING 5% AEP
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



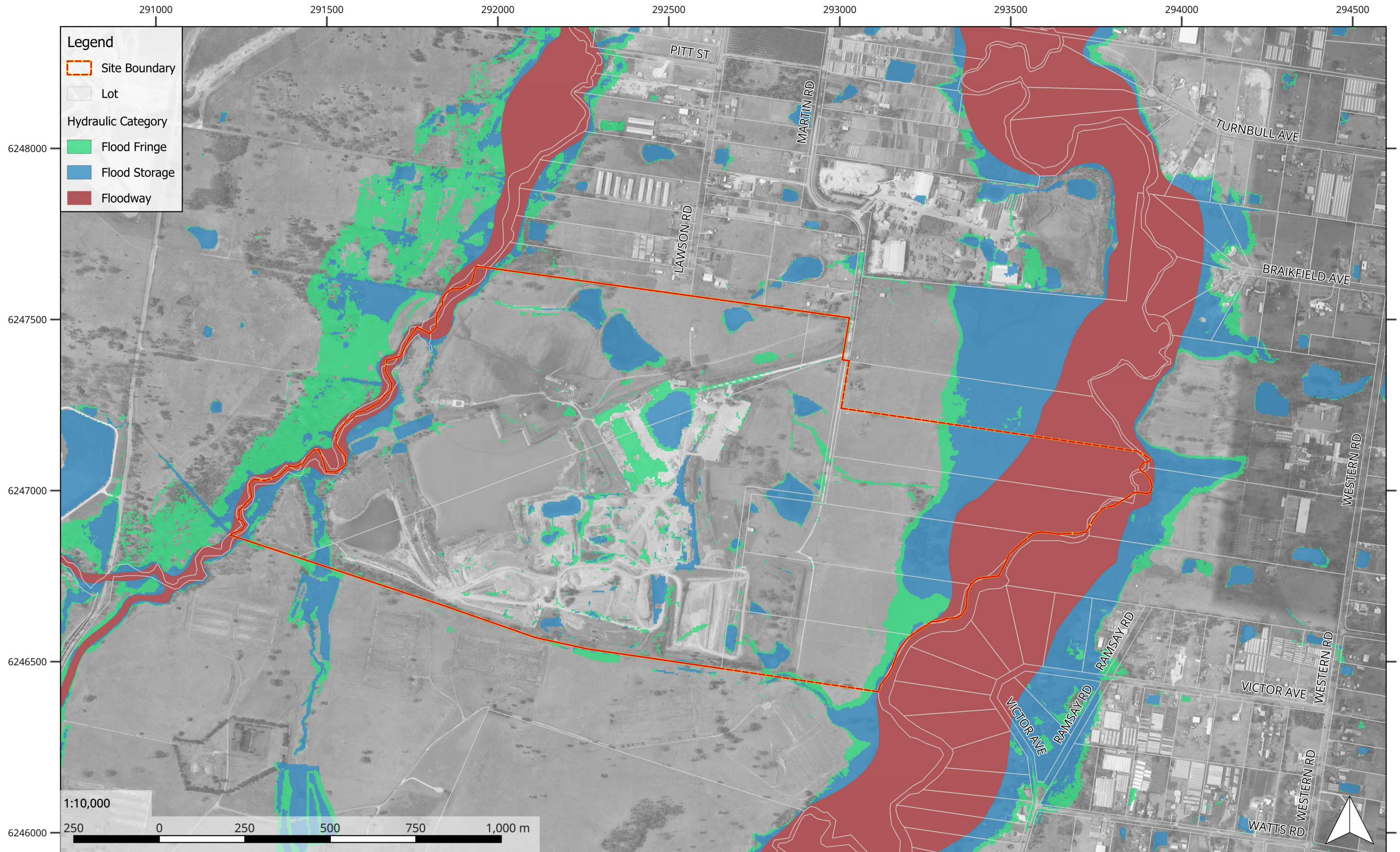
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Map 08: FLOOD VELOCITY MAP EXISTING 5% AEP
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



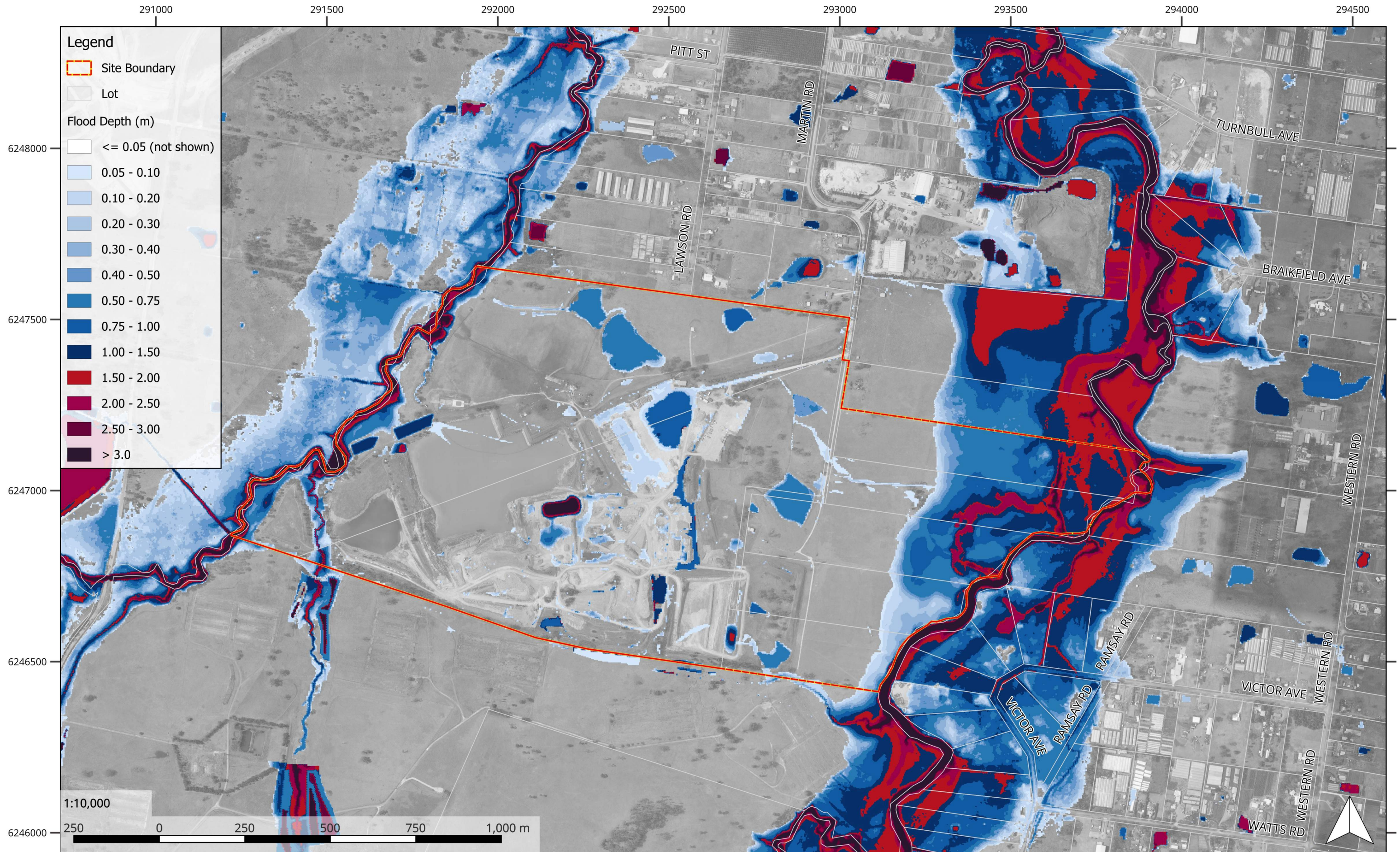
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Map 09: FLOOD HAZARD CATEGORY MAP EXISTING 5% AEP
Project Maverick - BEW SSDA No.97711727
Project Number: 25-0141
Client: Goodman Property Services (Aust)



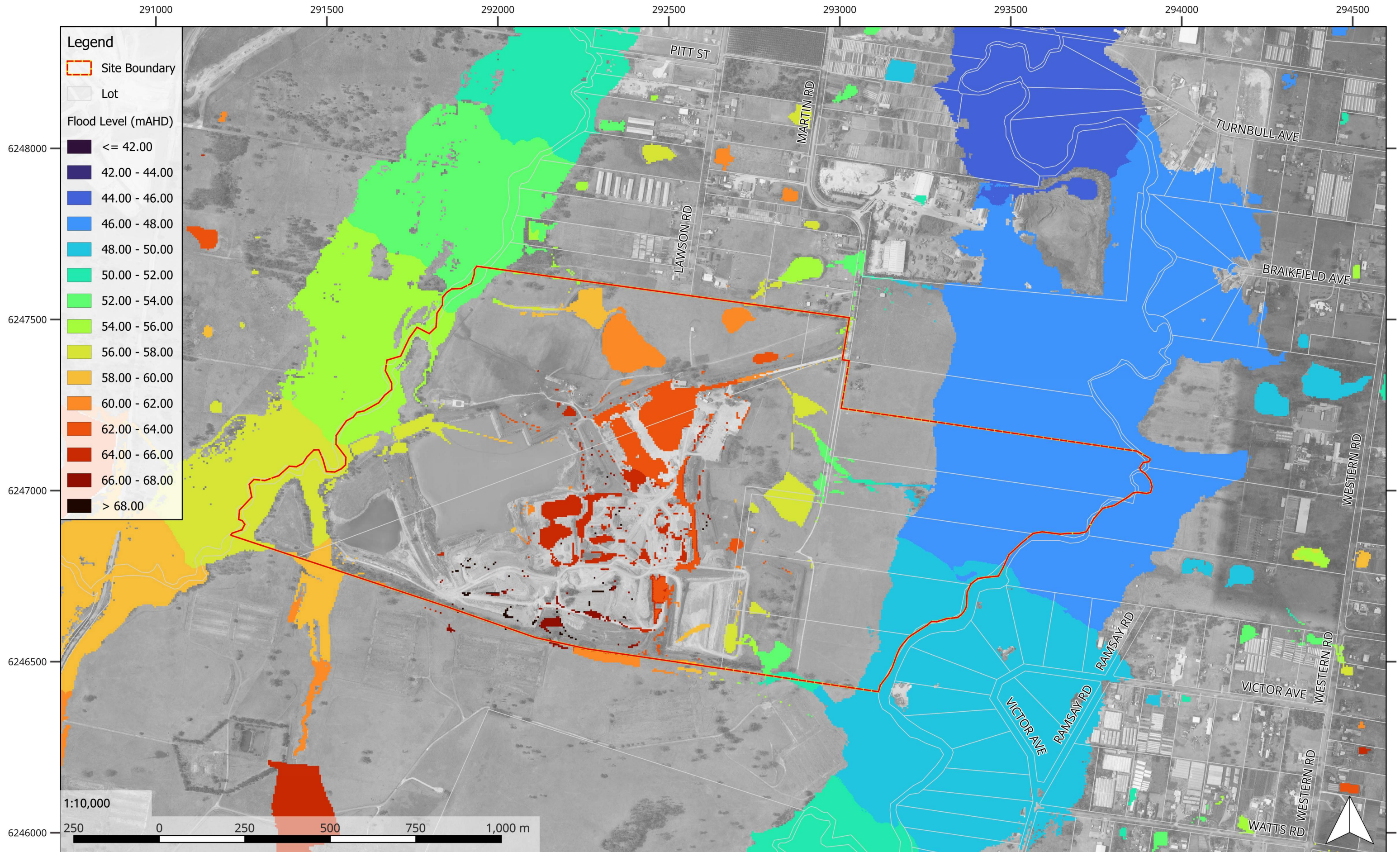
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Map 010: FLOOD HYDRAULIC CATEGORY MAP EXISTING 5% AEP
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



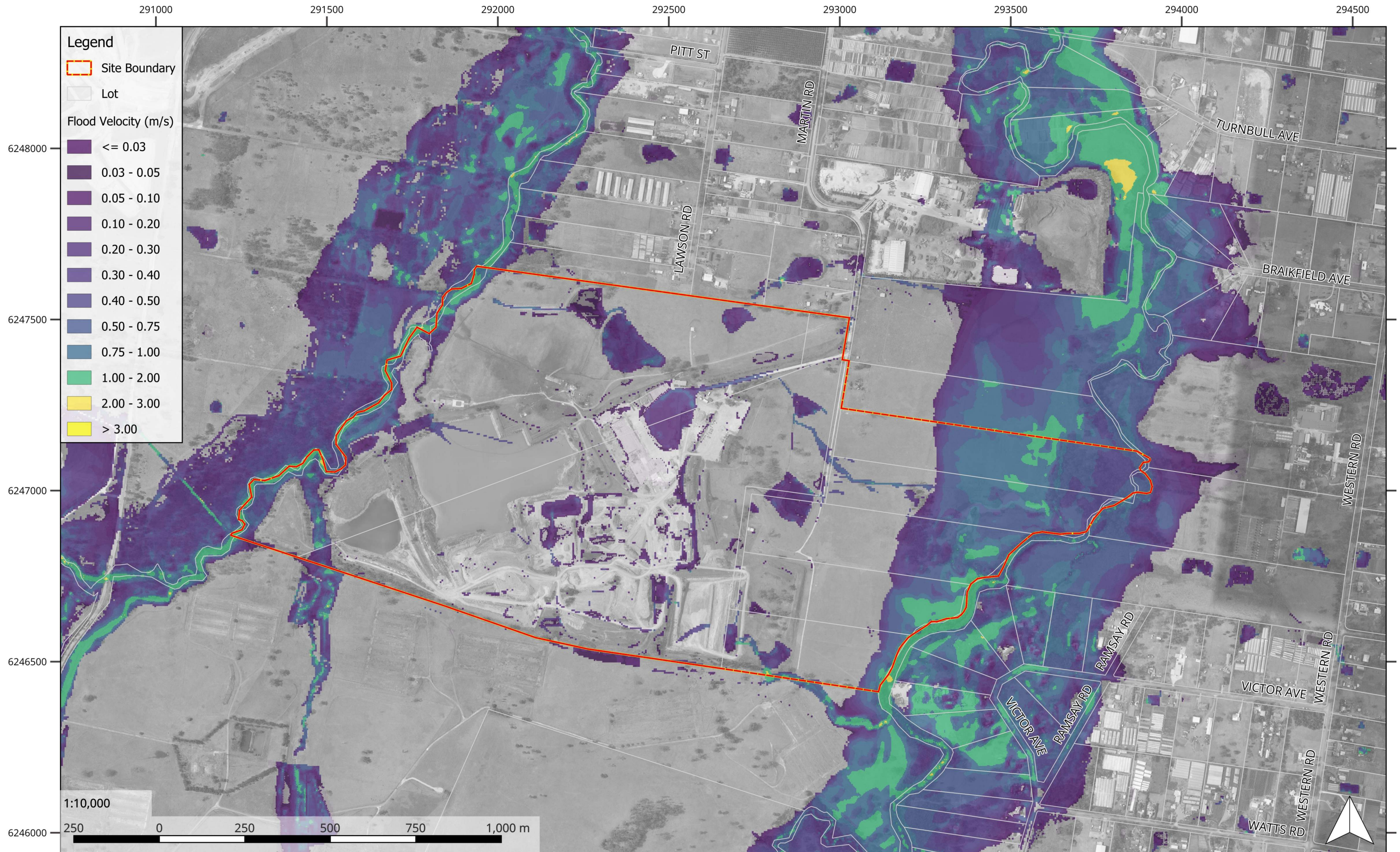
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Map 011: FLOOD DEPTH MAP EXISTING 1% AEP
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



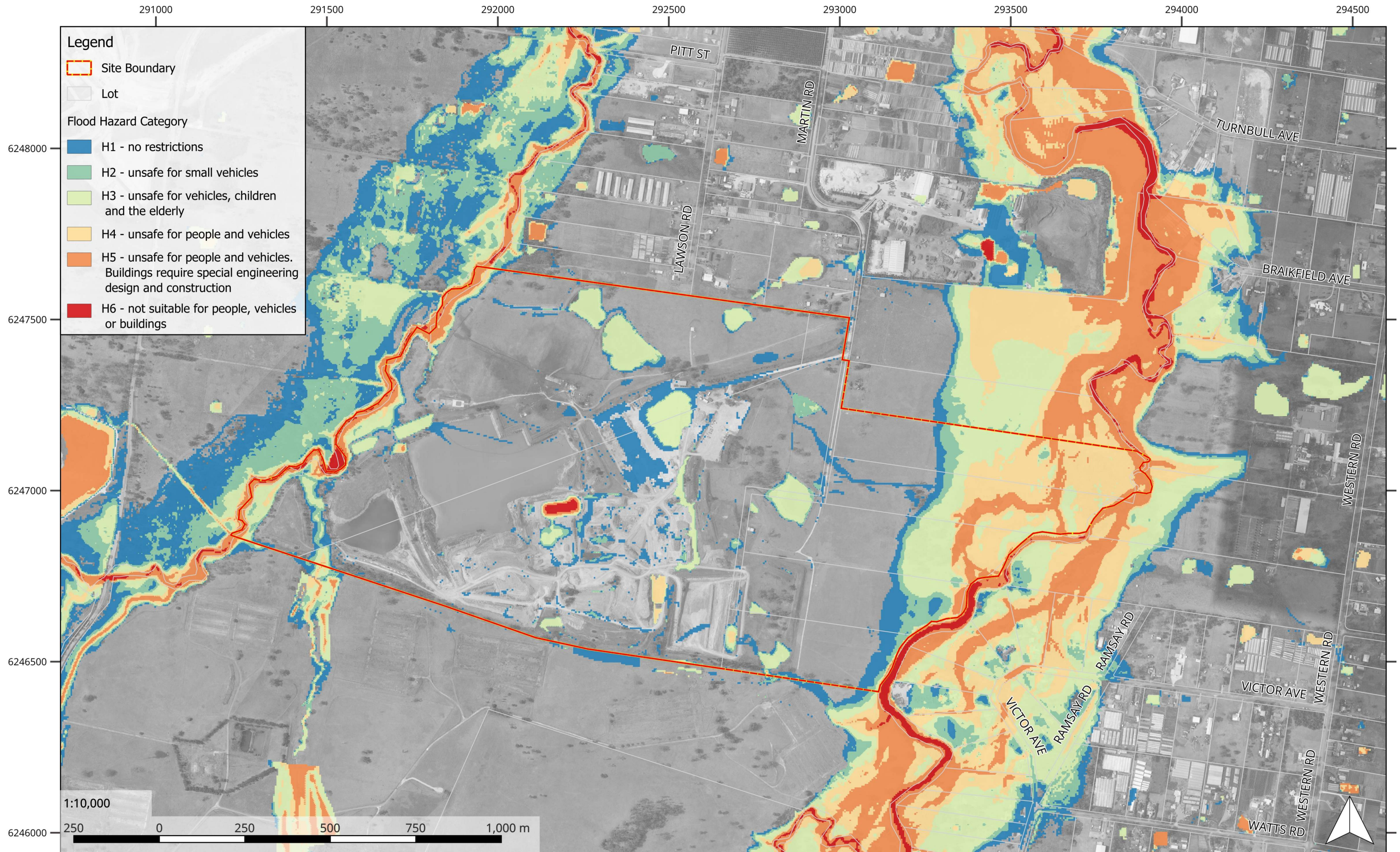
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Map 012: FLOOD LEVEL MAP EXISTING 1% AEP
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



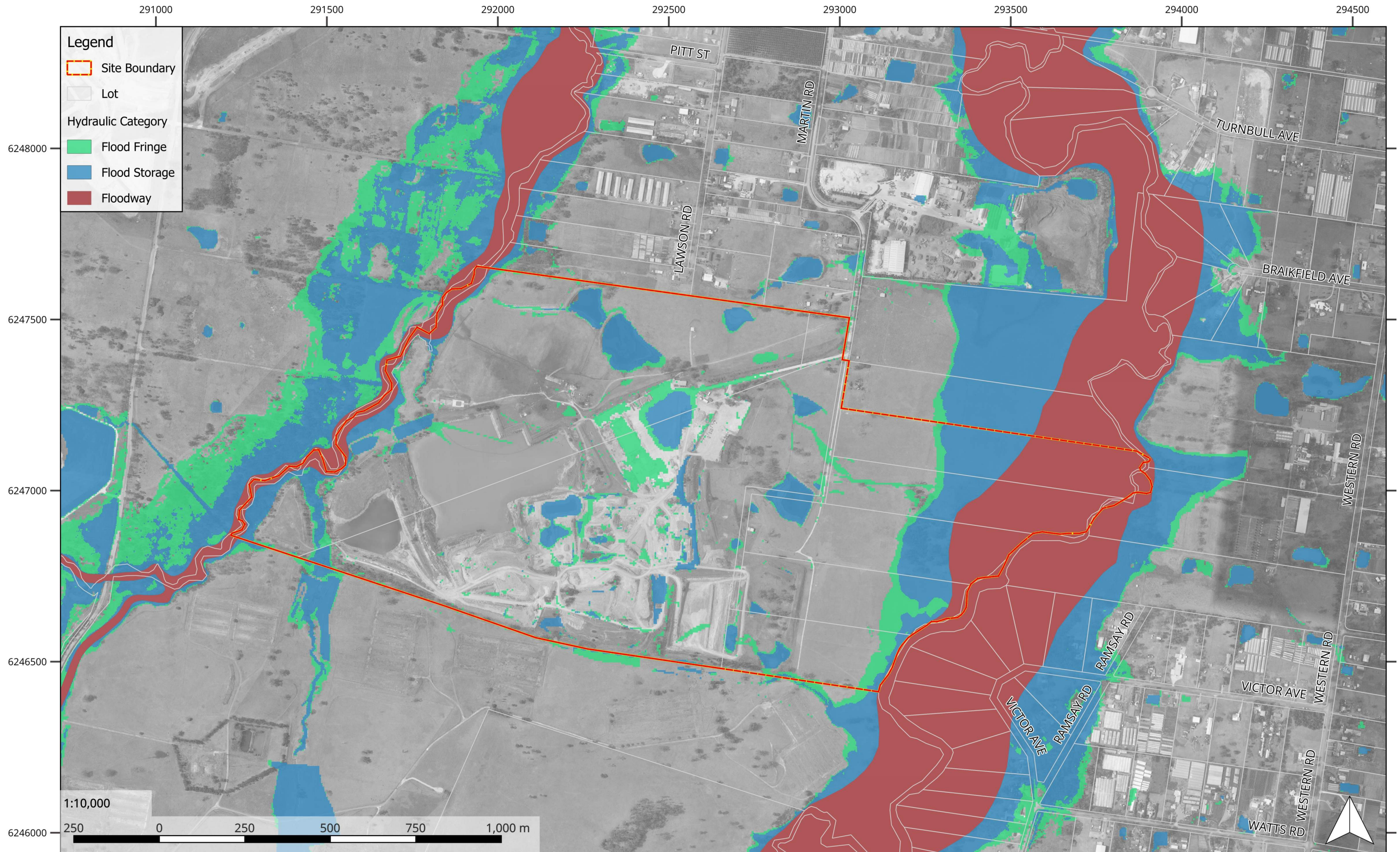
Colliers Engineering & Design (NSW) Pty Ltd endeavours to ensure that the information provided in this map is correct at the time of publication. Colliers Engineering & Design (NSW) Pty Ltd does not warrant, guarantee or make representations regarding the currency and accuracy of information contained within this map.

Map 013: FLOOD VELOCITY MAP EXISTING 1% AEP
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



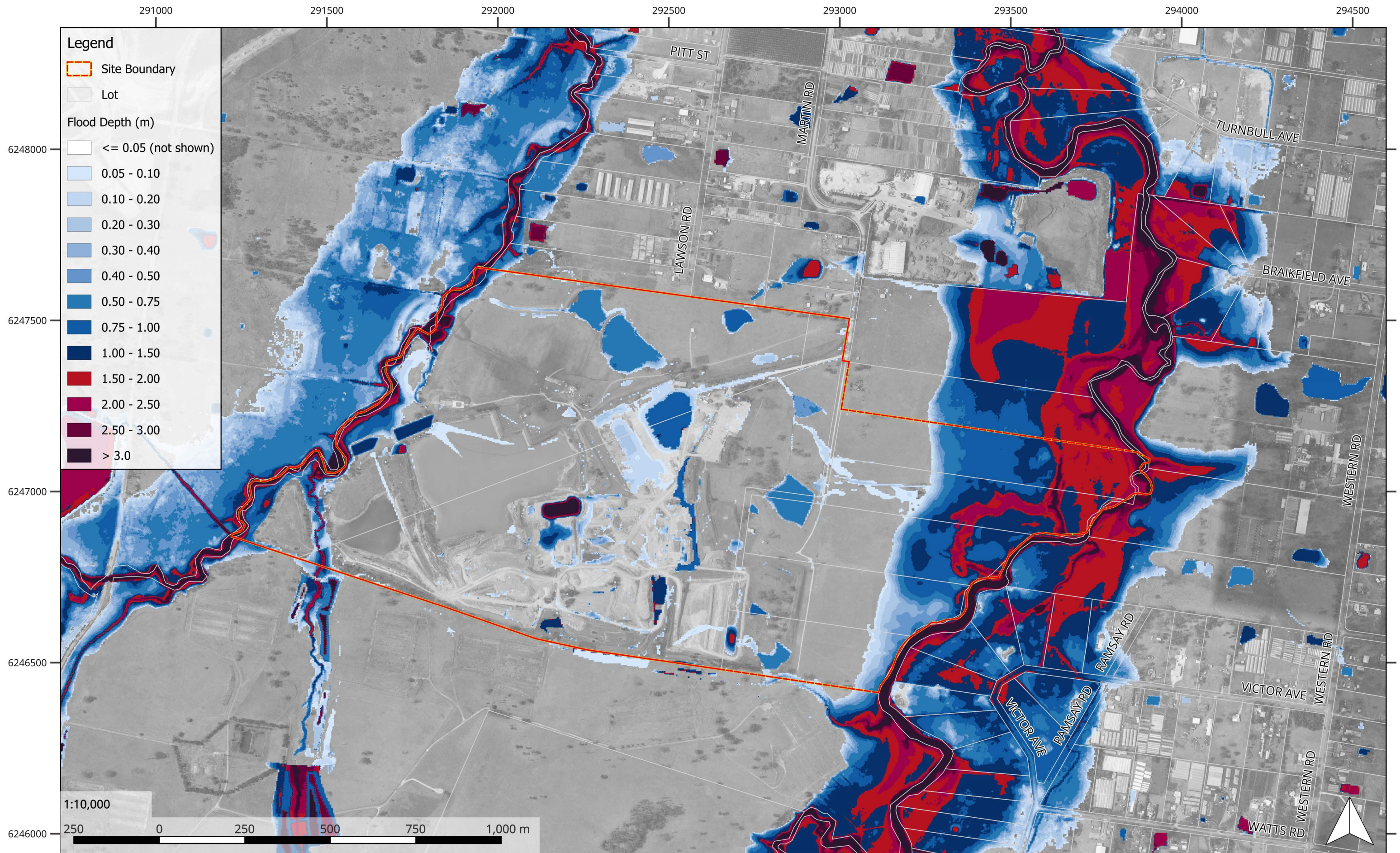
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Map 014: FLOOD HAZARD CATEGORY MAP EXISTING 1% AEP
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



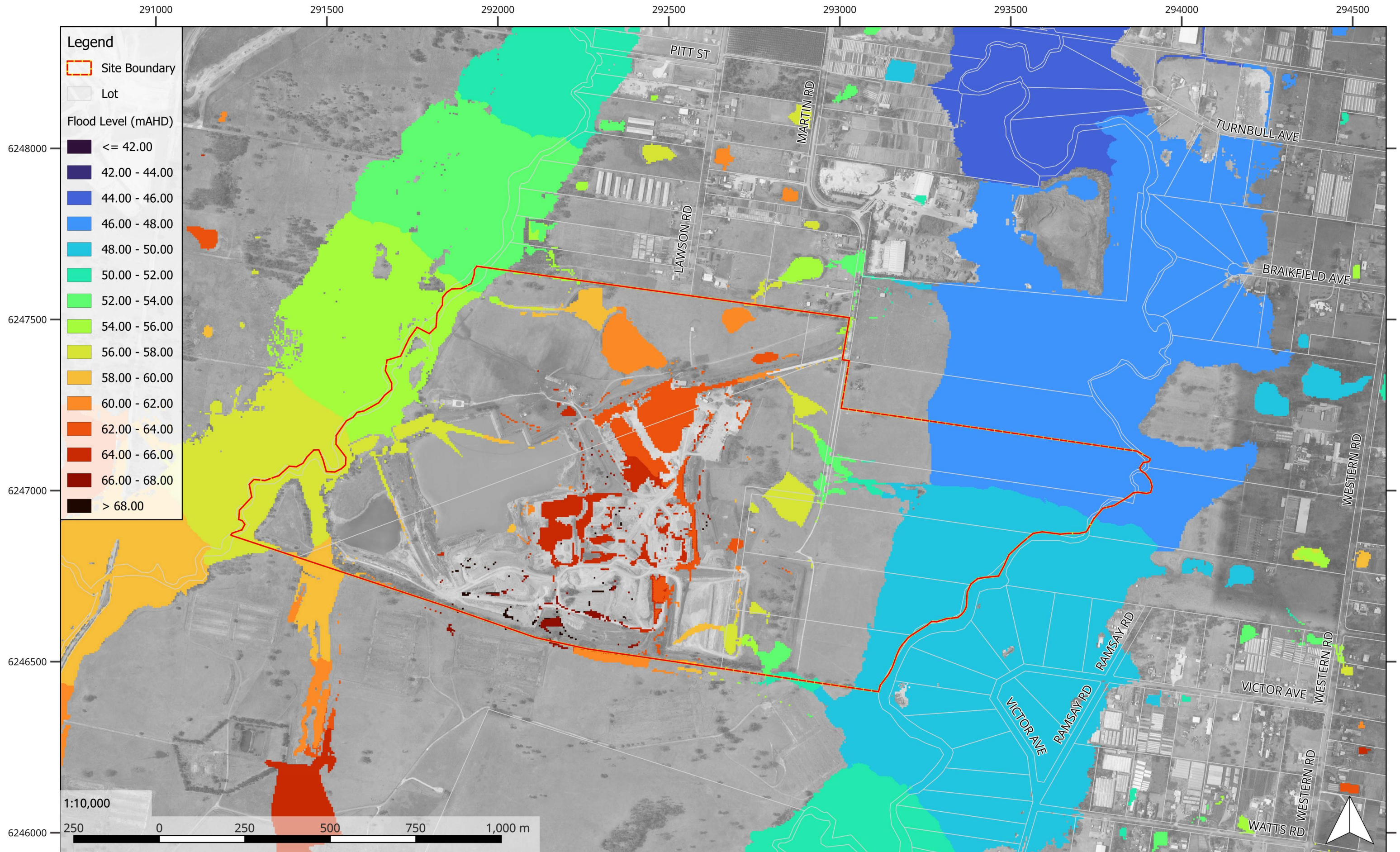
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Map 015: FLOOD HYDRAULIC CATEGORY MAP EXISTING 1% AEP
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



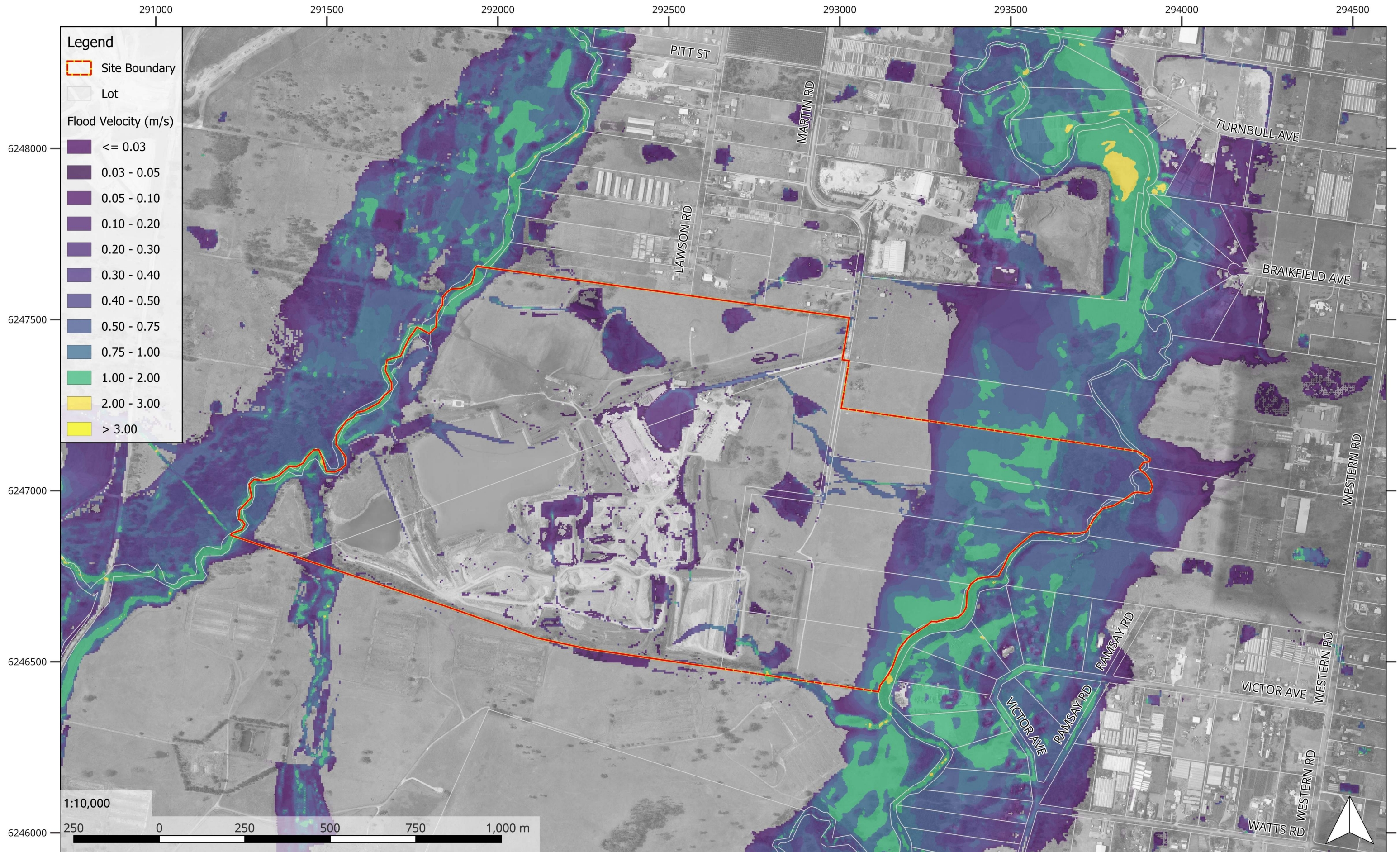
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Map 016: FLOOD DEPTH MAP EXISTING 1% AEP CC
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



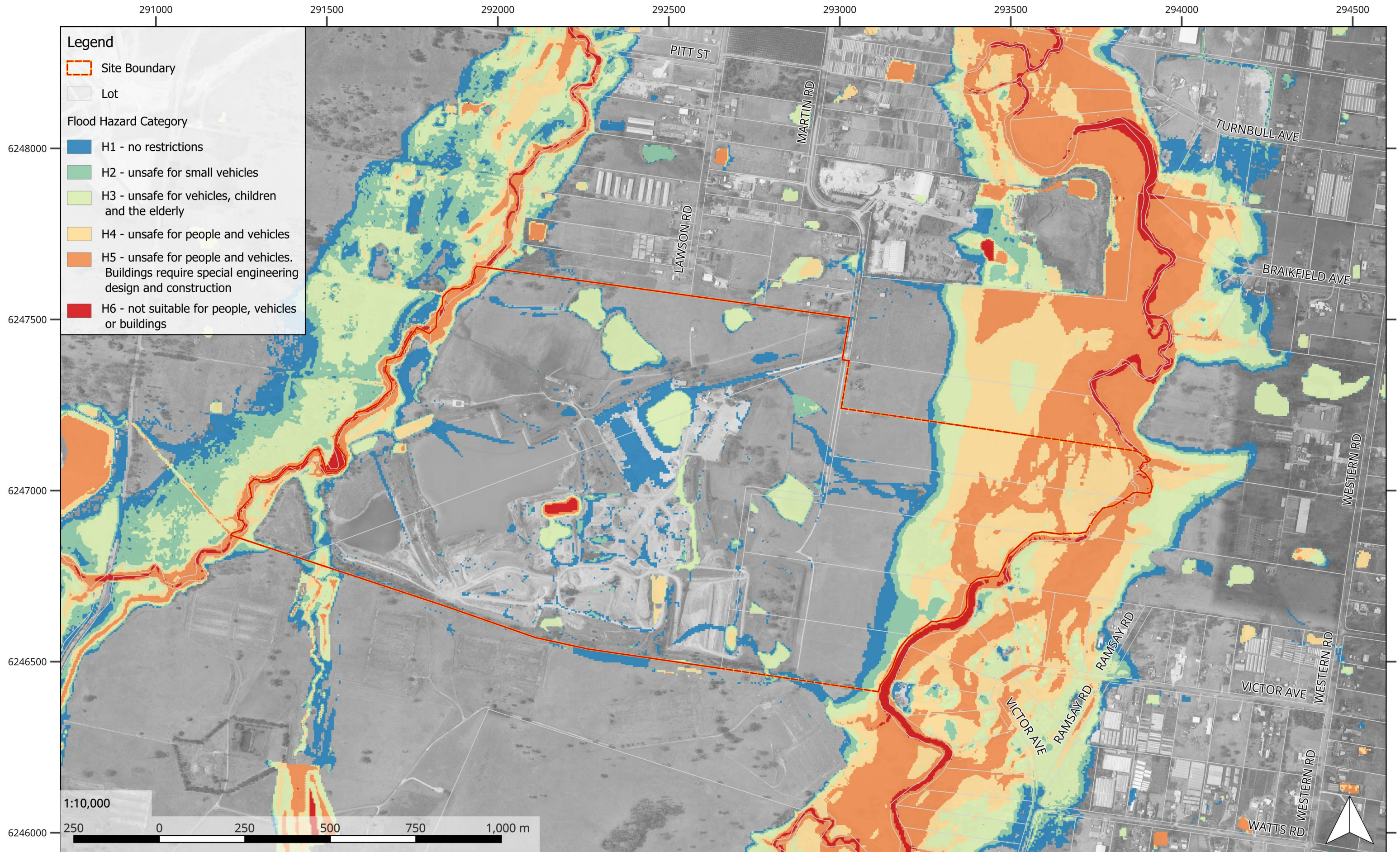
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Map 017: FLOOD LEVEL MAP EXISTING 1% AEP CC
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



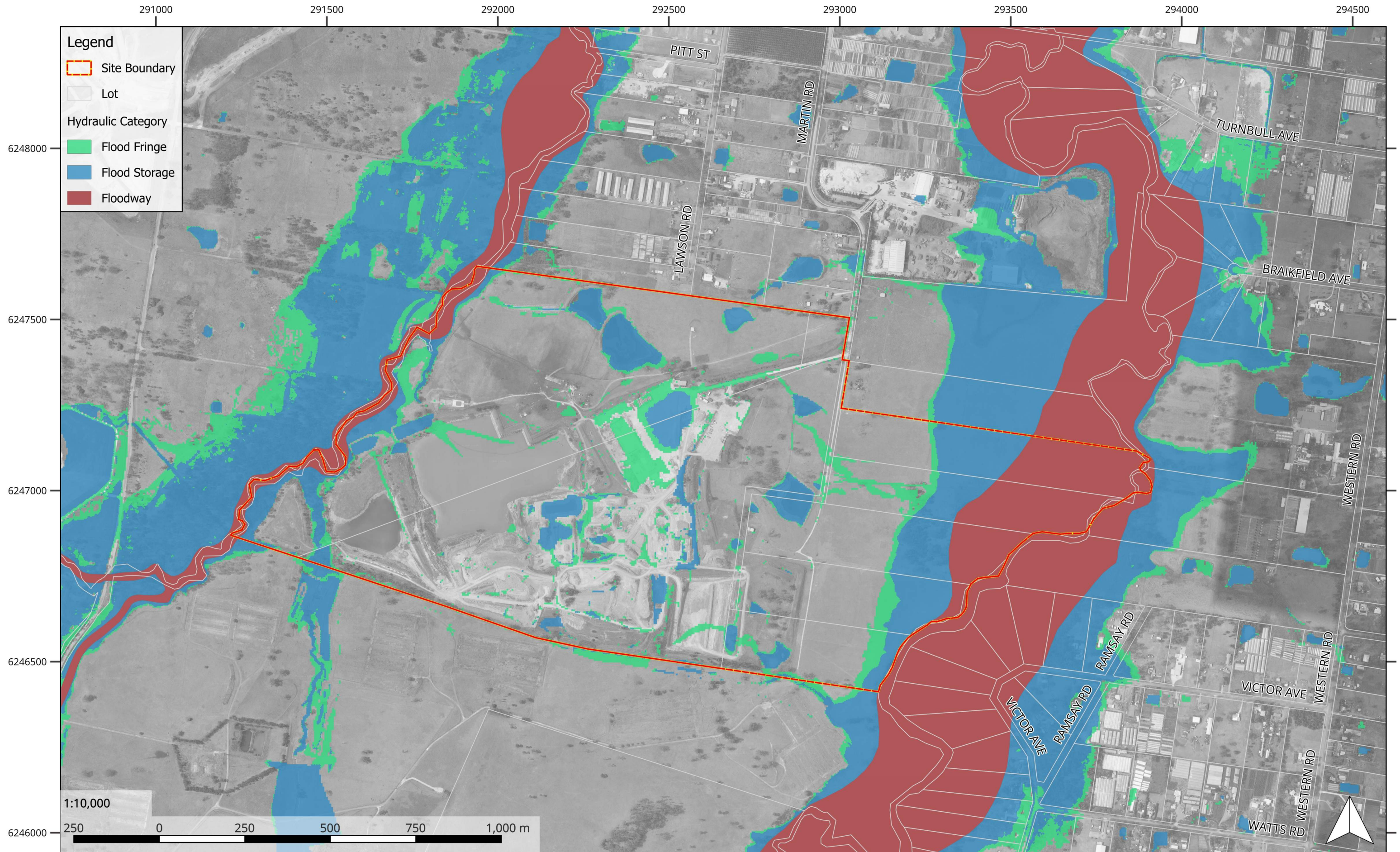
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Map 018: FLOOD VELOCITY MAP EXISTING 1% AEP CC
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



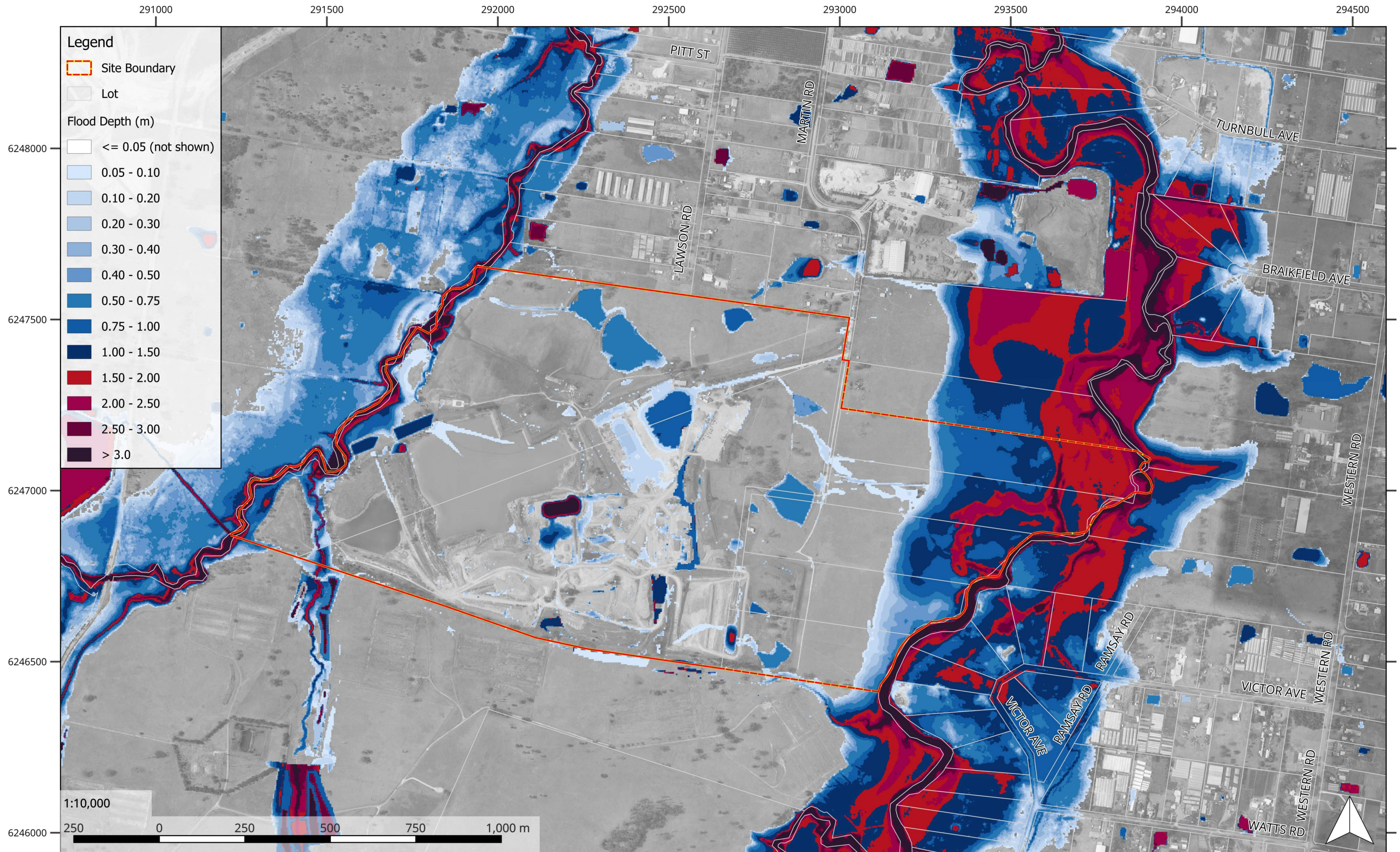
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Map 019: FLOOD HAZARD CATEGORY MAP EXISTING 1% AEP CC
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



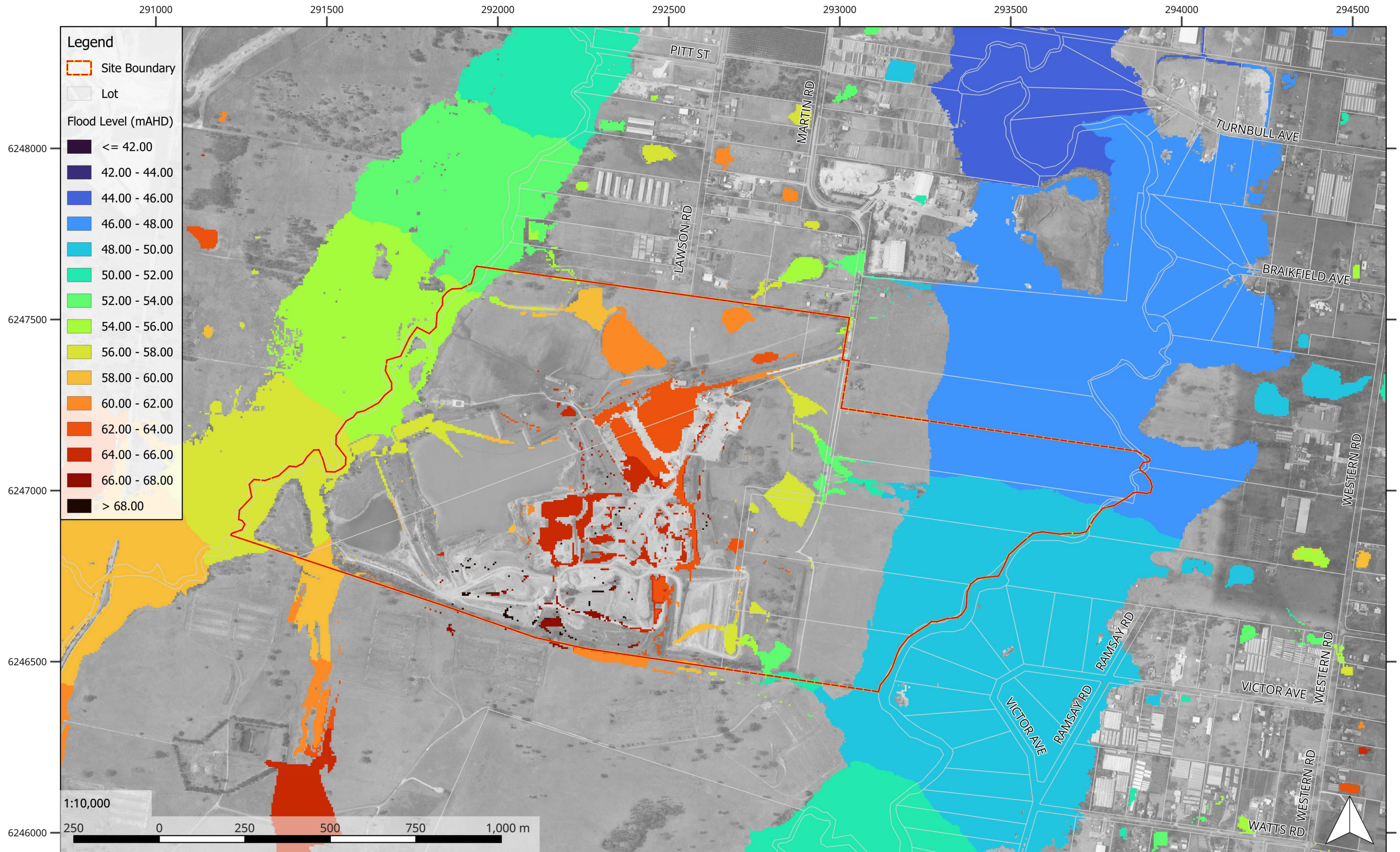
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Map 020: FLOOD HYDRAULIC CATEGORY MAP EXISTING 1% AEP CC
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



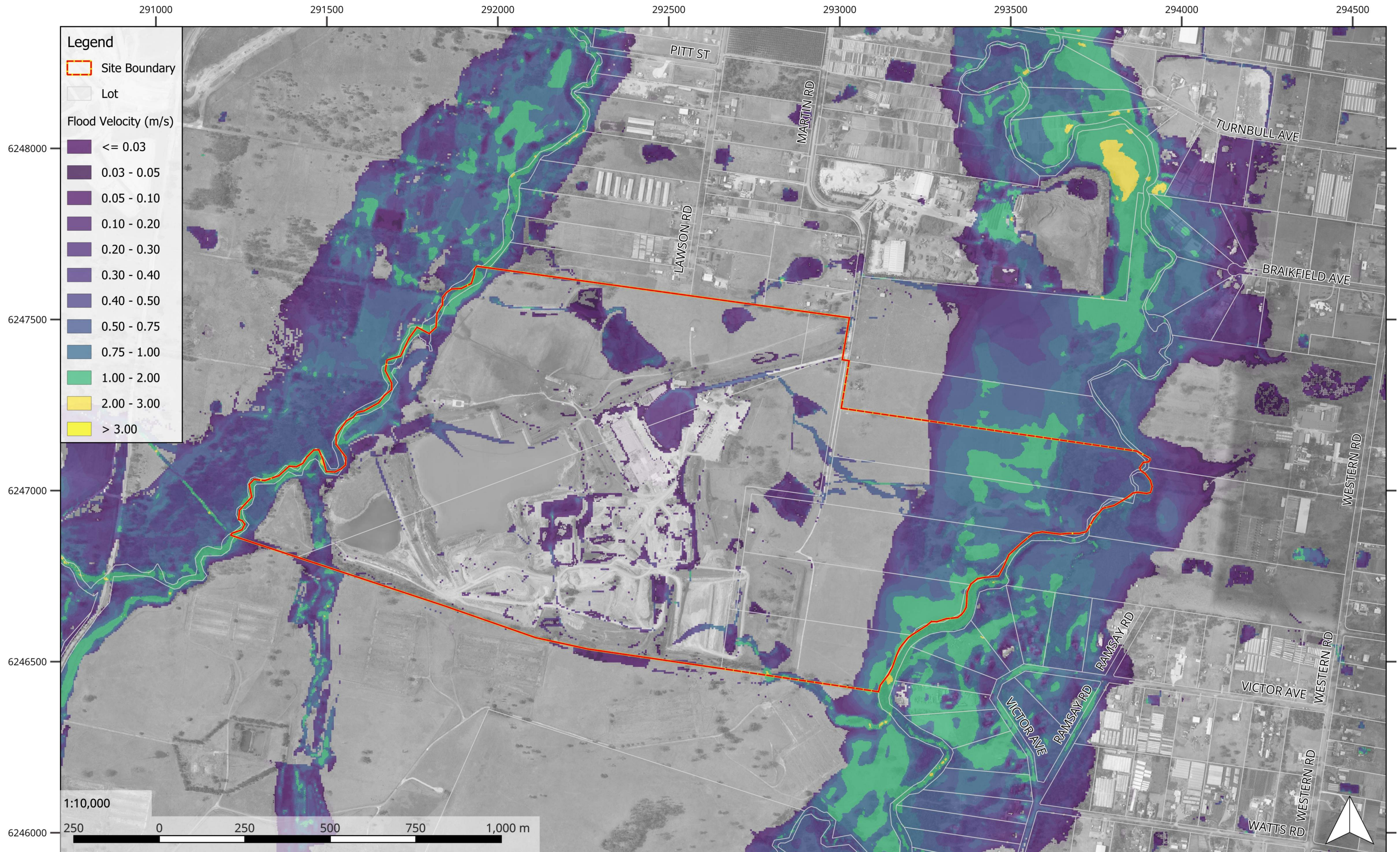
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Map 021: FLOOD DEPTH MAP EXISTING 0.2% AEP
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



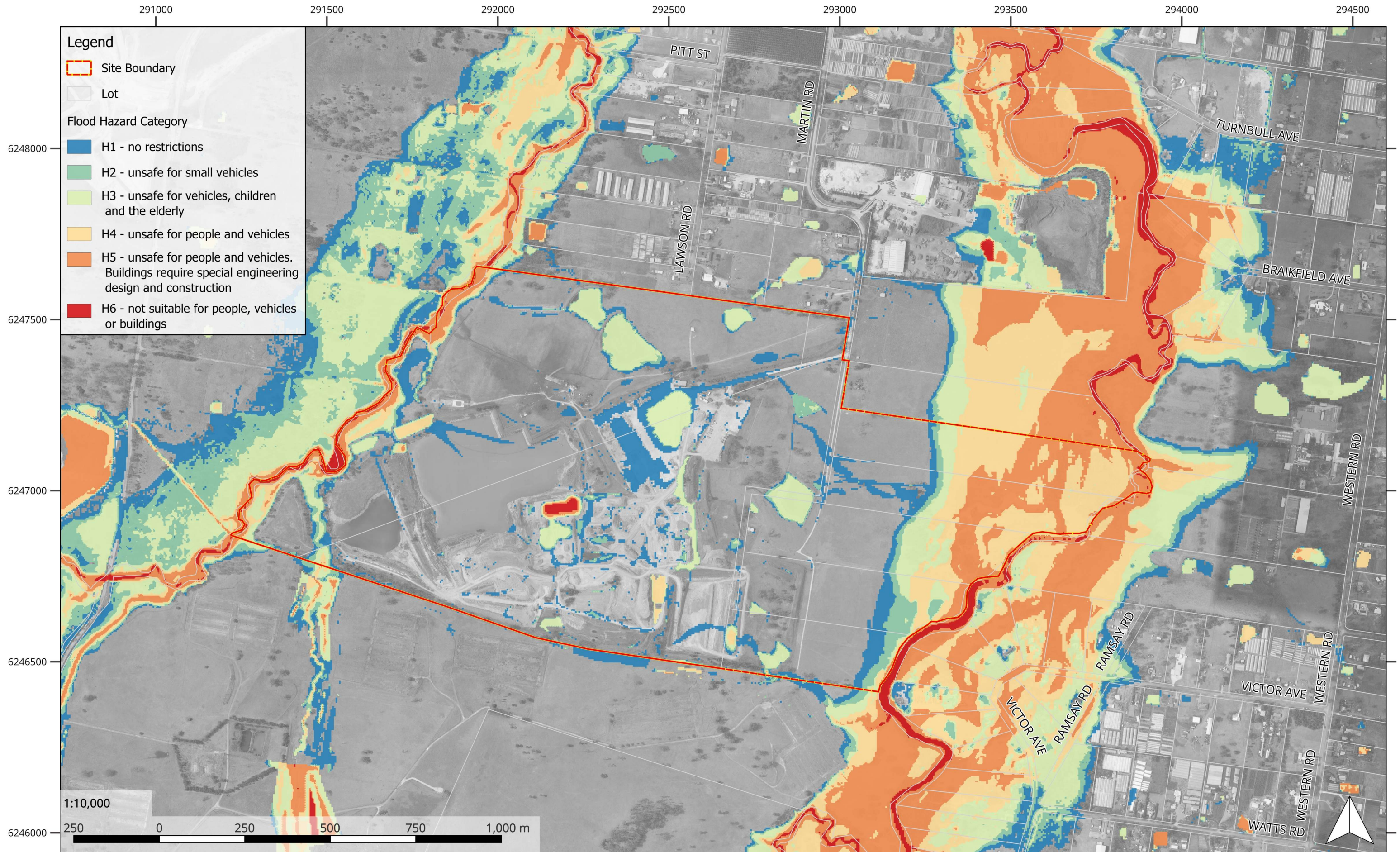
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Map 022: FLOOD LEVEL MAP EXISTING 0.2% AEP
Project Maverick - BEW SSDA No.97711727
Project Number: 25-0141
Client: Goodman Property Services (Aust)



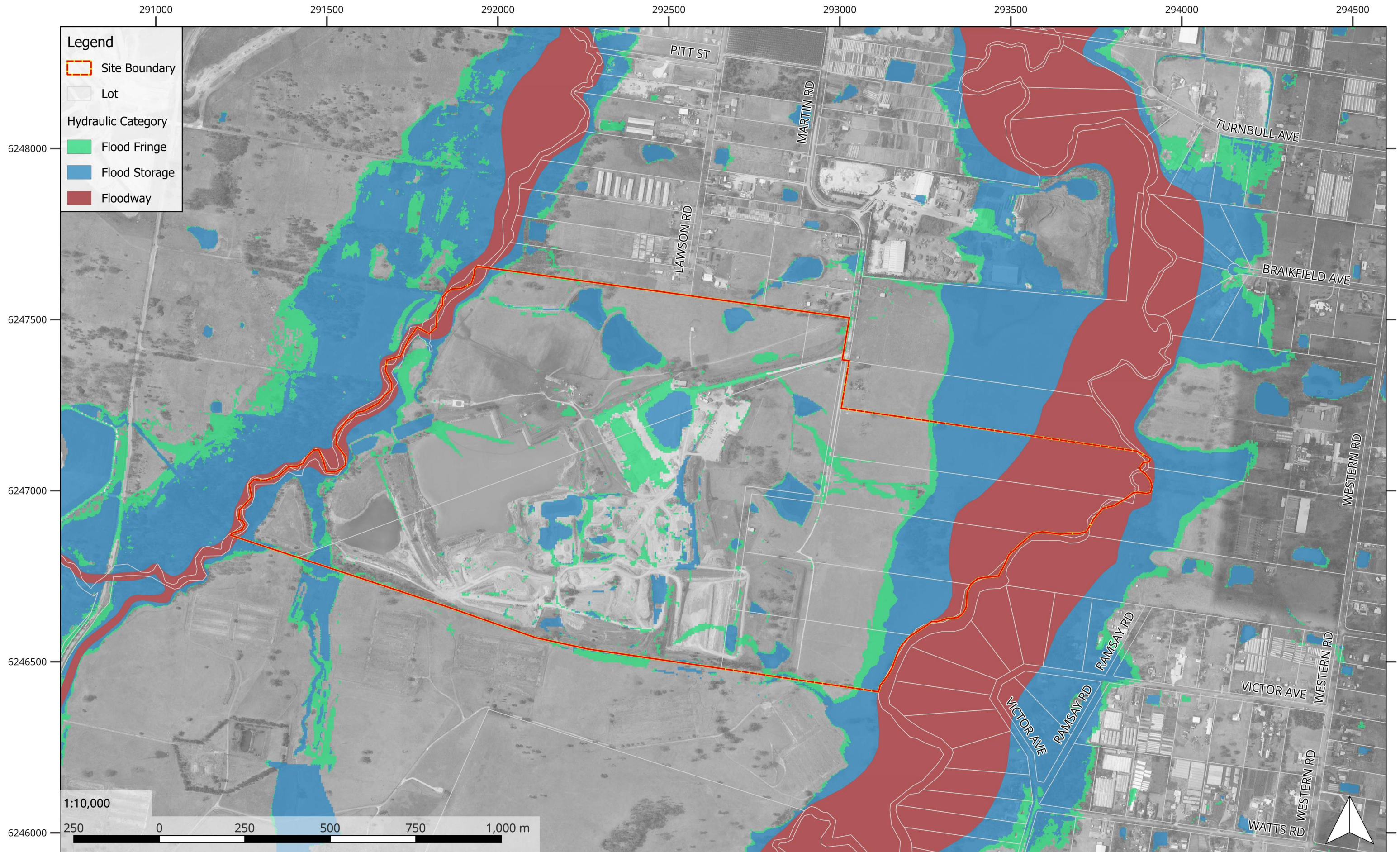
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Map 023: FLOOD VELOCITY MAP EXISTING 0.2% AEP
Project Maverick - BEW SSDA No.97711727
Project Number: 25-0141
Client: Goodman Property Services (Aust)



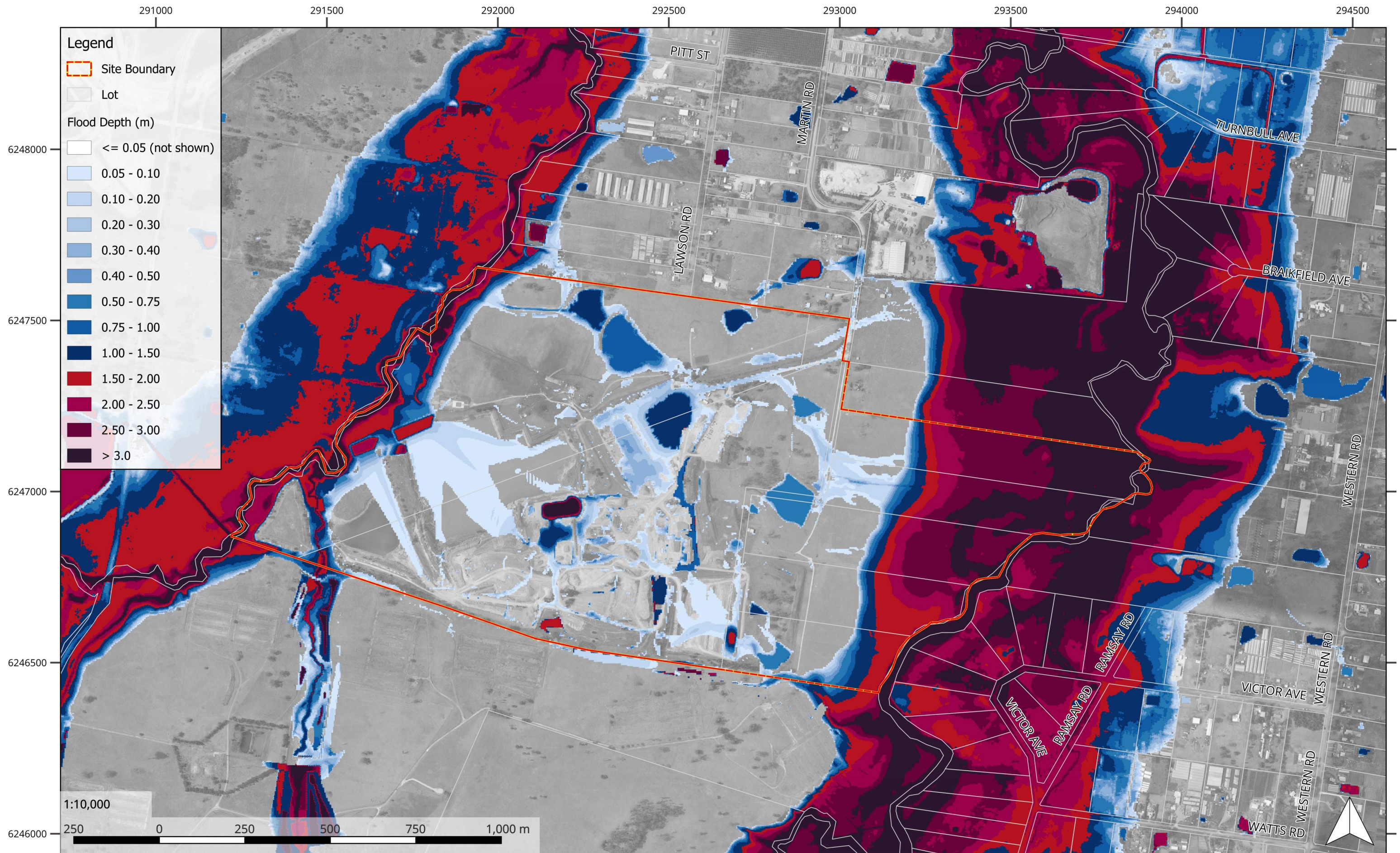
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Map 024: FLOOD HAZARD CATEGORY MAP EXISTING 0.2% AEP
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



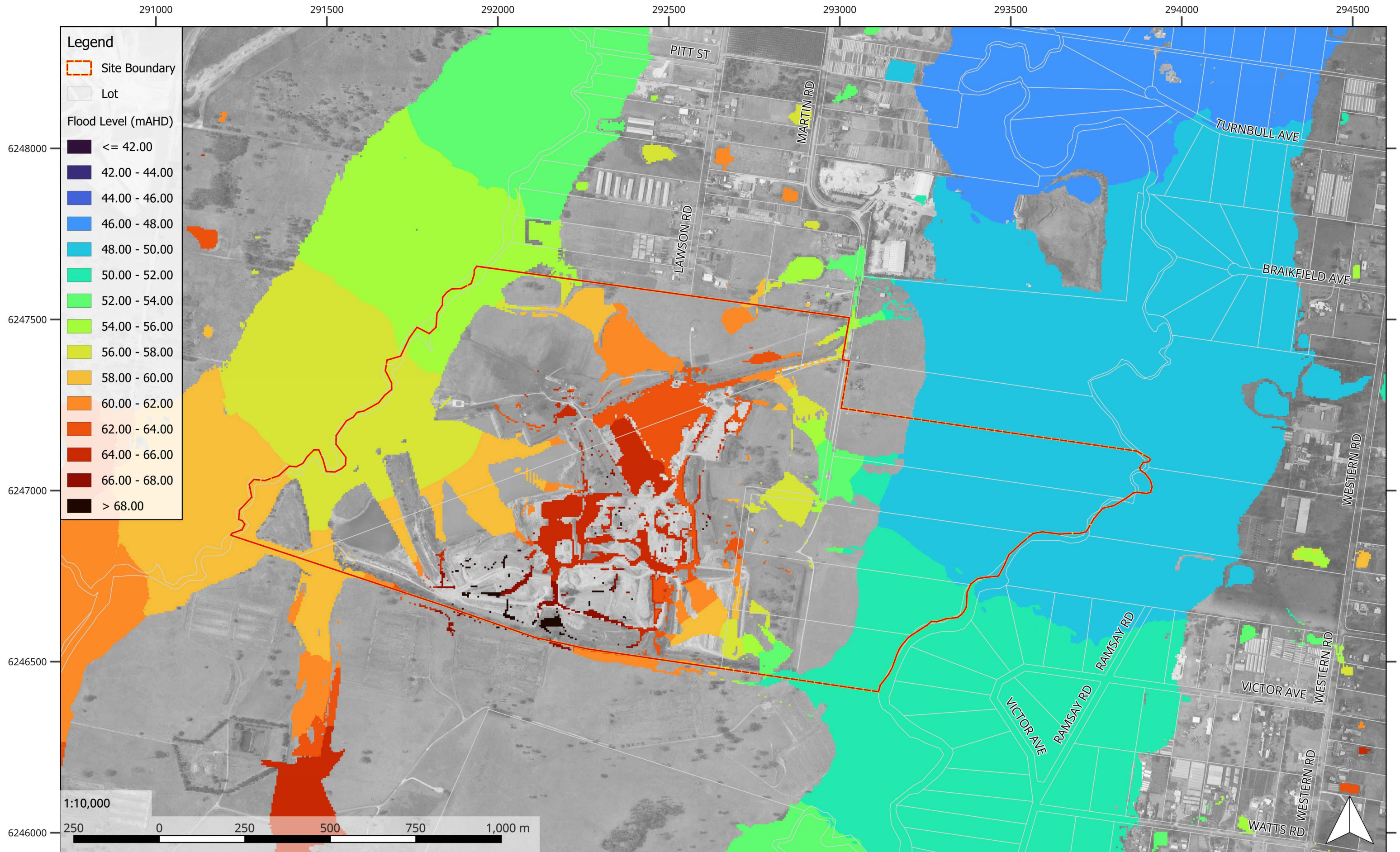
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Map 025: FLOOD HYDRAULIC CATEGORY MAP EXISTING 0.2% AEP
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



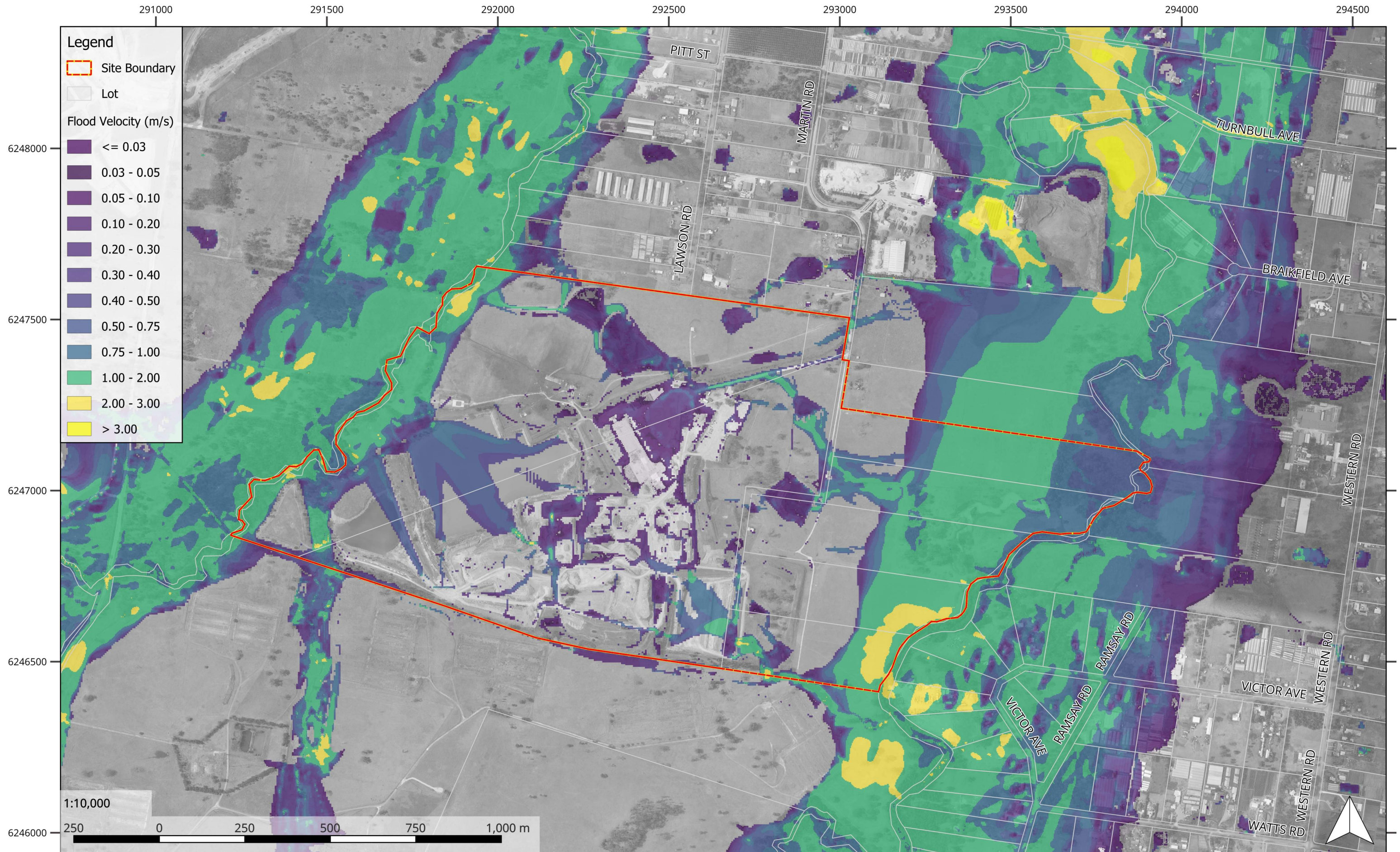
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Map 026: FLOOD DEPTH MAP EXISTING PMF
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



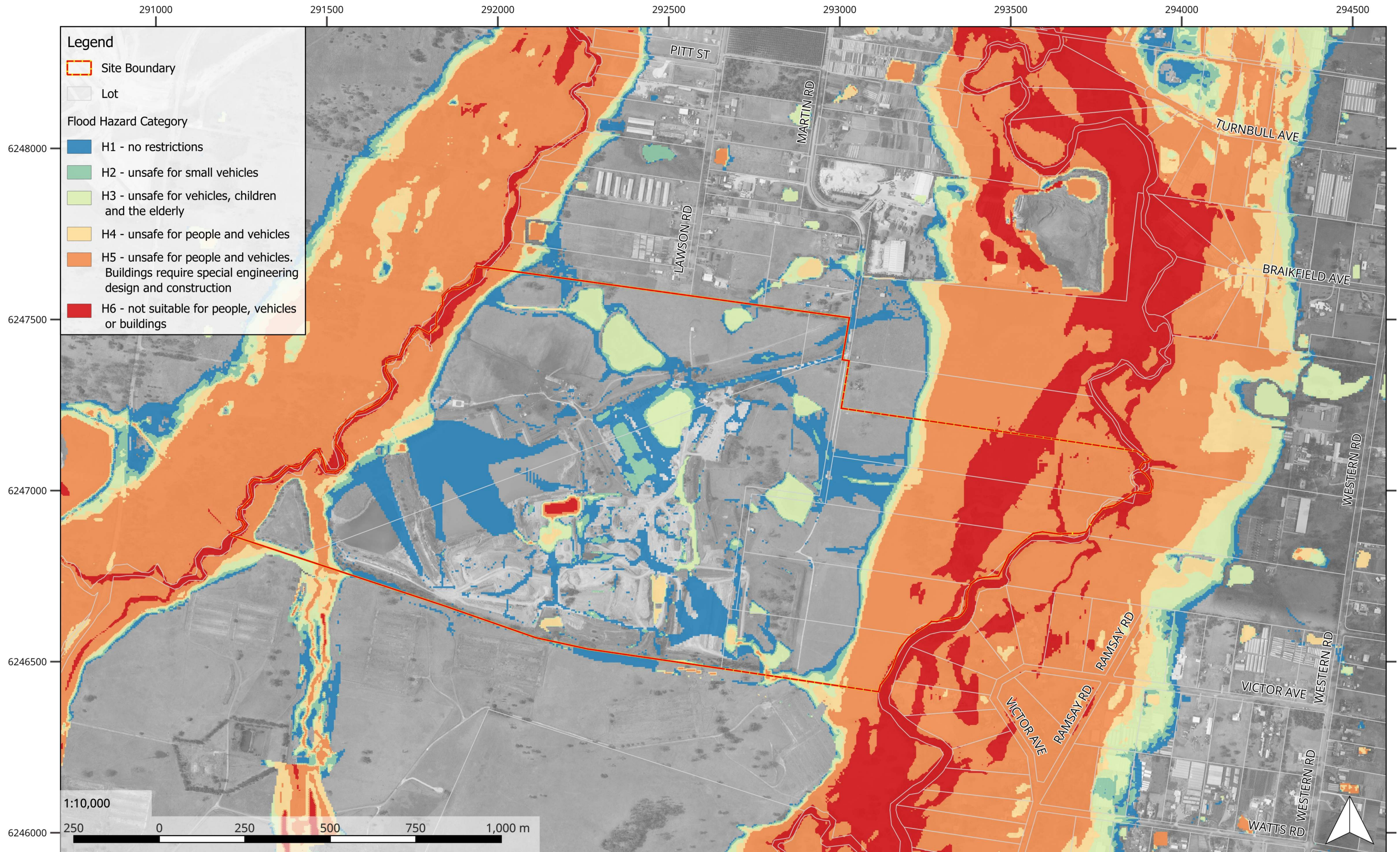
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Map 027: FLOOD LEVEL MAP EXISTING PMF
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



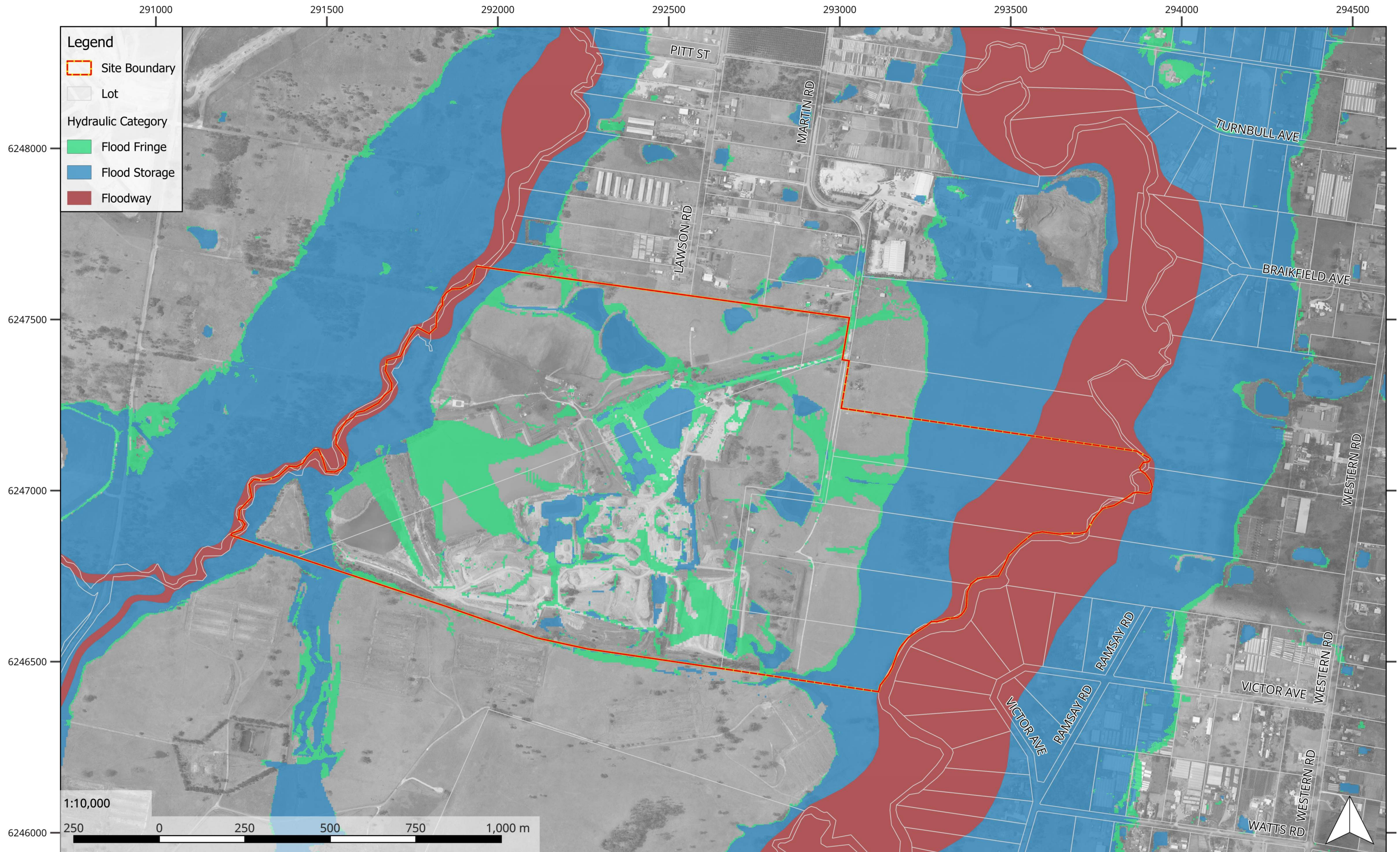
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Map 028: FLOOD VELOCITY MAP EXISTING PMF
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



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Map 029: FLOOD HAZARD CATEGORY MAP EXISTING PMF
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



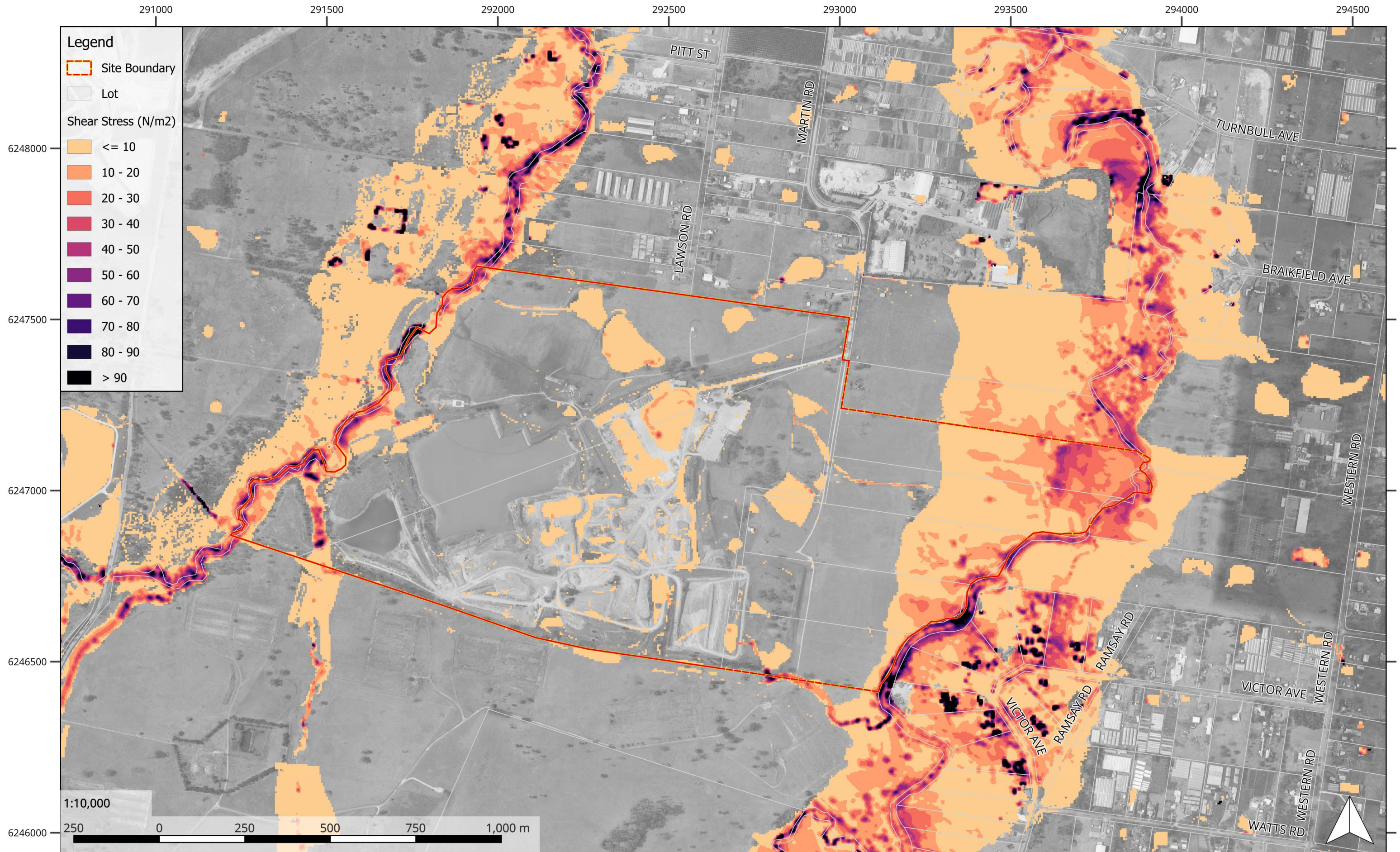
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Map 030: FLOOD HYDRAULIC CATEGORY MAP EXISTING PMF
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



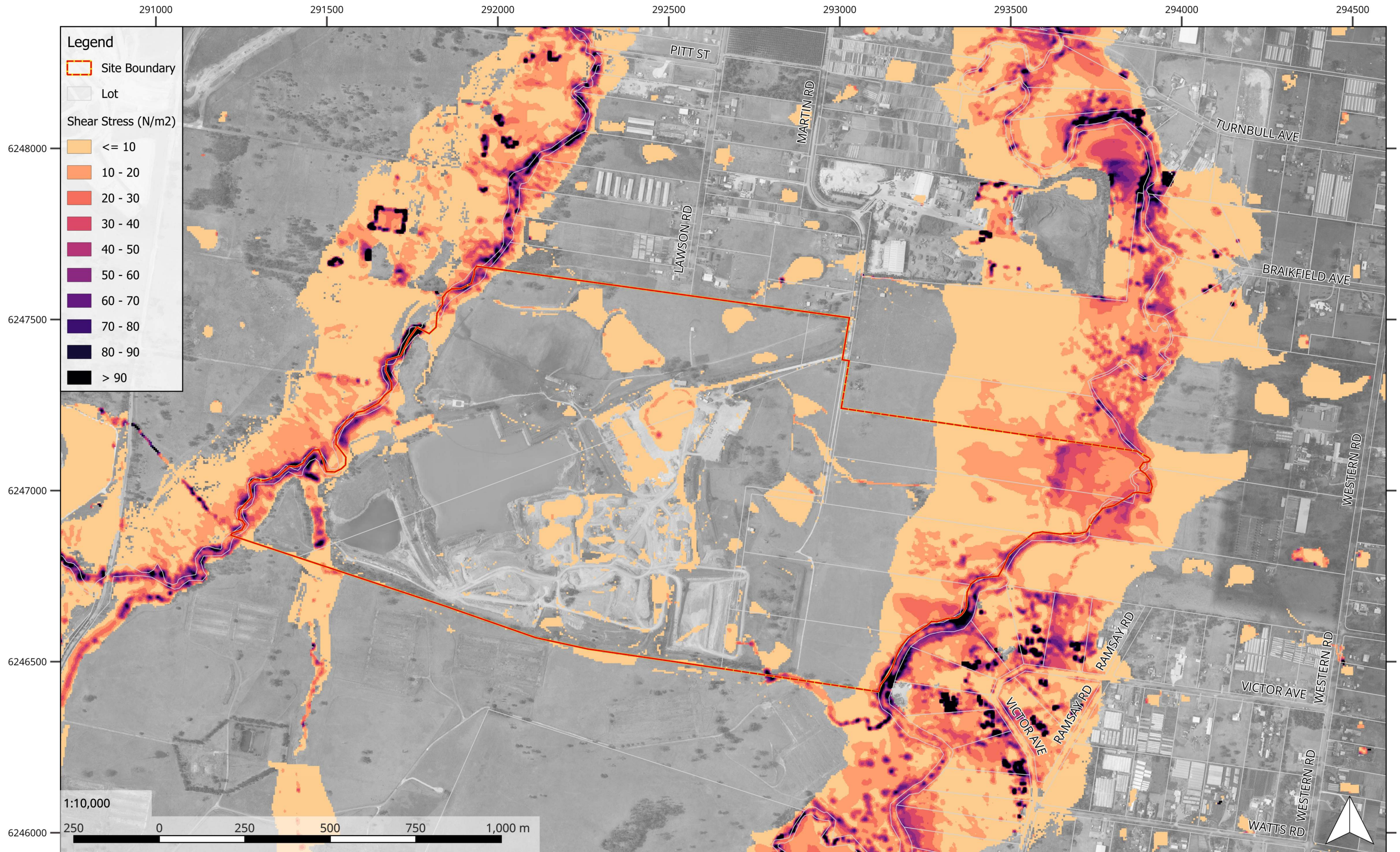
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Map 031: FLOOD BED SHEAR STRESS MAP EXISTING BSS 4 EY
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



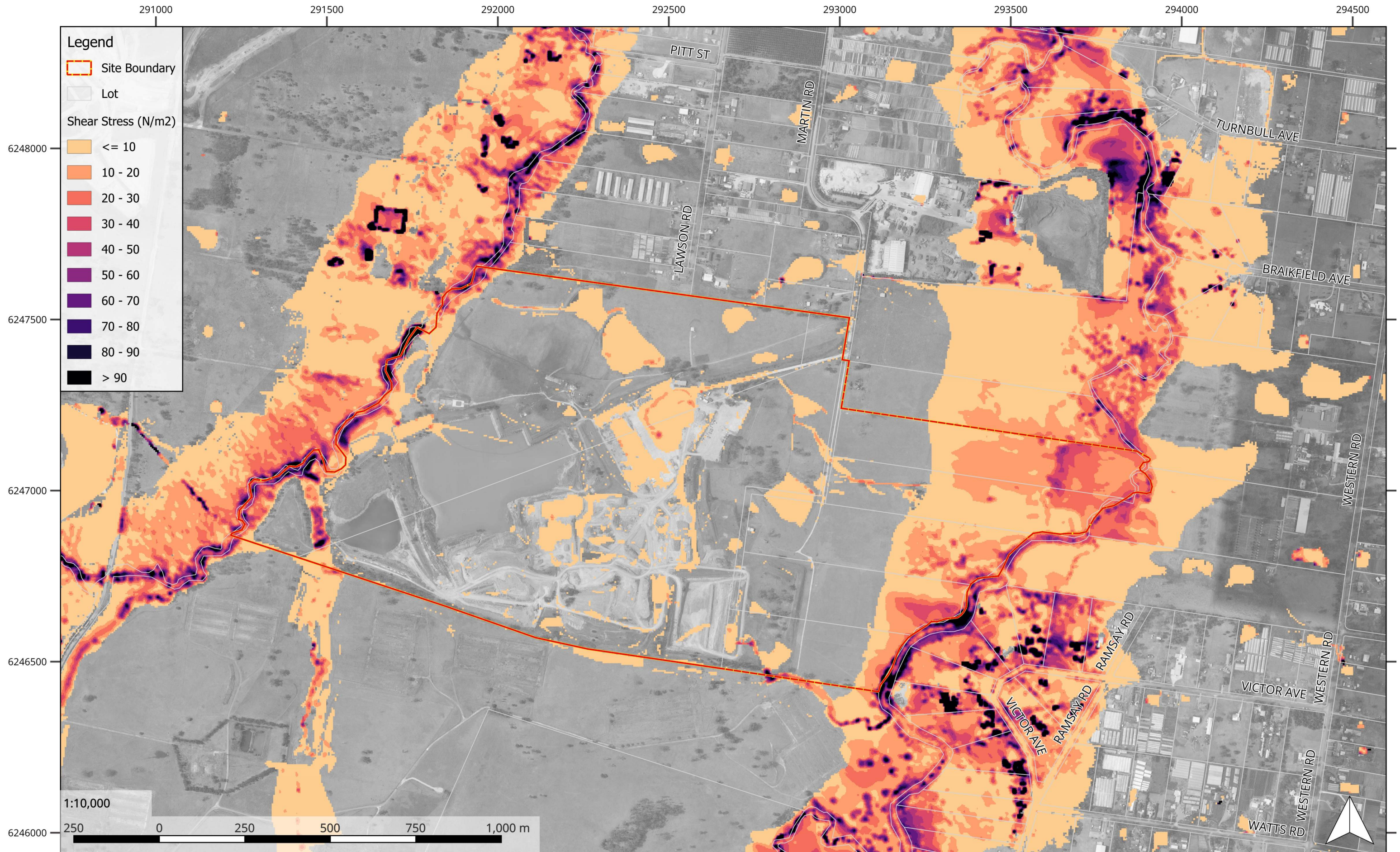
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Map 032: FLOOD BED SHEAR STRESS MAP EXISTING BSS 5% AEP
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



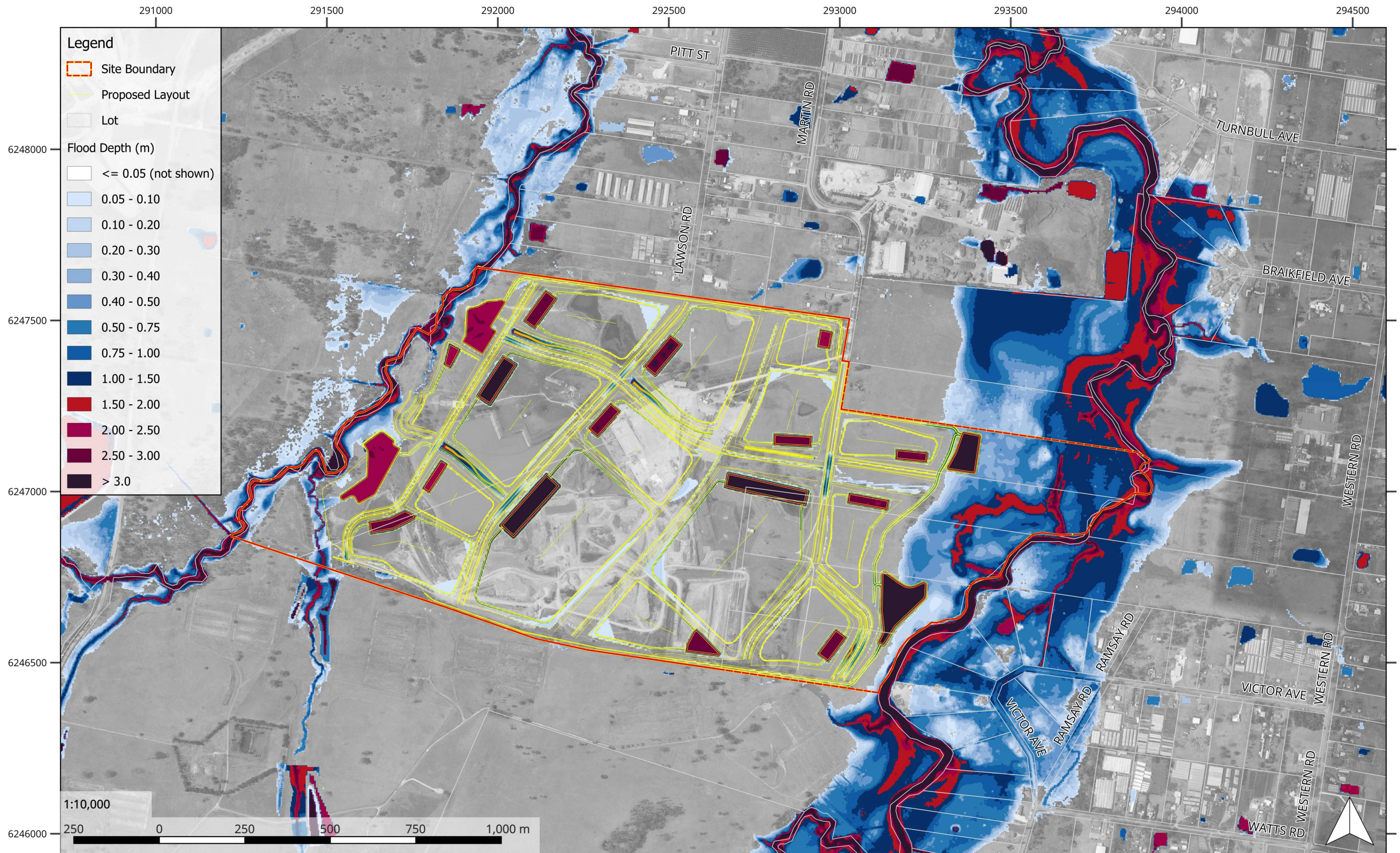
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Map 033: FLOOD BED SHEAR STRESS MAP EXISTING BSS 1% AEP
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



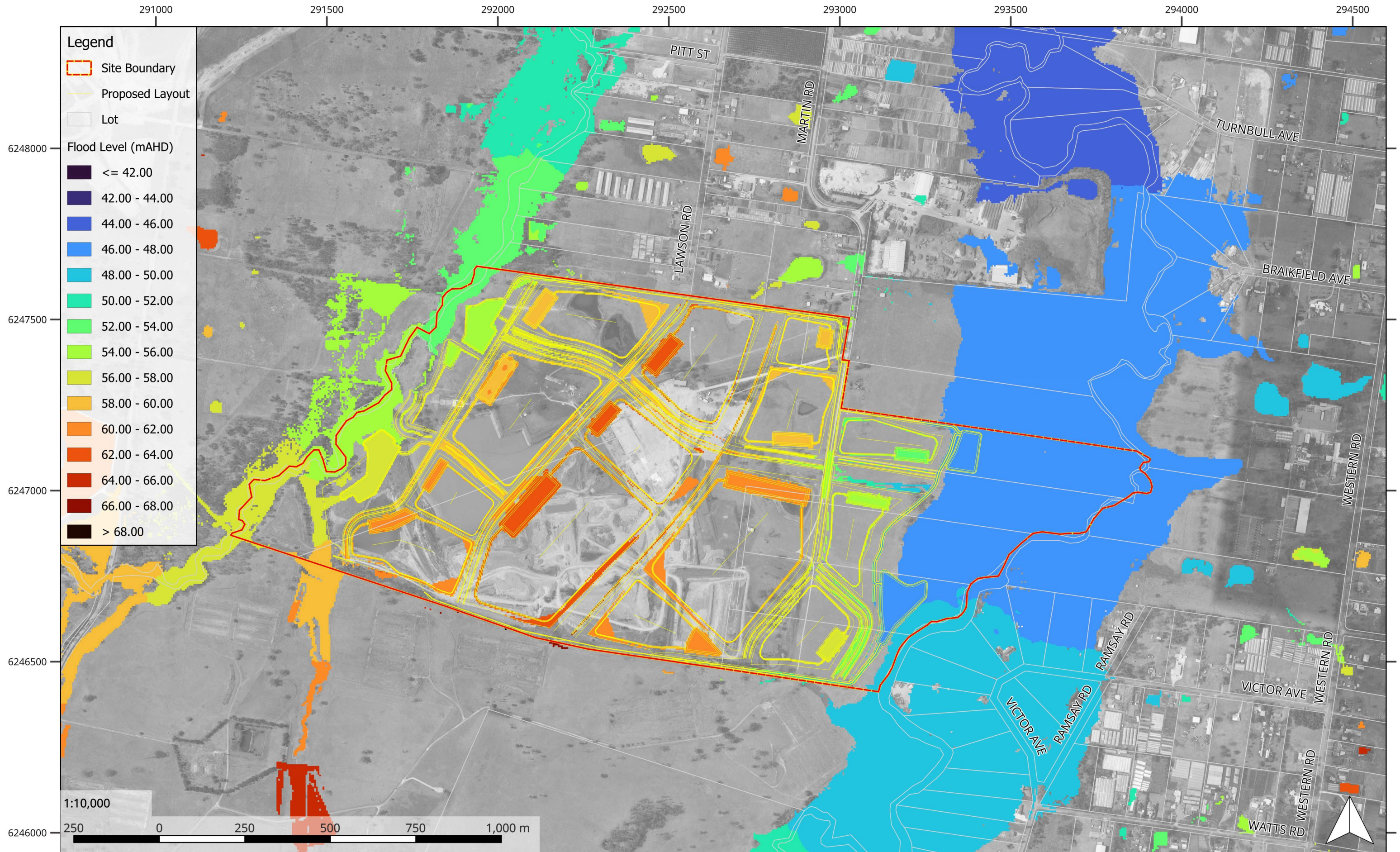
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Map 034: FLOOD BED SHEAR STRESS MAP EXISTING BSS 1% AEP CC
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



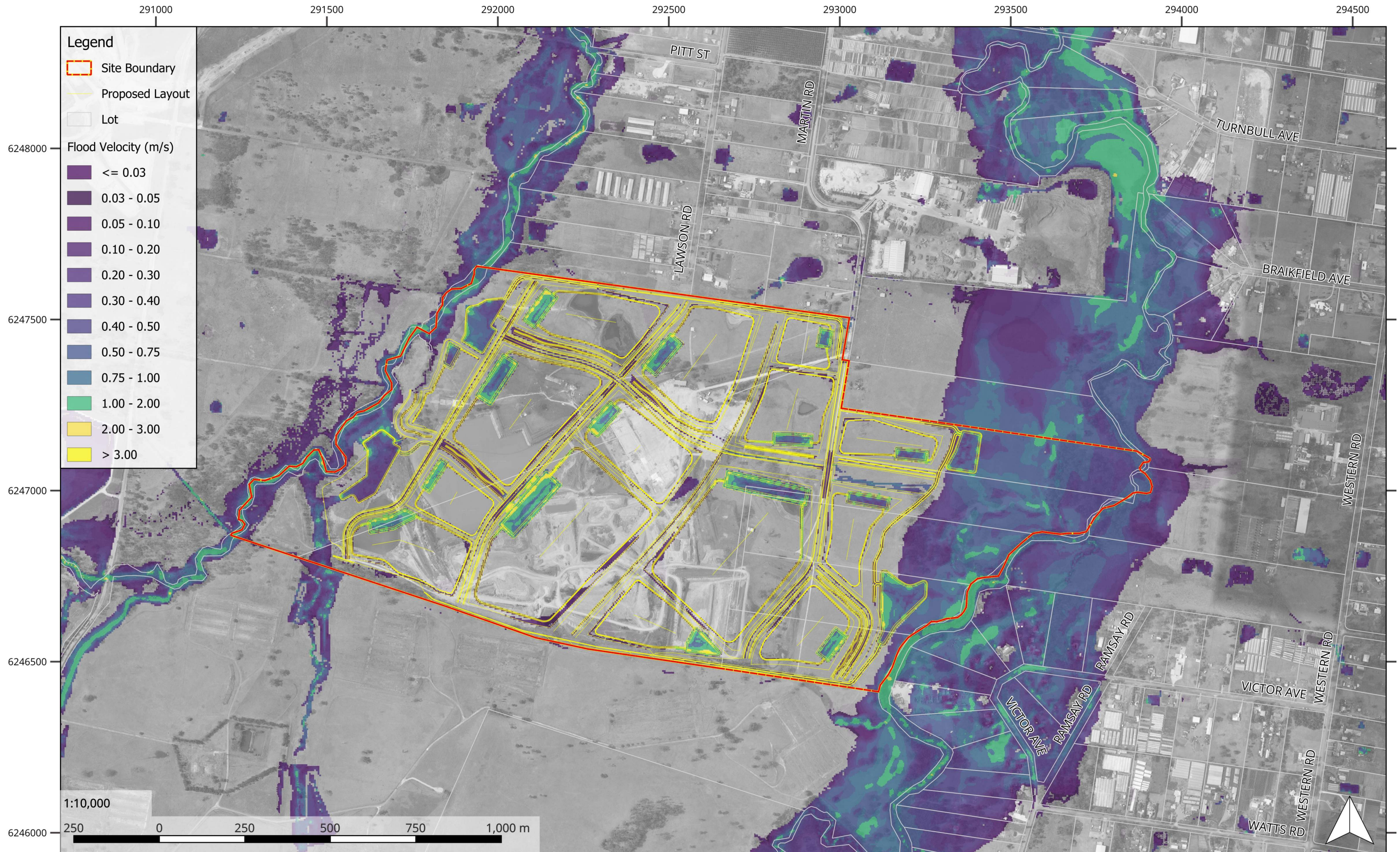
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Map 035: FLOOD DEPTH MAP DESIGN BEW 10% AEP
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



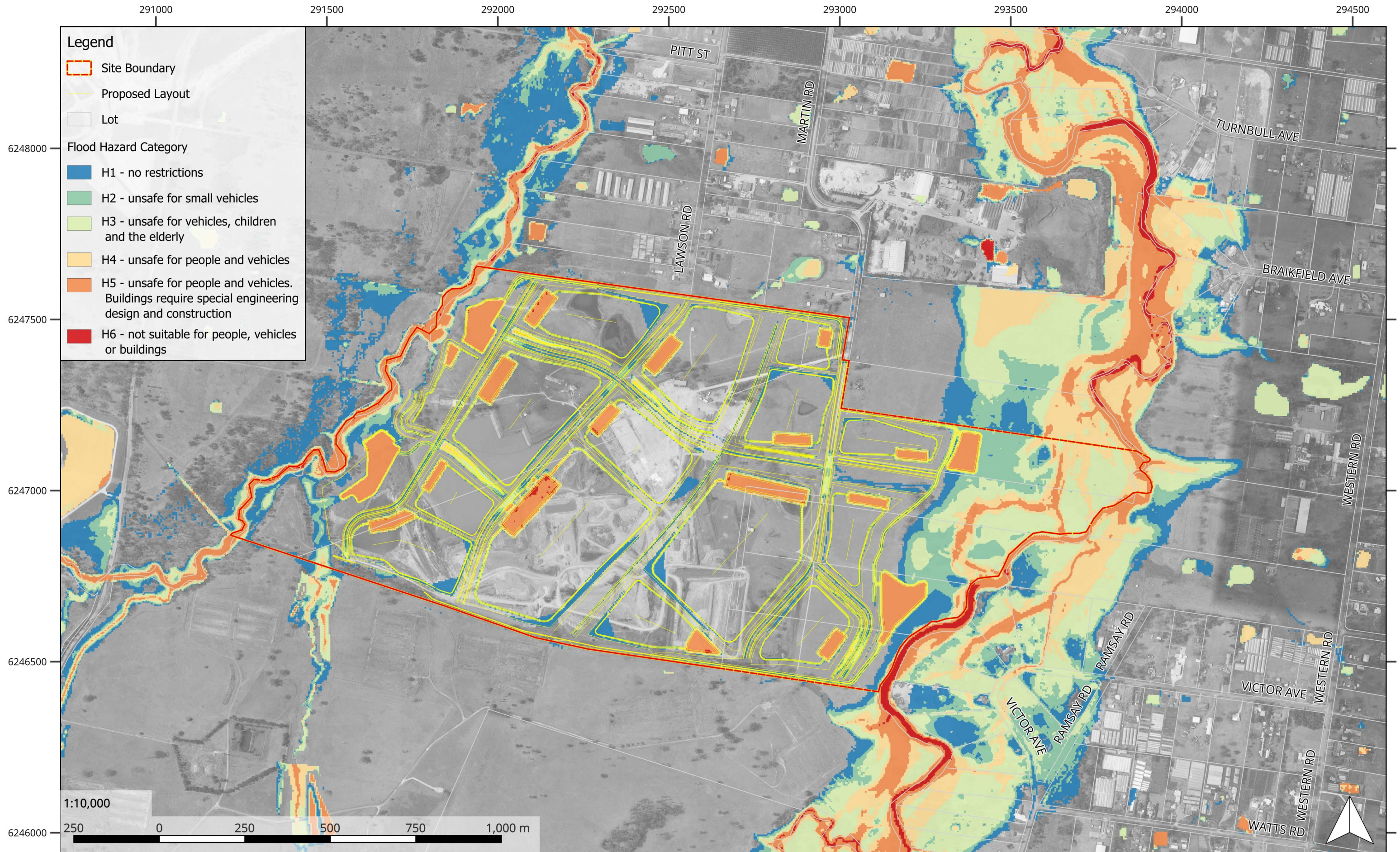
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Map 036: FLOOD LEVEL MAP DESIGN BEW 10% AEP
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



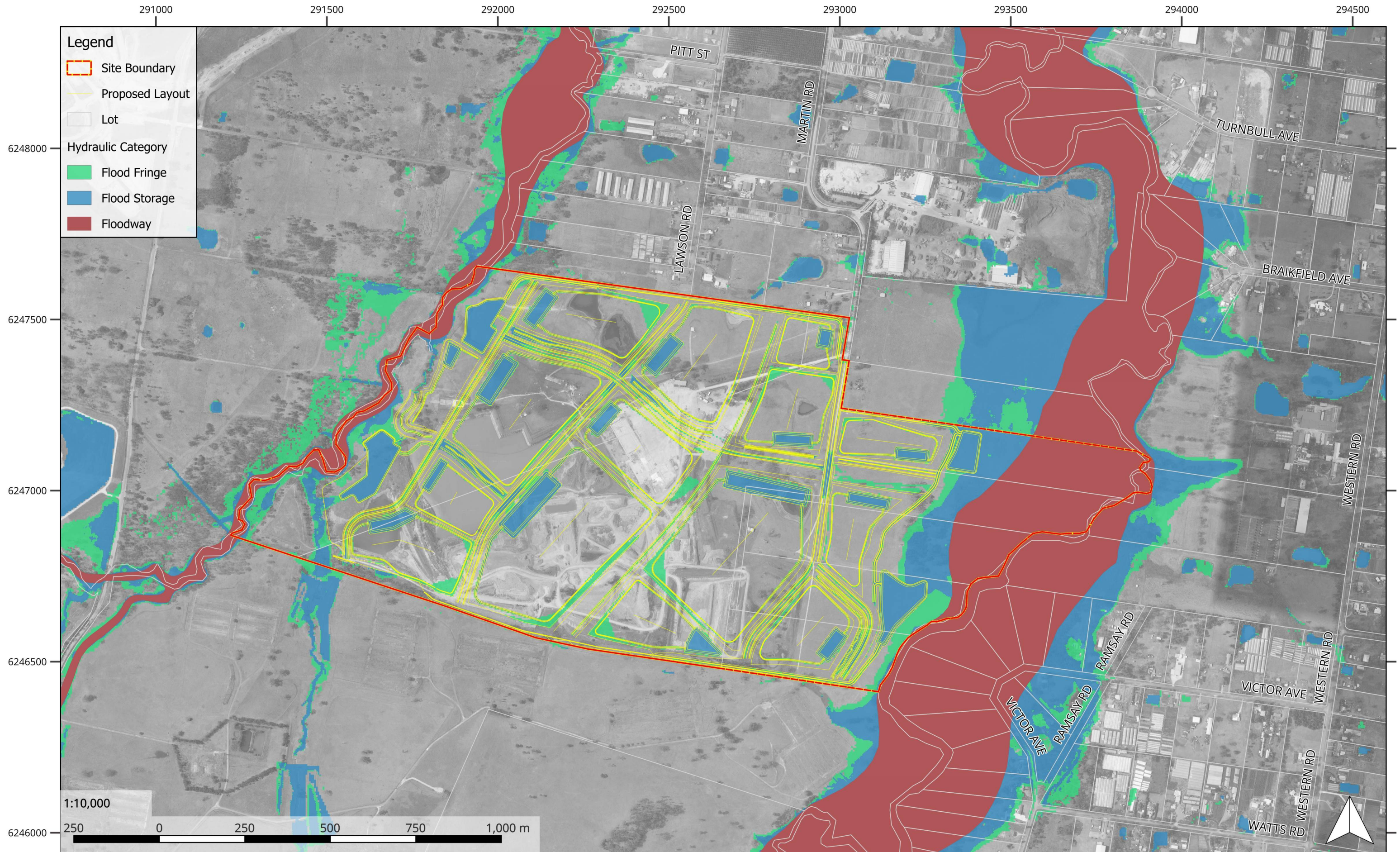
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Map 037: FLOOD VELOCITY MAP DESIGN BEW 10% AEP
Project Maverick - BEW SSDA No.97711727
Project Number: 25-0141
Client: Goodman Property Services (Aust)



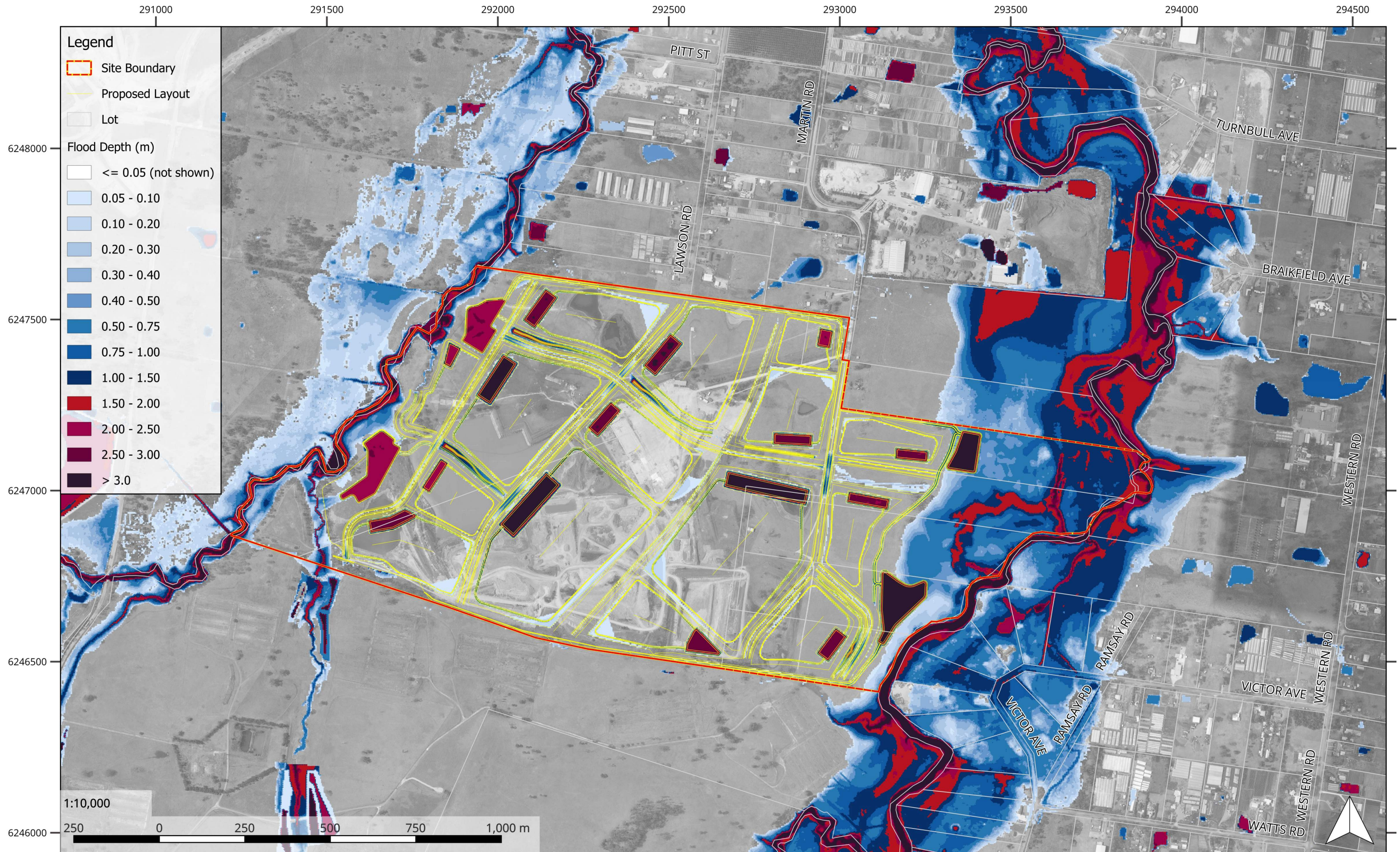
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Map 038: FLOOD HAZARD CATEGORY MAP DESIGN BEW 10% AEP
Project Maverick - BEW SSDA No.97711727
Project Number: 25-0141
Client: Goodman Property Services (Aust)



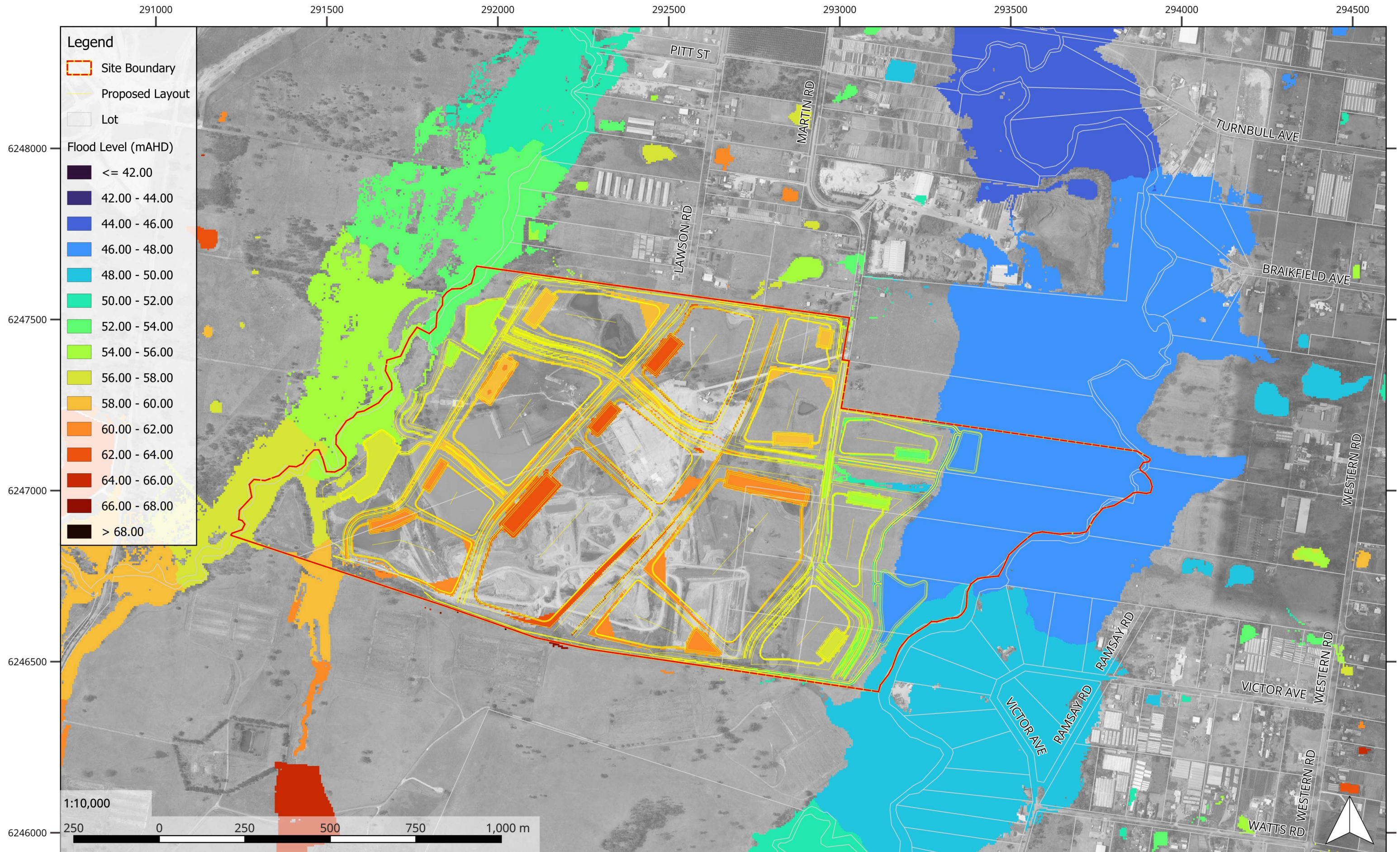
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Map 039: FLOOD HYDRAULIC CATEGORY MAP DESIGN BEW 10% AEP
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



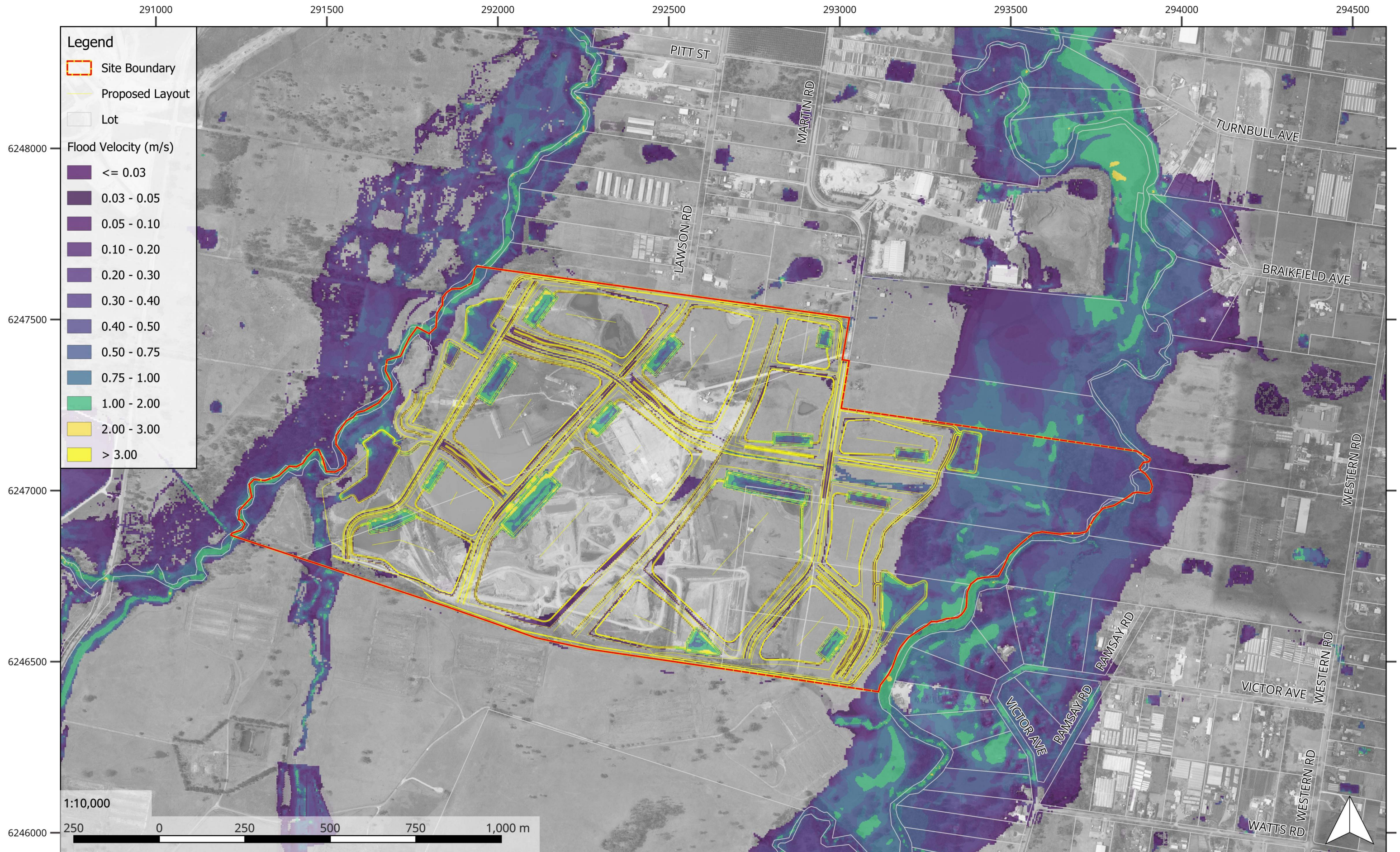
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Map 040: FLOOD DEPTH MAP DESIGN BEW 5% AEP
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



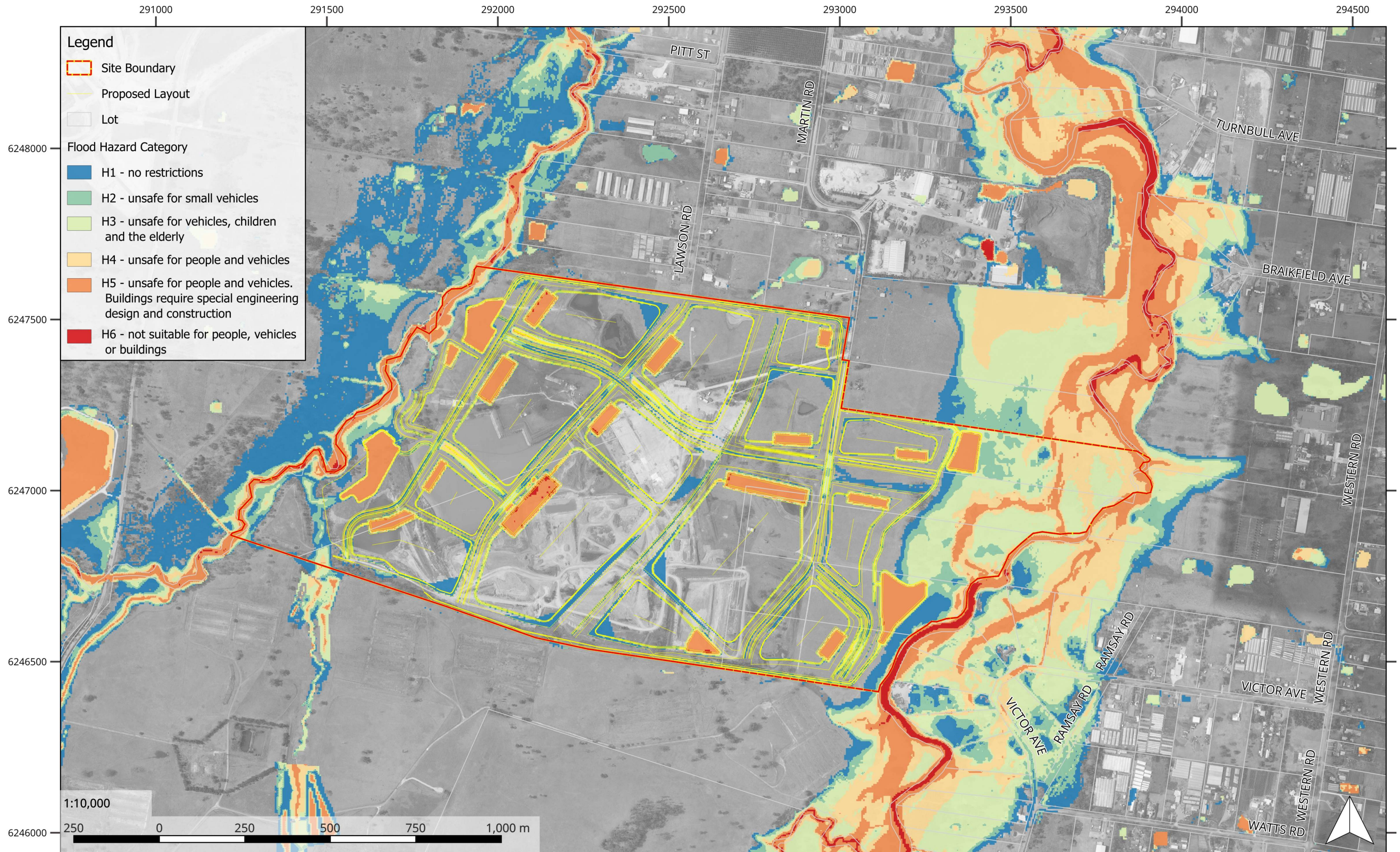
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Map 041: FLOOD LEVEL MAP DESIGN BEW 5% AEP
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



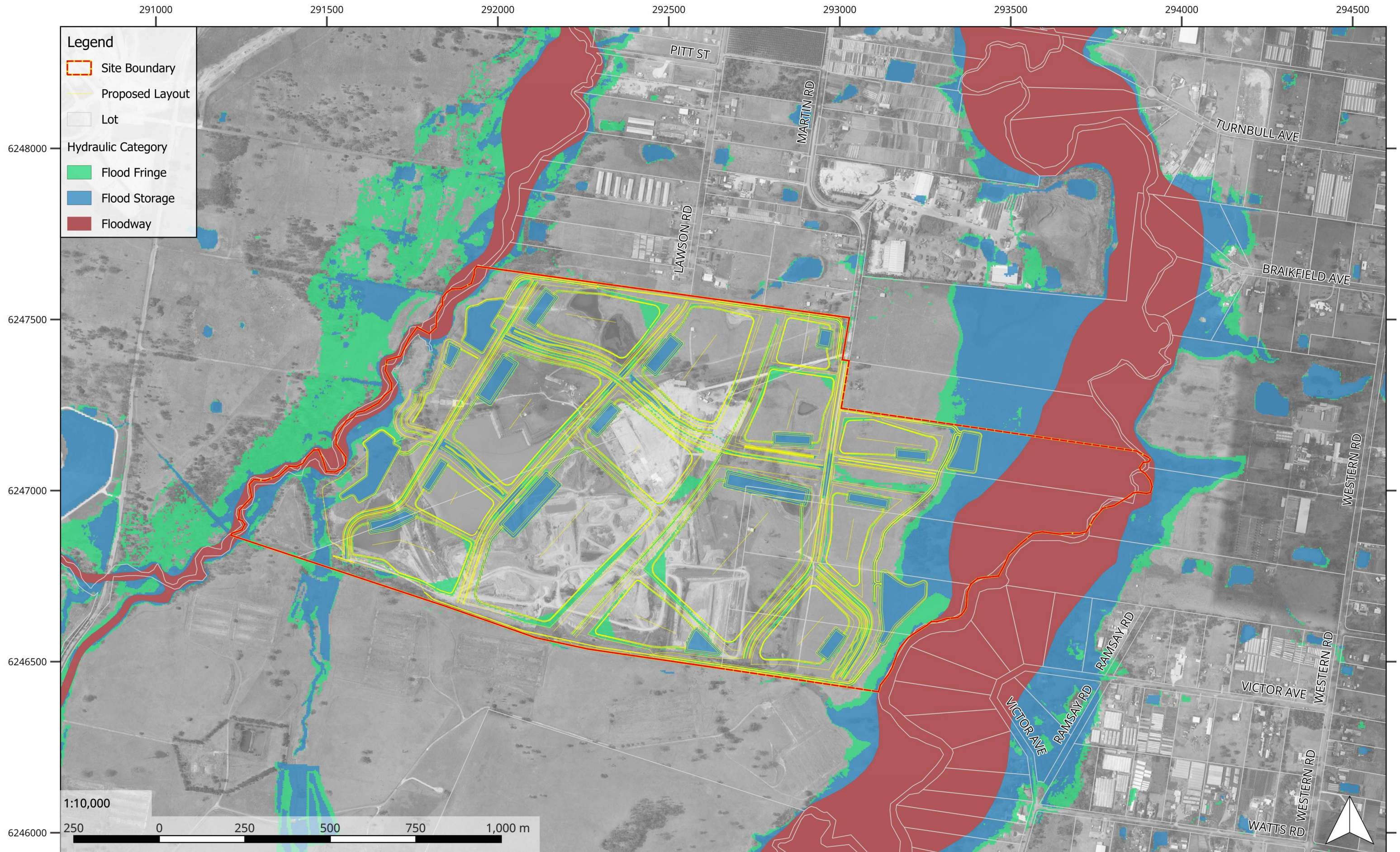
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Map 042: FLOOD VELOCITY MAP DESIGN BEW 5% AEP
Project Maverick - BEW SSDA No.97711727
Project Number: 25-0141
Client: Goodman Property Services (Aust)



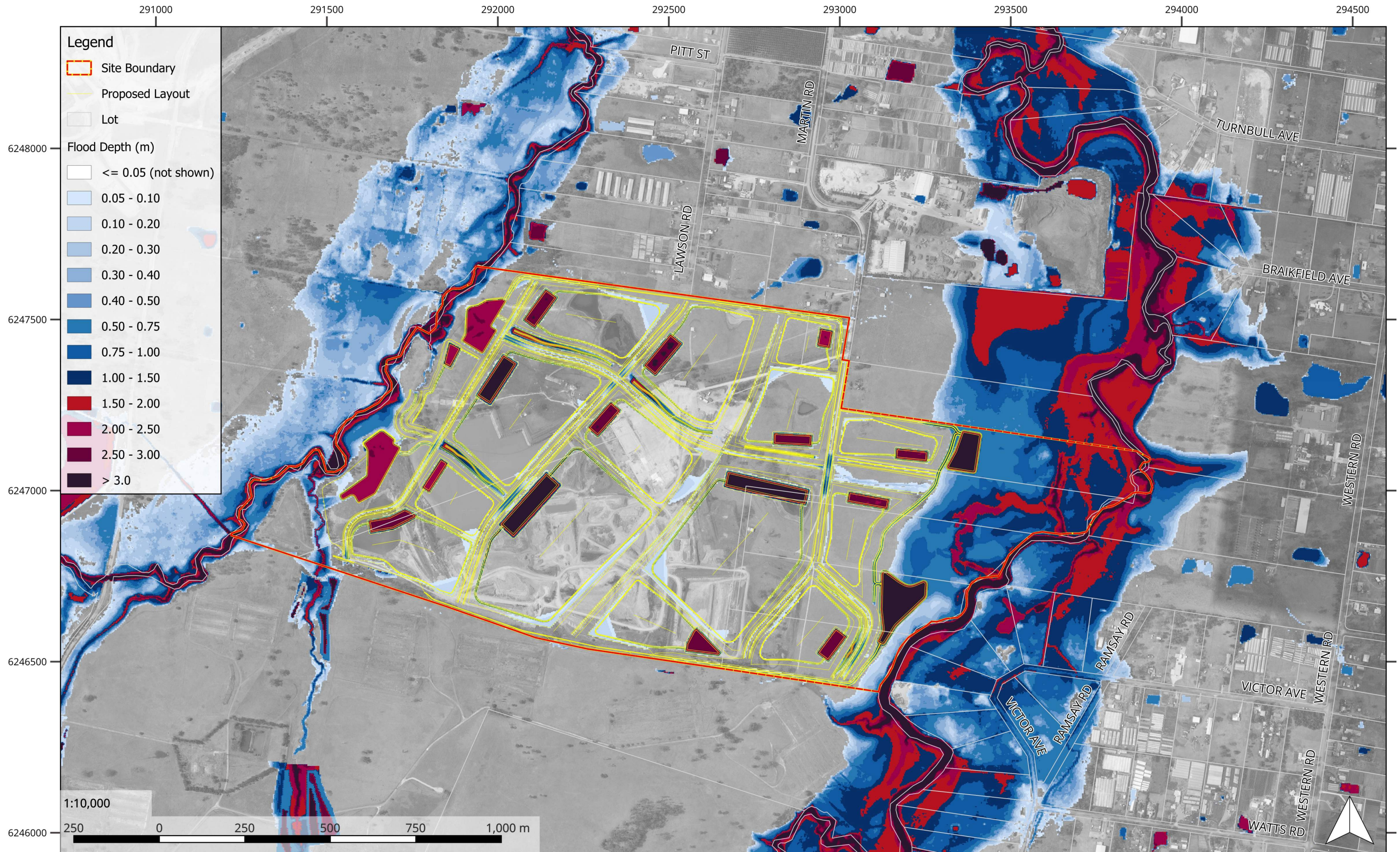
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Map 043: FLOOD HAZARD CATEGORY MAP DESIGN BEW 5% AEP
Project Maverick - BEW SSDA No.97711727
Project Number: 25-0141
Client: Goodman Property Services (Aust)



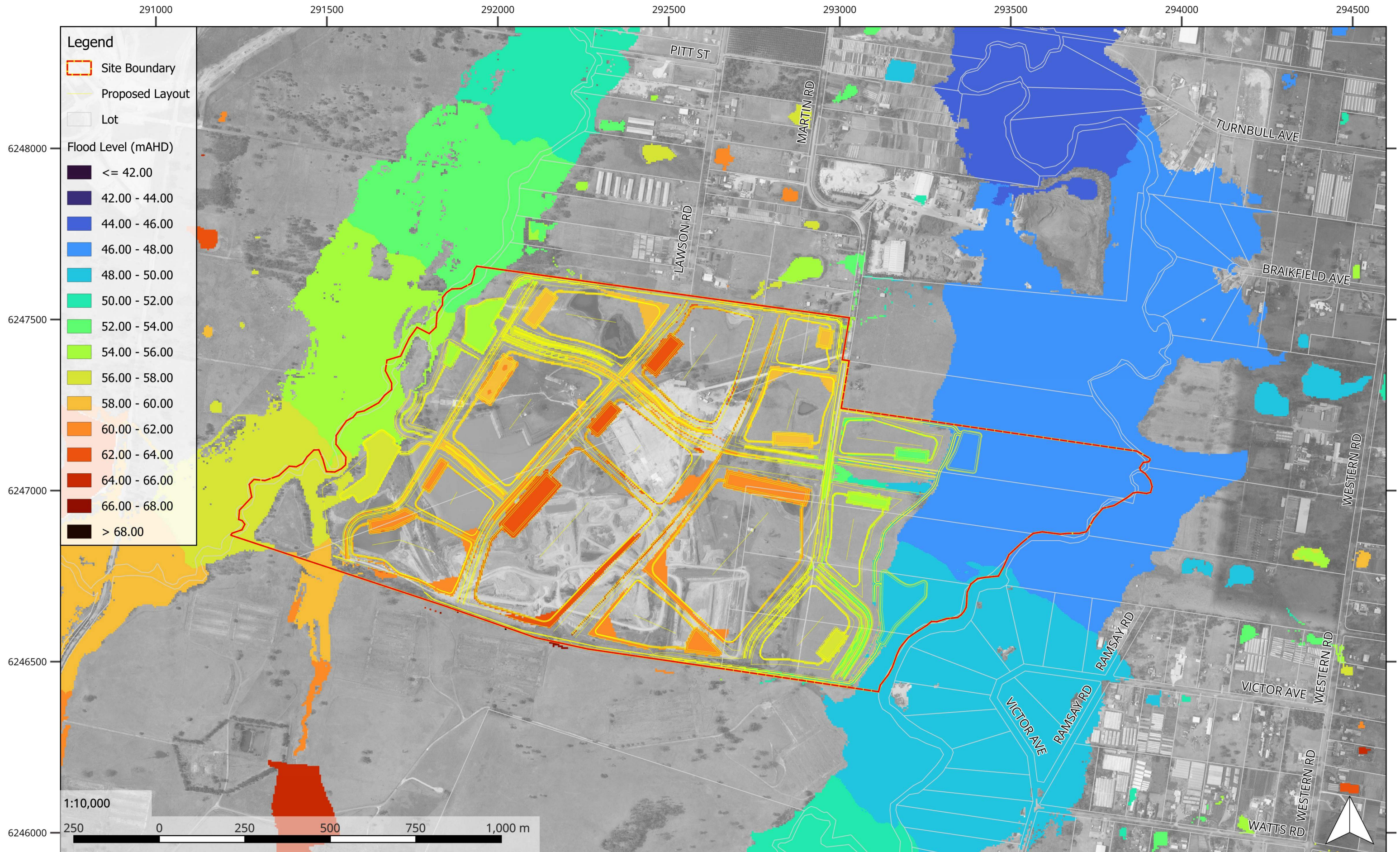
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Map 044: FLOOD HYDRAULIC CATEGORY MAP DESIGN BEW 5% AEP
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



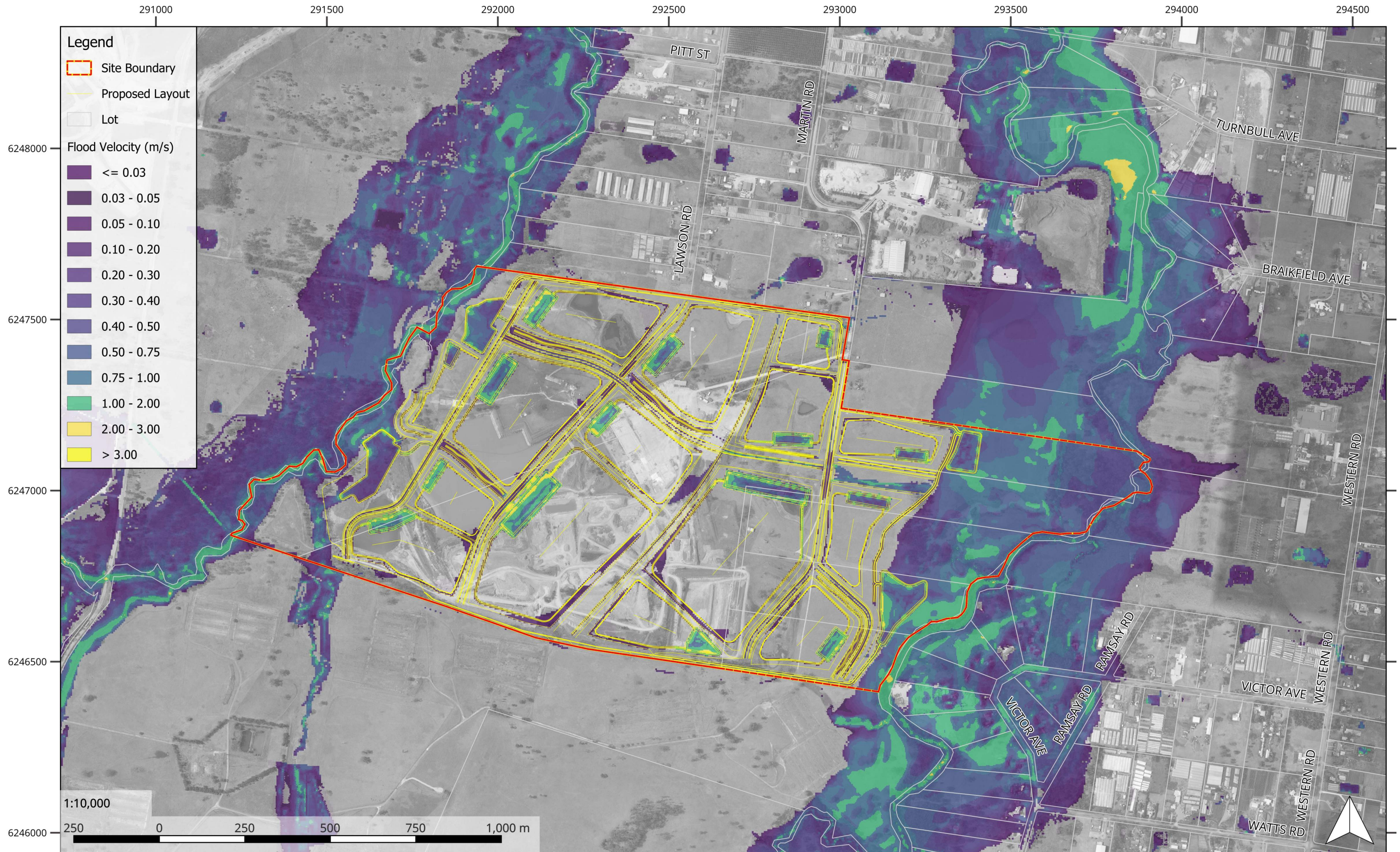
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Map 045: FLOOD DEPTH MAP DESIGN BEW 1% AEP
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



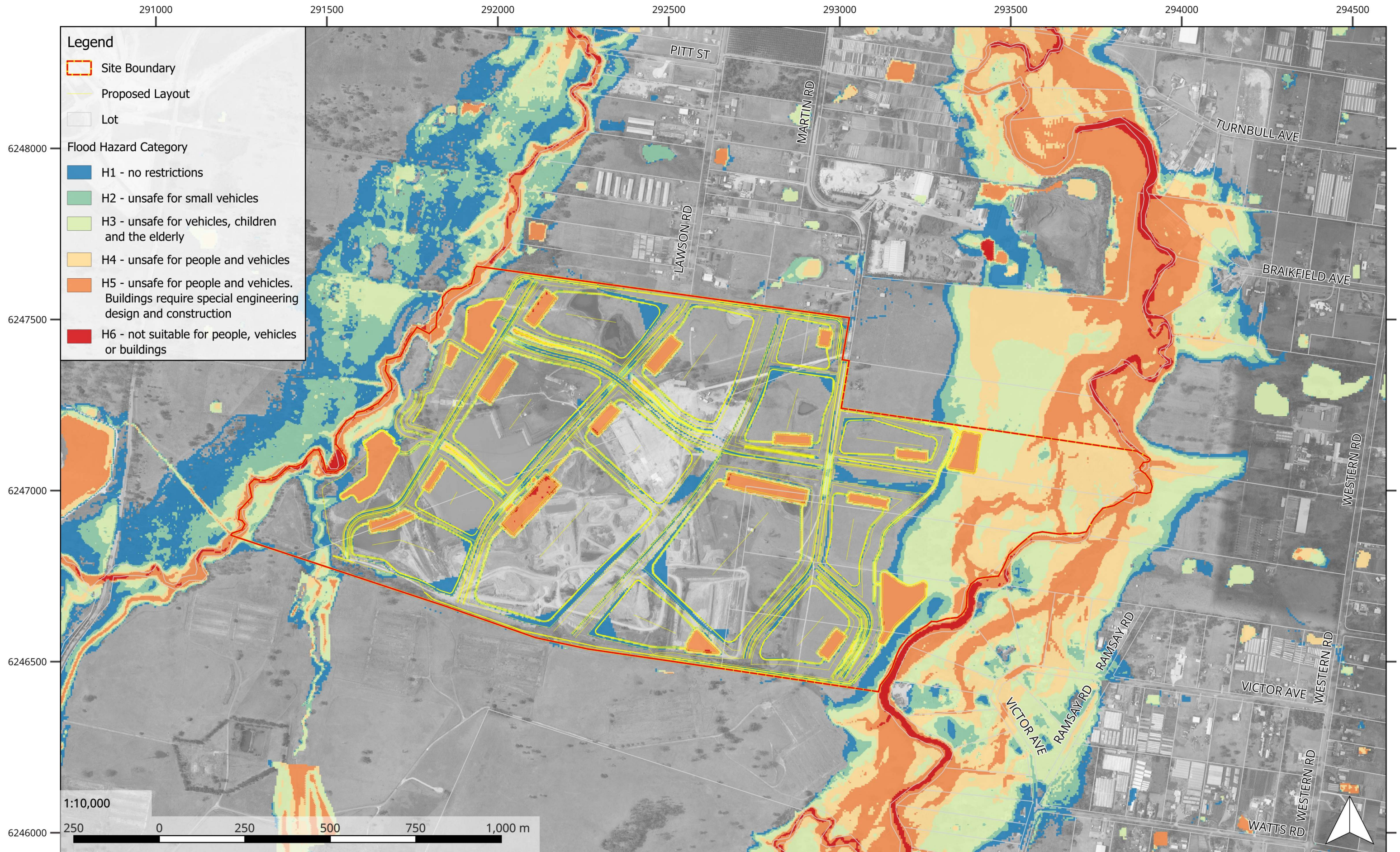
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Map 046: FLOOD LEVEL MAP DESIGN BEW 1% AEP
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



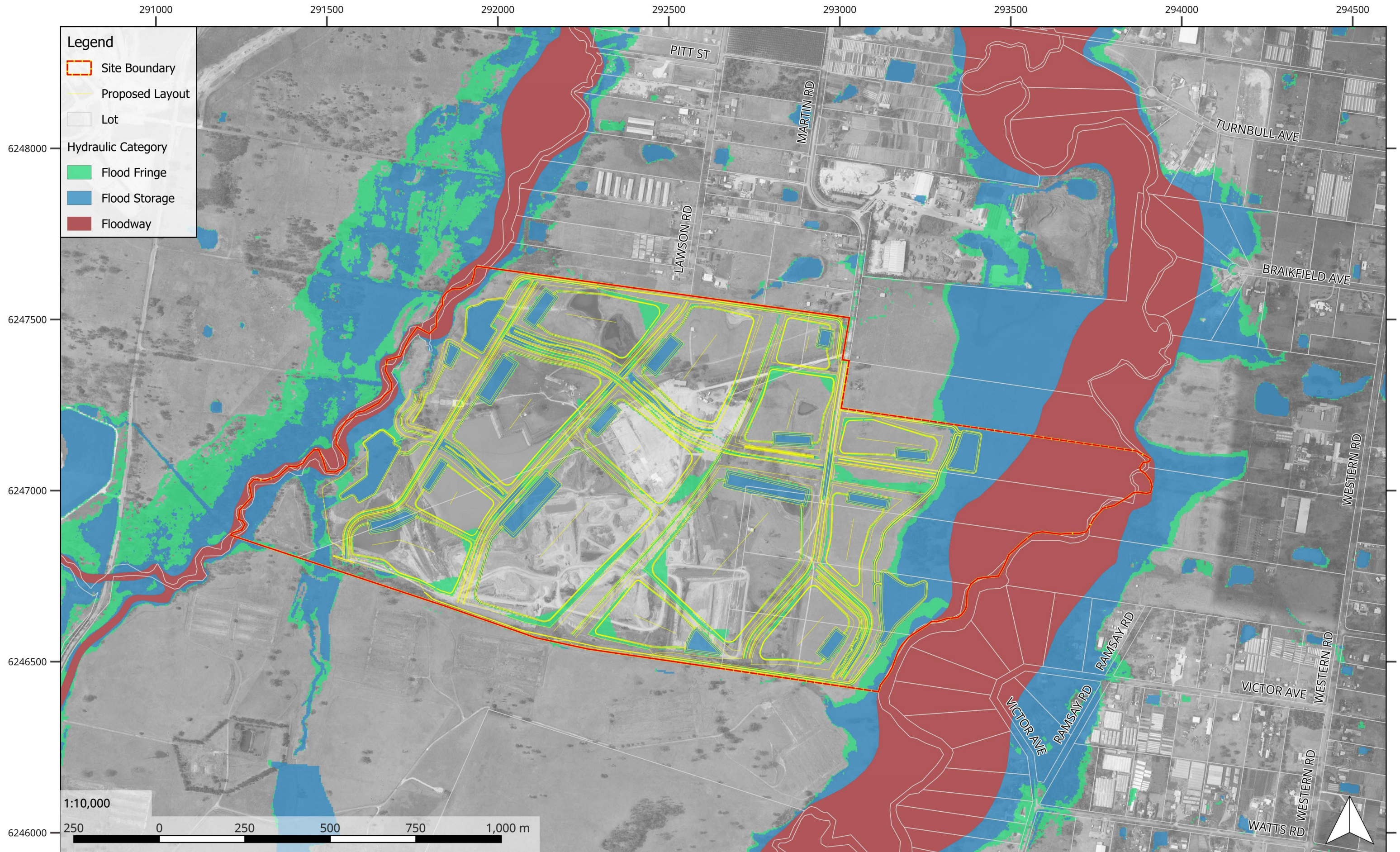
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Map 047: FLOOD VELOCITY MAP DESIGN BEW 1% AEP
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



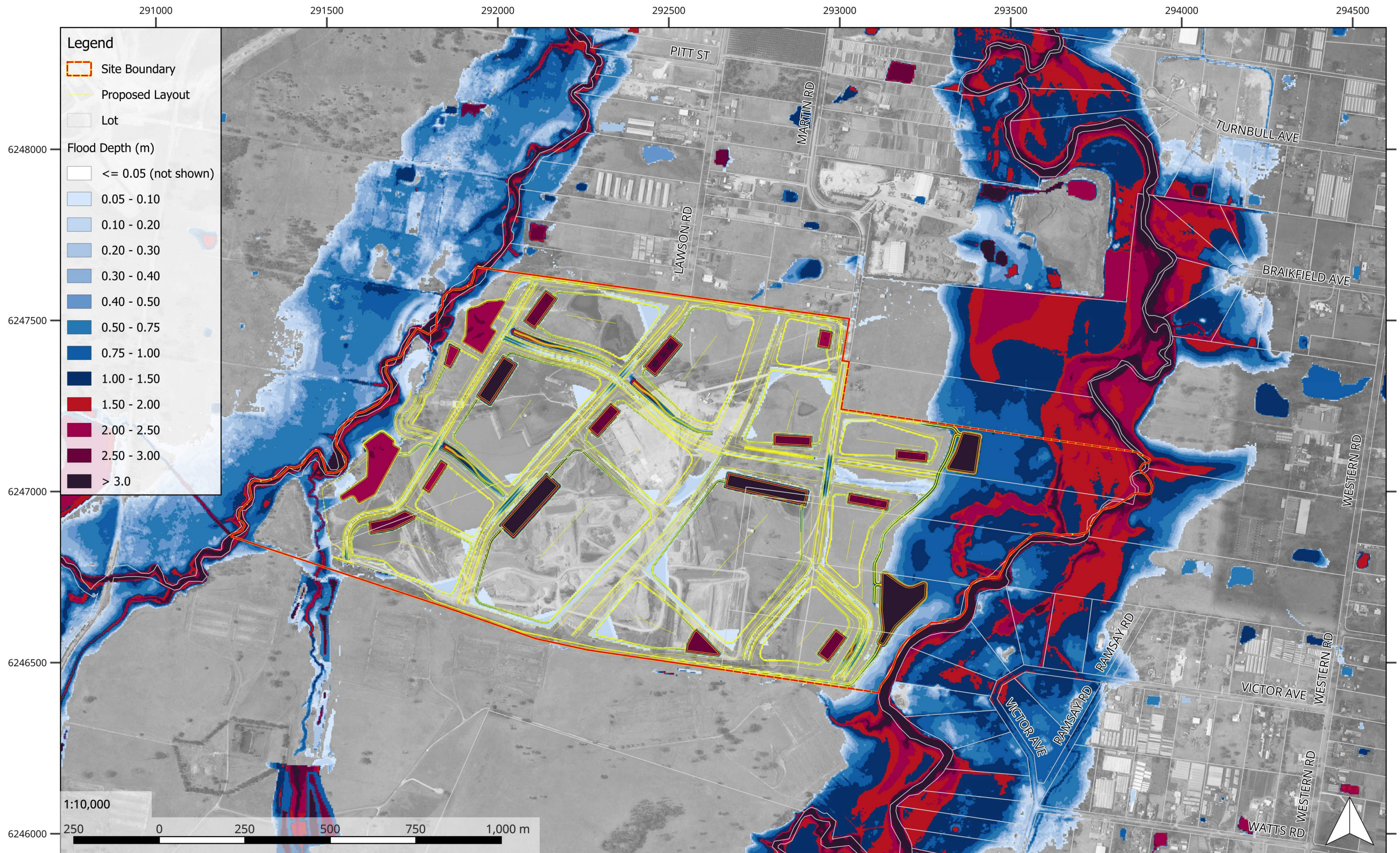
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Map 048: FLOOD HAZARD CATEGORY MAP DESIGN BEW 1% AEP
Project Maverick - BEW SSDA No.97711727
Project Number: 25-0141
Client: Goodman Property Services (Aust)



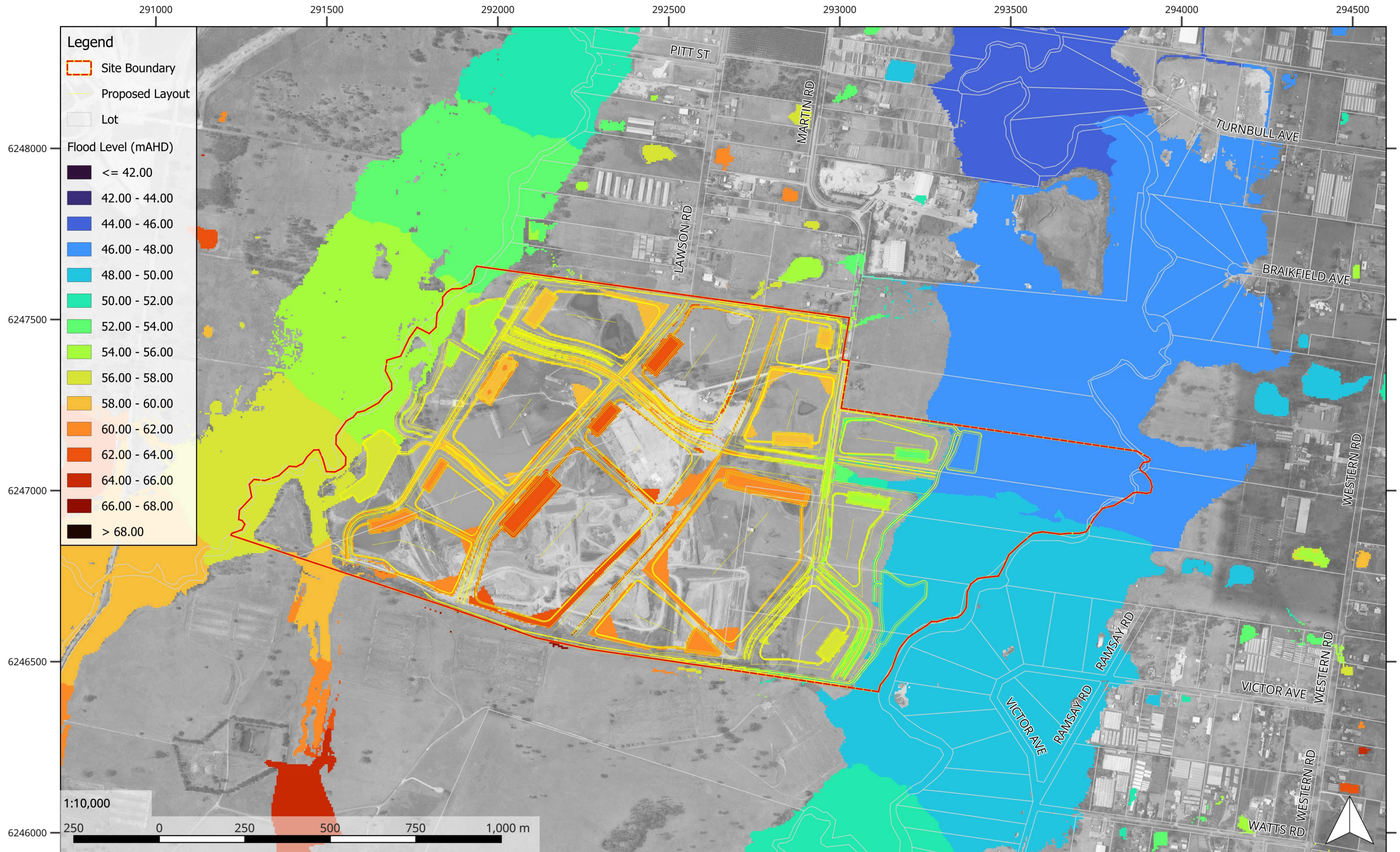
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Map 049: FLOOD HYDRAULIC CATEGORY MAP DESIGN BEW 1% AEP
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



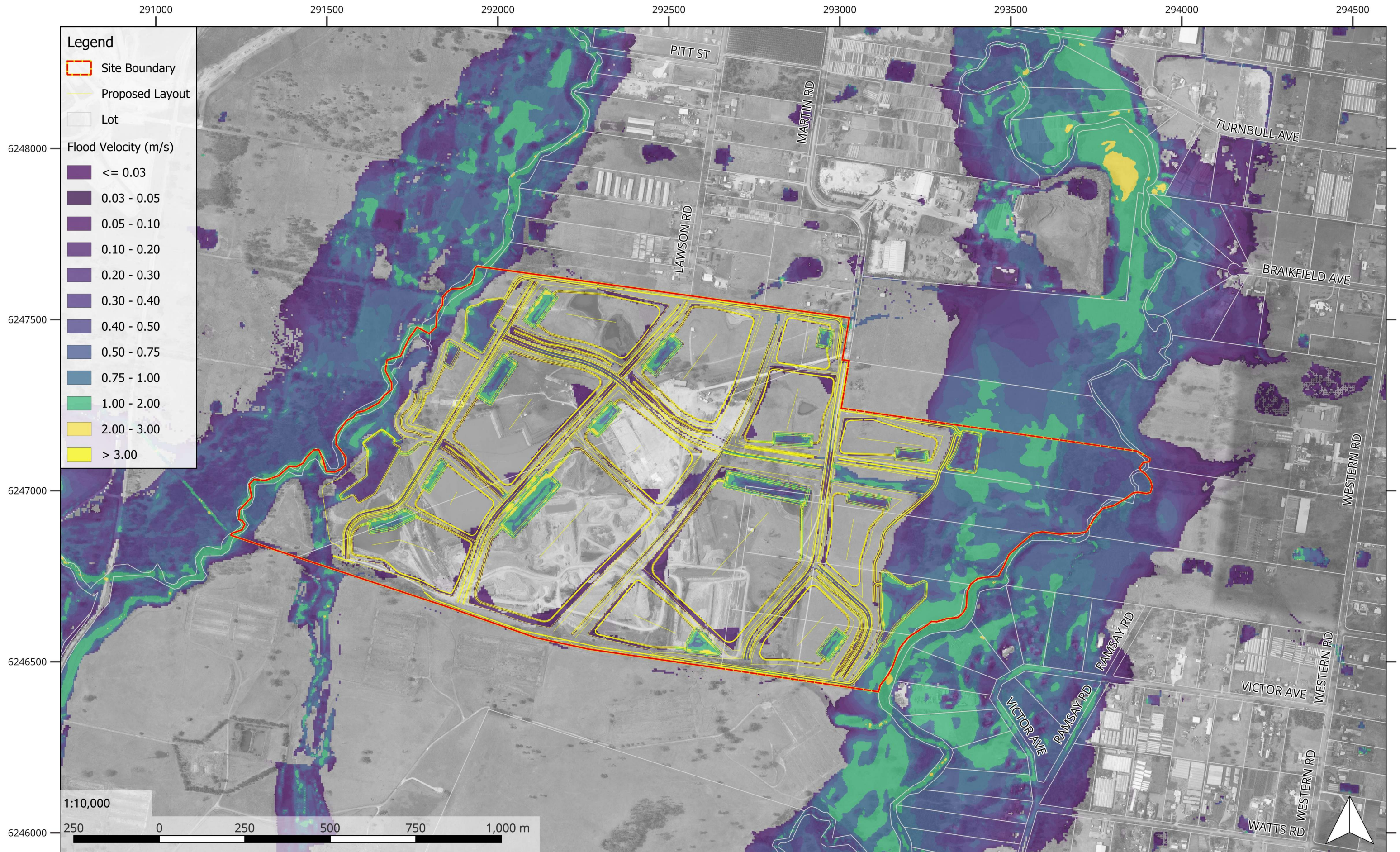
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Map 050: FLOOD DEPTH MAP DESIGN BEW 1% AEP CC
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



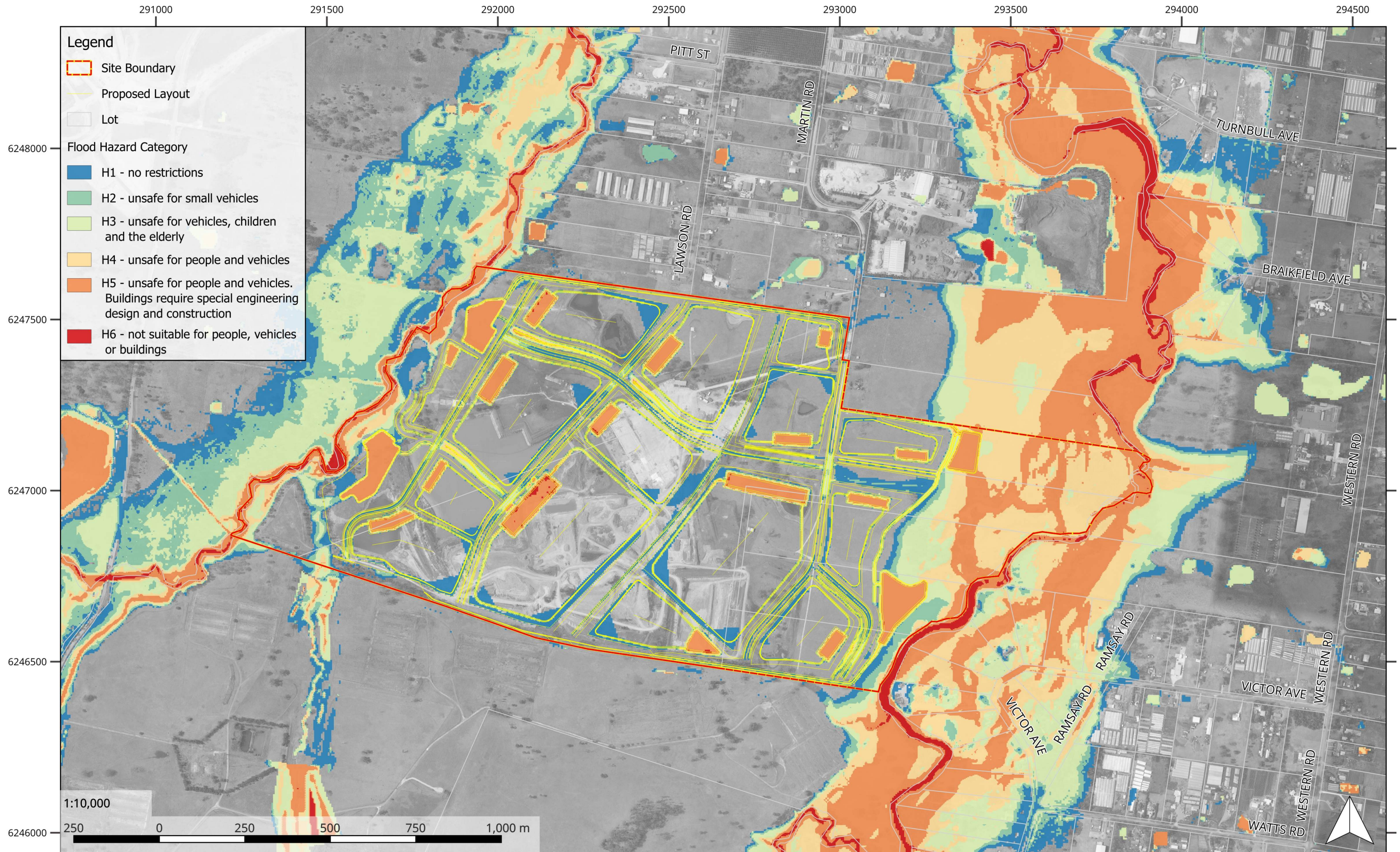
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Map 051: FLOOD LEVEL MAP DESIGN BEW 1% AEP CC
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



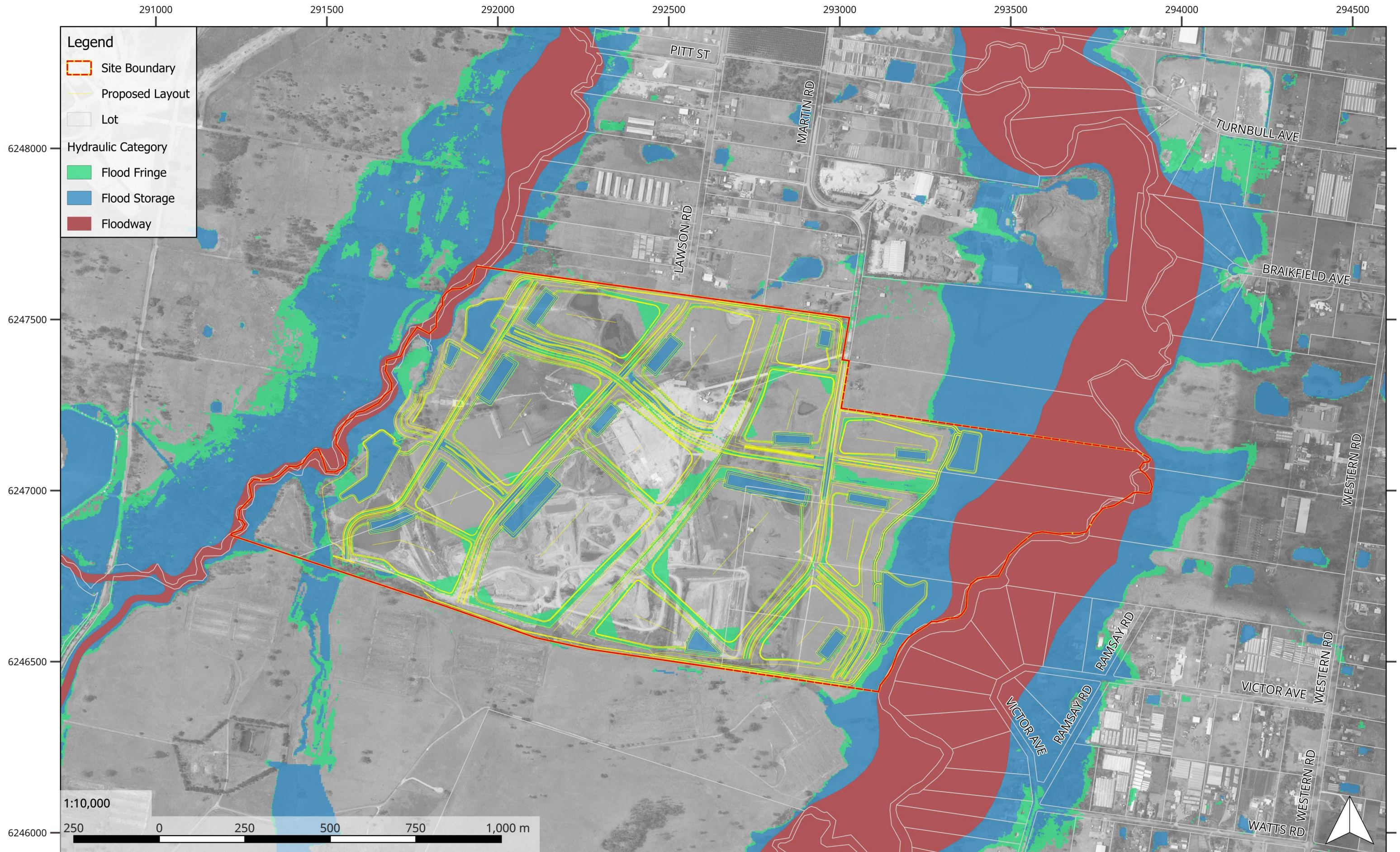
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Map 052: FLOOD VELOCITY MAP DESIGN BEW 1% AEP CC
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



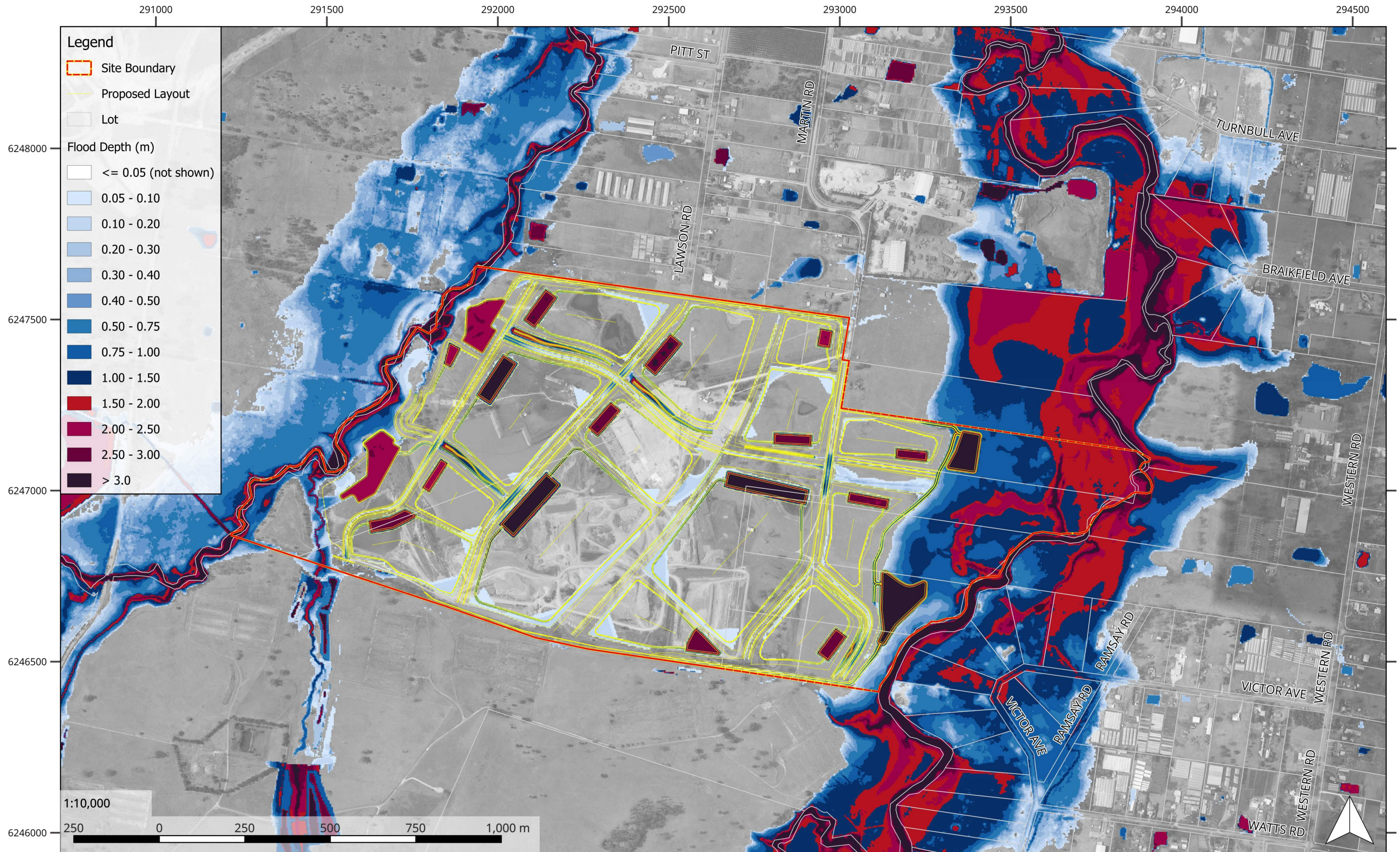
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Map 053: FLOOD HAZARD CATEGORY MAP DESIGN BEW 1% AEP CC
Project Maverick - BEW SSDA No.97711727
Project Number: 25-0141
Client: Goodman Property Services (Aust)



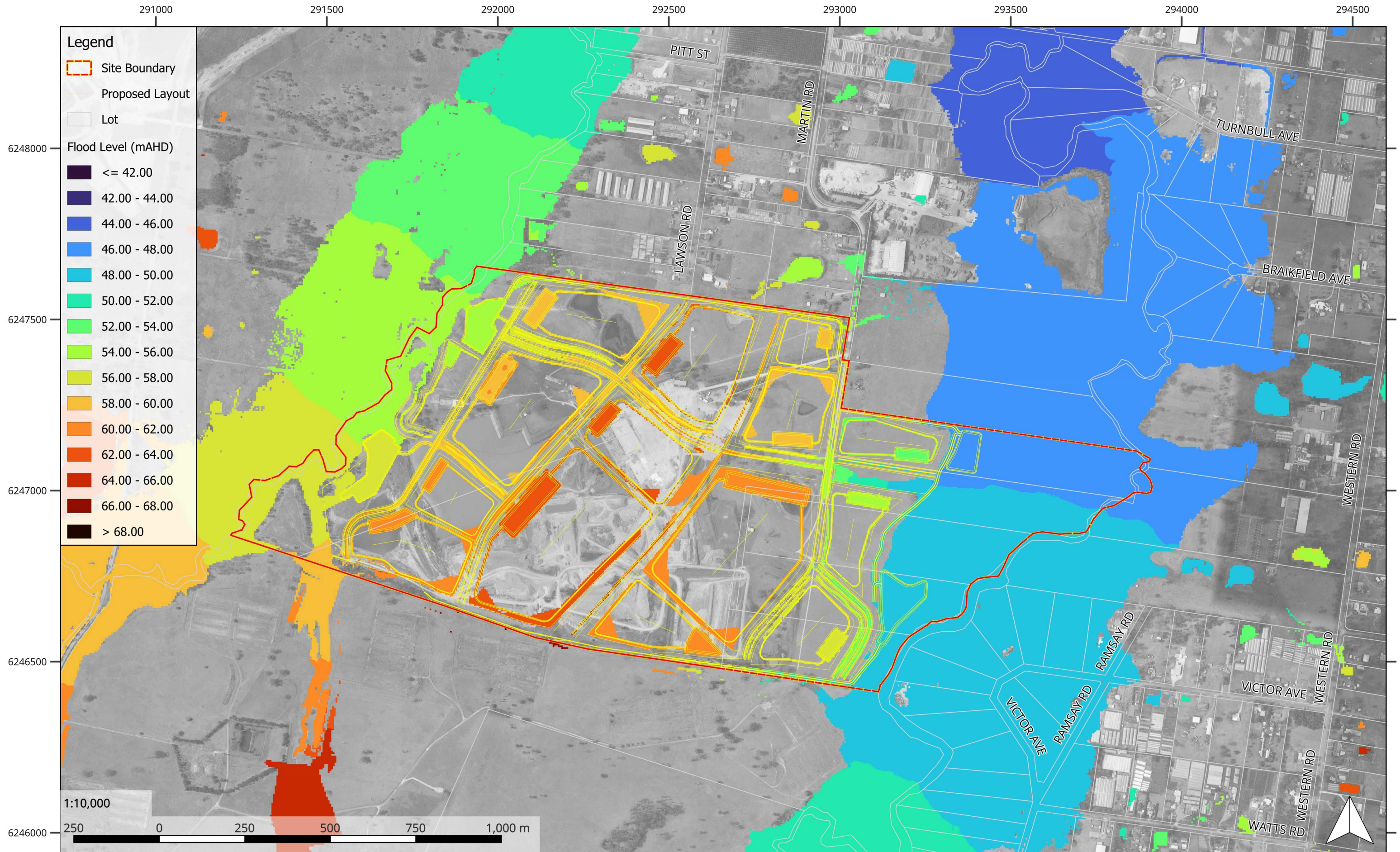
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Map 054: FLOOD HYDRAULIC CATEGORY MAP DESIGN BEW 1% AEP CC
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



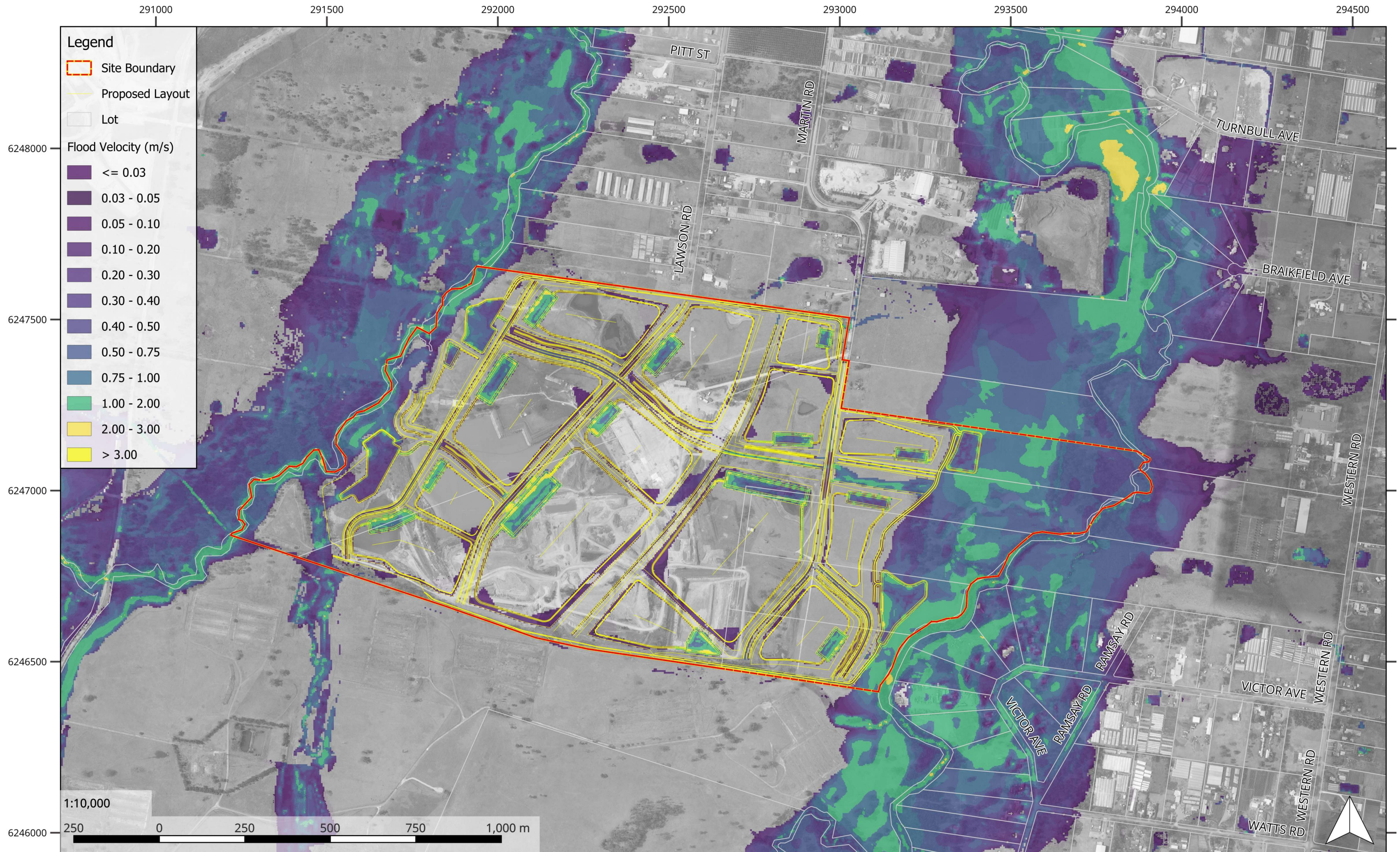
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Map 055: FLOOD DEPTH MAP DESIGN BEW 0.2% AEP
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



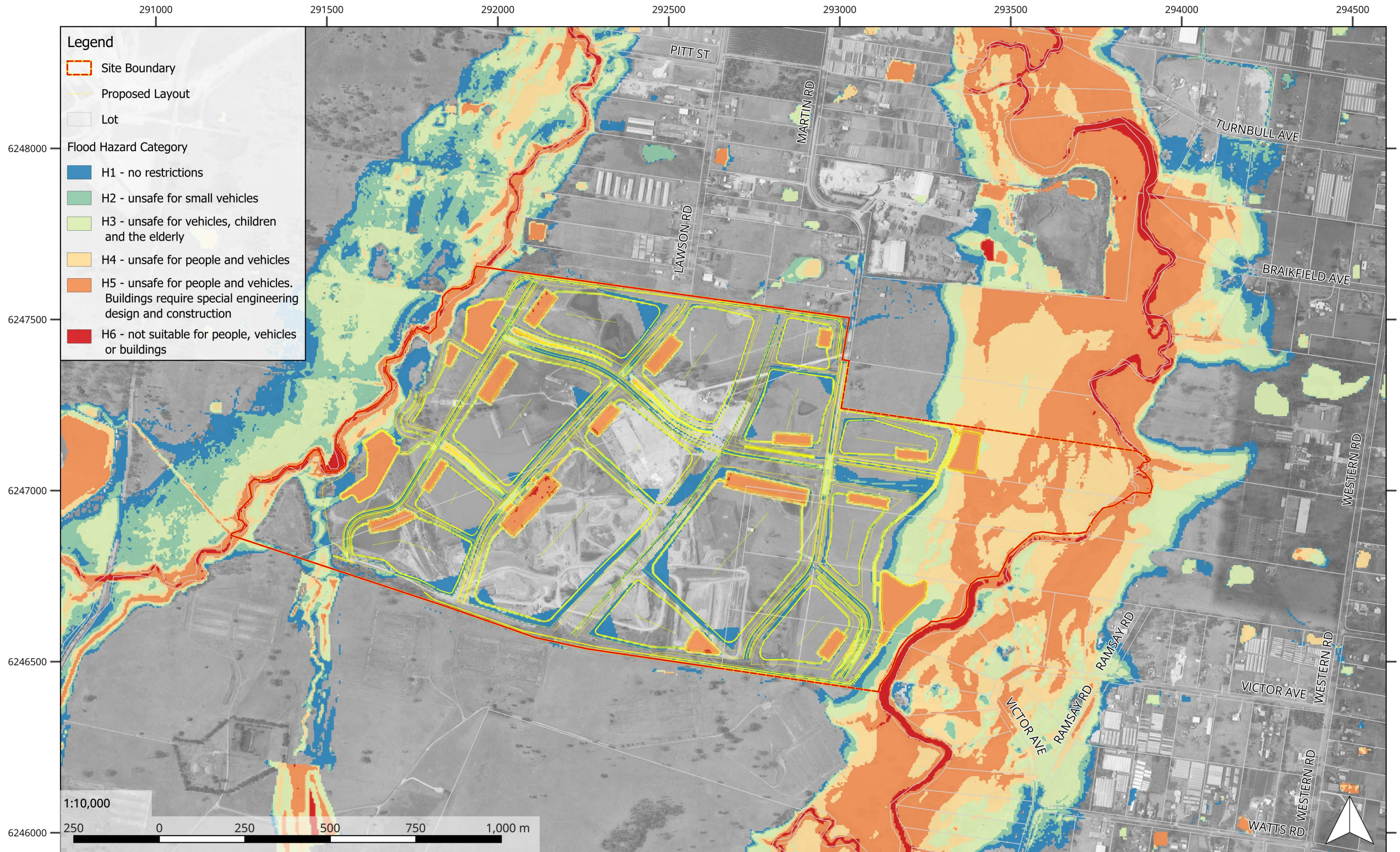
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Map 056: FLOOD LEVEL MAP DESIGN BEW 0.2% AEP
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



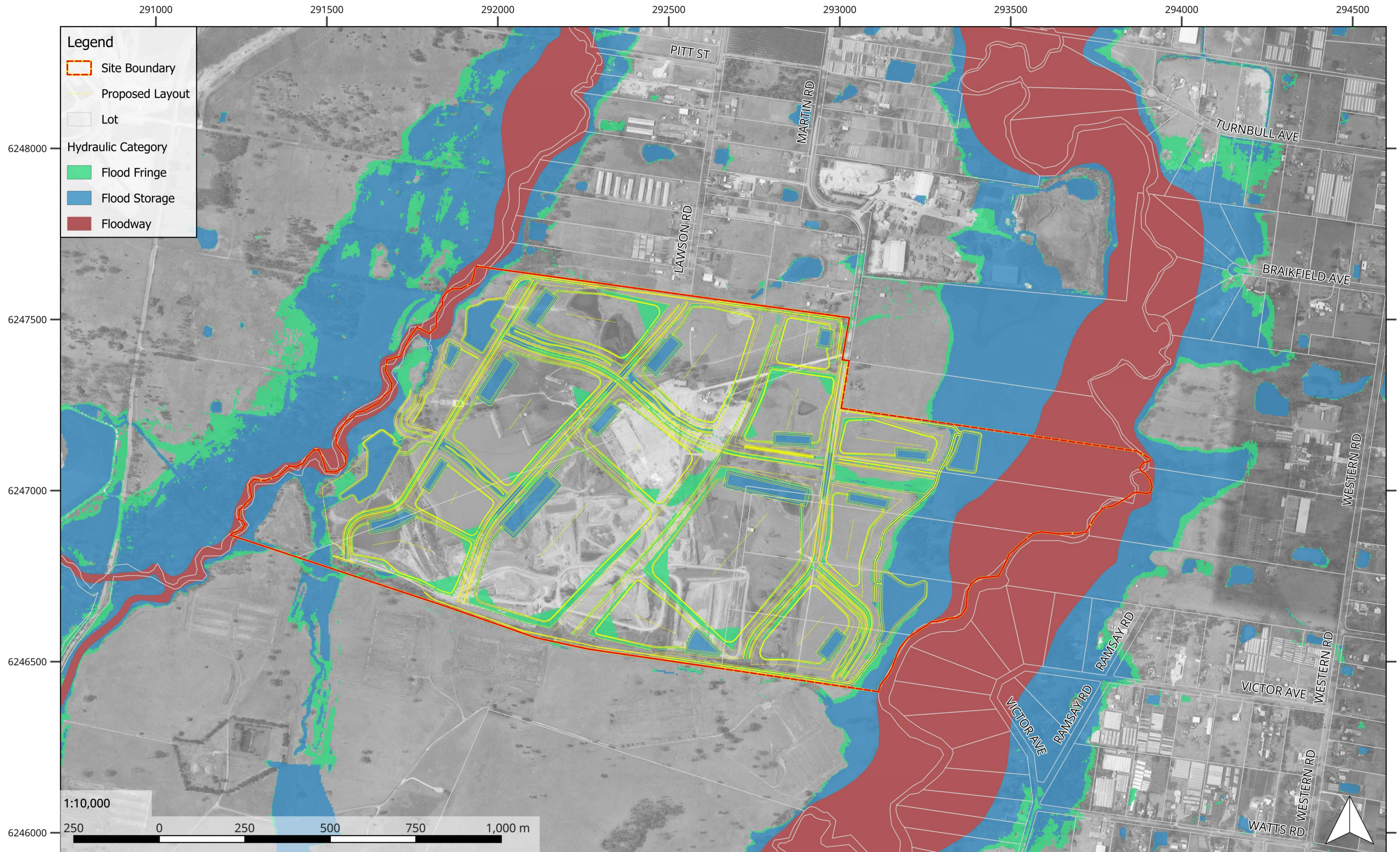
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Map 057: FLOOD VELOCITY MAP DESIGN BEW 0.2% AEP
Project Maverick - BEW SSDA No.97711727
Project Number: 25-0141
Client: Goodman Property Services (Aust)



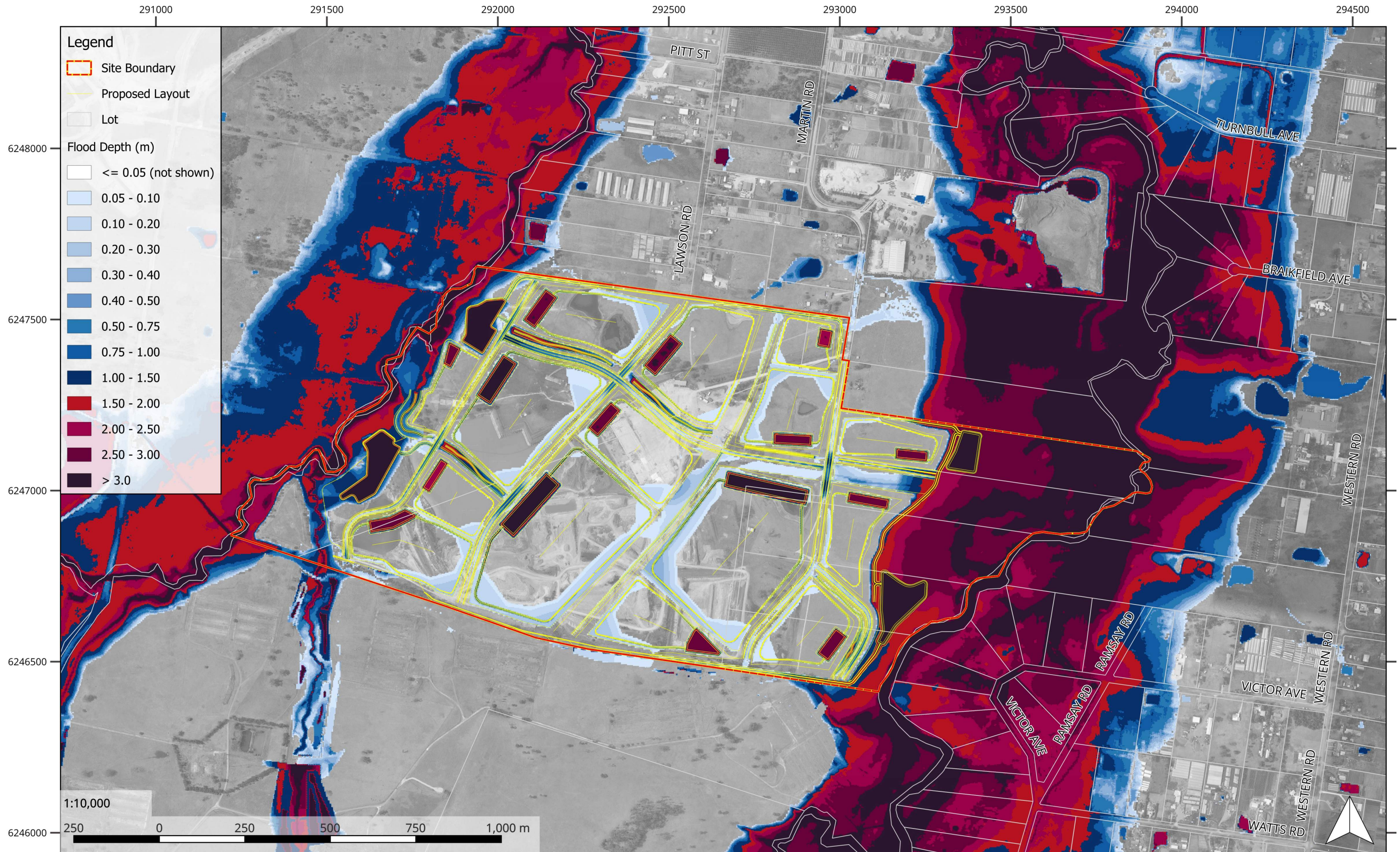
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Map 058: FLOOD HAZARD CATEGORY MAP DESIGN BEW 0.2% AEP
Project Maverick - BEW SSDA No.97711727
Project Number: 25-0141
Client: Goodman Property Services (Aust)



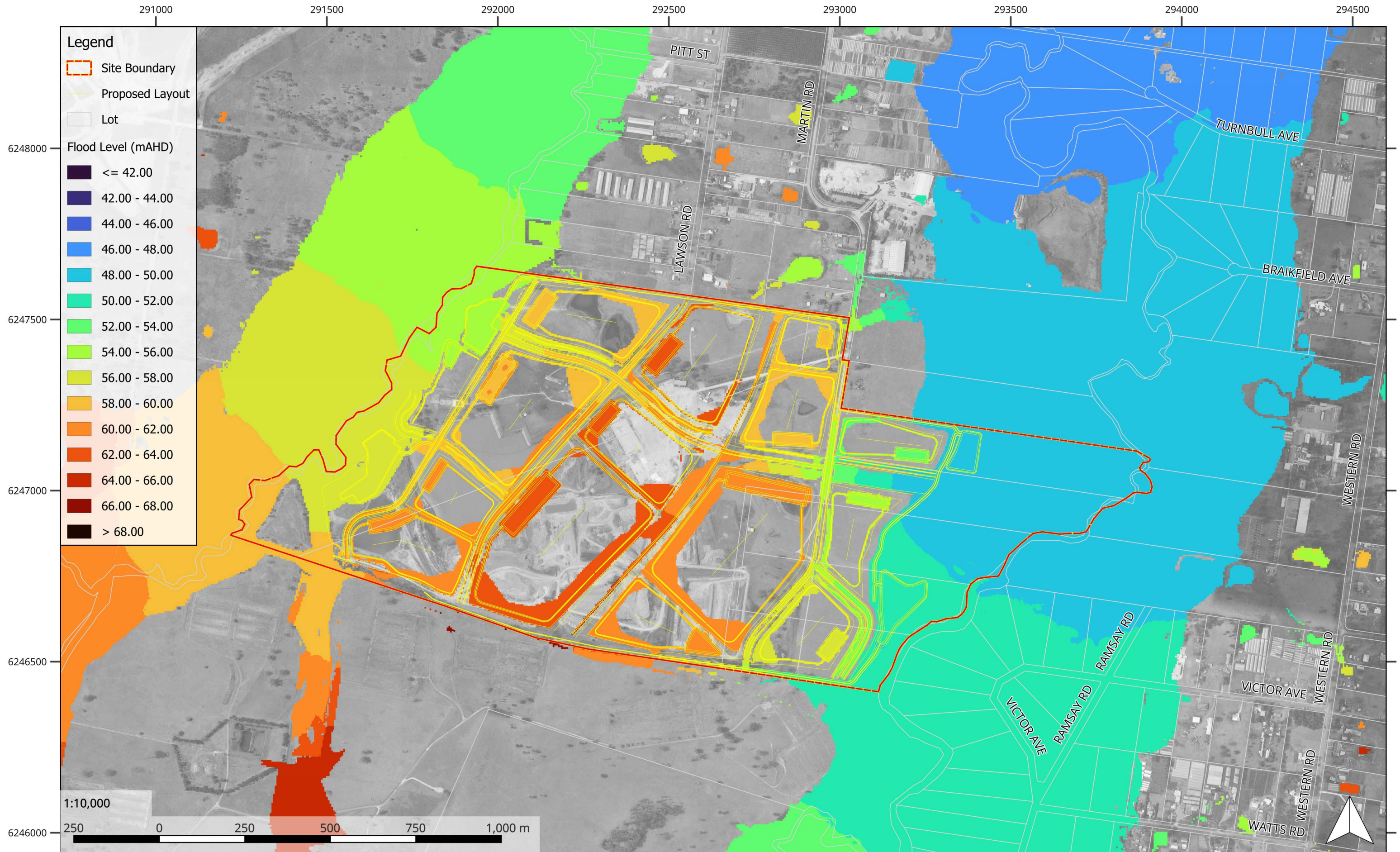
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Map 059: FLOOD HYDRAULIC CATEGORY MAP DESIGN BEW 0.2% AEP
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



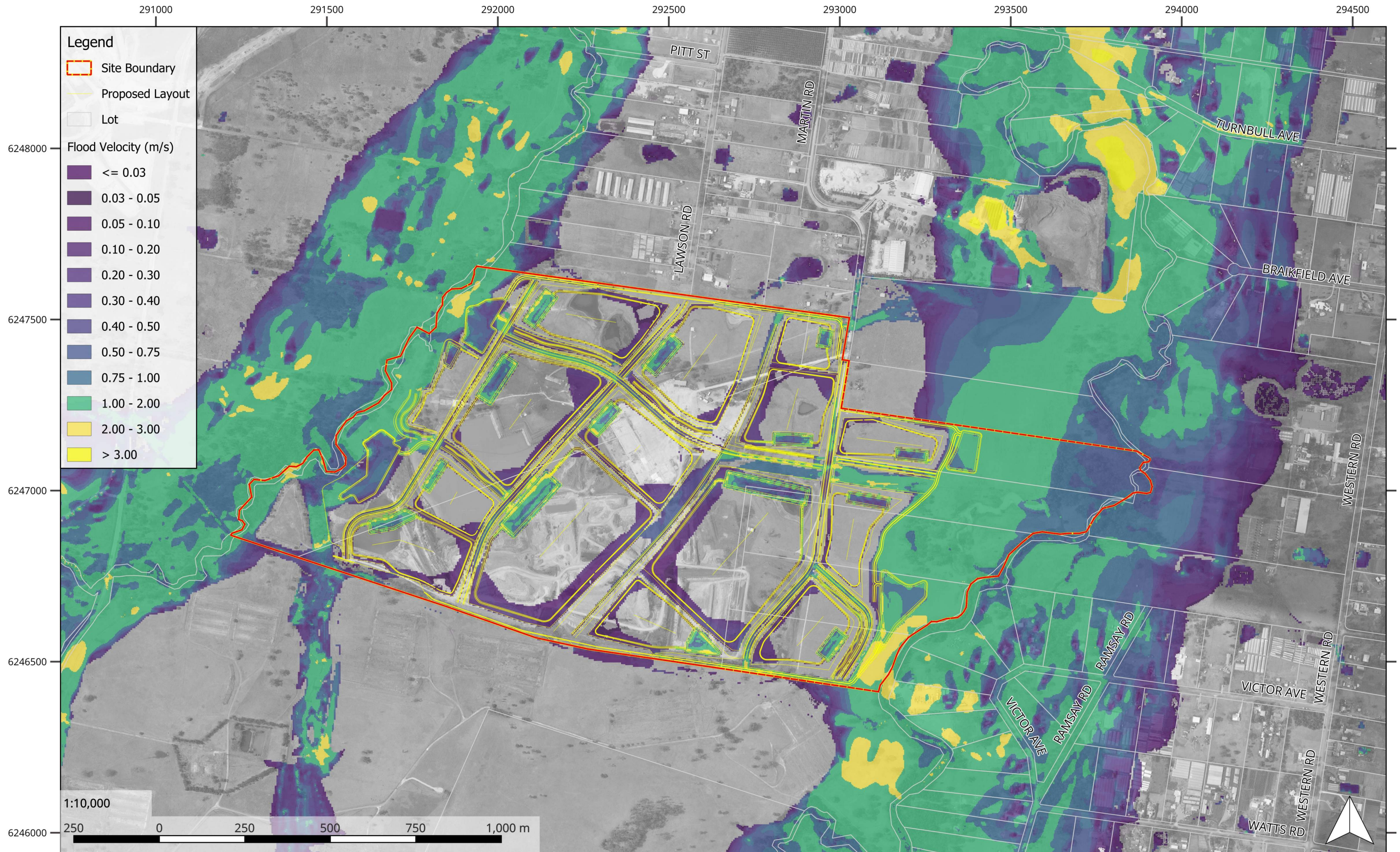
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Map 060: FLOOD DEPTH MAP DESIGN BEW PMF
Project Maverick - BEW SSDA No.97711727
Project Number: 25-0141
Client: Goodman Property Services (Aust)



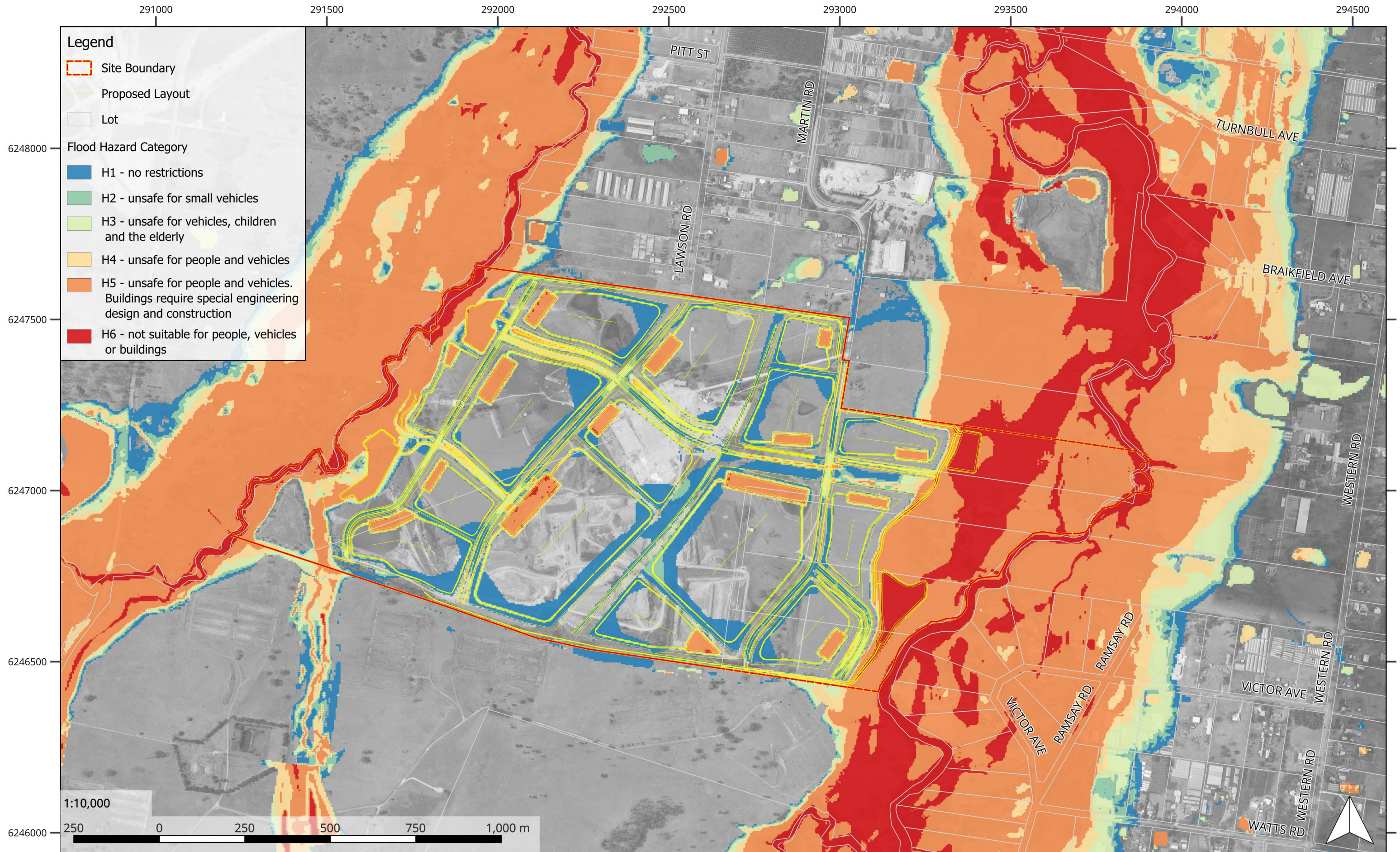
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Map 061: FLOOD LEVEL MAP DESIGN BEW PMF
Project Maverick - BEW SSDA No.97711727
Project Number: 25-0141
Client: Goodman Property Services (Aust)



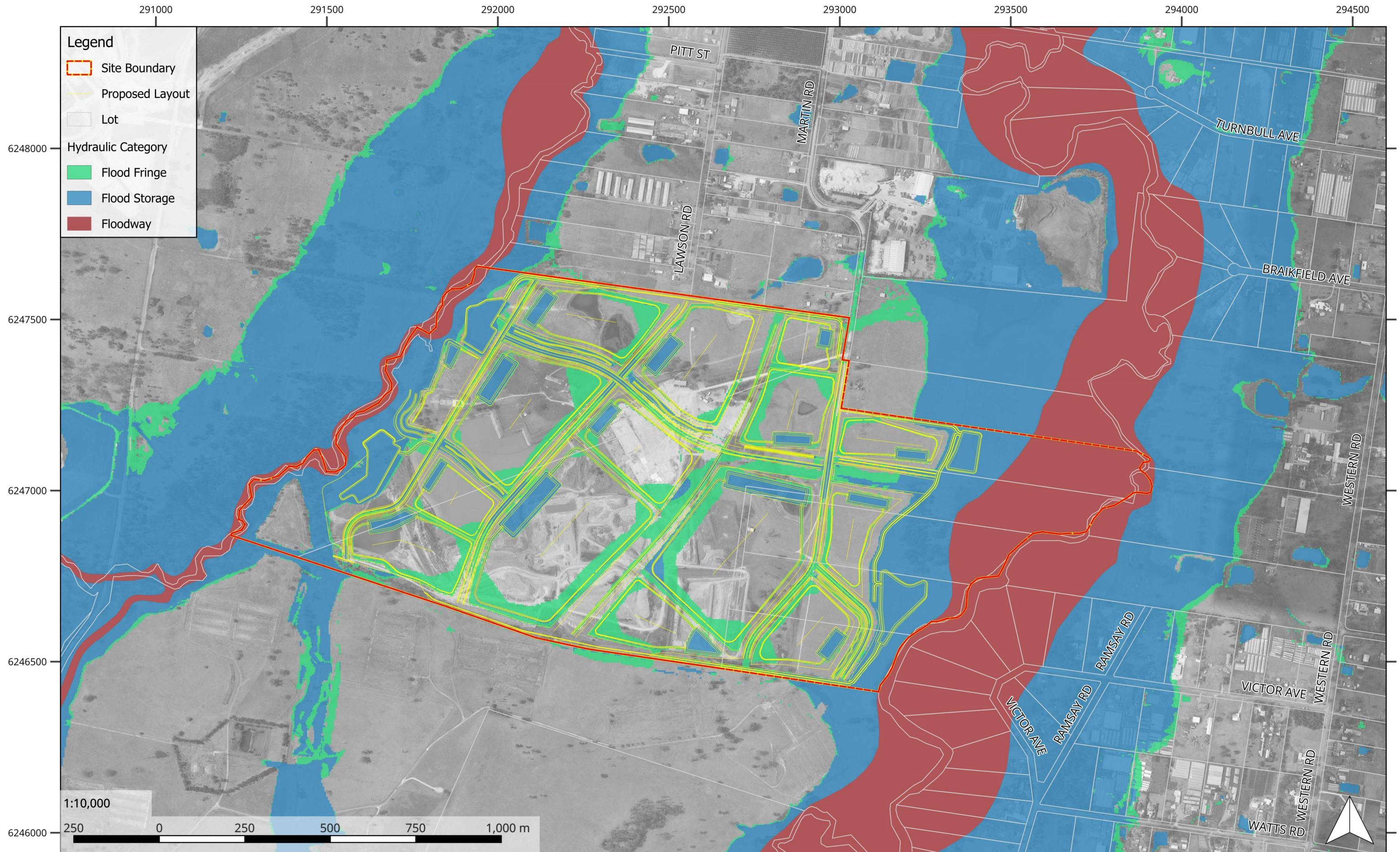
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Map 062: FLOOD VELOCITY MAP DESIGN BEW PMF
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



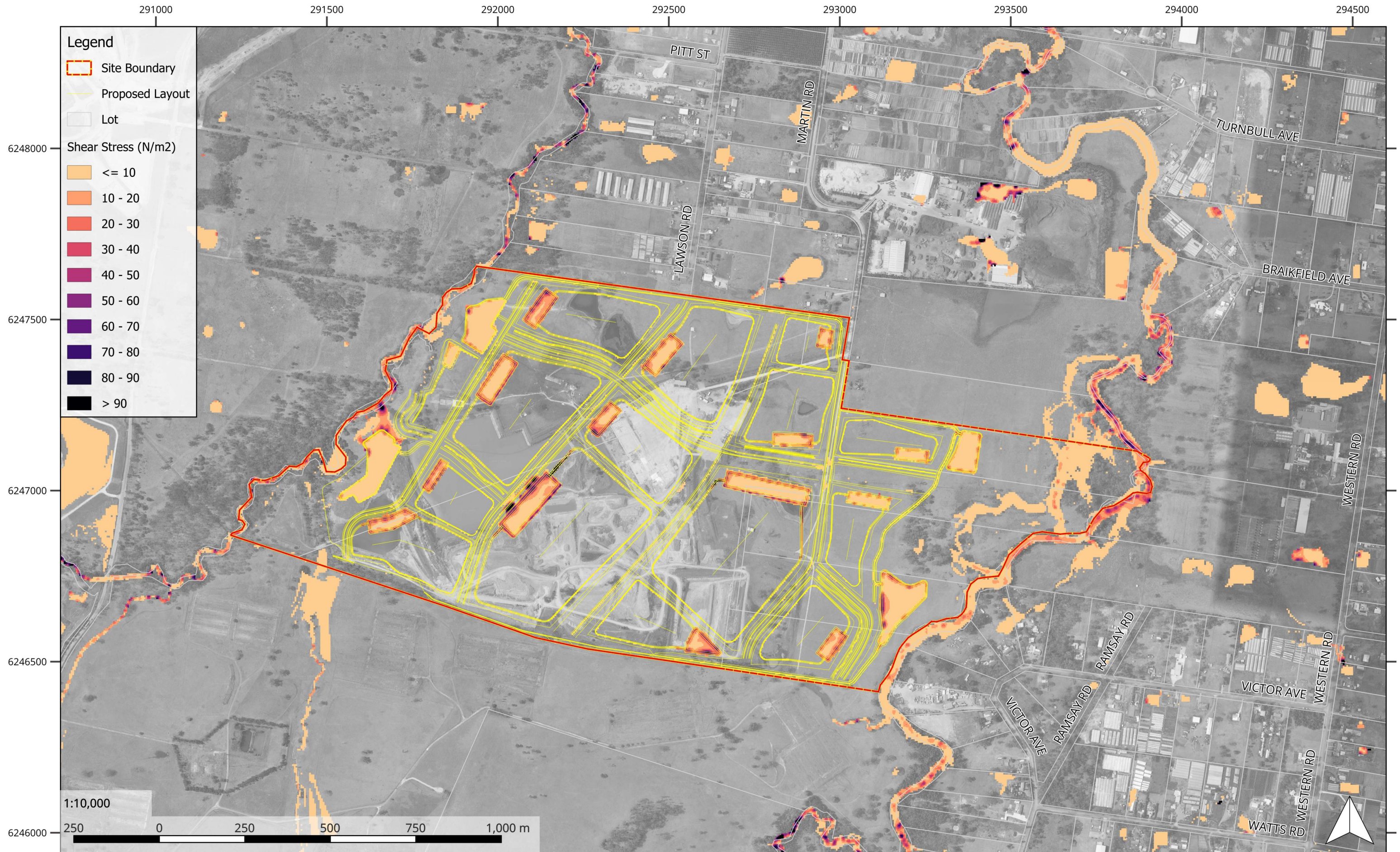
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Map 063: FLOOD HAZARD CATEGORY MAP DESIGN BEW PMF
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



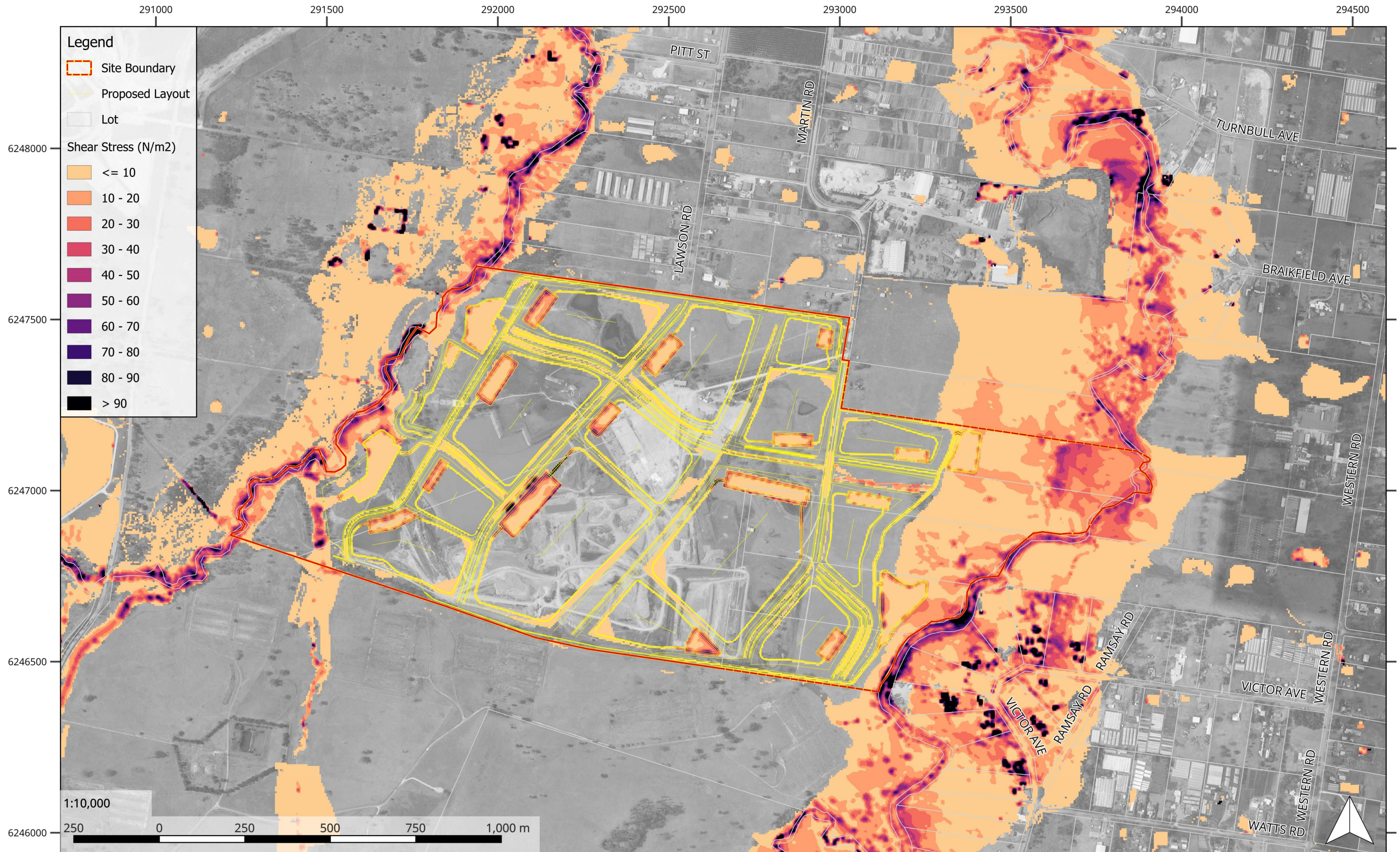
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Map 064: FLOOD HYDRAULIC CATEGORY MAP DESIGN BEW PMF
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



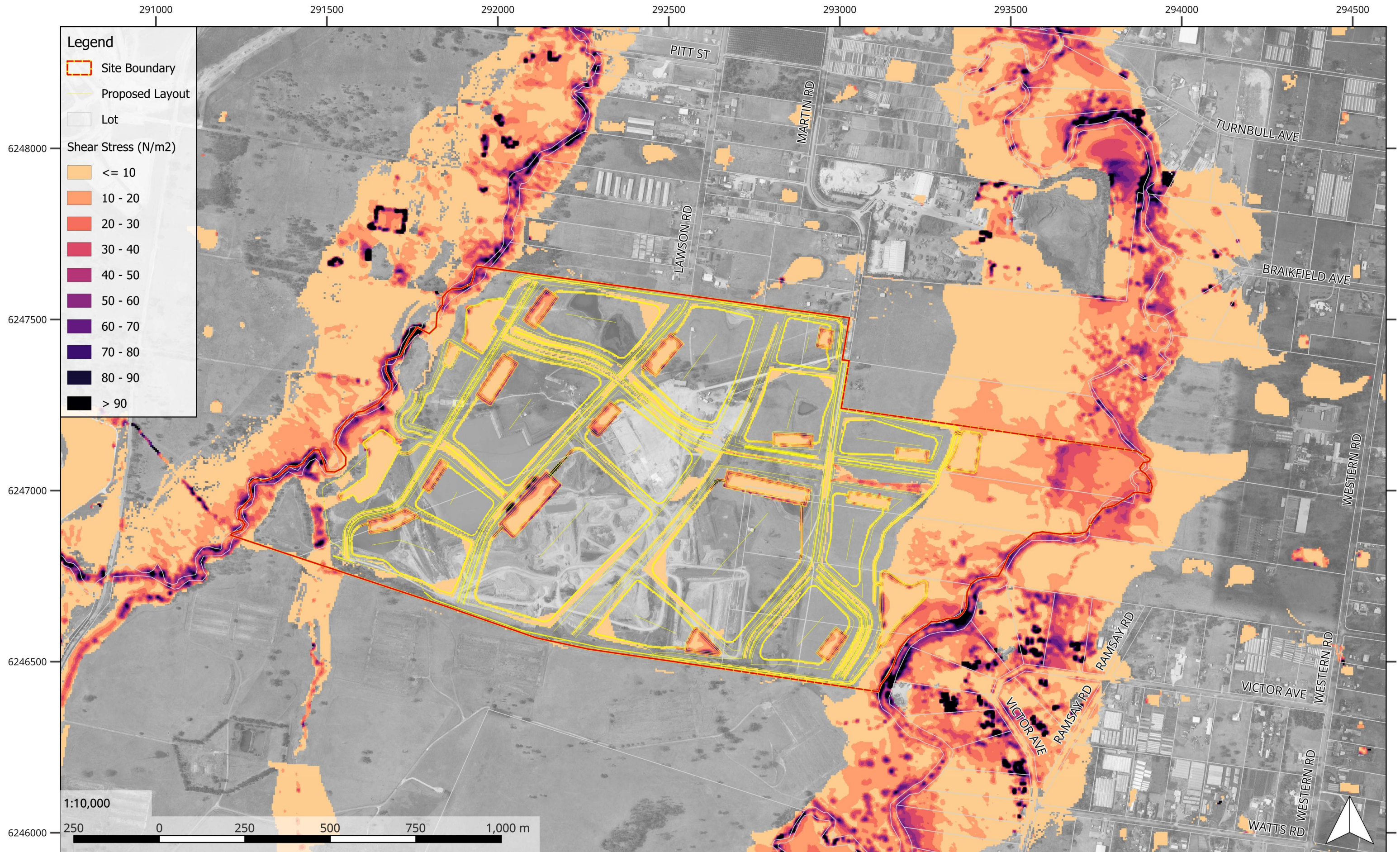
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Map 065: FLOOD BED SHEAR STRESS MAP DESIGN BEW BSS 4 EY
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



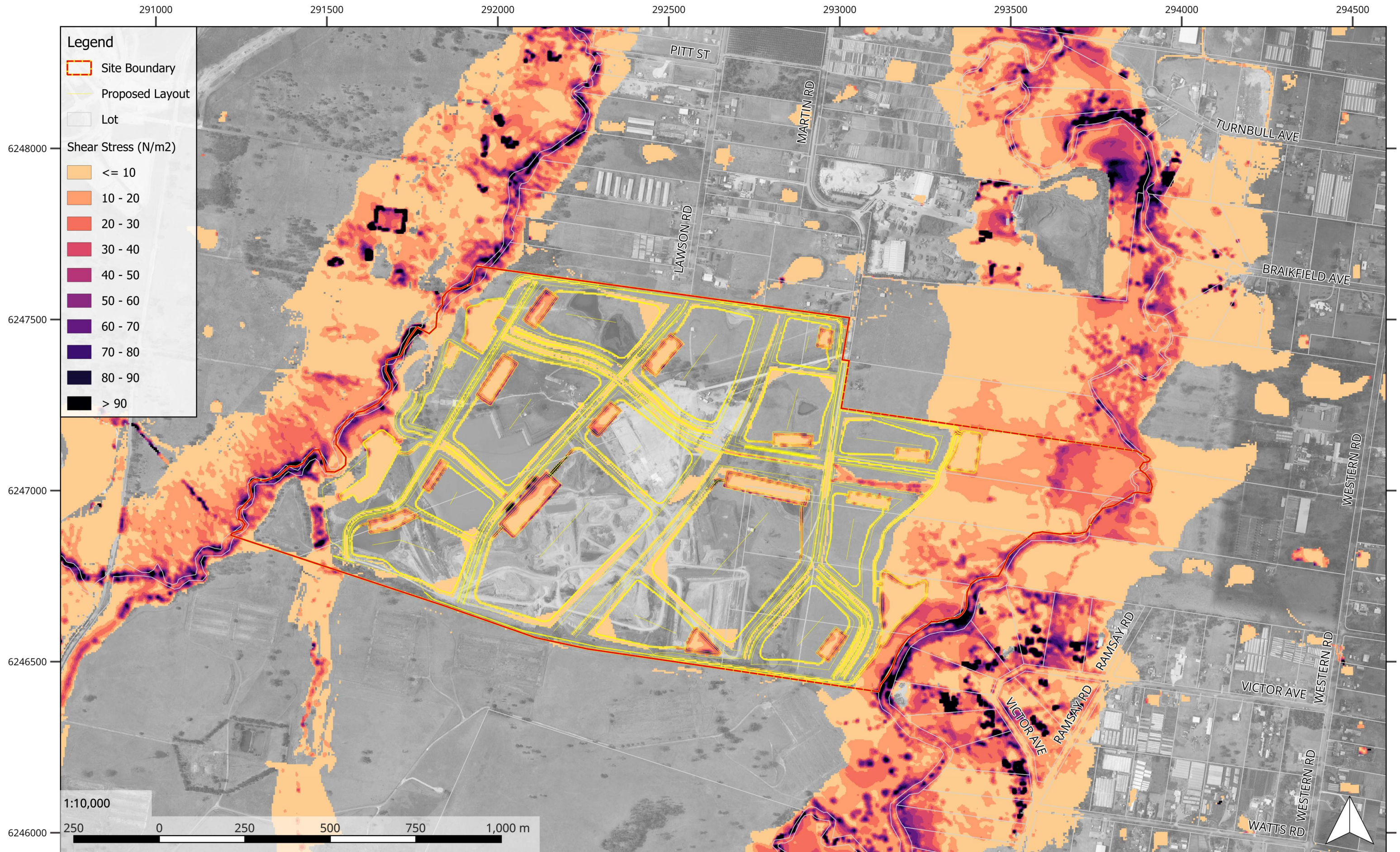
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Map 066: FLOOD BED SHEAR STRESS MAP DESIGN BEW BSS 5% AEP
Project Maverick - BEW SSDA No.97711727
Project Number: 25-0141
Client: Goodman Property Services (Aust)



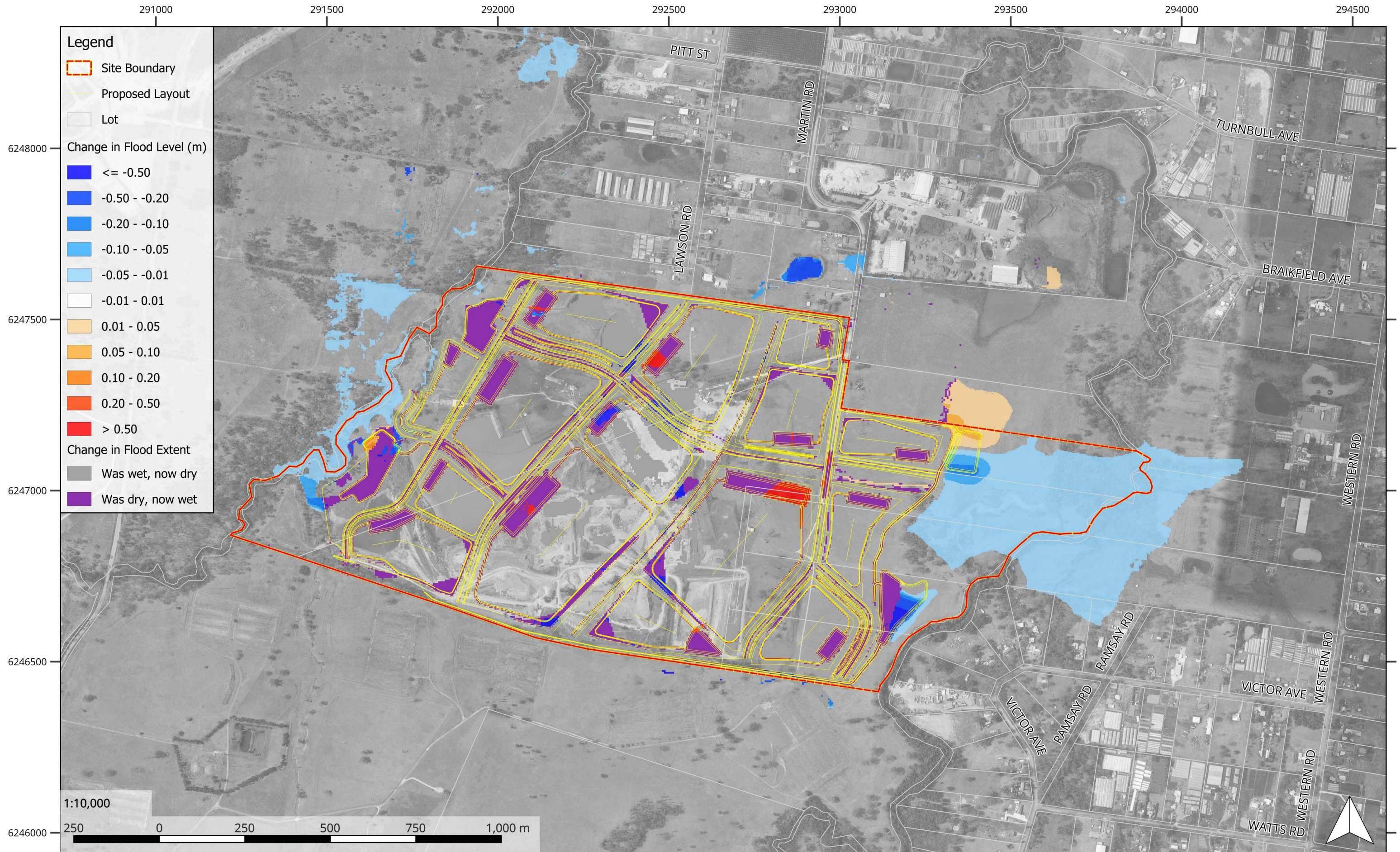
Colliers Engineering & Design (NSW) Pty Ltd endeavours to ensure that the information provided in this map is correct at the time of publication. Colliers Engineering & Design (NSW) Pty Ltd does not warrant, guarantee or make representations regarding the currency and accuracy of information contained within this map.

Map 067: FLOOD BED SHEAR STRESS MAP DESIGN BEW BSS 1% AEP
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



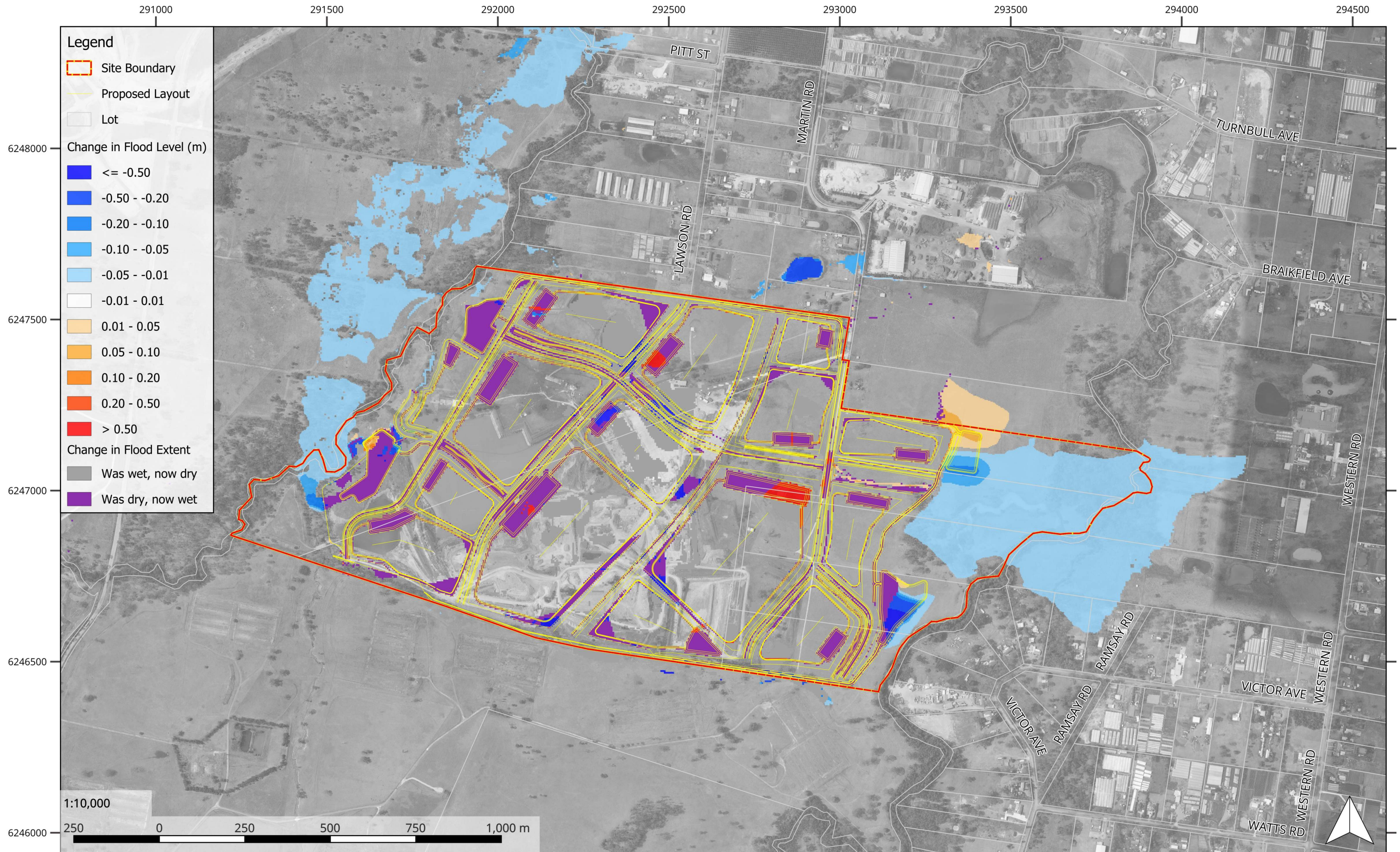
Colliers Engineering & Design (NSW) Pty Ltd endeavours to ensure that the information provided in this map is correct at the time of publication. Colliers Engineering & Design (NSW) Pty Ltd does not warrant, guarantee or make representations regarding the currency and accuracy of information contained within this map.

Map 068: FLOOD BED SHEAR STRESS MAP DESIGN BEW BSS 1% AEP CC
Project Maverick - BEW SSDA No.97711727
Project Number: 25-0141
Client: Goodman Property Services (Aust)



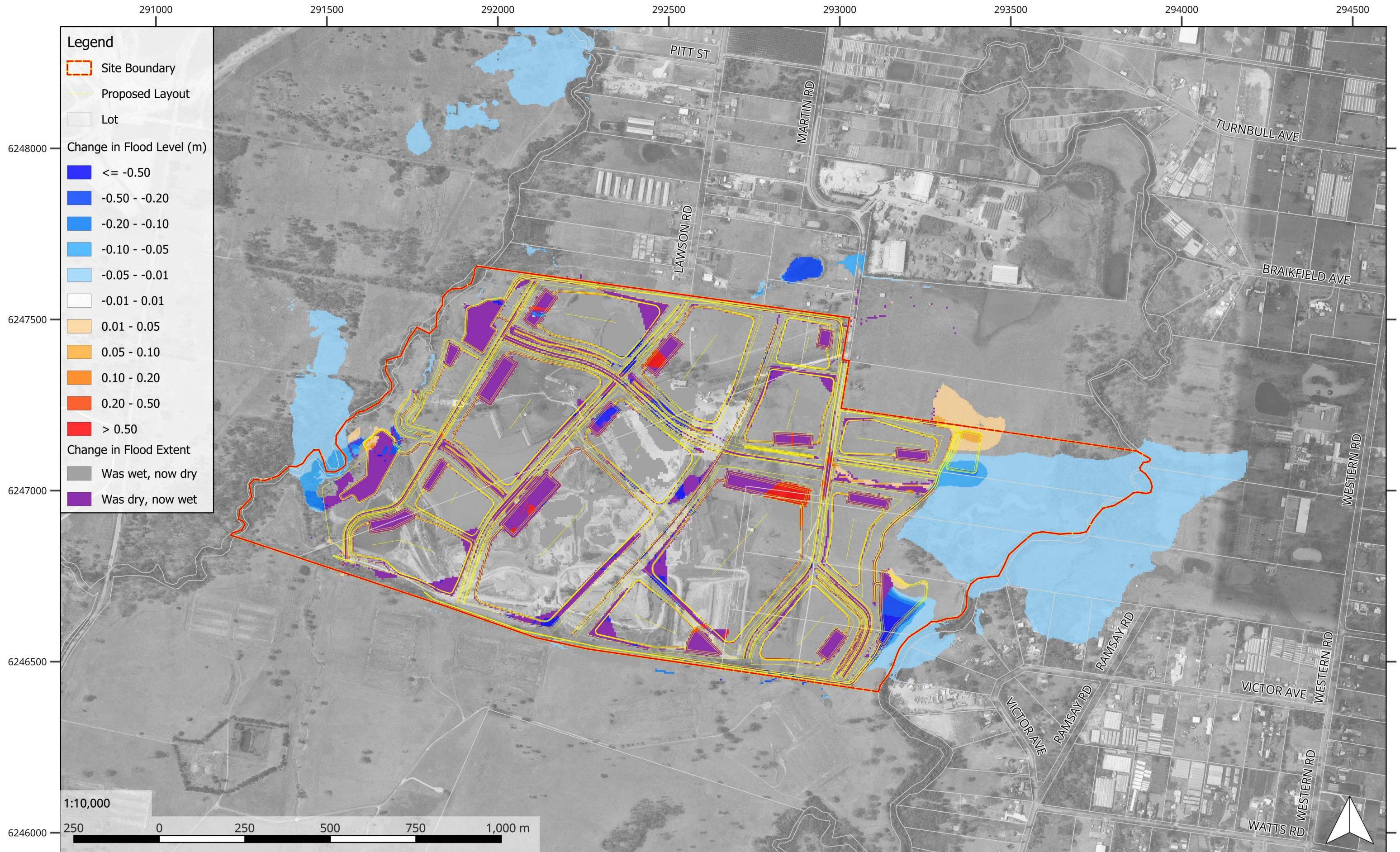
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Map 069: FLOOD AFFLUX MAP DESIGN BEW VS EXISTING 10% AEP
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



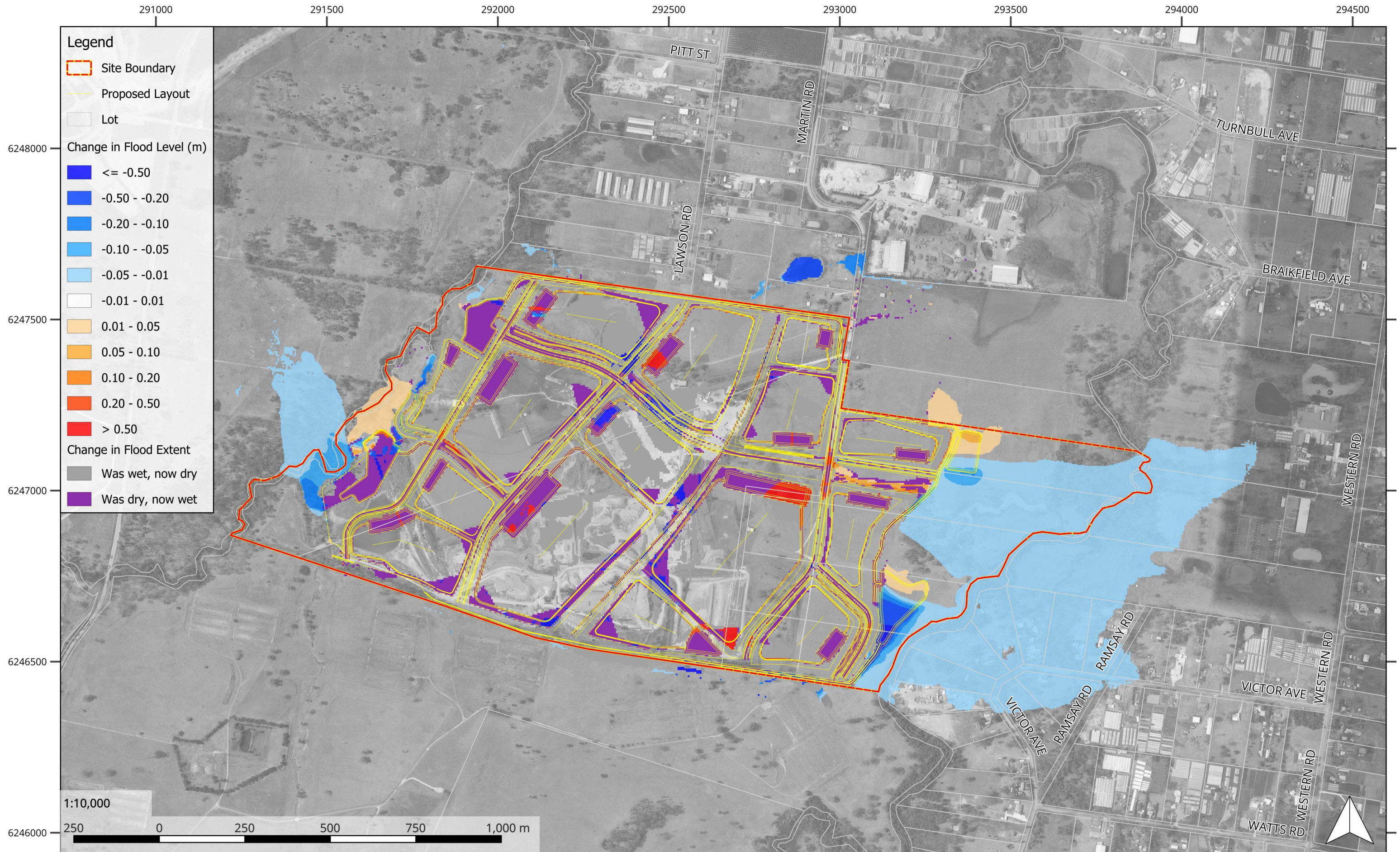
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Map 070: FLOOD AFFLUX MAP DESIGN BEW VS EXISTING 5% AEP
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



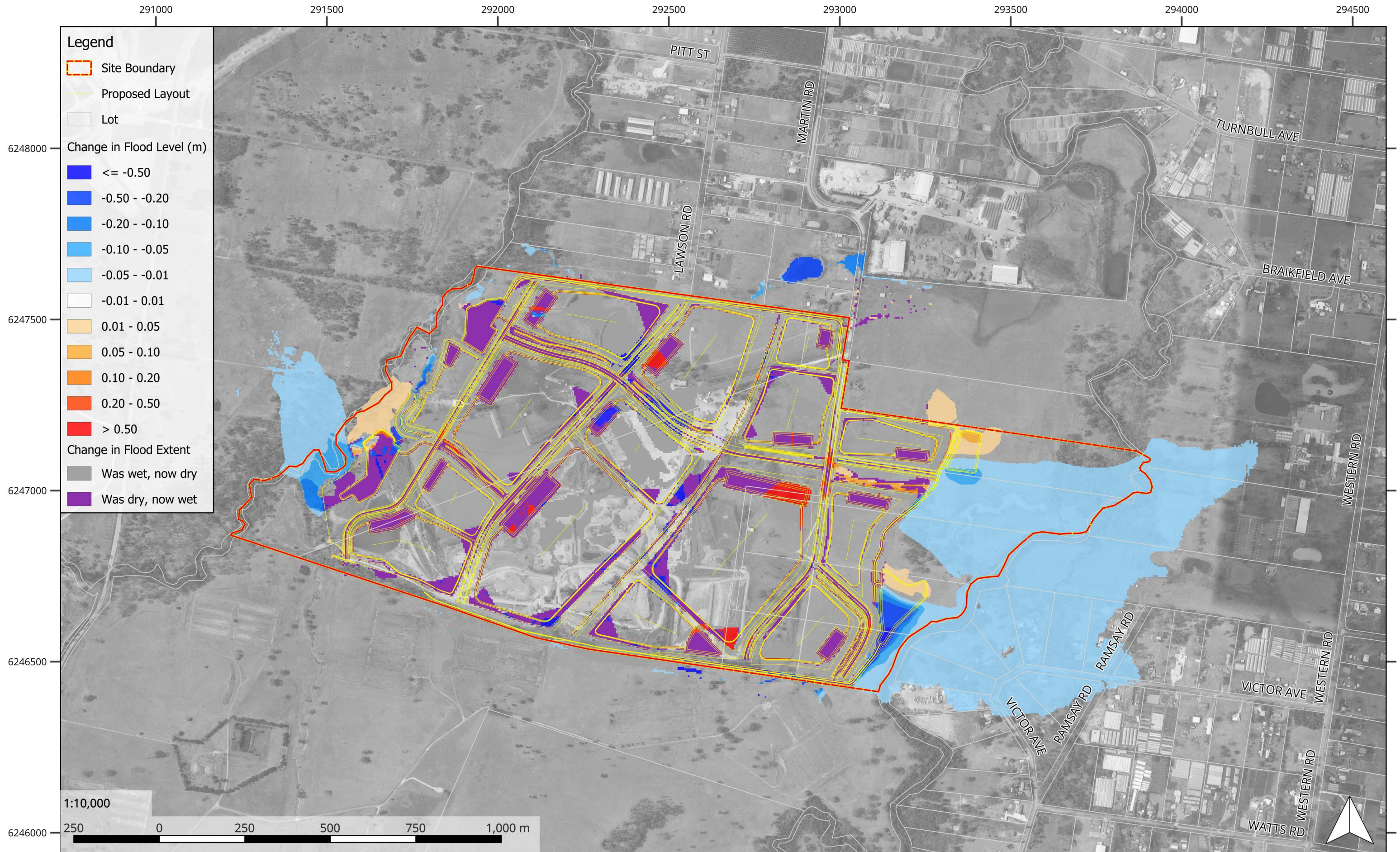
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Map 071: FLOOD AFFLUX MAP DESIGN BEW VS EXISTING 1% AEP
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



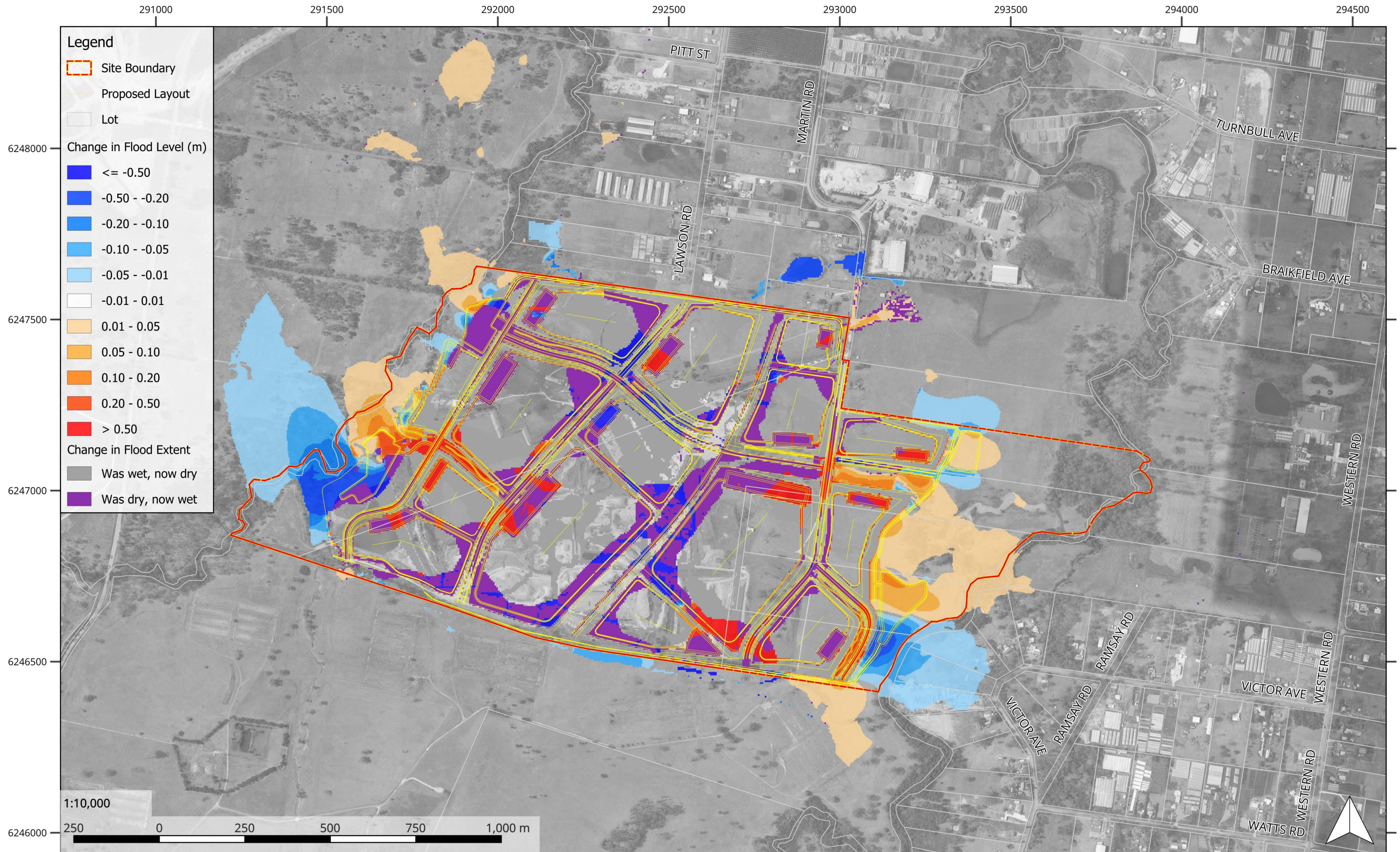
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Map 072: FLOOD AFFLUX MAP DESIGN BEW VS EXISTING 1% AEP CC
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



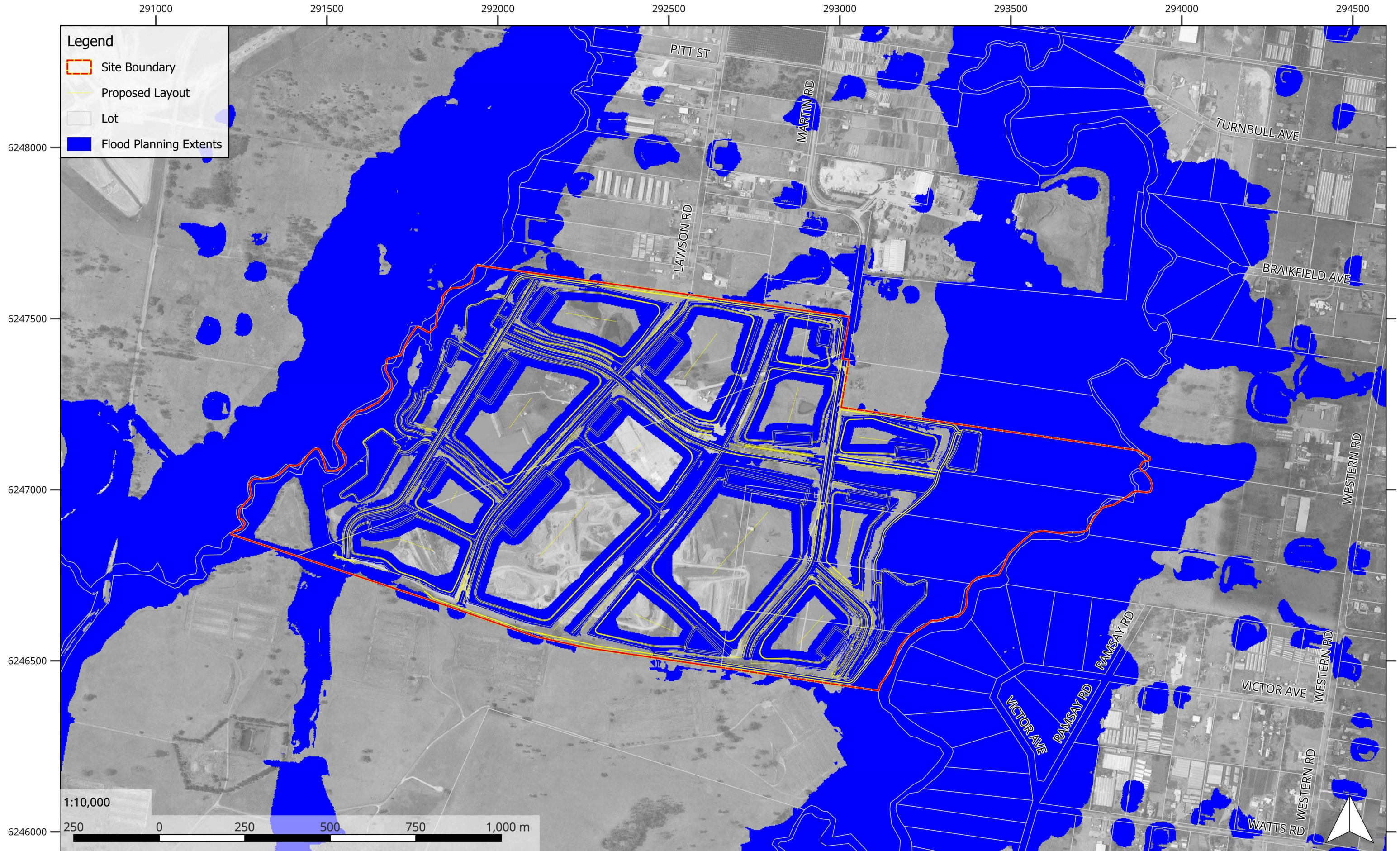
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Map 073: FLOOD AFFLUX MAP DESIGN BEW VS EXISTING 0.2% AEP
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



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Map 074: FLOOD AFFLUX MAP DESIGN BEW VS EXISTING PMF
 Project Maverick - BEW SSDA No.97711727
 Project Number: 25-0141
 Client: Goodman Property Services (Aust)



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Map 075: FLOOD FLOOD PLANNING AREAS MAP DESIGN BEW 1% AEP
Project Maverick - BEW SSDA No.97711727
Project Number: 25-0141
Client: Goodman Property Services (Aust)