COSTIN ROE CONSULTING



CIVIL ENGINEERING REPORT INCORPORATING WATER CYCLE MANAGEMENT STRATEGY SSD-17647189

DEVELOPMENT SITE

ACCESS LOGISTICS PARK
884-928 MAMRE RD,
KEMPS CREEK, NSW

Prepared for:

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Rev: G

DOCUMENT VERIFICATION	
Project Title	'Access Estate' - 884 - 928 Mamre Road, Kemps Creek
Document Title	Civil Engineering Report Incorporating Water Cycle Management Strategy
Project No.	Co14021.00
Description	SSD Report for proposed industrial subdivision development
Client Contact	Altis c/- Project Strategy – Mr Anthony Murr

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Issued by	Daniel Soliman	
File Name	14021.00-07f.rpt	

Document History

Date	Revision	Issued to	No. Copies
20 Jul. 2021	A	Mr Anthony Murr, Project Strategy	PDF
30 Aug. 2021	B	Mr Anthony Murr, Project Strategy	PDF
6 Sep. 2021	C	Mr Anthony Murr, Project Strategy	PDF
22 Sep. 2021	D	Mr Anthony Murr, Project Strategy	PDF
30 Mar. 2022	E	Mr Anthony Murr, Project Strategy	PDF
7 Sept 2022	F	Mr Anthony Murr, Project Strategy	PDF
8 Dec 2022	G	Mr Anthony Murr, Project Strategy	PDF

EXECUTIVE SUMMARY

Altis Property Partners (Altis - the Applicant) are seeking to establish a state-of-the art logistics park – "*Access Logistics Park*" - located at 884-928 Mamre Road, Kemps Creek. The Applicant is proposing to develop the land for industrial development within the recently rezoned Mamre Road Precinct.

The Proposal is considered State significant development (SSD) and accordingly, an Environmental Impact Statement (EIS) has been prepared to support the SSD Application for the Proposal. This Water and Hydrology Assessment has been prepared by Costin Roe Consulting to support the preparation of the EIS and assess the Proposal's impact on the surrounding environment in relation to soils and water including stormwater and stormwater management for both construction and operational phases of the development.

Proposal overview

The proposed development is for an industrial estate, earthworks and infrastructure for future industrial development over an area of 20 Ha. Infrastructure works will include bulk earthworks, provision of services, road & intersection construction, and stormwater management and has been completed in accordance with the Development Masterplan.

The preliminary masterplan layout provided by Altis shows development lots will vary between 0.3 Ha and 7 Ha in size. Siting of the development lots will be sympathetic to the topography of the land, access and flood planning requirements.

Access to all lots would be made via the new Southern Access Road from Mamre Road and via the new Precinct Collector Road. The new access road and associated intersection will be constructed to be consistent with the Final Mamre Road Precinct (MRP) DCP 2021.

Purpose of this assessment

This Water and Hydrology Impact Assessment has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) as they related to water and hydrology, including:

- Stormwater Management including stormwater quantity and quality during operation;
- Flooding; and
- Stormwater Management, including Erosion & Sediment Control during construction.

Construction impacts

During the construction phase, a Sediment and Erosion Control Plan will be in place to ensure the downstream drainage system and receiving waters are protected from sediment laden runoff.

Operational impacts

During the operational phase of the development, the proposed stormwater quality treatment system incorporating the use of a treatment train of gross pollutant traps (GPT's) and bio-retention filtration is proposed to mitigate any increase in stormwater pollutant load generated by the development. Best management practices have been applied to the development to ensure that the quality of stormwater runoff is not detrimental to the receiving environment.

Consultation and coordination of civil engineering and stormwater strategies has been completed with respective landowners to the north and east of the project and their respective civil engineering consultants. This includes discussion and coordination with Mirvac, Frasers Property and the private landowner to the south.

The stormwater management solution considers discharge from the development site consistent with best practice, the Final MRP DCP and EES MUSIC Modelling Toolkit (MARV targets) for both the current proposed development, and the final stormwater management targets that will be realised upon implementation of the precinct wetland system by Sydney Water.

Further it has been confirmed that the development meets flood and overland flow planning requirements. The development does not impact or encroach on existing flood affected areas (as confirmed in TUFLOW flooding assessment completed by Costin Roe Consulting). The modelling shows that local post development flows from the site, in conjunction with the flood management measures to be adopted in the flooding assessment demonstrates that the site discharge will not adversely affect any land, drainage system or watercourse as a result of the development.

Conclusion

The hydrological assessment of the local site drainage confirms that recommended water quality and quantity measures will ensure that no adverse impacts result on receiving waterways as a result of the development.

The detail contained in this report provides sufficient information to show the consent authority that legal points of discharge and a suitable stormwater management strategy is available for the development and the requirements associated with the strategy. It is recommended the management strategies in this report be approved and incorporated into the future detailed design.

TABLE OF CONTENTS

	EXECUTIVE SUMMARY	**(i)**
1	**INTRODUCTION & SCOPE**	**7**
1.1	**Introduction**	**7**
1.2	**Consultation**	**8**
1.3	**SEAR's Responses**	**8**
2	**DEVELOPMENT SITE**	**38**
2.1	**Location**	**38**
2.2	**Existing Site**	**38**
2.3	**Proposed Development**	**39**
3	**SITE WORKS**	**41**
3.1	**Soil and Geological Conditions**	**41**
3.2	**Bulk Earthworks**	**41**
3.3	**Retaining Walls**	**42**
3.4	**Embankment Stability**	**42**
3.5	**Supervision of Earthworks**	**42**
3.6	**Groundwater**	**43**
3.7	**Acid Sulphate Soils and Salinity**	**43**
3.8	**SEPP (WSEA) Clause 33H Earthworks**	**43**
4	**ESTATE ROADS & ACCESS**	**46**
4.1	**Introduction**	**46**
4.2	**Internal Roads**	**46**
4.3	**General Requirements**	**49**
4.4	**Mamre Road Intersections**	**49**
5	**WATER CYCLE MANAGEMENT STRATEGY & DRAINAGE METHODOLOGY**	**52**
5.1	**Key Areas and Objectives**	**52**

5.2 Existing Drainage System & Overland Flows 56

5.3 Proposed Estate Drainage System 57

5.4 Hydrologic Modelling and Analysis 58
5.4.1 General Design Principles 58
5.4.2 Minor/ Major System Design 58
5.4.3 Rainfall Data 58
5.4.4 Runoff Models 58

5.5 Hydraulics 60
5.5.1 General Requirements 60
5.5.2 Freeboard 60
5.5.3 Public Safety 60
5.5.4 Inlet Pit Spacing 60
5.5.5 Overland Flow (development lots) 60

5.6 External Catchment and Flooding 60

5.7 SEPP (WSEA) Clause 33L Stormwater, water quality and water sensitive design 61

6 WATER QUANTITY MANAGEMENT 64

6.1 Water Quantity Management Objectives 64

6.2 Methodology 64

6.3 Existing & Post Development Peak Flows 64

6.4 Proposed Water Quantity Management 66

7 STORMWATER QUALITY, REUSE AND MAINTENANCE 67

7.1 Stormwater Quality Objectives 67

7.2 Proposed Stormwater Treatment System 67

7.3 Stormwater Quality Modelling 67

7.4 Stormwater Harvesting 70

7.5 Stream Health/ Stormwater Discharge Assessment 71
7.5.1 Stream Health Introduction 71
7.5.2 MARV Assessment – Estate Solution 71

7.6 Maintenance and Monitoring 74

8 FLOODING AND OVERLAND FLOW 75

8.1 Introduction 75

8.2 Catchment Description & Existing Flood Behaviour 75

8.3 Proposed Overland Flow Management Strategy 76

8.4 Costin Roe Consulting Modelling 77
8.4.1 Introduction 77
8.4.2 Pre-Development 1% AEP 77
8.4.3 Post-Development 1% AEP 79
8.4.4 1% AEP Comparison 81

8.5 Flood Planning and Hazard Categorisation 82

8.6 Confirmation of Councils Development Control Pan Part C3 Requirements 84
8.6.1 Council DCP Part C3 (1% AEP Comparison) 84
8.6.2 South Ck Floodplain Risk Management Plan Recommended DCP Criteria (1% AEP Comparison) 86

8.7 Climate Change Sensitivity Assessment 88

8.8 Flood Assessment Conclusion 90

9 CONSTRUCTION SOIL AND WATER MANAGEMENT 91

9.1 Soil and Water Management General 91

9.2 Typical Management Measures 91

9.3 Other Management Measures 92

10 CONCLUSION 93

REFERENCES 94

1 INTRODUCTION & SCOPE

1.1 Introduction

Costin Roe Consulting Pty Ltd has been commissioned by Project Strategy on behalf of Altis Property Partners to undertake a *Civil Engineering Report & Water Cycle Management Strategy* (WCMS) to accompany a State Significant Development Application (SSDA) with the NSW Department of Planning, Industry and Environment (DPIE) for the future industrial development of the land.

This report presents a civil engineering assessment of a property bounded by Lot 52 and Lot 53 DP259135, Lots 26-28 DP255560, and Mamre Road, Erskine Park. The development will be referred to '*The Access Estate*' in this report.

This report provides an assessment of the civil engineering characteristics of the development site and technical considerations of the following aspects:

- Earthworks & geotechnical considerations;
- Roads and Access;
- Water Cycle Management Strategy (WCMS).

The WCMS comprises several key areas of stormwater and water management which are provided below. These key areas have been established with the aim to reduce impacts from the development on the surrounding environment and neighbouring properties. The water cycle management strategy identifies the management measures required to meet the targets set. The key water cycle management areas assessed in this report are:

- Storm Water Quantity;
- Storm Water Quality;
- Water Supply and Reuse;
- Flooding; and
- Erosion and Sediment Control

This engineering analysis is based on development for industrial warehouse and logistic facilities consistent with industrial estates in the surrounding areas and indicative Masterplan provided by Altis.

A request for Planning Secretary's Environmental Assessment Requirements (SEAR's) to the DPIE has been made by the applicant. Reference to **Appendix C** should be made for SSD-17647189 SEAR's dated 14 May 2021. **Section 1.3** of this report for specific responses to civil engineering and water management related items included in the SEAR's.

Revision D of this report has been produced to provide additional information pertaining to comments from DPIE as part of the Test of Adequacy assessment prior to formal exhibition and assessment of the SSDA.

Revision E of this report has been prepared to include updated design and assessment for Response to Submission received from DPIE, Penrith City Council, EES and TfNSW in November 2021 and to encompass the requirements of the *Final Mamre Road Precinct Development Control Plan* (MRP DCP) dated November 2021.

Revision F of this report has been prepared to include updated design and assessment for Response to Submission received from Infrastructure & Development Consulting (IDC) in June 2022, which assessed the stream health & water cycle management measures implemented on the site. Revision F of this report also includes updated design documentation to capture TfNSW's building setback requirements along Mamre Road.

Revision G of this report has been prepared to include updated design and assessment for Response to Submission received from Infrastructure & Development Consulting (IDC) in October 2022, which assessed the stream health & water cycle management measures implemented on the site.

1.2 Consultation

Consideration to the anticipated development levels, road and drainage requirements on the adjacent sites to the north, east and south contemplated by adjoining landowner/ developers Mirvac (north) and Fraser Property Australia (east), and the private landowner to the south. This has been made through consultation, where possible, with these respective parties throughout the concept design development and SSDA assessment.

Consultation with landowners Mirvac (north) and Fraser Property Australia (east) has been completed in the form of meetings between the developers and their respective Civil Engineering Consultants, and the sharing of information between the parties. The shared information has been used to coordinate alignments of road connections, drainage connections, interfacing of levels on boundaries and ensuring coordination of strategy pertaining to stormwater managements and overall civil works.

Reference to the civil engineering drawings included in **Appendix A** shows overlays and coordination of the various SSDA designs submitted by Mirvac to the north, and Frasers to the south-east and east.

Contact with the landowner of the property to the south for consultation purposes was made. However, despite reaching out to the landowner (via SLR Consulting), no comments or discussions were enabled between the parties. Whilst the owner to the south chose not to engage with Altis, the earthworks and road levels between the sites were carefully considered to minimise impacts. Level differences are generally less than 0.5m (noting one isolated area where level differences are up to 1.2m), and connection to their property can be readily made from the proposed new road.

Consultation with the community was undertaken by SLR Consulting, and consultation by the project team with various stakeholders has also been undertaken throughout the assessment phase. These stakeholders include Penrith City Council, DPIE, EES and TfNSW.

1.3 SEAR's Responses

This report supports the EIS for the proposal and to address the NSW Department of Planning and Environment SEARS letter dated 14 May 2021, reference SSD-17647189, agency response letters from Penrith City Council, NSW Department of Primary Industries (DPI) and NSW Office of Environment & Heritage (OEH).

Further reference to the EIS prepared by Willowtree Planning should be made for confirmation of how the SEAR's have been addressed for non-civil engineering or WCM related items.

Table 1.1 provides a summary of the SEARs General Requirements which relate to water and hydrology, and where these have been addressed in this report. **Table 1.2** provides a similar summary pertaining to specific Agency requirements.

Table 1.1. SEARs General Requirements

SEARS – General Requirements
A topographic assessment and justification of the proposed earthworks are site responsive and contextually appropriate Response The development responds to the topography by providing development pads which step progressively from the existing high point on the east of the development site, to the lowest part of the site on the west adjacent to Mamre Road. The Altis development site has an approximate level difference of c30m from the highest to the lowest point. Level changes and retaining structures are required in order to facilitate the large flat building pads required for industrial development. Altis has sought to reduce the required extent and height of retaining walls, as well as the extent of cut across the site by utilising a terraced approach to the development site. This approach is contextually appropriate as it follows the progression of the natural form from the front of the site (Mamre Rd) to the rear. Consideration to the anticipated development levels on the adjacent sites to the north and east, contemplated by adjoining landowner/ developers Mirvac (north) and Fraser Property Australia (east), through consultation with these respective developers has also been made. This consultation has been completed in form of meetings between the developers and respective Civil Engineering Consultants, and the sharing of information between the parties which has been used to coordinate alignments of road connections, drainage connections, interfacing of levels on boundaries and ensuring coordination of strategy pertaining to stormwater managements and overall civil works. Refer **Section 1.2**. Refer to **Section 3,** and drawings included in **Appendix A**.
An assessment of potential impacts to soil and water resources, topography, hydrology, groundwater, groundwater dependent ecosystems, drainage lines, downstream assets such as Warragamba Pipelines corridor, watercourses and riparian lands on or nearby to the site. This will include mapping and a description of existing background conditions and cumulative impacts, and measures proposed to reduce and mitigate impacts. Response Refer to **Section 5 to 8** for assessment of water resources, hydrology, watercourses and riparian lands. Refer to **Section 3** for assessment of soil resources. Refer to **Section 2 & 3** for background conditions. The development is noted to be approximately 2.0km south of the Warragamba Pipeline. There are no watercourses which drain toward or through the Warragamba Pipeline from the subject land. The proposed development has no impact or works associated with the Warragamba Pipeline and no additional assessments are required in relation to the development and the pipeline. There is no identified waterfront land on the property and/ or requirements for controlled activities as such.

Consideration of the NSW Aquifer Interference Policy (2012) and the guidelines for Controlled Activities on Waterfront Land (2018) Response There are no identified aquifers on the site and no proposed water uptake requirements. There is no identified waterfront land on the property and/ or requirements for controlled activities as such.
A detailed Site water balance including identification of water requirements for the life of the project, measures that would be implemented to ensure an adequate and secure water supply is available for the development, and a detailed description of the measures to minimize the water use at the site. Response Water supply for the development will be provided by Sydney Water, an adequate and secure supplier. Measures including rainwater reuse are proposed for non-potable water use with the demand on non-potable being reduced by 80%.
Demonstrate satisfactory arrangements for drinking water, wastewater, and if required, recycled water services have been made. Response Reference to the services infrastructure reporting by Landpartners should be made pertaining to drinking water and wastewater supply.
Characterization of water quality at the point of discharge to surface and/or groundwater against the relevant water quality criteria (including the draft Mamre Road Precinct Development Control Plan) and the proposed mitigation measures to manage any impacts to receiving waters and monitoring activities and methodologies. Response Stormwater assessment including surface water runoff, water quality and water quantity has been completed. The key stormwater objectives, based on relevant water quality criteria, have been set out in **Section 5.1** and **Section 7.1** of the report. **Section 7** provides demonstration of the key criteria being met, based on MUSIC modelling. Configuration of the proposed measures are shown on the Civil Design Drawings included in **Appendix A**.
A site- specific integrated water management strategy with details of a stormwater/ wastewater management system including how it will be designed, operated and maintained, including the capacity of onsite detention system(s), onsite sewage management and measures to treat, reuse (including indicative quantities) or dispose of water. Response A stormwater management assessment including surface water runoff, water quality and water quantity has been completed. The key stormwater objectives, based on relevant water quality criteria, have been set out in **Section 5.1** and **Section 7.1** of the report.

Section 6 provides demonstration of the water quantity management, including on-site detention system storage capacity operation, hydrology and hydraulics. **Section 7** provides demonstration of the key water quality criteria being met, based on MUSIC modelling. Also included in **Section 7** is stormwater harvesting (via rainwater reuse), stream health and maintenance and monitoring requirements. Further detail on maintenance and monitoring can be found in **Appendix D**. Configuration of the proposed measures are shown on the Civil Design Drawings included in **Appendix A**.
A demonstration is provided of how stormwater discharge will comply with the trunk drainage infrastructure identified in the Draft Mamre Road Precinct Development Control Plan, including concept stormwater plans for both Warehouse Building 1 and the ultimate developed estate. <u>Response</u> Stormwater discharge from the estate is proposed at three locations – on the north-east of the development land, on the west of the development and in the south-west of the development, consistent with existing drainage paths and watercourses/ trunk stormwater infrastructure identified in the Final MRP DCP. The proposed stormwater management system is designed such that pre-development flows are not exceeded in the interim scenario and in the ultimate scenario. Allowances have been made in the hydrological & hydraulic modelling for the provision of future warehouse buildings to this effect. Confirmation of discharge conditions consistent with the EES MUSIC Modelling Toolkit have been made, as included in **Section 7.5**. Further technical confirmation of EES MUSIC Modelling Toolkit can be found in **Appendix F**
A detailed flooding impact assessment is provided. <u>Response</u> Refer to **Section 8** for detailed flood assessment and **Appendix E** for technical supporting information relating to the flood assessment. A flood assessment has been undertaken using the two-dimensional TUFLOW modelling engine. Assessment includes pre and post development modelling of the 5% AEP, 1% AEP, 0.5% AEP, 0.2% AEP and the PMF events. Impact assessments have been included for the 1% AEP, and the 0.5% AEP, 0.2% AEP events assessed as proxies for climate change. The assessment shows acceptable outcomes which meet the objectives of the NSW Floodplain Development Manual, Penrith City Council DCP and the proposed amendments to the Penrith City Council DCP proposed in the *Exhibition Draft South Creek Floodplain Management Plan 2020*.
Descriptions of the proposed erosion and sediment controls during construction are provided, as well as consideration of salinity and acid sulphate soil impacts. <u>Response</u>

Refer to **Section 9** for soil and water management measures, drawings in **Appendix A** for associated erosion and sediment control drawings, and **Appendix C** for a Draft Soil and Water Management Plan.

These sections show proposed measures, based on the Landcom document *Managing Urban Stormwater – Soils & Construction Volume 1 ('Blue Book')(Landcom, 2004)*, are proposed during the construction of the development. Measures proposed will limit potential for offsite impact associated with water runoff and soils during construction. Consideration to management of salinity and acid sulphate has been made based on the recommendations of the geotechnical investigations and noted Landcom document.

Table 1.2. SEARs Agency Responses

DPIE – ref: IRF21/2357
High quality built form, setbacks and earthworks, including landscaped retaining walls and setbacks, should be provided at the interface with the public domain, consistent with the Mamre Road DCP. Retaining walls should be minimised on the public domain interface (including public roads). <u>Response</u> The site has been designed to allow for the natural site topography where practical with tiered earthworks pads and smaller lots through steeper parts of the development site, which in turn allow for smaller overall retaining walls. The landscaped retaining structures, which incorporate setbacks and tiers as proposed in the Final MRP DCP, have been incorporated in the design. Refer discussion in **Section 3.3** and drawings in **Appendix A**. The Altis development site has an approximate level difference of c30m from the highest to the lowest point. Level changes and retaining structures are required in order to facilitate the large flat building pads required for industrial development. Altis has sought to reduce the required extent and height of retaining walls, as well as the extent of cut across the site by utilising a terraced approach to the development site. This approach is contextually appropriate as it follows the progression of the natural form from the front of the site (Mamre Rd) to the rear. The site setbacks, landscaping and retaining walls proposed are compliant with the final MRP DCP
Demonstrate how matters of stormwater management and flood risk address the integrated water cycle management provisions set out in the draft Mamre Road DCP and meet the requirements of Clause 33L of the WSEA SEPP. It is noted that trunk drainage C03 flows south west boundary from Lot 52 DP 259135. <u>Response</u> A stormwater management assessment including surface water runoff, water quality and water quantity has been completed. The key stormwater objectives, based on relevant water quality criteria, have been set out in **Section 5.1** and **Section 7.1** of the report. A detailed response to *Clause 33L of the WSEA SEPP* is included in **Section 5.7**. **Section 6** provides demonstration of the water quantity management, including on-site detention system storage capacity operation, hydrology and hydraulics. Further discussion

on Stream Health and waterway discharge (including EES discharge criteria) is included in **Section 7.5**.

Section 7 provides demonstration of the key water quality criteria being met, based on MUSIC modelling. Also included in **Section 7** is stormwater harvesting (via rainwater reuse), stream health and maintenance and monitoring requirements. Further detail on maintenance and monitoring can be found in **Appendix D**.

Refer to **Section 8** for detailed flood assessment and **Appendix E** for technical supporting information relating to the flood assessment.

A flood assessment has been undertaken using the two-dimensional TUFLOW modelling engine. Assessment includes pre and post development modelling of the 5% AEP, 1% AEP, 0.5% AEP, 0.2% AEP and the PMF events. Impact assessments have been included for the 1% AEP, and the 0.5% AEP, 0.2% AEP events assessed as proxies for climate change.

The assessment shows acceptable outcomes which meet the objectives of the NSW Floodplain Development Manual, Penrith City Council DCP and the proposed amendments to the Penrith City Council DCP proposed in the *Exhibition Draft South Creek Floodplain Management Plan 2020*.

Configuration of the proposed measures are shown on the Civil Design Drawings included in **Appendix A**.

Demonstrate that the access roads as shown in the proposed master plan for SSD 17647189, link into and support the road network and hierarchy for the Mamre Road Precinct as described in the Mamre Road DCP. Roads identified to connect with adjoining properties should be delivered as part of the first stage of the development. Road levels.

Response

Access roads are proposed in accordance with the Final MRP DCP, and subsequent discussion and precinct modelling undertaken by Ason Group for DPIE and TfNSW.

Reference to **Section 4** and Civil Design Drawings included in **Appendix A** should be made in relation to the provided road design and road design allowances. Reference to the traffic assessment completed by Ason Group should also be made in relation to traffic aspects.

Further, consideration to the anticipated development road networks of the adjacent sites to the north and east, contemplated by adjoining landowner/ developers Mirvac (north) and Fraser Property Australia (east), through consultation with these respective developers has also been made. This consultation has been completed in form of meetings between the developers and respective Civil Engineering Consultants, and the sharing of information between the parties which has been used to coordinate alignments of road connections, drainage connections, interfacing of levels on boundaries and ensuring coordination of strategy pertaining to stormwater managements and overall civil works. Refer **Section 1.2**.

The site adjoins Mamre Road and the provided plans identify an intersection with Mamre Road. The location and need for the intersection is still under review as part of the finalisation of the Mamre Road DCP. The applicant must consult with TfNSW regarding the ultimate design, including the location and design of intersections, of Mamre Road upgrade.

Response

The final MRP DCP confirms a left in left out intersection at the location shown on the development plans. Interim and ultimate intersection arrangements have been completed for the intersection of the estate road and Mamre Road, completed in consultation with TfNSW and Final MRP DCP. Refer functional layout drawings by Costin Roe Consulting in **Appendix A** and by MU Group (refer separate document by MU Group).
Bulk earthworks must demonstrate compliance with Clause 33H of the WSEA SEPP. This includes demonstration of how bulk earthworks will be prepared to connect to adjoining sites to enable their feasible development. <u>Response</u> A detailed response to *Clause 33H of the WSEA SEPP* is included in **Section 3.8**. Acceptable outcomes relating to earthworks to suit large format industrial warehouse development has been demonstrated.
Demonstrate how the proposal considers the physical and natural features of the site and the immediate surrounding area and provides a streetscape design and landscaped transition to the public realm that is consistent with the Mamre Road DCP. <u>Response</u> Consideration to natural and physical features of the site have been considered by introducing, where practical, battering within landscaped areas and stepped earthworks pads across the development which are integrated with the existing landform. The Altis development site has an approximate level difference of c30m from the highest to the lowest point. Level changes and retaining structures are required in order to facilitate the large flat building pads required for industrial development. Altis has sought to reduce the required extent and height of retaining walls, as well as the extent of cut across the site by utilising a terraced approach to the development site. This approach is contextually appropriate as it follows the progression of the natural form from the front of the site (Mamre Rd) to the rear. Furthermore, extensive landscaping has been designed to integrate with retaining walls and batters to provide an acceptable transition between the streetscape and built form.
Demonstrate how the views and visual impacts relating to the site will be maintained as specified in the Mamre Road DCP. <u>Response</u> Refer to separate visual assessment report completed by Geoscapes and EIS for visual impact assessments.

DPIE (Water) – ref: OUT21/4898

The SEARS should include:

The identification of an adequate and secure water supply for the life of the project. This includes confirmation that water can be sourced from an appropriately authorised and reliable supply. This is also to include an assessment of the current market depth where water entitlement is required to be purchased.

Response

Water supply for the development will be provided by Sydney Water, an adequate and secure supplier.

No water entitlements are required to be purchased.

Refer to the Service Infrastructure Assessment completed by Landpartners.

A detailed and consolidated site water balance.

Response

Reference to **Sections 5, 6** and **7** of this report should be made for surface water assessments.

Assessment of impacts on surface and ground water sources (both quality and quantity), related infrastructure, adjacent licensed water users, basic landholder rights, watercourses, riparian land, and groundwater dependent ecosystems, and measures proposed to reduce and mitigate these impacts.

Response

Refer to **Section 5, 6 & 7** for assessment of water resources, hydrology (including quality and quantity), watercourses and riparian lands.

Refer to **Section 3** for assessment of soil resources.

Refer to **Section 2 & 3** for background conditions.

Refer to separate report, completed by JBS&G, in relation to groundwater and groundwater dependent ecosystems.

There are no proposed water licenses and adjacent properties are noted to be contemplating similar developments.

Proposed surface and groundwater monitoring activities and methodologies.

Response

There are no proposed or required surface and groundwater monitoring activities.

Consideration of relevant legislation, policies and guidelines, including the NSW Aquifer Interference Policy (2012), the Guidelines for Controlled Activities on Waterfront Land (2018) and the relevant Water Sharing Plans (available at https://www.industry.nsw.gov.au/water).

Response

There is no identified waterfront land on the property and/ or requirements for controlled activities as such.

DPIE (EES) – ref:DOC20/316515	
Water & Soils	
Table 1	***Waterway Health*** *As set out in the Section 7 Water and Soils in Attachment A, EES recommends that:* *The EIS must describe background conditions for any water resource likely to be affected by the development, including:* *· Risk-based Framework for Considering Waterway Health Outcomes in Strategic Land-use Planning Decisions http://www.environment.nsw.gov.au/research-and-publications/publications-search/risk-based-framework-for-considering-waterway-health-outcomes-in-strategic-land-use-planning.* *In accordance with the Risk-based Framework for Considering Waterway Health Outcomes in Strategic Land-use Planning Decisions, EES has developed the NSW Government water quality and flow related objectives (Tables 1 and 2 below) for the Wianamatta-South Creek catchment to achieve the vision for Western Sydney Parkland City.* *The water quality and flow related objectives were provided to key stakeholders at a workshop on 19 October 2020 and were included in the recently exhibited Draft Aerotropolis Precinct Plan. EES has also worked closely with DPIE Place Design and Public Spaces in developing the exhibited draft Mamre Road Precinct DCP and it is expected that the interim objectives in Section 2.6 in the draft Mamre Road Precinct DCP will be superseded by tables 1 and 2 below as follows:* *· Page 26, Section 2.6 Integrated Water Cycle Management: The following description of the flow components the new Table 1 (below) will be added and referred to. Also, 'and baseflow requirements' in the last/following sentence will be deleted.*

Table 1 Ambient stream flows and requirements of waterways and water dependent ecosystems in the Mamre Rd Precinct

Flow Related Objectives		
	1-2 Order Streams	3rd Order Streams or greater
Median Daily Flow Volume (L/ha)	71.8 ± 22.0	1095.0 ± 157.3
Mean Daily Flow Volume (L/ha)	2351.1 ± 604.6	5542.2 ± 320.9
High Spell (L/ha) ≥ 90th Percentile Daily Flow Volume	2048.4 ± 739.2	10091.7 ± 769.7
High Spell - Frequency (number/y) High Spell - Average Duration (days/y)	6.9 ± 0.4 6.1 ± 0.4	19.2 ± 1.0 2.2 ± 0.2
Freshes (L/ha) ≥ 75th and ≤ 90th Percentile Daily Flow Volume	327.1 to 2048.4	2642.9 to 10091.7
Freshes - Frequency (number/y) Freshes - Average Duration (days/y)	4.0 ± 0.9 38.2 ± 5.8	24.6 ± 0.7 2.5 ± 0.1
Cease to Flow (proportion of time/y)	0.34 ± 0.04	0.03 ± 0.007
Cease to Flow – Duration (days/y)	36.8 ± 6	6 ± 1.1

Response

Refer **Section 7.5** of this report for discussion on Stream Health. The assessment considers stream health via the metrics included in Section 2.4 of the Final MRP DCP (noting the final adopted objectives differ from those above).

Refer to **Section 7.5** which discusses, assesses, and provides demonstration of acceptable stream health outcomes for discharge from the estate, consistent with best practice. It has been confirmed that discharge from the development (based on construction of Building 2, the roadways and earthworks over the remainder of the estate) meets the requirements of the EES MUSIC Modelling Toolkit and Final MRP DCP.

It is also noted that the MARV for the precinct would be met for approximately five years when considering the anticipated development rate of 50 Ha/ Annum, which would allow for further development within the estate without additional measures. This is consistent with submission by the Mamre Landowners Group (LOG) and their submission by AT&L ("*LTR003-03-20-747 Final DCP Comments.docx*" dated 17 August 2021).

Refer report section **Section 7.5** for details. Further technical confirmation of EES MUSIC Modelling Toolkit can be found in **Appendix F**

We note that further review of the newly provided MUSIC Toolkit may need to be undertaken by Costin Roe Consulting and the applicant for ongoing consultation with DPIE/EES and Sydney Water, noting however that an interim and final solution for the FDC/MARV waterway discharge arrangement has been able to be demonstrated.

Table 2	*Page 30, Section 2.6.2 Stormwater Quality: Table 6 will be replaced with the new Table 2 below.*

Table 2 Ambient water quality of waterways and waterbodies in the Mamre Rd Precinct

Water Quality Objectives	
*Total Nitrogen (TN, mg/L)	1.72
Dissolved Inorganic Nitrogen (DIN, mg/L)	0.74
Ammonia (NH_3-N, mg/L)	0.08
Oxidised Nitrogen (NOx, mg/L)	0.66
*Total Phosphorus (TP, mg/L)	0.14
Dissolved Inorganic Phosphorus (DIP, mg/L)	0.04
Turbidity (NTU)	50
Total Suspended Solids (TSS, mg/L)	37
Conductivity (µS/cm)	1103
pH	6.20 - 7.60

Dissolved Oxygen (DO, %SAT)	43 - 75
Dissolved Oxygen (DO, mg/L)	8

Response

Refer **Section 7** of this report for discussion on proposed water quality measures and achieved pollution reductions, and pollution concentrations. The assessment considers stream health via the metrics included in Section 2.4 of the Final MRP DCP (noting the final adopted objectives differ from those above).

The adopted objectives are consistent with those included in the Final MRP DCP. The proposed measures and modelling demonstrate the pollutant concentration values which can be modelled (TSS, TP, TN) have been achieved for the current proposed development (Lot 2 and roadways).

Item 6	***The EIS must map the following features relevant to water and soils including:***
Item 6a	*Acid sulfate soils (Class 1, 2, 3 or 4 on the Acid Sulfate Soil Planning Map).* Response Refer separate geotechnical investigation for mapping by JBS&G, and **Section 3.7** of this report for discussion on acid sulfate soils.

Item 6b	*Rivers, streams, wetlands, estuaries (as described in s4.2 of the Biodiversity Assessment Method).* Response There are no rivers, streams, wetlands or estuaries (as described in s4.2 of the Biodiversity Assessment Method) within the study area. A first order water course is noted to be present on the site which is confirmed to not be considered waterfront land by NRAR.
Item 6c	*Wetlands as described in s4.2 of the Biodiversity Assessment Method.* Response There are no wetlands within the study area.
Item 6d	*Groundwater.* Response Refer separate report by JBS&G which includes the groundwater assessment and recommendations. **Section 3.6** of this report confirms how the civil engineering design includes the recommendations of the groundwater assessment.
Item 6e	*Groundwater dependent ecosystems* Response Refer separate report by JBS&G which includes the groundwater assessment and recommendations. **Section 3.6** of this report confirms how the civil engineering design includes the recommendations of the groundwater assessment.
Item 6f	*Proposed intake and discharge locations* Response There are proposed groundwater intake or discharge locations on the project. This requirement is not relevant nor required for the development.
Item 7	***The EIS must describe background conditions for any water resource likely to be affected by the development, including:***
Item 7a	*Existing surface and groundwater.* Response Refer **Sections 2, 5, 6, 7 & 8** for assessment of surface stormwater management including assessments of hydrology, watercourses, and drainage lines.
Item 7b	*Hydrology, including volume, frequency and quality of discharges at proposed intake and discharge locations.*

	Response Refer **Sections 2, 5, 6, 7 & 8** for assessment of surface stormwater management including assessments of hydrology, watercourses, and drainage lines. There are proposed intake or discharge locations on the project.
Item 7c	*Water Quality Objectives (as endorsed by the NSW Government http://www.environment.nsw.gov.au/ieo/index.htm) including groundwater as appropriate that represent the community's uses and values for the receiving waters* Response Stormwater assessment including surface water runoff, water quality and water quantity has been completed. The key stormwater objectives, based on relevant water quality criteria, have been set out in **Section 5.1** and **Section 7.1** of the report. **Section 7** provides demonstration of the key criteria being met, based on MUSIC modelling and the requirements of Section 2.4 of the Final MRP DCP. Configuration of the proposed measures are shown on the Civil Design Drawings included in **Appendix A**.
Item 7d	*Indicators and trigger values/criteria for the environmental values identified at (c) in accordance with the ANZECC (2000) Guidelines for Fresh and Marine Water Quality and/or local objectives, criteria or targets endorsed by the NSW Government* Response Stormwater assessment including surface water runoff, water quality and water quantity has been completed. The key stormwater objectives, based on relevant water quality criteria, have been set out in **Section 5.1** and **Section 7.1** of the report. **Section 7** provides demonstration of the key criteria being met, based on MUSIC modelling and the requirements of Section 2.4 of the Final MRP DCP. Configuration of the proposed measures are shown on the Civil Design Drawings included in **Appendix A**.
Item 7e	*Risk-based Framework for Considering Waterway Health Outcomes in Strategic Land-use Planning Decisions http://www.environment.nsw.gov.au/research-and-publications/publications-search/risk-based-framework-for-considering-waterway-health-outcomes-in-strategic-land-use-planning* Response Stormwater assessment including surface water runoff, water quality and water quantity has been completed. The key stormwater objectives, based

	on relevant water quality criteria, have been set out in **Section 5.1** and **Section 7.1** of the report. **Section 7** provides demonstration of the key criteria being met, based on MUSIC modelling and the requirements of Section 2.4 of the Final MRP DCP. Configuration of the proposed measures are shown on the Civil Design Drawings included in **Appendix A**.
Item 8	***The EIS must assess the impact of the development on hydrology, including:***
Item 8a	*Water balance including quantity, quality and source.* Response Refer to **Section 5, 6 & 7** for assessment of water resources, hydrology (including quality and quantity), watercourses and riparian lands.
Item 8b	*Effects to downstream rivers, wetlands, estuaries, marine waters and floodplain areas.* Response Refer to **Section 7.5** which discusses, assesses, and provides demonstration of acceptable stream health outcomes, consistent with best practice via *Alternate 2* of the EES MUSIC Modelling Toolkit. and the stream health metrics included in Section 2.4 of the Final MRP DCP and MUSIC Modelling Toolkit. Further technical confirmation of EES MUSIC Modelling Toolkit can be found in **Appendix F**
Item 8c	*Effects to downstream water-dependent fauna and flora including groundwater dependent ecosystems.* Response Refer to **Section 7.5** which discusses, assesses, and provides demonstration of acceptable stream health outcomes, consistent with best practice via *Alternate 2* of the EES MUSIC Modelling Toolkit. and the stream health metrics included in Section 2.4 of the Final MRP DCP and MUSIC Modelling Toolkit. Further technical confirmation of EES MUSIC Modelling Toolkit can be found in **Appendix F**
Item 8d	*Impacts to natural processes and functions within rivers, wetlands, estuaries and floodplains that affect river system and landscape health such as nutrient flow, aquatic connectivity and access to habitat for spawning and refuge (e.g. river benches).* Response

	Refer to **Section 7.5** which discusses, assesses, and provides demonstration of acceptable stream health outcomes, consistent with best practice via *Alternate 2* of the EES MUSIC Modelling Toolkit. and the stream health metrics included in Section 2.4 of the Final MRP DCP and MUSIC Modelling Toolkit. Further technical confirmation of EES MUSIC Modelling Toolkit can be found in **Appendix F**
Item 8e	*Changes to environmental water availability, both regulated/licensed and unregulated/rules-based sources of such water.* <u>Response</u> No changes to environmental water availability are proposed as part of the development.
Item 8f	*Mitigating effects of proposed stormwater and wastewater management during and after construction on hydrological attributes such as volumes, flow rates, management methods and re-use options* <u>Response</u> Refer to **Section 5, 6 & 7** for assessment of water resources, hydrology (including quality and quantity), watercourses and riparian lands during operation. Refer to **Section 9** for soil and water management measures during construction, drawings in **appendix A** for associated erosion and sediment control drawings, and **Appendix C** for a Draft Soil and Water Management Plan. These sections show proposed measures, based on the Landcom document *Managing Urban Stormwater – Soils & Construction Volume 1 ('Blue Book')(Landcom, 2004)*, are proposed during the construction of the development. Measures proposed will limit potential for offsite impact associated with water runoff and soils during construction. Consideration to management of salinity and acid sulphate has been made based on the recommendations of the geotechnical investigations and noted Landcom document. Refer to services infrastructure report completed by Landpartners for discussion relating to wastewater management.
Item 8g	*Identification of proposed monitoring of hydrological attributes.* <u>Response</u> Refer **Appendix D** for DRAFT Maintenance and Monitoring requirements associated with the specified drainage system and water quality measures.

Flooding & Coastal Areas	
Item 9	*The EIS must map the following features relevant to flooding as describes in the floodplain development manual 2005 (NSW Government 2005) Including:* *a) Flood prone land,* *b) Flood planning areas, and the areas below the flood planning level,* *c) Hydraulic Categorization (floodways and flood storage areas) and lastly,* *d) Flood hazards.* <u>Response</u> Refer to **Section 8** for detailed flood assessment and **Appendix E** for technical supporting information relating to the flood assessment. A flood assessment has been undertaken using the two-dimensional TUFLOW modelling engine. Assessment includes pre and post development modelling of the 5% AEP, 1% AEP, 0.5% AEP, 0.2% AEP and the PMF events. Impact assessments have been included for the 1% AEP, and the 0.5% AEP, 0.2% AEP events assessed as proxies for climate change. The assessment includes mapping of flood prone land, flood planning areas, hydraulic categorization and flood hazards. It is noted that the site is not within the South Creek floodplain (being at higher elevation than the South Creek PMF flood extent), however is affected by overland flow associated with the first order watercourse on the east of the development. This watercourse presents low hazard to the development and future occupants of the development site, and is noted to not be defined as waterfront land under the act. The assessment shows acceptable outcomes which meet the objectives of the NSW Floodplain Development Manual, Penrith City Council DCP and the proposed amendments to the Penrith City Council DCP proposed in the *Exhibition Draft South Creek Floodplain Management Plan 2020*.
Item10	*The EIS must describe flood assessment and modelling undertaken in determining the design flood levels for events, including a minimum of the 5% Annual Exceedance Probability (AEP), 1% AEP, flood levels and the probable maximum flood, or an equivalent extreme event.* <u>Response</u> Refer to **Section 8** for detailed flood assessment and **Appendix E** for technical supporting information relating to the flood assessment. A flood assessment has been undertaken using the two-dimensional TUFLOW modelling engine. Assessment includes pre and post development modelling of the 5% AEP, 1% AEP, 0.5% AEP, 0.2% AEP and the PMF events. Impact assessments have been included for the 1% AEP, and the 0.5% AEP, 0.2% AEP events assessed as proxies for climate change.

	The assessment includes mapping of flood prone land, flood planning areas, hydraulic categorization and flood hazards. It is noted that the site is not within the South Creek floodplain (being at higher elevation than the South Creek PMF flood extent), however is affected by overland flow associated with the first order watercourse on the east of the development. This watercourse presents low hazard to the development and future occupants of the development site, and is noted to not be defined as waterfront land under the act. The assessment shows acceptable outcomes which meet the objectives of the NSW Floodplain Development Manual, Penrith City Council DCP and the proposed amendments to the Penrith City Council DCP proposed in the *Exhibition Draft South Creek Floodplain Management Plan 2020*.
Item 11	*The EIS must model the effect of the proposed development (including fill) on the flood behaviour under the following scenario:* *a) Current flood behaviour for a range of design events as identified 14 above. This includes the 0.5% and 0.2% AEP year flood events as proxies for assessing sensitivity to an increase in rainfall intensity of flood producing rainfall events due to climate change.* <u>Response</u> Refer to **Section 8** for detailed flood assessment and **Appendix E** for technical supporting information relating to the flood assessment. A flood assessment has been undertaken using the two-dimensional TUFLOW modelling engine. Assessment includes pre and post development modelling of the 5% AEP, 1% AEP, 0.5% AEP, 0.2% AEP and the PMF events. Impact assessments have been included for the 1% AEP, and the 0.5% AEP, 0.2% AEP events assessed as proxies for climate change. The assessment includes mapping of flood prone land, flood planning areas, hydraulic categorization and flood hazards. It is noted that the site is not within the South Creek floodplain (being at higher elevation than the South Creek PMF flood extent), however is affected by overland flow associated with the first order watercourse on the east of the development. This watercourse presents low hazard to the development and future occupants of the development site, and is noted to not be defined as waterfront land under the act. The assessment shows acceptable outcomes which meet the objectives of the NSW Floodplain Development Manual, Penrith City Council DCP and the proposed amendments to the Penrith City Council DCP proposed in the *Exhibition Draft South Creek Floodplain Management Plan 2020*.

Item 12a	*Modelling in the EIS must consider and document:* *The existing council flood studies in the area and examine consistency to the flood behavior documented in these studies.* <u>Response</u> The modelling contemplates existing studies including Penrith Councils *South Creek Flood Study (Advisian 2014)* and Penrith Council *Overview Study – Flood Analysis for Central Urban (Zone 1), Northern Rural (Zone 2), Southern Rural (Zone 3)*" – Cardno 2006
Item 12b	*The impact on existing flood behavior for a full range of flood event including up to the probable maximum flood, or an equivalent extreme flood.* <u>Response</u> The assessment includes a range of storms for pre and post development conditions with modelling of the 5% AEP, 1% AEP, 0.5% AEP, 0.2% AEP and the PMF events. Impact assessments have been included for the 1% AEP. The 0.5% AEP, 0.2% AEP events assessed as proxies for climate change.
Item 12c	*The impacts of the development on flood behavior resulting in detrimental changes in potential flood affection of other developments or land. This may include redirection of flow, flow, velocities, flood levels, hazard categories and hydraulic categories.* <u>Response</u> The assessment includes a range of storms for pre and post development conditions with modelling of the 5% AEP, 1% AEP, 0.5% AEP, 0.2% AEP and the PMF events. Impact assessments have been included for the 1% AEP. The 0.5% AEP, 0.2% AEP events assessed as proxies for climate change.
Item 12d	*Relevant provisions of the NSW Floodplain Development Manual 2005.* <u>Response</u> The assessment shows acceptable outcomes which meet the objectives of the NSW Floodplain Development Manual, Penrith City Council DCP and the proposed amendments to the Penrith City Council DCP proposed in the *Exhibition Draft South Creek Floodplain Management Plan 2020*.
Item 13a	***The EIS must assess the impacts on the proposed development on flood behavior, including:*** *Whether there will be detrimental increases in the potential flood affection of other properties, assets and infrastructure.* <u>Response</u>

	The assessment shows acceptable outcomes which meet the objectives of the NSW Floodplain Development Manual, Penrith City Council DCP and the proposed amendments to the Penrith City Council DCP proposed in the *Exhibition Draft South Creek Floodplain Management Plan 2020*.
Item 13b	*Consistency with council floodplain risk management plans.* Response The assessment shows acceptable outcomes which meet the objectives of the NSW Floodplain Development Manual, Penrith City Council DCP and the proposed amendments to the Penrith City Council DCP proposed in the *Exhibition Draft South Creek Floodplain Management Plan 2020*.
Item 13c	*Consistency with any rural floodplain management plans.* Response The assessment shows acceptable outcomes which meet the objectives of the NSW Floodplain Development Manual, Penrith City Council DCP and the proposed amendments to the Penrith City Council DCP proposed in the *Exhibition Draft South Creek Floodplain Management Plan 2020*.
Item 13d	*Compatibility with the flood hazard of the land.* Response The assessment shows acceptable outcomes which meet the objectives of the NSW Floodplain Development Manual, Penrith City Council DCP and the proposed amendments to the Penrith City Council DCP proposed in the *Exhibition Draft South Creek Floodplain Management Plan 2020*.
Item 13e	*Compatibility with the hydraulic functions of flow conveyance in floodways and storage in flood storage areas of the land* Response The assessment shows acceptable outcomes which meet the objectives of the NSW Floodplain Development Manual, Penrith City Council DCP and the proposed amendments to the Penrith City Council DCP proposed in the *Exhibition Draft South Creek Floodplain Management Plan 2020*.
Item 13f	*Whether there will be adverse effect to beneficial inundation of the floodplain environment, on, adjacent to or downstream of the site.* Response The assessment shows acceptable outcomes which meet the objectives of the NSW Floodplain Development Manual, Penrith City Council DCP and the proposed amendments to the Penrith City Council DCP proposed in the *Exhibition Draft South Creek Floodplain Management Plan 2020*.

Item 13g	*Whether there will be direct or indirect increase in erosion, siltation, destruction of riparian vegetation or a reduction in the stability of riverbanks or watercourses.* Response The assessment shows acceptable outcomes which meet the objectives of the NSW Floodplain Development Manual, Penrith City Council DCP and the proposed amendments to the Penrith City Council DCP proposed in the *Exhibition Draft South Creek Floodplain Management Plan 2020*. Refer to **Section 7.5** which discusses, assesses, and provides demonstration of acceptable stream health outcomes, consistent with best practice and consideration of the 9 stream health metrics recommended for assessment of stream health. This includes consideration and management of erosion, stability of watercourses and riverbanks.
Item 13h	*Any impacts the development may have upon existing community emergency management arrangements for flooding. These matters are to be discussed with the NSW SES and Council.* Response Refer to **Section 8**. The site is noted to be outside of the South Creek floodplain (being at higher elevation than the South Creek PMF flood extent), however is affected by overland flow associated with the first order watercourse on the east of the property. The development sites are noted to be above the 1% AEP and PMF levels related to overland flow in the watercourse and as such this presents low hazard to the development and future occupants of the development site. If surrounding low level roadways are affected during flooding, on site refuge is available. The development presents low/ no risk to existing community emergency management arrangements.
Item 13i	*Whether the proposal incorporates specific measures to manage risk to life from flood. These matters are to be discussed with the NSW SES and Council.* Response Refer to **Section 8**. The site is noted to be outside of the South Creek floodplain (being at higher elevation than the South Creek PMF flood extent), however is affected by overland flow associated with the first order watercourse on the east of the property. The development sites are noted to be above the 1% AEP and PMF levels related to overland flow in the watercourse and as such this presents low hazard to the development and future occupants of the development site. If surrounding low level roadways are affected during flooding, on site refuge is available. The development presents low/ no risk to existing community emergency management arrangements.

Item 13j	*Emergency management, evacuation and access, and contingency measures for the development considering the full range of flood risk (based upon the probable maximum flood or an equivalent extreme flood event). These matters are to be discussed with and have the support of the Council and the NSW SES.* <u>Response</u> Refer to **Section 8**. The site is noted to be outside of the South Creek floodplain (being at higher elevation than the South Creek PMF flood extent), however is affected by overland flow associated with the first order watercourse on the east of the property. The development sites are noted to be above the 1% AEP and PMF levels related to overland flow in the watercourse and as such this presents low hazard to the development and future occupants of the development site. If surrounding low level roadways are affected during flooding, on site refuge is available. The development presents low/ no risk to existing community emergency management arrangements.
Item 13k	*Any impacts the development may have on the social and economic costs to the community as consequence of flooding.* <u>Response</u> It is confirmed there is no change in flooding conditions, social or economic cost to community as a result of the development.

TfNSW – ref:SYD21/00462
The EIS shall provide a flood impact assessment to understand the potential impacts of the development on flood evacuation is to be carried out. The EIS will assess the impacts of the proposed development, information for pre and post- development scenarios including modelling of the local overland flows are to be provided to allow assessment of the impact of the development. Response Refer to **Section 8** and **Appendix E**. The site is noted to be outside of the South Creek floodplain (being at higher elevation than the South Creek PMF flood extent), however is affected by overland flow associated with the first order watercourse within the E2 corridor. The development sites are noted to be above the 1% AEP and PMF levels related to overland flow in the watercourse and as such this presents low hazard to the development and future occupants of the development site. If surrounding low level roadways are affected during flooding, on site refuge is available. The development presents low/ no risk to existing community emergency management arrangements.
Authority Information Requests
Penrith City Council
The stormwater drainage for the site must be in accordance with the Draft Mamre Road Precinct Development Control Plan. Response Stormwater assessment and management strategy, including surface water runoff, water quality and water quantity has been completed. The key stormwater objectives, based on relevant water quality criteria (including those of Penrith City Council and the Final MRP DCP), have been set out in **Section 5, 6 & 7** of the report. Coordination with the anticipated drainage connection points and trunk drainage lines on the adjacent sites to the north and east, contemplated by adjoining landowner/ developers Mirvac (north) and Fraser Property Australia (east), through consultation with these respective developers has also been made. This consultation has been completed in form of meetings between the developers and respective Civil Engineering Consultants, and the sharing of information between the parties which has been used to coordinate alignments of road connections, drainage connections, interfacing of levels on boundaries and ensuring coordination of strategy pertaining to stormwater managements and overall civil works. Refer **Section 1.2** and drawings in **Appendix A**.

Authority Information Requests
A stormwater concept plan, accompanied by a supporting report and calculations, shall be submitted with the application. Response Stormwater assessment and management strategy, including surface water runoff, water quality and water quantity has been completed. The stormwater strategy has been completed by Costin Roe Consulting, being professional engineers with demonstrated experience in similar industrial projects within Kemps Creek, Penrith City Council LGA and surrounding LGA's including Blacktown, Liverpool, Cumberland and Canterbury Bankstown. The key stormwater objectives, based on relevant water quality criteria (including those of Penrith City Council and the FINAL MRP DCP), have been set out in **Section 5, 6 & 7** of the report.
The stormwater concept plan shall demonstrate how the development complies with the overarching DCP Trunk Drainage infrastructure (Figure 6) along with the DCP water quality and the water quantity controls for any interim and the ultimate developments. Response Interim and ultimate drainage discharge arrangements have been shown in the documents. The drainage catchment which drains west to Mamre Road is noted to have consistent interim and ultimate discharge arrangements. The drainage catchment which drains north (consistent with the existing flow path) currently follows a natural gully line. Based on discussion and consultation with the northern landowner Mirvac, and their submitted EIS, discharge of this catchment in the interim will be to an open channel as documented in the Civil Engineering Plans produced for Mirvac by AT&L. In the ultimate condition, the drainage will revert to inground system within the proposed roadway. Connection of development land to the south (contemplated by Frasers Property, also documented by AT&L) also includes for the ultimate drainage discharge via roadway drainage. The proposed trunk drainage in the interim and ultimate conditions has been discussed and agreed with the adjoining landowners, consistent with the intent of the Final MRP DCP trunk drainage infrastructure requirements. The final details of the system will require coordination and confirmation depending on timing as part of future detail design and construction certificate phases of this and surrounding developments. The key stormwater objectives, based on relevant water quality criteria (including those of Penrith City Council and the FINAL MRP DCP), have been set out in **Section 5, 6 & 7** of the report.
As the site catchment is split by a ridge line, and pending the timing for adjoining development, drainage of the northern portion of the site may require an easement to drain water over the downstream properties. Evidence of the owner's consent shall be provided with the application for the provision of the easement. The easement to drain water must be registered prior to the issue of an operational consent. Drainage easement widths shall

Authority Information Requests
be in accordance with the council's stormwater Drainage Specification for Building Developments policy Response Interim and ultimate drainage discharge arrangements have been shown in the documents. The drainage catchment which drains west to Mamre Road is noted to have consistent interim and ultimate discharge arrangements with discharge to Mamre Road, being public drainage infrastructure. The drainage catchment which drains north (consistent with the existing flow path) currently follows a natural gully line. Based on discussion and consultation with the northern landowner Mirvac, and their submitted EIS, discharge of this catchment in the interim will be to an open channel as documented in the Civil Engineering Plans produced for Mirvac by AT&L. In the ultimate condition, the drainage will revert to inground system within the proposed roadway (which will ultimately be dedicated to a public authority – Penrith City Council). Connection of drainage from the development land to the east (contemplated by Frasers Property, also documented by AT&L) also considers the ultimate drainage discharge arrangement via roadway drainage and conveyance of the existing flow path through the site. The proposed trunk drainage in the interim and ultimate conditions has been discussed and agreed with the adjoining landowners, consistent with the intent of the FINAL MRP DCP trunk drainage infrastructure requirements. The final details of the system will require coordination and confirmation depending on timing as part of future detail design and construction certificate phases of this and surrounding developments. There are no proposed works on adjoining properties, hence landowners consent is not required. Existing drainage flow paths remain consistent with the current paths of flow, which do not have easements. The requirement for all landowners to account for upstream catchments and not impede or restrict flows is a requirement of Council Policy and the Final MRP DCP and allowed for in the design. The need for easements in the interim or ultimate conditions are not deemed necessary. Refer drawings **Co14021.00-SSDA400, SSDA401** and **SSDA402**.
Penrith City Council will not accept the dedication of any estate water quantity or water quality basins. Any estate drainage basins are to be maintained in perpetuity by the estate. It is Council's preference that all water quantity and water quality treatment be provide on the individual lots. Any on-site detention system or water quality system must be within common property and accessible from the street. Response Configuration of the proposed measures and stormwater layout concept are shown on the Civil Design Drawings included in **Appendix A**. Management and ownership of basins will be completed by the proponent.

Authority Information Requests
A water sensitive urban design strategy prepared by a suitably qualified person is to be provided for the site. The strategy shall address water conservation, water quality, water quantity, and operation maintenance. Response Stormwater assessment and management strategy, including surface water runoff, water quality and water quantity has been completed. The stormwater strategy has been completed by Costin Roe Consulting, being professional engineers with demonstrated experience in similar industrial projects within Kemps Creek, Penrith City Council LGA and surrounding LGA's including Blacktown, Liverpool, Cumberland and Canterbury Bankstown. Refer **Sections 5** to **8**.
The application shall include MUSICX modelling (.mxproj file) demonstrating compliance with council's adopted **Water Sensitive Design Policy and Technical Guidelines*** Response MUSIC modelling has been completed and included in the assessment. Refer **Section 5.1** for objectives and **Section 7** for details of modelling. The "*.mxproj " file has been included in the EIS submission.
The site flood affected by local overland flow flooding from the local catchment at the north-east corner of the site. Response Refer to **Section 8** for detailed flood assessment and **Appendix E** for technical supporting information relating to the flood assessment. A flood assessment has been undertaken using the two-dimensional TUFLOW modelling engine. Assessment includes pre and post development modelling of the 5% AEP, 1% AEP, 0.5% AEP, 0.2% AEP and the PMF events. Impact assessments have been included for the 1% AEP, and the 0.5% AEP, 0.2% AEP events assessed as proxies for climate change. The assessment includes mapping of flood prone land, flood planning areas, hydraulic categorization and flood hazards. It is noted that the site is not within the South Creek floodplain (being at higher elevation than the South Creek PMF flood extent), however is affected by overland flow associated with the first order watercourse within the E2 corridor. This watercourse presents low hazard to the development and future occupants of the development site. The assessment shows acceptable outcomes which meet the objectives of the NSW Floodplain Development Manual, Penrith City Council DCP, the Final MRP DCP and the proposed amendments to the Penrith City Council DCP proposed in the *Exhibition Draft South Creek Floodplain Management Plan 2020*.

Authority Information Requests
The application must be accompanied by an overland flow flood report prepared by a suitably qualified person to assess the developments impacts upon overland flows. Overland flows shall be managed through the site in a safe manner. Response Refer to **Section 8** for detailed flood assessment and **Appendix E** for technical supporting information relating to the flood assessment. The flooding assessment has been completed by Costin Roe Consulting, being professional engineers with demonstrated experience in similar industrial projects within Kemps Creek, Penrith City Council LGA and surrounding LGA's including Blacktown, Liverpool, Cumberland and Canterbury Bankstown.
Further information regarding Council's Flood Studies is available from Council's website at the following address: *https://www.penrithcity.nsw.gov.au/services/otherservices/floodplain-managment* Response The assessment shows acceptable outcomes which meet the objectives of the NSW Floodplain Development Manual, Penrith City Council DCP and the proposed amendments to the Penrith City Council DCP proposed in the *Exhibition Draft South Creek Floodplain Management Plan 2020*. The assessment has been completed with consideration to existing studies including Penrith Councils regional assessment of local tributaries Penrith Overland Flow "*Overview Study – Flood Analysis for Central Urban (Zone 1), Northern Rural (Zone 2), Southern Rural (Zone 3)*" – Cardno 2006, South Creek Flood Study (Advisian 2014) and more recent assessments completed for adjoining Mirvac EIS by Cardno.
No retaining walls or filling is permitted for this development which will impede, divert or concentrate stormwater runoff passing through this site. Response Collection and conveyance of upstream drainage systems has been made in the design. The drainage catchment which drains north (consistent with the existing flow path on the east of the property) currently follows a natural gully line. Based on discussion and consultation with the northern landowner Mirvac, and their submitted EIS, discharge of this catchment in the interim will be to an open channel as documented in the Civil Engineering Plans produced for Mirvac by AT&L. In the ultimate condition, the drainage will revert to inground system within the proposed roadway (which will ultimately be dedicated to a public authority – Penrith City Council). Connection of drainage from the development land to the south (contemplated by Frasers Property, also documented by AT&L) also considers the ultimate drainage discharge arrangement via roadway drainage and conveyance of the existing flow path through the site. The proposed trunk drainage in the interim and ultimate conditions has been discussed and agreed with the adjoining landowners, consistent with the intent of the FINAL MRP DCP

Authority Information Requests
trunk drainage infrastructure requirements. The final details of the system will require coordination and confirmation depending on timing as part of future detail design and construction certificate phases of this and surrounding developments. The requirement for all landowners to account for upstream catchments and not impede or restrict flows is a requirement of Council Policy and the FINAL MRP DCP and this has been allowed for in the design.
The application is to be supported by a geotechnical report prepared by a suitably qualified person and shall address, but not be limited to ground water movement, salinity, contamination, and potential damage to adjoining public and private infrastructure during construction. <u>Response</u> A geotechnical investigation has been completed by PSM. Refer to Section 3 for summary and separate report by PSM.
Sydney Water
The proponent of development should determine service demands following servicing investigations and demonstrate that satisfactory arrangements for drinking water, wastewater, and recycled water (where required) services have been made. The proponent must obtain endorsement and/ or approval from Sydney Water to ensure that the proposed development does not adversely impact on any existing water, wastewater or stormwater main, or any other Sydney Water asset, including ay easement or property. When determining landscaping options, the proponent should take into account that certain tree species can cause cracking o blockage of Sydney Water pipes and therefore should be avoided. <u>Response</u> Refer to infrastructure servicing report by Landpartners for confirmation pertaining to services.
Strict requirements for Sydney Water's stormwater assets (for certain types of development) may apply to this site. The proponent should ensure that satisfactory steps/ measures been taken to protect existing stormwater assets, such as avoiding building over and/ or adjacent to stormwater assets and building bridges over stormwater assets. The proponent should consider taking measures to minimise or eliminate potential flooding, degradation of water quality, and avoid adverse impacts on any heritage items, and create pipeline easements where required. <u>Response</u> Refer to infrastructure servicing report by Landpartners for confirmation pertaining to services.

Authority Information Requests
As this development creates trade wastewater, Sydney Water has trade wastewater requirements which need to be met. By law, the property owner must submit an application requesting permission to discharge trade wastewater to Sydney Water's sewerage system. The proponent must obtain Sydney Water approval for this permit before any business activities can commence. Given this development comprises industrial operations, wastewater may discharge into a sewerage area that is subject to wastewater reuse. Please contact Sydney Water's Business Customer Services to send your permit application or to find out more information. They can be contacted at the following email address: Businesscustomers@sydneywater.com.au Response Refer to infrastructure servicing report by Landpartners for confirmation pertaining to services.
The proponent should outline any sustainability initiatives that will minimise/ reduce the demand for drinking water, including any alternative water supply and end uses of drinking and non-drinking water that my be proposed, and demonstrate water sensitive urban design (principles are used), and any water conservation measures that are likely to be proposed. This will allow Sydney Water to determine the impact of the proposed development on our existing services and required system capacity to service the development, Response Refer to ESD report completed by Northrop pertaining to ESD initiatives. We note that it is proposed to provide rainwater reuse in the estate to reduce demand on non-potable water use as discussed in **Section 7.4**.
WaterNSW ref: D2021/50869
Consideration of the Mamre Road Precinct planning controls and objectives, including a detailed assessment against the provisions of the Draft Mamre Road Precinct DCP and how they will be achieved. Response Stormwater assessment and management strategy, including surface water runoff, water quality and water quantity has been completed. The key stormwater objectives, based on relevant water quality criteria (including those of Penrith City Council and the FINAL MRP DCP), have been set out in **Section 5, 6 & 7** of the report.
An assessment of the impacts of the proposed development on hydrology. The EIS should include a water balance that models pre- and post- development flows that enter and leave the site, including volume, frequency and quality of discharges.

Authority Information Requests
Response Stormwater assessment and management strategy, including surface water runoff, water quality and water quantity has been completed. The key stormwater objectives, based on relevant water quality criteria (including those of Penrith City Council and the FINAL MRP DCP), have been set out in **Section 5, 6 & 7** of the report. The assessment demonstrates acceptable management measures in accordance with accepted criteria, and with consideration to the FINAL MRP DCP.
The EIS should include a stormwater management strategy that ensures safe and appropriate management and disposal stormwater without negative impacts on downstream or neighbouring allotments Response Stormwater assessment and management strategy, including surface water runoff, water quality and water quantity has been completed. The key stormwater objectives, based on relevant water quality criteria (including those of Penrith City Council and the FINAL MRP DCP), have been set out in **Section 5, 6 & 7** of the report. The assessment demonstrates acceptable management measures in accordance with accepted criteria, and with consideration to the FINAL MRP DCP.

2 DEVELOPMENT SITE

2.1 Location

The proposed development is located in the suburb of Kemps Creek on Mamre Road on Lots 52 & 53 DP259135 as shown in **Figure 2.1**.

The site is bounded on the west by Mamre Road, semi-rural farmland to the north, south and east. It is noted that the property has been recently rezoned by NSW Department of Planning, Infrastructure and the Environment (DPIE) as IN1 General Industrial. We understand that the land to north is proposed to be developed by Mirvac, and the land to the east by Frasers Property Australia. Some consideration to this has been made in the assessment and design drawings included in the submission.



Figure 2.1 Locality Plan

2.2 Existing Site

The site is located on the eastern side of Mamre Road approximately 1.8km south of the intersection of Mamre Road and Bakers Lane, and 0.85km north of the intersection of Mamre Road and Abbotts Road. The nearest residential receivers are approximately 2km south-east of the site in Mount Vernon.

The property is currently comprising rural-residential use. The existing semi-rural residential dwellings are located on the eastern portion of the site and include a dwelling with detached sheds, carports and other minor structures. Otherwise, the majority of the site is undeveloped pasture and grassed fields.

The site is noted to be located within an area comprising rural/agricultural use, however nearby to existing and future industrial development areas, and noted as being recently rezoned by the NSW DPIE as IN1 General Industrial.

The site is four sided and irregular in shape. The front (Mamre Road) boundary, at 445m wide, is more than twice the width of the 226m wide rear boundary. The side boundaries are similar in length however the northern boundary, 750m, is longer than the southernmost boundary which is 550m long. The area of the development site is approximately of 20.25 Ha.

There are two catchments on the property which are separated by a spur which diagonally crosses the eastern third of the property. The spur varies in level from RL 66.5m AHD on the southern boundary to RL 65m AHD on the northern boundary.

Falls on the western side of the spur, generally fall to the south-west to the lowest part of the site which aligns with the western drainage discharge location. The existing drainage discharge location is an existing culvert (2x 600mm R.C.P.) beneath Mamre Road (at an invert level of RL 47.25m AHD). A large farm dam is located on the west of the property adjacent to Mamre Road, with its spillway draining water to the Mamre Road culverts described above.

East of the spur, a low point aligns with a gully and series of farm dams from the current rural use. Upstream (south) of the site is an approximate 24Ha catchment. Drainage flow path follows the gully and dams drain to the north with spillways from the dams generally on the western side of the existing dams. The existing dam within the property has a level of approximately RL 56.2m AHD.

2.3 Proposed Development

The proposed development is for an industrial estate, earthworks and infrastructure for future industrial development over an area of 20 Ha, and construction of the building on Lot 2.

The Masterplan Layout is shown in **Figure 2.2**. Infrastructure works will include bulk earthworks, provision of services, road & intersection construction, and stormwater management and has completed in accordance with the Development Masterplan.

The preliminary masterplan layout provided by Altis shows development lots will vary between 0.3 Ha and 7 Ha in size. Siting of the development lots will be sympathetic to the topography of the land, access and flood planning requirements.

Access to all lots would be made via the new Southern Access Road from Mamre Road and via the new Precinct Collector Road. The new access road and associated intersection will be constructed to the Final MRP DCP requirements and ownership transferred to Penrith City Council.



Figure 2.2. Development Layout (Source: Nettleton Tribe Architects)

3 SITE WORKS

3.1 Soil and Geological Conditions

Assessments relating to soil have been undertaken by JBS&G (contamination and environmental), and by PSM (geotechnical investigation – PSM3939-004L REV2 dated 20 January 2020).

As referenced in the investigation by JBS&G, reference to the online ESPADE 2.0 tool hosted by the NSW Office of Environment and Heritage (OEH 20193) and the 1:100 000 Geological Series Penrith Geological Survey of NSW Sheet 9030 (DMR 19834) indicates that the site is present within the following natural geological and soil landscapes:

- Geology: Shale/carbonaceous claystone/claystone laminite - comprising fine to medium grained lithic sandstone with rare coal and tuff.
- Landscape: Gently undulating rises on Wianamatta Group shales. Local relief to 30 m, slopes usually >5%. Broad rounded crests and ridges with gently inclined slopes.
- Soils: Red and brown podzolic soils on crests, shallow to moderately deep (>100 cm), hardsetting with mottled texture, grading to yellow podzolic soils on lower slopes and in drainage lines.
- Limitations: Potential for localised seasonal waterlogging, water erosion/surface movement, and can consist of moderately reactive highly plastic subsoil.

The PSM Geotechnical report confirms the above regional geometry and has advised the typical profile to comprise topsoil of 0.1-0.2m in depth over natural soils of 1.0-3.0m in depth over weathered shale bedrock.

3.2 Bulk Earthworks

Bulk earthworks will be required to facilitate the development of the estate for industrial use. The earthworks will be undertaken to provide large flat building pads, facilitate site access from Mamre Road and proposed estate roads, to drain the site stormwater via gravity, and to keep building levels above the 1 in 100-year ARI flood level with a minimum freeboard of 500mm.

A preliminary assessment has been completed to provide an order of magnitude estimate of the earthwork's volumes and considerations for access, drainage and ensure that there is no excess spoil removal from the property. A variance on the quoted levels is noted to allow for minor variations in the quoted levels, at detail and post approval phase, which may result from introduction of the allowances noted above which are not fully known at EIS stage. The existing and proposed levels are shown on the Costin Roe drawings in **Appendix A.**

Earthworks and retaining wall construction will be required for the development to incorporate the architectural layout and drainage requirements of the development, and to facilitate a large flat area for the proposed warehouse buildings. Consideration has been made for interfacing with existing levels to the north on the common boundary of the Mirvac Land. Consideration has also been given to interfacing with the Mirvac design.

Soil Erosion and Sediment Control measures, including sedimentation basins are to be placed in accordance with submitted drawings and the *Soil and Water Management Plan* in **Appendix C** of this report.

An earthwork design and volume estimate assessment has been completed for the site. The estimated volumes are shown on drawing **Co14021.00-SSDA300**. It is noted that levels shown

on the drawings are subject to variance of +/-1000mm to account for unknowns in geotechnical conditions and final detail design considerations. This is to ensure that excessive export or import is not required in the final design arrangement.

The earthworks volume estimates are as follows in **Table 3.1**:

Item	Lower Bound (-15%)	Apparent Volume (m^3)	Upper Bound (+15%)
Cut	-157,930	-185,800	-213,670
Fill	+188,870	+222,200	255,530
Topsoil Strip	-33,660	-39,600	-46,540
Detailed Excavation	-33,660	-39,600	-46,540
Lot 9 & 10 Temp. Basin backfill	**+4,250**	+5,000	**+5,750**
Diff. (fill over cut)	**+1,530**	**+1,800**	**+2,070**

Table 3.1. Earthwork Volume Estimates

3.3 Retaining Walls

The civil engineering objective is to minimise retaining walls within the constraints of the masterplan layout, allowable grading to suit industrial development and batters in landscaped areas where possible.

Retaining walls will be required along the northern and west boundaries and between development lots.

Retaining in these areas is a maximum of 3m in height. Location and indicative heights of retaining walls are shown on drawing **CO14021.00-SSDA600, SSDA610 & SSDA611**. Level differences along the property frontage (i.e. fronting public domain) are noted to comprise a stepped arrangement, in accordance with the Final MRP DCP.

3.4 Embankment Stability

To assist in maintaining embankment stability permanent batters in clay will be no steeper than 3 horizontal to 1 vertical while temporary batters will be no steeper than 2 horizontal to 1 vertical. Steeper batters in shale can be considered subject to geotechnical advice.

Permanent batters will also be adequately vegetated or turfed which will assist in maintaining embankment stability.

Stability of batters and reinstatement of vegetation shall be in accordance with the submitted drawings and the Soil and Water Management Plan in **Appendix C** of this report.

3.5 Supervision of Earthworks

All geotechnical testing and inspections performed during the filling operations will be undertaken to Level 1 geotechnical control, in accordance with AS3798-2007.

3.6 Groundwater

Groundwater discussions have been made by JBS&G. As noted by JBS&G:

> *Registered bore information obtained from the Water NSW online database (WNSW6) is included as Appendix B. The search identified that there were no groundwater bores located within a 0.5 km radius of the site.*
>
> *Locally, based on the reported geology and topography, groundwater migration is expected to occur toward the south west consistent with slope direction, towards Kemps Creek. Water bearing zones are expected at the interface of permeable layers (surface soils) and underlying clays, at the clay/shale interface and within fractures in the deeper bedrock. Regionally, groundwater is expected to flow to the northwest toward the Hawkesbury River.*
>
> *Perched (saline) groundwater may be present within localised (shallow) filled areas and generally within the soils in the lower landscape above shale bedrock. Saline groundwater is also anticipated at relatively shallow depths in the lower landscape portions of the site, hosted by fracturing / jointing of the Wianamatta Shales. Given the site is underlain by low permeability clays and shales, the potential for groundwater movement is likely to be low. We confirm that the development does not propose to utilise surface or groundwater water sources. An assessment of the impact on these items is not relevant for the warehouse distribution center construction.*

The PSM geotechnical investigation did not encounter any groundwater during their work.

Surface water management, including conveyance of surface runoff, management of water quantity (through on-site detention) and water quantity (through on-site and estate wide management systems using WSUD principles and best practice pollution reduction objectives) has been proposed in the design.

3.7 Acid Sulphate Soils and Salinity

An assessment of the potential for acid sulphate soils has been requested as part of the SEAR's requirements.

Reference to the *NSW Land & Water Conservation Acid Sulphate Soils Map 92_Liverpool* shows the subject land clear of any known occurrence of acid sulphate soils.

An Acid Sulfate Soils assessment has been undertaken by JBS&G for the development – as included in the EIS. The JBS&G letter showed that the risk of acid sulphate soils were low and this site is not subject to any policies relating to acid sulfate soils. As such no specific requirements relating to management of these soils are considered necessary. Refer to the JBS&G report for more detail on acid sulfate soil management during construction.

The PSM investigation confirms soils are non-saline to moderately saline.

3.8 SEPP (WSEA) Clause 33H Earthworks

Consideration to the requirements of SEPP (WSEA) Clause 33H Earthworks has been made in the impact assessment. Review and confirmation specific matters included in Clause 33H(3) has been made for Items (a) through (j) as follows.

a) the likely disruption of, or detrimental effect on, existing drainage patterns and soil stability in the locality,

A detailed flood assessment has been completed in relation to flooding considerations – refer report **Section 8** and **Appendix E** of this report.

Refer **Sections 5, 6, 7 & 8** of this report and associated drawings in **Appendix A** which set out stormwater management for the site. The proposed strategy incorporates management of site runoff and upstream drainage paths managing quantity and quality and ensuring acceptable impacts in accordance with various council and NSW government policy.

Consideration to stability of soil has been made during and post construction.

b) the effect of the proposed development on the likely future use or redevelopment of the land,

the proposed development (being industrial warehouse distribution development) is consistent with the land zoning. Future redevelopment of similar industrial developments would be able to be undertaken.

c) the quality of the fill or the soil to be excavated, or both,

Geotechnical and environmental assessments have been undertaken for the site and reviews and discusses suitability for use as engineered fill, foundations and other development requirements. The report shows that with due consideration to the design requirements that development would be able to be made over the development footprint.

d) the effect of the proposed development on the existing and likely amenity of adjoining properties,

Adjoining properties to the north, south, east and west are noted to comprise land zoned for industrial use, hence similar amenity to these frontages is achieved.

e) the source of fill material and the destination of excavated material,

There is no excavated material to be removed from the site. Import of fill is required and is expected to be sourced from a variety of locations which will need to be confirmed as part of the Construction Management Plan for the development during Construction Certificate stage of the development.

f) the likelihood of disturbing relics,

A heritage and aboriginal impact study has been undertaken. Refer to separate reports and management measures relating to aboriginal heritage.

g) the proximity to and potential for adverse impacts on a waterway, drinking water catchment or environmentally sensitive area,

A detailed flood assessment has been completed in relation to flooding considerations and confirmation of acceptable impacts as included in this report. Assessments relating to discharge to water has been made in the Ecologist report (refer separate report). Refer **Section 6, 7 &** 8 of this report for details of water quantity, water quality and stream erosion index assessments which confirm acceptable impacts relating to stormwater management.

h) appropriate measures proposed to avoid, minimise or mitigate the impacts of the development,

Appropriate measures during and following development have been made in relation to earthworks, erosion and sediment controls during construction/ earthworks per Landcom Blue Book.

i) the proximity to and potential for adverse impacts on a heritage item, an archaeological site, or a heritage conservation area,

A heritage and aboriginal impact study has been undertaken. Refer to separate reports.

j) the visual impact of earthworks as viewed from the waterways.

Refer separate visual impact report by Geoscapes in relation to visual amenity.

4 ESTATE ROADS & ACCESS

4.1 Introduction

Integration with the broader transport strategy for the area will be required including the Mamre Road upgrade and Final MRP DCP. This includes the provision of signalised intersections with Mamre Road which will be required to be designed and constructed to the requirements of TfNSW.

The current posted speed limit for Mamre Road is 80kM/hr. Surrounding local road networks are confirmed in the Final MRP DCP to be posted at 50kM/hr. The corresponding design speeds for the two roads in the Altis Access Estate are 50kM/hr. A new unsignalised intersection is proposed for access into the development site as part of this submission in line with the Precinct Local Road Network Plan.

The proposed road alignments will need to be designed to meet the Final MRP requirements (refer **Figures 4.1** to **4.3**). The proposed road layout will incorporate best practice for both horizontal and vertical alignments with empathy to the landform. Road layouts currently proposed are consistent with those proposed in the Final MRP DCP and per the Landowners Group (LOG) which have been consulted with Council and the DPIE.

4.2 Internal Roads

The estate road will need to be designed and constructed as an industrial road consistent with the agreed cross section and hierarchy in the Final Mamre Road Precinct DCP. The proposed road widths are noted to be greater than the Penrith City Council *Development Control Plan 2014, Part C10 Transport, Access and Parking*. The road cross section as adopted include 24.0m and 25.6m overall reserve widths as per the Local and Collector road hierarchy included in **Figure 4.1,** and arrangements shown in **Figure 4.2** & **Figure 4.3**.

Road Type & Traffic Volume	**Parking Lane Provision**	**Dedicated Travel Lanes**	**Verge Width (Footpath Pedestrian)**	**Total Road Reserve**	**Number of lanes**	**1.5m Footpath or 2.5m Shared Path**
Type 1 – Local Industrial Road	8.0m (2 x 4.00m)	7.0m (2 x 3.5m)	5.0m & 4.0m	24.0m	2 travel/ 2 parking lane	2.5m & 1.5m
Type 2 – Collector Road	8.4m (2 x 4.20m)	7.0m (2 x 3.5m)	5.6m & 4.6m	25.6m	2 travel/ 2 parking lane	2.5m & 1.5m

Table 4.1. Estate Road Cross Sections - MRP DCP2021

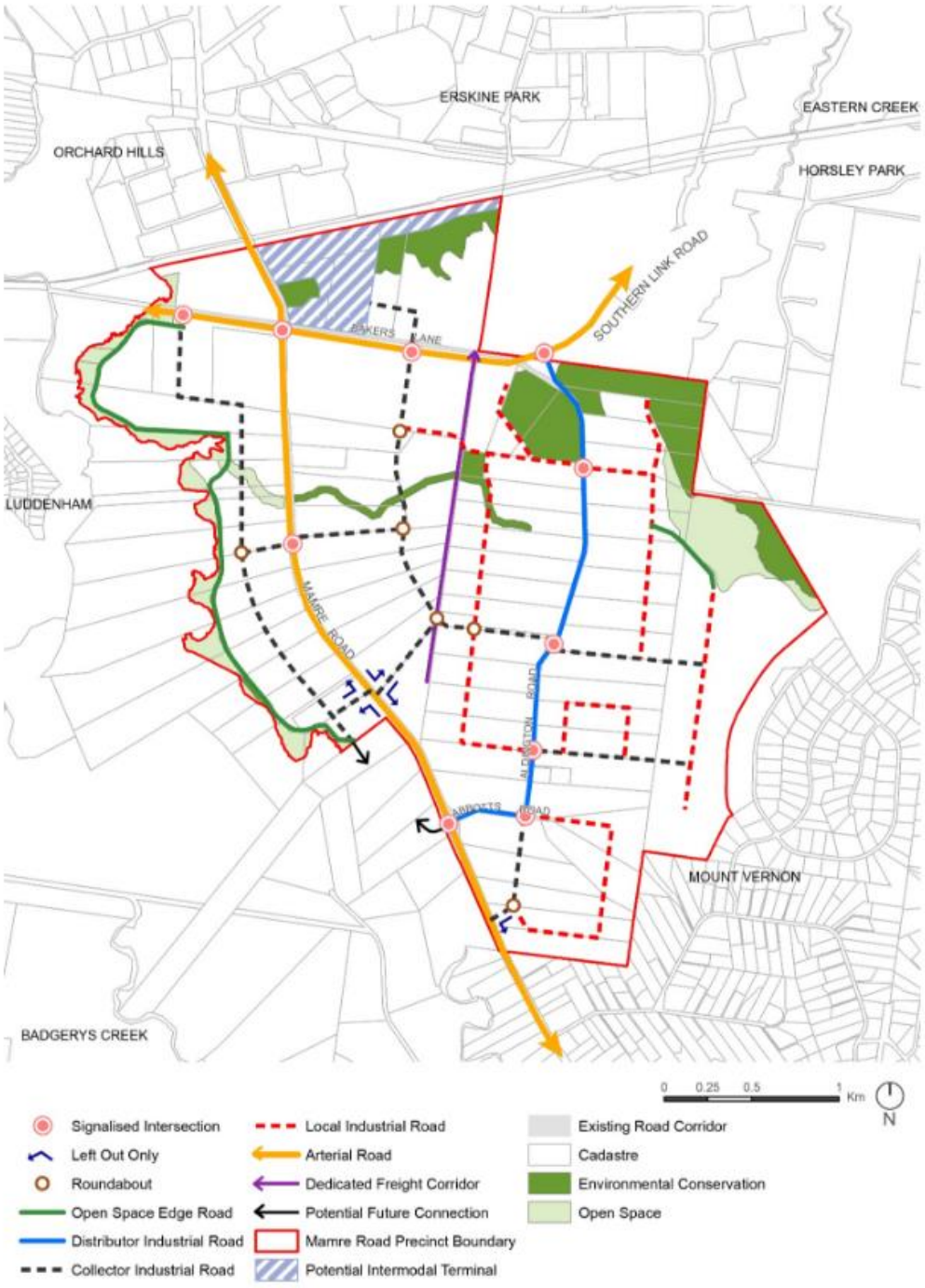


Figure 12. Road network hierarchy in the Mamre Road Precinct.

Figure 4.1. MRP DCP Road Hierarchy (source: MRP DCP 2021 Figure 12)

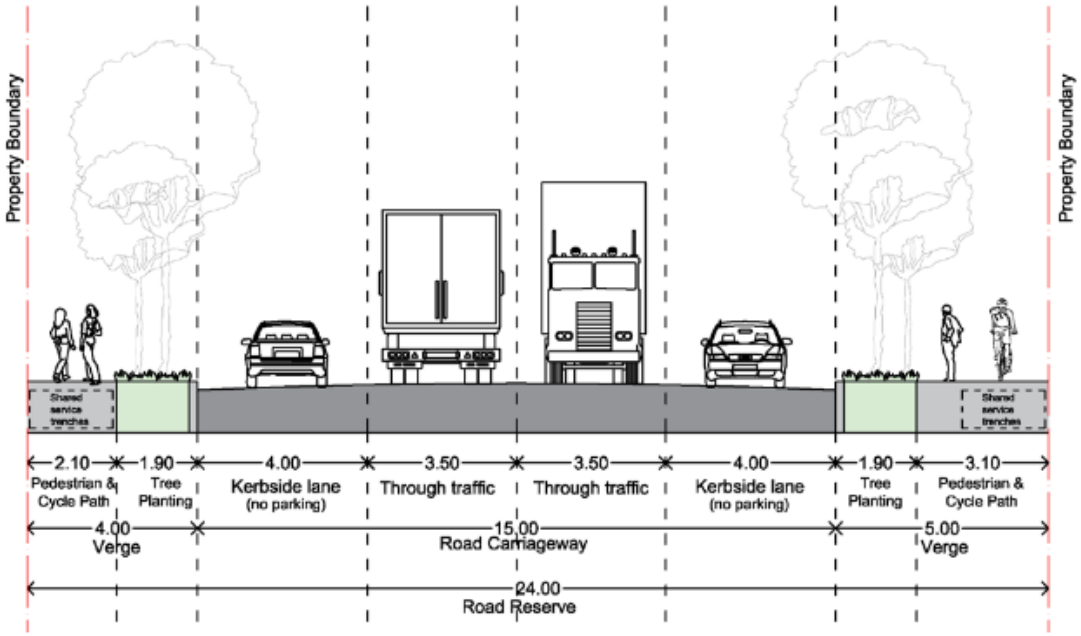


Figure 13. Typical Local Industrial Road (Type 1)

Figure 4.2. MRP DCP Local Road Cross Section

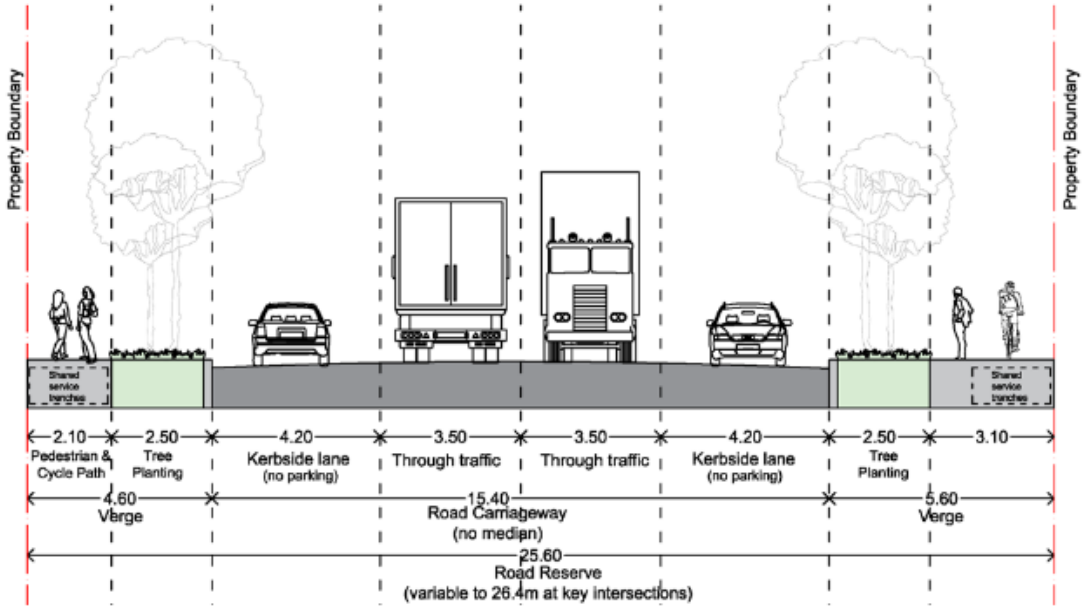


Figure 14. Typical Collector Road (Type 2)

Figure 4.3. MRP DCP Industrial Collector Road Cross Section

4.3 General Requirements

All roads will have concrete kerb and gutter and carriageway surface finished with asphaltic concrete as per the requirements of Penrith City Council.

The design for the proposed pavement for internal roads is to be based on *Austroads Pavement Design – A Guide to the Structural Design of Road Pavements.* Council DCP requires the pavement design to be based on a minimum traffic loading of $1x10^7$ ESA. This loading is typical of an industrial road and would meet the needs of the estate, depending on the final traffic studies being undertaken for the precinct DCP. The final adopted traffic loading will be based on the DCP.

We recommend that further review of the proposed pavement construction specification and design loading allowance be undertaken for the internal roads when this becomes available.

In accordance with the estate master plan and council requirements, a 1.5m pedestrian path will need to be located on one side of the road cross section with a 2.5m shared path on the other as included in **Table 4.1** and **Figure 4.2**.

4.4 Mamre Road Intersections

Intersections will be required to Mamre Road. The intersections will need to align with the proposed Mamre Road upgrade and will require consultation and agreement on the layout with TfNSW. Allowances for boundary resumptions as discussed with TfNSW and consistent with the concept design layouts for the Mamre Road upgrade.

Reference to the Traffic Report by Ason Group provides details on performance of the intersections both pre and post development, and general arrangement for the intersections.

Functional layouts of the intersections based on the general arrangement defined in the Traffic Report for the interim scenario have been prepared by MU Group as shown below in **Figure 4.4-4.5** and included in **Appendix A**.

Functional layouts of the intersections based on the general arrangement defined in the Traffic Report for the final scenario involve the augmentation of the interim layout to suit the ultimate Mamre road design. This work will occur at the point of time TfNSW completes this work and the intersection moved further east into the site.

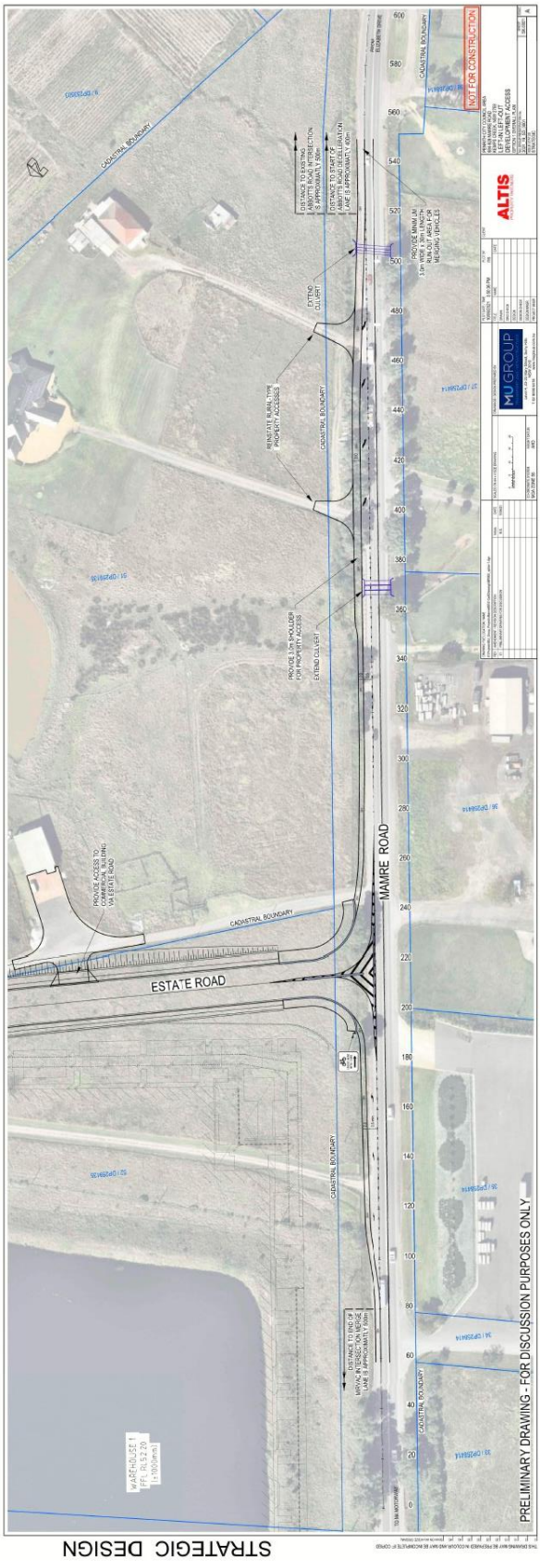


Figure 4.4. Functional Layout (interim)

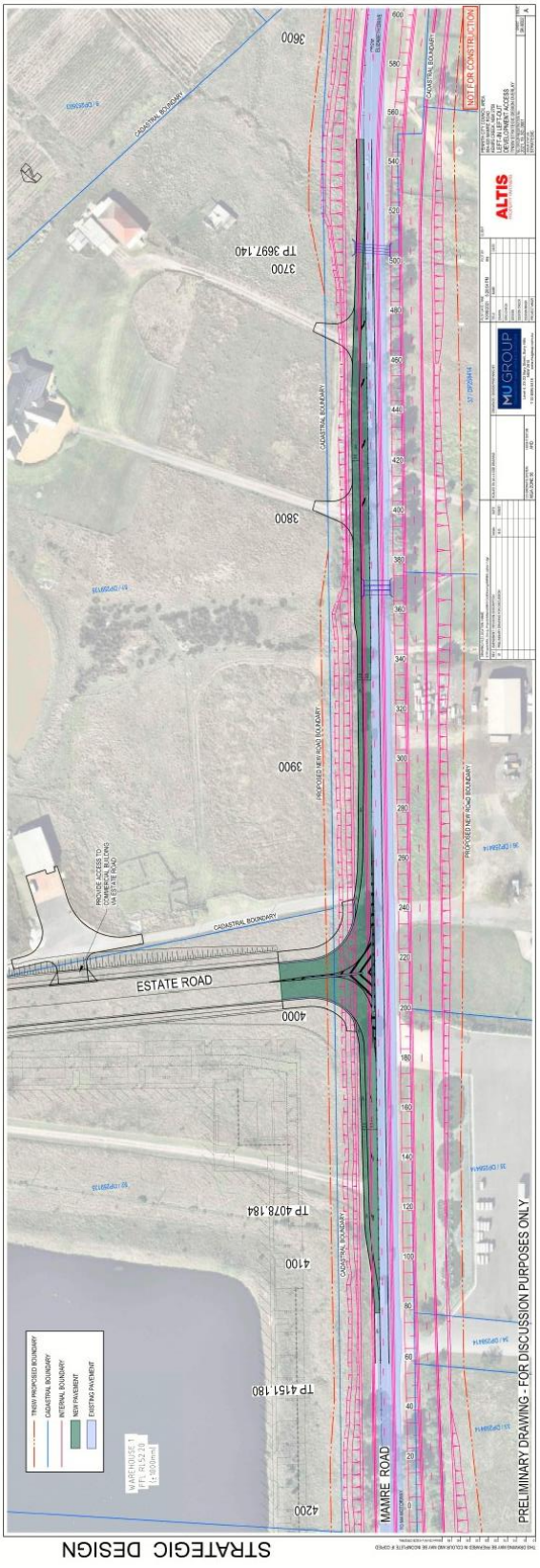


Figure 4.5. Functional Layout (interim) – left in and left out

5 WATER CYCLE MANAGEMENT STRATEGY & DRAINAGE METHODOLOGY

5.1 Key Areas and Objectives

Water Cycle Management (WCM) is a holistic approach that addresses competing demands placed on a region's water resources, whilst optimising the social and economic benefits of development in addition to enhancing and protecting the environmental values of receiving waters.

Developing a WCMS at the SSD stage of the land development process provides guidance on urban water management issues to be addressed for the estate and development as a whole. This assists urban rezoning and estate infrastructure planning for the industrial development proposed on the land.

This WCMS has been prepared to inform DPIE that the development is able to provide and integrate WCM measures into the stormwater management strategy for the estate and for future development sites in the estate. It presents guiding principles for WCM across the precinct which includes establishing water management targets and identifying management measures required for future building developments to meet these targets.

Several WCM measures have been included in the WCMS and engineering design, which are set out in this report and the attached drawings. The key WCM elements and targets which have been adopted in the design are included in **Table 5.1** following.

Table 5.1. WCM Targets

Element	Target	Reference
Water Quantity	Maintaining or improving the volume of stormwater and peak flows from this site. "*demonstrate that there will be no increase in runoff from the site as a result of the development for all storms up to and including the 100-year Average Recurrence Interval (ARI) event for all storm durations*".	Penrith Council - *Stormwater Management Policy, Section 3.3.3* Final MRP DCP2021
Water Quality	Load-based pollution reduction targets based on an untreated urbanised catchment **or** total resultant concentration per the Wianamatta MUSIC Modelling Toolkit: **Opt1 or Opt2** Gross Pollutants 90% **or** <16kg/ha/yr Total Suspended Solids 90% **or** <80kg/ha/yr Total Phosphorus 80% **or** <0.3kg/ha/yr Total Nitrogen 65% **or** <3.5kg/ha/yr Total Hydrocarbons 90%	Final MRP DCP2021 DPIE Technical Guidance for Achieving Wianamatta South Creek Stormwater Management Targets

<table>
<tr><th>Element</th><th>Target</th><th>Reference</th></tr>
<tr><td>Flooding</td><td>Buildings and road set 500mm above 1% AEP.

No affectation to upstream downstream or adjoining properties as a result of development</td><td>Penrith Council DCP Part C3.
NSW Floodplain Development Manual.
Final MRP DCP2021</td></tr>
<tr><td>Water Supply</td><td>Reduce Demand on non-potable water uses.
Provide minimum 100,000L rainwater tanks per development or 80% reduction of non-potable uses.</td><td>Penrith Council DCP Part C3.</td></tr>
<tr><td>Construction Stormwater Management & Erosion and Sediment Control</td><td>A construction stormwater management plan and appropriate associated erosion and sedimentation control measures must be described in the environmental assessment for all stages of construction to mitigate potential impacts to surrounding properties.</td><td>Landcom Blue Book
Penrith City Council
DPI
Final MRP DCP2021</td></tr>
<tr><td>Waterway and Stream Health</td><td>
<table>
<tr><th></th><th>Target</th></tr>
<tr><td colspan="2">Option 1: Mean Annual Runoff Volume (MARV) Approach</td></tr>
<tr><td>MARV</td><td>≤ 2 ML/ha/year at the point of discharge to the local waterway</td></tr>
<tr><td>90%ile flow</td><td>1000 to 5000 L/ha/day at the point of discharge to the local waterway</td></tr>
<tr><td>50%ile flow</td><td>5 to 100 L/ha/day at the point of discharge to the local waterway</td></tr>
<tr><td>10%ile flow</td><td>0 L/ha/day at the point of discharge to the local waterway</td></tr>
<tr><td colspan="2">Option 2: Flow Duration Curve Approach</td></tr>
<tr><td>95%ile flow</td><td>3000 to 15000 L/ha/day at the point of discharge to the local waterway</td></tr>
<tr><td>90%ile flow</td><td>1000 to 5000 L/ha/day at the point of discharge to the local waterway</td></tr>
<tr><td>75%ile flow</td><td>100 to 1000 L/ha/day at the point of discharge to the local waterway</td></tr>
<tr><td>50%ile flow</td><td>5 to 100 L/ha/day at the point of discharge to the local waterway</td></tr>
<tr><td>Cease to flow</td><td>Cease to flow to be between 10% to 30% of the time</td></tr>
</table>
</td><td>Final MRP DCP2021
EES MUSIC Model Toolkit (2 Aug. 2021)</td></tr>
</table>

A summary of the how each of the WCM objectives will be achieved are described below. Reference to the relevant sections of the report should be made for further and technical details relating to the WCM measures:

- *Stormwater Quantity Management (Refer **Section 6)***

  The intent of this criterion is to reduce the impact of urban development on existing drainage system by limiting post-development discharge within the receiving waters to the pre-development peak, and to ensure no affectation of upstream, downstream or adjacent properties.

  Attenuation of stormwater runoff from the development is proposed to be managed via three estate level basins. The intention is for no water quantity measures (other than

rainwater reuse) to be provided on individual development lots. This will mean that future building developments can be assessed, approved and constructed without the need for site specific detention, based on the provision of the estate level detention basins. There are three proposed basins, two of which are located at the downstream/ western end of the property adjacent to Mamre Road, and the third is at the NE of the property. A fourth basin is located on Lot 4 to provide water storage and reuse during construction and to assist with complying with the overall EES Stream Health objectives.

Sizing of the detention systems has been completed using DRAINS modelling software in accordance with the Penrith City Council Policy for the 50% AEP to the 1% AEP storm for various durations and the Final MRP DCP. The modelling accounts for the drainage system provided for the adjacent sites and conveyance of upstream catchments around the site.

Refer to **Section 6** of the document for detailed sizing of detention systems.

- *Stormwater Quality Management (Refer **Section 7**)*

  There is a need to target pollutants that are present in stormwater runoff to minimise the adverse impact these pollutants could have on downstream receiving waters.

  The required pollutant reductions are included in **Table 5.1** of this document and MUSIC modelling has been completed to confirm the reduction objectives can be met for the estate.

  A series of Stormwater quality improvement devises (SQID's) have been incorporated in the design of the estate. The proposed management strategy will include the following measures:

  - Primary treatment of the whole of the development catchment (including roads and development sites) will be made via one of two gross pollutant traps (GPT's). GPT's will be located upstream of each of the stormwater management basins.
  - Tertiary treatment of the whole of the development catchment will be made via one of two estate level bio-retention basins. Bio-retention treatment will be provided within the stormwater management basins and are sized to treat the whole of the estate catchment. Refer to drawings **Co14021.00-SSDA400 & DA411 and DA412.**
  - Some treatment will also be present by provision of rainwater reuse tanks on development sites through reuse and settlement within the tanks. Allowance for this treatment is noted to not be included in MUSIC modelling produced for the development.
  - Development sites will not require any lot specific treatment systems due to the estate wide management systems proposed.

  Reference to **Section 7** of this document should be made for detailed Stormwater Quality modelling and measures.

- *Flood Management (refer **Section 8**)*

  The proposed development considered flooding and large rainfall events in relation to runoff from upstream properties primarily on the north-eastern overland flow path where a series of farm dams are currently present.

  Consideration to flood requirements has been made per Penrith City Council DCP, the Final MRP DCP and the proposed recommendations for DCP criteria included in the DRAFT Exhibition South Creek Floodplain Management Study. It is noted that this site is clear of

the South Creek Floodplain however, forms part of a contributing catchment of South Creek. Refer **Section 8** and **Appendix E** for details.

The following measures have been incorporated in the design:

- All buildings are sited 500mm above the 1% AEP design flood level of South Creek.
- Requirements of Penrith City Council DCP Part C3 and the MRP DCP have been met regarding works in and around flooding areas;
- Stormwater detention measures have been included to manage pre and post development runoff as discussed above and in **Section 8**; and
- Overland flow paths to manage runoff in large storm events have been made including achieving at least 500mm freeboard to building levels from the flow paths.

- *Water Demand Reduction/ Rainwater Reuse (refer **Section 7.6**)*

  Rainwater reuse measures will be provided as part of future building development designs. Rainwater reuse will be required to reduce demand on non-potable uses by at 80%. The reduction in demand will target non-potable uses such as toilet flushing and irrigation. **Refer Section 7.6**.

- *Waterway Health (refer **Section 7.5**)*

  A MUSIC assessment for discharge from the development has been completed based the stormwater flow targets set out in Table 6 of the MRP DCP. The assessment has utilised the MUSIC modelling Toolkit provided by NSW EES to confirm the flow duration and mean annual runoff volumes objectives have been met.

  The assessment is explored further in **Section 7.5**. The assessment confirms the objectives have been achieved for the current level of proposed development (i.e. Lot 2 and associated roadways) as agreed with DPIE.

  Further technical confirmation of EES MUSIC Modelling Toolkit can be found in **Appendix F**

- *Stormwater Management During Construction (refer **Section 9**)*

  A construction stormwater management plan and associated erosion and sediment control measures is proposed based on *Landcom Blue Book* and Penrith Council requirements. The management measures take a staged approach from initial site establishment, construction stages and the period between the completion of the estate infrastructure works and development of individual lots.

5.2 Existing Drainage System & Overland Flows

The site is currently undeveloped rural land with undulating topography which has been described in **Section 2.2**. There is no formal drainage currently on the site however several local depressions, natural gullies and farm dams are present. There are also several dams which are used for the currently rural farming operations on the land which lie in relation to the natural gullies.

The site is affected by overland flow from minor upstream catchments to the east of the site. A catchment of approximately 24 Ha is conveyed through the site via existing infrastructure in Mamre Road, diverting along the southern boundary of the site to South Creek.

A smaller catchment of 3.5Ha currently drains through the site from the north, however per the Mirvac EIS is proposed to be diverted north and managed with the Mirvac estate management system.

Existing twin 600mm RCP's are located at the low point on Mamre Road and drain runoff from the property west toward South Creek through existing gully within rurual properties on the western side of Mamre Road. This has been shown on drawing **Co14021.00-SSDA420 and Figure 5.1** below. Conveyance of these flows has been included in the estate infrastructure stormwater design.

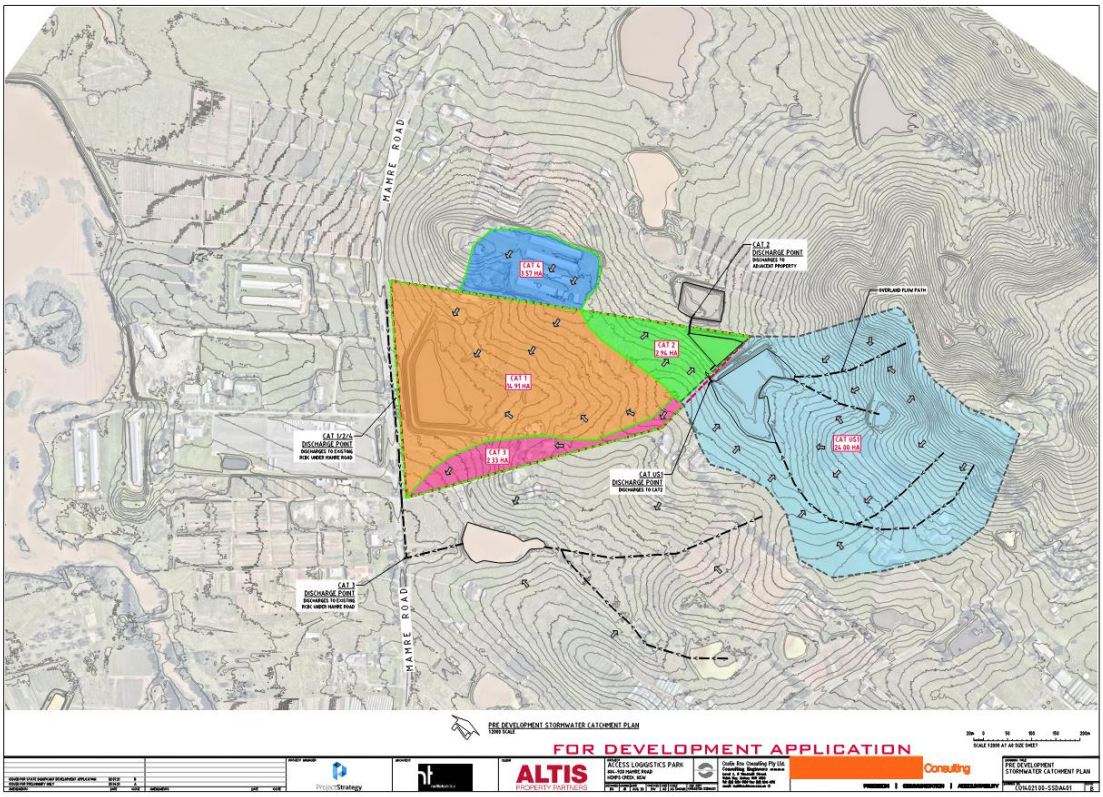


Figure 5.1. Site Catchments and external Contributing Catchment.

5.3 Proposed Estate Drainage System

As per general engineering practice and the guidelines of PCC, the proposed stormwater drainage system for the estate development will comprise a minor and major system to safely and efficiently convey collected stormwater run-off from the development to the legal point of discharge.

The minor system is to consist of a piped drainage system which has been designed to accommodate the 1 in 20-year ARI storm event (Q20). This results in the piped system being able to convey all stormwater runoff up to and including the Q20 event. The major system will be designed to cater for storms up to and including the 1 in 100-year ARI storm event (Q100). The major system will employ the use of defined overland flow paths, such as roads and open channels, to safely convey excess run-off from the site.

The design of the stormwater system for this site will be based on relevant national design guidelines, Australian Standard Codes of Practice, the standards of PCC and accepted engineering practice. Runoff from buildings will generally be designed in accordance with AS 3500.3 National Plumbing and Drainage Code Part 3 – Stormwater Drainage. Overall site runoff and stormwater management will generally be designed in accordance with the Institution of Engineers, Australia publication "Australian Rainfall and Runoff" (2019 Edition), Volumes 1 and 2 (AR&R).

Water quality and re-use are to be considered in the design to ensure that any increase in the detrimental effects of pollution are mitigated, PCC Water Quality Objectives are met and that the demand on potable water resources is reduced.

The proposed drainage system will be required to convey the overland flow from upstream catchments east of the property through the site.

The legal point of discharge is a point specified by Council where stormwater from a property can be discharged. The legal point of discharge is usually Council's stormwater infrastructure (where available), the street kerb and channel for smaller developments or downstream receiving waters like an existing stream or gully, lake, pond or waterbody.

Legal discharge for the western portions of the site is via the existing culverts on Mamre Road. Legal point of discharge for the eastern portion of the site is via the existing gully and farm dam in the Stage 1 condition and in Stage 2 will be via precinct road drainage.

The drainage system proposed can be described as follows:

- Road drainage system designed to the 5% AEP (1 in 20yr ARI);
- Stub connections for all development lots connecting to road drainage.
- All road drainage and development site drainage directed to one of the three stormwater management basins;
- Stormwater management basins comprising stormwater detention to limit post development runoff to pre-development runoff and bio-retention system to complete final stormwater polishing.
- Inter-allotment drain to collect runoff from the northern external catchment;
- Inter-allotment drain to convey runoff through the north-eastern site portion, noting that the Stage 1 design allows for runoff to be conveyed through the site within an open channel.
- It is noted that the design of stormwater management systems proposes integration of bio-retention elements within the stormwater detention basins. The bio-retention elements

are noted to be sited such that a maximum depth of inundation of 1.2m occurs during infrequent major storms, and generally less than 0.6m during the majority of storm events.

- The main detention storage areas are noted to be sited at a level approximately 1m below the bio-retention elements. This will ensure effective discharge of bio-retention filtration, however, also assists in ensuring maximum storage capacity can be realized within the basin area. Further, this enables depth of water over the bio-retention elements to be limited to less than 0.6m generally as noted above and below.
- Based on the design, the water level over the bio-retention elements of the basin would have maximum ponding of 0.4m (being the extended detention depth) for >90% of all runoff events (i.e. events between the 6 month and 1yr ARI). The detention storage would be at 1.4m at the same time the ponding of the bio-retention elements are only 0.4m.
- A maximum depth of 0.75m would be realised for all events up to the 5% AEP (1 in 20 ARI), and maximum depths between 0.75m to 1.2m only occur very infrequently for storms > 5% AEP to the 1% AEP event. Depths greater than 0.75m would be considered to occur only several times throughout the life of the system.

5.4 Hydrologic Modelling and Analysis

5.4.1 General Design Principles

The design of the stormwater system for this site will be based on relevant national design guidelines, Australian Standard Codes of Practice, Penrith City Council and accepted engineering practice.

Runoff from buildings will generally be designed in accordance with AS 3500.3 National Plumbing and Drainage Code Part 3 – Stormwater Drainage.

Overall site runoff and stormwater management will generally be designed in accordance with the Institution of Engineers, Australia publication "Australian Rainfall and Runoff" (1987 Edition), Volumes 1 and 2 (AR&R).

Storm events for the 2 to 100 Year ARI events have been assessed.

5.4.2 Minor/ Major System Design

The piped stormwater drainage (minor) system has been designed to accommodate the 20-year ARI storm event (Q20). Overland flow paths (major) which will convey all stormwater runoff up to and including the Q100 event have also been provided which will limit major property damage and any risk to the public in the event of a piped system failure.

5.4.3 Rainfall Data

Rainfall intensity Frequency Duration (IFD) data used as a basis for DRAINS modelling for the 2 to 100 Year ARI events, was taken from The Bureau of Meteorology Online IFD Tool.

5.4.4 Runoff Models

In accordance with the recommendations and standards of Penrith City Council, the calculation of the runoff from storms of the design ARI has been calculated with the catchment modelling software DRAINS for internal drainage only. Refer **Section 8** for discussion pertaining to overland flow runoff models.

Detailed hydraulic assessment of the internal drainage system will be calculated at detail/ construction certificate stage.

The design parameters for the DRAINS model are to be based on the recommendations as defined by council and parameters for the area and are as follows:

Table 5.1. DRAINS Parameters

Model	Model for Design and analysis run	Rational method	
	Rational Method Procedure	ARR87	
	Soil Type-Normal	3.0	
	Paved (Impervious) Area Depression Storage	1	mm
	Supplementary Area Depression Storage	1	mm
	Grassed (Pervious) Area Depression Storage	5	mm
AMC	Antecedent Moisture Condition (ARI=1-5 years)	2.5	
AMC	Antecedent Moisture Condition (ARI=10-20 years)	3.0	
AMC	Antecedent Moisture Condition (ARI=50-100 years)	3.5	
	Sag Pit Blocking Factor (Minor Systems)	0	
	On Grade Pit Blocking Factor (Minor Systems)	0	
	Sag Pit Blocking Factor (Major Systems)	0.5	
	On Grade Pit Blocking Factor (Major Systems)	0.2	

5.5 Hydraulics

5.5.1 General Requirements

Hydraulic calculations will be carried out utilising DRAINS modelling software during the detail design stage to ensure that all surface and subsurface drainage systems perform to or exceed the required standard.

5.5.2 Freeboard

The calculated water surface level in open junctions of the piped stormwater system will not exceed a freeboard level of 150mm below the finished ground/ grate level, for the peak runoff from the Minor System runoff.

The calculated water surface for the peak runoff from the Major System runoff will not exceed a freeboard level of 300mm below the finished floor level of the building/ development pads.

5.5.3 Public Safety

For all areas subject to pedestrian traffic, the product (dV) of the depth of flow d (in metres) and the velocity of flow V (in metres per second) will be limited to 0.4, for all storms up to the 100-year ARI.

For other areas, the dV product will be limited to 0.6 for stability of vehicular traffic (whether parked or in motion) for all storms up to the 100-year ARI.

5.5.4 Inlet Pit Spacing

The spacing of inlets throughout the site will be such that the depth of flow, for the Major System design storm runoff, will not exceed the top of the kerb (150mm above gutter invert).

5.5.5 Overland Flow (development lots)

Dedicated flow paths have been designed to convey all storms up to and including the

100-year ARI. These flow paths will convey stormwater from the site to the detention systems prior to discharge.

5.6 External Catchment and Flooding

There are several external catchments which affect the development site as described in **Section 5.2** and shown in **Figure 5.1**.

Council has advised (in their pre-DA minutes) that consideration to overland flow is required on the north-east corner of the property. The overland flow being comprised of runoff from runoff from a 24Ha catchment to east of the property.

An assessment of overland flow and flooding has been made in **Section 8** and **Appendix E** of this report. Refer to these sections for detailed discussion on overland flow and flooding. Overall, once the above factors are duly considered, it can be confirmed that the works can commence without affectation of upstream, downstream or adjoining properties in relation to overland flow.

5.7 SEPP (WSEA) Clause 33L Stormwater, water quality and water sensitive design

Consideration to the requirements of *SEPP (WSEA) Clause 33L Stormwater, water quality and water sensitive design* has been made in the impact assessment.

Review and confirmation specific matters included in Clause 33L(2) has been made for Items (a) through (f) as follows:

a) water sensitive design principles are incorporated into the design of the development,

An integrated stormwater management plan which integrates WSUD principles (including detention systems, bio-retention basins, irrigation, rainwater reuse and other measures) has been proposed for the development.

Reference to WSUD objectives in **Section 5.1** should be made in conjunction with **Section 6** (*Water Quantity Management),* **Section 7** (*Stormwater Quality Reuse and Maintenance*) and **Section 8** (*Flooding and Overland Flow*), and associated drawings in **Appendix A** should be made pertaining to the proposed stormwater management for the development.

b) riparian, stormwater and flooding measures are integrated,

Stormwater and flooding measures have been integrated in the proposed management system. We note the site is not affected by mainstream flooding from South Creek and is not affected by any riparian corridors.

Reference to **Section 6** (*Water Quantity Management),* **Section 7** (*Stormwater Quality Reuse and Maintenance*) and **Section 8** (*Flooding and Overland Flow*), and associated drawings in Appendix A should be made pertaining to the proposed stormwater management and flood management measures proposed for the development.

c) the stormwater management system includes all reasonable management actions to avoid adverse impacts on the land to which the development is to be carried out, adjoining properties, riparian land, native bushland, waterways, groundwater dependent ecosystems and groundwater systems,

Stormwater management systems have been proposed based on relevant local and state government policy, and Final MRP DCP. The proposed measures result in acceptable impacts based on industry best practice and noted policy.

Reference to **Section 6** (*Water Quantity Management),* **Section 7** (*Stormwater Quality Reuse and Maintenance*) and **Section 8** (*Flooding and Overland Flow*), and associated drawings in Appendix A should be made pertaining to the proposed stormwater management and flood management measures proposed for the development.

d) if a potential adverse environmental impact cannot be feasibly avoided, the development minimises and mitigates the adverse impacts of stormwater runoff on adjoining properties, riparian land, native bushland, waterways, groundwater dependent ecosystems and groundwater systems,

Stormwater management systems have been proposed based on relevant local and state government policy, and Final MRP DCP. The proposed measures result in acceptable impacts based on industry best practice and noted policy.

Reference to **Section 6** (*Water Quantity Management),* **Section 7** (*Stormwater Quality Reuse and Maintenance*) and **Section 8** (*Flooding and Overland Flow*), and associated drawings in

Appendix A should be made pertaining to the proposed stormwater management and flood management measures proposed for the development.

e) the development will have an adverse impact on—

(i) the water quality or quantity in a waterway, including the water entering the waterway, and

(ii) the natural flow regime, including groundwater flows to a waterway, and

(iii) the aquatic environment and riparian land (including aquatic and riparian species, communities, populations and habitats), and

(iv) the stability of the bed, banks and shore of a waterway,

The proposed stormwater management proposed measures to ensure stream health based on the stream flow objectives proposed by NSW EES and now included in the Final MRP DCP. Reference to **Section 7.5** should be made for confirmation of Stream Health metrics.

f) the development includes measures to retain, rehabilitate and restore riparian land.,

There are no riparian corridors influenced by the development.

Further expansion relating to subclause (2)(a), the water sensitive design principles set out in Clause 33L(3) has been made for Items (a) through (d) as follows:

a) protection and enhancement of water quality, by improving the quality of stormwater runoff from catchments,

Stormwater runoff is proposed to be managed by water quality systems including bio-retention basins.

Reference to **Section 7** (*Stormwater Quality Reuse and Maintenance*) and associated drawings in **Appendix A** should be made pertaining to the proposed stormwater quality management measures proposed for the development.

b) minimisation of harmful impacts of development on water balance and on surface and groundwater flow regimes,

Stormwater management systems have been proposed based on relevant local and state government policy, and Final MRP DCP. The proposed measures result in acceptable impacts based on industry best practice and noted policy.

Reference to **Section 6** (*Water Quantity Management),* **Section 7** (*Stormwater Quality Reuse and Maintenance*) and **Section 8** (*Flooding and Overland Flow*), and associated drawings in Appendix A should be made pertaining to the proposed stormwater management and flood management measures proposed for the development.

c) integration of stormwater management systems into the landscape in a manner that provides multiple benefits, including water quality protection, stormwater retention and detention, public open space, habitat improvement and recreational and visual amenity

Integration of stormwater management systems has been made within landscape setbacks and landscaped areas. Reference to drawings in **Appendix A** should be made pertaining to the proposed stormwater management system location and integration into landscape zones proposed for the development.

d) retention, where practical, of on-site stormwater for use as an alternative supply to mains water, groundwater or river water

Reuse of rainwater is proposed for non-potable uses (irrigation and toilet flushing) as set out in **Section 7.4**.

6 WATER QUANTITY MANAGEMENT

6.1 Water Quantity Management Objectives

Penrith City Council adopts the principles of water quantity management, also known as "On-site Detention (OSD)", to ensure the cumulative effect of development does not have a detrimental effect on the existing stormwater infrastructure and watercourses located within their LGA downstream from the particular site.

Section 3.3.3 of Councils draft stormwater management policy requires that "*it will be necessary to demonstrate that there will be no increase in runoff from the site as a result of the development for all storms up to and including the 100-year Average Recurrence Interval (ARI) event for all storm durations*".

Further discussion on stream health and overall discharge are included in **Section 7.5**.

6.2 Methodology

A hydrological analysis was undertaken to estimate the impact of the development of the site on peak flows at the downstream extent of the site. Modelling of stormwater runoff quantity was considered for the pre-existing case and for the operational phase of the development.

As the site is greater than 5000m^2, the simplified PSD/SSR method contained in *Section 3.3* of the Penrith Council document *Stormwater Drainage for Building Developments* has not been used in calculating the storage and discharge relationship for the site. Council's preferred modelling software, DRAINS has been used to assess the site detention discharge and storage relationship.

In order to assess the existing and operational phase peak discharges from the development site, a DRAINS hydrological model was used to estimate peak flows from catchments on the site for various storm durations for Q2 year ARI to Q100 year ARI events.

6.3 Existing & Post Development Peak Flows

Table 6.1 to Table 6.3 show the existing and developed flows at the downstream boundary for the three existing catchments on the property.

Table 6.1. Q2, Q20 & Q100 ARI Peak Flows from Catchment North-East

ARI	Design Storm Duration	Peak Flow (m3/s)		
		Undeveloped	Developed	
		Site	Site (no atten.)	**Site (+ atten.)**
2	30	0.918	3.30	0.264
	60	1.04	2.78	0.281
	120	0.730	2.08	0.286
20	30	3.135	5.92	1.630
	60	3.000	4.92	2.058
	120	2.313	3.60	1.727
100	30	4.506	7.48	3.539
	60	4.324	6.33	3.996
	120	3.056	4.40	3.045

Table 6.2. Q2, Q20 & Q100 ARI Peak Flows from Catchment - West

ARI	Design Storm Duration	Peak Flow (m3/s)		
		Undeveloped	Developed	
		Site	Site (no atten.)	**Site (+ atten.)**
2	30	0.234	0.346	0.167
	60	0.255	0.277	0.146
	120	0.177	0.223	0.120
20	30	0.745	0.631	0.478
	60	0.673	0.499	0.500
	120	0.532	0.395	0.377
100	30	1.055	0.797	0.821
	60	0.937	0.645	0.814
	120	0.680	0.480	0.594

The post development (with site attenuation) flows can be seen to be lower than the pre-developed flows. The required detention storage for the development site is discussed in the following section.

6.4 Proposed Water Quantity Management

As previously discussed, detention storage on the development site is required to reduce local outflows. The proposed site layout allows for provision of a combined OSD/Bio-Retention basin. The ultimate discharge location will be to the existing table drains along the Mamre Road frontage.

A number of combinations of storages and outlet arrangements have been modelled. The adopted arrangement models the basin configuration shown in **Table 5.3** and the proposed layout can also be observed on drawing **Co14021.00-SSDA41**.

Table 5.3 OSD Detention Characteristics (Post Developed)

ARI	Duration	Peak Flow (m^3/s)					Depth (mm)	Storage (m^3)
		Discharge Location	No Atten.	With attenuation				
				Low	High	Total		
2	6 hour	Basin 1	0.369	0.290	0.043	0.274	1610	4303
	2 hour	Basin 2	0.126	0.036	0	0.036	1420	372
20	60 min	Basin 1	3.00	0.315	1.743	2.058	1860	5473
		Basin 2	0.673	0.039	0.257	0.296	1640	502
100	60 min	Basin 1	6.33	0.329	3.667	3.996	2020	6128
		Basin 2	0.645	0.040	0.511	0.551	1690	533

The hydrologic analysis shows that, with the provision of the on-site detention systems detailed above, the post development peak flows from the site will be attenuated to less than pre-development; hence the requirements of PCC have been met.

7 STORMWATER QUALITY, REUSE AND MAINTENANCE

7.1 Stormwater Quality Objectives

There is a need to provide a design which incorporates the principles of Water Sensitive Urban Design (WSUD) and to target pollutants that are present in the stormwater so as to minimise the adverse impact these pollutants could have on receiving waters and to also meet the requirements specified by PCC and the Final MRP DCP.

The requirements for stormwater quality to be performed for the entire estate catchment. The reduction objectives noted in **Section 5.1** and **Table 5.1** of this report are presented in terms of annual percentage pollutant reductions on a developed catchment based on the controls included in the *Final MRP DCP 2021.*

Assessment of compliance of the water quality objectives has been made using MUSIC as set out in the following sub-sections of the report.

The modelling assessed in this report considers the Stage 1 Approval site configuration as described in **Section 2.3** of this report. Further modelling will be required to confirm the Water Quality Objectives are being met as additional lots become developed.

7.2 Proposed Stormwater Treatment System

Developed impervious areas including roof, hardstand, car parking, roads and other extensive impervious areas are required to be treated by the Stormwater Treatment Measures (STM's). The STM's shall be sized according to the whole catchment area of the development. The STM's for the development shall be based on a treatment train approach to ensure that all the objectives above are met.

Components of the treatment train for the development are as follows:

- Primary treatment to development lots and proposed roads are via a Vortech type GPT (Rocla CDS, OceanSave or similar approved). Pre-treatment of the stormwater will assist in mitigating the potential for early onset sedimentation of the bio-retention systems;
- Tertiary treatment to the catchment will be provided by bio-retention system within each of the three proposed estate detention systems. As noted, the effective performance of bio-retention systems combined with on-site detention systems is described in detail in **Section 5.3** of this report.

7.3 Stormwater Quality Modelling

The MUSIC model was chosen to model water quality. By simulating the performance of stormwater management systems, MUSIC can be used to predict if the proposed systems and changes to land use are appropriate for their catchments and capable of meeting specified water quality objectives (CRC 2002). The water quality constituents modelled in MUSIC, of relevance to this report, include Total Suspended Solids (TSS), Total Phosphorus (TP) and Total Nitrogen (TN).

The pollutant retention criteria set out in Part C3 of PCC's DCP and nominated in **Section 5.1** of this report were used as a basis for assessing the effectiveness of the selected treatment trains.

The parameters used in the MUSIC model are presented in **Appendix B**. **Figure 7.1** below shows the MUSIC model layout.

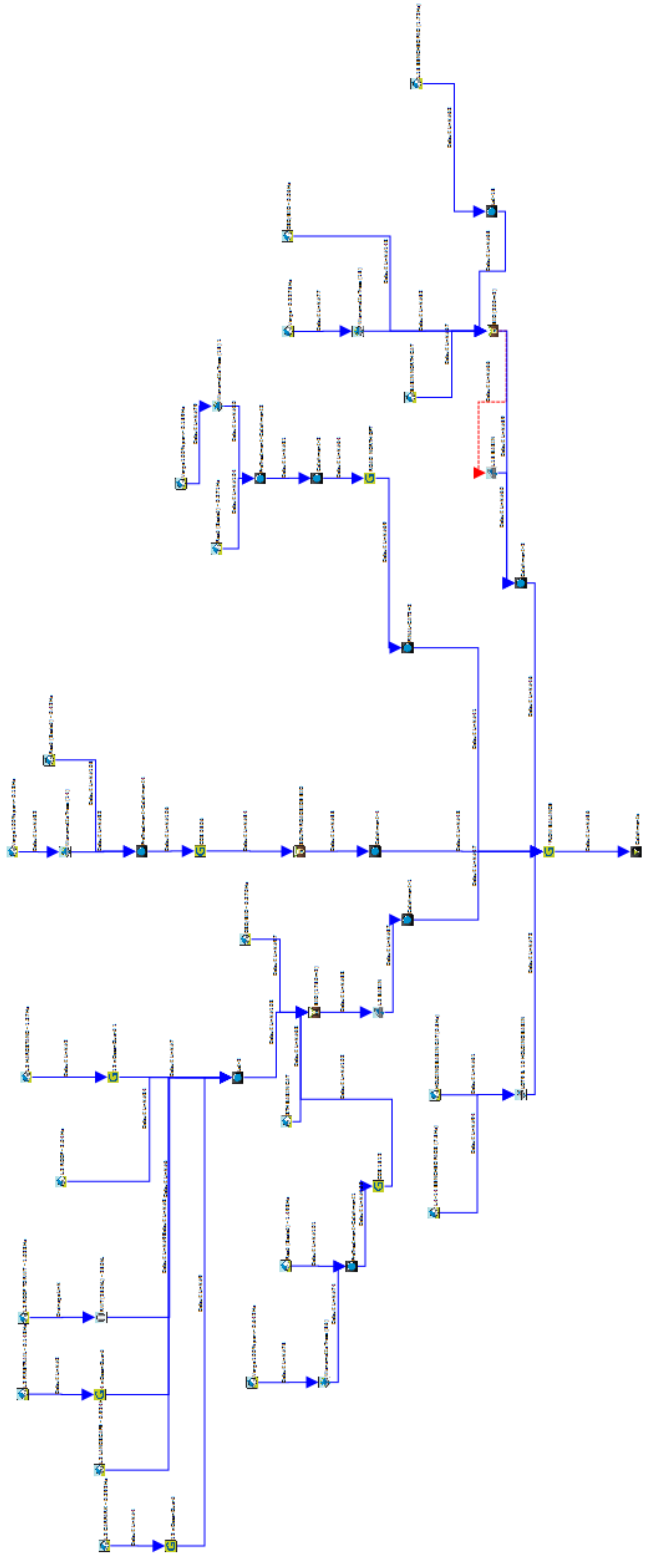


Figure 7.1. MUSIC model layout

Tables 7.1 & 7.2 shows the results of the MUSIC analysis and compares to the treatment targets described the MUSIC Modelling Toolkit. The toolkit provides two options for operational phase water quality targets – these are presented in *Table 2* & *Table 3* of the Toolkit. The toolkit requires one of the two options provided be met to demonstrate compliance. **Option 1** expresses targets as a percentage reduction, whereas **Option 2** expresses targets as a residual concentration. The tables compare the post-development pollutant loads without treatment versus post-development loads with treatment.

Table 7.1. MUSIC analysis results – Allowable Load Reduction

	Total Source Load (kg/yr)	**Total Residual Load** (kg/yr)	**Reduction Achieved** (%)	**Target Reduction (%)**
Total Suspended Solids (kg/yr)	9415	724.4	92.31	90
Total Phosphorus (kg/yr)	18.54	3.886	79.04	80
Total Nitrogen (kg/yr)	119.8	33.77	71.80	65
Gross Pollutants (kg/yr)	1391	4.056	99.71	90

Table 7.2. MUSIC analysis results – Allowable Loads

	Source Load (kg yr)	**Residual Load** (kg/yr)	**Target Load** (kg/yr)	**Per Hectare Residual Load** (kg/ha/yr)	**Target Per Hectare Residual Load** (kg/ha/yr)
Total Suspended Solids (kg/yr)	9415	724.4	1,638	35.4	<80
Total Phosphorus (kg/yr)	18.54	3.886	6.141	0.19	<0.3
Total Nitrogen (kg/yr)	119.8	33.77	71.65	1.65	<3.5
Gross Pollutants (kg/yr)	1391	4.056	327.52	0.20	<16

MUSIC modelling has been performed to assess the effectiveness of the selected treatment trains and to ensure that the pollutant retention requirements of Section 2.6 of Final MRP DCP have been met.

The modelling has shown that the proposed treatment train of STM will provide stormwater treatment which will meet the allowable load target objective requirements described in *DPIE Technical Guidance for Achieving Wianamatta South Creek Stormwater Management Targets* (Operational Phase Stormwater Quality Targets – Option 2) in an effective and economical manner.

The modelling demonstrates that the treatment train meets all percentage-based treatment reduction targets, except for the reduction in Total Phosphorus (79.04% achieved, 80% target). The minor shortfall in the percentage-based TP reduction is attributed to the large area of landscaping present on the site (e.g. in the realigned riparian corridor), noting the residual load (per *Option 2*) is well below the required threshold. The water quality system and achieved outcomes are shown to be compliant with the Wianamatta MUSIC Modelling Toolkit, and as such the MRP DCP.

Given the expected low source loadings of hydrocarbons and oil/grease and removal efficiencies of the treatment devices we consider that the requirements of the Penrith City Council have been met. Further discussion on hydrocarbons can be found in **Appendix B.**

7.4 Stormwater Harvesting

Stormwater harvesting refers to the collection of stormwater from the developments internal stormwater drainage system for re-use in non-potable applications. Stormwater from the stormwater drainage system can be classified as either rainwater, where the flow is from roof areas only, or stormwater where the flow is from all areas of the development.

Rainwater harvesting is not proposed for the estate development, however future individual development lots will require re-use for non-potable applications. Internal uses include such applications as toilet flushing while external applications will be used for irrigation. The aim is to reduce the water demand for the development and to satisfy the requirements of PCC DCP2014. Objectives have been set out in **Section 5.1** of this document.

In general terms the rainwater harvesting system will be an in-line tank for the collection and storage of rainwater. At times when the rainwater storage tank is full rainwater can pass through the tank and continue to be discharged via gravity into the stormwater drainage system. Rainwater from the storage tank will be pumped for distribution throughout the development in a dedicated non-potable water reticulation system.

Rainwater tanks for future development lots and application will need to have harvesting systems sized with reference to the NSW Department of Environment and Conservation document *Managing Urban Stormwater: Harvesting and Reuse*, using either a simple water balance analysis to balance the supply and demand, based on the base water demands and the requirement of PCC DCP2014 Part C3, or via MUSIC.

The objectives, as included in **Section 5.1**, are to provide a reduction in non-potable water demand with a minimum demand reduction of 80% based on a rainwater balance assessment.

7.5 Stream Health/ Stormwater Discharge Assessment

7.5.1 Stream Health Introduction

Stream health has been assessed for this development based on the requirements set in *Section 2.4* of the Final MRP DCP. The assessment is based on the current development extent (Lot 2 building, earthworks pads and surrounding estate roadways). The future precinct-wide system (wetland or similar), which is anticipated to be implemented by Sydney Water (now announced as the waterway manager for South Creek) has not currently been considered in the assessment.

The Flow Duration Curve (FDC)/ Mean Annual Runoff Volume (MARV) alternate proposed by EES in their MUSIC modelling Toolkit dated 2 August 2021 and included in Section 2.4 of the Final MRP DCP has been assessed in MUSIC.

The proposed additional stream flow measures are included in **Table 7.2**, and achieved values (per MUSIC modelling), are included and compared with a Section 2.4 and Table 6 of the Final MRP DCP.

7.5.2 MARV Assessment – Estate Solution

Assessment of estate discharge against the waterway discharge targets, based on *Alternate 1* (Flow Duration Curve) and *Alternate 2* (Flow Discharge Curve (FCC) in combination with Mean Annual Runoff Volume (MARV) can be met for the current proposed approval – refer **Table 5.1** target included in the EES MUSIC Toolkit (2 August 2021).

The model is based on the proposed Stage 1 application for approval of the estate and Building 2 development. Stage 1 therefore comprises construction of Building 2, the roadways and earthworks over the remainder of the estate. The estate basins are proposed to contain a long-term water storage volume which will store water for estate-level irrigation & trickle discharge. Further modelling and confirmation will be required to consider the construction of future warehouses over the estate, including the "Book End" development scenario (i.e. fully developed). The discharge rate for the basins are noted on the drawings in **Appendix A**, while the irrigation/re-use demand is detailed below.

The Stage 1 Development external base water demand has been based on the following allowances:

0.30kL/year/m^2 as PET-Rain for subsurface irrigation.

0.75kL/year/m^2 as PET-Rain for evaporative vapouriser/misting.

The configuration of Flow Management Measures, as well as water harvesting/re-systems is shown indicatively on drawing **Co14021.00-SSDA405**

The above regime for the landscaped & undeveloped area for the site gives the following yearly outdoor water demand:

Basin 1 Irrigated Area (0.30kL/year/m^2)	7,150m^2	2,145 kL/year
Basin 1 Misted Area (0.75kL/year/m^2)	20,500m^2	15,355 kL/year
Basin 1 Total Re-use:		17,500kL/year
Basin 2 Irrigated Area (0.30kL/year/m^2)	5,000m^2	1,500 kL/year
Basin 2 Misted Area (0.75kL/year/m^2)	0m^2	0 kL/year
Basin 2 Total Re-use:		1,500kL/year
Basin 3 Irrigated Area (0.30kL/year/m^2)	15,000m^2	5,000 kL/year
Basin 3 Misted Area (0.75kL/year/m^2)	0m^2	0 kL/year
Basin 3 Total Re-use:		5,000kL/year

7.5.3 Re-use basin Sizing

The use of rainwater reduces the mains water demand and the amount of stormwater runoff. By collecting the rainwater run-off from the site, storage basins provide a valuable water source suitable for landscape irrigation, dust suppression, and evaporative misting of the development.

Storage basins have been designed, using MUSIC software to balance the supply and demand, based on the calculated base water demands and proposed roof catchment areas. Allowances in the MUSIC model have been made for high flow bypass which will discharge surplus water into the stormwater drainage network. The final configuration, including the arrangement of downpipes shall be sized and confirmed by the hydraulic engineering consultant during the detailed design of individual warehouses.

Tank/Basin	Contributing Catchment (m2)	Storage Volume in MUSIC (kL)
Basin 1	96,200	3,600
Basin 2	16,200	450
Basin 3	75,000	5,000
Lot 2 RWT	10,380	225 (250 kL Provided)

Table 7.2. Rainwater Reuse Requirements

We note that the final configuration and sizing of the rainwater tanks is subject to detail design considerations and optimum site utilisation.

Figure 7.2 shows the MUSIC model Flow Duration Curve for the estate stormwater management strategy, while **Table 7.2** provides confirmation of target requirements and those achieved for Alternate 2**.** With reference to **Appendix F**, the modelling indicates that the flow metric targets are met.

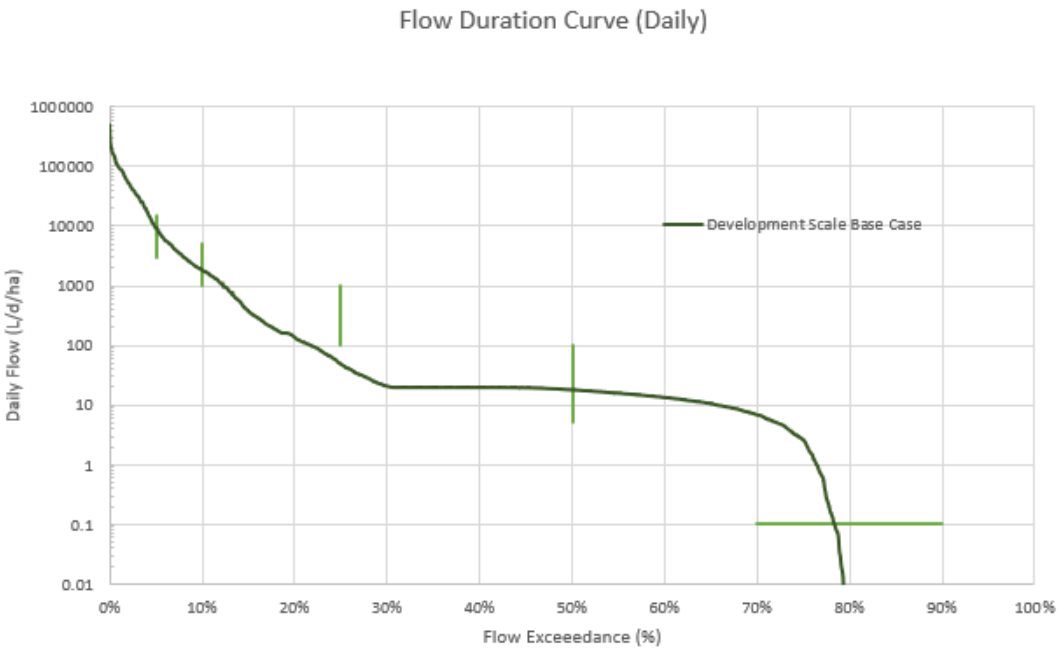


Figure 7.2. MUSIC Model Flow Duration Curve

Table 7.2. Confirmation of Estate MARV

Objective	Required Parameter	Result – Alternative 1	Result – Alternative 2
Mean Annual Runoff Volume (MARV)	<=2.0 ML/ha/year		1.24 ML/ha/year
95%ile flow	3000 to 15000 L/ha/day	9,343 L/ha/day	
90%ile flow	1000 to 5000 L/ha/day	1,826 L/ha/day	
75%ile	100 to 1000 L/ha/day	48 L/ha/day	
50%ile flow	5 to 100 L/ha/day	18 L/ha/day	
10%ile flow	0 L/ha/day		0 L/ha/day
Cease to Flow	10-30%	20%	

As demonstrated in **Table 7.2**, the requirements of EES Alternative 2 have been met.

7.6 Maintenance and Monitoring

It is important that each component of the stormwater system and water quality treatment train is properly operated and maintained. In order to achieve the design treatment objectives, an indicative maintenance schedule has been prepared and included as **Appendix D** to assist in the effective operation and maintenance of the various water quality components.

Inspection frequency may vary depending on site specific attributes and rainfall patterns in the area. In addition to the below nominated frequency it is recommended that inspections are made following large storm events.

It is reiterated that the landowner will retain ownership and management of all estate basins.

8 FLOODING AND OVERLAND FLOW

8.1 Introduction

The site has been identified by Penrith City Council as being affected by overland flow from the existing gully and series of farm dams on the north-east of the property

We note that the site is clear of the South Creek Floodplain however the site contributes to one of the sub-catchments of South Creek and ultimately runoff from the property drains to South Creek.

An overland flow and flood assessment has been completed for the development approval submission in relation to the north-eastern flow path. The following sections of the report describe the catchment description, flood description and proposed flood management.

Detailed technical information pertaining to the TUFLOW modelling and output completed by our office is included in **Appendix E**.

8.2 Catchment Description & Existing Flood Behaviour

The contributing upstream catchment is approximately 24Ha and is shown below in **Figure 8.1** and also as **Figure E2.1**.

The catchment comprises rural land use and >90% pervious surfaces. Future development is noted to require detention and as such has been modelled as per existing impervious surface breakdown.

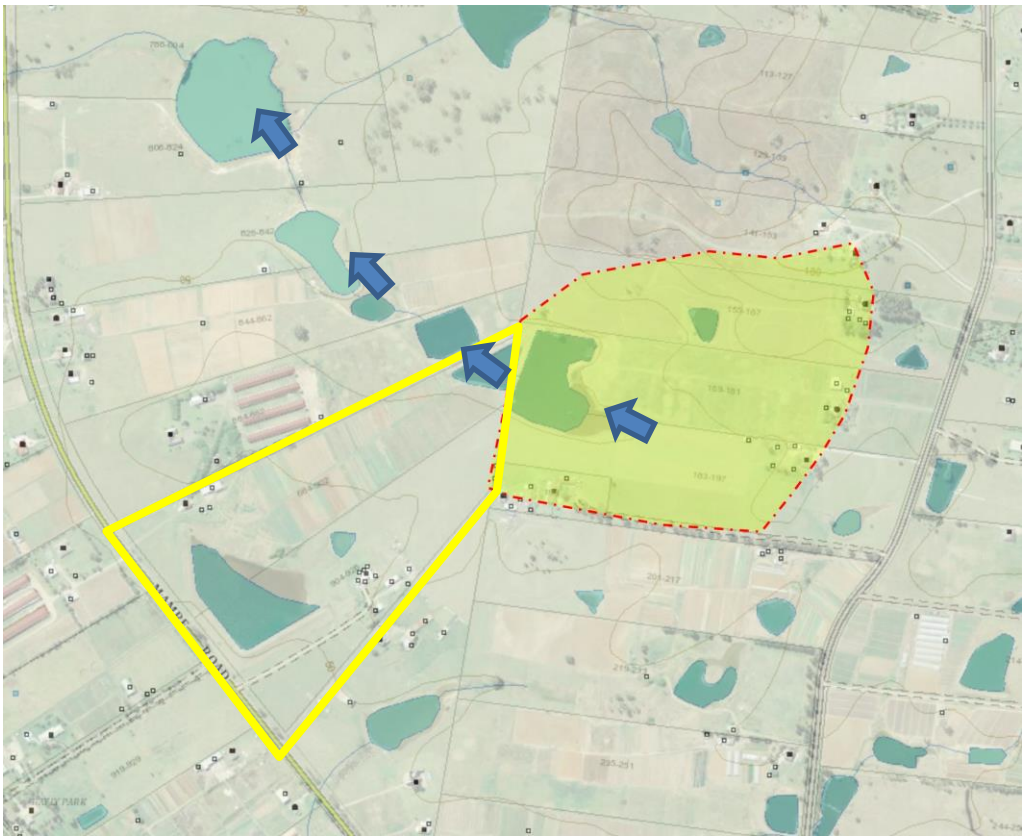


Figure 8.1. Upstream Contributing Catchment.

Penrith Council is noted to have undertaken a regional assessment of local tributaries Penrith Overland Flow "*Overview Study – Flood Analysis for Central Urban (Zone 1), Northern Rural (Zone 2), Southern Rural (Zone 3)*" – Cardno 2006. The site is located within the Southern Rural (Zone 3) and an excerpt of the flood model output is shown in **Figure 8.2 and also Figure E1.1 of Appendix E**. Councils assessment shows overland flow is present along the series of farm dams in the north-eastern corner of the property. The modelling shows the flood extent to be limited to the gully and dams only, and not extending to areas away from the local watercourse. The area shown on the southern portion of the site as being flood affected in the PMF event is noted to comprise a farm dam only which is fully within the proposed development extent and as such has not been included in the current overland flow assessment.

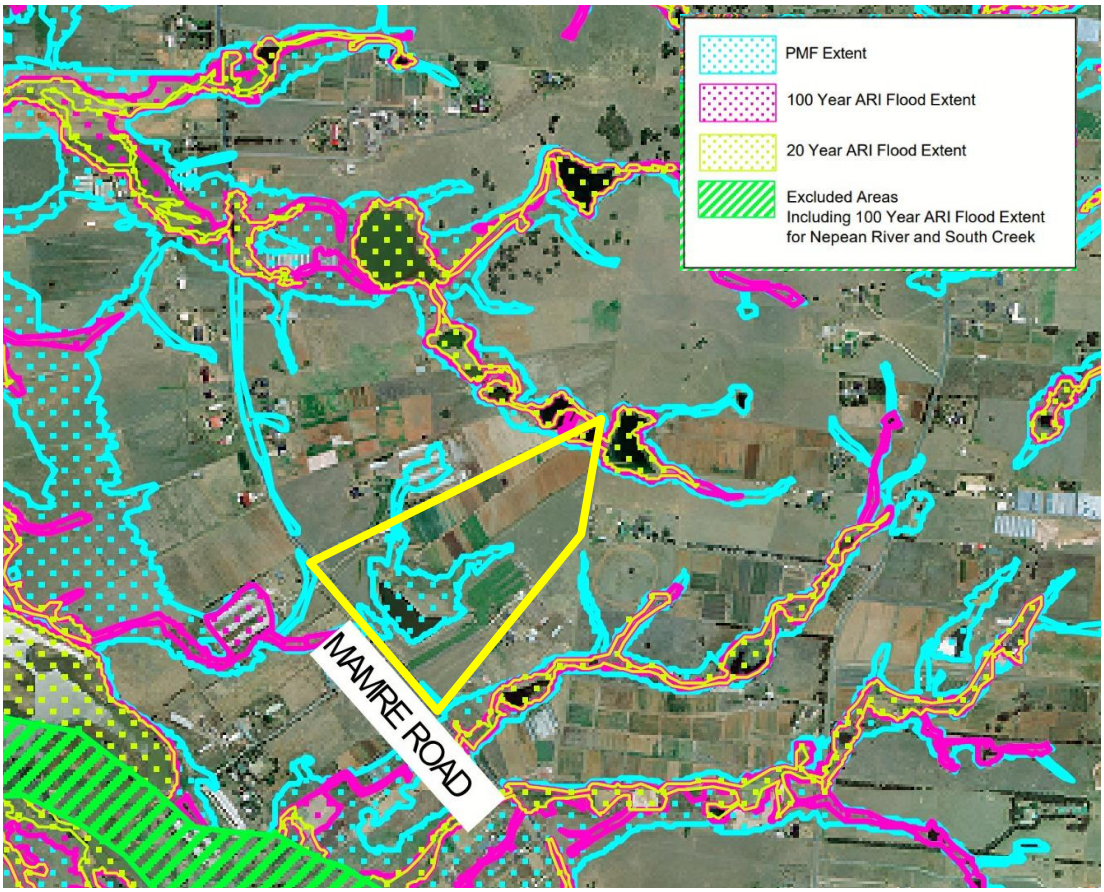


Figure 8.2. Excerpt of Figure 6.1k of Cardno 2006 Study

8.3 Proposed Overland Flow Management Strategy

Council requires an assessment of the pre and post development overland flow conditions for the 1% AEP storm event. Further that the overland flows from the upstream catchment is able to be conveyed through the site without affection of upstream, do0wnstream or adjacent properties in the 1% AEP.

A TUFLOW model has been prepared for the assessment as set out in the following sections of the report. The proposed management strategy involves conveying overland flow through the development site within an open channel in Stage 1, then via culverts in Stage 2. The final

conveyance arrangement will be subject to the precinct layout and trunk drainage strategy for the precinct.

8.4 Costin Roe Consulting Modelling

8.4.1 Introduction

A detailed site specific TUFLOW model of the pre and post development conditions has been completed by Costin Roe Consulting. The assessment being completed with consideration to PCC policy and the *NSW Floodplain Development Manual*. Technical parameters and detail included in the TUFLOW model are included as **Appendix E.**

The pre-developed model has been prepared utilising the flood levels and hydrographs as completed by our office. Validation of modelling was completed with comparison to Councils 2006 flood assessment.

8.4.2 Pre-Development 1% AEP

Reference to **Figure 8.4** shows the pre-developed 1% AEP output for depth and levels. **Figure 8.5** shows velocity and **Figure 8.6** show true hazard categorisation.

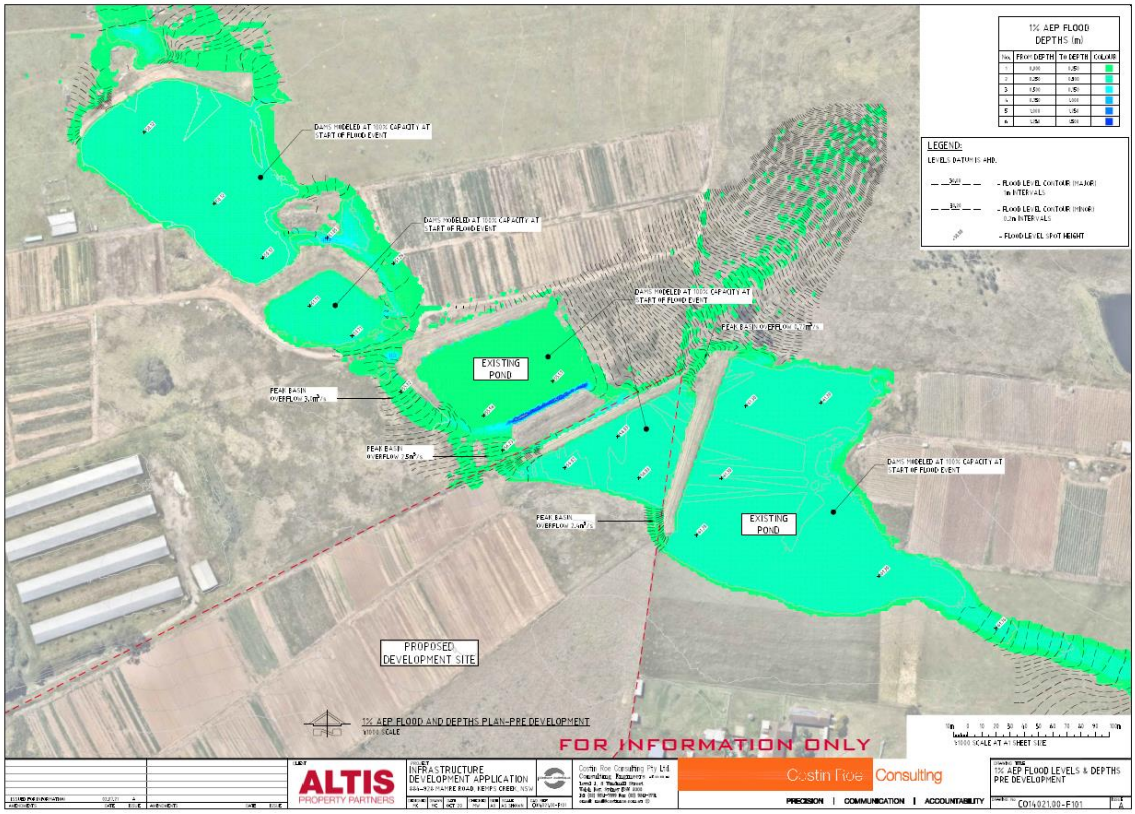


Figure 8.4: 1% AEP Pre-developed Level and Depth Output

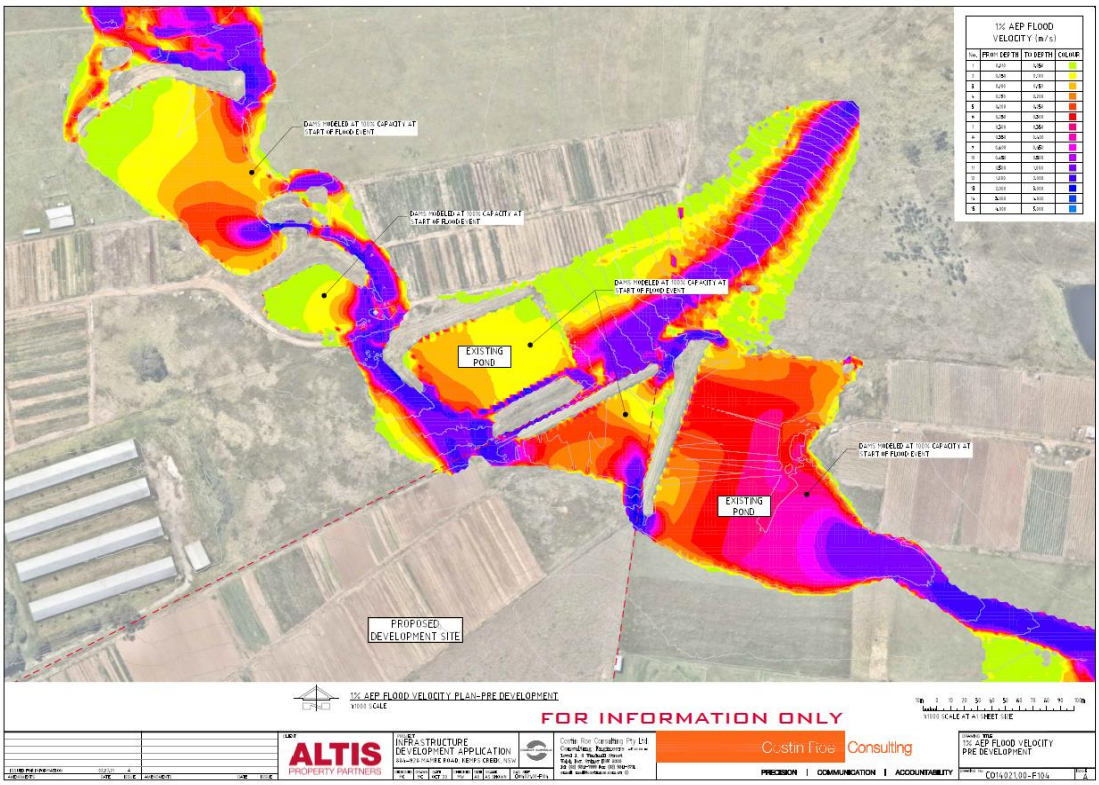


Figure 8.5: 1% AEP Pre-developed Velocity

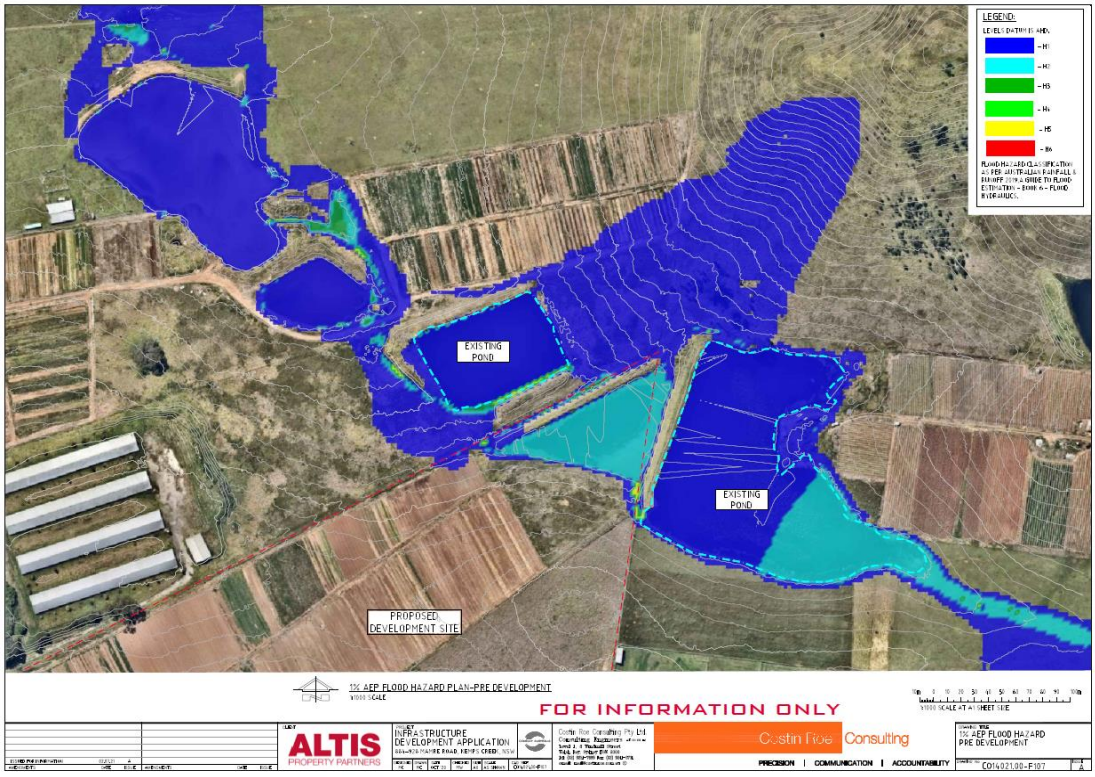


Figure 8.6: 1% AEP Pre-developed Flood Hazard Categorisation

8.4.3 Post-Development 1% AEP

Reference to **Figure 8.7** shows the post-developed 1% AEP output for depth and levels. **Figure 8.8** shows velocity and **Figure 8.9** show true hazard categorisation.

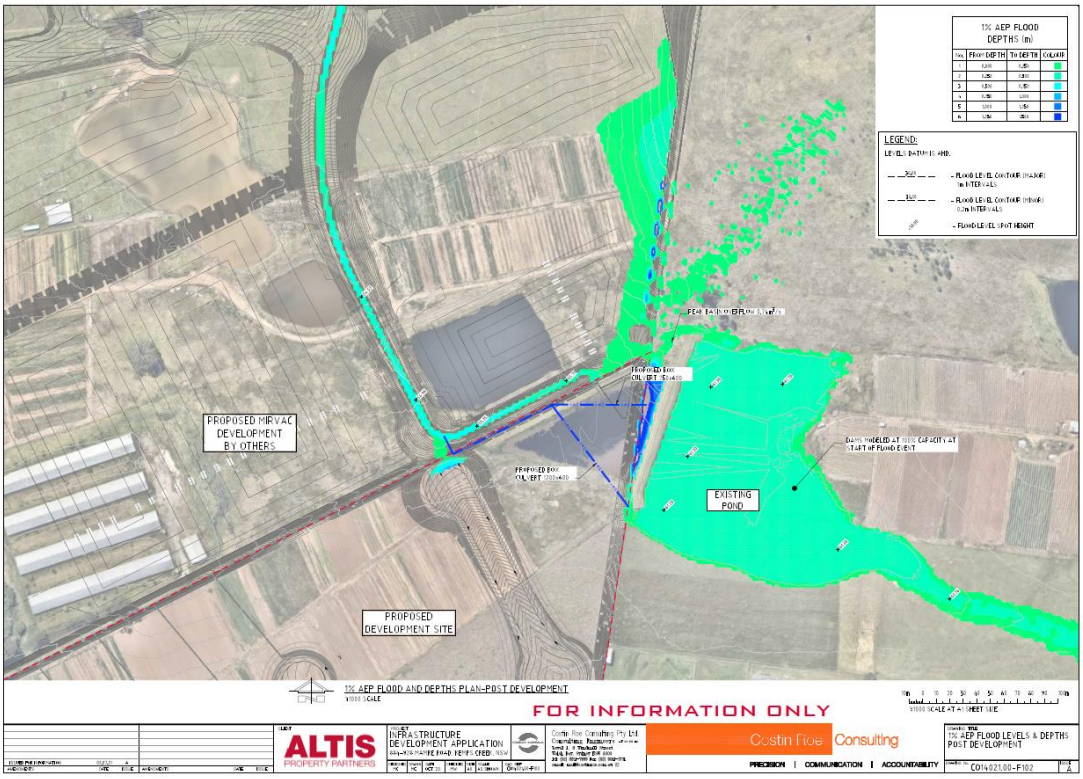


Figure 8.7: 1% AEP Post-developed Level and Depth Output

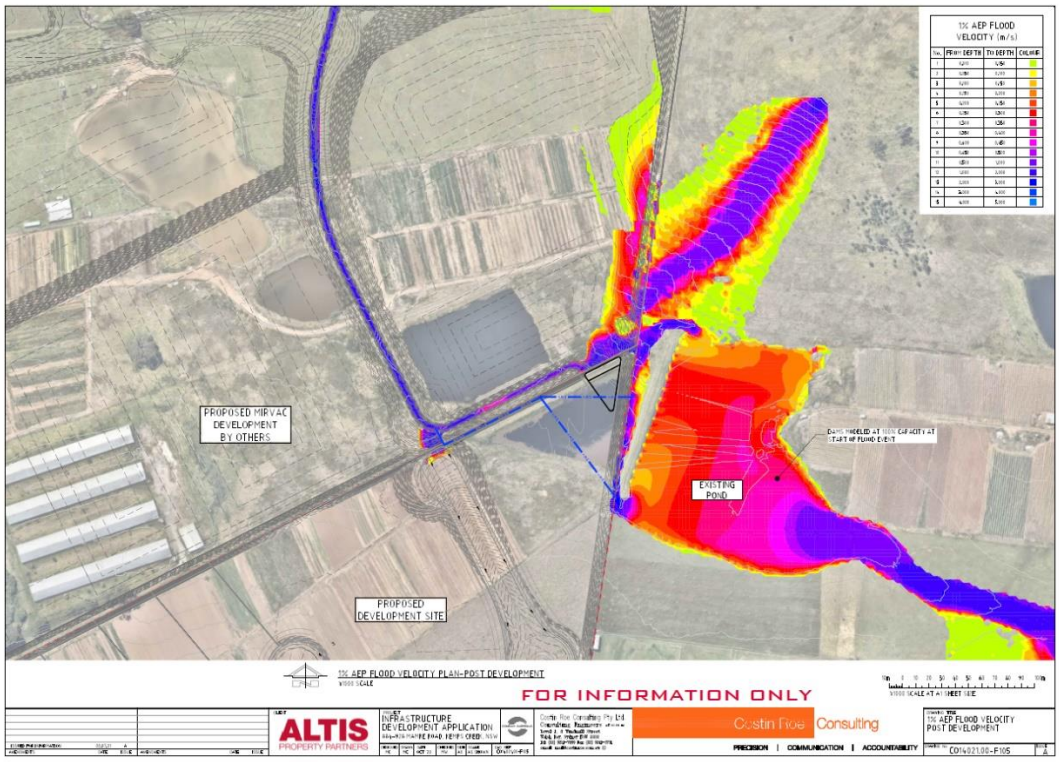


Figure 8.8: 1% AEP Post-developed Velocity

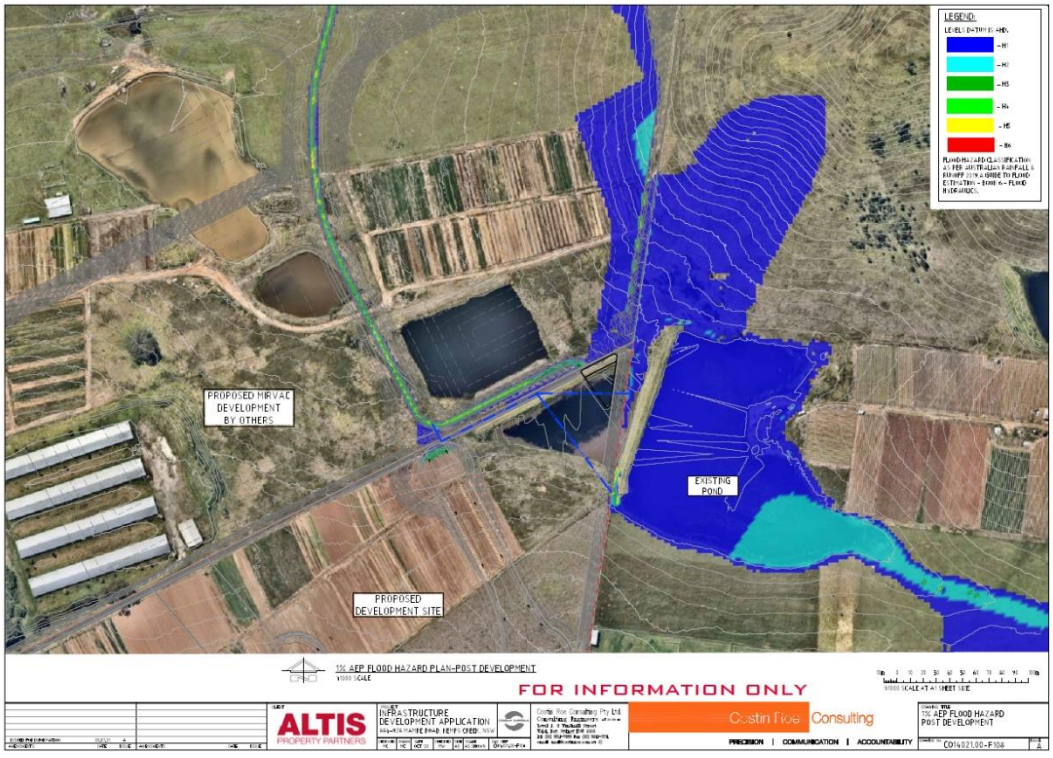


Figure 8.9: 1% AEP Post-developed Flood Hazard Categorisation

8.4.4 1% AEP Comparison

Figure 8.10 shows the flood afflux (flood level difference) associated with the development. The output shows that there is limited flood affectation to upstream downstream and adjoining properties.

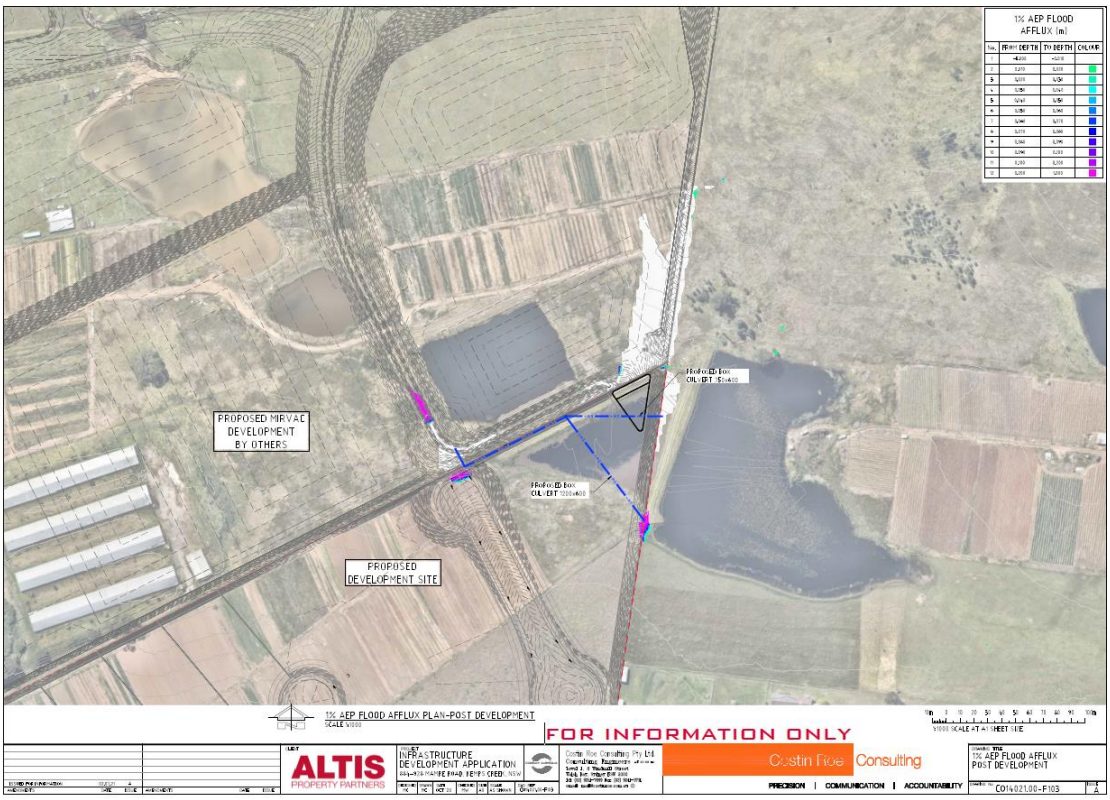


Figure 8.10: 1% AEP Post Developed Flood Level Afflux

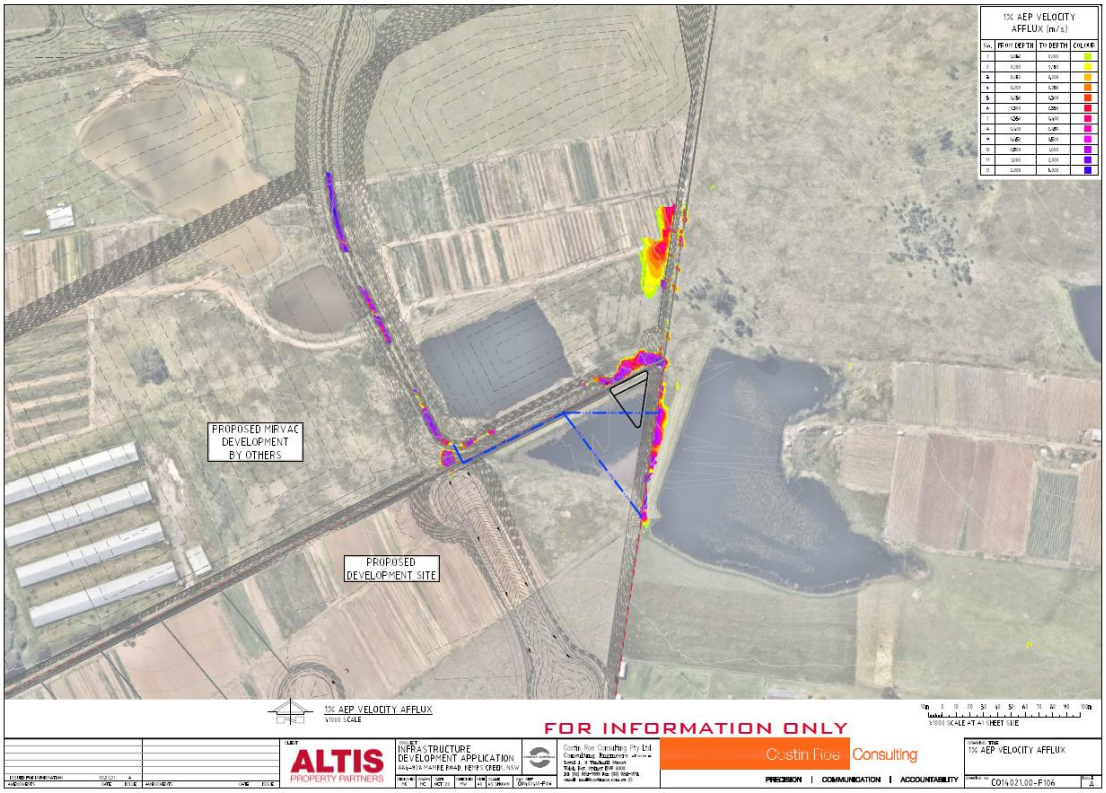


Figure 8.11: 1% AEP Post Developed Flood Velocity Afflux

8.5 Flood Planning and Hazard Categorisation

Penrith City Council has advised that the minimum floor level to be a minimum of 0.5m above 1% Annual Exceedance Probability flood level. The flood planning level (FPL) for the development is based on a minimum floor level of 1% AEP flood level plus 0.5m of freeboard.

For this site the proposed development requires a minimum FPL of RL 61.82m AHD, based on a 1% AEP level of 61.32m to the existing adjacent dam to the property on the north-east of the site.

Flood hazard categories are broken down into high and low hazard for each hydraulic category. High hazard areas are defined as those where there is a possible danger to personal safety and the potential for significant structural damage. Able-bodied adults would have difficulty in wading to safety. With low hazard areas, should it be necessary, a truck could evacuate people and their possessions, and able-bodied adults would have little difficulty in wading to safety.

Flood hazard criteria and mapping has been completed for the 1% AEP and PMF post development conditions as per criteria set out in the *Australian Rainfall and Runoff (2019), A Guide to Flood Estimation – Book 6 – Flood Hydraulics* and *Figure 6.7.9* as included as **Figure 8.12** below. Refer **Section 8.5** and **Appendix E** for hazard mapping.

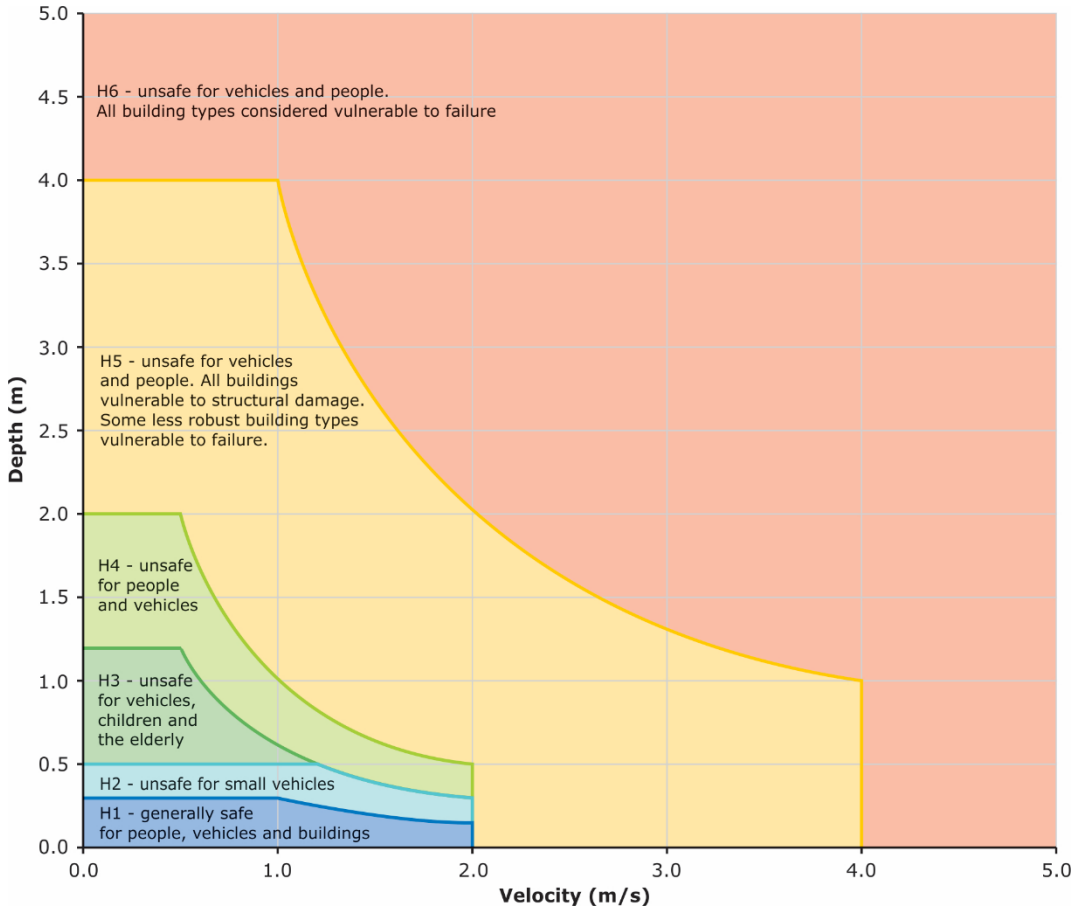


Figure 6.7.9. Combined Flood Hazard Curves (Smith et al., 2014)

Table 6.7.3. Combined Hazard Curves - Vulnerability Thresholds (Smith et al., 2014)

Hazard Vulnerability Classification	Description
H1	Generally safe for vehicles, people and buildings.
H2	Unsafe for small vehicles.
H3	Unsafe for vehicles. children and the elderly.
H4	Unsafe for vehicles and people.
H5	Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
H6	Unsafe for vehicles and people. All building types considered vulnerable to failure.

Table 6.7.4. Combined Hazard Curves - Vulnerability Thresholds Classification Limits (Smith et al., 2014)

Hazard Vulnerability Classification	Classification Limit (D and V in combination)	Limiting Still Water Depth (D)	Limiting Velocity (V)
H1	D*V ≤ 0.3	0.3	2.0
H2	D*V ≤ 0.6	0.5	2.0
H3	D*V ≤ 0.6	1.2	2.0
H4	D*V ≤ 1.0	2.0	2.0
H5	D*V ≤ 4.0	4.0	4.0
H6	D*V > 4.0	-	-

Figure 8.12. Adopted Hazard Criteria and Provisional Flood Hazard Chart (Australian Rainfall and Runoff 2019)

8.6 Confirmation of Councils Development Control Pan Part C3 Requirements

With reference to **Section 8.5** and modelling results contained in **Appendices E** we provide confirmation in **Table 8.1** that the criteria set out in the *Penrith Council Development Control Plan C3* (and listed in **Section 3.3**) for filling within flood affected land for the 1% AEP event.

We also provide, as **Table 8.2**, confirmation of Penrith Councils proposed adjusted DCP criteria as included in the Exhibition DRAFT of their *South Creek Floodplain Risk Management Plan Section 3.3* for the 1% AEP event.

8.6.1 Council DCP Part C3 (1% AEP Comparison)

Table 8.1. Confirmation of DCP Part C3 Criteria (1% AEP)

DCP Criteria	Post Development Scenario Confirmation (1% AEP Event)
Criteria 1 Flood levels are not increased by more than 0.1m by the proposed filling. *Post Note:* *As part of discussions with Council and the NSW DPE on recent nearby projects, Item i) above has been revised to ensure that no effect to upstream or downstream properties were to occur. The maximum offsite water level change confirmed for the assessment was to be 10-20mm or less. On-site changes would need to be within the 100mm as stipulated in Council DCP.*	The development proposes conveyance of flows up to the 1% AEP meeting councils limit on off-site affectation. Refer confirmation in **Section 8.5**. Flood level increase criteria is considered to be met.
Criteria 2 Downstream velocities are not increased by more than 10% by the proposed filling	Velocity assessment shows limited change to velocity and increase in velocity in and around proposed drainage infrastructure and inlets where it would be anticipated that velocity would change. Velocity change criteria is considered to be met.
Criteria 3 Proposed filling does not redistribute flows by more than 15%	Flow conveyance is based on meeting existing inlet and outlet positions for overland flow. As such there is no

DCP Criteria	Post Development Scenario Confirmation (1% AEP Event)
	redistribution of flow proposed as a result of development. Flow distribution criteria is considered to be met.
Criteria 4 The potential for cumulative effects of possible filling proposals in that area is minimal	The development ensure that there is no offsite impacts. Further, future developments proposed to coordinate conveyance of flows within dedicated precinct drainage systems. There is limited or no potential for cumulative impacts as part of this development. Cumulative effect criteria is considered to have been met.
Criteria 5 There are alternative opportunities for flood storage.	The overland flow is noted to be confined to existing gully and farm dams. The proposed development includes for detention storage for all catchments which could act as flood storage for some events. Generally as a conveyance area, flood storage is not required, however as noted above some storage will be available. Flood storage criteria is considered to have been met.
Criteria 6 The development potential of surrounding properties is not adversely affected by the filling proposal	The development ensures that there is limited and acceptable offsite changes. Further, future developments proposed to coordinate conveyance of flows within dedicated precinct drainage systems. There is limited or no potential for adverse effect on future development potential of surround properties as a result of the proposed development.
Criteria 7 The flood liability of buildings on surrounding properties is not increased	The flood liability of surrounding developments is not affected by the development proposal. surrounding buildings or properties.
Criteria 8	

DCP Criteria	Post Development Scenario Confirmation (1% AEP Event)
No local drainage flow/runoff problems are created by the filling	We confirm that no local drainage flow/runoff problems are created by the proposed filling. All local tributaries and flow paths will either operate in a similar manner to the existing regime or form part of the overall stormwater management system for the estate.
Criteria 9 The filling does not occur within Floodway Corridor	There is no floodway corridor defined or required to be considered for flows within the existing gully. The gully is noted to be a first order watercourse that only conveys runoff during periods of rainfall.
Criteria 10 The filling does not occur within the drip line of existing trees	Filling is proposed within the development land. It is expected that trees within development land will be affected by the civil works and future industrial development, consistent with the nature of the future development and zoning of the land. This is also noted to be consistent with the zoning of the land and discussion with Council.

8.6.2 South Ck Floodplain Risk Management Plan Recommended DCP Criteria (1% AEP Comparison)

Table 8.2. Confirmation of DCP Part C3/ South Creek Floodplain Risk Management Plan Recommended Criteria (1.0% AEP)

South Creek Floodplain Risk Management Plan Recommended DCP Criteria	Post Development Scenario Confirmation (1% AEP Event)
Recommended Criteria 1 Flood levels are not increased by more than 0.02m (20mm) outside of the development site.by the proposed filling.	The development proposes conveyance of flows up to the 1% AEP meeting councils limit on off-site affectation. Refer confirmation in **Section 8.5**. Flood level increase criteria is considered to be met.
Recommended Criteria 2/ 3	

South Creek Floodplain Risk Management Plan Recommended DCP Criteria	Post Development Scenario Confirmation (1% AEP Event)
On the development site itself, flood hazard is not increased to greater than "low" based on current ARR criteria for hazard. Low hazard zones are defined in ARR as where D.V < 0.4 m^2/s for children and D.V < 0.6 m2/s for adults and should be applied depending on the type of development. Isolated areas of high hazard may be considered at Council's discretion where people are prevented from entering the area i.e. dedicated flow paths. Hazard should never increase to exceed 0.8 m2/s as this is the limiting working flow for experienced personnel such as trained rescue workers. Flood hazard should be assessed for the duration of the event and is not necessarily the flood hazard at the time of the peak flood level. Flood hazard on surrounding properties should not increase.	Flood hazard and velocity mapping has been included in Section 8.5 of this report. The assessment shows acceptable hazard ratings and limited change in existing hazard rating. Velocity and flood hazard change criteria is considered to be met.
Recommended Criteria 4 The potential for cumulative effects of possible development proposals in that area is minimal	The development ensures that there is limited and acceptable offsite changes. Further, future developments proposed to coordinate conveyance of flows within dedicated precinct drainage systems. There is limited or no potential for adverse effect on future development potential of surround properties as a result of the proposed development. Cumulative effect criteria is considered to have been met.
Recommended Criteria 5 Where possible, any losses in floodplain storage are to be offset by compensatory cut at the same or a similar elevation.	The overland flow is noted to be confined to existing gully and farm dams. The proposed development includes for detention storage for all catchments which could act as flood storage for some events. Generally as a conveyance area, flood storage is not required, however as noted above some storage will be available. Flood storage criteria is considered to have been met.

South Creek Floodplain Risk Management Plan Recommended DCP Criteria	Post Development Scenario Confirmation (1% AEP Event)
Recommended Criteria 6/7 The flood liability and flood hazard of surrounding land is not adversely affected by the filling proposal	The flood liability of surrounding developments is not affected by the development proposal. surrounding buildings or properties.
Recommended Criteria 8 No local drainage flow/runoff problems are created by the development.	We confirm that no local drainage flow/runoff problems are created by the proposed development. All local tributaries and flow paths will either operate in a similar manner to the existing regime or form part of the overall stormwater management system for the estate.
Recommended Criteria 9 The filling does not occur within Floodway Corridor	There is no floodway corridor defined or required to be considered for flows within the existing gully. The gully is noted to be a first order watercourse that only conveys runoff during periods of rainfall.
Recommended Additional Criteria (i) Additional controls for critical facilities (eg schools, hospital, aged care facilities). (ii) Requirements for Flood Impact Asssessment (FIA) and Flood Risk Assessments (FRA) commensurate to development size, type and flood risk. (iii) Climate Change	(i) The proposed development is for industrial use and not considered to involve critical facilities. (ii) This report provides the necessary FIA and FRA. (iii) Given the limited catchment and site being located at the top of the catchment climate change assessment is not considered necessary for this development.

8.7 Climate Change Sensitivity Assessment

An assessment has been undertaken for the effect of climate change on the development. The assessment takes into consideration potential effect from increased rainfall intensity and sea level rise.

An assessment of the 0.2% AEP and 0.5% AEP was included as a proxy for the effect of climate change and is considered a conservative assessment for a 10% increase in flow to the 1% AEP event. Modelling has been undertaken for the 0.2% AEP and 0.5% AEP and flood afflux results are shown in **Figures 8.13 & 8.14**. Afflux results show minimal flood level change on the western side of the Mamre Road in the 0.5% AEP and 0.2% AEP when compared to the 1% AEP event. There is minor increase in flood afflux within. This assessment shows that the proposed stormwater drainage system and existing overland flow paths would have sufficient capacity to

manage the increased peak flows and water volume with minor increase in peak water level at areas surrounding the flow diversion culverts under the proposed development lot. We confirm the increase in rainfall intensities will achieve the required minimum 0.5m freeboard to the proposed development levels in relation to overland flow paths from external & local catchments.

Overall, flood immunity of the proposed development sites would not be compromised given a large available freeboard amount much larger than minimum 0.5m values generally adopted.

The site is situated well upstream from any tidally influenced receiving waters including expected potential sea level rise of 0.4m. We confirm the development will not affect or be affected by potential sea level rise.

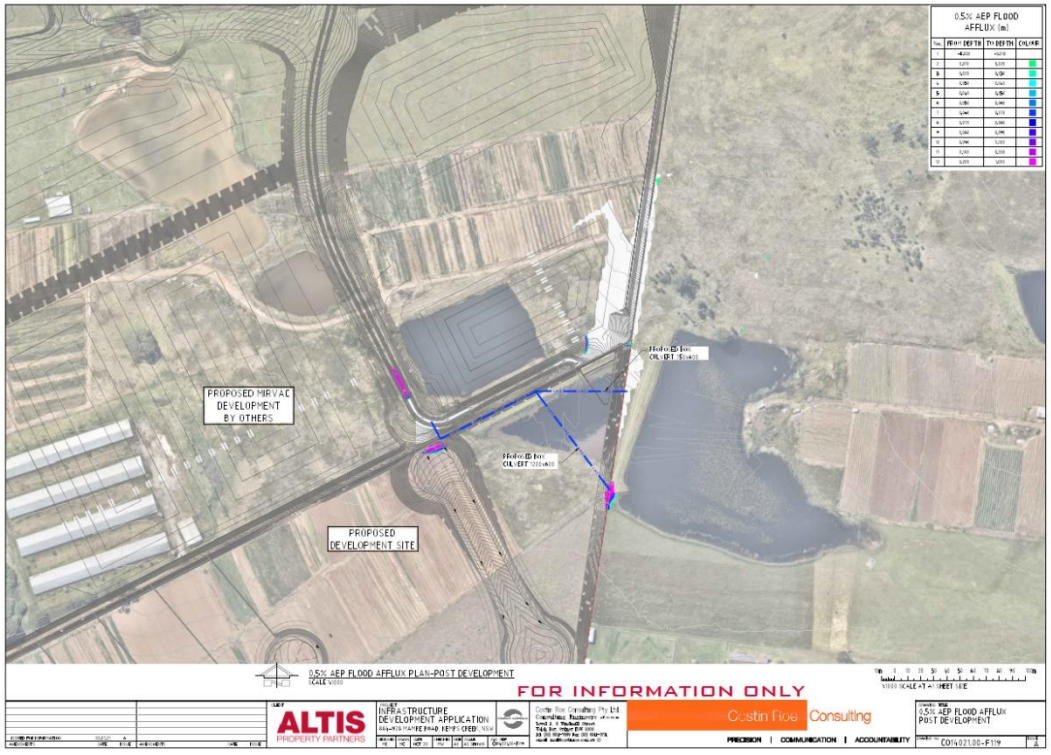


Figure 8.13: 0.5% AEP Post Developed Flood Level Afflux

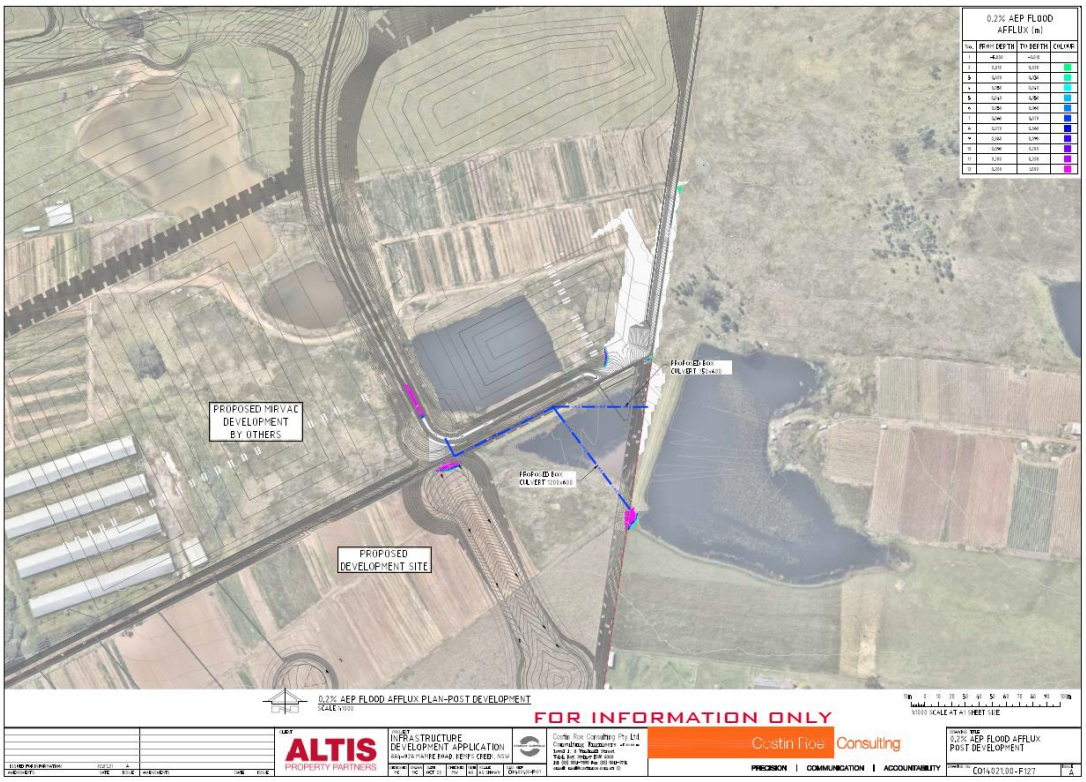


Figure 8.14: 0.2% AEP Post Developed Flood Level Afflux

8.8 Flood Assessment Conclusion

A TUFLOW hydrodynamic flood model has been completed and the pre and post development flood events assessed for flooding as a result of a 1% AEP rainfall event within the catchment.

The assessment of the 1% AEP event confirms that conveyance paths are available to the South-East side of the proposed estate development. There is negligible effect on flood water local to the development. The TUFLOW Modelling completed by Costin Roe Consulting and confirmation of DCP Criteria in **Section 8.7** confirms there is no affectation of upstream, downstream or adjoining properties.

9 CONSTRUCTION SOIL AND WATER MANAGEMENT

9.1 Soil and Water Management General

Without any mitigation measures and during typical construction activities, site runoff would be expected to convey a significant sediment load. A *Soil and Water Management Plan* (SWMP) and *Erosion and Sediment Control Plan* (ESCP), or equivalent, would be implemented for the construction of the Proposal. The SWMP and ESCPs would be developed in accordance with the principles and requirements of *Managing Urban Stormwater – Soils & Construction Volume 1 ('Blue Book')(Landcom, 2004)* with a staged approach.

In accordance with the principles included in the Blue Book, a number of controls have been incorporated into a preliminary Staged ESCP (refer to accompanying Drawings in **Appendix A**) and draft SWMP in **Appendix C**. The Staged ESCP considers initial site establishment, requirements during construction of roads and infrastructure and estate earthworks, completion of estate works and the period between this and development of individual lots.

Section 1 provides a summary of the construction works for the Proposal. While all construction activities have the potential to impact on water quality, the key activities are:

- Erosion and sediment control installation.
- Grading of existing earthworks to suit building layout, drainage layout and pavements.
- Stormwater and drainage works.
- Service installation works.
- Building construction works.

The sections below outline the proposed controls for management of erosion and sedimentation during construction of the Proposal. The staged approach is noted to consider initial site establishment, construction of the estate and the period between completed of the estate infrastructure works and development of individual lots in the estate as included in the ESCP drawings **Appendix A**.

9.2 Typical Management Measures

Sediment Basins

Sediment basins have been sized (based on 5 day 85th percentile rainfall) and located to ensure sediment concentrations in site runoff are within acceptable limits. Preliminary basin sizes have been calculated in accordance with the Blue Book and are based on 'Type F' soils. These soils are fine grained and require a relatively long residence time to allow settling.

Sediment basins for 'Type F' soils are typically wet basins which are pumped out following a rainfall event when suspended solids concentrations of less than 50 mg/L have been achieved.

Sediment Fences

Sediment fences are located around the perimeter of the site to ensure no untreated runoff leaves the site. They have also been located around the existing drainage channels to minimise sediment migration into waterways and sediment basins.

Stabilised Site Access

For the proposal, stabilised site access is proposed at one location at the entry to the works area. This will limit the risk of sediment being transported onto Mamre Road and other public roads.

9.3 Other Management Measures

Other management measures that will be employed are expected to include:

- Minimising the extent of disturbed areas across the site at any one time.
- Progressive stabilisation of disturbed areas or previously completed earthworks to suit the proposal once trimming works are complete.
- Regular monitoring and implementation of remedial works to maintain the efficiency of all controls.

It is noted that the controls included in the preliminary ESCP are expected to be reviewed and updated as the design, staging and construction methodology is further developed for the Proposal.

10 CONCLUSION

This Civil Engineering Report has been prepared to support the State Significant Development Application for a Proposed Development at Lots 52 & 53 DP259135 at 884 Mamre Road, Kemps Creek, NSW.

A civil engineering strategy for the site has been developed which provides a best practice solution within the constraints of the existing landform and proposed development layout. Within this strategy a stormwater quantity and quality management strategy has been developed to reduce both peak flows and pollutant loads in stormwater leaving this site. The stormwater management for the development has been designed in accordance with Penrith City Council and with consideration to the DPIE Final MRP DCP 2021, and the RtS submission from various agencies distributed in November of 2021.

The hydrological assessment proves local post development flows from the site will be less than pre-development flows and demonstrates that the site discharge will not adversely affect any land, drainage system or watercourse as a result of the development.

During the construction phase, a Sediment and Erosion Control Plan will be in place to ensure the downstream drainage system and receiving waters are protected from sediment laden runoff.

During the operational phase of the development, a treatment train incorporating the use of a proprietary filtration system is proposed to mitigate any increase in stormwater pollutant load generated by the development. MUSIC modelling results indicate that the proposed STM are effective in reducing pollutant loads in stormwater discharging from the site and meet the requirements of Council's pollution reduction targets. Best management practices have been applied to the development to ensure that the quality of stormwater runoff is not detrimental to the receiving environment.

Stream health, per the MARV/FDC metrics included in the Final MRP DCP, per NSW EES have been confirmed for the current proposed Lot 2 development and construction of the proposed estate roads.

It is recommended the management strategies in this report be approved and incorporated into the future detailed design.

11 REFERENCES

- Mamre Road Precinct Development Control Plan – 2021 (NSW DPIE)
- NSW Government (2005). *Floodplain Development Manual.*
- Managing Urban Stormwater: Harvesting and Reuse – 2006 (NSW DEC);
- Managing Urban Stormwater: Source Control – 1998 (NSW EPA);
- Managing Urban Stormwater: Treatment Techniques – 1997 (NSW EPA);
- Landcom (2004). *Managing Urban Stormwater – Soils and Construction* – 4th Edition.
- Penrith City Council – DCP 2013 (Part C3); and
- Water Sensitive Urban Design – "Technical Guidelines for Western Sydney" by URS Australia Pty Ltd, May 2004

Appendix A

DRAWINGS BY COSTIN ROE CONSULTING

STATE SIGNIFICANT DEVELOPMENT APPLICATION
ACCESS LOGISTICS PARK
884-928 MAMRE ROAD, KEMPS CREEK, NSW, 2178

DRAWING LIST

DRAWING NO. DRAWING TITLE

GENERAL
C014021.00- SSDA100 DRAWING LIST AND LOCALITY PLAN

EROSION AND SEDIMENT CONTROL
C014021.00- SSDA201 EROSION AND SEDIMENT CONTROL PLAN - STAGE 1
C014021.00- SSDA202 EROSION AND SEDIMENT CONTROL PLAN - STAGE 2
C014021.00- SSDA203 EROSION AND SEDIMENT CONTROL PLAN - STAGE 3
C014021.00- SSDA250 EROSION AND SEDIMENT CONTROL DETAILS

EARTHWORKS PLANS
C014021.00- SSDA300 BULK EARTHWORKS & CUT/FILL PLAN
C014021.00- SSDA350 BULK EARTHWORKS SECTIONS - SHEET 1
C014021.00- SSDA351 BULK EARTHWORKS SECTIONS - SHEET 2

INFRASTRUCTURE DRAINAGE
C014021.00- SSDA400 STORMWATER DRAINAGE MASTER PLAN
C014021.00- SSDA401 PRE DEVELOPMENT STORMWATER CATCHMENT PLAN
C014021.00- SSDA402 POST DEVELOPMENT STORMWATER CATCHMENT PLAN
C014021.00- SSDA405 WATER SENSITIVE URBAN DESIGN MANAGEMENT PLAN
C014021.00- SSDA411 STORMWATER DRAINAGE PLAN LOT 2
C014021.00- SSDA431 OSD BASIN 1 PLAN
C014021.00- SSDA432 OSD BASIN 2 PLAN
C014021.00- SSDA451 STORMWATER DRAINAGE DETAILS - SHEET 1
C014021.00- SSDA452 STORMWATER DRAINAGE DETAILS - SHEET 2
C014021.00- SSDA453 STORMWATER DRAINAGE DETAILS - SHEET 3

ROADWORKS
C014021.00- SSDA500 ROADWORKS PLAN
C014021.00- SSDA521 ROADWORKS LONG SECTIONS ESTATE ROAD - SHEET 1
C014021.00- SSDA522 ROADWORKS LONG SECTIONS ESTATE ROAD - SHEET 2
C014021.00- SSDA550 ROADWORKS TYPICAL SECTIONS
C014021.00- SSDA590 SWEPT PATH PLAN - B-DOUBLE & SUPER B-DOUBLE LEFT HAND & RIGHT HAND TURNS
C014021.00- SSDA591 SWEPT PATH PLAN - B-DOUBLE CONCURRENT LEFT HAND TURN - ROUNDABOUT
C014021.00- SSDA592 SWEPT PATH PLAN - B-DOUBLE CONCURRENT RIGHT HAND TURN - ROUNDABOUT
C014021.00- SSDA593 SWEPT PATH PLAN - B-TRIPLE LEFT AND RIGHT TURN - ROUNDABOUT
C014021.00- SSDA594 SWEPT PATH PLAN - B-DOUBLE CONCURRENT RIGHT HAND TURN - ROUNDABOUT
C014021.00- SSDA595 SWEPT PATH PLAN - B-DOUBLE CONCURRENT LEFT HAND TURN - ROUNDABOUT
C014021.00- SSDA596 SWEPT PATH PLAN - SUPER B-DOUBLE RIGHT HAND TURN IN AND LEFT HAND TURN OUT
C014021.00- SSDA597 SWEPT PATH PLAN - SUPER B-DOUBLE LEFT HAND TURN IN AND RIGHT HAND TURN OUT
C014021.00- SSDA598 SWEPT PATH PLAN - B-TRIPLE LEFT HAND TURN IN AND RIGHT HAND TURN OUT
C014021.00- SSDA599 SWEPT PATH PLAN - B-TRIPLE RIGHT HAND TURN IN AND LEFT HAND TURN OUT

RETAINING WALLS
C014021.00- SSDA600 RETAINING WALL SETOUT PLAN
C014021.00- SSDA610 TYPICAL SECTION - SHEET 1
C014021.00- SSDA611 TYPICAL SECTION - SHEET 2
C014021.00- SSDA612 TYPICAL SECTION - SHEET 3
C014021.00- SSDA650 RETAINING WALL DETAILS

GENERAL NOTES:

1. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL ARCHITECTURAL AND OTHER CONSULTANTS' DRAWINGS AND SPECIFICATIONS AND WITH SUCH OTHER WRITTEN INSTRUCTIONS AS MAY BE ISSUED DURING THE COURSE OF THE CONTRACT. ANY DISCREPANCY SHALL BE REFERRED TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.
2. ALL MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE RELEVANT AND CURRENT STANDARDS AUSTRALIA CODES AND WITH THE BY-LAWS AND ORDINANCES OF THE RELEVANT BUILDING AUTHORITIES EXCEPT WHERE VARIED BY THE PROJECT SPECIFICATION.
3. ALL DIMENSIONS SHOWN SHALL BE VERIFIED BY THE BUILDER ON SITE. ENGINEER'S DRAWINGS SHALL NOT BE SCALED FOR DIMENSIONS. ENGINEER'S DRAWINGS ISSUED IN ANY ELECTRONIC FORMAT MUST NOT BE USED FOR DIMENSIONAL SETOUT. REFER TO THE ARCHITECT'S DRAWINGS FOR ALL DIMENSIONAL SETOUT INFORMATION.
4. DURING CONSTRUCTION THE STRUCTURE SHALL BE MAINTAINED IN A STABLE CONDITION AND NO PART SHALL BE OVERSTRESSED. TEMPORARY BRACING SHALL BE PROVIDED BY THE BUILDER TO KEEP THE WORKS AND EXCAVATIONS STABLE AT ALL TIMES.
5. UNLESS NOTED OTHERWISE ALL LEVELS ARE IN METRES AND ALL DIMENSIONS ARE IN MILLIMETRES.
6. ALL WORKS SHALL BE UNDERTAKEN IN ACCORDANCE WITH ACCEPTABLE SAFETY STANDARDS & APPROPRIATE SAFETY SIGNS SHALL BE INSTALLED AT ALL TIMES DURING THE PROGRESS OF THE JOB.

ELECTRONIC INFORMATION NOTES:

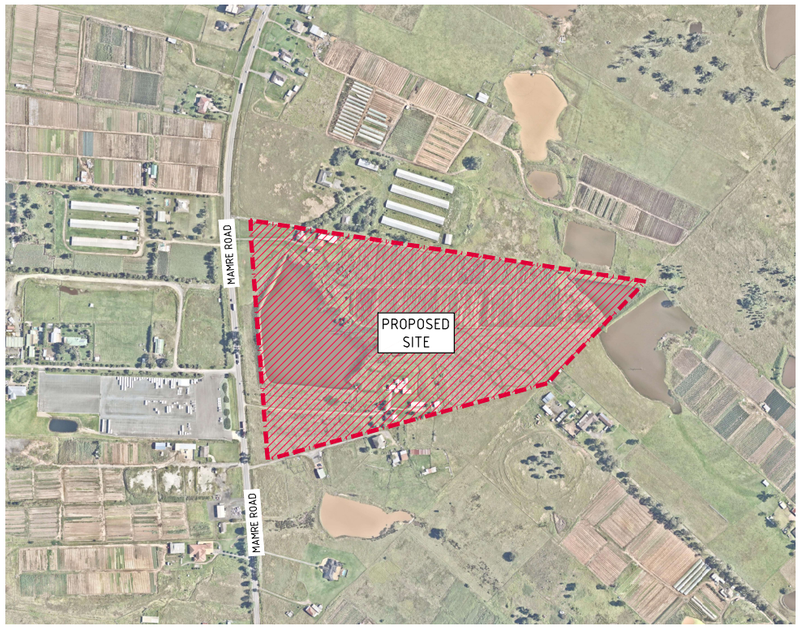
1. THE ISSUED DRAWINGS IN HARD COPY OR PDF FORMAT TAKE PRECEDENCE OVER ANY ELECTRONICALLY ISSUED INFORMATION, LAYOUTS OR DESIGN MODELS.
2. THE CONTRACTOR'S DIRECT AMENDMENT OR MANIPULATION OF THE DATA OR INFORMATION THAT MIGHT BE CONTAINED WITHIN AN ENGINEER-SUPPLIED DIGITAL TERRAIN MODEL AND ITS SUBSEQUENT USE TO UNDERTAKE THE WORKS WILL BE SOLELY AT THE DISCRETION OF AND THE RISK OF THE CONTRACTOR.
3. THE CONTRACTOR IS REQUIRED TO HIGHLIGHT ANY DISCREPANCIES BETWEEN THE DIGITAL TERRAIN MODEL AND INFORMATION PROVIDED IN THE CONTRACT AND/OR DRAWINGS AND IS REQUIRED TO SEEK CLARIFICATION FROM THE SUPERINTENDENT.
4. THE ENGINEER WILL NOT BE LIABLE OR RESPONSIBLE FOR THE POSSIBLE ON-GOING NEED TO UPDATE THE DIGITAL TERRAIN MODEL, SHOULD THERE BE ANY AMENDMENTS OR CHANGES TO THE DRAWINGS OR CONTRACT INITIATED BY THE CONTRACTOR.

EXISTING SERVICES NOTES:

1. DURING THE EXECUTION OF WORKS, THE CONTRACTOR SHALL MAINTAIN THE INTEGRITY OF EXISTING SERVICES. THE CONTRACTOR SHALL REPAIR ANY DAMAGE CAUSED TO THE EXISTING SERVICES TO THE SATISFACTION OF THE SUPERINTENDENT AND THE RELEVANT SERVICE AUTHORITY, AT NO COST TO THE PRINCIPAL.
2. WHERE IT IS NECESSARY TO REMOVE, DIVERT OR CUT INTO ANY EXISTING SERVICE, THE CONTRACTOR SHALL GIVE AT LEAST THREE (3) DAYS NOTICE OF ITS REQUIREMENTS TO THE SUPERINTENDENT, WHO WILL ADVISE WHAT ARRANGEMENTS SHOULD BE MADE FOR THE ALTERATION OF SUCH EXISTING WORKS.
3. EXISTING SERVICES HAVE BEEN PLOTTED FROM SUPPLIED DATA. THE ACCURACY IS NOT GUARANTEED. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO ESTABLISH THE LOCATION AND LEVEL OF ALL EXISTING SERVICES PRIOR TO COMMENCING WORK. ALL CLEARANCES AND APPROVALS SHALL ALSO BE OBTAINED FROM THE RELEVANT SERVICE AUTHORITY PRIOR TO THE COMMENCEMENT OF WORK.
4. ALL NEW AND EXHUMED SERVICES THAT CROSS EXISTING AND FUTURE ROADS/PAVEMENTS WITHIN THE SITE SHALL BE BACKFILLED WITH DGB20 MATERIAL TO SUBGRADE LEVEL AND COMPACTED TO 98% STANDARD DENSITY RATIO. SUBJECT TO PRIOR APPROVAL FROM RELEVANT AUTHORITY.
5. ON COMPLETION OF SERVICES INSTALLATION. ALL DISTURBED AREAS SHALL BE RESTORED TO ORIGINAL, INCLUDING KERBS, FOOTPATHS, CONCRETE AREAS, GRAVEL AREAS, GRASSED AREAS AND ROAD PAVEMENTS.
6. CARE TO BE TAKEN WHEN EXCAVATING NEAR UTILITY SERVICES. NO MECHANICAL EXCAVATION TO BE UNDERTAKEN OVER SERVICES. LIAISE WITH RELEVANT AUTHORITY.
7. THE CONTRACTOR SHALL ALLOW FOR THE CAPPING OFF, EXCAVATION AND REMOVAL IF REQUIRED OF ALL EXISTING SERVICES IN AREAS AFFECTED BY THE WORKS WITHIN THE CONTRACT AREA AS SHOWN ON THE DRAWINGS UNLESS DIRECTED OTHERWISE BY THE SUPERINTENDENT. ALL TO REGULATORY AUTHORITY STANDARDS AND APPROVAL.
8. THE CONTRACTOR IS TO MAINTAIN EXISTING STORMWATER DRAINAGE FLOWS THROUGH THE ROADS AT ALL TIMES. MAKE DUE ALLOWANCE FOR ALL SUCH FLOWS AT ALL TIMES.
9. PRIOR TO COMMENCEMENT OF ANY WORKS THE CONTRACTOR SHALL OBTAIN THE SUPERINTENDENT'S APPROVAL OF THE PROGRAM FOR THE RELOCATION/CONSTRUCTION OF TEMPORARY SERVICES.
10. CONTRACTOR SHALL CONSTRUCT TEMPORARY SERVICES AS REQUIRED TO MAINTAIN EXISTING SUPPLY TO BUILDINGS REMAINING IN OPERATION DURING WORKS TO THE SATISFACTION AND APPROVAL OF THE SUPERINTENDENT. ONCE DIVERSION IS COMPLETE AND COMMISSIONED THE CONTRACTOR SHALL REMOVE ALL SUCH TEMPORARY SERVICES AND MAKE GOOD TO THE SATISFACTION OF THE SUPERINTENDENT.
11. INTERRUPTION TO SUPPLY OF EXISTING SERVICES SHALL BE DONE SO AS NOT TO CAUSE ANY INCONVENIENCE OR DAMAGE TO THE ADJACENT RESIDENCES. CONTRACTOR TO GAIN APPROVAL OF THE SUPERINTENDENT FOR TIME OF INTERRUPTION.
12. THE CONTRACTOR SHALL UNDERTAKE A DIAL BEFORE YOU DIG (DBYD 1100) SERVICES SEARCH BEFORE THE COMMENCEMENT OF ANY WORKS.

SURVEY NOTE:

1. EXISTING SITE LEVELS AND DETAILS BASED ON A PLAN OF SURVEY 'SY074794.000.2.' BY 'LANDPARTNERS' DATED 25.03.2021.



LOCALITY PLAN
NOT TO SCALE

FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

AMENDMENTS	DATE	ISSUE
FOR STATE SIGNIFICATION DEVELOPMENT APPLICATION	30.03.22	F
ISSUED FOR INFORMATION	25.03.22	E
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	06.07.21	D
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	02.07.21	C
ISSUED FOR PRELIMINARY ONLY	25.06.21	B
ISSUED FOR PRELIMINARY ONLY	01.04.21	A

AMENDMENTS	DATE	ISSUE
FOR STATE SIGNIFICATION DEVELOPMENT APPLICATION	23.11.22	G

PROJECT MANAGER: ProjectStrategy
ARCHITECT: nettletontribe
CLIENT: ALTIS PROPERTY PARTNERS

PROJECT: ACCESS LOGISTICS PARK
884-928 MAMRE ROAD
KEMPS CREEK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
DS	JB	AUG '20	MW	A0	AS SHOWN	C014021.00-SSDA100

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Costin Roe Consulting
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DRAWING TITLE: DRAWING LIST AND LOCALITY PLAN
DRAWING No: C014021.00-SSDA100
ISSUE: G

MAMRE ROAD

STABILISED CONSTRUCTION ENTRY.
REFER TO DRAWING SSDA250 FOR DETAIL.

SILT FENCE

1 SSDA250

DIVERSION DRAIN

DIVERSION DRAIN

SEDIMENT BASIN 1 UTILISED:

CATCHMENT AREA	= 13.27ha
REQUIRED BASIN VOLUME	= 4,459m³
BASE DIMENSION (LxB)	= 72.0m x 36.0m
TOP DIMENSION (LxB)	= 81.0m x 45.0m
MAX SIDE SLOPE	= 1V:3H
DEPTH	= 1.5m
PROVIDED BASIN VOLUME	= 4,655m³

SEDIMENT BASIN 1
CATCHMENT
AREA: 13.27 HA

EXISTING POND TO BE DEWATERED AS PER POND DEWATERING NOTES. POND TO BE UTILISED AS SEDIMENTATION BASIN.

EMERGENCY OVERFLOW WIER

EXISTING POND TO BE DEWATERED AS PER POND DEWATERING NOTES.

SILT FENCE

EXISTING POND

EMERGENCY OVERFLOW WIER

DIVERSION DRAIN

SEDIMENT BASIN 2 UTILISED:

CATCHMENT AREA	= 3.13ha
REQUIRED BASIN VOLUME	= 1,052m³
BASE DIMENSION (LxB)	= 32.0m x 16.0m
TOP DIMENSION (LxB)	= 41.0m x 25.0m
MAX SIDE SLOPE	= 1V:3H
DEPTH	= 1.5m
PROVIDED BASIN VOLUME	= 1,131m³

SEDIMENT BASIN 2
CATCHMENT
AREA: 3.13 HA

EXISTING POND TO BE DEWATERED AS PER POND DEWATERING NOTES. POND TO BE UTILISED AS SEDIMENTATION BASIN.

EXISTING POND

DIVERSION DRAIN

SILT FENCE

STABILISED CONSTRUCTION ENTRY.
REFER TO DRAWING SSDA250 FOR DETAIL.

1 SSDA250

DIVERSION DRAIN

SEDIMENT BASIN 3
CATCHMENT
AREA: 3.85 HA

DIVERSION DRAIN

DIVERSION DRAIN

SILT FENCE

MAMRE ROAD

EMERGENCY OVERFLOW WIER

SEDIMENT BASIN 3:

CATCHMENT AREA	= 3.85ha
REQUIRED BASIN VOLUME	= 1,294m³
BASE DIMENSION (LxB)	= 36.0m x 18.0m
TOP DIMENSION (LxB)	= 45.0m x 27.0m
MAX SIDE SLOPE	= 1V:3H
DEPTH	= 1.5m
PROVIDED BASIN VOLUME	= 1,375m³

EROSION AND SEDIMENT CONTROL PLAN - STAGE 1
1:750 SCALE

LEGEND:

PROVIDE 1m RETURNS TO SILT FENCE AT 30m MAX. INTERVALS. TYPICAL (N.S.O.P.)

- DENOTES DIVERSION DRAIN
- DENOTES SILT FENCE WITH CATCH DRAIN
- DENOTES SILT FENCE ONLY
- DENOTES CONSTRUCTION ENTRY
- DENOTES OVERLAND FLOW PATH
- DENOTES EXISTING POND TO BE DEWATERED

POND DEWATERING NOTES:

1. DRAIN PONDS OF WATER & DISCHARGE CLEAN WATER TO STORMWATER DRAINAGE SYSTEM (AS PER NOTES 2 & 3) - REFER TO STORMWATER PLAN FOR LOCATIONS.
2. DEWATERING TO BE PERFORMED IN SUCH A MANNER AS TO REMOVE CLEAN WATER WITHOUT REMOVING OR DISTURBING SILT, SEDIMENT OR OTHER ORGANIC MATERIAL FROM THE BASE OF THE PONDS.
3. DISCHARGE OF WATER FROM PONDS TO HAVE A PH RANGE OF 6.5-8.5 AND TSS < 50mg/L. PONDS TO BE DOSED WITH GYPSUM (APPROX. 30mg PER CUBIC METRE) TO ACCELERATE SETTLEMENT OF SUSPENDED SOLIDS.
4. REMOVE ALL SILT, ORGANIC AND WATER LOGGED MATERIAL FROM BASE OF POND (NOM. DEPTH 0.5-1.0m) AND DISPOSE OF IN ACCORDANCE WITH THE ACCEPTABLE PRACTICE.
5. EXPOSE NATURAL SITE SOILS AND COMPACT SUBGRADE IN ACCORDANCE WITH THE SITE PREPARATION NOTES (REFER DRG. DA10) REMOVING ANY SOFT ZONES AS REQ'D.
6. PLACE AND COMPACT FILL AS PER SITE PREPARATION NOTES ON DRAWING CI110.
7. INFORMATION PROVIDED ON THIS DRAWING SHALL BE USED TO GUIDE THE DEVELOPMENT OF THE CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN THAT SHALL BE IMPLEMENTED DURING CONSTRUCTION

SEDIMENTATION BASIN NOTE:

FOR SEDIMENT & EROSION CONTROL DETAILS REFER TO DRAWING C01402100-SSDA250.
SEDIMENTATION BASIN SIZING BASED ON RECOMMENDATIONS OF 'SOILS AND CONSTRUCTION, MANAGING URBAN STORMWATER-THE BLUE BOOK'. CAPACITY BASED UPON 5 DAY RAINFALL DEPTH AT 80th PERCENTILE INTENSITY (32.2mm).

APPROXIMATE AREA OF DISTURBED SITE = 19.88ha

SEDIMENTATION BASINS TO COLLECT RUN-OFF IN EXTREME RAINFALL EVENTS. COLLECTED RUN-OFF TO BE ASSESSED BY A QUALIFIED LABORATORY FOR DOUSING RATES OF ALUM OR GYPSUM TO ENSURE COAGULATION OF SEDIMENTS PRIOR TO WATER BEING DISCHARGED TO COUNCIL STORMWATER SYSTEM.

EACH BASIN IS TO HAVE A MARKER PLACED AS PER THE DETAIL TO INDICATE WHEN SEDIMENT IS TO BE REMOVED. REMOVED SEDIMENT IS TO BE CLASSED AND DEWATERED PRIOR TO REMOVAL FROM SITE.

ALLOWANCE TO BE MADE DURING BENCHING OF SITE TO ENSURE RUN-OFF IS DIRECTED TO SEDIMENTATION BASINS.

NOTES:
1. ASSUME TYPE D SOIL (CLAY/SILTY CLAY)
2. ASSUME GROUP D SOIL (HIGH PLASTICITY AND SHRINK/SWELL PROPERTIES)

EROSION CONTROL NOTES:

ALL CONTROL WORK INCLUDING DIVERSION BANKS AND CATCH DRAINS, V-DRAINS AND SILT FENCES SHALL BE COMPLETED DIRECTLY FOLLOWING THE COMPLETION OF THE EARTHWORKS.

1. SILT FENCES AND SILT FENCE RETURNS SHALL BE ERECTED CONVEX TO THE CONTOUR TO POND WATER.
2. HAY BALE BARRIERS AND GEOFABRIC FENCES ARE TO BE CONSTRUCTED TO TOE OF BATTER, PRIOR TO COMMENCEMENT OF EARTHWORKS, IMMEDIATELY AFTER CLEARING OF VEGETATION AND BEFORE REMOVAL OF TOP SOIL.
3. ALL TEMPORARY EARTH BERMS, DIVERSION AND SILT DAM EMBANKMENTS ARE TO BE MACHINE COMPACTED, SEEDED AND MULCHED FOR TEMPORARY VEGETATION COVER AS SOON AS THEY HAVE BEEN FORMED.
4. CLEAR WATER IS TO BE DIVERTED AWAY FROM DISTURBED GROUND AND INTO THE DRAINAGE SYSTEM.
5. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING AND PROVIDING ON GOING ADJUSTMENT TO EROSION CONTROL MEASURES AS REQUIRED DURING CONSTRUCTION.
6. ALL SEDIMENT TRAPPING STRUCTURES AND DEVICES ARE TO BE INSPECTED AFTER STORMS FOR STRUCTURAL DAMAGE OR CLOGGING, TRAPPED MATERIAL IS TO BE REMOVED TO A SAFE, APPROVED LOCATION.
7. ALL FINAL EROSION PREVENTION MEASURES INCLUDING THE ESTABLISHMENT OF GRASSING ARE TO BE MAINTAINED UNTIL THE END OF THE DEFECTS LIABILITY PERIOD.
8. ALL EARTHWORKS AREAS SHALL BE ROLLED ON A REGULAR BASIS TO SEAL THE EARTHWORKS.
9. ALL FILL AREAS ARE TO BE LEFT WITH A BUND AT THE TOP OF THE SLOPE AT THE END OF EACH DAYS EARTHWORKS. THE HEIGHT OF THE BUND SHALL BE A MINIMUM OF 200mm.
10. ALL CUT AND FILL SLOPES ARE TO BE SEEDED AND HYDROMULCHED WITHIN 10 DAYS OF COMPLETION OF FORMATION.
11. AFTER REVEGETATION OF THE SITE IS COMPLETE AND THE SITE IS STABLE IN THE OPINION OF A SUITABLY QUALIFIED PERSON ALL TEMPORARY WORK SUCH AS SILT FENCE, DIVERSION DRAINS ETC SHALL BE REMOVED.
12. ALL TOPSOIL STOCKPILES ARE TO BE SUITABLY COVERED TO THE SATISFACTION OF THE SITE MANAGER TO PREVENT WIND AND WATER EROSION.
13. ANY AREA THAT IS NOT APPROVED BY THE CONTRACT ADMINISTRATOR FOR CLEARING OR DISTURBANCE BY THE CONTRACTOR'S ACTIVITIES SHALL BE CLEARLY MARKED AND SIGN POSTED, FENCED OFF OR OTHERWISE APPROPRIATELY PROTECTED AGAINST ANY SUCH DISTURBANCE.
14. ALL STOCKPILE SITES SHALL BE SITUATED IN AREAS APPROVED FOR SUCH USE BY THE SITE MANAGER. A 6m BUFFER ZONE SHALL EXIST BETWEEN STOCKPILE SITES AND ANY STREAM OR FLOW PATH. ALL STOCKPILES SHALL BE ADEQUATELY PROTECTED FROM EROSION AND CONTAMINATION OF THE SURROUNDING AREA BY USE OF THE MEASURES APPROVED IN THE EROSION AND SEDIMENTATION CONTROL PLAN.
15. ACCESS AND EXIT AREAS SHALL INCLUDE SHAKE-DOWN OR OTHER METHODS APPROVED BY THE SITE MANAGER FOR THE REMOVAL OF SOIL MATERIALS FORM MOTOR VEHICLES.
16. THE CONTRACTOR IS TO ENSURE RUNOFF FROM ALL AREAS WHERE THE NATURAL SURFACE IS DISTURBED BY CONSTRUCTION, INCLUDING ACCESS ROADS, DEPOT AND STOCKPILE SITES, SHALL BE FREE OF POLLUTANTS BEFORE IT IS EITHER DISPERSED TO STABLE AREAS OR DIRECTED TO NATURAL WATERCOURSES.
17. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN SLOPES, CROWNS AND DRAINS ON ALL EXCAVATIONS AND EMBANKMENTS TO ENSURE SATISFACTORY DRAINAGE AT ALL TIMES WATER SHALL NOT BE ALLOWED TO POND ON THE WORKS UNLESS SUCH PONDING IS PART OF AN APPROVED ESCP / SWMP.

6m 0 15 30 45 60 75m
SCALE 1:750 AT A0 SIZE SHEET

FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

AMENDMENTS	DATE	ISSUE
FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	30.03.22	D
ISSUED FOR INFORMATION	25.03.22	C
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	02.07.21	B
ISSUED FOR PRELIMINARY ONLY	25.06.21	A

PROJECT MANAGER: ProjectStrategy
ARCHITECT: nettletontribe
CLIENT: ALTIS PROPERTY PARTNERS

PROJECT: ACCESS LOGISTICS PARK
884-928 MAMRE ROAD
KEMPS CREEK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
DS	JB	AUG '20	MW	A0	AS SHOWN	C01402100-SSDA201

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DRAWING TITLE: EROSION AND SEDIMENT CONTROL PLAN - STAGE 1
DRAWING No: C01402100-SSDA201
ISSUE: D

MAMRE ROAD

DP 259135

SEDIMENT BASIN 5
REFER TO SCHEDULE

SEDIMENT BASIN 6
REFER TO SCHEDULE

SEDIMENT BASIN 7
REFER TO SCHEDULE

EXISTING POND

SEDIMENT BASIN R2
REFER TO SCHEDULE

NOMINAL STOCKPILE LOCATION
T.B.C ON SITE

PROPOSED BUND

SEDIMENT BASIN 15
REFER TO SCHEDULE

NOMINAL STOCKPILE LOCATION
T.B.C ON SITE

PROPOSED BUND

EXISTING POND

SEDIMENT BASIN 8
REFER TO SCHEDULE

SEDIMENT BASIN 13
REFER TO SCHEDULE

SEDIMENT BASIN 9
REFER TO SCHEDULE

SEDIMENT BASIN 14
REFER TO SCHEDULE

SEDIMENT BASIN 10
REFER TO SCHEDULE

SEDIMENT BASIN 12
REFER TO SCHEDULE

SEDIMENT BASIN 11
REFER TO SCHEDULE

SEDIMENT BASIN 2
REFER TO SCHEDULE

MAMRE ROAD

1
SSDA250

STABILISED CONSTRUCTION ENTRY. REFER TO DRAWING SSDA250 FOR DETAIL.

SEDIMENT BASIN R1
REFER TO SCHEDULE

EROSION AND SEDIMENT CONTROL PLAN - STAGE 2
1:750 SCALE

SEDIMENTATION BASIN NOTE:

FOR SEDIMENT & EROSION CONTROL DETAILS REFER TO DRAWING C014021.00-SSDA250.
SEDIMENTATION BASIN SIZING BASED ON RECOMMENDATIONS OF 'SOILS AND CONSTRUCTION, MANAGING URBAN STORMWATER-THE BLUE BOOK'. CAPACITY BASED UPON 5 DAY RAINFALL DEPTH AT 80th PERCENTILE INTENSITY (32.2mm).

APPROXIMATE AREA OF DISTURBED SITE = 19.88ha

SEDIMENTATION BASINS TO COLLECT RUN-OFF IN EXTREME RAINFALL EVENTS. COLLECTED RUN-OFF TO BE ASSESSED BY A QUALIFIED LABORATORY FOR DOUSING RATES OF ALUM OR GYPSUM TO ENSURE COAGULATION OF SEDIMENTS PRIOR TO WATER BEING DISCHARGED TO COUNCIL STORMWATER SYSTEM.

EACH BASIN IS TO HAVE A MARKER PLACED AS PER THE DETAIL TO INDICATE WHEN SEDIMENT IS TO BE REMOVED. REMOVED SEDIMENT IS TO BE CLASSED AND DEWATERED PRIOR TO REMOVAL FROM SITE.

ALLOWANCE TO BE MADE DURING BENCHING OF SITE TO ENSURE RUN-OFF IS DIRECTED TO SEDIMENTATION BASINS.

NOTES:
1. ASSUME TYPE D SOIL (CLAY/SILTY CLAY)
2. ASSUME GROUP D SOIL (HIGH PLASTICITY AND SHRINK/SWELL PROPERTIES)

SEDIMENT BASIN SCHEDULE

SEDIMENT BASIN	CATCHMENT AREA (Ha)	REQUIRED BASIN VOLUME (m^3)	BASE DIMENSION (LxB)	TOP DIMENSION (LxB)	MAX SIDE SLOPE	DEPTH	PROVIDED BASIN VOLUME (m^3)
BASIN 2	6.7824	2279	50.0m x 24.0m	59.0m x 33.0m	1V:3H	1.5m	2338
BASIN 5	0.6329	213	10.0m x 5.0m	19.0m x 14.0m	1V:3H	1.5m	216
BASIN 6	0.5804	195	9.0m x 5.0m	18.0m x 14.0m	1V:3H	1.5m	584
BASIN 7	0.9845	331	16.0m x 10.0m	25.0m x 19.0m	1V:3H	1.5m	350
BASIN 8	0.3203	108	7.0m x 2.0m	16.0m x 11.0m	1V:3H	1.5m	120
BASIN 9	0.3332	112	7.0m x 2.0m	16.0m x 11.0m	1V:3H	1.5m	120
BASIN 10	0.3320	112	7.0m x 2.0m	16.0m x 11.0m	1V:3H	1.5m	120
BASIN 11	0.4029	135	7.0m x 3.0m	16.0m x 12.0m	1V:3H	1.5m	138
BASIN 12	0.6091	215	10.0m x 5.0m	19.0m x 14.0m	1V:3H	1.5m	216
BASIN 13	0.6412	205	10.0m x 5.0m	19.0m x 14.0m	1V:3H	1.5m	216
BASIN 14	3.3030	1110	32.0m x 16.0m	41.0m x 25.0m	1V:3H	1.5m	1131
BASIN 15	1.7180	538	20.0m x 10.0m	29.0m x 19.0m	1V:3H	1.5m	541
BASIN R1	3.5700	1200	34.0m x 17.0m	43.0m x 26.0m	1V:3H	1.5m	1250
BASIN R2	0.8500	283	14.0m x 7.0m	23.0m x 16.0m	1V:3H	1.5m	328

LEGEND:

PROVIDE 1m RETURNS TO SILT FENCE AT 30m MAX. INTERVALS. TYPICAL (N.S.O.P.)

- DENOTES SILT FENCE ONLY
- DENOTES DIVERSION DRAIN
- DENOTES DIRECTION OF FLOW

EROSION CONTROL NOTES:

ALL CONTROL WORK INCLUDING DIVERSION BANKS AND CATCH DRAINS, V-DRAINS AND SILT FENCES SHALL BE COMPLETED DIRECTLY FOLLOWING THE COMPLETION OF THE EARTHWORKS.

1. SILT FENCES AND SILT FENCE RETURNS SHALL BE ERECTED CONVEX TO THE CONTOUR TO POND WATER.
2. HAY BALE BARRIERS AND GEOFABRIC FENCES ARE TO BE CONSTRUCTED TO TOE OF BATTER, PRIOR TO COMMENCEMENT OF EARTHWORKS, IMMEDIATELY AFTER CLEARING OF VEGETATION AND BEFORE REMOVAL OF TOP SOIL.
3. ALL TEMPORARY EARTH BERMS, DIVERSION AND SILT DAM EMBANKMENTS ARE TO BE MACHINE COMPACTED, SEEDED AND MULCHED FOR TEMPORARY VEGETATION COVER AS SOON AS THEY HAVE BEEN FORMED.
4. CLEAR WATER IS TO BE DIVERTED AWAY FROM DISTURBED GROUND AND INTO THE DRAINAGE SYSTEM.
5. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING AND PROVIDING ON GOING ADJUSTMENT TO EROSION CONTROL MEASURES AS REQUIRED DURING CONSTRUCTION.
6. ALL SEDIMENT TRAPPING STRUCTURES AND DEVICES ARE TO BE INSPECTED AFTER STORMS FOR STRUCTURAL DAMAGE OR CLOGGING, TRAPPED MATERIAL IS TO BE REMOVED TO A SAFE, APPROVED LOCATION.
7. ALL FINAL EROSION PREVENTION MEASURES INCLUDING THE ESTABLISHMENT OF GRASSING ARE TO BE MAINTAINED UNTIL THE END OF THE DEFECTS LIABILITY PERIOD.
8. ALL EARTHWORKS AREAS SHALL BE ROLLED ON A REGULAR BASIS TO SEAL THE EARTHWORKS.
9. ALL FILL AREAS ARE TO BE LEFT WITH A BUND AT THE TOP OF THE SLOPE AT THE END OF EACH DAYS EARTHWORKS. THE HEIGHT OF THE BUND SHALL BE A MINIMUM OF 200mm.
10. ALL CUT AND FILL SLOPES ARE TO BE SEEDED AND HYDROMULCHED WITHIN 10 DAYS OF COMPLETION OF FORMATION.
11. AFTER REVEGETATION OF THE SITE IS COMPLETE AND THE SITE IS STABLE IN THE OPINION OF A SUITABLY QUALIFIED PERSON ALL TEMPORARY WORK SUCH AS SILT FENCE, DIVERSION DRAINS ETC SHALL BE REMOVED.
12. ALL TOPSOIL STOCKPILES ARE TO BE SUITABLY COVERED TO THE SATISFACTION OF THE SITE MANAGER TO PREVENT WIND AND WATER EROSION.
13. ANY AREA THAT IS NOT APPROVED BY THE CONTRACT ADMINISTRATOR FOR CLEARING OR DISTURBANCE BY THE CONTRACTOR'S ACTIVITIES SHALL BE CLEARLY MARKED AND SIGN POSTED, FENCED OFF OR OTHERWISE APPROPRIATELY PROTECTED AGAINST ANY SUCH DISTURBANCE.
14. ALL STOCKPILE SITES SHALL BE SITUATED IN AREAS APPROVED FOR SUCH USE BY THE SITE MANAGER. A 6m BUFFER ZONE SHALL EXIST BETWEEN STOCKPILE SITES AND ANY STREAM OR FLOW PATH. ALL STOCKPILES SHALL BE ADEQUATELY PROTECTED FROM EROSION AND CONTAMINATION OF THE SURROUNDING AREA BY USE OF THE MEASURES APPROVED IN THE EROSION AND SEDIMENTATION CONTROL PLAN.
15. ACCESS AND EXIT AREAS SHALL INCLUDE SHAKE-DOWN OR OTHER METHODS APPROVED BY THE SITE MANAGER FOR THE REMOVAL OF SOIL MATERIALS FORM MOTOR VEHICLES.
16. THE CONTRACTOR IS TO ENSURE RUNOFF FROM ALL AREAS WHERE THE NATURAL SURFACE IS DISTURBED BY CONSTRUCTION, INCLUDING ACCESS ROADS, DEPOT AND STOCKPILE SITES, SHALL BE FREE OF POLLUTANTS BEFORE IT IS EITHER DISPERSED TO STABLE AREAS OR DIRECTED TO NATURAL WATERCOURSES.
17. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN SLOPES, CROWNS AND DRAINS ON ALL EXCAVATIONS AND EMBANKMENTS TO ENSURE SATISFACTORY DRAINAGE AT ALL TIMES WATER SHALL NOT BE ALLOWED TO POND ON THE WORKS UNLESS SUCH PONDING IS PART OF AN APPROVED ESCP / SWMP.

6m 0 15 30 45 60 75m
SCALE 1:750 AT A0 SIZE SHEET

FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

AMENDMENTS	DATE	ISSUE
FOR STATE SIGNIFICATION DEVELOPMENT APPLICATION	15.09.22	F
FOR STATE SIGNIFICATION DEVELOPMENT APPLICATION	30.03.22	E
ISSUED FOR INFORMATION	30.03.22	D
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ISSUED FOR PRELIMINARY ONLY	25.06.21	A

AMENDMENTS | DATE | ISSUE

PROJECT MANAGER: ProjectStrategy

ARCHITECT: nettletontribe

CLIENT: ALTIS PROPERTY PARTNERS

PROJECT: ACCESS LOGISTICS PARK
884-928 MAMRE ROAD
KEMPS CREEK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
DS	JB	AUG '20	MW	A0	AS SHOWN	C014021.00-SSDA202

Costin Roe Consulting Pty Ltd.
Consulting Engineers
Level 1, 8 Windmill Street
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Tel: (02) 9241-7699 Fax: (02) 9241-5731
email: mail@costinroe.com.au ©

Costin Roe Consulting

PRECISION | COMMUNICATION | ACCOUNTABILITY

DRAWING TITLE: EROSION AND SEDIMENT CONTROL PLAN - STAGE 2

DRAWING No: C014021.00-SSDA202

ISSUE: F

MAMRE ROAD

DP 259135

SEDIMENT BASIN 5
REFER TO SCHEDULE

SEDIMENT BASIN 6
REFER TO SCHEDULE

SEDIMENT BASIN 7
REFER TO SCHEDULE

EXISTING POND

NOMINAL STOCKPILE LOCATION
T.B.C ON SITE

PROPOSED BUND

SEDIMENT BASIN 15
REFER TO SCHEDULE

NOMINAL STOCKPILE LOCATION
T.B.C ON SITE

PROPOSED BUND

EXISTING POND

KERB INLET CONTROL
PIT PROTECTION.
TYPICAL ALL PITS

SEDIMENT BASIN 8
REFER TO SCHEDULE

SEDIMENT BASIN 13
REFER TO SCHEDULE

SEDIMENT BASIN 9
REFER TO SCHEDULE

SEDIMENT BASIN 14
REFER TO SCHEDULE

SEDIMENT BASIN 10
REFER TO SCHEDULE

SEDIMENT BASIN 12
REFER TO SCHEDULE

SEDIMENT BASIN 11
REFER TO SCHEDULE

SEDIMENT BASIN 2
REFER TO SCHEDULE

KERB INLET CONTROL
PIT PROTECTION.
TYPICAL ALL PITS

MAMRE ROAD

EROSION AND SEDIMENT CONTROL PLAN – STAGE 3
1:750 SCALE

SEDIMENTATION BASIN NOTE:

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6m 0 15 30 45 60 75m
SCALE 1:750 AT A0 SIZE SHEET

FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

AMENDMENTS	DATE	ISSUE
FOR STATE SIGNIFICATION DEVELOPMENT APPLICATION	15.09.22	E
FOR STATE SIGNIFICATION DEVELOPMENT APPLICATION	30.03.22	D
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PROJECT MANAGER: ProjectStrategy
ARCHITECT: nettletontribe
CLIENT: ALTIS PROPERTY PARTNERS

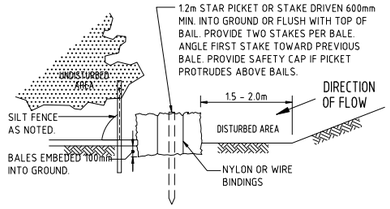
PROJECT: ACCESS LOGISTICS PARK
884-928 MAMRE ROAD
KEMPS CREEK, NSW

DESIGNED DS | DRAWN JB | DATE AUG '20 | CHECKED MW | SIZE A0 | SCALE AS SHOWN | CAD REF: C014021.00-SSDA203

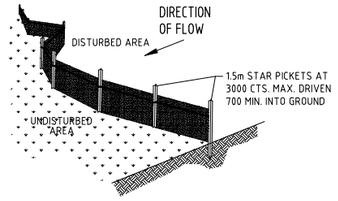
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Tel: (02) 9241-7699 Fax: (02) 9241-3731
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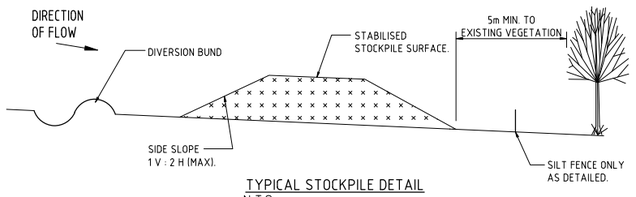
DRAWING TITLE: EROSION AND SEDIMENT CONTROL PLAN – STAGE 3
DRAWING No: C014021.00-SSDA203
ISSUE: E



SILT FENCE WITH STRAW BALE DETAIL
N.T.S.



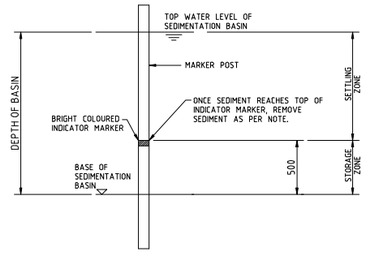
TYPICAL SILT FENCE DETAIL
N.T.S.
PROVIDE 1m RETURNS AT 30m INTERVALS.
TYPICAL



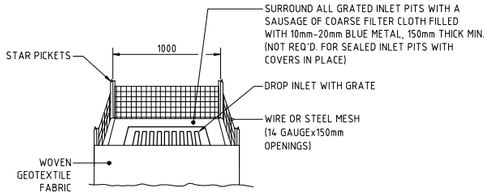
TYPICAL STOCKPILE DETAIL
N.T.S.

STOCKPILE NOTES

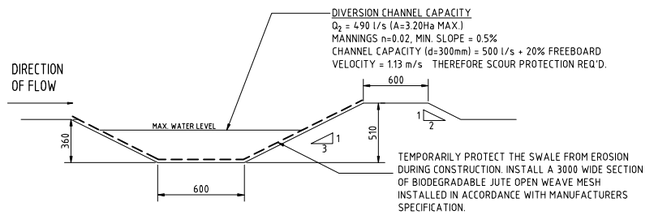
1. PLACE ALL STOCKPILES IN LOCATIONS MORE THAN 5m FROM EXISTING VEGETATION, ROADS & HAZARD AREAS.
2. CONSTRUCT ON THE CONTOUR AS LOW, FLAT ELONGATED MOUNDS. SIDE SLOPE TO BE 1 V: 2 H MAX.
3. WHERE THERE IS SUFFICIENT AREA, TOPSOIL STOCKPILES SHALL BE LESS THAN 2m IN HEIGHT.
4. WHERE STOCKPILES ARE TO BE IN PLACE FOR MORE THAN 10 DAYS, STABILISE USING WOOD CHIP MULCH - 16 TONNE/Ha.
5. CONSTRUCT SILT FENCE WITH CATCH DRAIN ON UPSLOPE SIDE TO DIVERT WATER AROUND STOCKPILES & SILT FENCE ONLY 1 TO 2m DOWNSLOPE AS SHOWN.



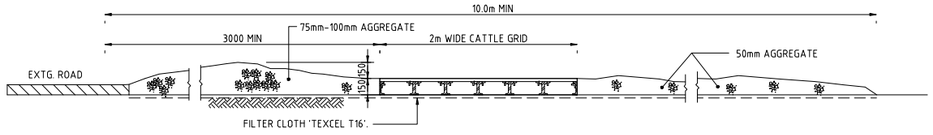
SEDIMENT STORAGE MARKER
SCALE 1:20



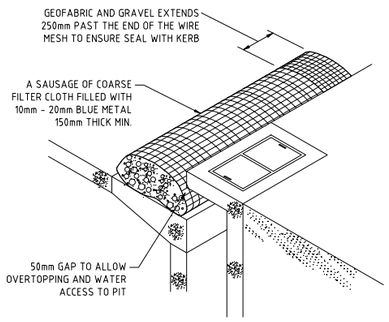
GRATED INLET PIT FILTER DETAIL
N.T.S



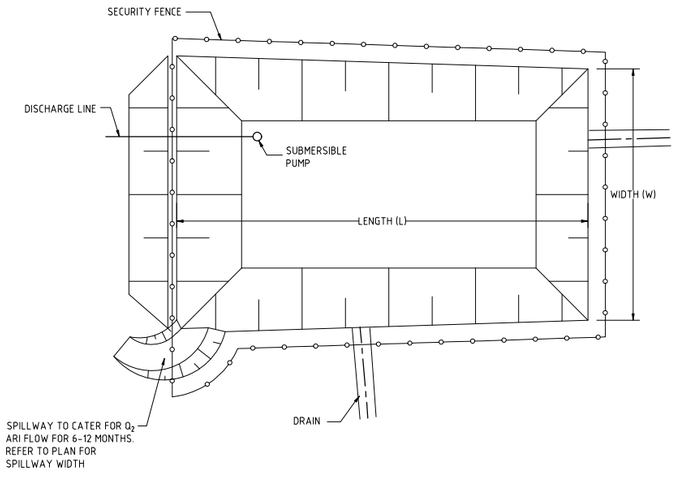
DIVERSION DRAIN SECTION
SCALE 1:20



SECTION 1:20 (1 / SSDA29) : STABILISED CONSTRUCTION ENTRANCE 'TRUCK SHAKER'



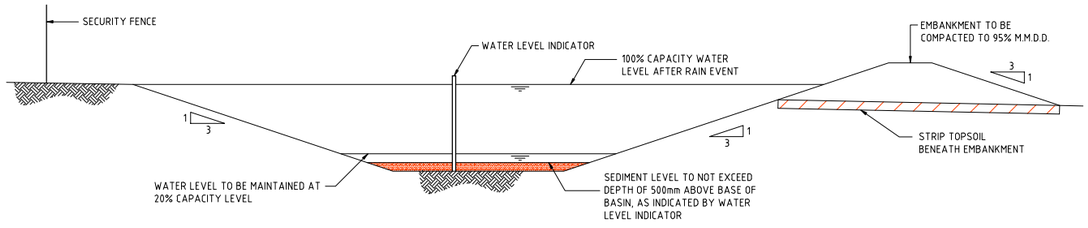
KERB INLET CONTROL
N.T.S



TYPICAL SEDIMENT CONTROL POND PLAN
SCALE 1:250

SPILLWAY DETAIL & SCHEDULE

CATCHMENT (Ha)	FLOW (m^3/s)	WIDTH (mm)	FLOW DEPTH (mm)	ROCK SIZE (mm)	BUND HEIGHT ABOVE SPILLWAY (mm)
0.20	0.14	1000	200	-	600
0.5	0.2	2000	200	-	600
1	0.3	2000	200	-	700
2	0.6	4000	200	-	700
5	1.4	5000	300	200	800
10	2.8	8000	350	200	850
20	5.5	14000	400	250	900
40	11.0	20000	500	250	1000



TYPICAL SEDIMENT CONTROL BASIN SECTION
SCALE 1:50

NOTE :
ADOPT ABOVE DETAILS AROUND ALL PITS WITHIN AREA ENCOMPASSED BY SILT FENCE & TO PITS ON THE ROAD ADJACENT TO SITE BOUNDARY.

NOTES:

ALL EROSION & SEDIMENT CONTROL MEASURES TO BE INSPECTED & MAINTAINED DAILY BY SITE MANAGER.

MINIMISE DISTURBED AREAS.

ROADS & FOOTPATHS TO BE SWEPT DAILY.

1.2m TURF TO BE PLACED BEHIND KERBS.

DUST MINIMISATION CONTROL BY WATERING TO BE IMPLEMENTED BY SITE MANAGER AS REQUIRED OR AS DIRECTED BY THE EPA.

2m 0 5 10 15 20 25m
SCALE 1:250 AT A0 SIZE SHEET

500mm 0 1 2 3 4 5m
SCALE 1:50 AT A0 SIZE SHEET

200mm 0 500 1000 1500 2000mm
SCALE 1:20 AT A0 SIZE SHEET

FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

AMENDMENTS	DATE	ISSUE
FOR STATE SIGNIFICATION DEVELOPMENT APPLICATION	30.03.22	D
ISSUED FOR INFORMATION	25.03.22	D
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	02.07.21	C
ISSUED FOR PRELIMINARY ONLY	25.06.21	B
ISSUED FOR PRELIMINARY ONLY	01.04.21	A

AMENDMENTS DATE ISSUE

PROJECT MANAGER: ProjectStrategy
ARCHITECT: nettletontribe
CLIENT: ALTIS PROPERTY PARTNERS

PROJECT: ACCESS LOGISTICS PARK
884-928 MAMRE ROAD
KEMPS CREEK, NSW

DESIGNED DS | DRAWN JB | DATE AUG '20 | CHECKED MW | SIZE A0 | SCALE AS SHOWN | CAD REF: C014021.00-SSDA250

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DRAWING TITLE: EROSION AND SEDIMENT CONTROL DETAILS
DRAWING NO: C014021.00-SSDA250
ISSUE: E

MIRVAC SITE
ANTICIPATED PAD LEVELS AS SHOWN
SITE LAYOUT PER MIRVAC SSDA_10448 EIS

MIRVAC SITE
ANTICIPATED PAD LEVELS AS SHOWN
SITE LAYOUT PER MIRVAC SSDA_10448 EIS

MAMRE ROAD

MAMRE ROAD

LOT 2
BEL 54.50 ± 1000mm

LOT 5
BEL 56.80 ± 1000mm

LOT 6
BEL 57.70 ± 1000mm

LOT 7
BEL 59.40 ± 1000mm

LOT 8
BEL 57.90 ± 1000mm

LOT 9
BEL 56.30 ± 1000mm

LOT 10
BEL 54.40 ± 1000mm

LOT 11
BEL 54.40 ± 1000mm

LOT 12
BEL 59.70 ± 1000mm

LOT 13
BEL 59.70 ± 1000mm

LOT 14
BEL 60.15 ± 1000mm

LOT 15
BEL 60.00 ± 1000mm

DP 259135

PT51
DP 259135

DP 255560

CONTOURS HERE ARE DERIVED FROM LIDAR DATA

BULK EARTHWORKS & CUT/FILL PLAN
1:750 SCALE

DEPTH RANGE

No.	FROM DEPTH	TO DEPTH	COLOUR
1	-9.000	-8.000	
2	-8.000	-7.000	
3	-7.000	-6.000	
4	-6.000	-5.000	
5	-5.000	-4.000	
6	-4.000	-3.000	
7	-3.000	-2.000	
8	-2.000	-1.000	
9	-1.000	0.000	
10	0.000	1.000	
11	1.000	2.000	
12	2.000	3.000	
13	3.000	4.000	
14	4.000	5.000	
15	5.000	6.000	
16	6.000	7.000	

EARTHWORKS VOLUMES

SITE AREA = 19.8 Ha

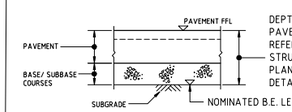
TOPSOIL STRIP (200 mm)	= (- 39,600 m^3)
CUT MATERIAL	= - 185,800 m^3
FILL MATERIAL	= + 222,200 m^3
DETAILED EXCAVATION (2,000m^3/Ha OVER 19.8 Ha)	= - 39,600 m^3
LOT 9 & 10 TEMPORARY BASIN BACKFILL	= + 5,000 m^3
BALANCE	= + 1,800 m^3

NOTE:
EARTHWORKS VALUES ARE APPROXIMATE ONLY.
NO ALLOWANCE HAS BEEN MADE IN THE ABOVE VOLUMES FOR EROSION & SEDIMENT CONTROL BACKFILLING, BULKING OR COMPACTION OF FILLED SOILS, THE REMOVAL OF UNCONTROLLED OR CONTAMINATED MATERIAL, TEMPORARY DRAINAGE SWALES WITHIN BUILDING PADS, OR ANY OTHER UNSPECIFIED EXCAVATION RELATED TO WAREHOUSE CONSTRUCTION.

LEGEND

NOTE:
LEVELS DATUM IS AHD.
ALL LEVELS ARE ±1000 mm

- EXISTING CONTOUR
- B.E.L. CONTOUR (MAJOR 1.0m)
- B.E.L. CONTOUR (MINOR 0.25m)



NOMINATED B.E.L. DETAIL
N.T.S.

SITE PREPARATION NOTES:

1. ALL EARTHWORKS SHALL BE COMPLETED GENERALLY IN ACCORDANCE WITH THE GUIDELINES SPECIFIED BY THE GEOTECHNICAL REPORT PROVIDED BY COFFEY SERVICES AUSTRALIA DATED 08.10.2019.
2. EXISTING LEVELS ARE BASED ON INFORMATION PROVIDED BY LANDPARTNERS TITLED SY074794.000.5.5_GDA2020 DATED 16.06.2021.
3. STRIP ANY TOP SOIL OR DELETERIOUS MATERIAL AND DISPOSE OF FROM SITE OR STORE AS DIRECTED.
4. COMPLETE CUT TO FILL EARTHWORKS TO ACHIEVE THE REQUIRED LEVELS AS INDICATED ON THE DRAWINGS WITHIN A TOLERANCE OF +0mm/-10mm THROUGH BUILDING PADS/PAVEMENTS AND +0mm/-20mm ELSEWHERE.
5. PREPARE STEEP BATTERS TO RECEIVE FILL BY CONSTRUCTING BENCHING TO FACILITATE FILL PLACEMENT AND COMPACTION.
6. AREAS TO RECEIVE FILL (THAT ARE NOT ON BENCHED BATTERS) AND AREAS IN CUT SHALL BE PROOF ROLLED TO IDENTIFY ANY SOFT HEAVING MATERIAL. SOFT MATERIAL SHALL BE BOXED OUT AND REMOVED PRIOR TO FILL PLACEMENT. PROOF ROLLING TO BE INSPECTED BY A GEOTECHNICAL ENGINEER OR THE EARTHWORKS DESIGNER.
7. SITE WON FILL SHALL BE COMPACTED IN MAXIMUM 300mm LAYERS AND TO DRY OR HILF DENSITY RATIOS (STANDARD COMPACTION) OF BETWEEN 98% AND 103%. THE PLACEMENT MOISTURE VARIATION OR HILF MOISTURE VARIATION SHALL BE CONTROLLED TO BE BETWEEN 2% DRY AND 2% WET.
8. IMPORTED FILL SHALL BE COMPACTED IN MAXIMUM 300mm LAYERS AND TO DRY OR HILF DENSITY RATIOS (STANDARD COMPACTION) OF BETWEEN 98% AND 103%. THE PLACEMENT MOISTURE VARIATION OR HILF MOISTURE VARIATION SHALL BE CONTROLLED TO BE BETWEEN 2% DRY AND 2% WET.
9. ALL ENGINEERED FILL PARTICLES SHALL BE ABLE TO BE INCORPORATED WITHIN A SINGLE LAYER. FURTHER, LESS THAN 30% OF PARTICLES SHALL BE RETAINED ON THE 37.5 mm SIEVE. ENGINEERED FILL SHALL BE ABLE TO BE TESTED IN ACCORDANCE WITH THE STANDARD COMPACTION METHOD (AS1289.5.4.1) OR HILF TEST METHOD (AS1289.5.7.1). THESE METHODS REQUIRE LESS THAN 20% RETAINED ON THE 37.5 mm SIEVE. WHERE BETWEEN 20% AND 30% OF PARTICLES ARE RETAINED ON THE 37.5 mm SIEVE THE ABOVE TEST METHODS SHALL STILL BE ADOPTED AND TEST REPORTS ANNOTATED APPROPRIATELY. THESE REQUIREMENTS SHOULD BE MET BY THE MATERIAL AFTER PLACEMENT AND COMPACTION
10. ALL THE EARTHWORKS UNDERTAKEN AND THE SUBGRADE CONDITION IN THE CUT AREAS (IN THE STATED PERIOD) ARE DOCUMENTED IN THE REPORTS AND HAVE BEEN UNDERTAKEN IN ACCORDANCE WITH THE SPECIFICATION (EG. COSTIN ROE SITE PREPARATION NOTES IN DWG C014021.00-DA100)
11. PRIOR TO ANY EARTHWORKS, EROSION CONTROL AS OUTLINED IN THE EROSION AND SEDIMENTATION CONTROL PLAN SHALL BE COMPLETED.
12. EXISTING ROCK, IF ANY, SHALL BE REMOVED BY HEAVY ROCK BREAKING OR RIPPING.
13. MATCH EXISTING LEVELS AT BATTER INTERFACE.
14. CONTRACTOR TO MATCH EXISTING LEVELS AT THE INTERFACE OF EARTHWORKS AND EXISTING SURFACE AT BATTER LOCATIONS OR WHERE NO RETAINING WALLS ARE PRESENT. ANY DISCREPANCY BETWEEN DESIGN AND EXISTING LEVELS TO BE REFERRED TO THE ENGINEER FOR DIRECTION OR ADJUSTMENTS TO DESIGN LEVELS.
15. DURING EARTHWORKS THE CONTRACTOR IS TO ENSURE ALL AREAS ARE FREE DRAINING & WILL NOT RETAIN WATER DURING RAINFALL. PROVIDE TEMPORARY MEASURES AS REQUIRED TO ENSURE FREE FLOWING RUNOFF THROUGH MANAGED DRAINAGE PATHS, DIVERSION DRAINS OR OTHER SUITABLE DISPOSAL METHOD AS AGREED DURING THE WORKS. REFER ANY CONCERNS TO THE ENGINEER. REFER TO EROSION AND SEDIMENT CONTROL DRAWINGS AND NOTES.

6m 0 15 30 45 60 75m
SCALE 1:750 AT A0 SIZE SHEET

FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	02.07.21	F
PRELIMINARY ISSUE ONLY	25.06.21	E
PRELIMINARY ISSUE ONLY	01.04.21	D
PRELIMINARY ISSUE ONLY	25.03.21	C
PRELIMINARY ISSUE ONLY	19.03.21	B
PRELIMINARY ISSUE ONLY	04.03.21	A
AMENDMENTS	DATE	ISSUE

FOR STATE SIGNIFICATION DEVELOPMENT APPLICATION	23.11.22	L
FOR STATE SIGNIFICATION DEVELOPMENT APPLICATION	15.09.22	K
FOR STATE SIGNIFICATION DEVELOPMENT APPLICATION	07.09.22	J
FOR STATE SIGNIFICATION DEVELOPMENT APPLICATION	30.03.22	I
ISSUED FOR INFORMATION	25.03.22	H
PRELIMINARY ISSUE ONLY	11.03.22	G
AMENDMENTS	DATE	ISSUE

PROJECT MANAGER: ProjectStrategy
ARCHITECT: nettletontribe
CLIENT: ALTIS PROPERTY PARTNERS

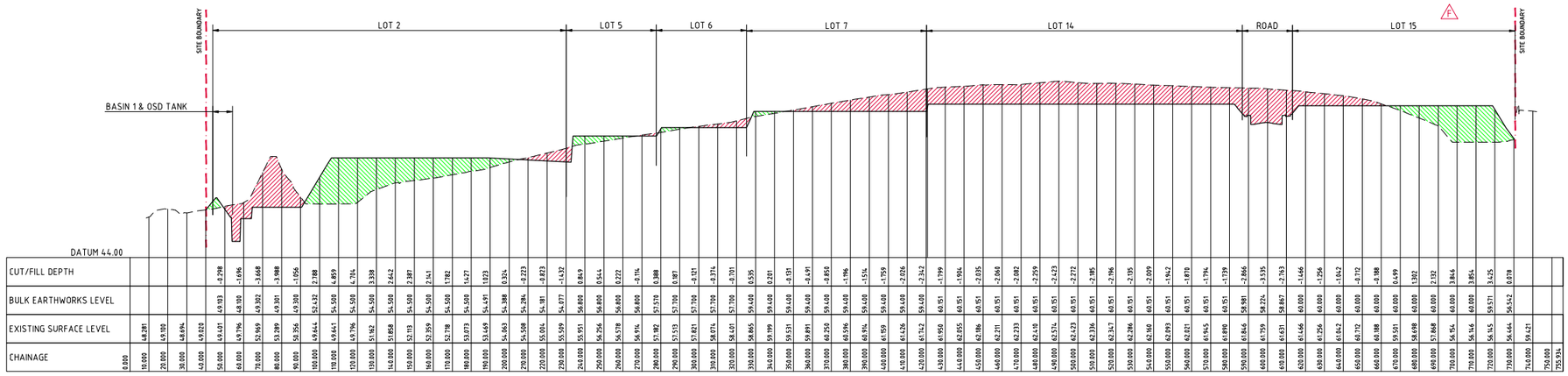
PROJECT: ACCESS LOGISTICS PARK
884-928 MAMRE ROAD
KEMPS CREEK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
DS	JB	AUG '20	MW	A0	AS SHOWN	C014021.00-SSDA300

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DRAWING TITLE: BULK EARTHWORKS & CUT/FILL PLAN
DRAWING No: C014021.00-SSDA300
ISSUE: L

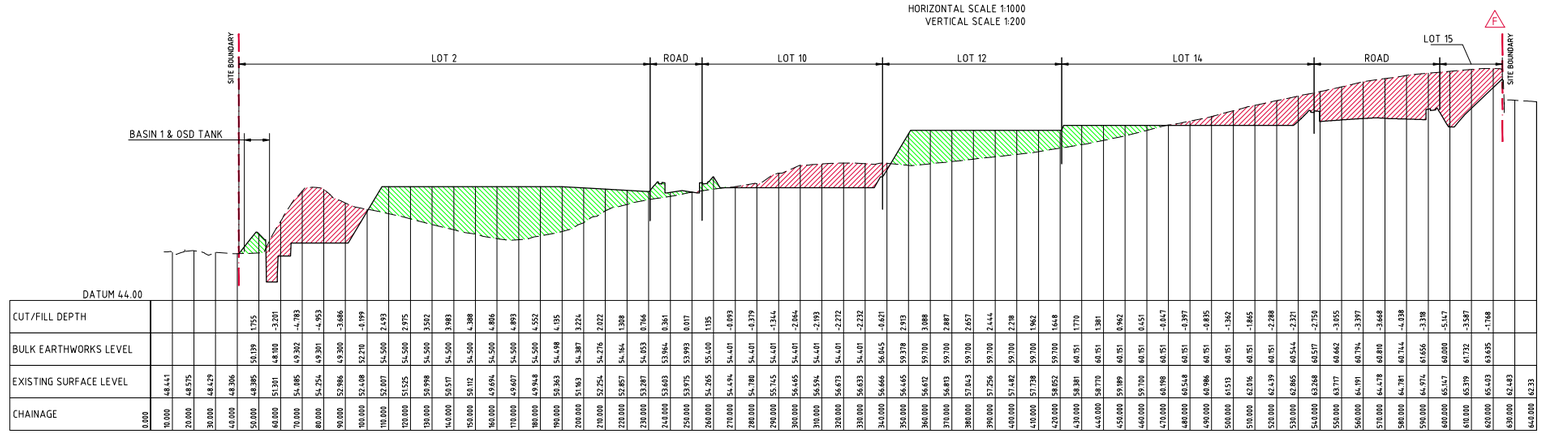


LEGEND:

- DENOTES BULK EARTHWORKS PROFILE
- DENOTES MIRVAC BULK EARTHWORKS PROFILE
- DENOTES EXISTING PROFILE
- DENOTES AREA IN CUT
- DENOTES AREA IN FILL

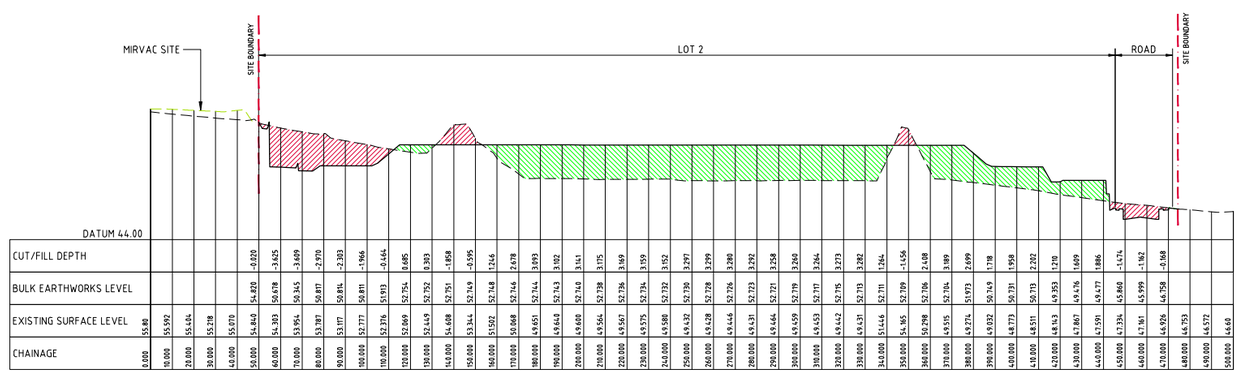
SECTION 1

HORIZONTAL SCALE 1:1000
VERTICAL SCALE 1:200



SECTION 2

HORIZONTAL SCALE 1:1000
VERTICAL SCALE 1:200



SECTION 3

HORIZONTAL SCALE 1:1000
VERTICAL SCALE 1:200

2m 0 5 10 15 20m
SCALE 1:200 AT A0 SIZE SHEET

10m 0 10 20 30 40 50 60 70 80 90 100m
SCALE 1:1000 AT A0 SIZE SHEET

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FOR STATE SIGNIFICATION DEVELOPMENT APPLICATION	07.09.22	G

PROJECT MANAGER: ProjectStrategy
ARCHITECT: nettletontribe
CLIENT: ALTIS PROPERTY PARTNERS

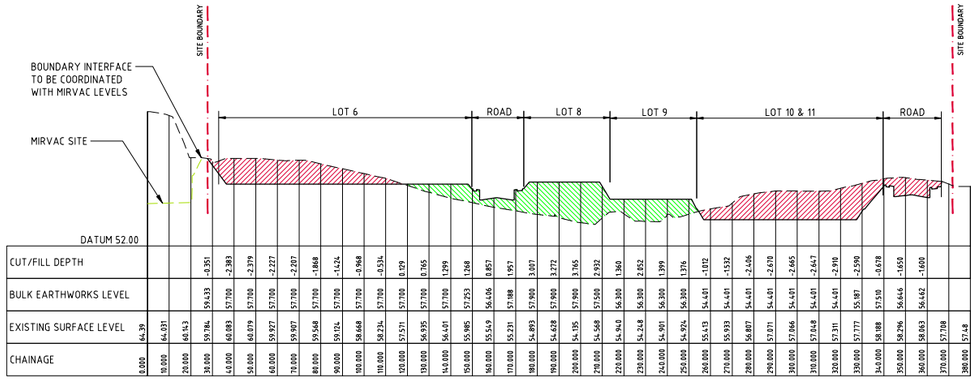
PROJECT: ACCESS LOGISTICS PARK
884-928 MAMRE ROAD
KEMPS CREEK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
DS	JB	AUG '20	MW	A0	AS SHOWN	C014021.00-SSDA350

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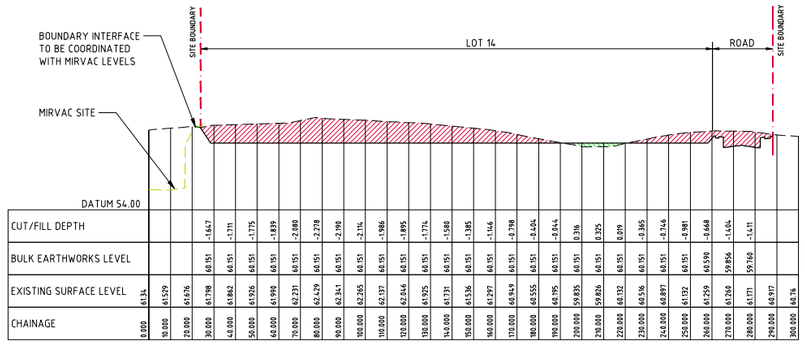
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DRAWING TITLE: BULK EARTHWORKS SECTIONS SHEET 1
DRAWING No: C014021.00-SSDA350
ISSUE: I



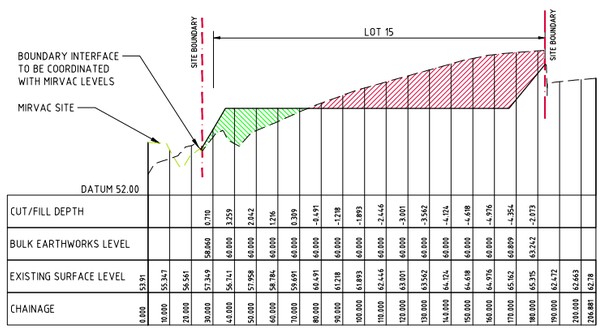
SECTION 4

HORIZONTAL SCALE 1:1000
VERTICAL SCALE 1:200



SECTION 5

HORIZONTAL SCALE 1:1000
VERTICAL SCALE 1:200



SECTION 6

HORIZONTAL SCALE 1:1000
VERTICAL SCALE 1:200

LEGEND:

- DENOTES BULK EARTHWORKS PROFILE
- DENOTES MIRVAC EARTHWORKS PROFILE
- DENOTES EXISTING PROFILE
- DENOTES AREA IN CUT
- DENOTES AREA IN FILL

2m 0 5 10 15 20m
SCALE 1:200 AT A0 SIZE SHEET

10m 0 10 20 30 40 50 60 70 80 90 100m
SCALE 1:1000 AT A0 SIZE SHEET

FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

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AMENDMENTS	DATE	ISSUE
FOR STATE SIGNIFICATION DEVELOPMENT APPLICATION	23.11.22	I
FOR STATE SIGNIFICATION DEVELOPMENT APPLICATION	15.09.22	H
FOR STATE SIGNIFICATION DEVELOPMENT APPLICATION	07.09.22	G

PROJECT MANAGER: ProjectStrategy

ARCHITECT: nettletontribe

CLIENT: ALTIS PROPERTY PARTNERS

PROJECT: ACCESS LOGISTICS PARK
884-928 MAMRE ROAD
KEMPS CREEK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
DS	JB	AUG '20	MW	A0	AS SHOWN	C014021.00-SSDA351

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DRAWING TITLE: BULK EARTHWORKS SECTIONS SHEET 2

DRAWING No: C014021.00-SSDA351

ISSUE: I

MAMRE ROAD

MIRVAC SITE
ANTICIPATED PAD LEVELS AS SHOWN
SITE LAYOUT PER MIRVAC SSDA_10448 EIS

BASIN 1

INDICATIVE ROAD DESIGN PER MIRVAC SSDA AND CIVIL DESIGN BY AT&L

DISCHARGE TO EXISTING POND TO BE COORDINATED WITH ADJACENT PROPERTY OWNER & CONNECTION TO Ø1500 PIPE BY MIRVAC

TRUNK DRAINAGE THROUGH ESTATE ROAD TO DISCHARGE TO TRUNK DRAINAGE ON NEIGHBOURING PROPERTY. TO BE COORDINATED BETWEEN LANDOWNERS

MIRVAC SITE
ANTICIPATED PAD LEVELS AS SHOWN
SITE LAYOUT PER MIRVAC SSDA_10448 EIS

ESTATE BASIN 2
COMBINED ON-SITE DETENTION & BIO RETENTION BASIN
ON SITE DETENTION VOLUME = 600 m³
BIO-RETENTION AREA = 300 m²
EXTENDED DETENTION DEPTH = 400mm

BASIN 2

PROVIDE AN ADDITIONAL 1.5m OF STORAGE BELOW THE FREE-DISCHARGE ORIFICE FOR MEDIUM/LONG-TERM STORAGE OF WATER. PROVIDE TRICKLE OUTLET WITH NOMINAL DISCHARGE RATE OF 450L/DAY

PROVIDE OCEAN PROTECT OCEANSAVE OS-0606 GROSS POLLUTANT TRAP OR SIMILAR APPROVED

LOT 5 RL 66.80 ± 1000mm

LOT 6 RL 57.70 ± 1000mm

LOT 7 RL 59.40 ± 1000mm

LOT 14 RL 60.15 ± 1000mm

LOT 15 RL 60.00 ± 1000mm

PROVIDE 2xDRAINAGE DIVERSION LINE TO COLLECT DISCHARGE FROM SOUTHERN POND. PROVIDE HEADWALL TO COLLECT DAY-TO-DAY OVERFLOWS. MAJOR OVERFLOWS TO BE CONVEYED IN AN OVERLAND FLOW PATH.

EXISTING POND

PROVIDE AN ADDITIONAL 1.5m OF STORAGE BELOW THE FREE-DISCHARGE ORIFICE FOR MEDIUM/LONG-TERM STORAGE OF WATER. PROVIDE TRICKLE OUTLET WITH NOMINAL DISCHARGE RATE OF 450L/DAY

DISCHARGE POINT TO EXISTING RCBC UNDER MAMRE ROAD

LOT 2 RL 54.50 ± 1000mm

PROPOSED Ø1050 PIPE IN ROAD TO BE CONSTRUCTED AS PART OF STAGE 1 WORKS, AND BLOCKED TO FACILITATE DRAINAGE TO TEMPORARY WETLAND ON LOT 9 & 10.

LOT 8 RL 57.90 ± 1000mm

LOT 13 RL 59.70 ± 1000mm

ESTATE BASIN 1
COMBINED ON-SITE DETENTION & BIO RETENTION BASIN
ON SITE DETENTION VOLUME = 6,800m³
BIO-RETENTION AREA = 1,750m²
EXTENDED DETENTION DEPTH = 400mm

LOT 9 RL 56.30 ± 1000mm

PROVIDE TEMPORARY DRAINAGE FROM ROAD & LOTS TO WETLAND. PIPES TO BE DECOMMISSIONED ON DECOMMISSIONING OF TEMPORARY WETLAND

LOT 10 RL 54.40 ± 1000mm

LOT 12 RL 59.70 ± 1000mm

REFER TO DRAWING SSDA411 FOR LOT 2 DRAINAGE LAYOUT

HIGH-FLOW BYPASS LINE

PROVIDE OCEAN PROTECT OCEANSAVE OS-1612-D GROSS POLLUTANT TRAP OR SIMILAR APPROVED

LOT 11 RL 54.40 ± 1000mm

STUB CONNECTION TO ALLOW FOR FUTURE 24Ha CONNECTION. Q20 FLOW = 5.5m³/s (APPROX).

INDICATIVE ROAD DESIGN AND DRAINAGE LAYOUT PER FRASERS SSDA AND CIVIL DESIGN BY AT&L

ESTATE BASIN 2
PROVIDE MIN 5,000m³, 1000mm AVERAGE DEPTH TEMPORARY STORAGE BASIN FOR DAILY FLOW MANAGEMENT FROM LOTS 4-14.

PROVIDE INLET PIT AT WETLAND SET 1000mm ABOVE BASIN FLOOR LEVEL. PROVIDE Ø1050 OUTLET PIPE TO ROAD NETWORK

EXISTING DRIVEWAY

DISCHARGE POINT

PROVIDE NEW CULVERT CROSSING TO EXISTING DRIVEWAY. SIZE T.B.C

PROVIDE OCEAN PROTECT OCEANSAVE OS-0606 GROSS POLLUTANT TRAP OR SIMILAR APPOVED

PROVIDE 80m² ROADSIDE BIORETENTION BASIN. MIN EXTENDED DETENTION DEPTH 400mm

CONTOURS HERE ARE DERIVED FROM LIDAR DATA

DP 259135

DP 255560

PT51 DP 259135

STORMWATER DRAINAGE MASTER PLAN
1:750 SCALE

LEGEND:
LEVELS DATUM IS AHD.

- SW – DENOTES DRAINAGE
- – DENOTES EASEMENT
- – DENOTES PRE-DEVELOPMENT CATCHMENT
- – DENOTES POST-DEVELOPMENT CATCHMENT
- – DENOTES KIP, KERB INLET PIT
- – DENOTES SJP, SEALED JUNCTION PIT

STORMWATER DRAINAGE NOTES:

1. ALL STORMWATER WORKS TO BE COMPLETED IN ACCORDANCE WITH AUSTRALIAN STANDARD AS3500.3:2003 PLUMBING AND DRAINAGE, PART 3: STORMWATER DRAINAGE.
2. THE MINOR (PIPED) SYSTEM HAS BEEN DESIGNED FOR THE 1 IN 20 YEAR ARI STORM EVENT AND THE MAJOR (OVERLAND) SYSTEM HAS BEEN DESIGNED FOR THE 1 IN 100 YEAR ARI STORM EVENT.
3. PIT SIZES SHALL BE AS INDICATED IN THE SCHEDULE WHILE PIPE SIZES AND DETAILS ARE PROVIDED ON PLAN.
4. EXISTING STORMWATER PIT LOCATIONS AND INVERT LEVELS TO BE CONFIRMED BY SURVEY PRIOR TO COMMENCING WORKS ON SITE.
5. ALL STORMWATER PIPES Ø375 OR GREATER SHALL BE CLASS 2 (WITH HS2 SUPPORT) REINFORCED CONCRETE WITH RUBBER RING JOINTS UNLESS NOTED OTHERWISE.
6. ALL PIPES UP TO AND INCLUDING Ø300 TO BE uPVC GRADE SN8 UNO.
7. PIPE CLASS NOMINATED ARE FOR IN-SERVICE LOADING CONDITIONS ONLY. CONTRACTOR IS TO MAKE ANY NECESSARY ADJUSTMENTS REQUIRED FOR CONSTRUCTION CONDITIONS.
8. ALL CONCRETE PITS GREATER THAN 1000mm DEEP SHALL BE REINFORCED USING N12-200 EACH WAY CENTERED IN WALL AND BASE. LAP MINIMUM 300mm WHERE REQUIRED. ALL CONCRETE FOR PITS SHALL BE F'c=25 MPa. PRECAST PITS MAY BE USED WITH THE APPROVAL OF THE ENGINEER.
9. IN ADDITION TO ITEM 9 ABOVE, ALL CONCRETE PITS GREATER THAN 3000mm DEEP SHALL HAVE WALLS AND BASE THICKNESS INCREASED TO 200mm.
10. PIPES SHALL BE LAID AS PER PIPE LAYING DETAILS. PARTICULAR CARE SHALL BE TAKEN TO ENSURE THAT THE PIPE IS FULLY AND EVENLY SUPPORTED. RAM AND PACK FILLING AROUND AND UNDER BACK OF PIPES AND PIPE FAUCETS, WITH NARROW EDGED RAMMERS OR OTHER SUITABLE TAMPING DETAILS.
11. CONCRETE PIPES UNDER, OR WITHIN THE ZONE OF INFLUENCE OF PAVED AREAS SHALL BE LAID USING HS2 TYPE SUPPORT, AS A MINIMUM, IN ACCORDANCE WITH AS 3725. AGGREGATE BACKFILL SHALL NOT BE USED FOR PIPE BEDDING AND OR HAUNCH/SIDE SUPPORT.
12. WHERE PIPE LINES ENTER PITS, PROVIDE 2m LENGTH OF STOCKING WRAPPED SLOTTED Ø100 uPVC TO EACH SIDE OF PIPE.
13. ALL SUBSOIL DRAINAGE LINES SHALL BE Ø100 SLOTTED uPVC WITH APPROVED FILTER WRAP LAID IN 300mm WIDE GRANULAR FILTER UNLESS NOTED OTHERWISE. LAY SUBSOIL LINES TO MATCH FALLS OF LAND AND/OR 1 IN 200 MINIMUM. PROVIDE CAPPED CLEANING EYE (RODDING POINT) AT UPSTREAM END OF LINE AND AT 30m MAX. CTS. PROVIDE SUBSOIL LINES TO ALL PAVEMENT/ LANDSCAPED INTERFACES, TO REAR OF RETAINING WALLS (AS NOMINATED BY STRUCTURAL ENGINEER) AND AS SHOWN ON PLAN.
14. ALL PIPE GRADES 1 IN 200 MINIMUM UNO.
15. PROVIDE STEP IRONS IN PITS DEEPER THAN 1000mm.
16. MIN. 600 COVER TO PIPE OBVERT BENEATH ROADS & MIN. 400 COVER BENEATH LANDSCAPED AND PEDESTRIAN AREAS.
17. PIT COVERS IN TRAFFICABLE PAVEMENT SHALL BE CLASS D 'HEAVY DUTY', THOSE LOCATED IN NON-TRAFFICABLE AREAS SHALL BE CLASS B 'MEDIUM DUTY' U.N.O.
18. PROVIDE CLEANING EYES (RODDING POINTS) TO PIPES AT ALL CORNERS AND T-JUNCTIONS WHERE NO PITS ARE PRESENT.
19. DOWN PIPES (DP) TO BE AS PER HYDRAULIC ENGINEERS DETAILS WITH CONNECTOR TO MATCH DP SIZE U.N.O. ON PLAN. PROVIDE CLEANING EYE AT GROUND LEVEL.
20. PIPE LENGTHS NOMINATED ON PLAN OR LONGSECTIONS ARE MEASURED FROM CENTER OF PITS TO THE NEAREST 0.5m AND DO NOT REPRESENT ACTUAL LENGTH. THE CONTRACTOR IS TO ALLOW FOR THIS.

6m 0 15 30 45 60 75m
SCALE 1:750 AT A0 SIZE SHEET

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ISSUED FOR PRELIMINARY ONLY	01.04.21	A

AMENDMENTS	DATE	ISSUE
FOR STATE SIGNIFICATION DEVELOPMENT APPLICATION	23.11.22	I
FOR STATE SIGNIFICATION DEVELOPMENT APPLICATION	15.09.22	H
FOR STATE SIGNIFICATION DEVELOPMENT APPLICATION	07.09.22	G

PROJECT MANAGER: ProjectStrategy
ARCHITECT: nettletontribe
CLIENT: ALTIS PROPERTY PARTNERS

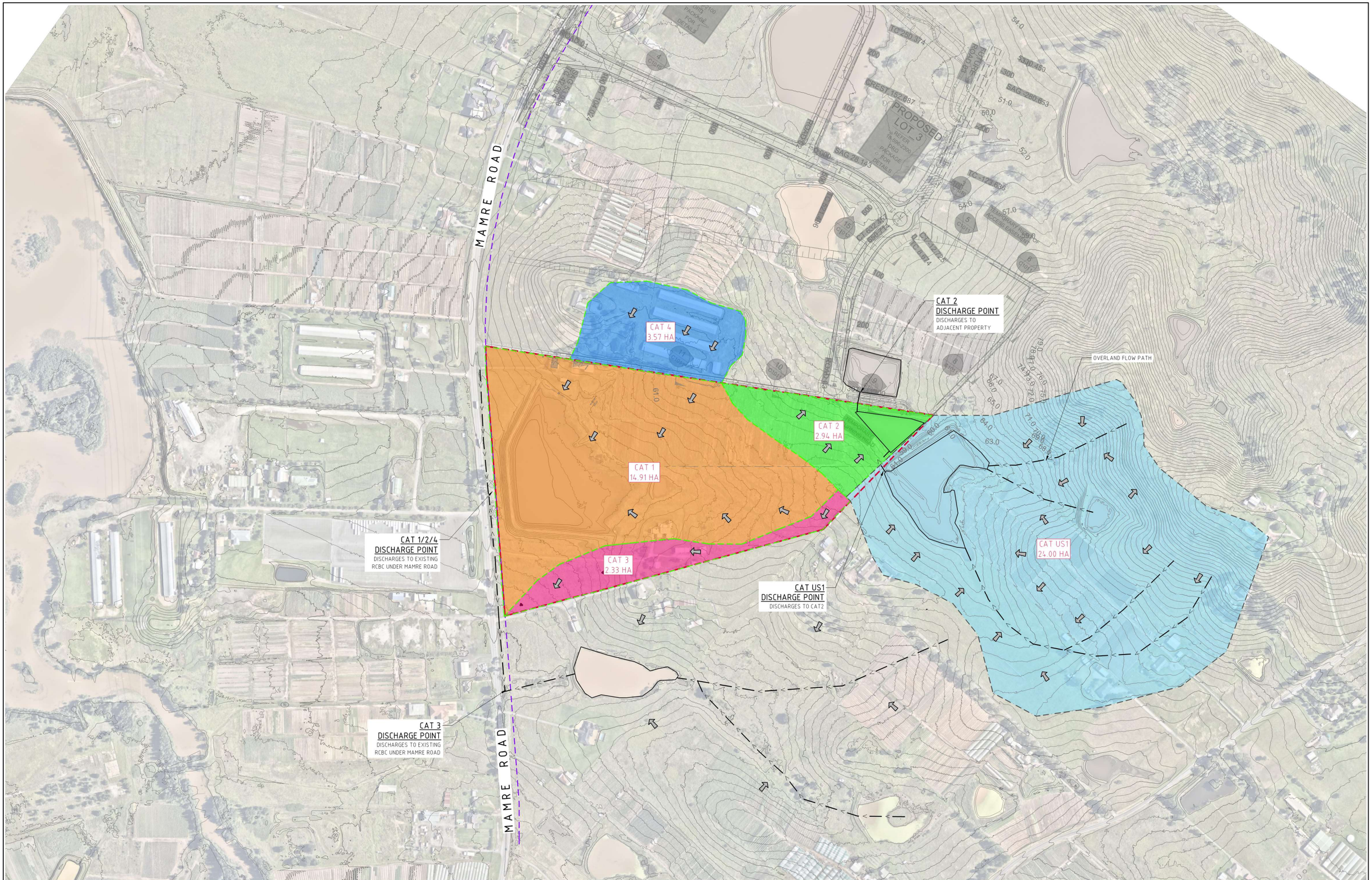
PROJECT: ACCESS LOGISTICS PARK
884-928 MAMRE ROAD
KEMPS CREEK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
DS	JB	AUG '20	MW	A0	AS SHOWN	C014021.00-SSDA400

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DRAWING TITLE: STORMWATER DRAINAGE MASTER PLAN
DRAWING No: C014021.00-SSDA400
ISSUE: I



PRE DEVELOPMENT STORMWATER CATCHMENT PLAN
1:2000 SCALE

20m 0 50 100 150 200m
SCALE 1:2000 AT A0 SIZE SHEET

FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

AMENDMENTS	DATE	ISSUE
FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	30.03.22	D
ISSUED FOR INFORMATION	25.03.22	C
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	02.07.21	B
ISSUED FOR PRELIMINARY ONLY	25.06.21	A

AMENDMENTS	DATE	ISSUE

PROJECT MANAGER: ProjectStrategy
ARCHITECT: nettletontribe
CLIENT: ALTIS PROPERTY PARTNERS

PROJECT: ACCESS LOGISTICS PARK
884-928 MAMRE ROAD
KEMPS CREEK, NSW

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DRAWING TITLE: PRE DEVELOPMENT STORMWATER CATCHMENT PLAN
DRAWING No: C014021.00-SSDA401
ISSUE: D

MAMRE ROAD

CAT 2
DISCHARGE POINT
DISCHARGES TO
ADJACENT PROPERTY

CAT 1
17.04 HA

CAT 2
2.23 HA

CAT US1
DISCHARGE POINT
DISCHARGES THROUGH
CAT2 TO MIRVAC SITE

CAT 1
DISCHARGE POINT
DISCHARGES TO EXISTING
RCBC UNDER MAMRE ROAD

CAT3
0.55 HA

CAT US1
24.00 HA

CAT 3
DISCHARGE POINT
DISCHARGES TO EXISTING
RCBC UNDER MAMRE ROAD

MAMRE ROAD

POST DEVELOPMENT STORMWATER CATCHMENT PLAN
1:2000 SCALE

20m 0 50 100 150 200m
SCALE 1:2000 AT A0 SIZE SHEET

FOR INFORMATION

AMENDMENTS	DATE	ISSUE
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	15.09.22	F
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	07.09.22	E
ISSUED FOR INFORMATION	30.03.22	D
ISSUED FOR INFORMATION	25.03.22	C
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	02.07.21	B
ISSUED FOR PRELIMINARY ONLY	25.06.21	A

AMENDMENTS DATE ISSUE

PROJECT MANAGER
ProjectStrategy

ARCHITECT
nettletontribe

CLIENT
ALTIS PROPERTY PARTNERS

PROJECT
ACCESS LOGISTICS PARK
884-928 MAMRE ROAD
KEMPS CREEK, NSW

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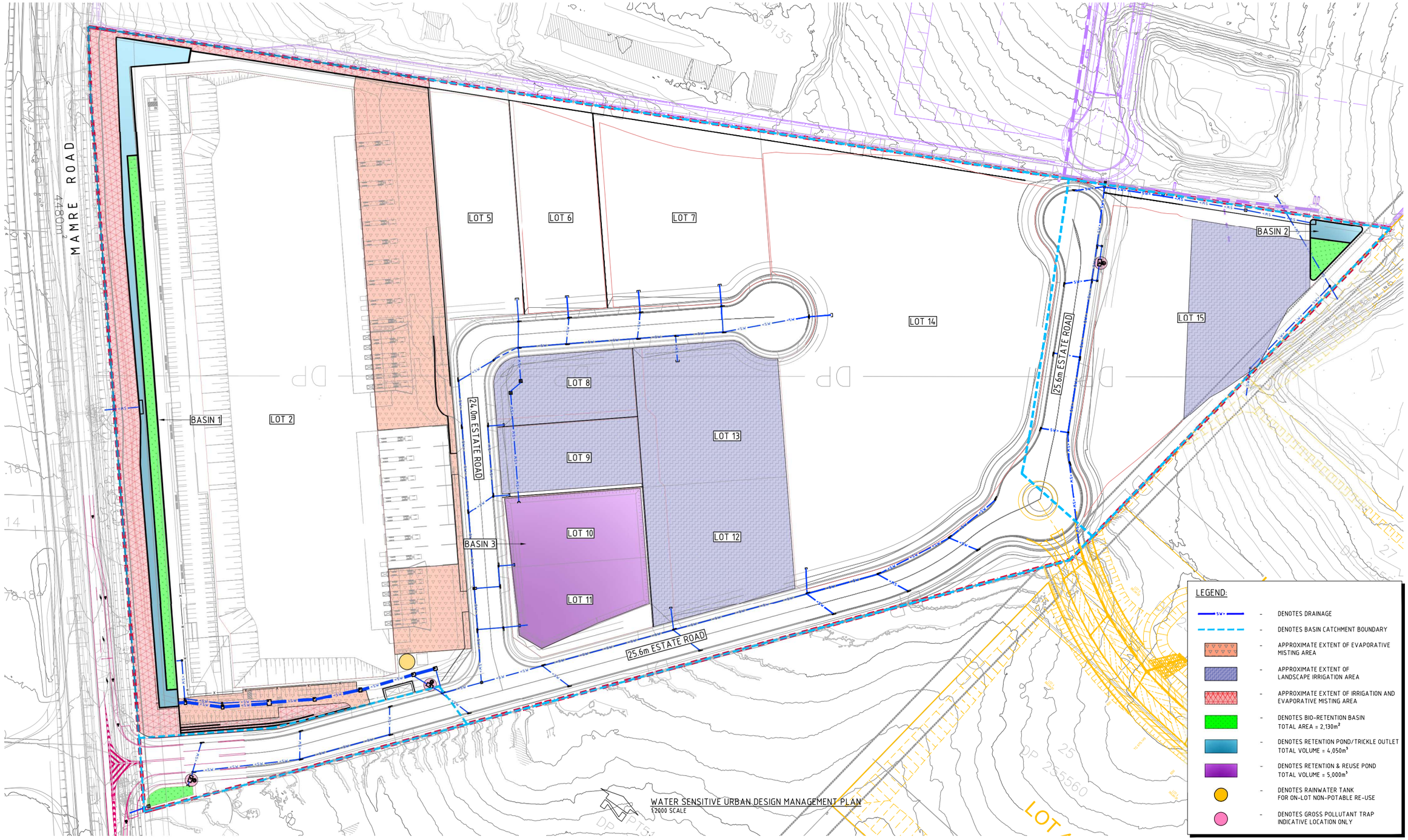
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DRAWING TITLE
POST DEVELOPMENT
STORMWATER CATCHMENT PLAN

DRAWING No. C014021.00-SSDA402 ISSUE F



LEGEND:

- SW - DENOTES DRAINAGE
- DENOTES BASIN CATCHMENT BOUNDARY
- APPROXIMATE EXTENT OF EVAPORATIVE MISTING AREA
- APPROXIMATE EXTENT OF LANDSCAPE IRRIGATION AREA
- APPROXIMATE EXTENT OF IRRIGATION AND EVAPORATIVE MISTING AREA
- DENOTES BIO-RETENTION BASIN TOTAL AREA = 2,130m²
- DENOTES RETENTION POND/TRICKLE OUTLET TOTAL VOLUME = 4,050m³
- DENOTES RETENTION & REUSE POND TOTAL VOLUME = 5,000m³
- DENOTES RAINWATER TANK FOR ON-LOT NON-POTABLE RE-USE
- DENOTES GROSS POLLUTANT TRAP INDICATIVE LOCATION ONLY

NOTE:

THIS PLAN DEPICTS THE STORMWATER MANAGEMENT MEASURES REQUIRED TO SATISFY THE MAMRE ROAD DCP STORMWATER FLOW AND QUALITY REQUIREMENTS FOR THE STAGE 1 SUBMISSION ONLY.

THE STORMWATER HARVESTING, MANAGEMENT AND RE-USE MEASURES SHOWN ON THIS PLAN ARE THOSE REQUIRED TO SATISFY THE STORMWATER FLOW AND OPERATIONAL STORMWATER QUALITY REQUIREMENTS OF THE MAMRE ROAD DCP.

FURTHER INFORMATION IS PRESENTED IN THE COSTIN ROE SOIL AND WATER MANAGEMENT REPORT.

20m 0 50 100 150 200m

SCALE 1:2000 AT A0 SIZE SHEET

FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

AMENDMENTS	DATE	ISSUE
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	23.11.22	A

AMENDMENTS	DATE	ISSUE

PROJECT MANAGER: ProjectStrategy

ARCHITECT: nettletontribe

CLIENT: ALTIS PROPERTY PARTNERS

PROJECT: ACCESS LOGISTICS PARK
884-928 MAMRE ROAD
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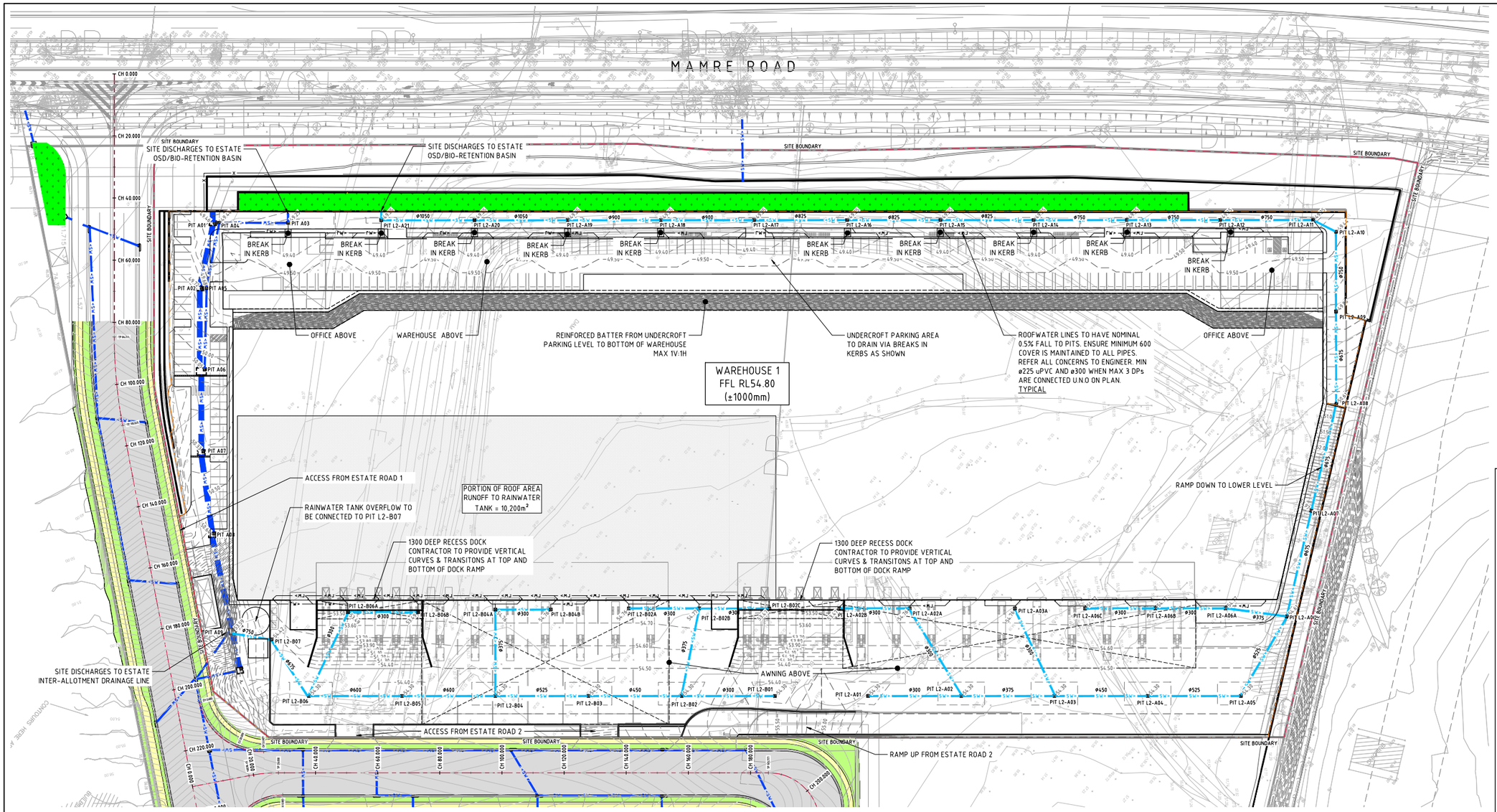
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DRAWING TITLE: WATER SENSITIVE URBAN DESIGN MANAGEMENT PLAN

DRAWING No: C014021.00-SSDA405 ISSUE: A



STORMWATER DRAINAGE PLAN LOT 2
1:500 SCALE

LEVELS NOTE:

LEVELS SHOWN TO BE +/-1000mm FROM THOSE SHOWN. FINAL LEVELS SUBJECT TO FINAL GEOTECHNICAL INVESTIGATIONS, ARCHITECTURAL LAYOUT AND ACHIEVING A CUT TO FILL EARTHWORKS BALANCE OVER THE PROPERTY.

LEGEND:

LEVELS DATUM IS AHD.

EXISTING SITE LEVELS AND DETAILS BASED ON SURVEY INFORMATION PROVIDED BY 'LANDPARTNERS' DATED 25.03.2021.

- SGGP, SINGLE GRATED GULLY PIT
- SJP, SEALED JUNCTION PIT
- KIP, KERB INLET PIT
- GD, GRATED DRAIN (300W x 225D UNO)
- PROPOSED INFRASTRUCTURE DRAINAGE LINE
- PROPOSED SITE DRAINAGE LINE
- EXISTING DRAINAGE LINE
- ROOFWATER DOWNPIPE (INDICATIVE)
- ROOFWATER LINE
- OVERLAND FLOW DIRECTION
- FINISHED PAVEMENT CONTOUR (MAJOR) 0.5m INTERVALS
- FINISHED PAVEMENT CONTOUR (MINOR) 0.1m INTERVALS

STORMWATER DRAINAGE NOTES:

1. ALL STORMWATER WORKS TO BE COMPLETED IN ACCORDANCE WITH AUSTRALIAN STANDARD AS3500.3-2018 PLUMBING AND DRAINAGE, PART 3: STORMWATER DRAINAGE.
2. THE MINOR (PIPED) SYSTEM HAS BEEN DESIGNED FOR THE 1 IN 20 YEAR ARI STORM EVENT AND THE MAJOR (OVERLAND) SYSTEM HAS BEEN DESIGNED FOR THE 1 IN 100 YEAR ARI STORM EVENT.
3. ALL FINISHED PAVEMENT LEVELS SHALL BE AS INDICATED ON FINISHED LEVELS PLANS SSDA511.
4. PIT SIZES SHALL BE AS INDICATED IN THE SCHEDULE WHILE PIPE SIZES AND DETAILS ARE PROVIDED ON PLAN.
5. EXISTING STORMWATER PIT LOCATIONS AND INVERT LEVELS TO BE CONFIRMED BY SURVEY PRIOR TO COMMENCING WORKS ON SITE.
6. ALL STORMWATER PIPES Ø375 OR GREATER SHALL BE CLASS 2 (WITH HS2 SUPPORT) REINFORCED CONCRETE WITH RUBBER RING JOINTS UNLESS NOTED OTHERWISE.
7. ALL PIPES UP TO AND INCLUDING Ø300 TO BE uPVC GRADE SN8 UNO.
8. PIPE CLASS NOMINATED ARE FOR IN-SERVICE LOADING CONDITIONS ONLY. CONTRACTOR IS TO MAKE ANY NECESSARY ADJUSTMENTS REQUIRED FOR CONSTRUCTION CONDITIONS.
9. ALL CONCRETE PITS GREATER THAN 1000mm DEEP SHALL BE REINFORCED USING N12-200 EACH WAY CENTERED IN WALL AND BASE. LAP MINIMUM 300mm WHERE REQUIRED. ALL CONCRETE FOR PITS SHALL BE F'c=25 MPa. PRECAST PITS MAY BE USED WITH THE APPROVAL OF THE ENGINEER.
10. IN ADDITION TO ITEM 6 ABOVE, ALL CONCRETE PITS GREATER THAN 3000mm DEEP SHALL HAVE WALLS AND BASE THICKNESS INCREASED TO 200mm.
11. PIPES SHALL BE LAID AS PER PIPE LAYING DETAILS. PARTICULAR CARE SHALL BE TAKEN TO ENSURE THAT THE PIPE IS FULLY AND EVENLY SUPPORTED. RAM AND B-ACK FILLING AROUND AND UNDER BACK OF PIPES AND PIPE FAUCETS, WITH NARROW EDGED RAMMERS OR OTHER SUITABLE TAMPING DETAILS.
12. CONCRETE PIPES UNDER, OR WITHIN THE ZONE OF INFLUENCE OF PAVED AREAS SHALL BE LAID USING HS2 TYPE SUPPORT, AS A MINIMUM, IN ACCORDANCE WITH AS 3725. AGGREGATE BACKFILL SHALL NOT BE USED FOR PIPE BEDDING AND OR HAUNCH/SIDE SUPPORT.
13. WHERE PIPE LINES ENTER PITS, PROVIDE 2m LENGTH OF STOCKING WRAPPED SLOTTED Ø100 uPVC TO EACH SIDE OF PIPE.
14. ALL SUBSOIL DRAINAGE LINES SHALL BE Ø100 SLOTTED uPVC WITH APPROVED FILTER WRAP LAID IN 300mm WIDE GRANULAR FILTER UNLESS NOTED OTHERWISE. LAY SUBSOIL LINES TO MATCH FALLS OF LAND AND/OR 1 IN 200 MINIMUM. PROVIDE CAPPED CLEANING EYE (RODDING POINT) AT UPSTREAM END OF LINE AND AT 30m MAX. CTS. PROVIDE SUBSOIL LINES TO ALL PAVEMENT/ LANDSCAPED INTERFACES, TO REAR OF RETAINING WALLS (AS NOMINATED BY STRUCTURAL ENGINEER) AND AS SHOWN ON PLAN.
15. ALL PIPE GRADES 1 IN 200 MINIMUM UNO.
16. PROVIDE STEP IRONS IN PITS DEEPER THAN 1000mm.
17. MIN. 600 COVER TO PIPE OBVERT BENEATH ROADS & MIN. 400 COVER BENEATH LANDSCAPED AND PEDESTRIAN AREAS.
18. PIT COVERS IN TRAFFICABLE PAVEMENT SHALL BE CLASS D 'HEAVY DUTY', THOSE LOCATED IN NON-TRAFFICABLE AREAS SHALL BE CLASS B 'MEDIUM DUTY' U.N.O.
19. PROVIDE CLEANING EYES (RODDING POINTS) TO PIPES AT ALL CORNERS AND T-JUNCTIONS WHERE NO PITS ARE PRESENT.
20. DOWN PIPES (DP) TO BE AS PER HYDRAULIC ENGINEERS DETAILS WITH CONNECTOR TO MATCH DP SIZE U.N.O. ON PLAN. PROVIDE CLEANING EYE AT GROUND LEVEL.
21. PIPE LENGTHS NOMINATED ON PLAN OR LONGSECTIONS ARE MEASURED FROM CENTER OF PITS TO THE NEAREST 0.5m AND DO NOT REPRESENT ACTUAL LENGTH. THE CONTRACTOR IS TO ALLOW FOR THIS.
22. WHERE CONNECTION TO EXISTING INGROUND DRAINAGE SYSTEMS, OPEN SWALES, CHANNELS OR ANY OTHER EXISTING SYSTEM, IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE LOCATION AND INVERT ON SITE AT THE BEGINNING OF THE CONSTRUCTION PERIOD. REFER ANY VARIANCE FROM DOCUMENTATION OR SURVEYS TO THE ENGINEER FOR CLARIFICATION.

PIT SCHEDULE - ESTATE - NETWORK A

PIT No.	GRATE RL	DEPTH	TYPE	GRATE SIZE	COMMENT
PIT A01	49.46		SGGP	900x900	◇
PIT A02	49.72		SGGP	900x900	◇
PIT A03	49.25		SGGP	900x900	◇
PIT A04	49.44		SGGP	900x900	◇
PIT A05	49.68		SGGP	900x900	◇
PIT A06	50.05		SGGP	900x900	◇
PIT A07	50.33		SGGP	900x900	◇
PIT A08	50.64		SGGP	900x900	◇
PIT A09	53.72		SGGP	900x900	◇

PIT SCHEDULE - LOT 2 - NETWORK A

PIT No.	GRATE RL	DEPTH	TYPE	GRATE SIZE	COMMENT
PIT L2-A01	54.30		SGGP	900x900	◇
PIT L2-A02	54.30		SGGP	900x900	◇
PIT L2-A02A	54.76		SJP	900x900	
PIT L2-A02B	53.67		SJP	900x900	
PIT L2-A03	54.30		SGGP	900x900	◇
PIT L2-A03A	54.76		SJP	900x900	
PIT L2-A04	54.30		SGGP	900x900	◇
PIT L2-A05	54.30		SGGP	900x900	◇
PIT L2-A06	54.67		SGGP	900x900	◇
PIT L2-A06A	54.76		SJP	900x900	
PIT L2-A06B	54.76		SJP	900x900	
PIT L2-A06C	54.76		SJP	900x900	
PIT L2-A07	53.97		SGGP	900x900	◇
PIT L2-A08	50.61		SGGP	900x900	◇
PIT L2-A09	49.86		SGGP	900x900	◇
PIT L2-A10	49.44		SGGP	900x900	◇
PIT L2-A11	49.25		SGGP	900x900	◇
PIT L2-A12	49.25		SGGP	900x900	◇
PIT L2-A13	49.25		SGGP	900x900	◇
PIT L2-A14	49.25		SGGP	900x900	◇
PIT L2-A15	49.25		SGGP	900x900	◇
PIT L2-A16	49.25		SGGP	900x900	◇
PIT L2-A17	49.25		SGGP	900x900	◇
PIT L2-A18	49.25		SGGP	900x900	◇
PIT L2-A19	49.25		SGGP	900x900	◇
PIT L2-A20	49.25		SGGP	900x900	◇
PIT L2-A21	49.25		SGGP	900x900	◇

PIT SCHEDULE - LOT 2 - NETWORK B

PIT No.	GRATE RL	DEPTH	TYPE	GRATE SIZE	COMMENT
PIT L2-B01	54.30		SGGP	900x900	◇
PIT L2-B02	54.30		SGGP	900x900	◇
PIT L2-B02A	54.76		SJP	900x900	
PIT L2-B02B	54.76		SJP	900x900	
PIT L2-B02C	53.67		SJP	900x900	
PIT L2-B03	54.30		SGGP	900x900	◇
PIT L2-B04	54.30		SGGP	900x900	◇
PIT L2-B04A	54.76		SJP	900x900	
PIT L2-B04B	54.76		SJP	900x900	
PIT L2-B05	54.30		SGGP	900x900	◇
PIT L2-B06	54.30		SGGP	900x900	◇
PIT L2-B06A	53.69		SJP	900x900	
PIT L2-B06B	53.69		SJP	900x900	
PIT L2-B07	54.61		SGGP	900x900	◇

NOTE:

PITS TO BE FITTED WITH OCEAN PROTECT OCEAN GUARD OG200 PIT INSERTS SHOWN THUS ◇
TOTAL NO OF PIT INSERTS = 37
REFER TO PIT SCHEDULE ABOVE

5m 0 10 20 30 40 50m
SCALE 1:500 AT A0 SIZE SHEET

FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

AMENDMENTS	DATE	ISSUE
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	30.03.22	E
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	06.07.21	D
ISSUED FOR PRELIMINARY ONLY	04.06.21	C
ISSUED FOR PRELIMINARY ONLY	01.06.21	B
ISSUED FOR PRELIMINARY ONLY	28.05.21	A

AMENDMENTS	DATE	ISSUE
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	23.11.22	H
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	15.09.22	G
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	07.09.22	F

PROJECT MANAGER: ProjectStrategy
ARCHITECT: nettletontribe
CLIENT: ALTIS PROPERTY PARTNERS

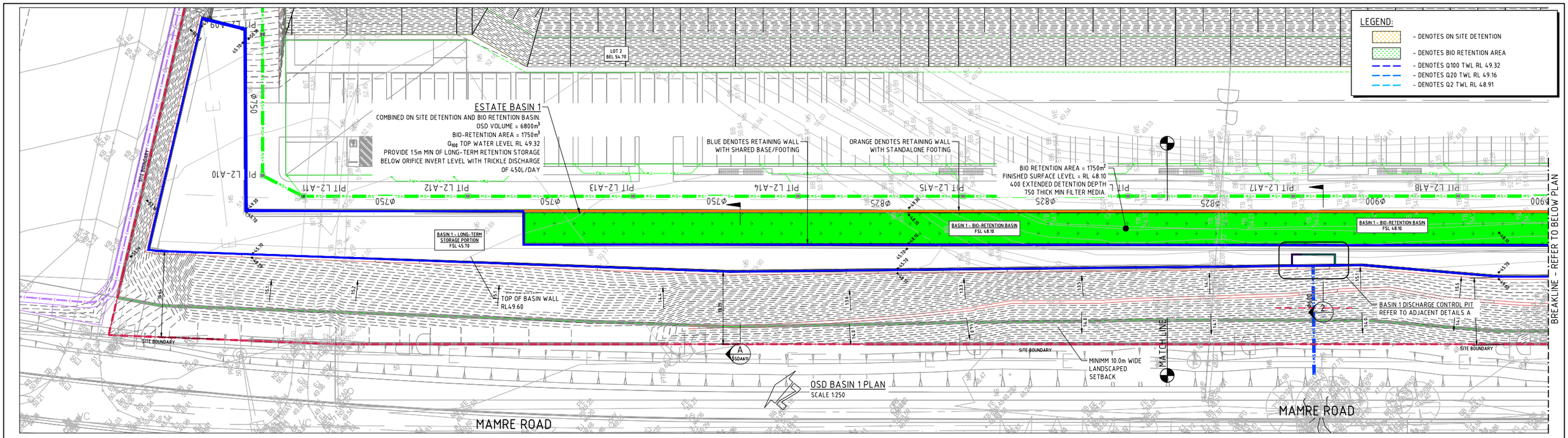
PROJECT: ACCESS LOGISTICS PARK
884-928 MAMRE ROAD
KEMPS CREEK, NSW

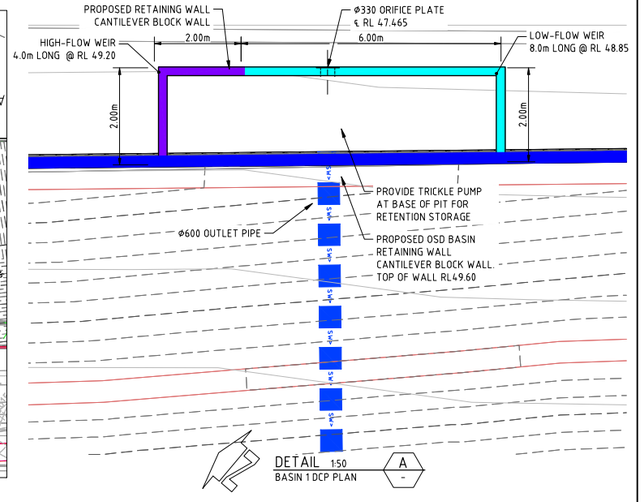
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DRAWING TITLE: STORMWATER DRAINAGE PLAN LOT 2
DRAWING No: C014021.00-SSDA411
ISSUE: H





500mm 0 1 2 3 4 5m
SCALE 1:50 AT A0 SIZE SHEET

2m 0 5 10 15 20 25m
SCALE 1:250 AT A0 SIZE SHEET

FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

AMENDMENTS	DATE	ISSUE
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	23.11.22	D
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	08.09.22	C
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	25.03.22	B
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	02.07.21	A

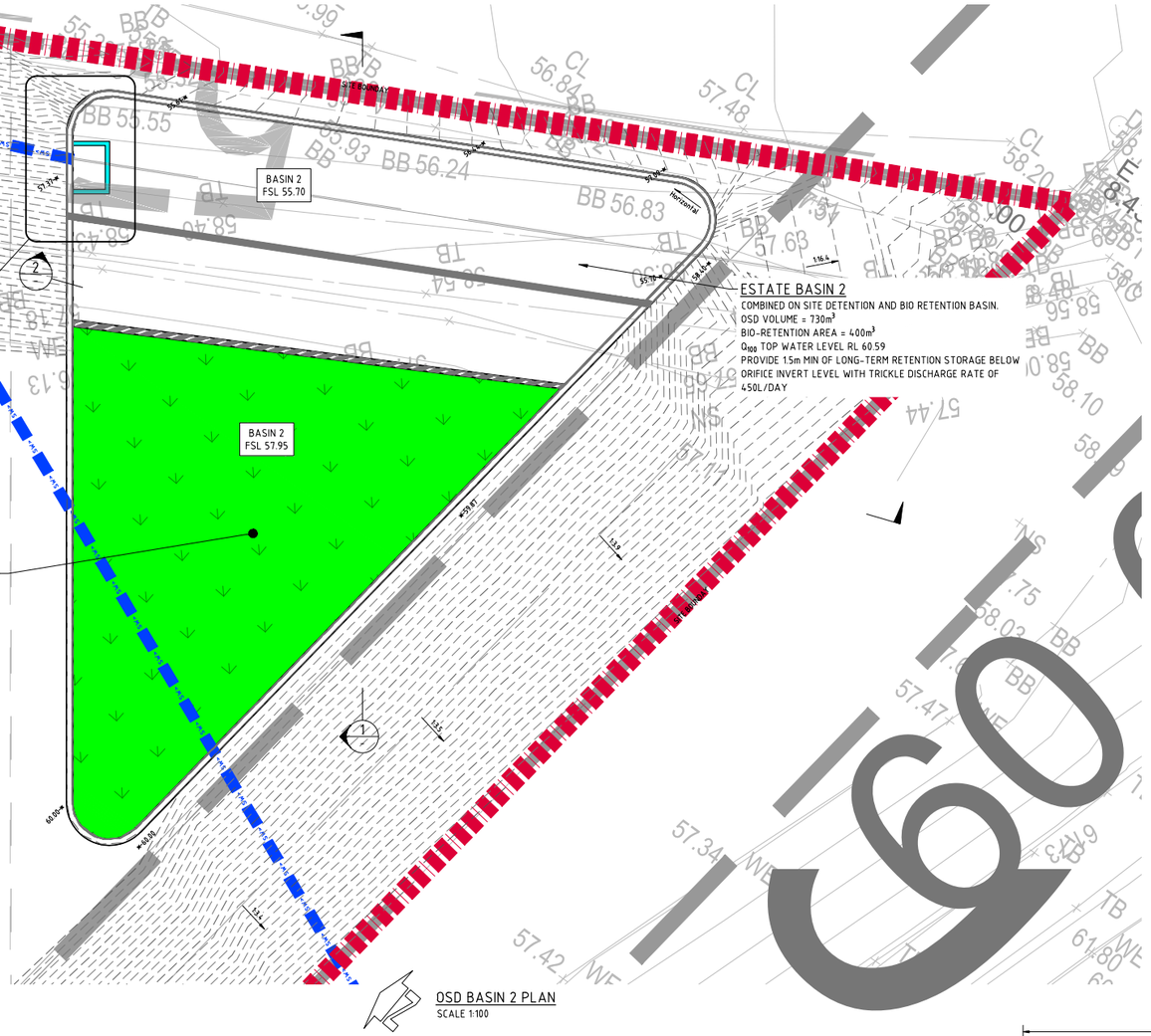
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ARCHITECT: nettletontribe
CLIENT: ALTIS PROPERTY PARTNERS
PROJECT: ACCESS LOGISTICS PARK
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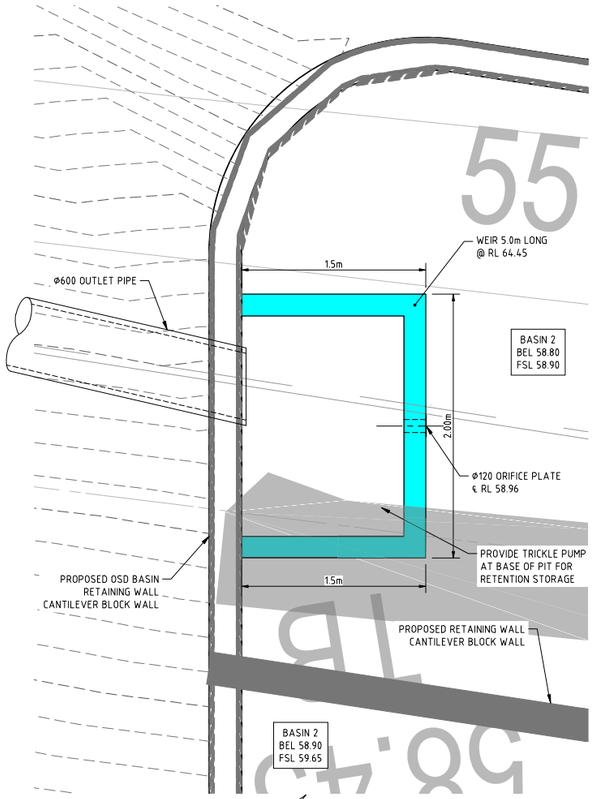
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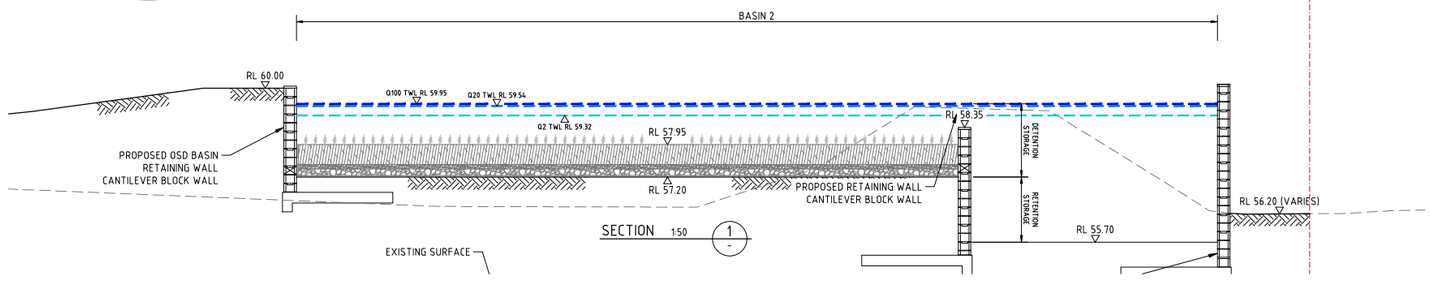


OSD BASIN 2 PLAN
SCALE 1:100

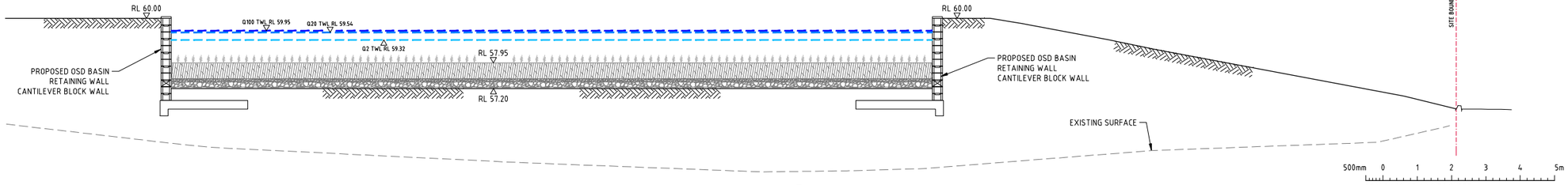


DETAIL 1:20 (A)
BASIN 2 DCP PLAN

LEGEND:
- DENOTES ON SITE DETENTION
- DENOTES BIO RETENTION AREA
- DENOTES Q100 TWL RL 59.95
- DENOTES Q20 TWL RL 59.54
- DENOTES Q2 TWL RL 59.32



SECTION 1:50 (1)



SECTION 1:50 (2)

500mm 0 1 2 3 4 5m
SCALE 1:50 AT A0 SIZE SHEET

1m 0 1 2 3 4 5 6 7 8 9 10m
SCALE 1:100 AT A0 SIZE SHEET

FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

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ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	25.03.22	B
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	02.07.21	A

AMENDMENTS DATE ISSUE

PROJECT MANAGER: ProjectStrategy
ARCHITECT: nettletontribe
CLIENT: ALTIS PROPERTY PARTNERS

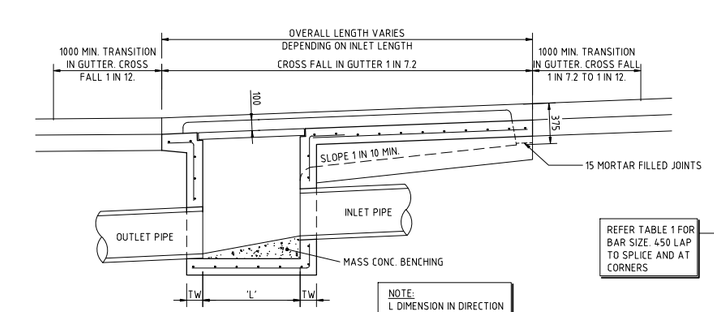
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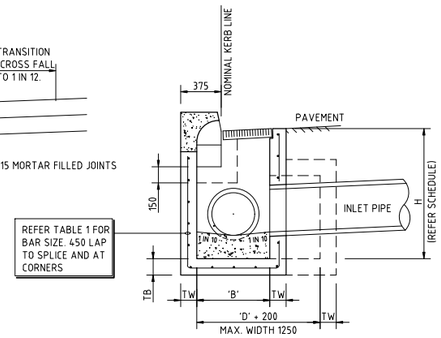
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DRAWING No: C0142100-SSDA432
ISSUE: E



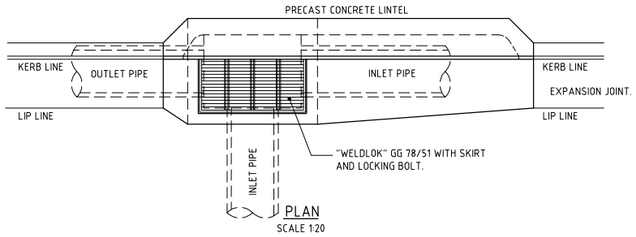
NOTE:
L DIMENSION IN DIRECTION OF DOWNSTREAM PIPE

LONG SECTION.
SCALE 1:20



REFER TABLE 1 FOR BAR SIZE. 450 LAP TO SPLICE AND AT CORNERS

CROSS SECTION.
SCALE 1:20



PLAN
SCALE 1:20

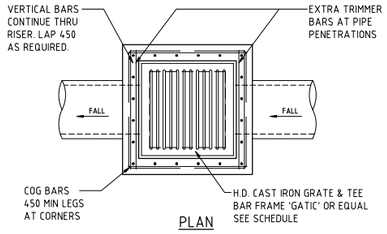
KERB INLET PIT - KIP

TABLE 1 - CLASS D <1200mm SQUARE PIT REINFORCEMENT & WALL THICKNESS				
DEPTH 'H'	WALL THICKNESS 'TW'	WALL REINFORCEMENT	BASE THICKNESS 'TB'	BASE REINFORCEMENT
< 1.0m	150mm	-	150mm	-
1.0m-3.0m	150mm	N12-200 EACH WAY	150mm	N12-200 EACH WAY
3.0m-4.5m	200mm	N12-200 EACH WAY	200mm	N12-200 EACH WAY
4.5-6.0	200mm	N16-200 EACH WAY	200mm	N16-200 EACH WAY

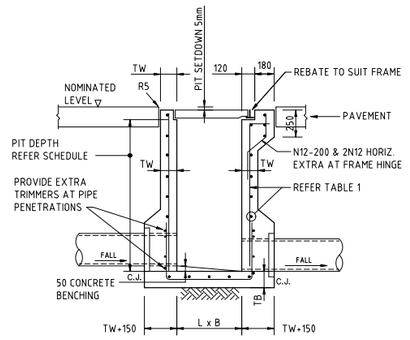
CONCRETE QUALITY					
ELEMENT	SLUMP	AGGREGATE (MAX. SIZE)	CEMENT TYPE	ADMIXTURE	F'c (MPa)
PIT	80	20	GP	NIL	32

NOTES:

1. WHERE GULLY PIT IS LOCATED ON KERB RETURNS OR BULB OF CUL-DE-SACS PROVIDE CURVED PRECAST CONCRETE LINTELS.
2. SAG PITS SHALL HAVE LINTEL PLACED CENTRALLY ABOUT THE GRATE.
3. ALL REINFORCING TO HAVE 30 MIN. CLAER CONCRETE COVER.
4. FOR PITS DEEPER THAN 1200mm CLIMB RAILS SHALL BE PROVIDED.



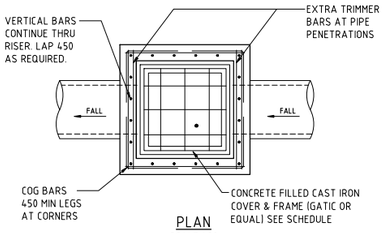
PLAN
SCALE 1:20



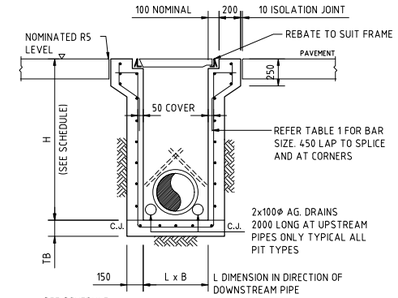
SEE SCHEDULE
L DIMENSION IN DIRECTION OF DOWNSTREAM PIPE

SECTION
SCALE 1:20

SINGLE GRATED GULLY PIT - SGGP



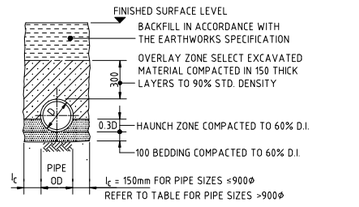
PLAN
SCALE 1:20



SEE SCHEDULE
L DIMENSION IN DIRECTION OF DOWNSTREAM PIPE

SECTION
SCALE 1:20

SEALED PIT - SJP

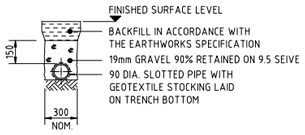


TYPE H1 SUPPORT TO CONCRETE PIPES AT LANDSCAPED AREAS
SCALE 1:20

BEDDING & HAUNCH MATERIAL GRADING	
SIEVE SIZE (mm)	WEIGHT PASSING (%)
19.0	100
2.36	100 TO 50
0.60	90 TO 50
0.30	60 TO 10
0.15	25 TO 0
0.075	10 TO 0

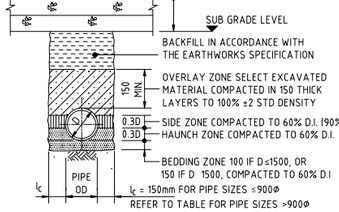
SIDE ZONE WIDTH	
PIPE SIZE (mm)	l_c (mm)
≤ 900Φ	150
1050Φ	175
1200Φ	200
1350Φ	225
1500Φ	250
1650Φ	275
1800Φ	300

ENGINEER TO SPECIFY TRENCH WIDTHS FOR PIPE SIZES GREATER THAN 1800Φ



SUPPORT TO AGRICULTURAL DRAIN
FOR USE UNDER CAR PARK PAVEMENTS/LANDSCAPED AREAS
SCALE 1:20

SIDE ZONE MATERIAL GRADING	
SIEVE SIZE (mm)	WEIGHT PASSING (%)
19.0	100
9.5	100 TO 50
2.6	100 TO 30
0.60	50 TO 15
0.075	25 TO 0

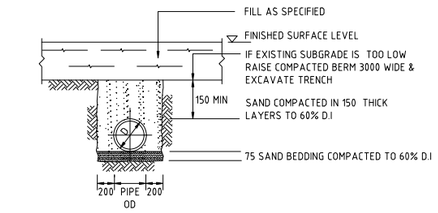


TYPE HS2 SUPPORT TO CONCRETE PIPES UNDER PAVEMENT
SCALE 1:20
D ≤1350, MAX FILL = 4.0m
D >1350, MAX FILL = 3.0m

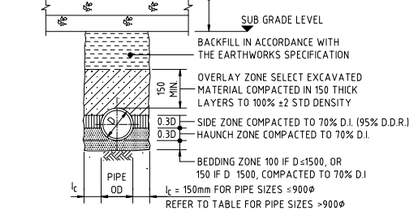
BEDDING & HAUNCH MATERIAL GRADING	
SIEVE SIZE (mm)	WEIGHT PASSING (%)
19.0	100
2.36	100 TO 50
0.60	90 TO 50
0.30	60 TO 10
0.15	25 TO 0
0.075	10 TO 0

SIDE ZONE WIDTH	
PIPE SIZE (mm)	l_c (mm)
≤ 900Φ	150
1050Φ	175
1200Φ	200
1350Φ	225
1500Φ	250
1650Φ	275
1800Φ	300

ENGINEER TO SPECIFY TRENCH WIDTHS FOR PIPE SIZES GREATER THAN 1800Φ



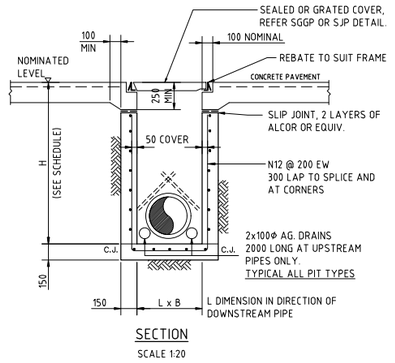
SUPPORT TO uPVC PIPES



TYPE HS3 SUPPORT TO CONCRETE PIPES UNDER PAVEMENT
SCALE 1:20
D ≤1050, MAX FILL = 6.0m
D >1050, MAX FILL = 4.8m

SIDE ZONE MATERIAL GRADING	
SIEVE SIZE (mm)	WEIGHT PASSING (%)
75.0	100
9.5	100 TO 50
2.36	100 TO 50
0.60	50 TO 15
0.075	25 TO 0

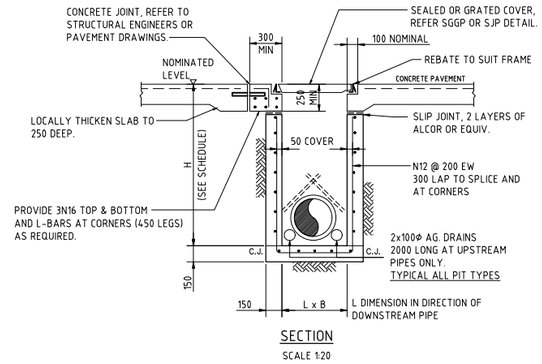
SELECT FILL MATERIAL IN ACCORDANCE WITH TABLE 1 AS 3725



SECTION
SCALE 1:20

SJP/CIS & SGGP/CIS (CAST IN SLAB) PIT DETAIL GRATE/COVER SUPPORT CAST-INTO PAVEMENT SLAB

(ADOPT IN CONCRETE PAVEMENTS FOR SGGP's & SJP's, WHERE JOINTS ARE NOT LOCATED WITHIN PROXIMITY OF THE GRATE)



SECTION
SCALE 1:20

SJP/CIS & SGGP/CIS (CAST IN SLAB) PIT DETAIL GRATE/COVER SUPPORT CAST-INTO PAVEMENT SLAB

(ADOPT IN CONCRETE PAVEMENT FOR SGGP's & SJP's, WHERE PITS ARE LOCATED IN THE CORNER OF SLAB PANELS OR ADJACENT TO SLAB PANEL JOINTS)

200mm 0 500 1000 1500 2000mm
SCALE 1:20 AT A0 SIZE SHEET

FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

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ISSUED FOR PRELIMINARY ONLY	25.06.21	B
ISSUED FOR INFORMATION ONLY	01.04.21	A

PROJECT MANAGER: ProjectStrategy
ARCHITECT: nettletontribe
CLIENT: ALTIS PROPERTY PARTNERS

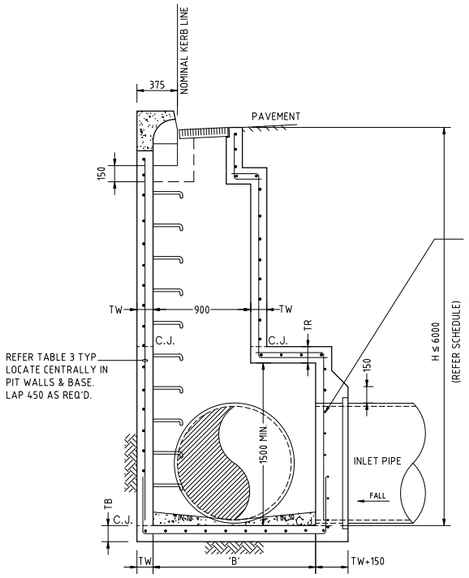
PROJECT: ACCESS LOGISTICS PARK
884-928 MAMRE ROAD
KEMPS CREEK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
DS	JB	AUG '20	MW	A0	AS SHOWN	C014021.00-SSDA451

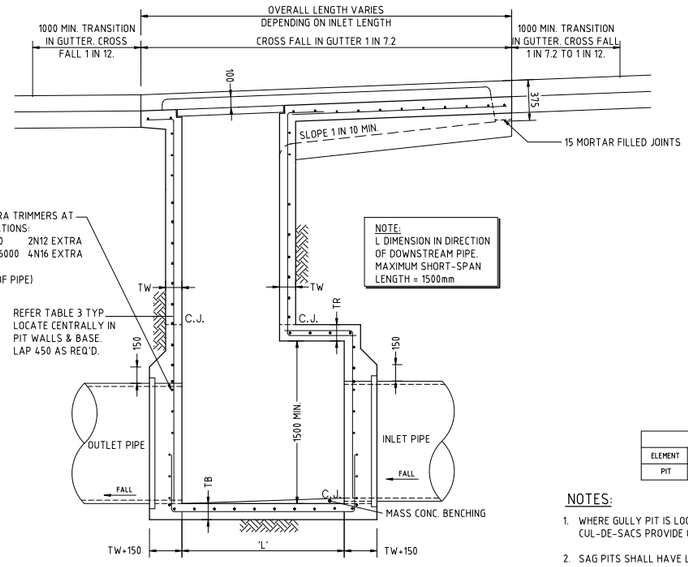
Costin Roe Consulting Pty Ltd.
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email: mail@costinroe.com.au

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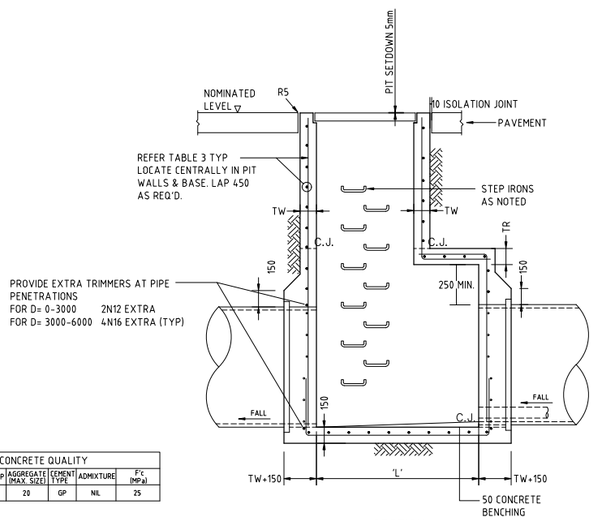
DRAWING TITLE: STORMWATER DRAINAGE DETAILS SHEET 1
DRAWING No: C014021.00-SSDA451
ISSUE: E



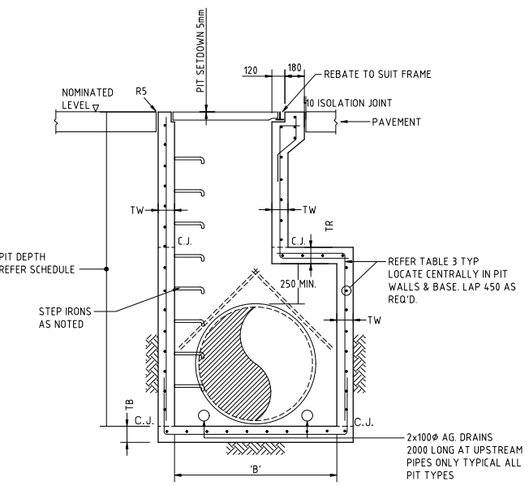
CROSS SECTION
SCALE 1:20



LONG SECTION
SCALE 1:20



SECTION
SCALE 1:20



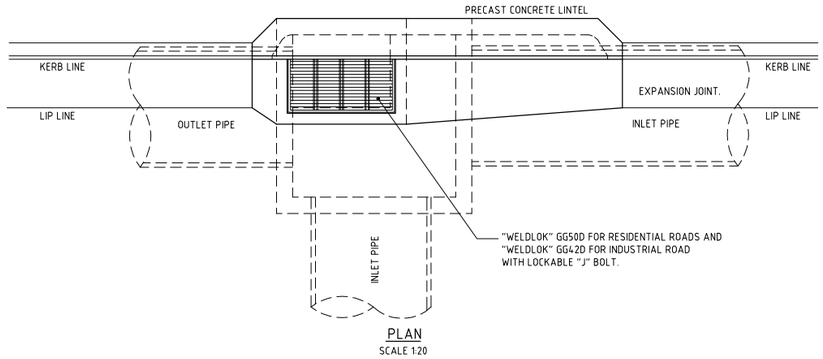
SECTION
SCALE 1:20

CONCRETE QUALITY					
ELEMENT	SLUMP	AGGREGATE (MAX. SIZE)	CEMENT TYPE	ADMIXTURE	F'c (MPa)
PIT	80	20	GP	NIL	25

NOTES:

1. WHERE GULLY PIT IS LOCATED ON KERB RETURNS OR BULB OF CUL-DE-SACS PROVIDE CURVED PRECAST CONCRETE LINTELS.
2. SAG PITS SHALL HAVE LINTEL PLACED CENTRALLY ABOUT THE GRATE.
3. ALL REINFORCING TO HAVE 30 MIN. CLEAR CONCRETE COVER.
4. FOR PITS DEEPER THAN 1200mm STEP IRONS SHALL BE PROVIDED.
5. FOR ALL PITS IN ITV PAVEMENT AREAS, PIT WALLS ARE TO BE INCREASED IN THICKNESS BY 50mm AND REINFORCEMENT TO BE N16 BARS IN LIEU OF N12

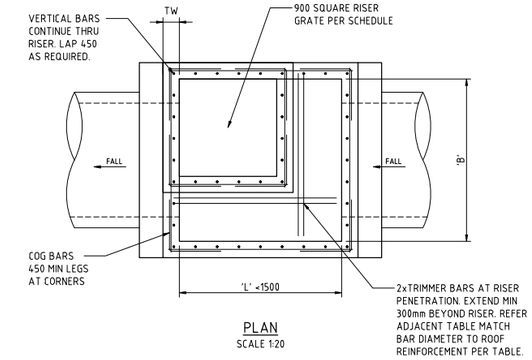
TABLE 3 - TAPERED CLASS D PIT REINFORCEMENT & WALL THICKNESS						
DEPTH 'H'	WALL THICKNESS 'TW'	WALL REINFORCEMENT	ROOF THICKNESS 'TR'	ROOF REINFORCEMENT	BASE THICKNESS 'TB'	BASE REINFORCEMENT
<1.5m	150mm	N12-200 EACH WAY	150mm	N12-200 EACH WAY	150mm	N12-200 EACH WAY
1.5m-3.0m	150mm	N12-200 EACH WAY	150mm	N12-200 EACH WAY	150mm	N12-200 EACH WAY
3.0m-4.5m	200mm	N16-200 EACH WAY	200mm	N16-200 EACH WAY	200mm	N12-200 EACH WAY
4.5-6.0	250mm	N16-200 EACH WAY	250mm	N16-200 EACH WAY	250mm	N16-200 EACH WAY



PLAN
SCALE 1:20

TAPERED KERB INLET PIT - KIP

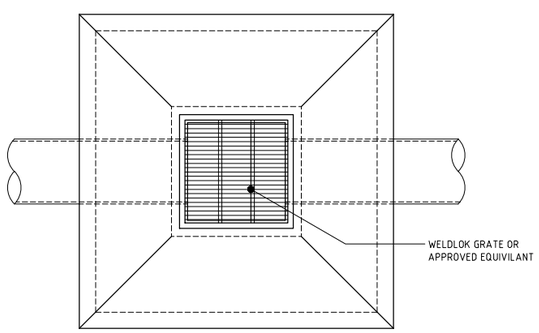
SUBSOIL NOT SHOWN
FOR CLARITY.



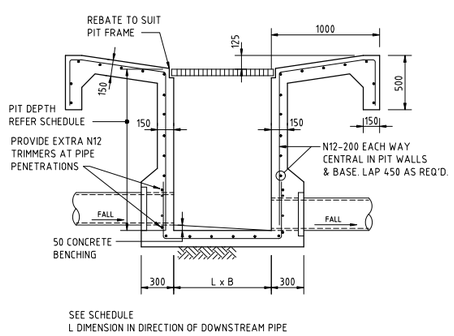
PLAN
SCALE 1:20

TAPERED SINGLE GRATED GULLY PIT - SGGP

SUBSOIL NOT SHOWN
FOR CLARITY.



PLAN
SCALE 1:20



SECTION
SCALE 1:20

FIELD INLET PIT - SIP

200mm 0 500 1000 1500 2000mm
SCALE 1:20 AT A0 SIZE SHEET

FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

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ISSUED FOR INFORMATION	25.03.22	D
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	02.07.21	C
ISSUED FOR PRELIMINARY ONLY	25.06.21	B
ISSUED FOR INFORMATION ONLY	01.04.21	A

PROJECT MANAGER: ProjectStrategy
ARCHITECT: nettletontribe
CLIENT: ALTIS PROPERTY PARTNERS

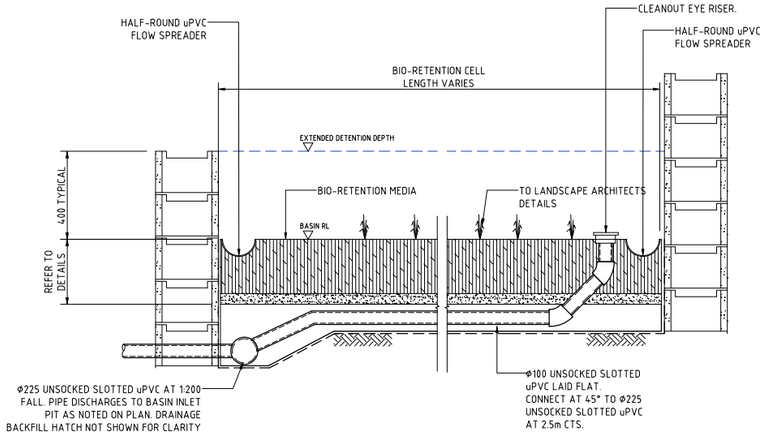
PROJECT: ACCESS LOGISTICS PARK
884-928 MAMRE ROAD
KEMPS CREEK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
DS	JB	AUG '20	MW	A0	AS SHOWN	C014021.00-SSDA452

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DRAWING TITLE: STORMWATER DRAINAGE DETAILS SHEET 2
DRAWING No. C014021.00-SSDA452
ISSUE: E



DETAIL 1:20 — A
TYPICAL THRU BIO CELL

BIO-RETENTION NOTES :

FILTER MEDIA TO BE LOAMY SAND WITH A PERMEABILITY NOT LESS THAN 200mm/hr. FILTER MEDIA TO BE FREE OF RUBBISH, DELETERIOUS MATERIAL, TOXICANTS, DECLARED PLANTS AND LOCAL WEEDS, AND IS TO NOT BE HYDROPHOBIC.

FILTER MEDIA TO HAVE THE FOLLOWING COMPOSITION RANGE:

CLAY & SILT (<0.05mm)	<3%
VERY FINE SAND (0.05-0.15mm)	5-30%
FINE SAND (0.15-0.25mm)	10-30%
MEDIUM TO COARSE SAND (0.25-1.00mm)	40-60%
COARSE SAND (1.0-2.0mm)	7-10%
FINE GRAVEL (2.0-3.4mm)	<3%

FILTER MEDIA THAT DOES NOT MEET THE FOLLOWING CRITERIA SHALL BE REJECTED:

a. ORGANIC MATTER CONTENT TO BE IDEALLY WITHIN 1% TO 3% (W/W) AND TO BE NO GREATER THAN 5%(W/W).
b. PH TO BE BETWEEN 5.5 AND 7.5
c. PHOSPHOROUS CONTENT TO BE NO GREATER THAN 35mg/kg

FILTER MEDIA TO BE ASSESSED BY QUALIFIED HORTICULTURALIST TO ENSURE CAPABILITY OF SUPPORTING PLANT LIFE.

DRAINAGE LAYER TO BE CLEAN GRAVEL 5-7mm.

PLANTS TO BE IN ACCORDANCE WITH PENRITH CITY COUNCIL REQUIREMENTS.

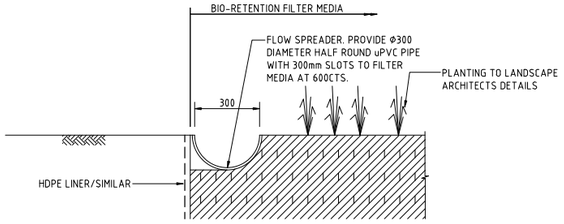
PROVIDE 100mm TOPSOIL AND TEMPORARY EROSION PROTECTION (JUTEMASTER OR EQUIV) TO SWALE BATTER SLOPES AND ADJACENT LANDSCAPED AREAS. NOTE THAT NO TOPSOIL IS TO BE PLACED OVER FILTRATION MEDIA. PROVIDE SILT FENCE TO TOP OF BANK UNTIL SUCH TIME AS THIS STABILISING AND VEGETATION HAS BEEN COMPLETED.

BIO-RETENTION TO BE PARTIALLY INSTALLED, FOLLOWING COMPLETION OF ROADWORKS, WITH THE TOP 75-100mm OF FILTER MEDIA REPLACED WITH A FINE TO COARSE SAND UNDERLAIN WITH A GEOTEXTILE LAYER (REFER TO DETAIL). FOLLOWING COMPLETION OF THE UPSTREAM DEVELOPMENT AND SITE STABILISATION, THE SAND IS TO BE REMOVED, REPLACED WITH FILTER MATERIAL AND PLANTED OUT. REFER TO TEMPORARY BIO-BASIN DETAIL

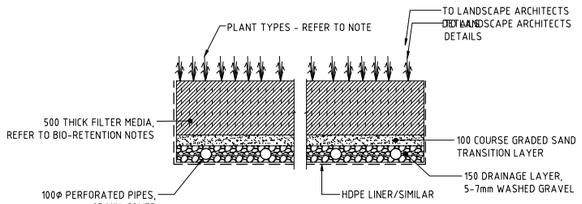
PRIOR TO PLANTING, THE TOP 100mm OF THE BIORETENTION FILTER MEDIA IS TO BE AMELIORATED WITH APPROPRIATE ORGANIC MATTER, FERTILISER AND TRACE ELEMENTS TO AID PLANT ESTABLISHMENT AS PER THE TABLE BELOW:

TABLE: RECIPE FOR AMELIORATING TOP 100mm OF BIORETENTION FILTER MEDIA

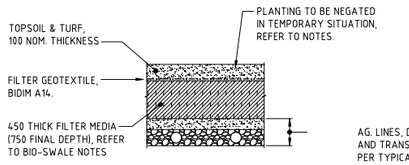
CONSTITUENT	QUANTITY (kg/m2 OF FILTER AREA)
GRANULATED POULTRY MANURE FINES	50
SUPERPHOSPHATE	2
MAGNESIUM SULPHATE	3
POTASSIUM SULPHATE	2
TRACE ELEMENT MIX	1
FERTILISER NPK (16.4.14)	4
LIME	20



TYPICAL HALF-ROUND FLOW SPREADER DETAIL
SCALE 1:10

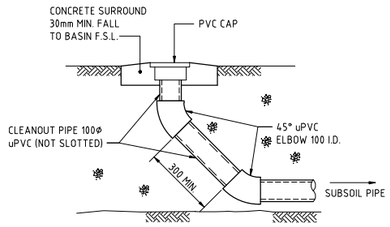


TYPICAL BIO-RETENTION DETAIL
SCALE 1:20



AG. LINES, DRAINAGE LAYER AND TRANSITION LAYER AS PER TYPICAL DETAIL.

TEMPORARY BIO-RETENTION PROTECTION DETAIL
SCALE 1:20
TEMPORARY CONSTRUCTION REQUIREMENT DETAIL - REFER TO NOTES FOR IMPLEMENTATION PERIODS.



BIORETENTION CLEANOUT EYE ELEVATION
SCALE 1:20
DENOTED C.E. ON PLAN

100mm 0 200 400 600 800 1000mm
SCALE 1:10 AT A0 SIZE SHEET

200mm 0 500 1000 1500 2000mm
SCALE 1:20 AT A0 SIZE SHEET

500mm 0 1 2 3 4 5m
SCALE 1:50 AT A0 SIZE SHEET

BIO-RETENTION BASIN DETAILS

FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

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ISSUED FOR INFORMATION ONLY	01.04.21	A

AMENDMENTS DATE ISSUE

PROJECT MANAGER: ProjectStrategy
ARCHITECT: nettletontribe
CLIENT: ALTIS PROPERTY PARTNERS

PROJECT: ACCESS LOGIGISTICS PARK
884-928 MAMRE ROAD
KEMPS CREEK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
DS	JB	AUG '20	MW	A0	AS SHOWN	C014021.00-SSDA453

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email: mail@costinroe.com.au

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DRAWING TITLE: STORMWATER DRAINAGE DETAILS SHEET 3
DRAWING NO: C014021.00-SSDA453
ISSUE: E

MAMRE ROAD

BASIN 1

EXISTING POND

PROPOSED ROAD LEVEL ON ADJACENT PROPERTY = RL57.00 (APPROX). FINAL COORDINATION BETWEE ROAD PACKAGES TO BE CONFIRMED DURING DETAILED DESIGN TO PROVIDE A SMOOTH TRANSITION AND INTERFACE BETWEEN BOTH PACKAGES

BASIN 2

LOT 5
PAD RL 56.80
±1000mm

LOT 6
PAD RL 57.70
±1000mm

LOT 7
PAD RL 59.40
±1000mm

LOT 14
PAD RL 60.15
±1000mm

LOT 15
PAD RL 60.00
±1000mm

ROAD 2
24.0m WIDE

ROAD 3
25.6m

LOT 2
PAD RL 54.50
FFL RL 54.80
±1000mm

LOT 8
PAD RL 57.90
±1000mm

LOT 13
PAD RL 59.70
±1000mm

LOT 9
PAD RL 56.30
±1000mm

ROAD 2
24.0m WIDE

LOT 10
TEMP POND INVERT 54.40
±1000mm

LOT 12
PAD RL 59.70
±1000mm

LOT 11
TEMP POND INVERT 54.40
±1000mm

ROAD 1
25.6m WIDE

PROPOSED ROAD LEVEL ON ADJACENT PROPERTY = RL61.50 (APPROX). FINAL COORDINATION BETWEE ROAD PACKAGES TO BE CONFIRMED DURING DETAILED DESIGN TO PROVIDE A SMOOTH TRANSITION AND INTERFACE BETWEEN BOTH PACKAGES

INTERSECTION WITH MAMRE ROAD PART OF MU GROUP SCOPE OF WORKS. LEVELS TO BE COORDINATED DURING DETAILED DESIGN

EXISTING DRIVEWAY

CONTOURS HERE ARE DERIVED FROM LIDAR DATA

Dp 259135

DP 255560

PT51 DP 259135

ROADWORKS PLAN
1:750 SCALE

TRAFFIC CONTROL NOTES:

1. TRAFFIC CONTROLS TO COMPLY WITH AS 1742.3-2002
2. TRAFFIC CONTROL PLANS TO BE SUBMITTED AND CERTIFIED BY AN ACCREDITED WORK SITE OPERATIVE.
3. AS PART OF THE TRAFFIC CONTROL PLAN ENSURE THAT PEDESTRIANS ARE CATERED FOR.
4. AFTER-HOURS TRAFFIC CONTROL THROUGH THE WORKSITE HAVE TO BE CATERED FOR.

PCC NOTES:

ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH PENRITH CITY COUNCIL STANDARDS AND SPECIFICATIONS:

6m 0 15 30 45 60 75m
SCALE 1:750 AT A0 SIZE SHEET

FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

AMENDMENTS	DATE	ISSUE
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	08.09.22	F
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	30.03.22	E
ISSUED FOR INFORMATION ONLY	25.03.22	D
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	02.07.21	C
ISSUED FOR PRELIMINARY ISSUE ONLY	25.06.21	B
ISSUED FOR PRELIMINARY ISSUE ONLY	01.04.21	A

AMENDMENTS	DATE	ISSUE
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	23.11.22	H
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	15.09.22	G

PROJECT MANAGER: ProjectStrategy

ARCHITECT: nettletontribe

CLIENT: ALTIS PROPERTY PARTNERS

PROJECT: ACCESS LOGISTICS PARK
884-928 MAMRE ROAD
KEMPS CREEK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
DS	JB	AUG '20	MW	A0	AS SHOWN	C014021.00-SSDA500

Costin Roe Consulting Pty Ltd.
Consulting Engineers
Level 1, 8 Windmill Street
Walsh Bay, Sydney NSW 2000
Tel: (02) 9241-7699 Fax: (02) 9241-4728
email: mail@costinroe.com.au

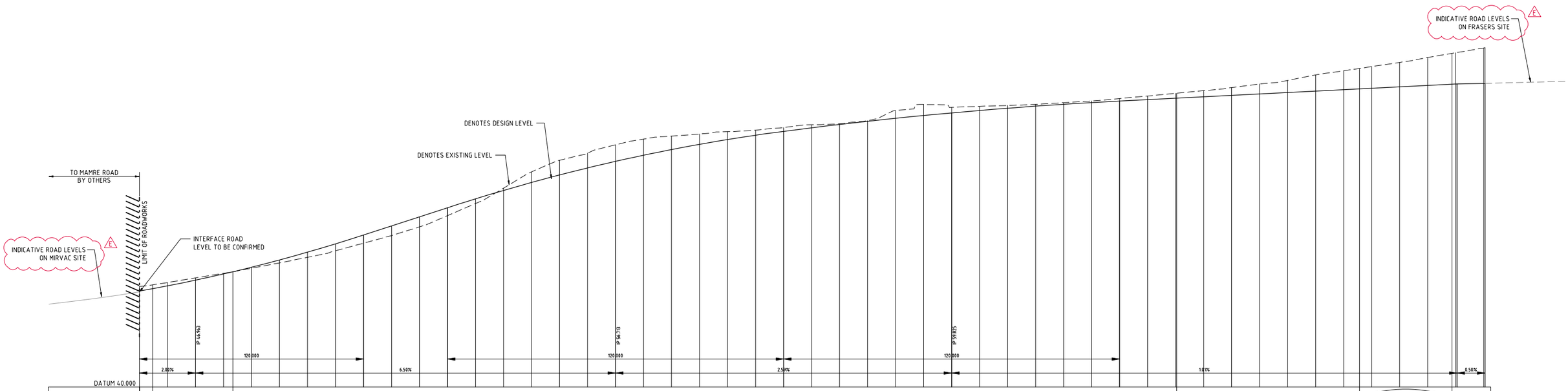
Costin Roe Consulting

PRECISION | COMMUNICATION | ACCOUNTABILITY

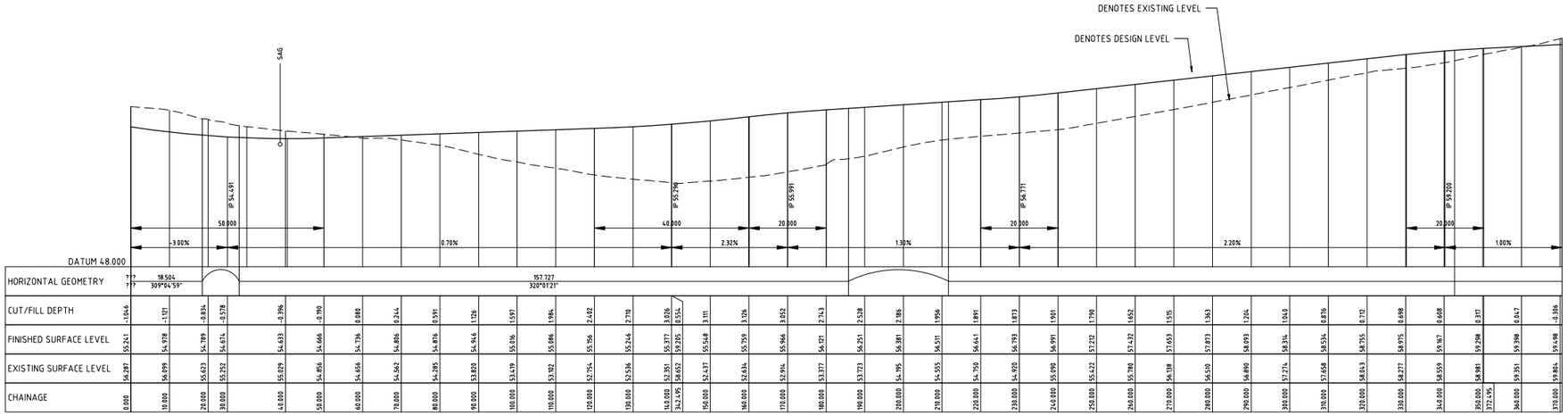
DRAWING TITLE: ROADWORKS PLAN

DRAWING No: C014021.00-SSDA500

ISSUE: H


INDICATIVE ROAD LEVELS ON FRASERS SITE
E
DENOTES DESIGN LEVEL
DENOTES EXISTING LEVEL
TO MAMRE ROAD BY OTHERS
LIMIT OF ROADWORKS
INDICATIVE ROAD LEVELS ON MIRVAC SITE
INTERFACE ROAD LEVEL TO BE CONFIRMED
IP 45.963
IP 90.113
IP 59.825
120.000
120.000
120.000
2.00%
6.50%
2.50%
1.01%
0.50%
DATUM 40.000

| | | |



LONGITUDINAL SECTION - CL IND RD 1

HORIZONAL SCALE 1:500
VERTICAL SCALE 1:100

1m 0 1 2 3 4 5 6 7 8 9 10m
SCALE 1:100 AT A0 SIZE SHEET

5m 0 10 20 30 40 50m
SCALE 1:500 AT A0 SIZE SHEET

FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

AMENDMENTS	DATE	ISSUE
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	08.09.22	F
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	30.03.22	E
ISSUED FOR INFORMATION	25.03.22	D
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	02.07.21	C
ISSUED FOR PRELIMINARY ONLY	25.06.21	B
ISSUED FOR PRELIMINARY ONLY	01.04.21	A

AMENDMENTS DATE ISSUE

PROJECT MANAGER ProjectStrategy

ARCHITECT nettletontribe

CLIENT ALTIS PROPERTY PARTNERS

PROJECT
ACCESS LOGISTICS PARK
884-928 MAMRE ROAD
KEMPS CREEK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
DS	JB	AUG '20	MW	A0	AS SHOWN	C014021.00-SSDA522

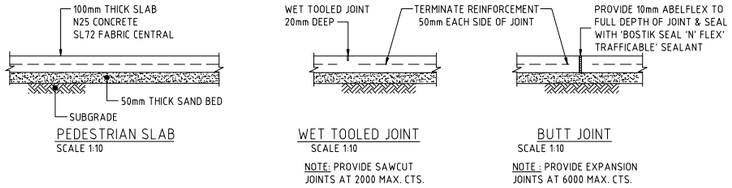
Costin Roe Consulting Pty Ltd.
Consulting Engineers
Level 1, 8 Windmill Street
Walsh Bay, Sydney NSW 2000
Tel: (02) 8251-7600 Fax: (02) 8041-3728
email: mail@costinroe.com.au

Costin Roe Consulting

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DRAWING TITLE
ROADWORKS LONG SECTIONS
ESTATE ROAD
SHEET 2

DRAWING NO. C014021.00-SSDA522 ISSUE F



PEDESTRIAN SLAB
SCALE 1:10

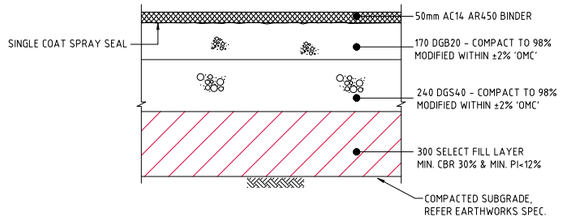
WET TOOLED JOINT
SCALE 1:10

NOTE: PROVIDE SAWCUT JOINTS AT 2000 MAX. CTS.

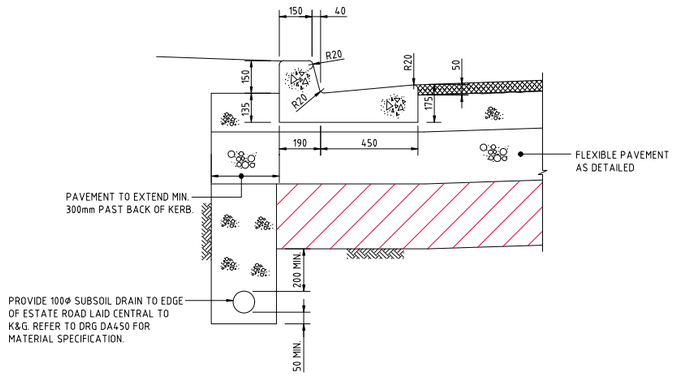
BUTT JOINT
SCALE 1:10

NOTE : PROVIDE EXPANSION JOINTS AT 6000 MAX. CTS.

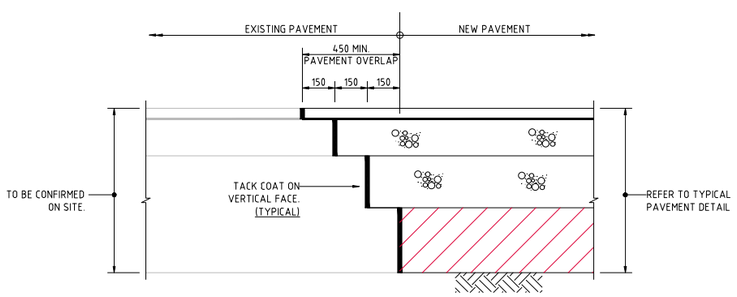
PEDESTRIAN SLAB DETAILS



ROAD PAVEMENT DETAIL
SCALE 1:10
DESIGN TRAFFIC $1x10^7$ ESA's
DESIGN CBR VALUE OF 2%
NOTE: FINAL DESIGN SUBJECT TO FURTHER TESTING TO CONFIRM CBR VALUE

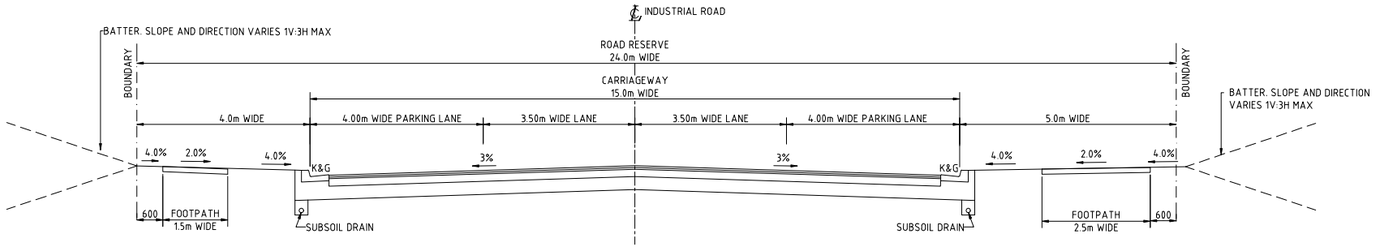


PENRITH CITY COUNCIL KERB & GUTTER
SCALE 1:10

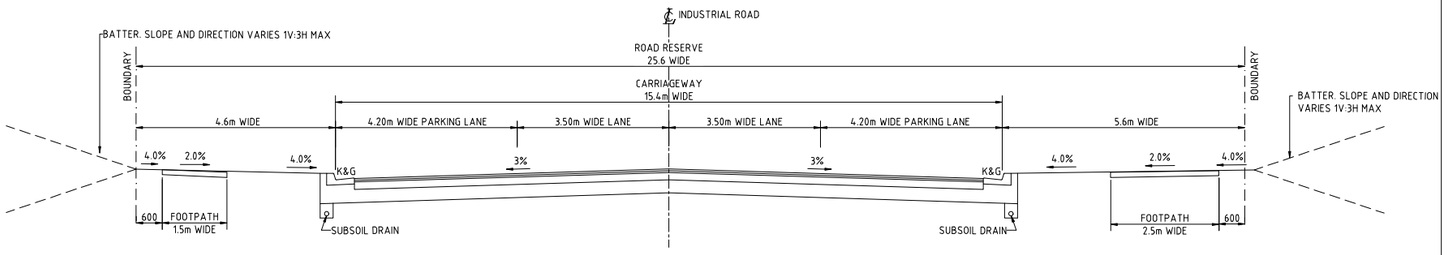


TYPICAL NEW / EXISTING PAVEMENT INTERFACE DETAIL

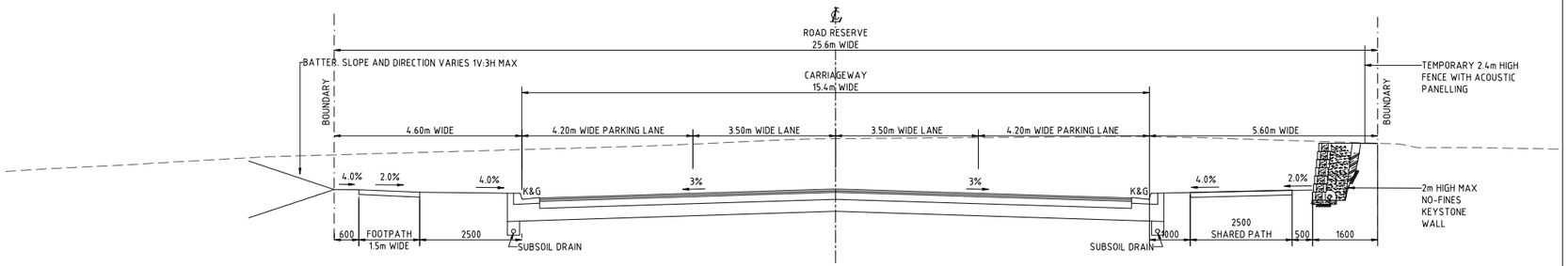
SCALE 1:10



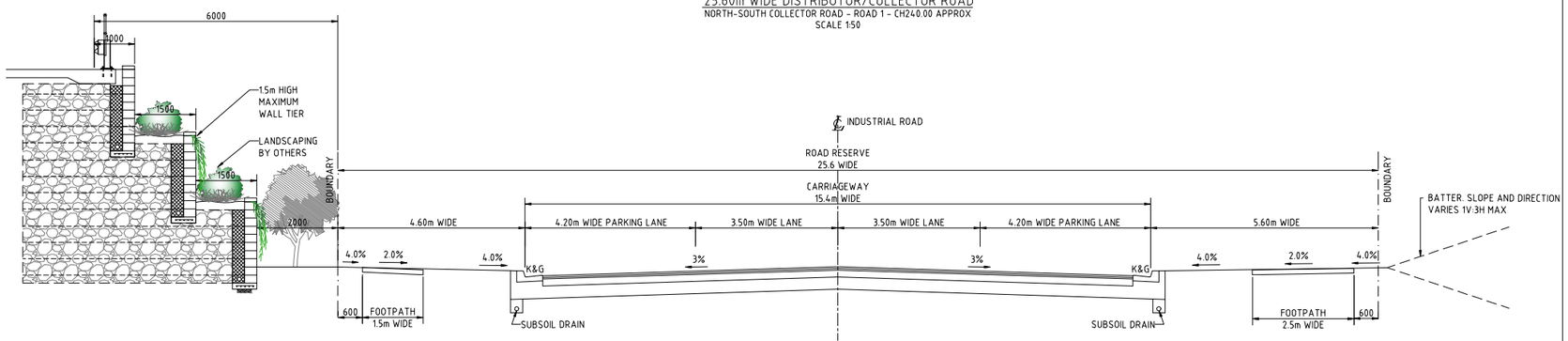
24.0m WIDE LOCAL INDUSTRIAL ROAD
INTERNAL INDUSTRIAL ROAD - ROAD 2
SCALE 1:50



25.60m WIDE DISTRIBUTOR/COLLECTOR ROAD
NORTH-SOUTH & EAST-WEST COLLECTOR ROAD ROAD 1 & ROAD 2 - TYPICAL
SCALE 1:50



25.60m WIDE DISTRIBUTOR/COLLECTOR ROAD
NORTH-SOUTH COLLECTOR ROAD - ROAD 1 - CH240.00 APPROX
SCALE 1:50



25.60m WIDE DISTRIBUTOR/COLLECTOR ROAD
NORTH-SOUTH COLLECTOR ROAD - ROAD 1 - CH60.00 APPROX
SCALE 1:50

500mm 0 1 2 3 4 5m
SCALE 1:50 AT A0 SIZE SHEET

100mm 0 200 400 600 800 1000mm
SCALE 1:10 AT A0 SIZE SHEET

200mm 0 500 1000 1500 2000mm
SCALE 1:20 AT A0 SIZE SHEET

FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

AMENDMENTS	DATE	ISSUE
ISSUED FOR INFORMATION ONLY	25.03.22	F
ISSUED FOR INFORMATION ONLY	18.03.22	E
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	06.09.21	D
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	02.07.21	C
ISSUED FOR PRELIMINARY ONLY	25.06.21	B
ISSUED FOR PRELIMINARY ONLY	01.04.21	A

AMENDMENTS	DATE	ISSUE
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	30.03.22	G

PROJECT MANAGER: ProjectStrategy
ARCHITECT: nettletontribe
CLIENT: ALTIS PROPERTY PARTNERS

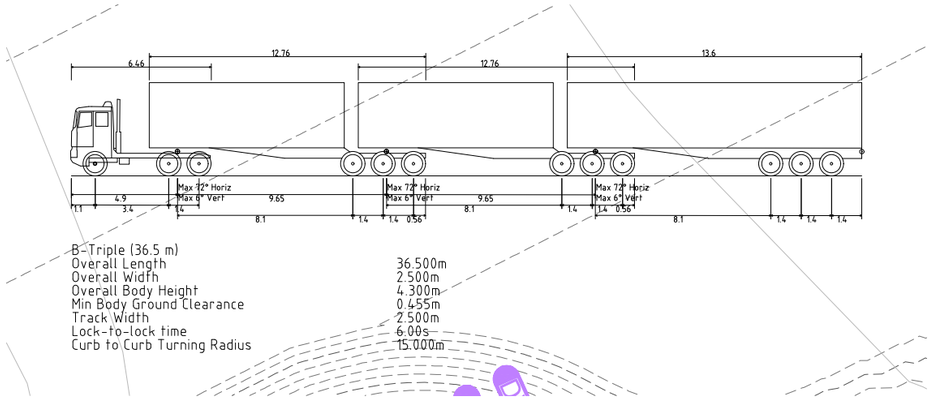
PROJECT: ACCESS LOGISTICS PARK
884-928 MAMRE ROAD
KEMPS CREEK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
DS	JB	AUG '20	MW	A0	AS SHOWN	C014021.00-SSDA550

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Level 1, 8 Windmill Street
Walsh Bay, Sydney NSW 2000
Tel: (02) 9241-7699 Fax: (02) 9241-3721
email: mail@costinroe.com.au

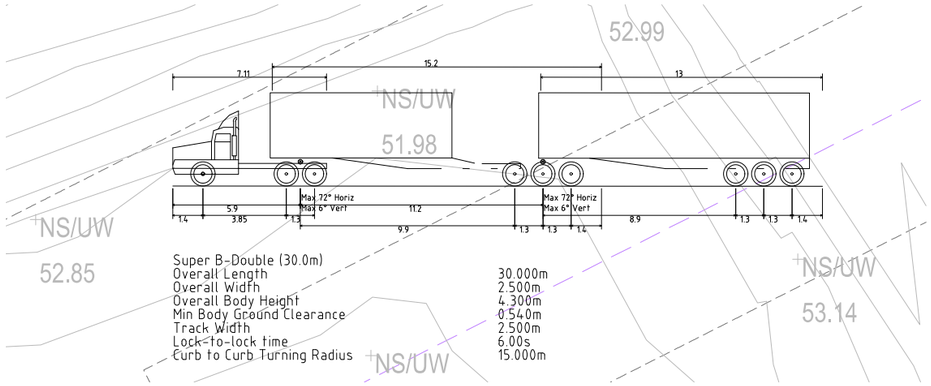
Costin Roe Consulting
PRECISION | COMMUNICATION | ACCOUNTABILITY

DRAWING TITLE: ROADWORKS TYPICAL SECTIONS
DRAWING No: C014021.00-SSDA550
ISSUE: G



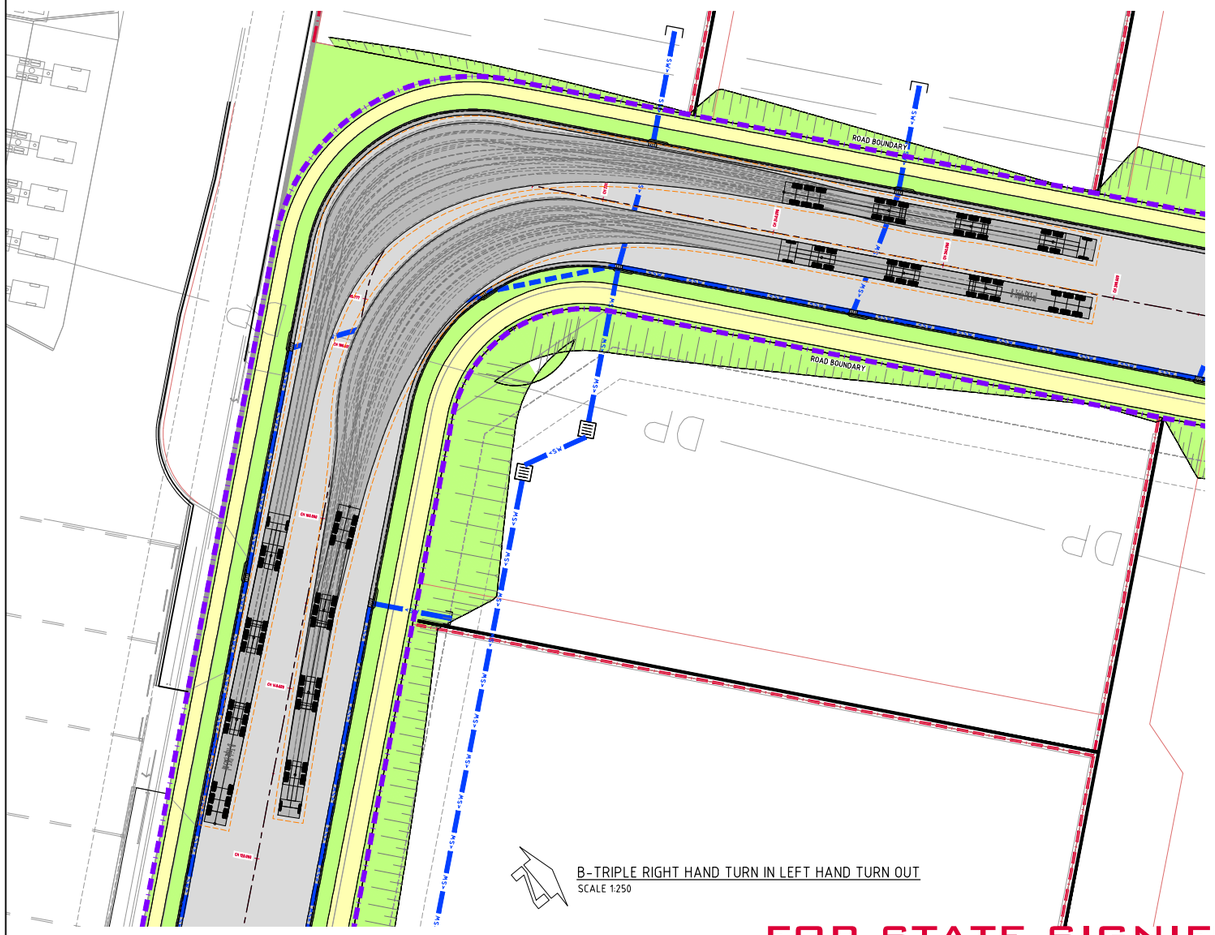
B-Triple (36.5 m)

Overall Length	36.500m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.455m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	15.000m



Super B-Double (30.0m)

Overall Length	30.000m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.540m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	15.000m

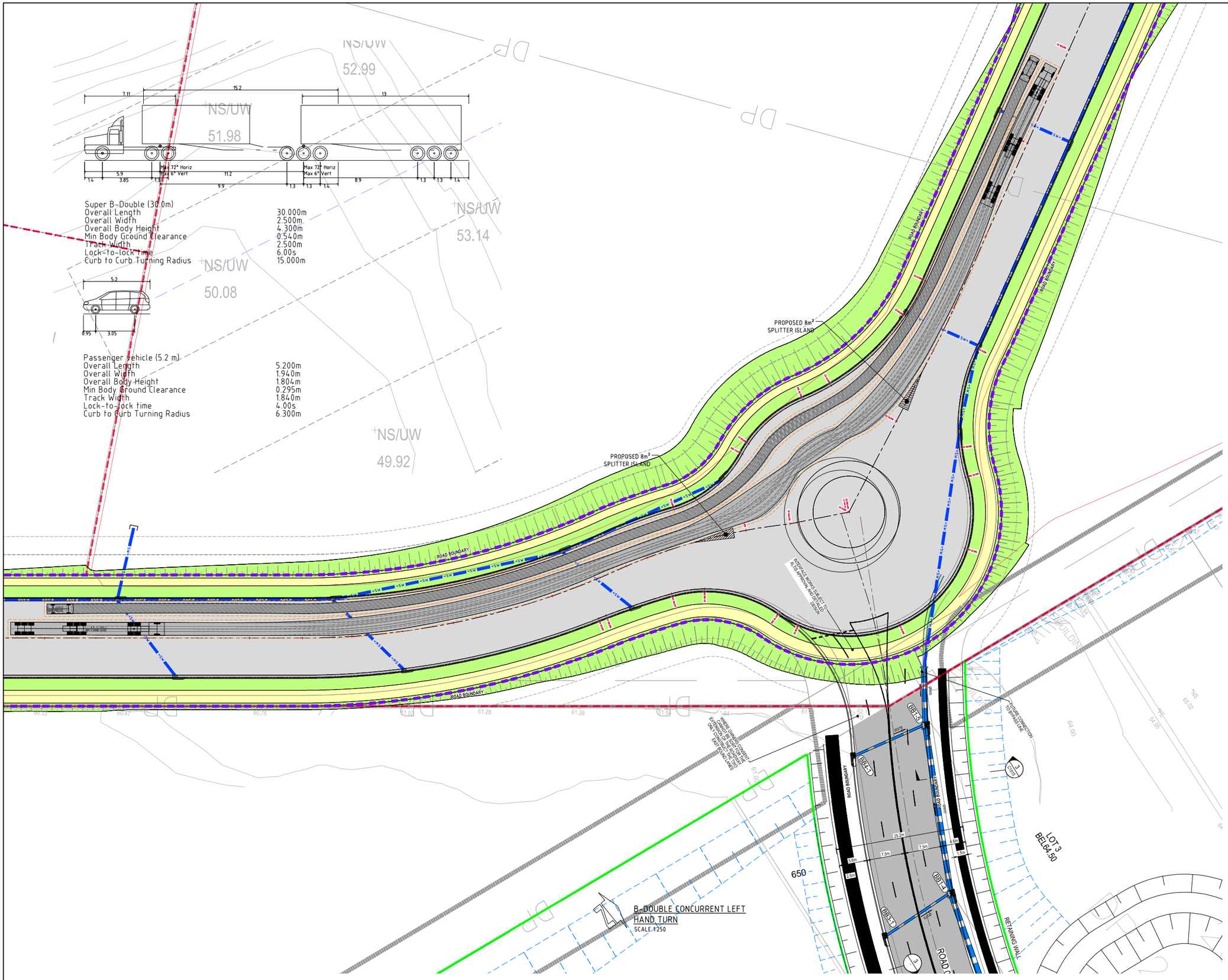


Super B-Double (30.0m)

Overall Length	30.000m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.540m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	15.000m

Passenger Vehicle (5.2 m)

Overall Length	5.200m
Overall Width	1.940m
Overall Body Height	1.804m
Min Body Ground Clearance	0.295m
Track Width	1.840m
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	6.300m

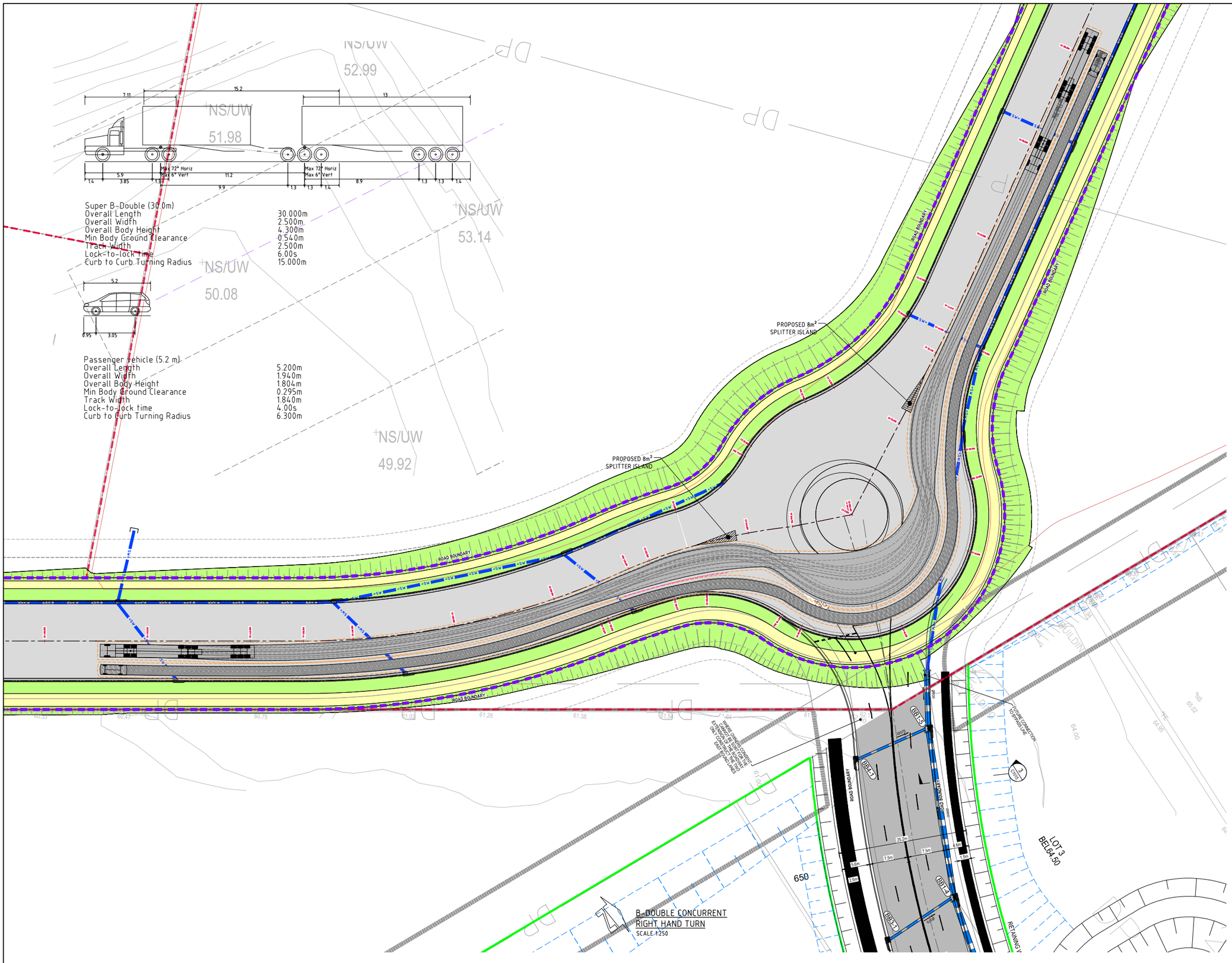

PROPOSED 8m² SPLITTER ISLAND
PROPOSED 8m² SPLITTER ISLAND
ROAD BOUNDARY
ROAD BOUNDARY
ROAD BOUNDARY
ROAD BOUNDARY
PEDESTRIAN NOMINAL SUBJECT TO ALTIS APPROVAL AND DETAILED DESIGN
B64-4
B64-4
B64-4

Super B-Double (30.0m)

Overall Length	30.000m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.540m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	15.000m

Passenger Vehicle (5.2 m)

Overall Length	5.200m
Overall Width	1.940m
Overall Body Height	1.804m
Min Body Ground Clearance	0.295m
Track Width	1.840m
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	6.300m



LEGEND:

PROPOSED SPLITTER ISLAND

SWEPT PATH NOTE:
ASSUMED SPEED 5km/h.

- VEHICLE CENTRELINE
- VEHICLE BODY PATH
- VEHICLE TYRE PATH
- VEHICLE BODY PATH 500mm CLEARANCE

NOTE:
THIS PLAN HAS BEEN PRODUCED USING VEHICLE MODELLING COMPUTER SOFTWARE AUTODESK VEHICLE TRACKING. THE VEHICLES ADOPTED ARE BASED UPON VEHICLE DATA PROVIDED BY THE SOFTWARE FOR AUSTROADS & AS2890.

2m 0 5 10 15 20 25m
SCALE 1:250 AT A0 SIZE SHEET

AMENDMENTS	DATE	ISSUE
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	30.03.22	B
ISSUED FOR INFORMATION	25.03.22	A

PROJECT MANAGER: ProjectStrategy
ARCHITECT: nettletontribe
CLIENT: ALTIS PROPERTY PARTNERS

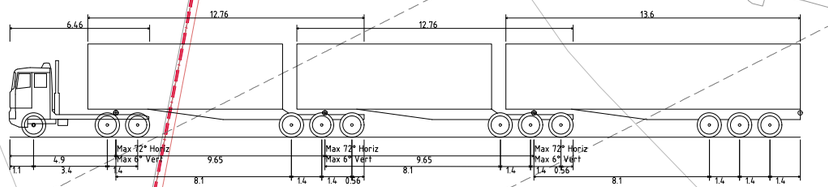
PROJECT: ACCESS LOGISTICS PARK
884-928 MAMRE ROAD
KEMPS CREEK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
DS	JB	AUG '20	MW	A0	AS SHOWN	C014021.00-SSDA92

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email: mail@costinroe.com.au ©

Costin Roe Consulting
PRECISION | COMMUNICATION | ACCOUNTABILITY

DRAWING TITLE: SWEPT PATH PLAN B-DOUBLE CONCURRENT RIGHT HAND TURN - ROUNDABOUT
DRAWING No. C014021.00-SSDA592
ISSUE C



B-Triple (36.5 m)	
Overall Length	36.500m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.455m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	15.000m

PROPOSED 8m² SPLITTER ISLAND

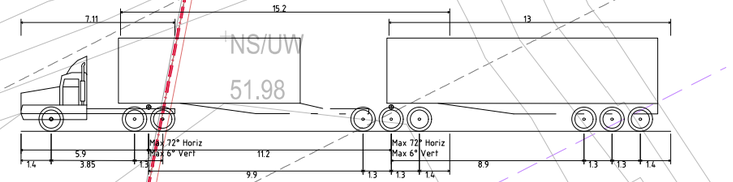
PROPOSED 8m² SPLITTER ISLAND

PROPOSED 8m² SPLITTER ISLAND

ROAD BOUNDARY

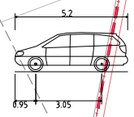
ROAD BOUNDARY

ROAD BOUNDARY



Super B-Double (30.0m)

Overall Length	30.000m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.540m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	15.000m



Passenger Vehicle (5.2 m)

Overall Length	5.200m
Overall Width	1.940m
Overall Body Height	1.804m
Min Body Ground Clearance	0.295m
Track Width	1.840m
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	6.300m

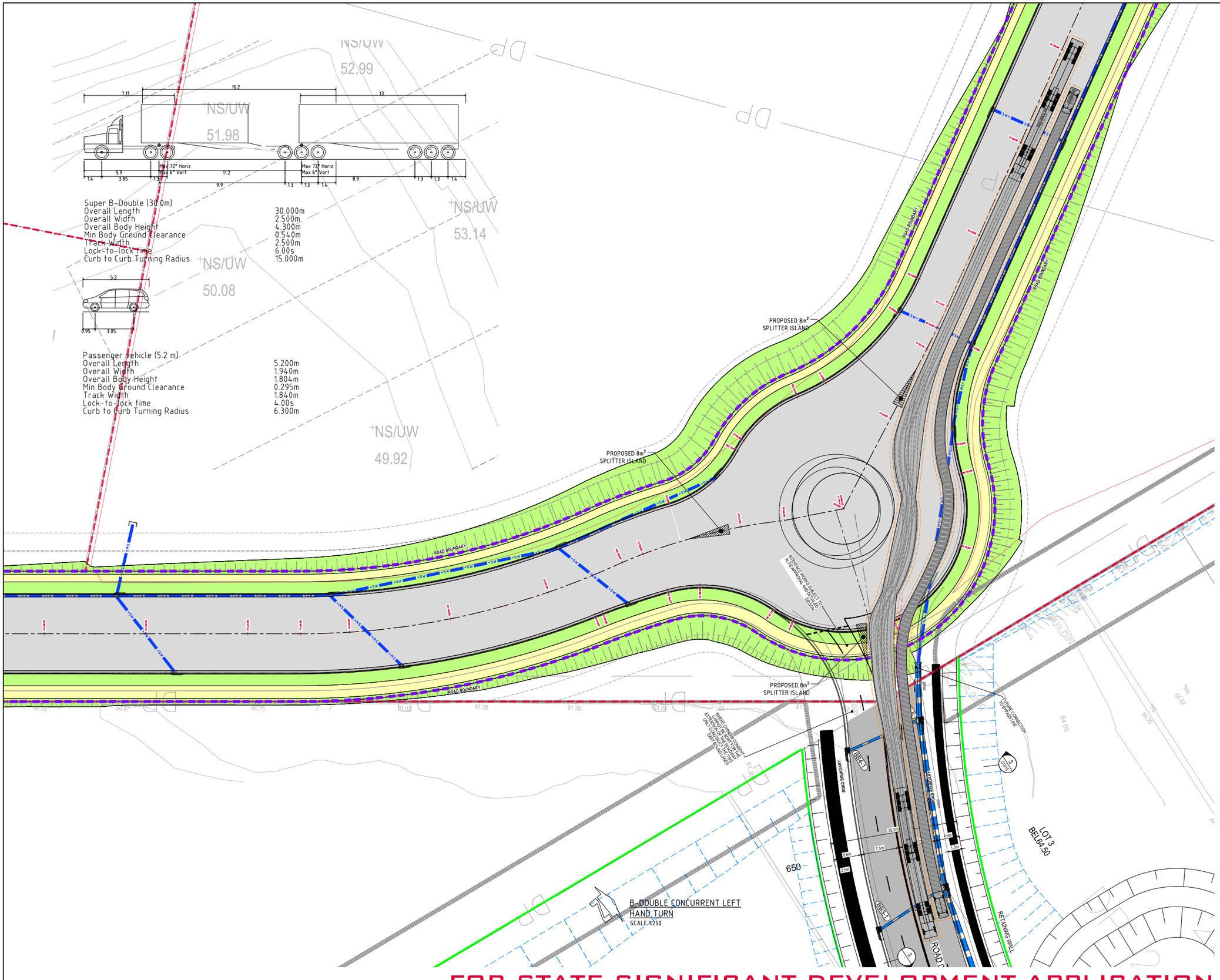
NS/UW
52.99
NS/UW
51.98
NS/UW
53.14
NS/UW
50.08
NS/UW
49.92
DP
DP
PROPOSED 8m² SPLITTER ISLAND
PROPOSED 8m² SPLITTER ISLAND
PROPOSED 8m² SPLITTER ISLAND
ROAD BOUNDARY
ROAD BOUNDARY
ROAD BOUNDARY

Super B-Double (30.0m)

Overall Length	30.000m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.540m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	15.000m

Passenger Vehicle (5.2 m)

Overall Length	5.200m
Overall Width	1.940m
Overall Body Height	1.804m
Min Body Ground Clearance	0.295m
Track Width	1.840m
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	6.300m



LEGEND:

PROPOSED SPLITTER ISLAND

SWEPT PATH NOTE:
ASSUMED SPEED 5km/h.

- VEHICLE CENTRELINE
- VEHICLE BODY PATH
- VEHICLE TYRE PATH
- VEHICLE BODY PATH 500mm CLEARANCE

NOTE:
THIS PLAN HAS BEEN PRODUCED USING VEHICLE MODELLING COMPUTER SOFTWARE AUTODESK VEHICLE TRACKING. THE VEHICLES ADOPTED ARE BASED UPON VEHICLE DATA PROVIDED BY THE SOFTWARE FOR AUSTROADS & AS2890.

2m 0 5 10 15 20 25m
SCALE 1:250 AT A0 SIZE SHEET

FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

AMENDMENTS	DATE	ISSUE
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	15.09.22	C
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	30.03.22	B
ISSUED FOR INFORMATION	25.03.22	A

PROJECT MANAGER: ProjectStrategy
ARCHITECT: nettletontribe
CLIENT: ALTIS PROPERTY PARTNERS

PROJECT: ACCESS LOGISTICS PARK
884-928 MAMRE ROAD
KEMPS CREEK, NSW

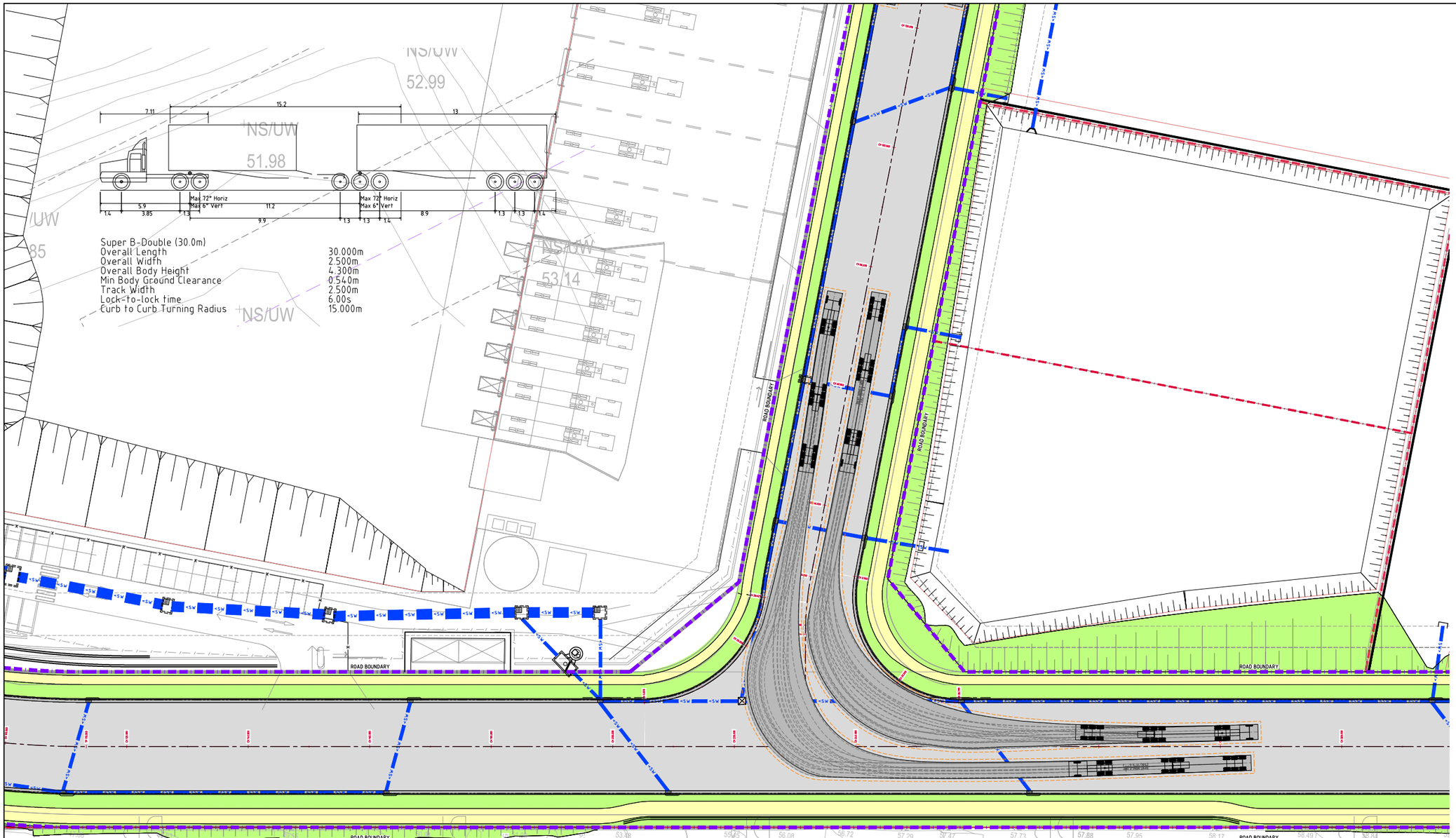
DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
DS	JB	AUG '20	MW	A0	AS SHOWN	C014021.00-SSDA595

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Consulting Engineers
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email: mail@costinroe.com.au

Costin Roe Consulting
PRECISION | COMMUNICATION | ACCOUNTABILITY

DRAWING TITLE: SWEPTH PATH PLAN
B-DOUBLE CONCURRENT LEFT HAND TURN - ROUNDABOUT

DRAWING No. C014021.00-SSDA595 ISSUE C



SUPER B-DOUBLE RIGHT HAND TURN IN LEFT HAND TURN OUT
SCALE 1:250

LEGEND:

PROPOSED SPLITTER ISLAND

SWEPT PATH NOTE:
ASSUMED SPEED 5km/h.

- VEHICLE CENTRELINE
- VEHICLE BODY PATH
- VEHICLE TYRE PATH
- VEHICLE BODY PATH 500mm CLEARANCE

NOTE:
THIS PLAN HAS BEEN PRODUCED USING VEHICLE MODELLING COMPUTER SOFTWARE AUTODESK VEHICLE TRACKING.
THE VEHICLES ADOPTED ARE BASED UPON VEHICLE DATA PROVIDED BY THE SOFTWARE FOR AUSTROADS & AS2890.

2m 0 5 10 15 20 25m
SCALE 1:250 AT A0 SIZE SHEET

FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

AMENDMENTS	DATE	ISSUE
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	15.09.22	B
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	30.03.22	A

PROJECT MANAGER: ProjectStrategy
ARCHITECT: nettletontribe
CLIENT: ALTIS PROPERTY PARTNERS

PROJECT
ACCESS LOGISTICS PARK
884-928 MAMRE ROAD
KEMPS CREEK, NSW

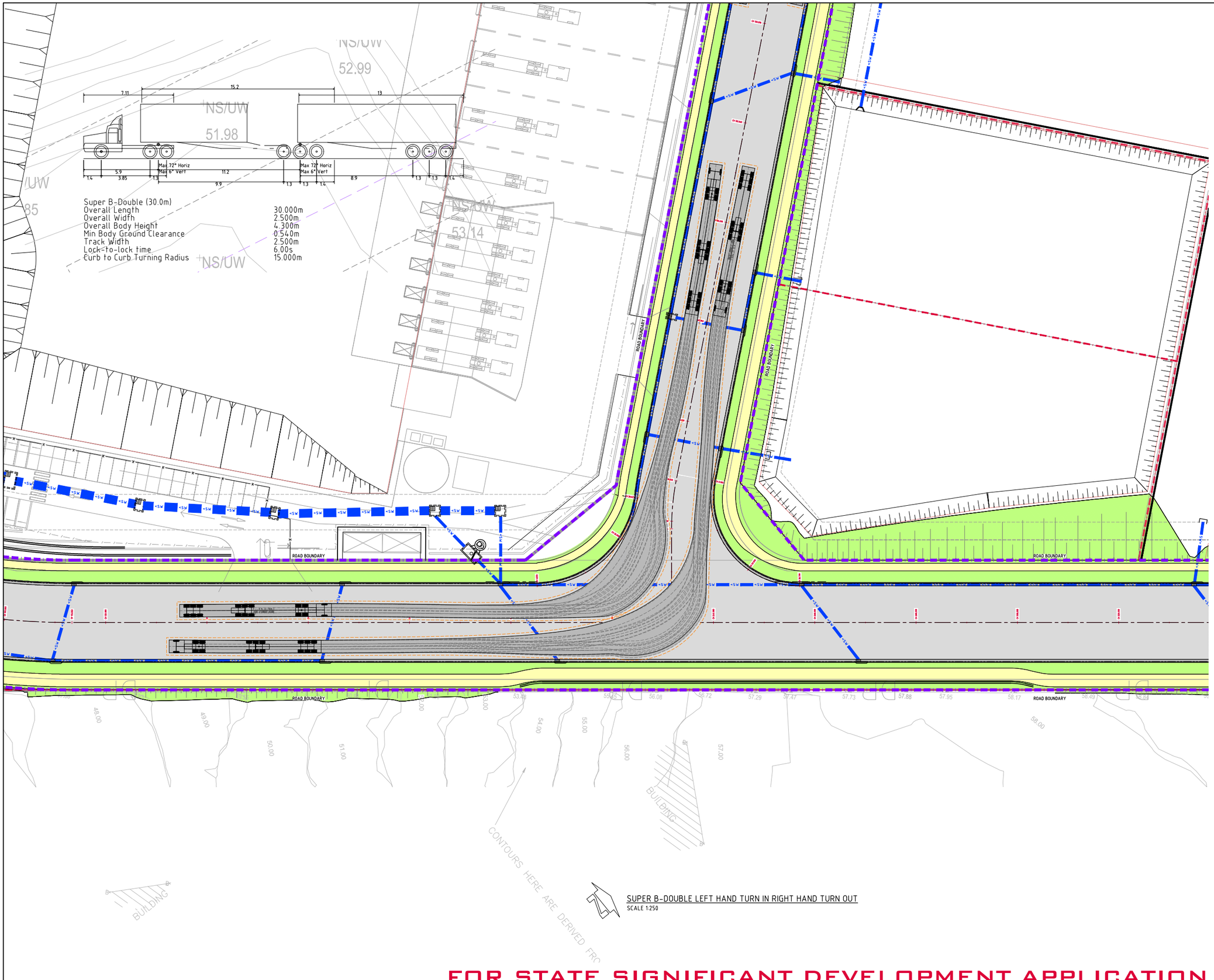
DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
DS	JB	AUG '20	MW	A0	AS SHOWN	C014021.00-SSDA595

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PRECISION | COMMUNICATION | ACCOUNTABILITY

DRAWING TITLE
SWEPTH PATH PLAN
SUPER B-DOUBLE RIGHT HAND TURN IN AND LEFT HAND TURN OUT

DRAWING No. C014021.00-SSDA596 ISSUE B



SUPER B-DOUBLE LEFT HAND TURN IN RIGHT HAND TURN OUT
SCALE 1:250

LEGEND:

PROPOSED SPLITTER ISLAND

SWEPT PATH NOTE:
ASSUMED SPEED 5km/h.

- VEHICLE CENTRELINE
- VEHICLE BODY PATH
- VEHICLE TYRE PATH
- VEHICLE BODY PATH 500mm CLEARANCE

NOTE:
THIS PLAN HAS BEEN PRODUCED USING VEHICLE MODELLING COMPUTER SOFTWARE AUTODESK VEHICLE TRACKING.
THE VEHICLES ADOPTED ARE BASED UPON VEHICLE DATA PROVIDED BY THE SOFTWARE FOR AUSTROADS & AS2890.

2m 0 5 10 15 20 25m
SCALE 1:250 AT A0 SIZE SHEET

FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

AMENDMENTS	DATE	ISSUE
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	15.09.22	B
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	30.03.22	A

PROJECT MANAGER: ProjectStrategy
ARCHITECT: nettletontribe
CLIENT: ALTIS PROPERTY PARTNERS

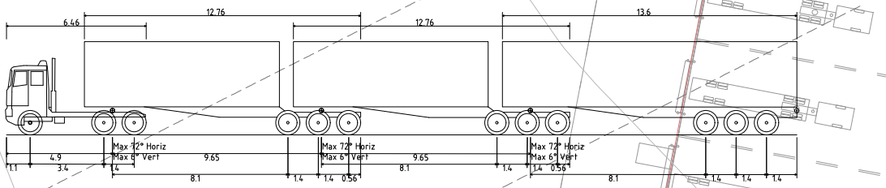
PROJECT: ACCESS LOGISTICS PARK
884-928 MAMRE ROAD
KEMPS CREEK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
DS	JB	AUG '20	MW	A0	AS SHOWN	C014021.00-SSDA595

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Costin Roe Consulting
PRECISION | COMMUNICATION | ACCOUNTABILITY

DRAWING TITLE: SWEPTH PATH PLAN
SUPER B-DOUBLE LEFT HAND TURN IN AND RIGHT HAND TURN OUT
DRAWING NO: C014021.00-SSDA596
ISSUE: B



B-Triple (36.5 m)

Overall Length	36.500m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.455m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	15.000m

ROAD BOUNDARY

BUILDING

CONTOURS HERE ARE DERIVED FRO

B-TRIPLE LEFT HAND TURN IN RIGHT HAND TURN OUT
SCALE 1:250

LEGEND:

PROPOSED SPLITTER ISLAND

SWEPT PATH NOTE:
ASSUMED SPEED 5km/h.

- VEHICLE CENTRELINE
- VEHICLE BODY PATH
- VEHICLE TYRE PATH
- VEHICLE BODY PATH 500mm CLEARANCE

NOTE:
THIS PLAN HAS BEEN PRODUCED USING VEHICLE MODELLING COMPUTER SOFTWARE AUTODESK VEHICLE TRACKING.
THE VEHICLES ADOPTED ARE BASED UPON VEHICLE DATA PROVIDED BY THE SOFTWARE FOR AUSTROADS & AS2890.

2m 0 5 10 15 20 25m
SCALE 1:250 AT A0 SIZE SHEET

FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

AMENDMENTS	DATE	ISSUE
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	15.09.22	B
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	30.03.22	A

PROJECT MANAGER: ProjectStrategy
ARCHITECT: nettletontribe
CLIENT: ALTIS PROPERTY PARTNERS

PROJECT: ACCESS LOGISTICS PARK
884-928 MAMRE ROAD
KEMPS CREEK, NSW

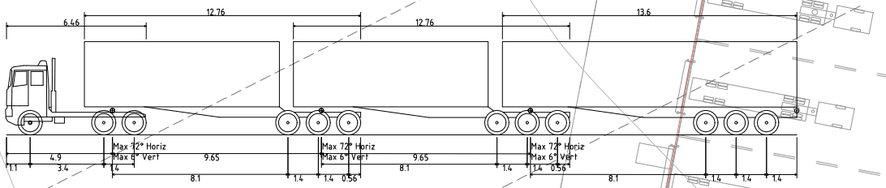
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DRAWING TITLE: SWEPTH PATH PLAN
B-TRIPLE LEFT HAND TURN IN AND RIGHT HAND TURN OUT

DRAWING NO: C014021.00-SSDA598 ISSUE: B



B-Triple (36.5 m)

Overall Length	36.500m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.455m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	15.000m

ROAD BOUNDARY

CONTOURS HERE ARE DERIVED FRO

BUILDING

B-TRIPLE RIGHT HAND TURN IN LEFT HAND TURN OUT
SCALE 1:250

LEGEND:

PROPOSED SPLITTER ISLAND

SWEPT PATH NOTE:
ASSUMED SPEED 5km/h.

- VEHICLE CENTRELINE
- VEHICLE BODY PATH
- VEHICLE TYRE PATH
- VEHICLE BODY PATH 500mm CLEARANCE

NOTE:
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THE VEHICLES ADOPTED ARE BASED UPON VEHICLE DATA PROVIDED BY THE SOFTWARE FOR AUSTROADS & AS2890.

2m 0 5 10 15 20 25m
SCALE 1:250 AT A0 SIZE SHEET

FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

AMENDMENTS	DATE	ISSUE
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	15.09.22	B
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	30.03.22	B

PROJECT MANAGER: ProjectStrategy
ARCHITECT: nettletontribe
CLIENT: ALTIS PROPERTY PARTNERS

PROJECT: ACCESS LOGISTICS PARK
884-928 MAMRE ROAD
KEMPS CREEK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
DS	JB	AUG '20	MW	A0	AS SHOWN	C014021.00-SSDA599

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DRAWING TITLE: SWEPTH PATH PLAN
B-TRIPLE RIGHT HAND TURN IN AND LEFT HAND TURN OUT

DRAWING No: C014021.00-SSDA599 ISSUE: B

MAMRE ROAD

RETAINING WALL 2B
START 2B
END 2B
RETAINING WALL 3B
WALL IN CUT
START 3B
END 3A
RETAINING WALL 4B
WALL IN CUT
START 4B
END 3B
END 4A
RETAINING WALL 5B
WALL IN CUT
START 5B
END 4B
END 5A
RETAINING WALL 6B
WALL IN CUT
START 6B
END 5B
END 6B
START 13B
RETAINING WALL 13B
WALL IN CUT
END 13B
END 13A
RETAINING WALL 5A
WALL IN CUT
RETAINING WALL 13A
WALL IN CUT
START 13A
RETAINING WALL 3A
WALL IN CUT
START 5A
START 4A
RETAINING WALL 4A
WALL IN CUT
END 14A
RETAINING WALL 14A
WALL IN FILL
START 14A
LOT 2
RL 54.50 ± 1000mm
LOT 5
RL 56.80 ± 1000mm
LOT 6
LOT 7
RL 59.40 ± 1000mm
LOT 14
RL 60.15 ± 1000mm
LOT 15
RL 60.00 ± 1000mm
END 12A
RETAINING WALL 7A
WALL IN FILL
LOT 8
RL 57.90 ± 1000mm
RETAINING WALL 12A
WALL IN FILL
START 7A
END 7A
LOT 13
RL 59.70 ± 1000mm
LOT 9
RL 56.30 ± 1000mm
RETAINING WALL 8A
WALL IN FILL
START 12A
END 8A
RETAINING WALL 13C
WALL IN FILL
START 8A
END 11A
LOT 10
RL 54.40 ± 1000mm
LOT 12
RL 59.70 ± 1000mm
RETAINING WALL 11A
WALL IN FILL
START 13C
LOT 11
RL 54.40 ± 1000mm
START 11A
START 3A
RETAINING WALL 2A
TIERED RETAINING WALL IN FILL.
TIER WALLS UP TO 1.5m MAXIMUM HIGH
START 2A
END 2A
START 15
RETAINING WALL 15
WALL IN CUT
END 15
EXTENT OF RETAINING WALL THAT IS NOT VISIBLE FROM MAMRE ROAD. TOP OF WALL HIDDEN BEHIND BERM AS SHOWN ON SECTION 9 ON DRAWING SSDA611
LOCATION OF ENTRY STATEMENT
EXTENT OF RETAINING WALL THAT IS VISIBLE FROM MAMRE ROAD. ENTRY STATEMENT TO BE PROVIDED AT CORNER OF ESTATE ROAD AND MAMRE ROAD TO LANDSCAPE ARCHITECT'S DETAILS

RETAINING WALL PLAN
1:750 SCALE

RETAINING WALL SCHEDULE			
RETAINING WALL	TYPE	LENGTH	MAX HEIGHT
2A	REINFORCED EARTH TIERED WALL	369m	4.0m
2B	REINFORCED EARTH WALL	175m	3.9m
3A	REINFORCED EARTH WALL	322m	3.8m
3B	KEYSTONE RETAINING WALL	48m	0.7m
4A	KEYSTONE RETAINING WALL	122m	0.9m
4B	KEYSTONE RETAINING WALL	48m	1.6m
5A	REINFORCED EARTH WALL	111m	1.3m
5B	REINFORCED EARTH WALL	48m	2.9m
6B	REINFORCED EARTH WALL	48m	3.7m
7A	KEYSTONE RETAINING WALL	83m	1.6m
8A	KEYSTONE RETAINING WALL	83m	0.8m
11A	REINFORCED EARTH WALL	79m	4.3m
12A	REINFORCED EARTH WALL	79m	3.5m
13A	KEYSTONE RETAINING WALL	77m	1.2m
13B	REINFORCED EARTH WALL	178m	4.8m
13C	KEYSTONE RETAINING WALL	130m	1.2m
14A	REINFORCED EARTH WALL	378m	5.7m
15	KEYSTONE RETAINING WALL	97m	1.3m

NOTE:
REFER TO DRAWING SSDA650 FOR ALL RETAINING WALL NOTES.

6m 0 15 30 45 60 75m
SCALE 1:750 AT A0 SIZE SHEET

FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

AMENDMENTS	DATE	ISSUE
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	02.05.22	F
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	30.03.22	E
ISSUED FOR INFORMATION	25.03.22	D
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	02.07.21	C
PRELIMINARY ISSUE ONLY	25.06.21	B
PRELIMINARY ISSUE ONLY	09.06.21	A

AMENDMENTS	DATE	ISSUE
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	23.11.22	K
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	19.09.22	J
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	15.09.22	I
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	08.09.22	H
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	03.05.22	G

PROJECT MANAGER: ProjectStrategy
ARCHITECT: nettletontribe
CLIENT: ALTIS PROPERTY PARTNERS

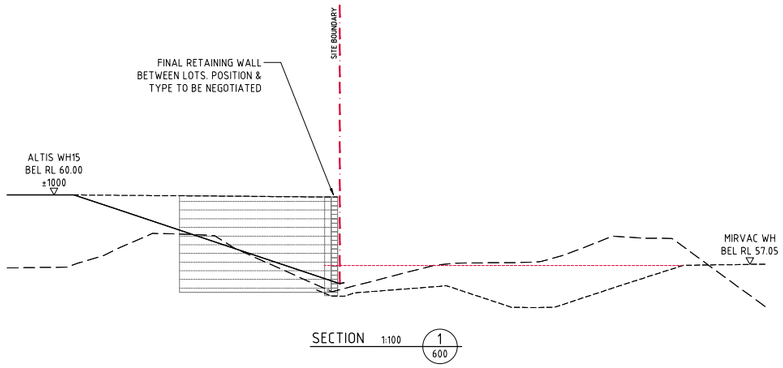
PROJECT: ACCESS LOGISTICS PARK
884-928 MAMRE ROAD
KEMPS CREEK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
DS	JB	AUG '20	MW	A0	AS SHOWN	C014021DD-SSDA600

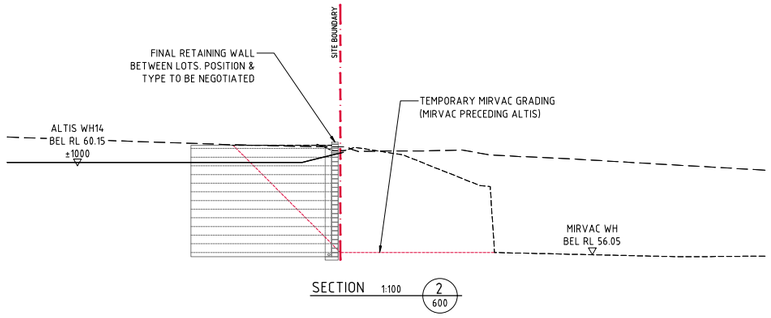
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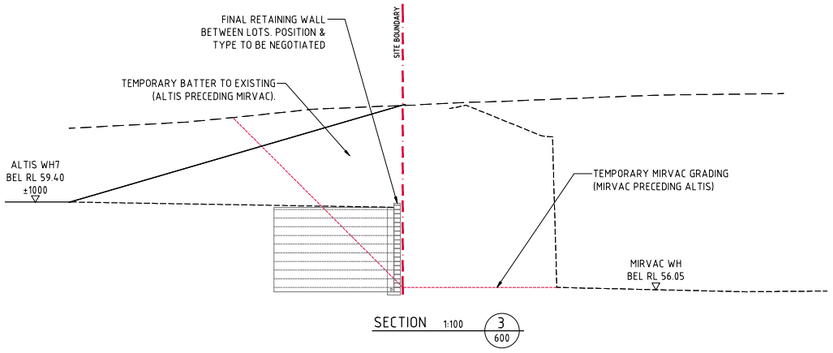
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DRAWING No: C014021.00-SSDA600
ISSUE: K



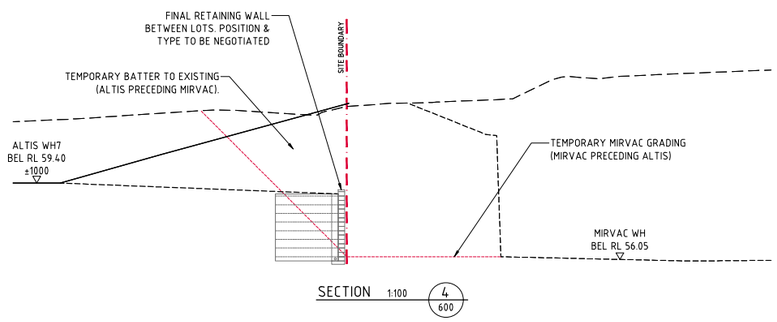
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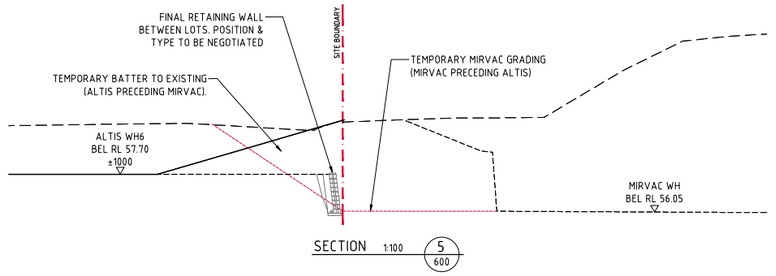
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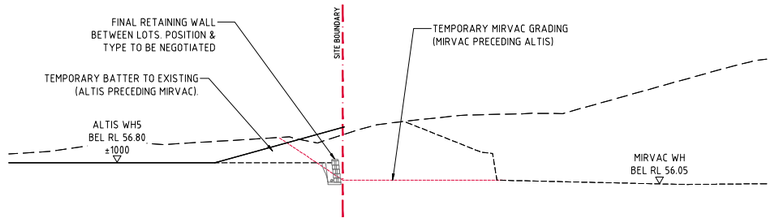
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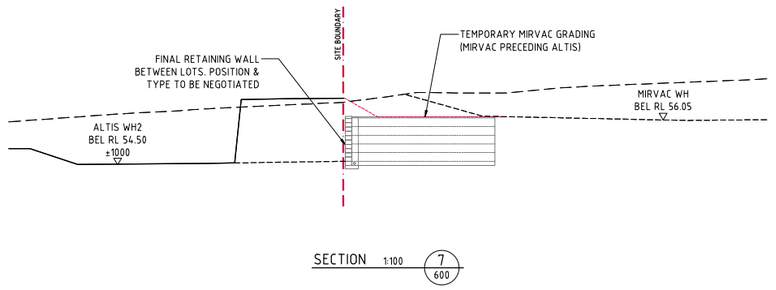
SECTION 1:100 4/600



SECTION 1:100 5/600



SECTION 1:100 6/600



SECTION 1:100 7/600

LEGEND:

- DENOTES EARTHWORKS PROFILE
- DENOTES EXISTING PROFILE
- DENOTES MIRVAC EARTHWORKS PROFILE
- DENOTES TEMPORARY EARTHWORKS PROFILE

1m 0 1 2 3 4 5 6 7 8 9 10m

SCALE 1:100 AT A0 SIZE SHEET

FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

AMENDMENTS	DATE	ISSUE
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	08.09.22	F
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	30.03.22	E
ISSUED FOR INFORMATION	25.03.22	D
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	02.07.21	C
ISSUED FOR PRELIMINARY ONLY	25.06.21	B
ISSUED FOR PRELIMINARY ONLY	09.06.21	A

AMENDMENTS	DATE	ISSUE
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	23.11.22	H
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	15.09.22	G

PROJECT MANAGER: ProjectStrategy

ARCHITECT: nettletontribe

CLIENT: ALTIS PROPERTY PARTNERS

PROJECT: ACCESS LOGISTICS PARK
884-928 MAMRE ROAD
KEMPS CREEK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
DS	JB	AUG '20	MW	A0	AS SHOWN	C014021.00-SSDA610

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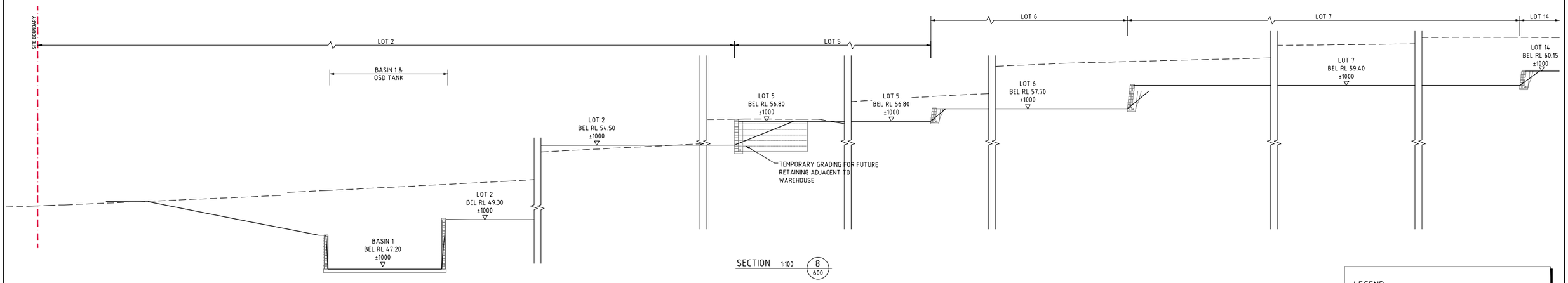
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DRAWING TITLE: TYPICAL SECTIONS
SHEET 1

DRAWING No: C014021.00-SSDA610

ISSUE: H

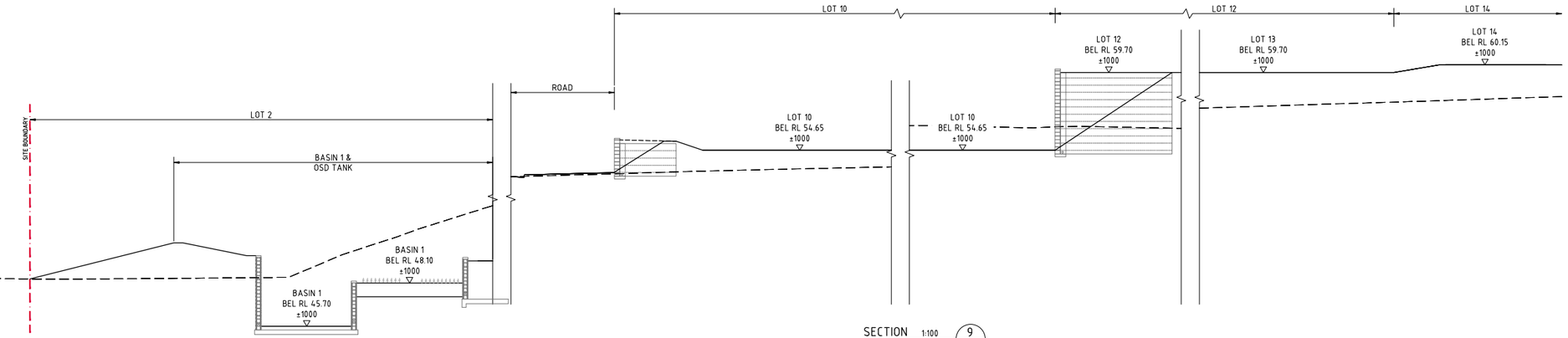


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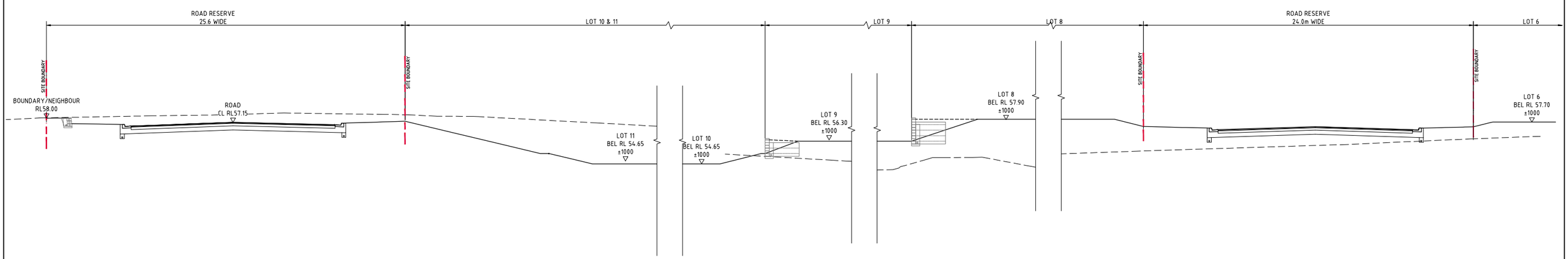
LEGEND:

——— – DENOTES EARTHWORKS PROFILE

– – – – DENOTES EXISTING PROFILE



SECTION 1:100 (9/600)



SECTION 1:100 (10/600)

1m 0 1 2 3 4 5 6 7 8 9 10m

SCALE 1:100 AT A0 SIZE SHEET

FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

AMENDMENTS	DATE	ISSUE
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	08.09.22	F
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	30.03.22	E
ISSUED FOR INFORMATION	25.03.22	D
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	02.07.21	C
PRELIMINARY ISSUE ONLY	25.06.21	B
PRELIMINARY ISSUE ONLY	09.06.21	A

AMENDMENTS	DATE	ISSUE
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	23.11.22	H
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	16.09.22	G

PROJECT MANAGER: ProjectStrategy

ARCHITECT: nettletontribe

CLIENT: ALTIS PROPERTY PARTNERS

PROJECT: ACCESS LOGISTICS PARK
884–928 MAMRE ROAD
KEMPS CREEK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
DS	JB	AUG '20	MW	A0	AS SHOWN	C014021.00-SSDA611

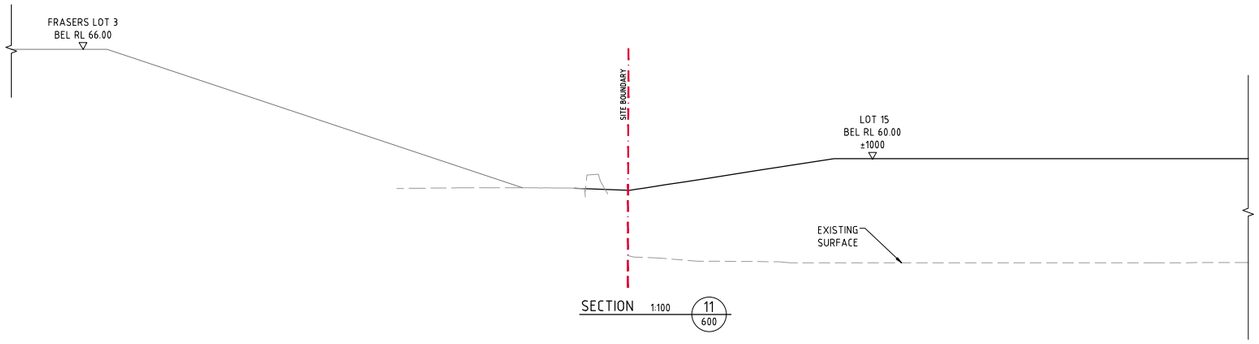
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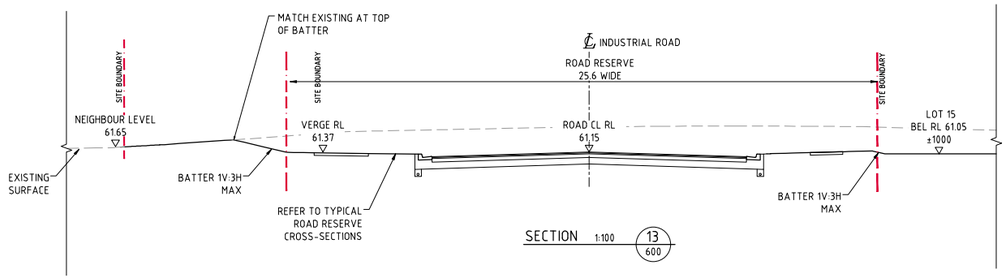
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DRAWING TITLE: TYPICAL SECTIONS
SHEET 2

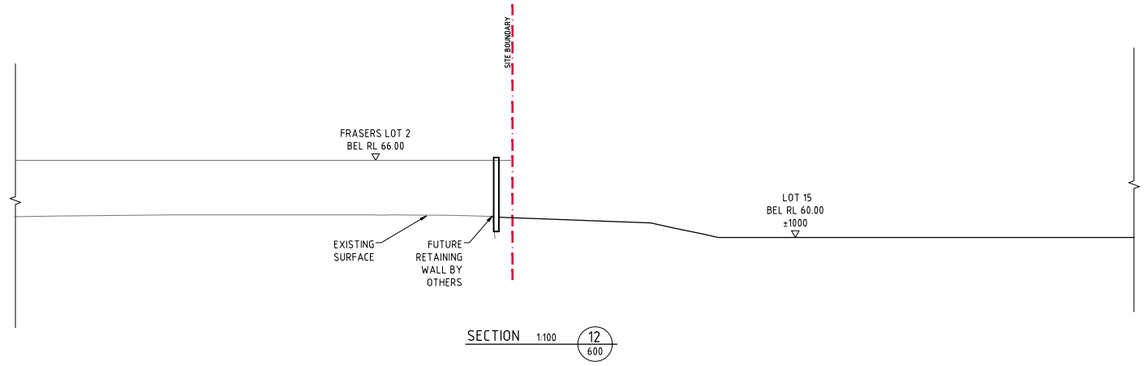
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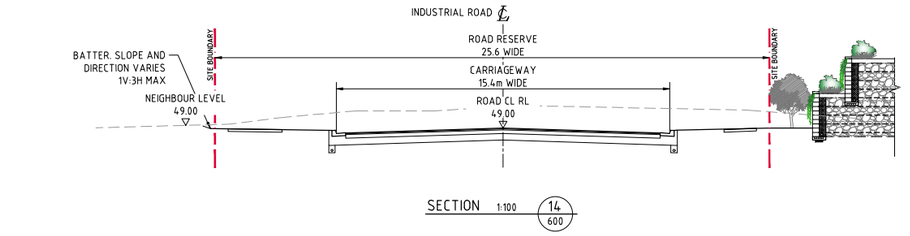
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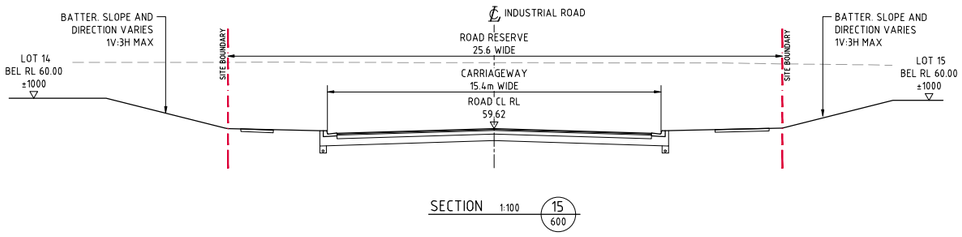
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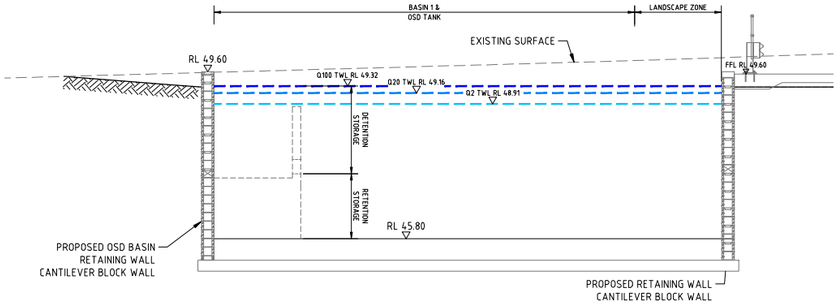
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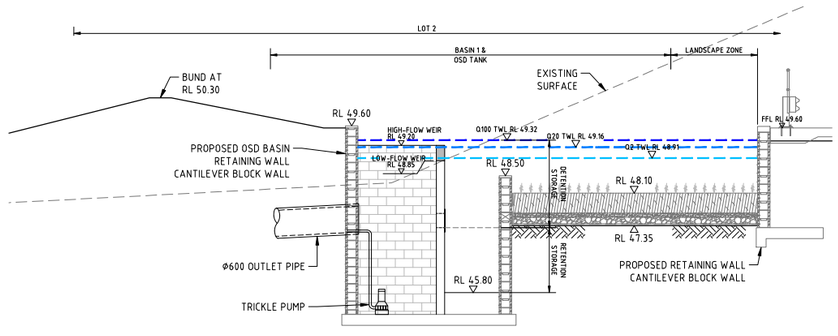
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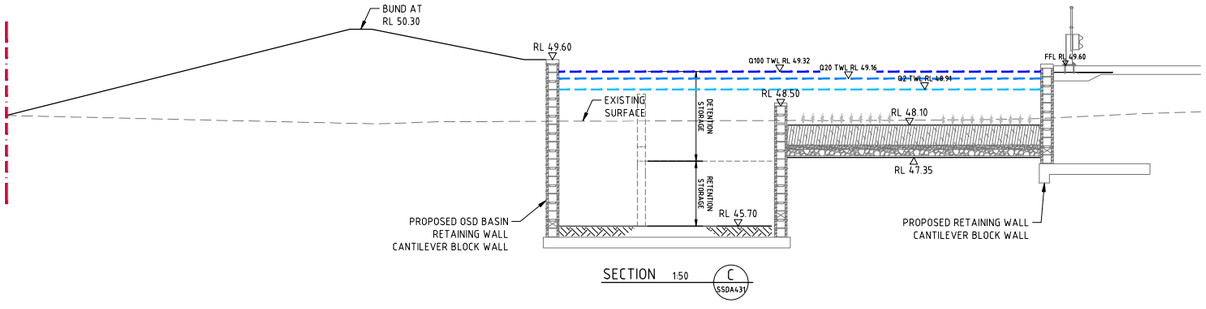
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SECTION 1:50 A/SSDA341



SECTION 1:50 B/SSDA431



SECTION 1:50 C/SSDA431

LEGEND:

——— – DENOTES EARTHWORKS PROFILE

– – – – DENOTES EXISTING PROFILE

1m 0 1 2 3 4 5 6 7 8 9 10m

SCALE 1:100 AT A0 SIZE SHEET

FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

AMENDMENTS	DATE	ISSUE
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	23.11.22	E
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	16.09.22	D
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	08.09.22	C
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	02.05.22	B
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	30.03.22	A

AMENDMENTS DATE ISSUE

PROJECT MANAGER ProjectStrategy

ARCHITECT nettletontribe

CLIENT ALTIS PROPERTY PARTNERS

PROJECT
ACCESS LOGISTICS PARK
884-928 MAMRE ROAD
KEMPS CREEK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
DS	JB	AUG '20	MW	A0	AS SHOWN	C014021.00-SSDA612

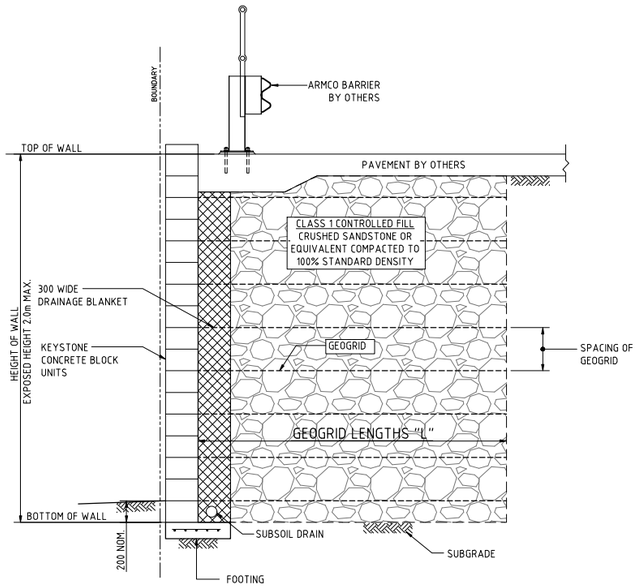
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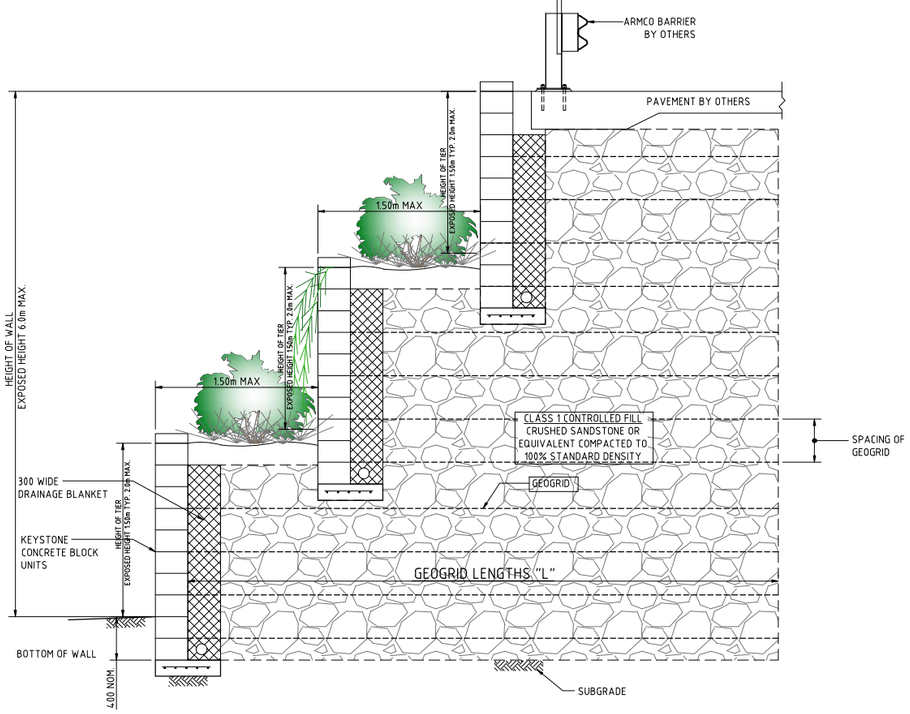
DRAWING TITLE
TYPICAL SECTIONS
SHEET 3

DRAWING No. C014021.00-SSDA612 ISSUE E



REINFORCED EARTH WALL
SCALE 1:20

REINFORCED EARTH RETAINING WALL
STRUCTURAL DESIGN TO D&C DETAILS.



TIERED REINFORCED EARTH WALL
SCALE 1:20

REINFORCED EARTH RETAINING WALL
STRUCTURAL DESIGN TO D&C DETAILS.

MASONRY BLOCKWORK

M1 ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS 3700.

M2 STRENGTH OF BRICKS, CLASS OF BLOCKS AND TYPE OF MORTAR SHALL BE AS LISTED BELOW :

MATERIAL:	CHARACTERISTIC UNCONFINED COMPRESSIVE STRENGTH, F'_{uc}	MORTAR CLASSIFICATION:
CONCRETE BLOCKS	15 MPa	M3

M3 MORTAR ADMIXTURES SHALL NOT BE USED WITHOUT THE WRITTEN APPROVAL OF THE SUPERINTENDENT

M4 ALL MASONRY WALLS AND PIERS SUPPORTING SLABS AND BEAMS SHALL HAVE A PRE-GREASED GALVANISED STEEL SLIP JOINT BETWEEN CONCRETE SOFFIT AND THE TOP OF OF THE MASONRY ELEMENT U.N.O.

M5 ALL MASONRY SUPPORTING OR SUPPORTED BY CONCRETE FLOORS SHALL BE PROVIDED WITH VERTICAL JOINTS TO MATCH ALL CONTROL JOINTS IN THE CONCRETE.

M6 NON LOAD BEARING WALLS SHALL BE SEPARATED FROM CONCRETE ABOVE BY A 12mm THICK CLOSED CELL POLYETHYLENE STRIP.

M7 NO CHASES OR RECESSES ARE PERMITTED IN LOAD BEARING MASONRY WITHOUT THE APPROVAL OF THE ENGINEER.

M8 PROVIDE CLEANOUT HOLES AT BASE OF ALL WALLS. ROD CORE HOLES TO REMOVE PROTRUDING MORTAR FOLLOWING APPROVAL FROM THE ENGINEER.

M9 CORE FILLING GROUT TO HAVE A CHARACTERISTIC STRENGTH OF 20 MPa, 10mm AGGREGATE, 230mm SLUMP. GROUT FILL ALL BLOCK CORES.

M10 PROVIDE 45mm COVER TO REINFORCING BARS FROM THE OUTSIDE FACE OF THE BLOCKWORK IF REINFORCEMENT IS NOT TO BE PLACED CENTRALLY.

M11 PROVIDE VERTICAL CONTROL JOINTS AT 10 METRE MAX CENTRES, AND AT 5 METRE MAXIMUM FROM CORNERS IN ALL BRICKWORK WALLS

M12 PROVIDE VERTICAL CONTROL JOINTS AT 8 METRE MAX CENTRES, AND AT 4 METRE MAXIMUM FROM CORNERS IN ALL CONCRETE BLOCK WALLS.

M13 BACKFILL TO RETAINING WALLS TO BE FREE DRAINING GRANULAR MATERIAL U.N.O. PROVIDE SUBSOIL DRAIN BEHIND WEEP HOLES.

M14 DO NOT CONSTRUCT MASONRY WALLS ON SUSPENDED CONCRETE UNTIL SLAB HAS BEEN STRIPPED AND DE-PROPPED.

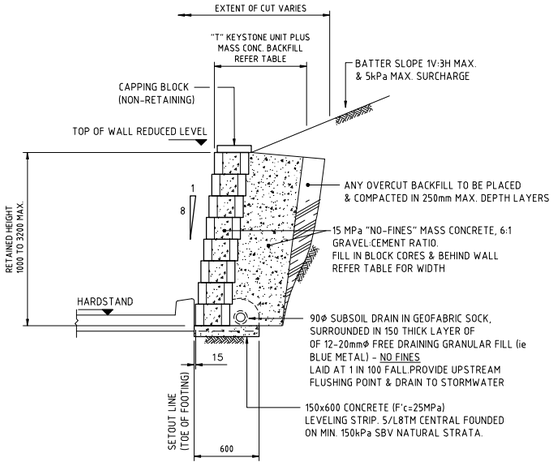
M15 ALL CAVITY CONSTRUCTION TO HAVE GALVANISED OR STAINLESS STEEL WALL TIES INSTALLED AS PER AS 3700

RETAINING WALL NOTES:

1. ALL COMPONENTS AND INSTALLATION SHALL COMPLY WITH AS4678 AND THE STANDARDS REFERRED TO THEREIN.
2. MINIMUM BEARING CAPACITY OF FOUNDATION TO BE AS FOLLOWS :
   a. H MAX. 2.0m = 100 kPa
   b. H MAX. 3.5m = 150 kPa
   c. H MAX. 5.0m = 200 kPa
   BEFORE COMMENCEMENT OF CONSTRUCTION THE FOUNDATION SHALL BE INSPECTED AND VERIFIED BY A QUALIFIED GEOTECHNICAL ENGINEER.
3. WHERE MINIMUM BEARING IS NOT ACHIEVABLE OR NOT MEETING DESIGN REQUIREMENT, THE FOUNDATION MATERIAL IS TO BE EXCAVATED AND REPLACED WITH APPROVED MATERIAL PLACED IN ACCORDANCE WITH THE FILLING SPECIFICATION TO A MINIMUM COMPACTION OF 100% SMDD AND PLACED WITHIN 2% OF OMC.
4. MINIMUM SURCHARGE LOADS TO BE APPLIED AS FOLLOWS U.N.O.
5. ON PLAN :
   a. LIVE LOAD = 20 kPa
   b. DEAD LOAD = 5 kPa
   c. CONSTRUCTION TRAFFIC LIVE LOAD = 10 kPa
6. MINIMUM WALL EMBEDMENT AT THE TOE OF THE WALL TO BE 300mm MINIMUM UNLESS NOTED OTHERWISE.
7. DESIGN LIFE OF STRUCTURE IS TO BE 100 YEARS.
8. TIED WALLS ARE TO BE TEMPORARILY PROPPED AT TOP UNTIL SUCH TIME THE TOP OF WALL IS TIED TO THE SLAB AND 28-DAY CONCRETE STRENGTH HAS BEEN ACHIEVED.
9. CONSTRUCTION EQUIPMENT WEIGHING MORE THAN 500KG STATIC WEIGHT IS TO BE KEPT BACK 1.5m FROM THE REAR FACE OF THE WALL FACING UNITS. COMPACTION OF THE SELECT FILL MATERIAL WITHIN THE 1.5m STRIP ADJACENT TO THE WALL SHALL BE ACHIEVED BY LIGHT MECHANICAL TAMPERS (VIBRATING PLATE, TRENCH COMPACTOR OR SIMILAR) TO GIVE THE SAME DENSITY AS IN THE REMAINDER OF THE SELECT FILL.
10. ALL DESIGN AND CONSTRUCT WALL SYSTEMS TO BE COMPLETED IN ACCORDANCE WITH THESE NOTES.

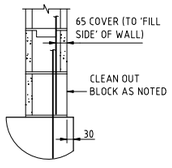
REINFORCED EARTH RETAINING WALL NOTES:

1. ALL COMPONENTS AND INSTALLATION SHALL COMPLY WITH AS4678 AND THE STANDARDS REFERRED TO THEREIN.
2. MINIMUM HEIGHT (H) TO GEOGRID REINFORCEMENT LENGTH (L) TO BE 1.0.
3. MINIMUM BEARING CAPACITY OF FOUNDATION (BASED ON MINIMUM H/L RATIO OF 1.0) TO BE AS FOLLOWS :
   a. H MAX. 2.0m = 100 kPa
   b. H MAX. 3.5m = 150 kPa
   c. H MAX. 5.0m = 200 kPa
   BEFORE COMMENCEMENT OF CONSTRUCTION THE FOUNDATION SHALL BE INSPECTED AND VERIFIED BY A QUALIFIED GEOTECHNICAL ENGINEER.
4. WHERE MINIMUM BEARING IS NOT ACHIEVABLE OR NOT MEETING DESIGN REQUIREMENT, THE FOUNDATION MATERIAL IS TO BE EXCAVATED AND REPLACED WITH APPROVED MATERIAL PLACED IN ACCORDANCE WITH THE FILLING SPECIFICATION TO A MINIMUM COMPACTION OF 100% SMDD AND PLACED WITHIN 2% OF OMC.
5. MINIMUM SURCHARGE LOADS TO BE APPLIED AS FOLLOWS U.N.O. ON PLAN:
   a. LIVE LOAD = 20 kPa
   b. DEAD LOAD = 5 kPa
   c. CONSTRUCTION TRAFFIC LIVE LOAD = 10 kPa
6. THE GEOGRIDS SHALL BE OF THE TYPE AND INDEX STRENGTH NOMINATED ON THE DRAWINGS. THE MINIMUM GEOGRIDS SHALL BE A SINGLE LENGTH IN THE DIRECTION OF DESIGN TENSION, NOT LAPPED, MAKING PROVISION FOR CONNECTION TO THE FACING ACROSS THE WHOLE WIDTH OF THE FACING AND PROVIDING FOR THE SPECIFIED ANCHORAGE WITHIN THE DESIGNATED ANCHORAGE ZONE. GEOGRIDS SHALL COVER THE WHOLE OF THE PLAN AREA BEHIND THE WALL FOR THE SPECIFIED ANCHORAGE LENGTH AND SHALL BE LAPPED WITH ADJACENT SECTIONS IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.
7. MINIMUM WALL EMBEDMENT AT THE TOE OF THE WALL TO BE 300mm.
8. DESIGN LIFE OF STRUCTURE IS TO BE 100 YEARS.
9. SELECT BACKFILL MATERIAL WITHIN THE REINFORCED SOIL BLOCK SHALL BE SOUND GRANULAR MATERIAL OF NATURAL OR INDUSTRIAL ORIGIN, NON-EXPANSIVE, FREE FROM ORGANIC OR OTHER DELETERIOUS MATERIAL CONFORMING TO THE PHYSICAL, CHEMICAL AND ELECTROCHEMICAL LIMITS AS SPECIFIED AND SHALL NOT BE SUBJECT TO BREAKDOWN UNDER COMPACTION. THE SELECT BACKFILL MATERIAL IS TO HAVE THE FOLLOWING PARAMETERS:
   a. MINIMUM INTERNAL FRICTION, ϕ = 34°
   b. EFFECTIVE COHESION, C' = 0 kPa
   c. UNIT WEIGHT = 21 kN/m³
   d. PH BETWEEN 4 AND 9
10. SELECT BACKFILL IS TO BE PLACED AND COMPACTED IN LAYERS NOT MORE THAN 300mm (LOOSE). COMPACTION TO NOT LESS THAN 100% SMDD WILL BE ACHIEVED AND MATERIAL PLACED WITHIN 2% OF OMC. DENSITY TESTING SHALL BE PERFORMED IN EACH COMPACTED LIFT IN ACCORDANCE WITH AS3798.
11. PROVIDE A DRAINAGE LAYER DIRECTLY BEHIND THE FACING UNITS IN A MINIMUM 300mm WIDE 12-20mm AGGREGATE LAYER. FACING UNIT VOIDS TO BE FILLED WITH AGGREGATE. PROVIDE 100mm MINIMUM AG. DRAIN IN GEOTEXTILE SOCK AT TOE OF WALL FACING AND CONNECT TO DRAINAGE SYSTEM AT 30m MAX. SPACING.
12. THE NEED FOR A CHIMNEY DRAIN OR DRAINAGE AT THE REAR OF THE MASS SOIL BLOCK IS TO BE CONFIRMED ON SITE BY THE GEOTECHNICAL ENGINEER AND DESIGNER FOLLOWING PREPARATION OF THE FOUNDATION AND PRIOR TO CONSTRUCTION OF THE MASS SOIL BLOCK.
13. CONSTRUCTION EQUIPMENT WEIGHING MORE THAN 500kG STATIC WEIGHT IS TO BE KEPT BACK 1.5m FROM THE REAR FACE OF THE WALL FACING UNITS. COMPACTION OF THE SELECT FILL MATERIAL WITHIN THE 1.5m STRIP ADJACENT TO THE WALL SHALL BE ACHIEVED BY LIGHT MECHANICAL TAMPERS (VIBRATING PLATE, TRENCH COMPACTOR OR SIMILAR) TO GIVE THE SAME DENSITY AS IN THE REMAINDER OF THE SELECT FILL.
14. ALL DESIGN AND CONSTRUCT WALL SYSTEM TO BE COMPLETED IN ACCORDANCE WITH THESE NOTES.
15. TOP OF WALL HEIGHTS ARE NOTED TO ALIGN WITH FINISHED PAVEMENT HEIGHTS. THE CONTRACTOR AND THEIR DESIGN AND CONSTRUCT WALLING CONTRACTORS ARE TO ENSURE THAT ALL WALL STRAPS ARE INSTALLED BELOW THE DESIGN EARTHWORKS SUBGRADE. CONTRACTOR TO ALLOW FOR WALL STRAPS TO BE GRADED AWAY FROM THE FACE OF THE WALL OR OTHERWISE INSTALLED TO SUIT EARTHWORKS DESIGN LEVELS AND GRADES.
16. DIFFERENTIAL SETTLEMENT NOTE:
    FUTURE BUILDING AND SERVICE DESIGNERS TO CONSIDER DIFFERENTIAL SETTLEMENT OF REINFORCED EARTH WALL BLOCK AND GENERAL FILL AREAS. PARTICULAR ATTENTION TO BE DRAWN TO HEAVILY LOADED AREAS, OR DIFFERING LOADED AREAS (INCLUDING SPRINKLER TANK AND TRUCK PAVEMENT AREAS) AND WHERE SIGNIFICANT CHANGES IN OVERALL WALL HEIGHT OR FILL AMOUNTS ARE EXPERIENCED. IT IS THE RESPONSIBILITY OF THE FUTURE DESIGNERS TO ENSURE APPROPRIATE DESIGN CONSIDERATION TO DIFFERENTIAL SETTLEMENT ARE MADE DEPENDING ON THE DESIGN ELEMENT AND INTERACTION WITH RETAINED ELEMENTS AND GENERAL FILL MATERIAL.



TYPICAL THRU' KEYSTONE RETAINING WALL
(1000 TO 2500 MAXIMUM RETAINED HEIGHT)
SCALE 1:20

KEYSTONE WALL SPECIFICATIONS :	
RETAINED HEIGHT (mm)	OVERALL THICKNESS "T" (mm)
UP TO 1000	600 – NO FINES MASS. CONC. FILL
1000 TO 1200	700 – NO FINES MASS. CONC. FILL
1200 TO 1800	950 – NO FINES MASS. CONC. FILL
1800 TO 2400	1200 – NO FINES MASS. CONC. FILL
2400 TO 2500	1450 – NO FINES MASS. CONC. FILL

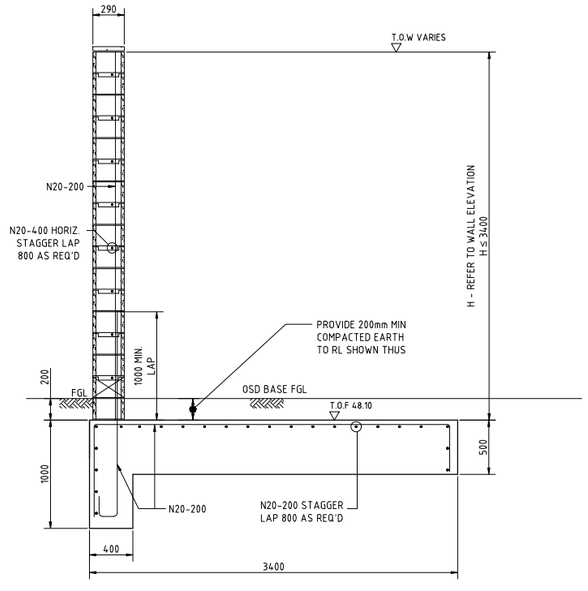


WALL VERTICAL REINF'T DETAIL
TYPICAL
NOT TO SCALE

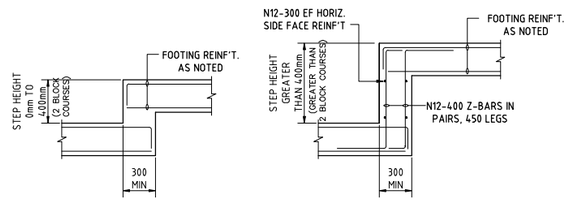
NOTE :
ALL BLOCK CORES TO BE FULLY GROUTED.
NOTES SHOWN ARE TYPICAL FOR ALL WALLS.
ALL BASE KEYS TO BE POURED AGAINST
UNDISTURBED NATURAL GROUND.

NOTE:
COVER TO ALL BASE REINFORCEMENT
TO BE MINIMUM 50mm

CONCRETE QUALITY					
ELEMENT	SLUMP	AGGREGATE (MAX. SIZE)	CEMENT TYPE	ADMIXTURE	F'c (MPa)
CORE FILL	230	10	GP	NIL	20
FOOTING	80	20	GP	NIL	32



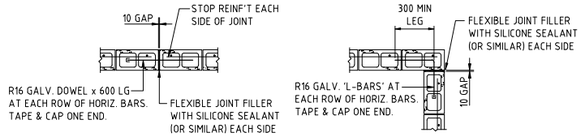
CANTILEVER BLOCK WALL
SCALE 1:20



STEP HEIGHT
0mm TO 400mm

STEP HEIGHT
GREATER THAN 400mm

TYPICAL WALL FOOTING STEPS
1:20 SCALE



VERTICAL JOINT DETAIL
PROVIDE VERTICAL JOINTS IN
BLOCKWORK 8.0M MAX. CENTRES

CORNER DETAIL

RETAINING WALL BLOCKWORK JOINTING DETAILS
1:20 SCALE

200mm 0 500 1000 1500 2000mm
SCALE 1:20 AT A0 SIZE SHEET

FOR INFORMATION

AMENDMENTS	DATE	ISSUE
ISSUED FOR INFORMATION	30.03.22	E
ISSUED FOR INFORMATION	25.03.22	D
ISSUED FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION	02.07.21	C
ISSUED FOR PRELIMINARY ONLY	25.06.21	B
ISSUED FOR PRELIMINARY ONLY	09.06.21	A

AMENDMENTS DATE ISSUE

PROJECT MANAGER: ProjectStrategy
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CLIENT: ALTIS PROPERTY PARTNERS

PROJECT: ACCESS LOGISTICS PARK
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DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
DS	JB	AUG '20	MW	A0	AS SHOWN	C014021.00-SSDA650

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DRAWING TITLE: RETAINING WALL DETAILS
DRAWING No: C014021.00-SSDA650
ISSUE: E

Appendix B

MUSIC MODEL CONFIGURATION & PARAMETERS

B.1 Introduction

The MUSIC model was chosen to model water quality. This model, released by the Cooperative Research Centre for Catchment Hydrology (CRCCH), is a standard industry model for this purpose. MUSIC (the Model for Urban Stormwater Improvement Conceptualisation) is suitable for simulating catchment areas of up to 100 km^2 and utilises a continuous simulation approach to model water quality.

By simulating the performance of stormwater management systems, MUSIC can be used to predict if the proposed systems and changes to land use are appropriate for their catchments and capable of meeting specified water quality objectives (CRC 2002). The water quality constituents modelled in MUSIC, of relevance to this report, include Total Suspended Solids (TSS), Total Phosphorus (TP) and Total Nitrogen (TN).

The pollutant retention criteria set out in Section C3 of Council *DCP 2014* and nominated in **Section 7.1** of this report were used as a basis for assessing the effectiveness of the selected treatment trains.

The MUSIC model "*14021.00-SSDA_Rev1.mxproj"* was set up to examine the effectiveness of the water quality treatment train and to predict if Council's requirements have been achieved.

Modelling parameters used are based on those nominated in the Sydney Catchment Management Authority (SCA) document *Using Music in Sydney's Drinking Water Catchment – A Sydney Catchment Authority Standard (2012)* and *Draft NSW MUSIC Modelling Guidelines (2011).*

B.2 Rainfall Data

As per the recommendation of Table 3-1 of *Draft NSW MUSIC Modelling Guidelines (2011), s*ix-minute pluviographic data for the Sydney Meteorological Office Station was sourced from the Bureau of Meteorology (BOM) as nominated below. Evapo-transpiration data for the period was sourced from the Sydney Monthly Areal PET data set supplied with the MUSIC software.

Input	**Data Used**
Rainfall Station	67113 Penrith Lakes AWS
Rainfall Period	1999 – 2008 (10 years)
Mean Annual Rainfall (mm)	712
Evapo- transpiration	Sydney Monthly Areal PET
Model Time step	6 minutes

B.3 Rainfall Runoff Parameters

Parameter	**Value**
Rainfall Threshold	1.40
Soil Storage Capacity (mm)	105
Initial Storage (% capacity)	30
Field Capacity (mm)	70
Infiltration Capacity Coefficient a	150
Infiltration Capacity exponent b 3.5	
Initial Depth (mm)	10
Daily Recharge Rate (%)	25

Daily Baseflow Rate (%)	10
Daily Seepage Rate (%)	0

B.4 Pollutant Concentrations & Source Nodes

Pollutant concentrations for source nodes are based on parameters adopted by the SCA as per **Table B.1**.

Flow Type	Surface Type	TSS (log_{10} values)		TP (log_{10} values)		TN (log_{10} values)	
		Mean	Std Dev.	Mean	Std Dev.	Mean	Std Dev.
Baseflow	Roof	NA	NA	NA	NA	NA	NA
	Roads	1.20	0.17	-0.85	0.19	0.11	0.12
Stormflow	Roof	1.30	0.32	-0.89	0.25	0.30	0.19
	Roads	2.43	0.32	-0.30	0.25	0.34	0.19

Table B.1. Pollutant Concentrations

The MUSIC model has been setup with a treatment train approach based on the pollutant concentrations in **Table B.1** above.

The relevant stormwater catchment sizes are listed below in **Table B.2** and their configuration within the MUSIC model.

Catchment	**Area (Ha)**	**Source Node**	**% Impervious**
Roof	9.89	Roof	100
Carpark	1.61	Mixed	75
Hardstand	2.9	Sealed Road	100
Firetrail	0.88	Mixed	50
Landscape	0.96	Mixed	0
Access Road	3.27	Sealed Road	100
OSD/Bio-Retention Basin	0.96	Mixed	0
Total	20.47		

Table B.2. Music Model Source Nodes

B.5 Treatment Nodes

Bio-Retention system and Ocean Protect OceanGuard (GPT) nodes have been used in the modelling of the development.

It is noted that the bio-retention node, within the flood storage basin, has been modelled in MUSIC to simulate treatment during low flow and non-flood scenario. The bio-retention node allows for a high flow bypass which would operate when flows from the site are greater than 100 l/s. This flow is based on the 1 in 3-month flow from the site and would simulate a conservative model for the site during the period when the flood basin operates and would not provide treatment to the site. It is noted that the model is conservative in that the flood basin is not expected to operate until flood events which are greater than 1 in 5-year ARI which

would mean that possible higher treatment of stormwater from the site. This is considered a suitable and conservative modelling approach for the treatment of stormwater from this site.

B.6 Results

Table B.3 shows the results of the MUSIC analysis. The reduction rate is expressed as a percentage and compares the post-development pollutant loads without treatment versus post-development loads with treatment.

Table B.3. MUSIC analysis results – Allowable Load Reduction

	Total Source Load (kg/yr)	**Total Residual Load** (kg/yr)	**Reduction Achieved** (%)	**Target Reduction (%)**
Total Suspended Solids (kg/yr)	9415	724.4	92.31	90
Total Phosphorus (kg/yr)	18.54	3.886	79.04	80
Total Nitrogen (kg/yr)	119.8	33.77	71.80	65
Gross Pollutants (kg/yr)	1391	4.056	99.71	90

Table B.#. MUSIC analysis results – Allowable Loads

	Source Load (kg yr)	**Residual Load** (kg/yr)	**Target Load** (kg/yr)	**Per Hectare Residual Load** (kg/ha/yr)	**Target Per Hectare Residual Load** (kg/ha/yr)
Total Suspended Solids (kg/yr)	9415	724.4	1,638	35.4	<80
Total Phosphorus (kg/yr)	18.54	3.886	6.141	0.19	<0.3
Total Nitrogen (kg/yr)	119.8	33.77	71.65	1.65	<3.5
Gross Pollutants (kg/yr)	1391	4.056	327.52	0.20	<16

The model results indicate that, through the use of the STM in the treatment train, pollutant residual loads for Total Suspended Solids, Total Phosphorous, Total Nitrogen and Gross Pollutants will meet the requirements of *DPIE Technical Guidance for Achieving Wianamatta South Creek Stormwater Management Targets* (Operational Phase Stormwater Quality Targets – Option 2) on an overall catchment basis.

B.7 Modelling Discussion

MUSIC modelling has been performed to assess the effectiveness of the selected treatment trains and to ensure that the pollutant retention requirements of *DPIE Technical Guidance for Achieving Wianamatta South Creek Stormwater Management Targets* (Operational Phase Stormwater Quality Targets – Option 2) have been met.

The MUSIC modelling has shown that the proposed treatment train of STM will provide stormwater treatment which will meet PCC/DPIE requirements in an effective and economical manner.

Hydrocarbon and oil & grease removal cannot be modelled with MUSIC software. As an industrial estate with users for individual development sites not known, the exact levels of hydrocarbons would not be known however given the expected use of the site as a warehouse distribution centre these pollutants would not be expected to be large. Potential sources of hydrocarbons and/or oil & grease which drain to the stormwater system would be limited to leaking engine sumps or for accidental fuel spills/leaks and leaching of bituminous pavements (car parking only). The potential for these pollutants is low and published data from the CSIRO indicates that average concentrations from industrial sites are in the order of 10mg/L and we would expect source loading from this site to be near to or below this concentration. Hydrocarbon pollution would also be limited to surface areas which will be treated via OceanProtect OceanGuard absorbent material which are predicted to reduce this pollutant.

Given the expected low source loadings of hydrocarbons and oil/grease and removal efficiencies of the treatment devices and bio-retention systems we consider that the requirements of the Penrith City Council have been met.

Appendix C

DRAFT SOIL AND WATER MANAGEMENT PLAN

C.1 Introduction

An erosion and sediment control plan (ESCP) is shown on drawing **Co14021.00-DA200** with details on **DA250**. These are conceptual plans only providing sufficient detail to clearly show that the works can proceed without undue pollution to receiving waters. A detailed plan will be prepared once consent is given and before works start.

The Staged ESCP considers initial site establishment, requirements during construction of roads and infrastructure and estate earthworks, completion of estate works and the period between this and development of individual lots.

C.2 General Conditions

1. The ESCP will be read in conjunction with the engineering plans, and any other plans or written instructions that may be issued in relation to development at the subject site.
2. Contractors will ensure that all soil and water management works are undertaken as instructed in this specification and constructed following the guidelines stated in *Managing Urban Stormwater, Soils and Construction (1998) "The Blue Book"* and Penrith City Council specifications.
3. All subcontractors will be informed of their responsibilities in minimising the potential for soil erosion and pollution to down slope areas.

C.3 Land Disturbance

1. Where practicable, the soil erosion hazard on the site will be kept as low as possible and as recommended in Table C.1.

Land Use	Limitation	Comments
Construction areas	Limited to 5 (preferably 2) metres from the edge of any essential construction activity as shown on the engineering plans.	All site workers will clearly recognise these areas that, where appropriate, are identified with barrier fencing (upslope) and sediment fencing (downslope), or similar materials.
Access areas	Limited to a maximum width of 5 metres	The site manager will determine and mark the location of these zones onsite. They can vary in position so as to best conserve existing vegetation and protect downstream areas while being considerate of the needs of efficient works activities. All site workers will clearly recognise these boundaries.
Remaining lands	Entry prohibited except for essential management works	

Table C.1 Limitations to access

C.4 Erosion Control Conditions

1. Clearly visible barrier fencing shall be installed as shown on the plan and elsewhere at the discretion of the site superintendent to ensure traffic control and prohibit unnecessary site disturbance. Vehicular access to the site shall be limited to only those essential for construction work and they shall enter the site only through the stabilised access points.
2. Soil materials will be replaced in the same order they are removed from the ground. It is particularly important that all subsoils are buried and topsoils remain on the surface at the completion of works.
3. Where practicable, schedule the construction program so that the time from starting land disturbance to stabilisation has a duration of less than six months.
4. Notwithstanding this, schedule works so that the duration from the conclusion of land shaping to completion of final stabilisation is less than 20 working days.
5. Land recently established with grass species will be watered regularly until an effective cover has properly established and plants are growing vigorously. Further application of seed might be necessary later in areas of inadequate vegetation establishment.
6. Where practical, foot and vehicular traffic will be kept away from all recently established areas
7. Earth batters shall be constructed in accordance with the Geotechnical Engineers Report or with as law a gradient as practical but not steeper than:
    - 2H:1V where slope length is less than 7 metres
    - 2.5H:1V where slope length is between 7 and 10 metres
    - 3H:1V where slope length is between 10 and 12 metres
    - 4H:1V where slope length is between 12 and 18 metres
    - 5H:1V where slope length is between 18 and 27 metres
    - 6H:1V where slope length is greater than 27 metres
8. All earthworks, including waterways/drains/spillways and their outlets, will be constructed to be stable in at least the design storm event.
9. During windy weather, large, unprotected areas will be kept moist (not wet) by sprinkling with water to keep dust under control. In the event water is not available in sufficient quantities, soil binders and/or dust retardants will be used or the surface will be left in a cloddy state that resists removal by wind.

C.5 Pollution Control Conditions

1. Stockpiles will not be located within 5 metres of hazard areas, including likely areas of high velocity flows such as waterways, paved areas and driveways. Silt/ sediment fences and appropriate stabilisation of stockpiles are to be provided as detailed on the drawings.
2. Sediment fences will:
    a) Be installed where shown on the drawings, and elsewhere at the discretion of the site superintendent to contain the coarser sediment fraction (including aggregated fines) as near as possible to their source.
    b) Have a catchment area not exceeding 720 square meters, a storage depth (including both settling and settled zones) of at least 0.6 meters, and internal dimensions that provide maximum surface area for settling, and
    c) Provide a return of 1 metre upslope at intervals along the fence where catchment area exceeds 720 square meters, to limit discharge reaching each section to 10 litres/second in a maximum 20-year t_c discharge.
3. Sediment removed from any trapping device will be disposed in locations where further erosion and consequent pollution to down slope lands and waterways will not occur.
4. Water will be prevented from directly entering the permanent drainage system unless it is relatively sediment free (i.e. the catchment area has been permanently landscaped and/or likely sediment has been treated in an approved device). Nevertheless, stormwater inlets will be protected.
5. Temporary soil and water management structures will be removed only after the lands they are protecting are stabilised.

C.6 Waste Management Conditions

Acceptable bind will be provided for any concrete and mortar slurries, paints, acid washings, lightweight waste materials and litter. Clearance service will be provided at least weekly.

C.7 Site Inspection and Maintenance

1. A self-auditing program will be established based on a Check Sheet. A site inspection using the Check Sheet will be made by the site manager:
    - At least weekly.
    - Immediately before site closure.
    - Immediately following rainfall events in excess of 5mm in any 24-hour period.

The self-audit will include:

- Recording the condition of every sediment control device
- Recording maintenance requirements (if any) for each sediment control device
- Recording the volumes of sediment removed from sediment retention systems, where applicable

- Recording the site where sediment is disposed
- Forwarding a signed duplicate of the completed Check Sheet to the project manager/developer for their information

2. In addition, a suitably qualified person will be required to oversee the installation and maintenance of all soil and water management works on the site. The person shall be required to provide a short monthly written report. The responsible person will ensure that:
   - The plan is being implemented correctly
   - Repairs are undertaken as required
   - Essential modifications are made to the plan if and when necessary

   The report shall carry a certificate that works have been carried out in accordance with the plan.
3. Waste bins will be emptied as necessary. Disposal of waste will be in a manner approved by the Site Superintendent.
4. Proper drainage will be maintained. To this end drains (including inlet and outlet works) will be checked to ensure that they are operating as intended, especially that,
   - No low points exist that can overtop in a large storm event
   - Areas of erosion are repaired (e.g. lined with a suitable material) and/or velocity of flow is reduced appropriately through construction of small check dams of installing additional diversion upslope.
   - Blockages are cleared (these might occur because of sediment pollution, sand/soil/spoil being deposited in or too close to them, breached by vehicle wheels, etc.).
5. Sand/soil/spoil materials placed closer than 2 meters from hazard areas will be removed. Such hazard areas include and areas of high velocity water flows (e.g. waterways and gutters), paved areas and driveways.
6. Recently stabilised lands will be checked to ensure that erosion hazard has been effectively reduced. Any repairs will be initiated as appropriate.
7. Excessive vegetation growth will be controlled through mowing or slashing.
8. All sediment detention systems will be kept in good, working condition. In particular, attention will be given to:
   a) Recent works to ensure they have not resulted in diversion of sediment laden water away from them
   b) Degradable products to ensure they are replaced as required, and
   c) Sediment removal, to ensure the design capacity or less remains in the settling zone.
9. Any pollutants removed from sediment basins or litter traps will be disposed of in areas where further pollution to down slope lands and waterways should not occur.
10. Additional erosion and/or sediment control works will be constructed as necessary to ensure the desired protection is given to down slope lands and waterways, i.e. make ongoing changes to the plan where it proves inadequate in practice or is subjected to changes in conditions at the work site or elsewhere in the catchment.

11. Erosion and sediment control measures will be maintained in a functioning condition until all earthwork activities are completed and the site stabilised
12. Litter, debris and sediment will be removed from the gross pollutant traps and trash racks as required.

EROSION AND SEDIMENT CONTROL
WEEKLY SITE INSPECTION SHEET

LOCATION .....
INSPECTION OFFICER ..... **DATE** .....
SIGNATURE .....

Legend: □ OK □ Not OK N/A Not applicable

Item	Consideration	Assessment
1	Public roadways clear of sediment.	.....
2	Entry/exit pads clear of excessive sediment deposition.	.....
3	Entry/exit pads have adequate void spacing to trap sediment.	.....
4	The construction site is clear of litter and unconfined rubbish.	.....
5	Adequate stockpiles of emergency ESC materials exist on site.	.....
6	Site dust is being adequately controlled.	.....
7	Appropriate drainage and sediment controls have been installed prior to new areas being cleared or disturbed.	.....
8	Up-slope "clean" water is being appropriately diverted around/through the site.	.....
9	Drainage lines are free of soil scour and sediment deposition.	.....
10	No areas of exposed soil are in need of erosion control.	.....
11	Earth batters are free of "rill" erosion.	.....
12	Erosion control mulch is not being displaced by wind or water.	.....
13	Long-term soil stockpiles are protected from wind, rain and stormwater flow with appropriate drainage and erosion controls.	.....
14	Sediment fences are free from damage.	.....
15	Sediment-laden stormwater is not simply flowing "around" the sediment fences or other sediment traps.	.....
16	Sediment controls placed up-slope/around stormwater inlets are appropriate for the type of inlet structure.	.....
17	All sediment traps are free of excessive sediment deposition.	.....
18	The settled sediment layer within a sediment basin is clearly visible through the supernatant prior to discharge such water.	.....
19	All reasonable and practicable measures are being taken to control sediment runoff from the site.	.....
20	All soil surfaces are being appropriately prepared (i.e. pH, nutrients, roughness and density) prior to revegetation.	.....
21	Stabilised surfaces have a minimum 70% soil coverage.	.....
22	The site is adequately prepared for imminent storms.	.....
23	All ESC measures are in proper working order.	.....

Appendix D

STORMWATER SYSTEM MAINTENANCE SCHEDULE

MAINTENANCE ACTION	FREQUENCY	RESPONSIBILITY	PROCEDURE
SWALES/ LANDSCAPED AREAS			
Check density of vegetation and ensure minimum height of 150mm is maintained. Check for any evidence of weed infestation	Six monthly	Maintenance Contractor	Replant and/or fertilise, weed and water in accordance with landscape consultant specifications
Inspect swale for excessive litter and sediment build up	Six monthly	Maintenance Contractor	Remove sediment and litter and dispose in accordance with local authorities' requirements.
Check for any evidence of channelisation and erosion	Six monthly/ After Major Storm	Maintenance Contractor	Reinstate eroded areas so that original, designed swale profile is maintained
Weed Infestation	Three Monthly	Maintenance Contractor	Remove any weed infestation ensuring all root ball of weed is removed. Replace with vegetation where required.
Inspect swale surface for erosion	Six Monthly	Maintenance Contractor	Replace top soil in eroded area and cover and secure with biodegradable fabric. Cut hole in fabric and revegetate.
INLET & JUNCTION PITS			
Inside of pits	Six Monthly	Maintenance Contractor	Remove grate and inspect internal walls and base, repair where required. Remove any collected sediment, debris, litter.

MAINTENANCE ACTION	FREQUENCY	RESPONSIBILITY	PROCEDURE
Outside of pits	Four Monthly/ After Major Storm	Maintenance Contractor	Clean grate of collected sediment, debris, litter and vegetation.
PROPRIETARY TREATMENT DEVICES (OceanSave GPT)			
Refer to Manufacturers Operation and Maintenance Manuel	Annually	Maintenance Contractor	Refer to Manufacturers Operation and Maintenance Manuel
BIORETENTION BASIN			
Check all items nominated for SWALES/ LANDSCAPED AREAS above	Refer to SWALES/ LANDSCAPED AREAS section above	Refer to SWALES/ LANDSCAPED AREAS section above	Refer to SWALES/ LANDSCAPED AREAS section above
Check for sediment accumulation at inflow points	Six monthly/ After Major Storm	Maintenance Contractor	Remove sediment and dispose in accordance with local authorities' requirements.
Check for erosion at inlet or other key structures.	Six monthly/ After Major Storm	Maintenance Contractor	Reinstate eroded areas so that original, designed profile is maintained
Check for evidence of dumping (litter, building waste or other).	Six monthly	Maintenance Contractor	Remove waste and litter and dispose in accordance with local authorities' requirements.
Check condition of vegetation is satisfactory (density, weeds, watering, replating, mowing/ slashing etc)	Six monthly	Maintenance Contractor	Replant and/or fertilise, weed and water in accordance with landscape consultant specifications

MAINTENANCE ACTION	FREQUENCY	RESPONSIBILITY	PROCEDURE
Check for evidence of prolonged ponding, surface clogging or clogging of drainage structures	Six monthly/ After Major Storm 5-10 years	Maintenance Contractor	Remove sediment and dispose in accordance with local authorities' requirements. Replace filter media & planting – refer to appropriately qualified engineer or stormwater specialist
Check stormwater pipes and pits	Six monthly/ After Major Storm	Maintenance Contractor	Refer to INLET/ JUNCTION PIT section.
FUTURE RAINWATER TANK			
Check for any clogging and blockage of the first flush device	Monthly	Maintenance Contractor	First flush device to be cleaned out
Check for any clogging and blockage of the tank inlet -leaf/litter screen	Six monthly	Maintenance Contractor	Leaves and debris to be removed from the inlet leaf/litter screen
Check the level of sediment within the tank	Every two years	Maintenance Contractor	Sediment and debris to be removed from rainwater tank floor if sediment level is greater than the maximum allowable depth as specified by the hydraulic consultant
STORMWATER SYSTEM			
General Inspection of complete stormwater drainage system	Bi-annually	Maintenance Contractor	Inspect all drainage structures noting any dilapidation in

MAINTENANCE ACTION	FREQUENCY	RESPONSIBILITY	PROCEDURE
			structures and carry out required repairs.
OSD SYSTEM			
Inspect and remove any blockage from orifice	Six Monthly	Maintenance Contractor/ Owner	Remove grate and screen to inspect orifice.
Inspect trash screen and clean	Six Monthly	Maintenance Contractor/ Owner	Remove grate and screen if required to clean it.
Inspect flap valve and remove any blockage.	Six Monthly	Maintenance Contractor/ Owner	Remove grate. Ensure flap valve moves freely and remove any blockages or debris.
Inspect pit sump for damage or blockage.	Six Monthly	Maintenance Contractor/ Owner	Remove grate & screen. Remove sediment/ sludge build up and check orifice and flap valve are clear.
Inspect storage areas and remove debris/ mulch/ litter etc likely to block screens/ grates.	Six Monthly	Maintenance Contractor/ Owner	Remove debris and floatable materials.
Check attachment of orifice plate and screen to wall of pit	Annually	Maintenance Contractor	Remove grate and screen. Ensure plate or screen mounted securely, tighten fixings if required. Seal gaps if required.
Check orifice diameter is correct and retains sharp edge.	Five yearly	Maintenance Contractor	Compare diameter to design (see Work-as-Executed) and ensure edge is not pitted or damaged.
Check screen for corrosion	Annually	Maintenance Contractor	Remove grate and screen and examine for rust or corrosion,

MAINTENANCE ACTION	FREQUENCY	RESPONSIBILITY	PROCEDURE
			especially at corners or welds.
Inspect overflow weir and remove any blockage	Six monthly	Maintenance Contractor/ Owner	Ensure weir is free of blockage.
Inspect walls for cracks or spalling	Annually	Maintenance Contractor	Remove grate to inspect internal walls, repair as necessary.
Check step irons	Annually	Maintenance Contractor	Ensure fixings are secure and irons are free from corrosion.

Appendix E

COSTIN ROE CONSULTING FLOOD AND OVERLAND FLOW ASSESSMENT

E.1 INTRODUCTION

E.1.1 Introduction

This Appendix to Section 8 is provided to confirm technical parameters adopted in the *Overland Flow Assessment* for the proposed industrial estate development. The *Study Area* has been identified by Penrith City Council, as being affected by overland flow from an external catchment on the north-east of the property.

The scope and primary objectives of the overland flow assessment, are as follows:

- Determine the design flows generated by the contributing external catchments for a range of storms (5%, 1%, 0.5%, 0.2% AEP & PMF); Hydrology would be based on RAFTS modelling;
- Assess the pre-development overland flow path through the development site for the 1% AEP storm event;
- Assess the post-development levels on the effect of overland flow through the development site for the 1% AEP storm event so that potential impacts on the development can be assessed and mitigated;
- Confirm that there is adverse impact to upstream, downstream and adjacent properties as a result of the development; and
- Confirm flood planning levels applicable to the development.

Appendix E provides technical detail to the summary and conclusions discussed in the **Section 8** of this report.

E.1.2 Survey/ DTM

Survey is required to define the physical attributes of the floodplain topography including the channel cross sections and the associated floodplain levels.

The pre-development scenario survey has been compiled based on a detail site survey for areas within the site, and for areas external to the site where detail survey is not available, digital terrain information has been obtained through government sources in the form of ALS survey. The on-ground survey information was completed in and around the study area to properly define the existing overland flow path cross section and features.

For assessment of the post-development scenario, the proposed development levels and drainage system (where appropriate) were then added to the pre-developed survey surface to create a post developed surface to use in the TUFLOW model and scenario modelling. This DTM was imported to the TUFLOW model to simulate land filling and proposed compensation areas in and around the flood affected land.

The surveys and design surfaces were used as the basis for the digital terrain model (DTM) used in the hydraulic modelling of the pre and post development scenario respectively.

E.1.3 Previous Studies

Penrith Council has undertaken a flood study of the nearby South Creek - *Updated South Creek Flood Study, Worley Parsons, 30 January 2015.* The site is noted to be east of South Creek however clear of the South Creek Floodplain, hence does not form part of Councils South Creek Flood Study. The site is noted to be a contributing catchment of South Creek.

Penrith Council has also undertaken a regional assessment of local tributaries Penrith Overland Flow Flow "*Overview Study – Flood Analysis for Central Urban (Zone 1), Northern Rural (Zone 2), Southern Rural (Zone 3)*" – Cardno 2006. The site is located within the Southern Rural (Zone 3) and an excerpt of the flood model output is shown in **Figure E1.1**. The area shown on the southern portion of the site as being flood affected in the PMF event is noted to comprise a farm dam only which is fully within the proposed development extent and as such has not been included in the current overland flow assessment.

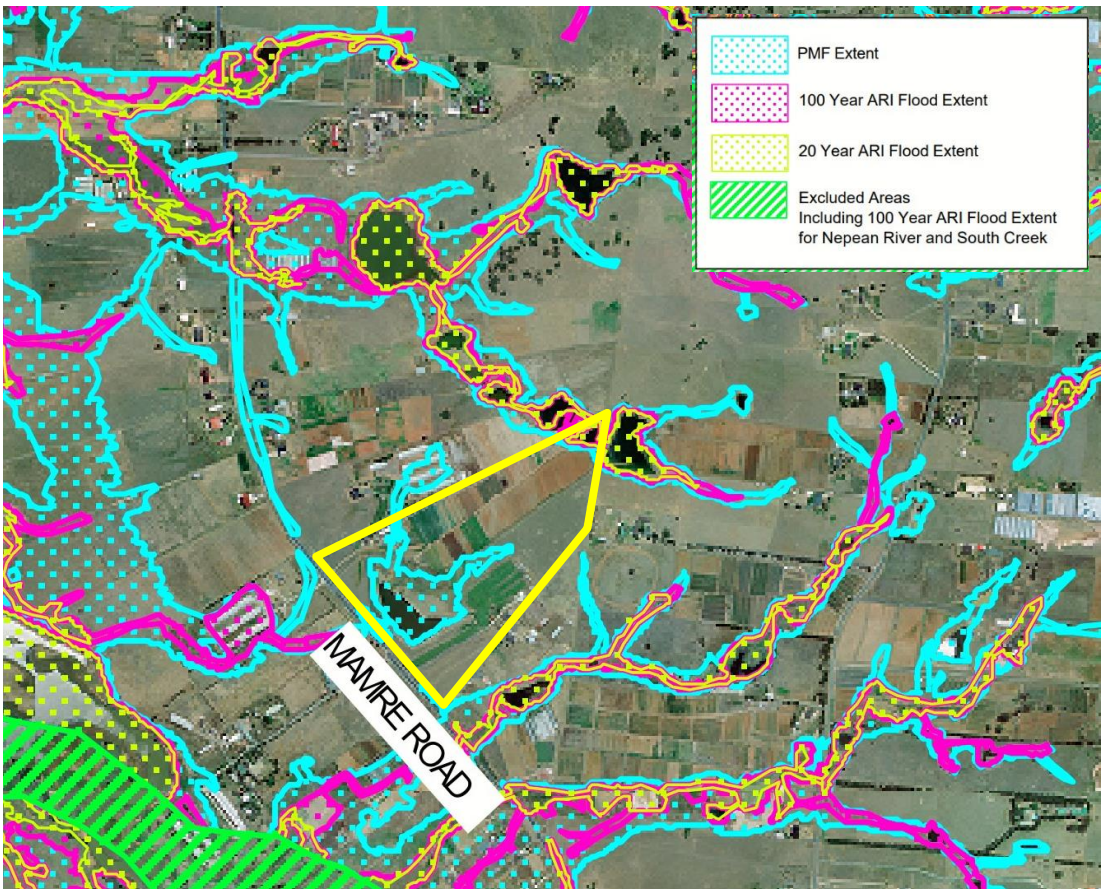


Figure E1.1. Excerpt of Figure 6.1k of Cardno 2006 Study

E.2 CATCHMENT INVESTIGATION & HYDROLOGY

E.2.1 Contributing Catchment Definition

The contributing catchment comprises rural land use with approximately >90% pervious surfaces. The area has recently been rezoned by DPIE as part of the Mamre Road Precinct of the Badgerys Creek Airport Aerotropolis.

Future developments will need to match pre-development flows through detention. As such our assessment has been based on modelling the existing rural pervious land use.

The contributing upstream catchment is approximately 26.7Ha and is shown below in **Figure E2.1**. The total catchment is divided into 3 separate sub-catchments.

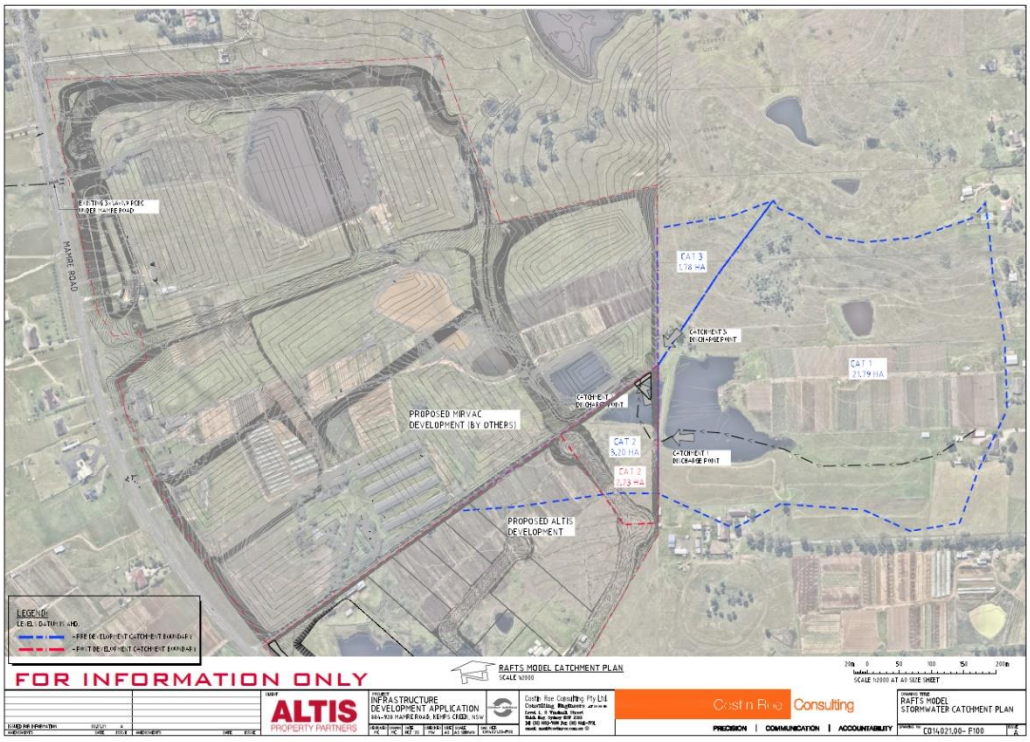


Figure E2.1. Contributing Catchment.

For the post-development condition, sub-catchment 2 changes in area from 3.20Ha pre-development to 2.23Ha post development. Sub-catchment 1 and 3 is consistent in both the pre-development and post development scenario.

E.2.2 Hydrological Assessment of Existing Catchment

Flood hydrographs were assessed using a RAFTS model based on the contributing catchment. The inflow hydrograph was extrapolated from the RAFTS model for the 5%, 1%, 0.5%, 0.2% AEP & PMF events as shown in **Figures E2.2 to Figure E2.22.** Rainfall intensities and temporal patterns were derived from the Bureau of Meteorology online IFD tool and Australian Rainfall and Runoff. It was determined that the critical storm duration which produces peak flows for the contributing catchments is the 45 minute storm duration. This is consistent with the critical duration storm used in the Penrith Overland Flow Study by Cardno (2006).

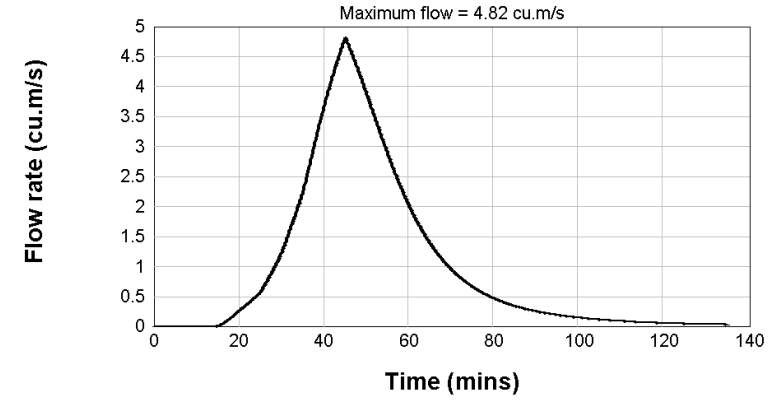


Figure E2.2: 5% AEP Inflow Hydrograph - Catchment 1

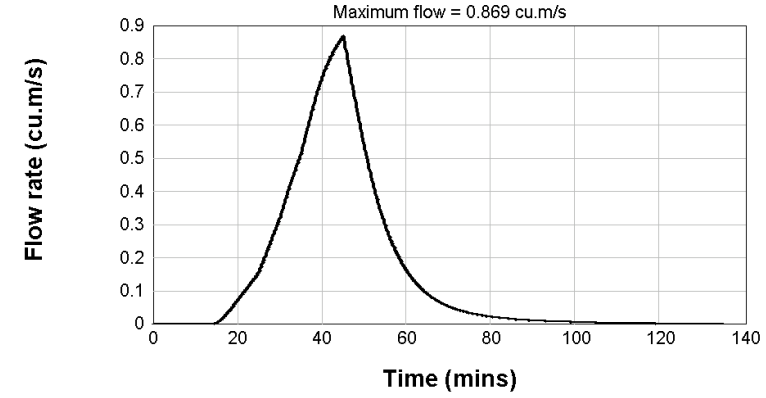


Figure E2.3: 5% AEP Inflow Hydrograph - Catchment 2 Pre-Development

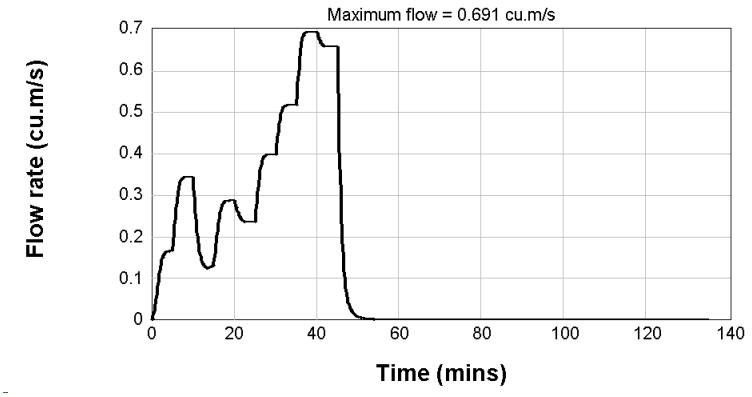


Figure E2.4: 5% AEP Inflow Hydrograph - Catchment 2 Post Development

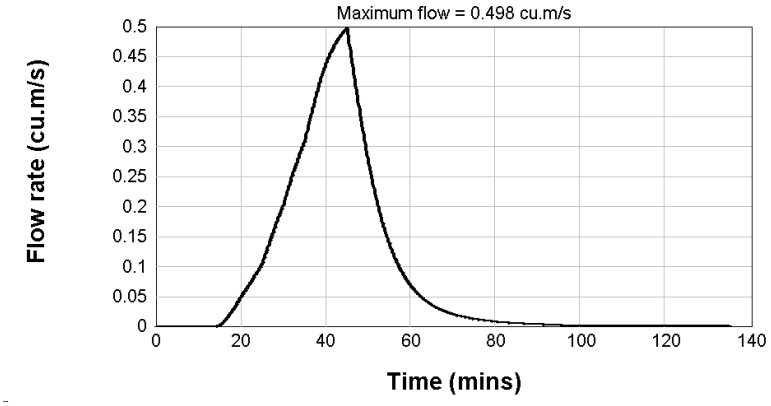


Figure E2.5: 5% AEP Inflow Hydrograph - Catchment 3

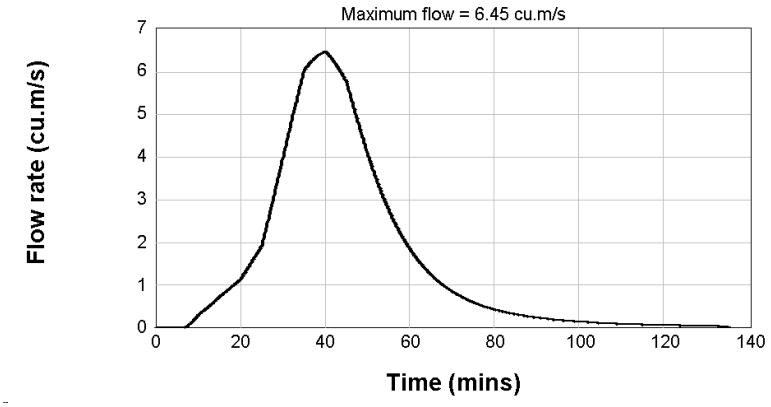


Figure E2.6: 1% AEP Inflow Hydrograph - Catchment 1

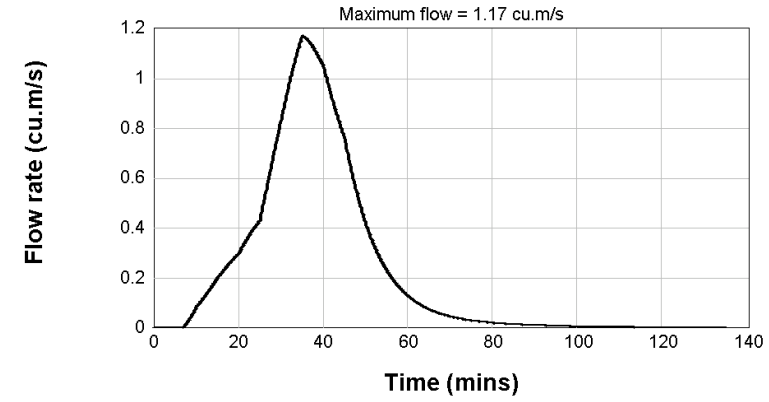


Figure E2.7: 1% AEP Inflow Hydrograph - Catchment 2 Pre-Development

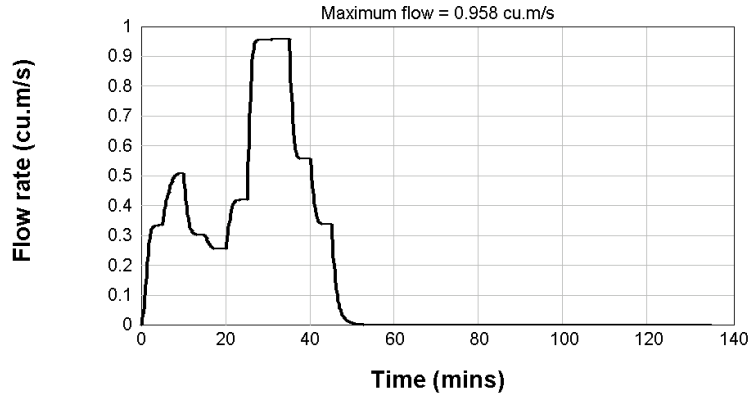


Figure E2.8: 1% AEP Inflow Hydrograph - Catchment 2 Post Development

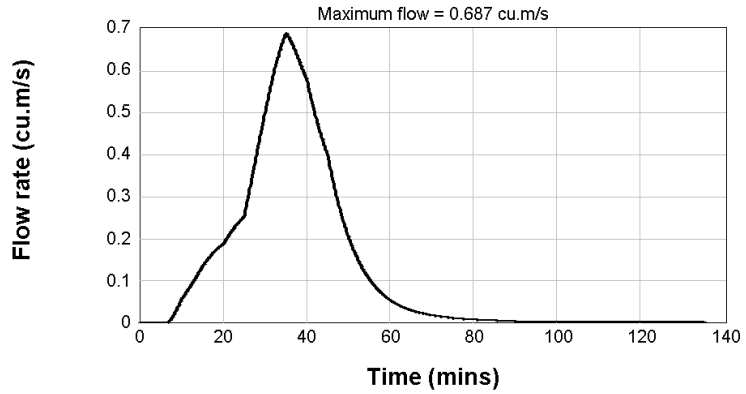


Figure E2.9: 1% AEP Inflow Hydrograph - Catchment 3

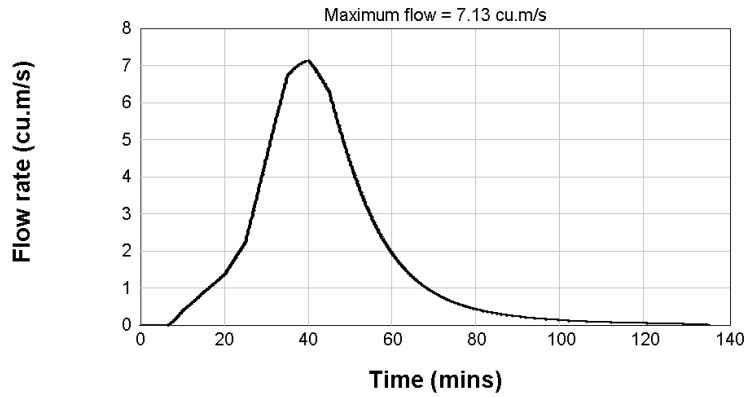


Figure E2.10: 0.5% AEP Inflow Hydrograph - Catchment 1

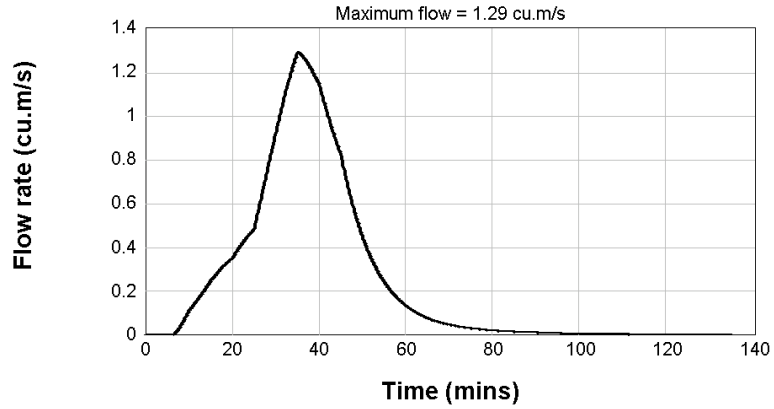


Figure E2.11: 0.5% AEP Inflow Hydrograph - Catchment 2 Pre-Development

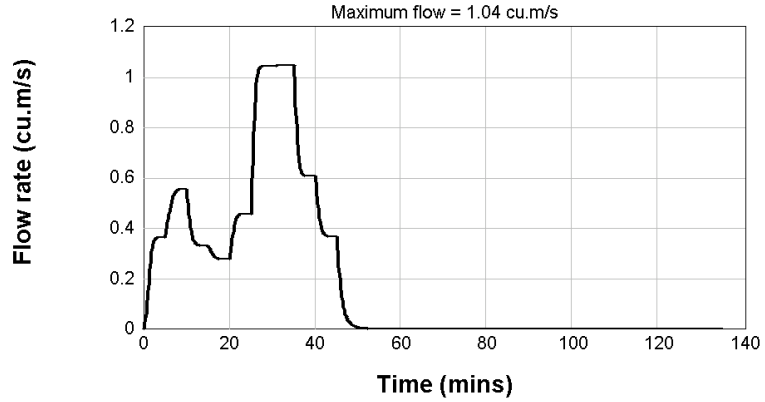


Figure E2.12: 0.5% AEP Inflow Hydrograph - Catchment 2 Post Development

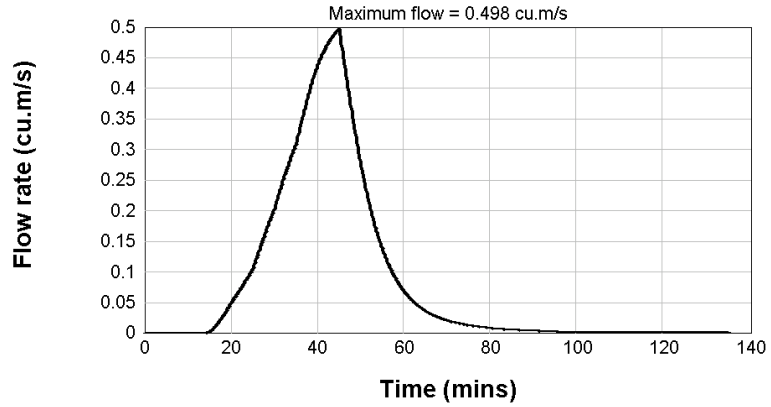


Figure E2.13: 0.5% AEP Inflow Hydrograph - Catchment 3

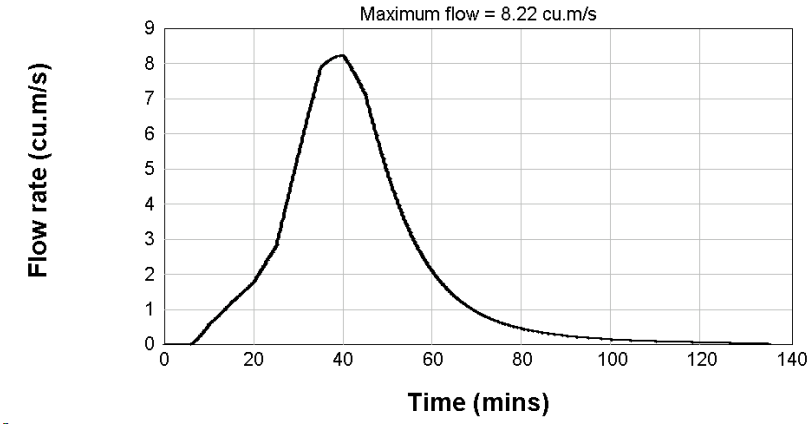


Figure E2.14: 0.2% AEP Inflow Hydrograph - Catchment 1

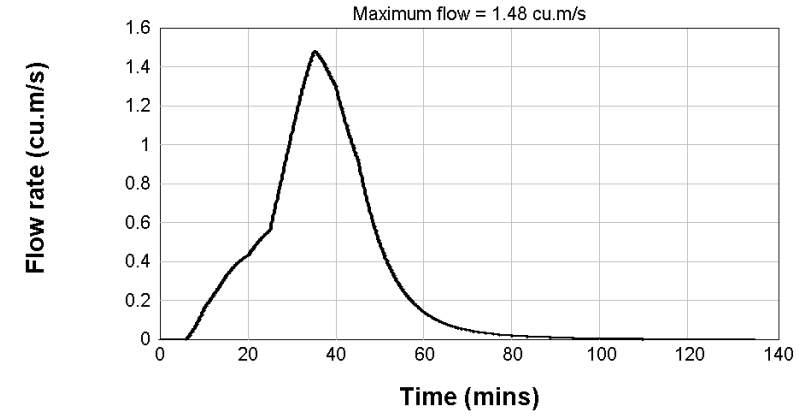


Figure E2.15: 0.2% AEP Inflow Hydrograph - Catchment 2 Pre-Development

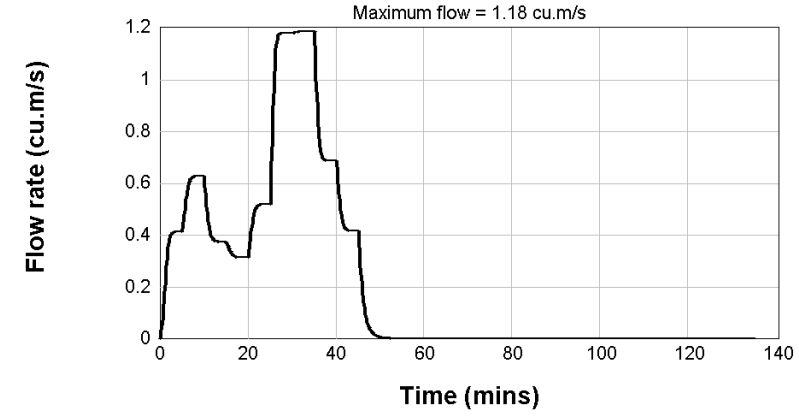


Figure E2.16: 0.2% AEP Inflow Hydrograph - Catchment 2 Post Development

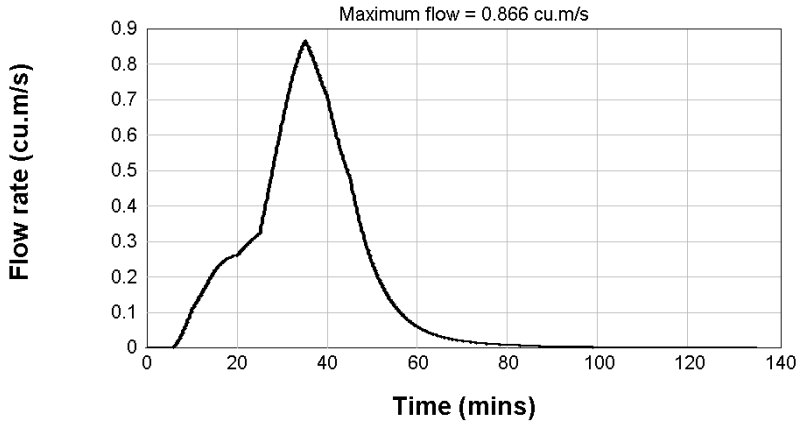


Figure E2.17: 0.2% AEP Inflow Hydrograph - Catchment 3

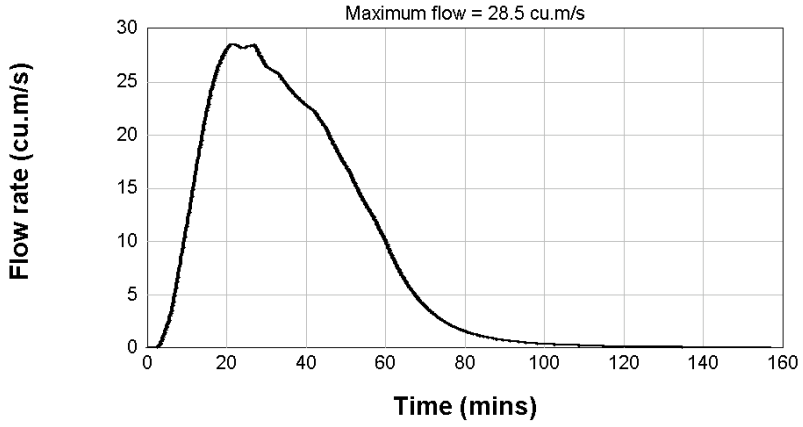


Figure E2.18: PMF Inflow Hydrograph - Catchment 1

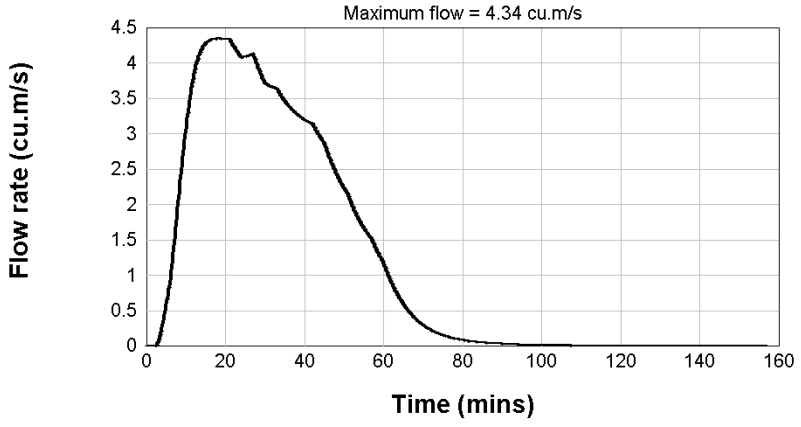


Figure E2.19: PMF Inflow Hydrograph - Catchment 2 Pre-Development

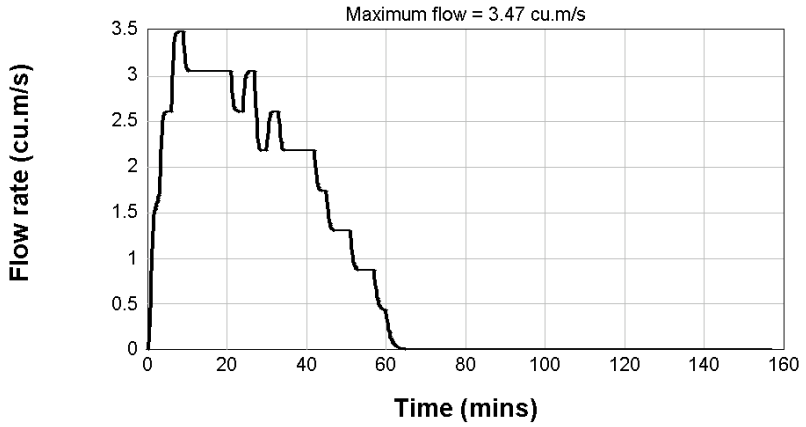


Figure E2.20: PMF Inflow Hydrograph - Catchment 2 Post Development

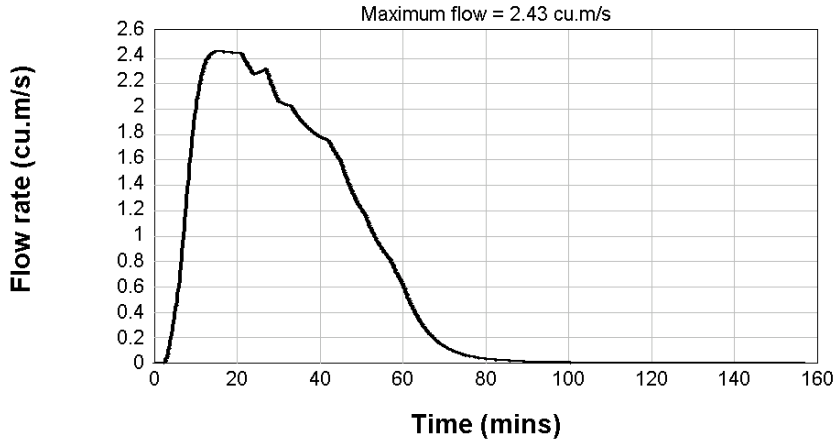


Figure E2.1: PMF Inflow Hydrograph - Catchment 3

E.3 HYDRODYNAMIC MODEL DEVELOPMENT

E 3.1 Extent and Topography

The model extent is shown in **Figure E3.1** of this appendix. The model begins approximately 450m upstream of the development and extending approximately 450m downstream of the development.

E.3.2 Boundary Conditions

Inflow Boundaries

Design inflow hydrographs for the model have been included at the location approximately 450m upstream of the existing upstream farm dam. Flows are based on hydrology as discussed in **Section E.2.2** of this Appendix.

The upstream boundary was located sufficiently upstream of the development to ensure the extent of predicted impacts from the development would be covered and any modelling iterations would be resolved clear of the development affectation zone.

Downstream Water Level Boundaries

The downstream water levels have been based on normal outlflow and design gradient of 1%

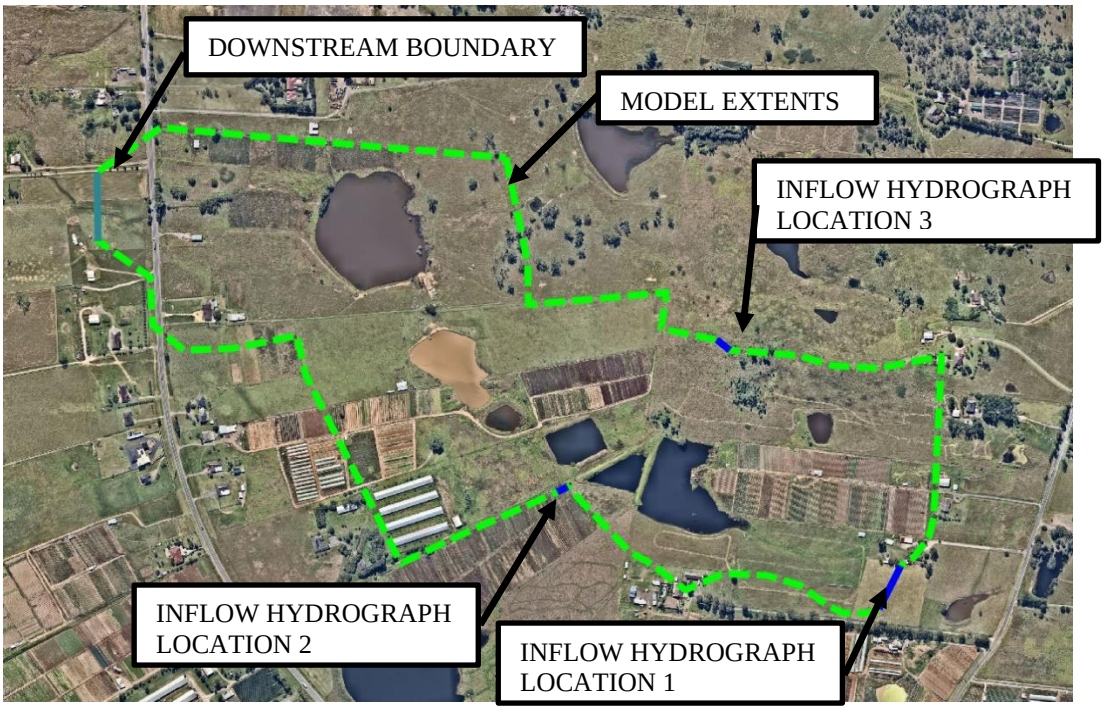


Figure E3.1: Model Extent and Model Boundary Locations

E.3.3 Channel and Floodplain Roughness

Roughness values adopted in the model are contained in **Table E2** below. These are generally consistent with previous studies completed within the Penrith Council area and have been adopted in this overland flow study.

Table E2. Adopted TUFLOW Element Roughness Values

Model Element	Description	Roughness Parameter Value
1	Trees / Vegetation	0.08
2	Grassed (Default)	0.04
3	Ponds	0.025
4	Roads	0.025
5	Hardstand	0.012
6	Buildings	(blockout)

A figurative representation of where the above roughness values have been applied can be found in **Figures E3.2 & E3.3.**

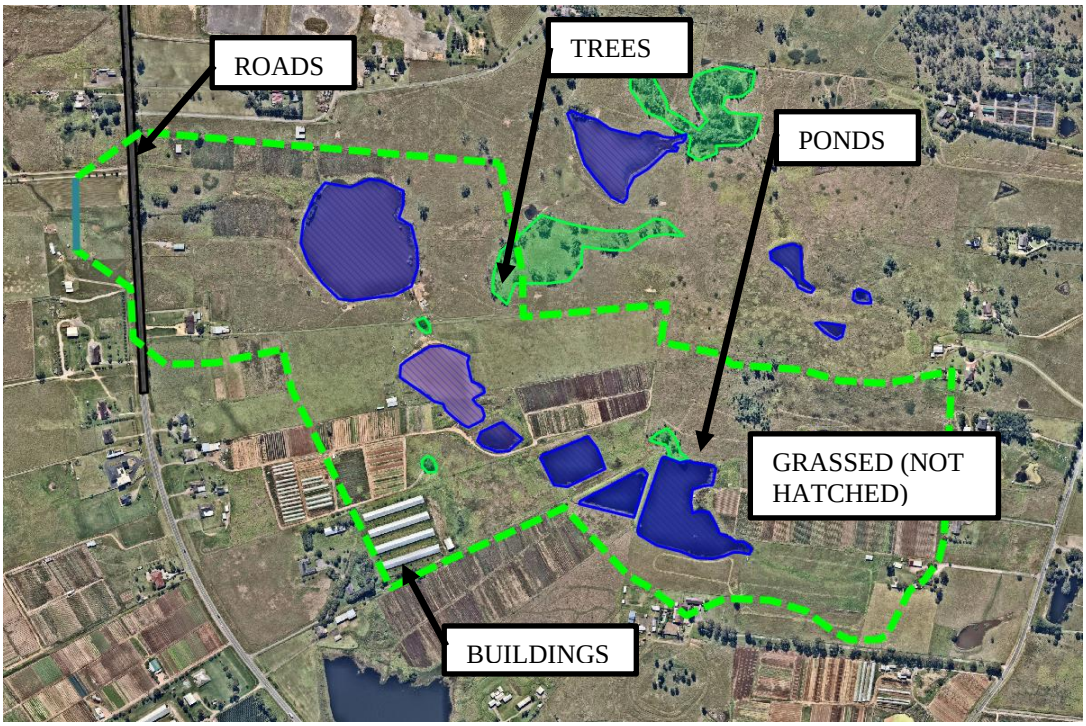


Figure E3.2: Manning's Roughness Surface Areas (Pre-Development)

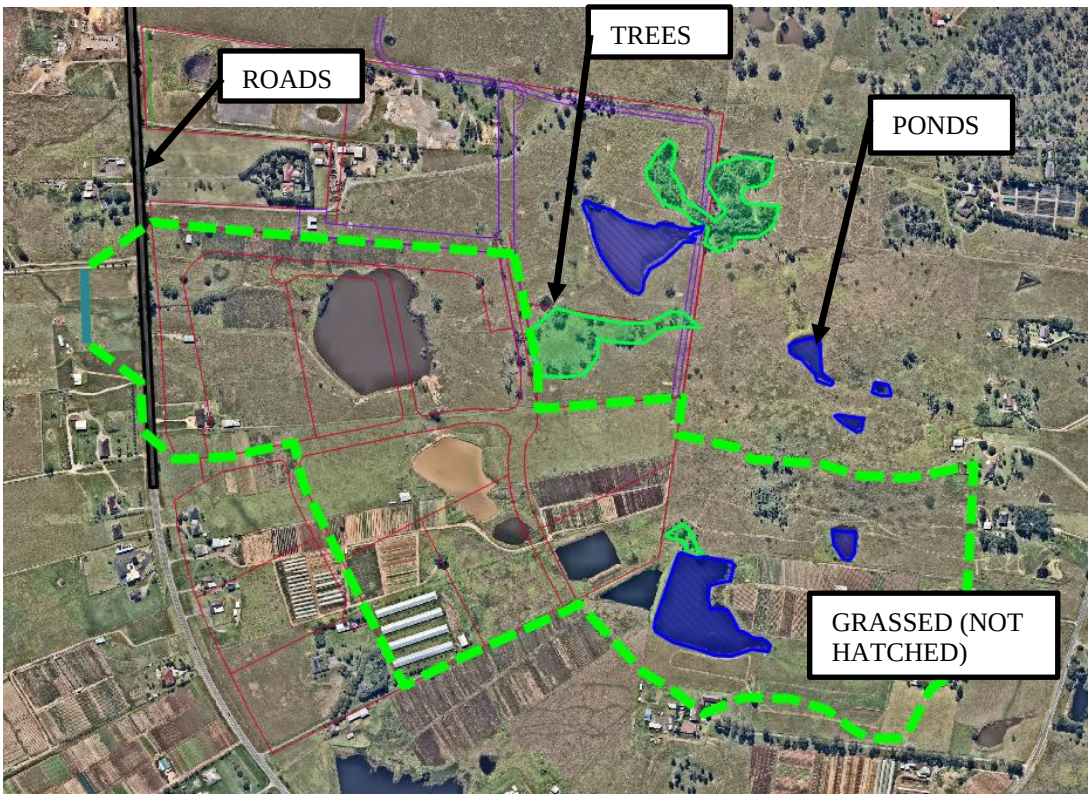


Figure E3.3: Manning's Roughness Surface Areas (Post-Development)

E.3.4 Model Validation

Model validation has been completed by comparing results of the TUFLOW modelling against the results contained in the Penrith Council study from 2006. Model parameters were adjusted as required to achieve acceptable agreement between the two model output. The process for the validation was as follows:

- Establish hydrology, peak flows and hydrograph for modelled events;
- Establish TUFLOW Model using defined parameters;
- Compare results of TUFLOW modelling with the Penrtith Council Figures including flood depths, flood levels, flood extents and hydraulics. The comparison is made at the peak of the predicted parameters;
- Adjust roughness factors to align TUFLOW flood extent to align with the Penrith Council Results.

Hydrology and peak flows were established as described in **Section E.2.2** of this report.

A number of trial models and iterations of the TUFLOW model were performed. Adjustment of roughness parameters were used to align the flood levels with those compiled in the council figures.

The comparison of the flood level results shows good alignment of those produced in the TUFLOW model when compared with those of the council figures. Flood water levels were seen to have a difference less than 0.1m and generally in the order of 0.025-0.05m

through the study area. The predicted flood extent is consistent between the two models for the flood event modelled.

Given the differences in modelling techniques, parameters, predicted model accuracy (+/- 0.2m) and model components these differences are considered acceptable for the base model and for continuation of post-developed scenario modelling.

E.3.5 Proposed Overland Flow Management Strategy

Flows from within the development sites have been only considered in the sizing of the stormwater system and erosion control for the development sites. The proposed buildings will be set at the 1% AEP level plus 0.5m freeboard per council policy.

Penrith City Council require that flows from the upstream catchment to be conveyed through the site. Council also requires proof that the proposed development does not increase the flood risk to the surrounding properties. Further, the TUFLOW modelling and assessment confirms there is negligible impact on upstream, downstream and/ or adjoining sites as a result of the proposed developments.

As part of the Stage 1 development, conveyance is proposed via an underground culvert system and open channel. In the Stage 2 development, when surrounding development sites are also developed, runoff from the upstream catchment is expected to comprise inground system which follows proposed precinct roads and trunk drainage defined in the Mamre Precinct DCP. This flood assessment does not consider the surrounding sites to be fully developed with temporary open channels in place in lieu of an in-ground drainage system.

E.4 MODEL OUTPUT

Model output for pre and post development conditions for the Catchment flooding events on site as discussed in earlier sections have been included in the following Figures.

We note figures represent predicted values at the peak of each event.

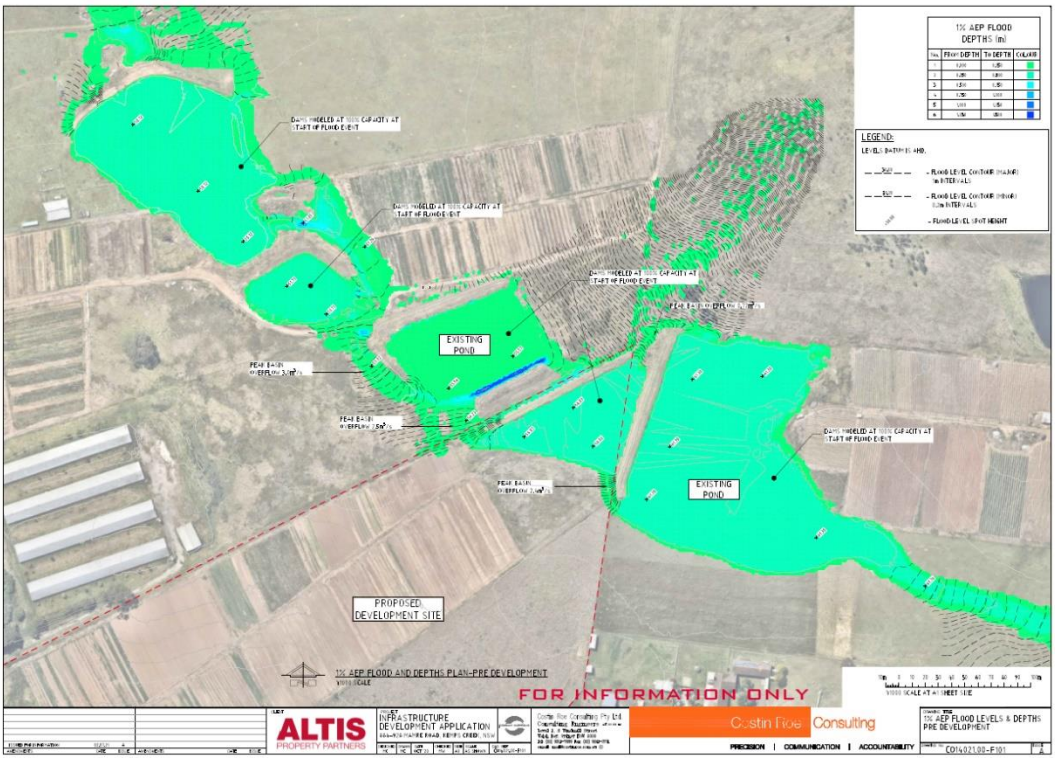


Figure E4.1: 1% AEP Flood Depths – Pre-Development

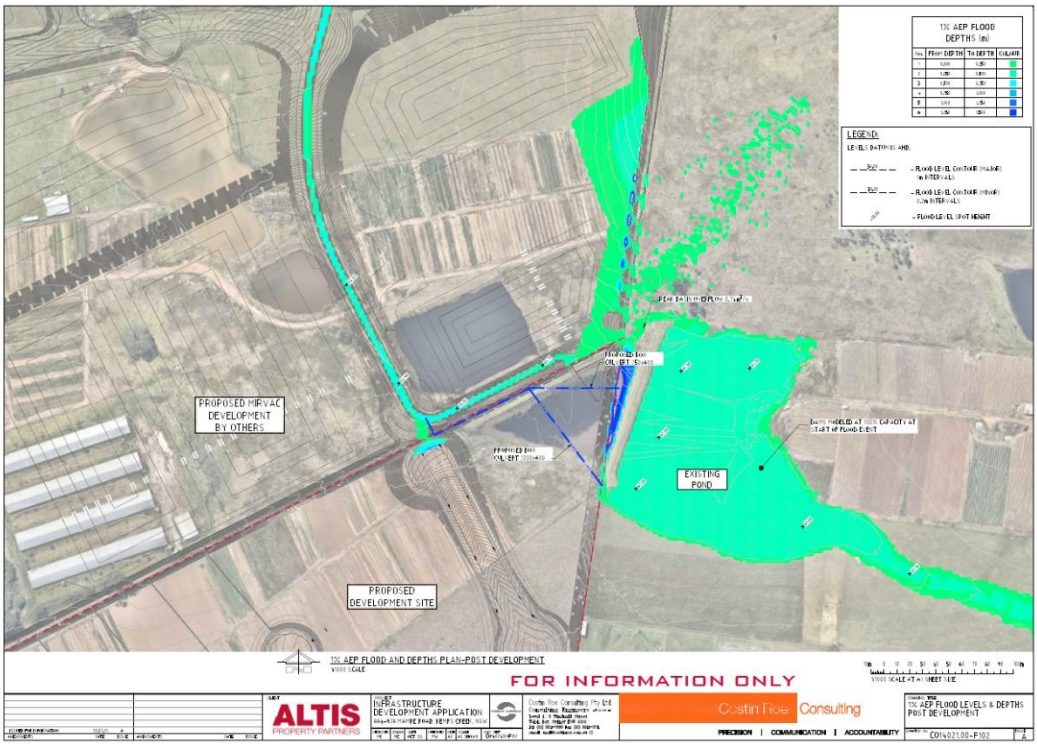


Figure E4.2: 1% AEP Flood Depths – Post Development

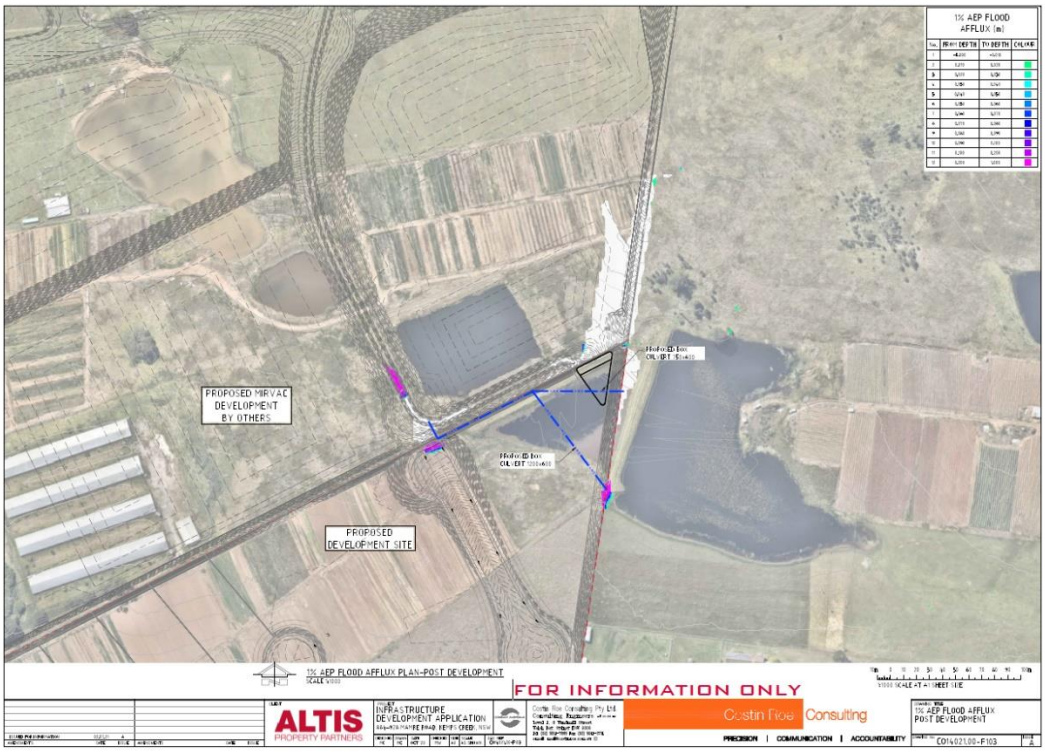


Figure E4.3: 1% AEP Flood Afflux Plan

E.5 FLOOD ASSESSMENT DISCUSSION

This Appendix to the *Civil Engineering Report* for 884 Mamre Road, Kemps Creek, NSW, has been prepared to assess the effect of flooding on the proposed development, and also to confirm no affectation on upstream downstream or adjoining properties. Further the assessment was also completed to ensure that sufficient flood conveyance are available, post development, during the 5%, 1%. 0.5%, 0.2% AEP and PMF flood event.

A TUFLOW hydrodynamic flood model has been completed and the pre and post development flood events assessed for the 5%, 1%. 0.5%, 0.2% AEP and PMF rainfall event.

This Appendix confirms the technical input and detailed output completed as part of the assessment. **Appendix E** is to be read in conjunction with **Section 8** of this report.

Appendix E2

FLOOD ASSESSMENT FIGURES

CO14021.00-F100 – RAFTS MODEL CATCHMENT PLAN

CO10421.00-F101 - 1% AEP FLOOD LEVELS AND DEPTHS PRE-DEVELOPMENT

CO10421.00-F102 - 1% AEP FLOOD LEVELS AND DEPTHS POST DEVELOPMENT

CO10421.00-F103 - 1% AEP FLOOD AFFLUX PLAN

CO10421.00-F104 - 1% AEP VELOCITY PRE-DEVELOPMENT

CO10421.00-F105 - 1% AEP VELOCITY POST DEVELOPMENT

CO10421.00-F106 - 1% AEP VELOCITY AFFLUX

CO10421.00-F107 - 1% AEP HAZARD PRE-DEVELOPMENT

CO10421.00-F108 - 1% AEP HAZARD POST DEVELOPMENT

CO10421.00-F109 - 5% AEP FLOOD LEVELS AND DEPTHS PRE-DEVELOPMENT

CO10421.00-F110 - 5% AEP FLOOD LEVELS AND DEPTHS POST DEVELOPMENT

CO10421.00-F111 - 5% AEP FLOOD AFFLUX PLAN

CO10421.00-F112 - 5% AEP VELOCITY PRE-DEVELOPMENT

CO10421.00-F113 - 5% AEP VELOCITY POST DEVELOPMENT

CO10421.00-F114 - 5% AEP VELOCITY AFFLUX

CO10421.00-F115 - 5% AEP HAZARD PRE-DEVELOPMENT

CO10421.00-F116 - 5% AEP HAZARD POST DEVELOPMENT

CO10421.00-F117 – 0.5% AEP FLOOD LEVELS AND DEPTHS PRE-DEVELOPMENT

CO10421.00-F118 – 0.5% AEP FLOOD LEVELS AND DEPTHS POST DEVELOPMENT

CO10421.00-F119 – 0.5% AEP FLOOD AFFLUX PLAN

CO10421.00-F120 – 0.5% AEP VELOCITY PRE-DEVELOPMENT

CO10421.00-F121 – 0.5% AEP VELOCITY POST DEVELOPMENT

CO10421.00-F122 – 0.5% AEP VELOCITY AFFLUX

CO10421.00-F123 – 0.5% AEP HAZARD PRE-DEVELOPMENT

CO10421.00-F124 – 0.5% AEP HAZARD POST DEVELOPMENT

CO10421.00-F125 – 0.2% AEP FLOOD LEVELS AND DEPTHS PRE-DEVELOPMENT

CO10421.00-F126 – 0.2% AEP FLOOD LEVELS AND DEPTHS POST DEVELOPMENT

CO10421.00-F127 – 0.2% AEP FLOOD AFFLUX PLAN

CO10421.00-F128 – 0.2% AEP VELOCITY PRE-DEVELOPMENT

CO10421.00-F129 – 0.2% AEP VELOCITY POST DEVELOPMENT

CO10421.00-F130 – 0.2% AEP VELOCITY AFFLUX

CO10421.00-F131 – 0.2% AEP HAZARD PRE-DEVELOPMENT

CO10421.00-F132 – 0.2% AEP HAZARD POST DEVELOPMENT

CO10421.00-F133 - PMF FLOOD LEVELS AND DEPTHS PRE-DEVELOPMENT

CO10421.00-F134 – PMF FLOOD LEVELS AND DEPTHS POST DEVELOPMENT

CO10421.00-F135 - PMF FLOOD AFFLUX PLAN

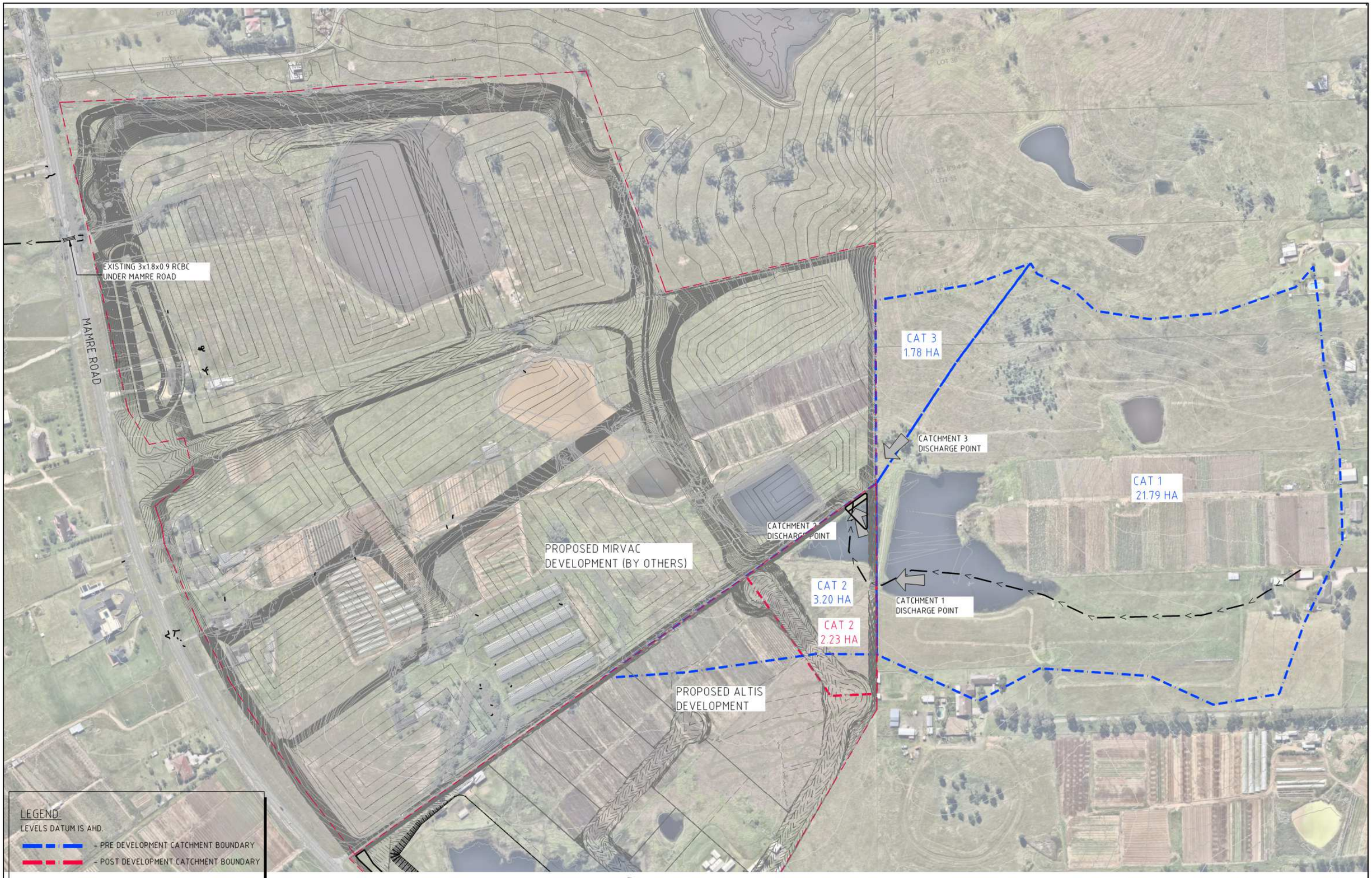
CO10421.00-F136 - PMF VELOCITY PRE-DEVELOPMENT

CO10421.00-F137 - PMF VELOCITY POST DEVELOPMENT

CO10421.00-F138 - PMF VELOCITY AFFLUX

CO10421.00-F139 - PMF HAZARD PRE-DEVELOPMENT

CO10421.00-F140 - PMF HAZARD POST DEVELOPMENT



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RAFTS MODEL CATCHMENT PLAN
SCALE 1:2000

20m 0 50 100 150 200m
SCALE 1:2000 AT A0 SIZE SHEET

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RAFTS MODEL
STORMWATER CATCHMENT PLAN

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1% AEP FLOOD DEPTHS (m)			
No.	FROM DEPTH	TO DEPTH	COLOUR
1	0.000	0.250	
2	0.250	0.500	
3	0.500	0.750	
4	0.750	1.000	
5	1.000	1.250	
6	1.250	1.500	

LEGEND:

LEVELS DATUM IS AHD.

30.00 - FLOOD LEVEL CONTOUR (MAJOR) 1m INTERVALS

30.20 - FLOOD LEVEL CONTOUR (MINOR) 0.2m INTERVALS

+30.00 - FLOOD LEVEL SPOT HEIGHT

DAMS MODELED AT 100% CAPACITY AT START OF FLOOD EVENT

DAMS MODELED AT 100% CAPACITY AT START OF FLOOD EVENT

DAMS MODELED AT 100% CAPACITY AT START OF FLOOD EVENT

DAMS MODELED AT 100% CAPACITY AT START OF FLOOD EVENT

PEAK BASIN OVERFLOW 0.72m³/s

EXISTING POND

PEAK BASIN OVERFLOW 3.0m³/s

PEAK BASIN OVERFLOW 2.5m³/s

PEAK BASIN OVERFLOW 2.4m³/s

EXISTING POND

PROPOSED DEVELOPMENT SITE

1% AEP FLOOD AND DEPTHS PLAN-PRE DEVELOPMENT

1:1000 SCALE

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10m 0 10 20 30 40 50 60 70 80 90 100m

1:1000 SCALE AT A1 SHEET SIZE

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1% AEP FLOOD DEPTHS (m)			
No.	FROM DEPTH	TO DEPTH	COLOUR
1	0.000	0.250	
2	0.250	0.500	
3	0.500	0.750	
4	0.750	1.000	
5	1.000	1.250	
6	1.250	1.500	

LEGEND:

LEVELS DATUM IS AHD.

30.00 - FLOOD LEVEL CONTOUR (MAJOR) 1m INTERVALS

30.20 - FLOOD LEVEL CONTOUR (MINOR) 0.2m INTERVALS

+30.00 - FLOOD LEVEL SPOT HEIGHT

PEAK BASIN OVERFLOW 0.74m³/s

PROPOSED BOX CULVERT 750x600

PROPOSED BOX CULVERT 1200x600

DAMS MODELED AT 100% CAPACITY AT START OF FLOOD EVENT

PROPOSED MIRVAC DEVELOPMENT BY OTHERS

EXISTING POND

PROPOSED DEVELOPMENT SITE

54.53 55.71 54.96 55.39 61.30 61.30 61.30 61.30 61.30 61.16

1% AEP FLOOD AND DEPTHS PLAN-POST DEVELOPMENT

1:1000 SCALE

10m 0 10 20 30 40 50 60 70 80 90 100m

1:1000 SCALE AT A1 SHEET SIZE

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1% AEP FLOOD AFFLUX PLAN-POST DEVELOPMENT

SCALE 1:1000

10m 0 10 20 30 40 50 60 70 80 90 100m

1:1000 SCALE AT A1 SHEET SIZE

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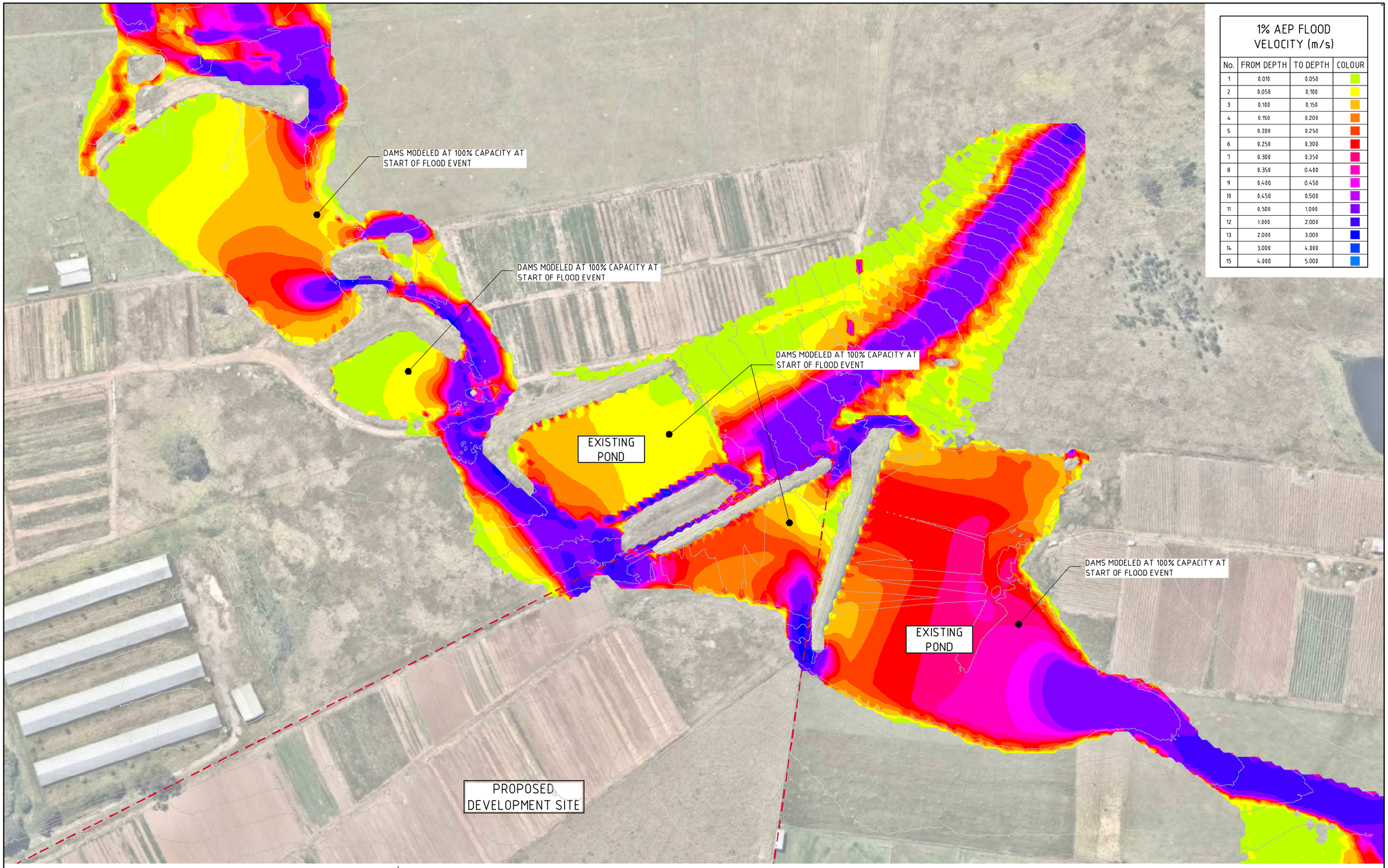
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1% AEP FLOOD VELOCITY (m/s)

No.	FROM DEPTH	TO DEPTH	COLOUR
1	0.010	0.050	
2	0.050	0.100	
3	0.100	0.150	
4	0.150	0.200	
5	0.200	0.250	
6	0.250	0.300	
7	0.300	0.350	
8	0.350	0.400	
9	0.400	0.450	
10	0.450	0.500	
11	0.500	1.000	
12	1.000	2.000	
13	2.000	3.000	
14	3.000	4.000	
15	4.000	5.000	

1% AEP FLOOD VELOCITY PLAN-PRE DEVELOPMENT
1:1000 SCALE

10m 0 10 20 30 40 50 60 70 80 90 100m
1:1000 SCALE AT A1 SHEET SIZE

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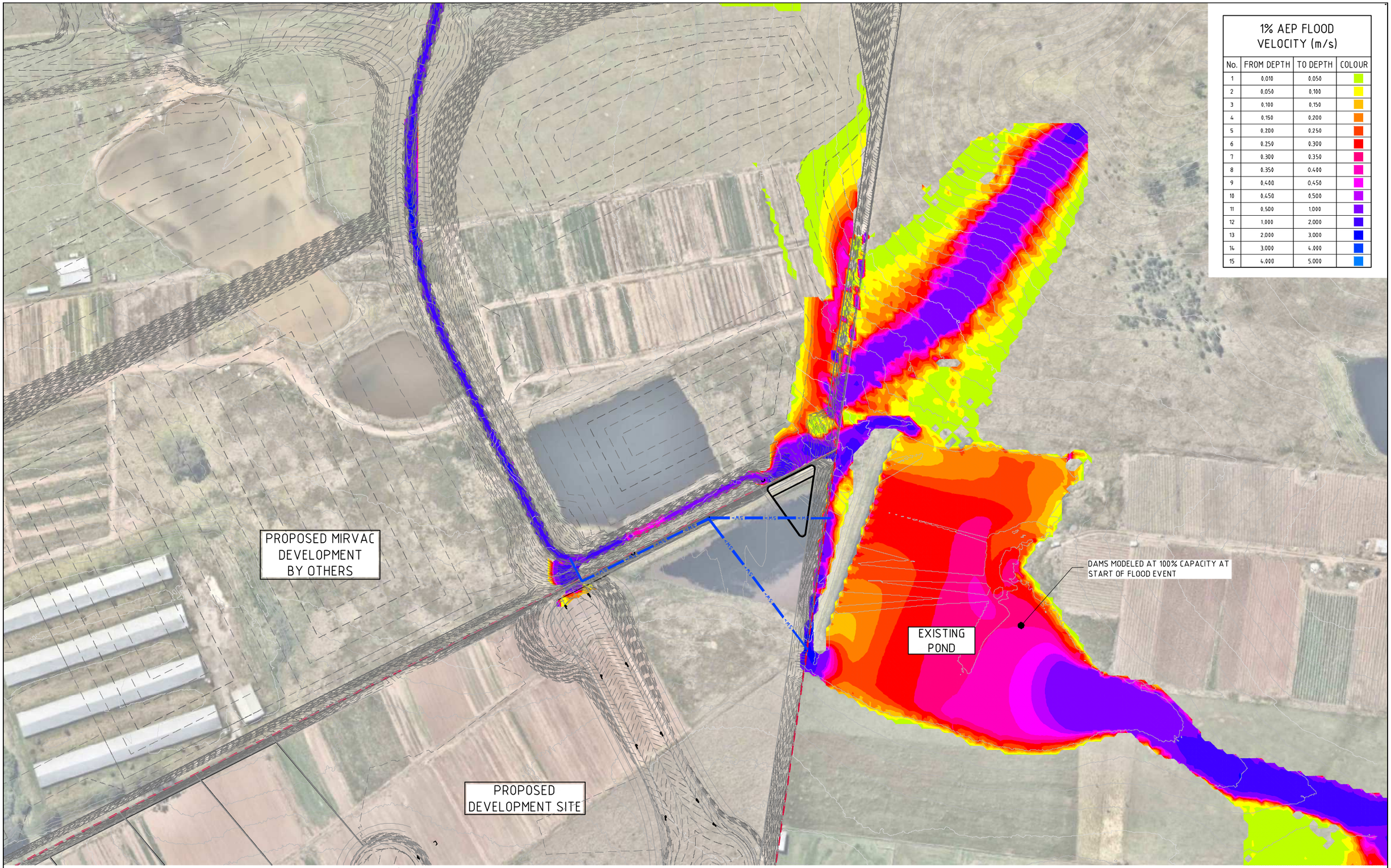
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PRE DEVELOPMENT

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1% AEP FLOOD VELOCITY (m/s)

No.	FROM DEPTH	TO DEPTH	COLOUR
1	0.010	0.050	
2	0.050	0.100	
3	0.100	0.150	
4	0.150	0.200	
5	0.200	0.250	
6	0.250	0.300	
7	0.300	0.350	
8	0.350	0.400	
9	0.400	0.450	
10	0.450	0.500	
11	0.500	1.000	
12	1.000	2.000	
13	2.000	3.000	
14	3.000	4.000	
15	4.000	5.000	

1% AEP FLOOD VELOCITY PLAN-POST DEVELOPMENT
1:1000 SCALE

10m 0 10 20 30 40 50 60 70 80 90 100m
1:1000 SCALE AT A1 SHEET SIZE

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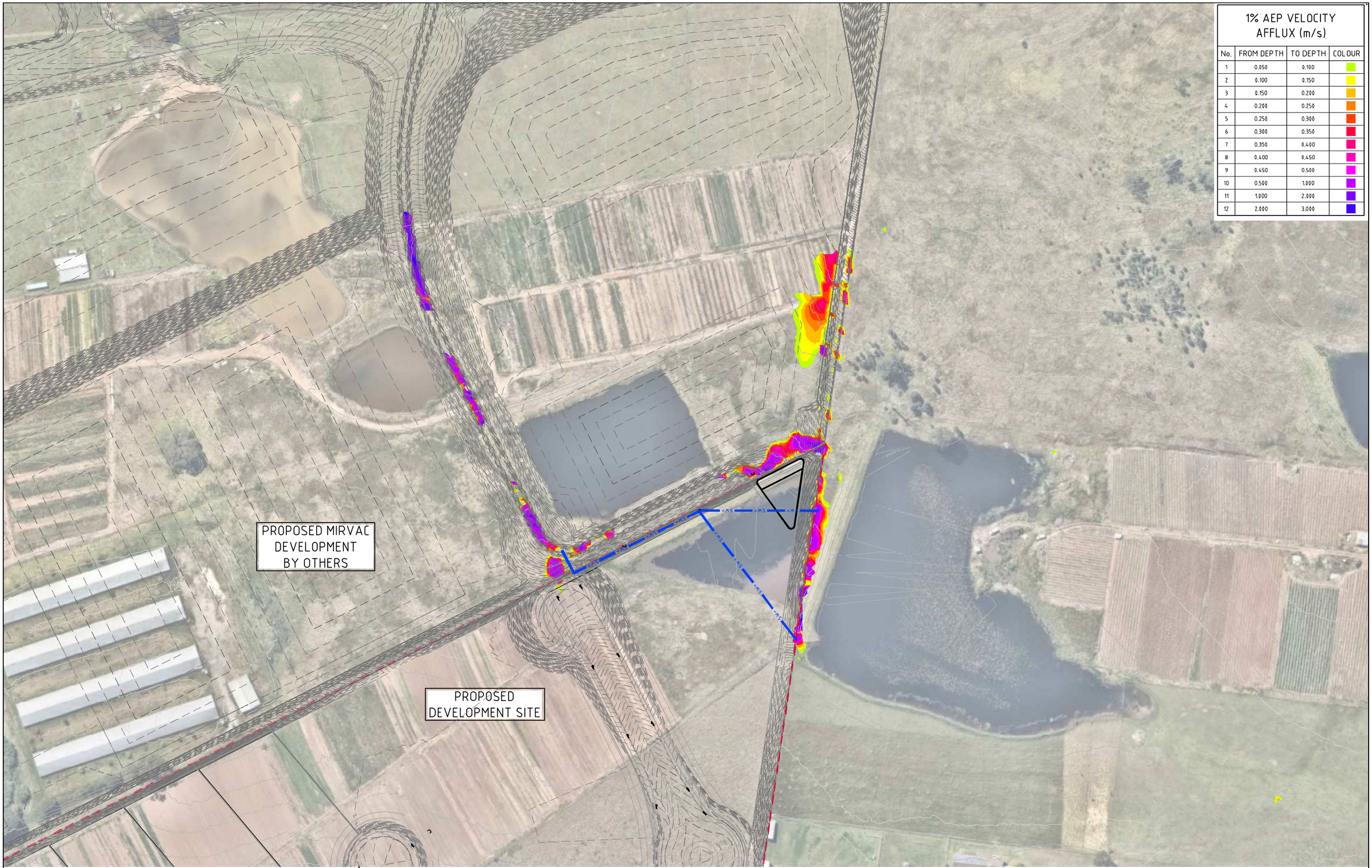
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POST DEVELOPMENT

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1% AEP VELOCITY AFFLUX (m/s)			
No.	FROM DEPTH	TO DEPTH	COLOUR
1	0.050	0.100	
2	0.100	0.150	
3	0.150	0.200	
4	0.200	0.250	
5	0.250	0.300	
6	0.300	0.350	
7	0.350	0.400	
8	0.400	0.450	
9	0.450	0.500	
10	0.500	1.000	
11	1.000	2.000	
12	2.000	3.000	

1% AEP VELOCITY AFFLUX
1:1000 SCALE

10m 0 10 20 30 40 50 60 70 80 90 100m
1:1000 SCALE AT A1 SHEET SIZE

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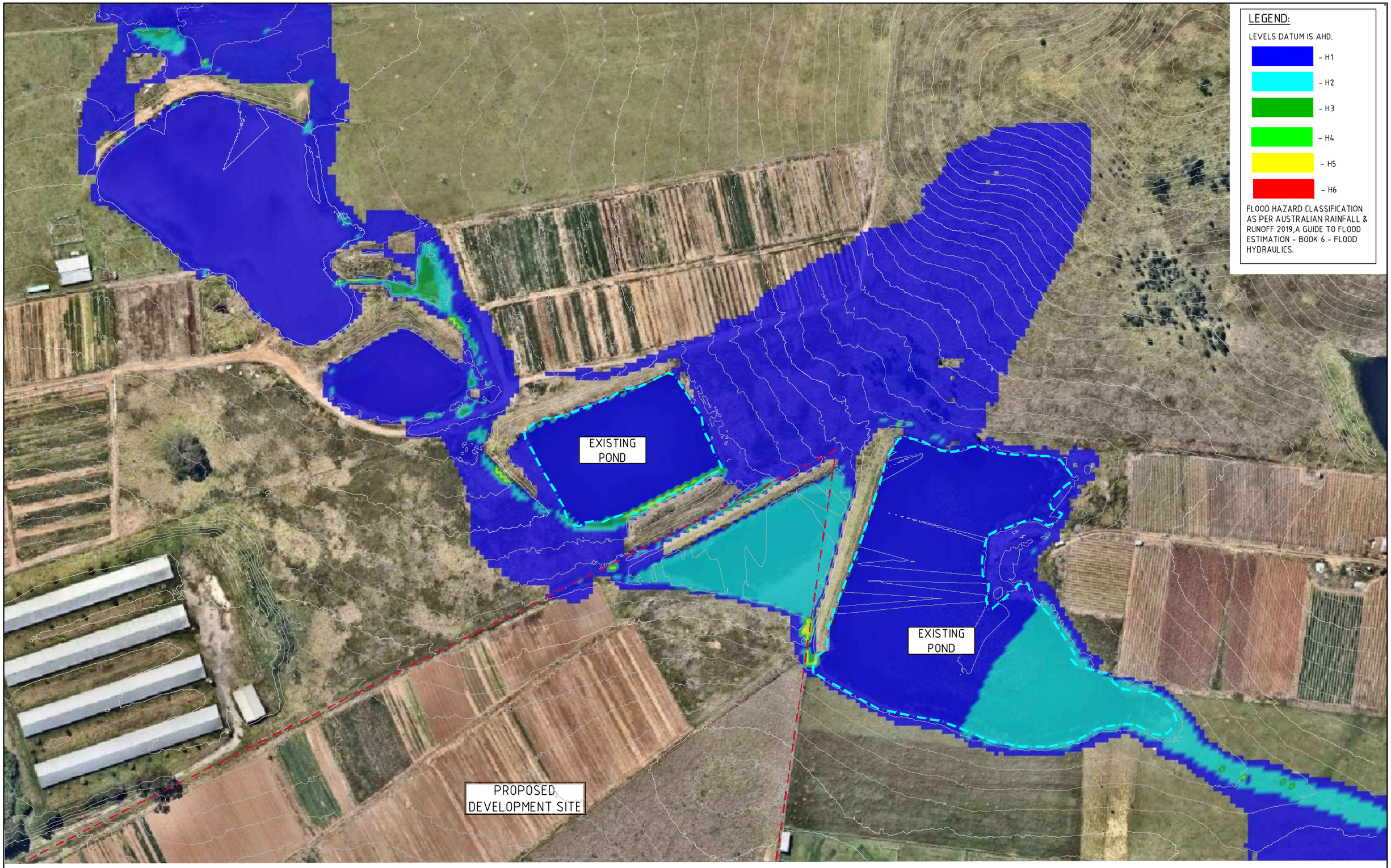
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1% AEP FLOOD HAZARD PLAN-PRE DEVELOPMENT

1:1000 SCALE

10m 0 10 20 30 40 50 60 70 80 90 100m

1:1000 SCALE AT A1 SHEET SIZE

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884-928 MAMRE ROAD, KEMPS CREEK, NSW

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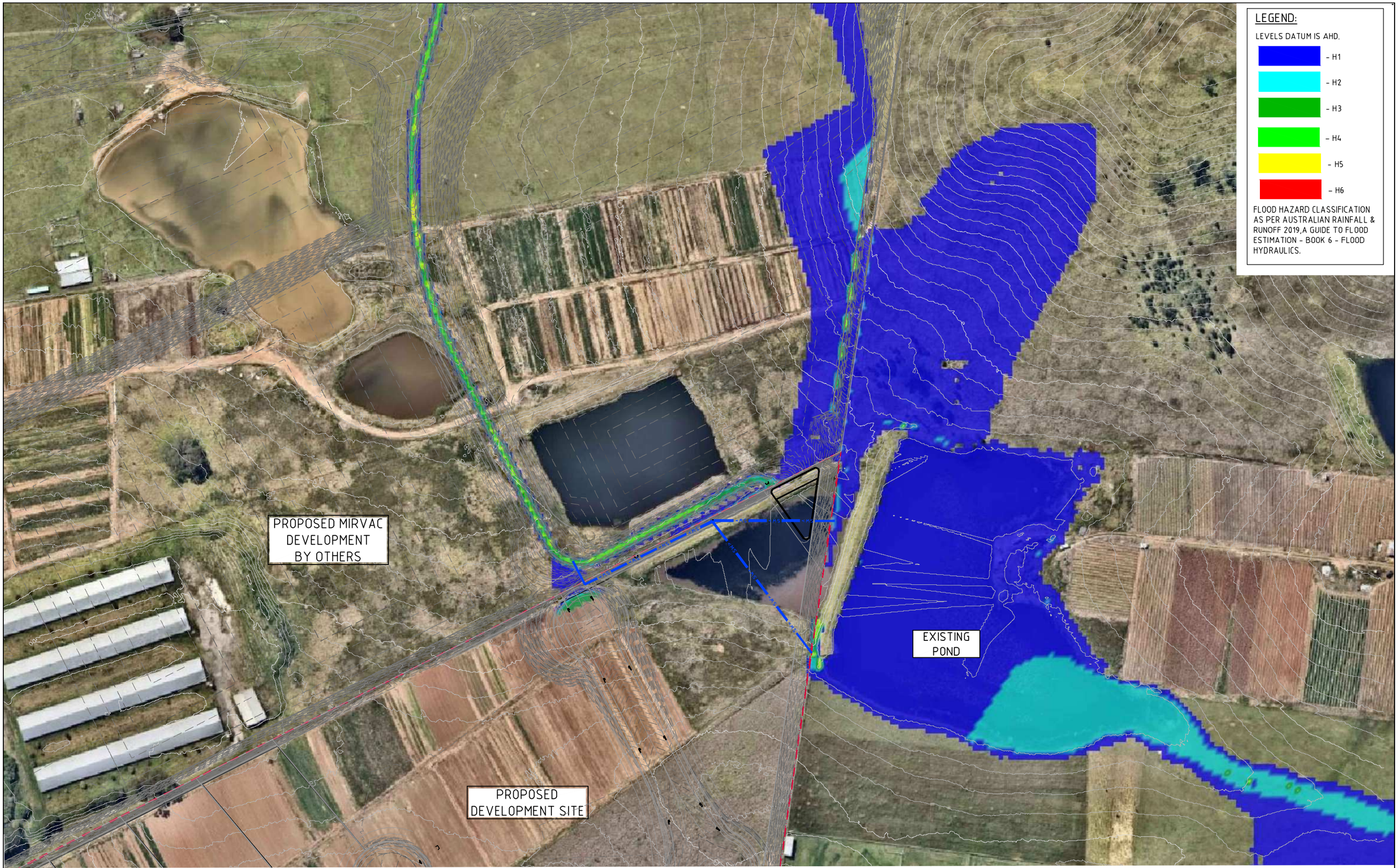
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DRAWING TITLE

1% AEP FLOOD HAZARD PRE DEVELOPMENT

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1% AEP FLOOD HAZARD PLAN-POST DEVELOPMENT
1:1000 SCALE

10m 0 10 20 30 40 50 60 70 80 90 100m
1:1000 SCALE AT A1 SHEET SIZE

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ALTIS PROPERTY PARTNERS

PROJECT
INFRASTRUCTURE DEVELOPMENT APPLICATION
884-928 MAMRE ROAD, KEMPS CREEK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
MC	ME	OCT '20	MW	A0	AS SHOWN	C014021.00-F108

Costin Roe Consulting Pty Ltd.
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Costin Roe Consulting
PRECISION | COMMUNICATION | ACCOUNTABILITY

DRAWING TITLE
1% AEP FLOOD HAZARD POST DEVELOPMENT

DRAWING No C014021.00-F108
ISSUE A

5% AEP FLOOD DEPTHS (m)			
No.	FROM DEPTH	TO DEPTH	COLOUR
1	0.000	0.250	
2	0.250	0.500	
3	0.500	0.750	
4	0.750	1.000	
5	1.000	1.250	
6	1.250	1.500	

LEGEND:

LEVELS DATUM IS AHD.

30.00 - FLOOD LEVEL CONTOUR (MAJOR) 1m INTERVALS

30.20 - FLOOD LEVEL CONTOUR (MINOR) 0.2m INTERVALS

+30.00 - FLOOD LEVEL SPOT HEIGHT

DAMS MODELED AT 100% CAPACITY AT START OF FLOOD EVENT

DAMS MODELED AT 100% CAPACITY AT START OF FLOOD EVENT

DAMS MODELED AT 100% CAPACITY AT START OF FLOOD EVENT

DAMS MODELED AT 100% CAPACITY AT START OF FLOOD EVENT

EXISTING POND

EXISTING POND

PROPOSED DEVELOPMENT SITE

59.04
59.04
59.05
50.90
51.64
51.64
55.51
55.50
53.28
57.94
57.94
57.94
56.20
61.22
61.22
61.22
61.23
61.22

5% AEP FLOOD AND DEPTHS PLAN-PRE DEVELOPMENT
1:1000 SCALE

FOR INFORMATION ONLY

10m 0 10 20 30 40 50 60 70 80 90 100m
1:1000 SCALE AT A1 SHEET SIZE

ISSUED FOR INFORMATION	02.07.21	A
AMENDMENTS	DATE	ISSUE

AMENDMENTS	DATE	ISSUE

CLIENT
ALTIS PROPERTY PARTNERS

PROJECT
INFRASTRUCTURE DEVELOPMENT APPLICATION
884-928 MAMRE ROAD, KEMPS CREEK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
MC	MC	OCT '20	MW	A0	AS SHOWN	C014021.00-F109

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PRECISION | COMMUNICATION | ACCOUNTABILITY

DRAWING TITLE
5% AEP FLOOD LEVELS & DEPTHS PRE DEVELOPMENT

DRAWING No C014021.00-F109 ISSUE A

5% AEP FLOOD DEPTHS (m)			
No.	FROM DEPTH	TO DEPTH	COLOUR
1	0.000	0.250	
2	0.250	0.500	
3	0.500	0.750	
4	0.750	1.000	
5	1.000	1.250	
6	1.250	1.500	

LEGEND:

LEVELS DATUM IS AHD.

30.00 - FLOOD LEVEL CONTOUR (MAJOR) 1m INTERVALS

30.20 - FLOOD LEVEL CONTOUR (MINOR) 0.2m INTERVALS

+30.00 - FLOOD LEVEL SPOT HEIGHT

PEAK BASIN OVERFLOW 0.74m³/s

PROPOSED BOX CULVERT 750x600

PROPOSED BOX CULVERT 1200x600

DAMS MODELED AT 100% CAPACITY AT START OF FLOOD EVENT

PROPOSED MIRVAC DEVELOPMENT BY OTHERS

EXISTING POND

PROPOSED DEVELOPMENT SITE

54.37 54.92 55.42 55.13 61.22 61.22 61.22 61.22 61.23 61.12

5% AEP FLOOD AND DEPTHS PLAN-POST DEVELOPMENT

1:1000 SCALE

10m 0 10 20 30 40 50 60 70 80 90 100m

1:1000 SCALE AT A1 SHEET SIZE

FOR INFORMATION ONLY

ISSUED FOR INFORMATION	02.07.21	A
AMENDMENTS	DATE	ISSUE

AMENDMENTS	DATE	ISSUE

CLIENT: ALTIS PROPERTY PARTNERS

PROJECT: INFRASTRUCTURE DEVELOPMENT APPLICATION
884-928 MAMRE ROAD, KEMPS CREEK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
MC	ME	OCT '20	MW	A0	AS SHOWN	C014021.00-F110

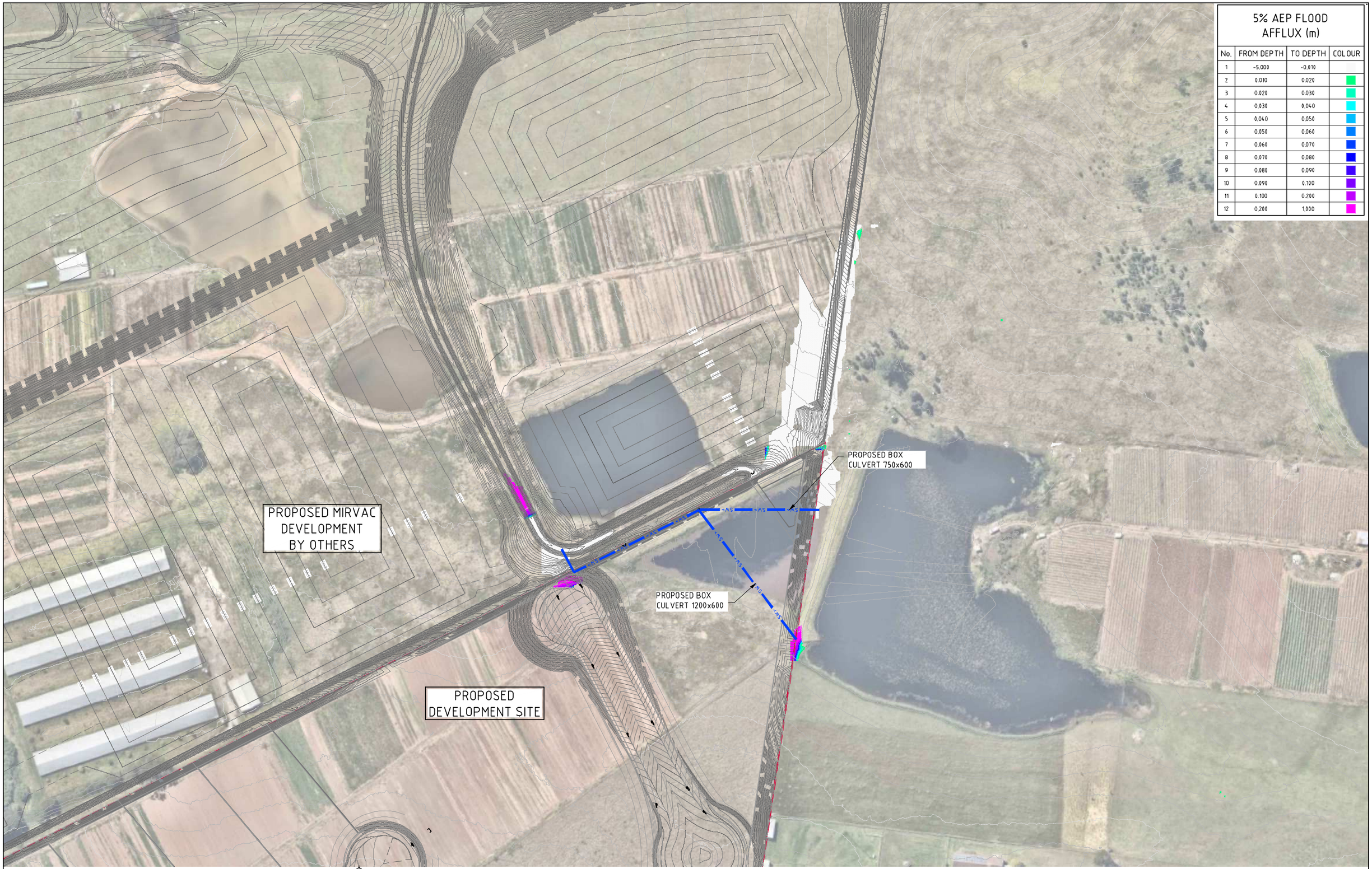
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DRAWING TITLE: 5% AEP FLOOD LEVELS & DEPTHS POST DEVELOPMENT

DRAWING No: C014021.00-F110 ISSUE: A



5% AEP FLOOD AFFLUX PLAN-POST DEVELOPMENT
SCALE 1:1000

10m 0 10 20 30 40 50 60 70 80 90 100m
1:1000 SCALE AT A1 SHEET SIZE

FOR INFORMATION ONLY

AMENDMENTS	DATE	ISSUE
ISSUED FOR INFORMATION	02.07.21	A

CLIENT: ALTIS PROPERTY PARTNERS

PROJECT: INFRASTRUCTURE DEVELOPMENT APPLICATION
884-928 MAMRE ROAD, KEMPS CREEK, NSW

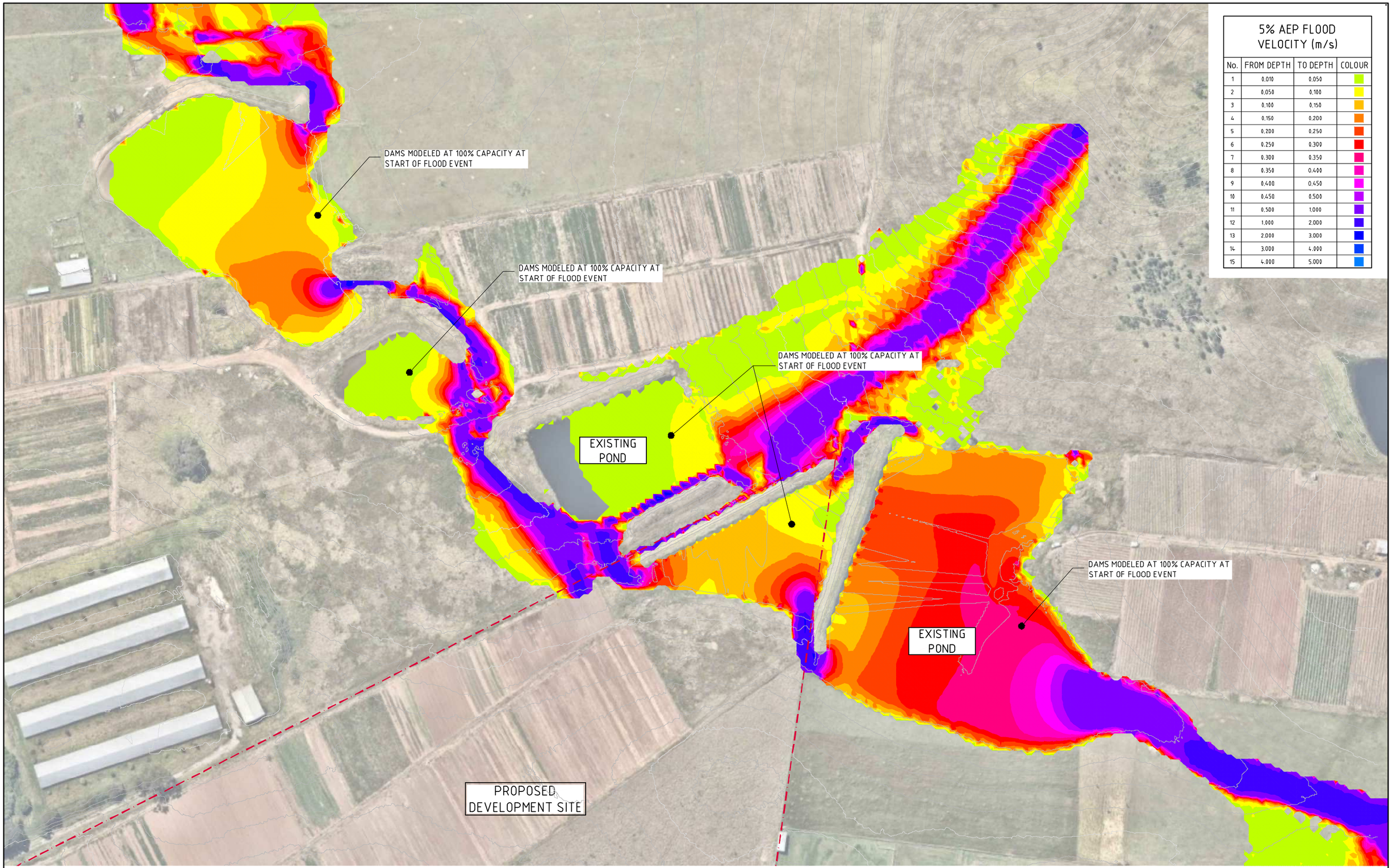
DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
MC	ME	OCT '20	MW	A0	AS SHOWN	C014021.00-F111

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DRAWING TITLE: 5% AEP FLOOD AFFLUX POST DEVELOPMENT

DRAWING No: C014021.00-F111 ISSUE: A



5% AEP FLOOD VELOCITY (m/s)

No.	FROM DEPTH	TO DEPTH	COLOUR
1	0.010	0.050	
2	0.050	0.100	
3	0.100	0.150	
4	0.150	0.200	
5	0.200	0.250	
6	0.250	0.300	
7	0.300	0.350	
8	0.350	0.400	
9	0.400	0.450	
10	0.450	0.500	
11	0.500	1.000	
12	1.000	2.000	
13	2.000	3.000	
14	3.000	4.000	
15	4.000	5.000	

5% AEP FLOOD VELOCITY PLAN-PRE DEVELOPMENT
1:1000 SCALE

10m 0 10 20 30 40 50 60 70 80 90 100m
1:1000 SCALE AT A1 SHEET SIZE

FOR INFORMATION ONLY

ISSUED FOR INFORMATION	02.07.21	A
AMENDMENTS	DATE	ISSUE

AMENDMENTS	DATE	ISSUE

CLIENT
ALTIS PROPERTY PARTNERS

PROJECT
INFRASTRUCTURE DEVELOPMENT APPLICATION
884-928 MAMRE ROAD, KEMPS CREEK, NSW

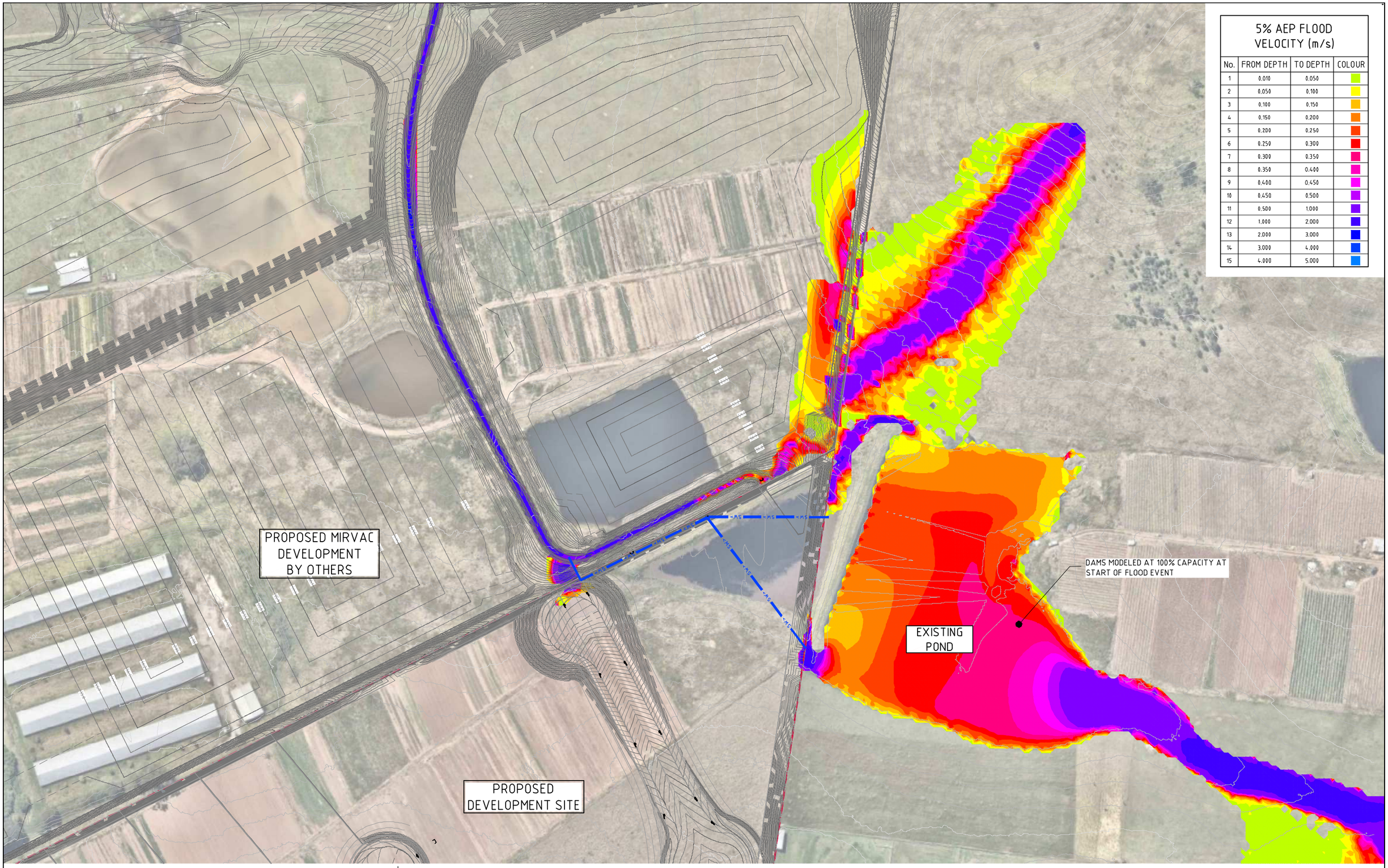
DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
MC	MC	OCT '20	MW	A0	AS SHOWN	C014021.00-F112

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DRAWING TITLE
5% AEP FLOOD VELOCITY
PRE DEVELOPMENT

DRAWING No C014021.00-F112 ISSUE A



5% AEP FLOOD VELOCITY PLAN-POST DEVELOPMENT

1:1000 SCALE

10m 0 10 20 30 40 50 60 70 80 90 100m

1:1000 SCALE AT A1 SHEET SIZE

FOR INFORMATION ONLY

AMENDMENTS	DATE	ISSUE
ISSUED FOR INFORMATION	02.07.21	A

AMENDMENTS	DATE	ISSUE

CLIENT: ALTIS PROPERTY PARTNERS

PROJECT: INFRASTRUCTURE DEVELOPMENT APPLICATION
884-928 MAMRE ROAD, KEMPS CREEK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
MC	MC	OCT '20	MW	A0	AS SHOWN	C014021.00-F113

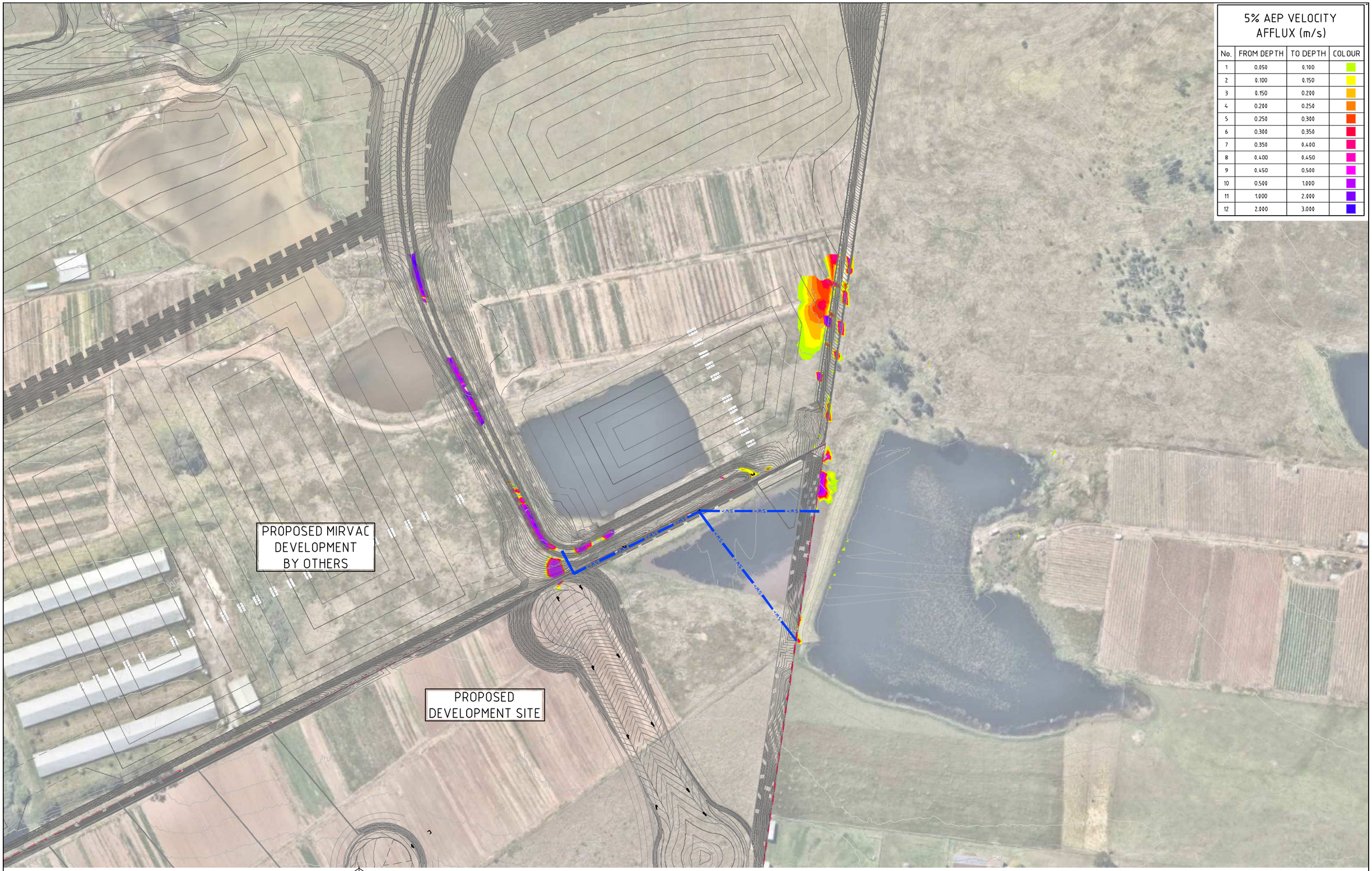
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DRAWING TITLE: 5% AEP FLOOD VELOCITY POST DEVELOPMENT

DRAWING No: C014021.00-F113 ISSUE: A



5% AEP VELOCITY AFFLUX (m/s)			
No.	FROM DEPTH	TO DEPTH	COLOUR
1	0.050	0.100	
2	0.100	0.150	
3	0.150	0.200	
4	0.200	0.250	
5	0.250	0.300	
6	0.300	0.350	
7	0.350	0.400	
8	0.400	0.450	
9	0.450	0.500	
10	0.500	1.000	
11	1.000	2.000	
12	2.000	3.000	

5% AEP VELOCITY AFFLUX
1:1000 SCALE

10m 0 10 20 30 40 50 60 70 80 90 100m
1:1000 SCALE AT A1 SHEET SIZE

FOR INFORMATION ONLY

ISSUED FOR INFORMATION	02.07.21	A
AMENDMENTS	DATE	ISSUE

AMENDMENTS	DATE	ISSUE

CLIENT
ALTIS PROPERTY PARTNERS

PROJECT
INFRASTRUCTURE DEVELOPMENT APPLICATION
884-928 MAMRE ROAD, KEMPS CREEK, NSW

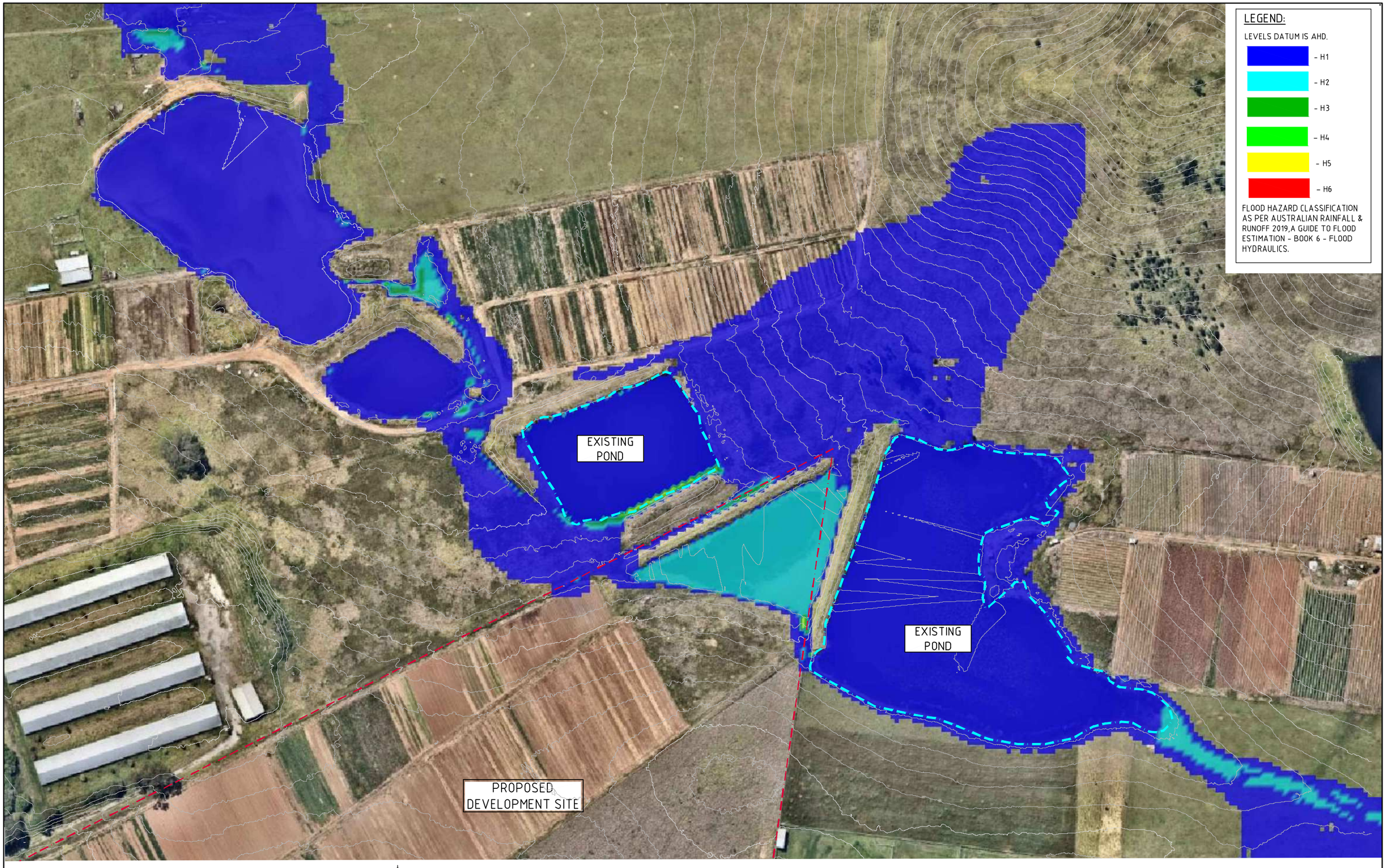
DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
MC	MC	OCT '20	MW	A0	AS SHOWN	C014021.00-F114

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DRAWING TITLE
5% AEP VELOCITY AFFLUX

DRAWING No C014021.00-F114
ISSUE A



5% AEP FLOOD HAZARD PLAN-PRE DEVELOPMENT
1:1000 SCALE

10m 0 10 20 30 40 50 60 70 80 90 100m
1:1000 SCALE AT A1 SHEET SIZE

FOR INFORMATION ONLY

ISSUED FOR INFORMATION	02.07.21	A
AMENDMENTS	DATE	ISSUE

AMENDMENTS	DATE	ISSUE

CLIENT
ALTIS PROPERTY PARTNERS

PROJECT
INFRASTRUCTURE DEVELOPMENT APPLICATION
884-928 MAMRE ROAD, KEMPS CREEK, NSW

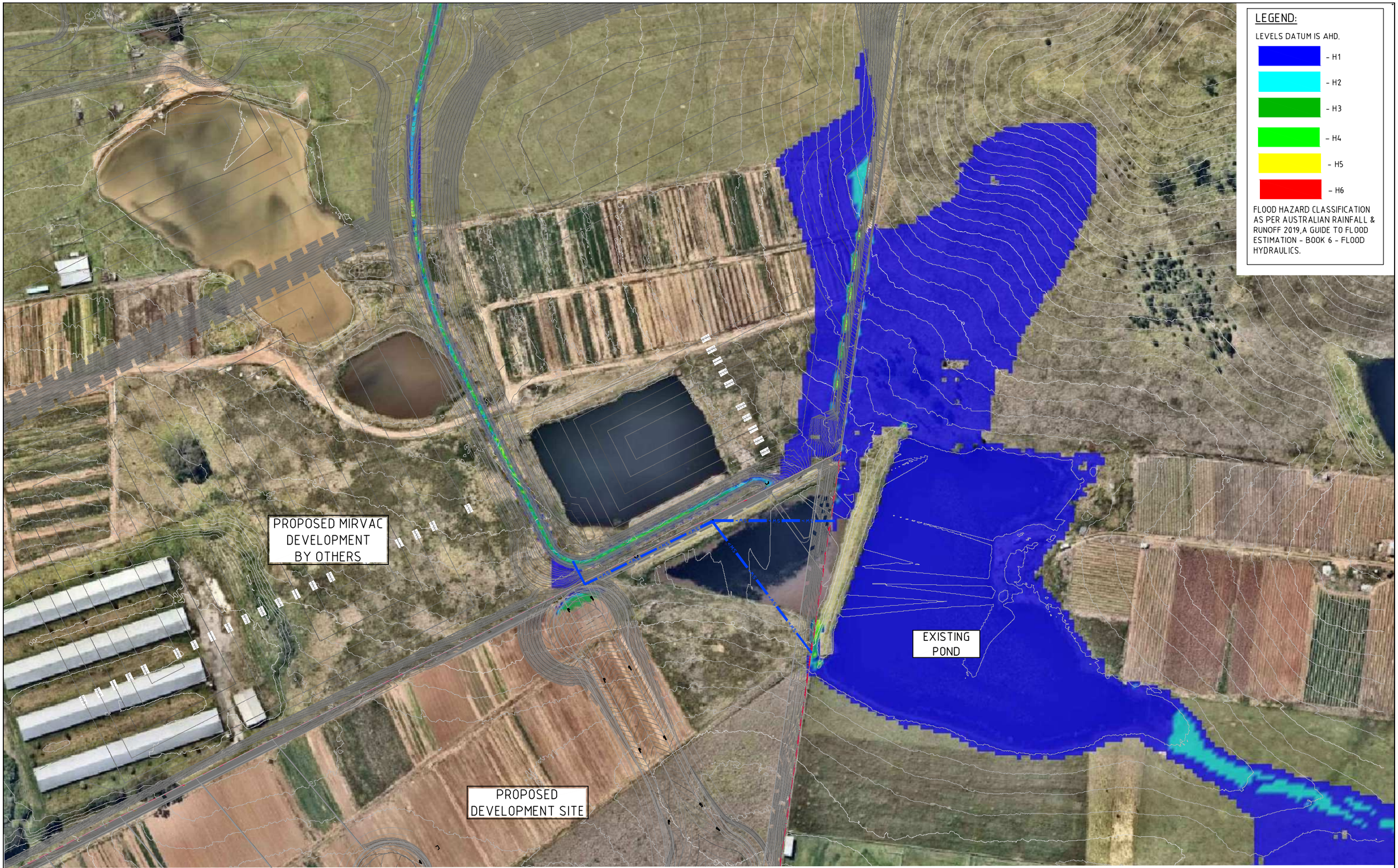
DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
MC	MC	OCT '20	MW	A0	AS SHOWN	C014021.00-F115

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DRAWING TITLE
5% AEP FLOOD HAZARD PRE DEVELOPMENT

DRAWING No C014021.00-F115 ISSUE A



5% AEP FLOOD HAZARD PLAN-POST DEVELOPMENT
1:1000 SCALE

10m 0 10 20 30 40 50 60 70 80 90 100m
1:1000 SCALE AT A1 SHEET SIZE

FOR INFORMATION ONLY

AMENDMENTS	DATE	ISSUE
ISSUED FOR INFORMATION	02.07.21	A

AMENDMENTS	DATE	ISSUE

CLIENT
ALTIS PROPERTY PARTNERS

PROJECT
INFRASTRUCTURE DEVELOPMENT APPLICATION
884-928 MAMRE ROAD, KEMPS CREEK, NSW

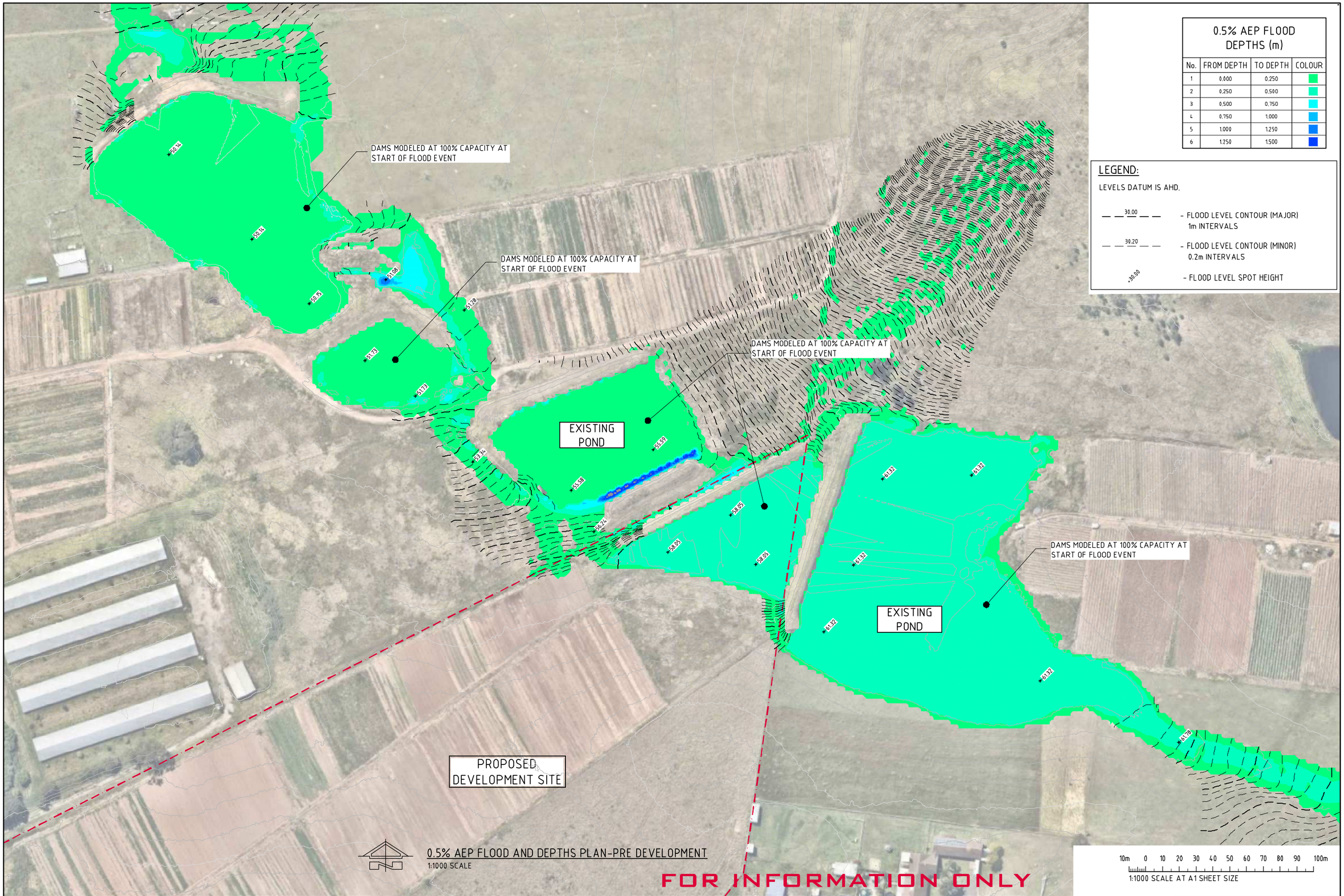
DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
MC	ME	OCT '20	MW	A0	AS SHOWN	C014021.00-F116

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PRECISION | COMMUNICATION | ACCOUNTABILITY

DRAWING TITLE
5% AEP FLOOD HAZARD POST DEVELOPMENT

DRAWING No C014021.00-F116
ISSUE A



0.5% AEP FLOOD DEPTHS (m)			
No.	FROM DEPTH	TO DEPTH	COLOUR
1	0.000	0.250	
2	0.250	0.500	
3	0.500	0.750	
4	0.750	1.000	
5	1.000	1.250	
6	1.250	1.500	

LEGEND:

LEVELS DATUM IS AHD.

30.00 - FLOOD LEVEL CONTOUR (MAJOR) 1m INTERVALS

30.20 - FLOOD LEVEL CONTOUR (MINOR) 0.2m INTERVALS

+30.00 - FLOOD LEVEL SPOT HEIGHT

0.5% AEP FLOOD AND DEPTHS PLAN-PRE DEVELOPMENT

1:1000 SCALE

10m 0 10 20 30 40 50 60 70 80 90 100m

1:1000 SCALE AT A1 SHEET SIZE

FOR INFORMATION ONLY

AMENDMENTS	DATE	ISSUE
ISSUED FOR INFORMATION	02.07.21	A

CLIENT: ALTIS PROPERTY PARTNERS

PROJECT: INFRASTRUCTURE DEVELOPMENT APPLICATION
884-928 MAMRE ROAD, KEMPS CREEK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
MC	MC	OCT '20	MW	A0	AS SHOWN	C014021.00-F117

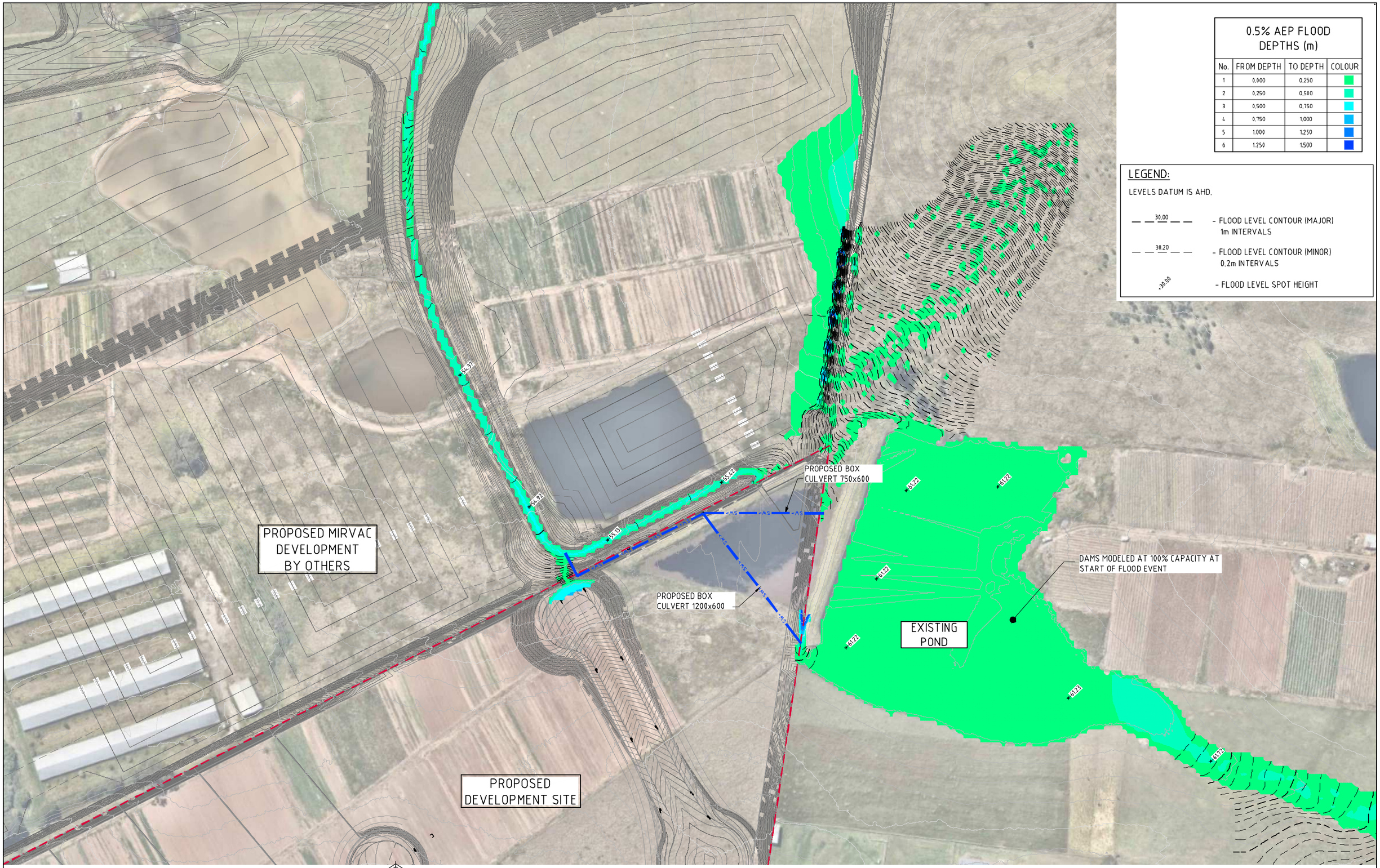
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DRAWING TITLE: 0.5% AEP FLOOD LEVELS & DEPTHS PRE DEVELOPMENT

DRAWING No: C014021.00-F117 ISSUE: A



0.5% AEP FLOOD DEPTHS (m)			
No.	FROM DEPTH	TO DEPTH	COLOUR
1	0.000	0.250	
2	0.250	0.500	
3	0.500	0.750	
4	0.750	1.000	
5	1.000	1.250	
6	1.250	1.500	

LEGEND:

LEVELS DATUM IS AHD.

30.00 - FLOOD LEVEL CONTOUR (MAJOR) 1m INTERVALS

30.20 - FLOOD LEVEL CONTOUR (MINOR) 0.2m INTERVALS

+30.00 - FLOOD LEVEL SPOT HEIGHT

0.5% AEP FLOOD AND DEPTHS PLAN-POST DEVELOPMENT

1:1000 SCALE

10m 0 10 20 30 40 50 60 70 80 90 100m

1:1000 SCALE AT A1 SHEET SIZE

FOR INFORMATION ONLY

AMENDMENTS	DATE	ISSUE
ISSUED FOR INFORMATION	02.07.21	A

AMENDMENTS	DATE	ISSUE

CLIENT: ALTIS PROPERTY PARTNERS

PROJECT: INFRASTRUCTURE DEVELOPMENT APPLICATION
884-928 MAMRE ROAD, KEMPS CREEK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
MC	ME	OCT '20	MW	A0	AS SHOWN	C014021.00-F118

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PRECISION | COMMUNICATION | ACCOUNTABILITY

DRAWING TITLE: 0.5% AEP FLOOD LEVELS & DEPTHS POST DEVELOPMENT

DRAWING No: C014021.00-F118

ISSUE: A

0.5% AEP FLOOD AFFLUX (m)			
No.	FROM DEPTH	TO DEPTH	COLOUR
1	-5.000	-0.010	
2	0.010	0.020	
3	0.020	0.030	
4	0.030	0.040	
5	0.040	0.050	
6	0.050	0.060	
7	0.060	0.070	
8	0.070	0.080	
9	0.080	0.090	
10	0.090	0.100	
11	0.100	0.200	
12	0.200	1.000	

PROPOSED BOX CULVERT 750x600

PROPOSED BOX CULVERT 1200x600

PROPOSED MIRVAC DEVELOPMENT BY OTHERS

PROPOSED DEVELOPMENT SITE

0.5% AEP FLOOD AFFLUX PLAN-POST DEVELOPMENT
SCALE 1:1000

10m 0 10 20 30 40 50 60 70 80 90 100m
1:1000 SCALE AT A1 SHEET SIZE

FOR INFORMATION ONLY

AMENDMENTS	DATE	ISSUE
ISSUED FOR INFORMATION	02.07.21	A

AMENDMENTS	DATE	ISSUE

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ALTIS PROPERTY PARTNERS

PROJECT
INFRASTRUCTURE DEVELOPMENT APPLICATION
884-928 MAMRE ROAD, KEMPS CREEK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
MC	ME	OCT '20	MW	A0	AS SHOWN	C014021.00-F119

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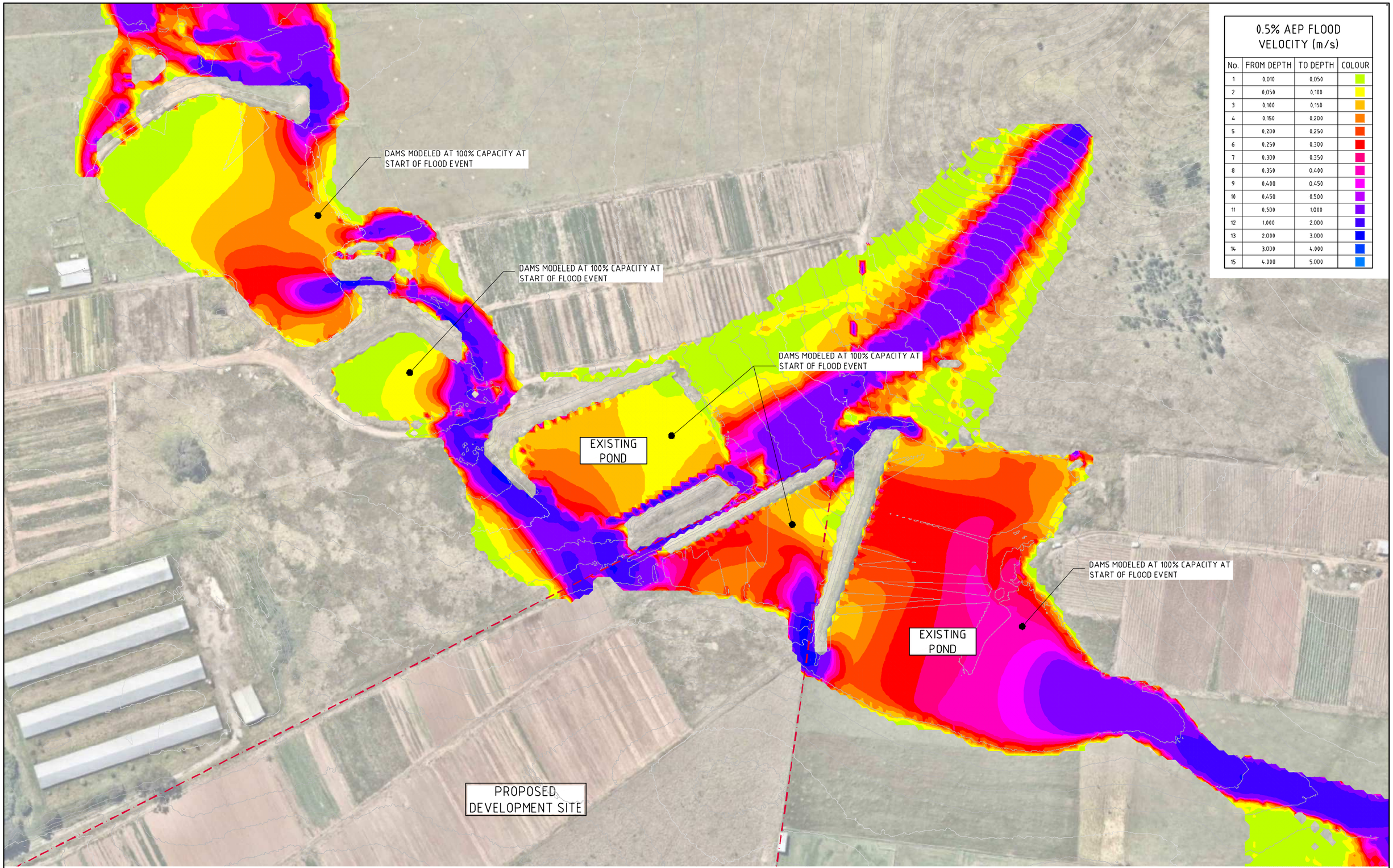
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DRAWING TITLE
0.5% AEP FLOOD AFFLUX POST DEVELOPMENT

DRAWING No C014021.00-F119

ISSUE A



0.5% AEP FLOOD VELOCITY (m/s)

No.	FROM DEPTH	TO DEPTH	COLOUR
1	0.010	0.050	
2	0.050	0.100	
3	0.100	0.150	
4	0.150	0.200	
5	0.200	0.250	
6	0.250	0.300	
7	0.300	0.350	
8	0.350	0.400	
9	0.400	0.450	
10	0.450	0.500	
11	0.500	1.000	
12	1.000	2.000	
13	2.000	3.000	
14	3.000	4.000	
15	4.000	5.000	

0.5% AEP FLOOD VELOCITY PLAN-PRE DEVELOPMENT
1:1000 SCALE

10m 0 10 20 30 40 50 60 70 80 90 100m
1:1000 SCALE AT A1 SHEET SIZE

FOR INFORMATION ONLY

ISSUED FOR INFORMATION	02.07.21	A
AMENDMENTS	DATE	ISSUE

AMENDMENTS	DATE	ISSUE

CLIENT
ALTIS PROPERTY PARTNERS

PROJECT
INFRASTRUCTURE DEVELOPMENT APPLICATION
884-928 MAMRE ROAD, KEMPS CREEK, NSW

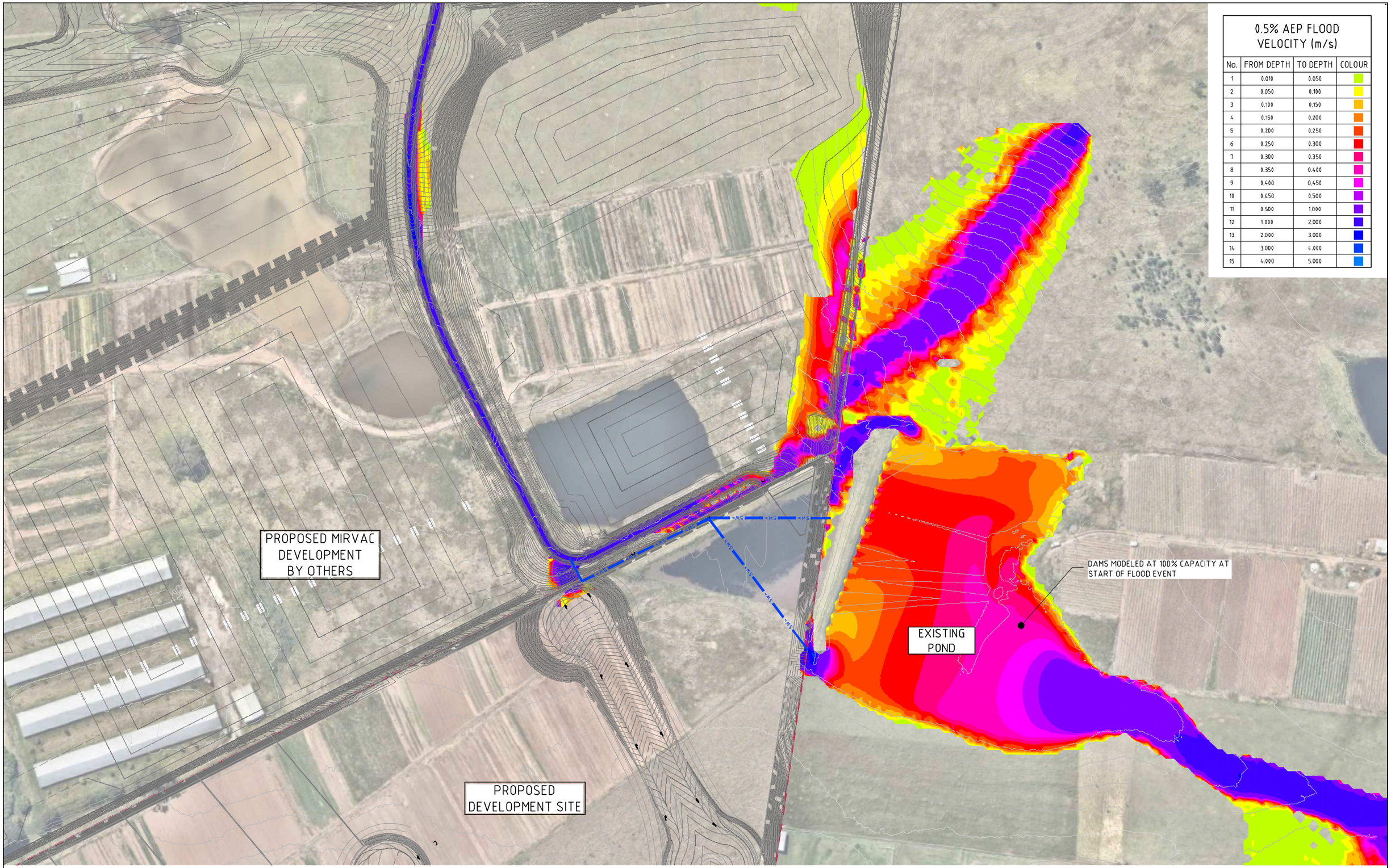
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MC	MC	OCT '20	MW	A0	AS SHOWN	C014021.00-F120

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PRECISION | COMMUNICATION | ACCOUNTABILITY

DRAWING TITLE
0.5% AEP FLOOD VELOCITY
PRE DEVELOPMENT

DRAWING No C014021.00-F120 ISSUE A



0.5% AEP FLOOD VELOCITY (m/s)			
No.	FROM DEPTH	TO DEPTH	COLOUR
1	0.010	0.050	
2	0.050	0.100	
3	0.100	0.150	
4	0.150	0.200	
5	0.200	0.250	
6	0.250	0.300	
7	0.300	0.350	
8	0.350	0.400	
9	0.400	0.450	
10	0.450	0.500	
11	0.500	1.000	
12	1.000	2.000	
13	2.000	3.000	
14	3.000	4.000	
15	4.000	5.000	

0.5% AEP FLOOD VELOCITY PLAN-POST DEVELOPMENT

1:1000 SCALE

10m 0 10 20 30 40 50 60 70 80 90 100m

1:1000 SCALE AT A1 SHEET SIZE

FOR INFORMATION ONLY

AMENDMENTS	DATE	ISSUE
ISSUED FOR INFORMATION	02.07.21	A

AMENDMENTS	DATE	ISSUE

CLIENT: ALTIS PROPERTY PARTNERS

PROJECT: INFRASTRUCTURE DEVELOPMENT APPLICATION
884-928 MAMRE ROAD, KEMPS CREEK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
MC	ME	OCT '20	MW	A0	AS SHOWN	C014021.00-F121

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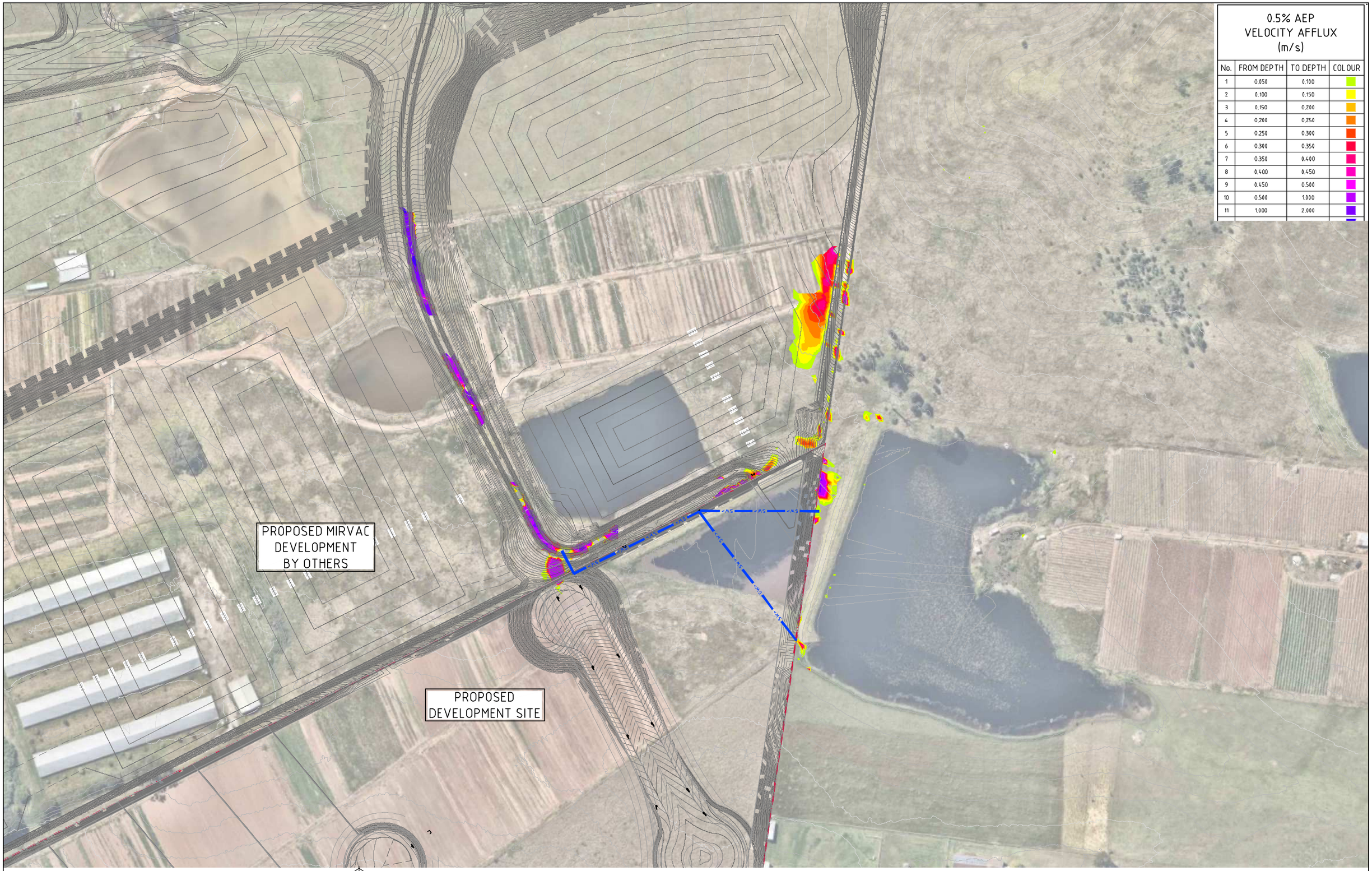
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PRECISION | COMMUNICATION | ACCOUNTABILITY

DRAWING TITLE: 0.5% AEP FLOOD VELOCITY POST DEVELOPMENT

DRAWING No: C014021.00-F121

ISSUE: A



0.5% AEP VELOCITY AFFLUX (m/s)			
No.	FROM DEPTH	TO DEPTH	COLOUR
1	0.050	0.100	
2	0.100	0.150	
3	0.150	0.200	
4	0.200	0.250	
5	0.250	0.300	
6	0.300	0.350	
7	0.350	0.400	
8	0.400	0.450	
9	0.450	0.500	
10	0.500	1.000	
11	1.000	2.000	

0.5% AEP VELOCITY AFFLUX
1:1000 SCALE

10m 0 10 20 30 40 50 60 70 80 90 100m
1:1000 SCALE AT A1 SHEET SIZE

FOR INFORMATION ONLY

AMENDMENTS	DATE	ISSUE
ISSUED FOR INFORMATION	02.07.21	A

AMENDMENTS	DATE	ISSUE

CLIENT
ALTIS PROPERTY PARTNERS

PROJECT
INFRASTRUCTURE DEVELOPMENT APPLICATION
884-928 MAMRE ROAD, KEMPS CREEK, NSW

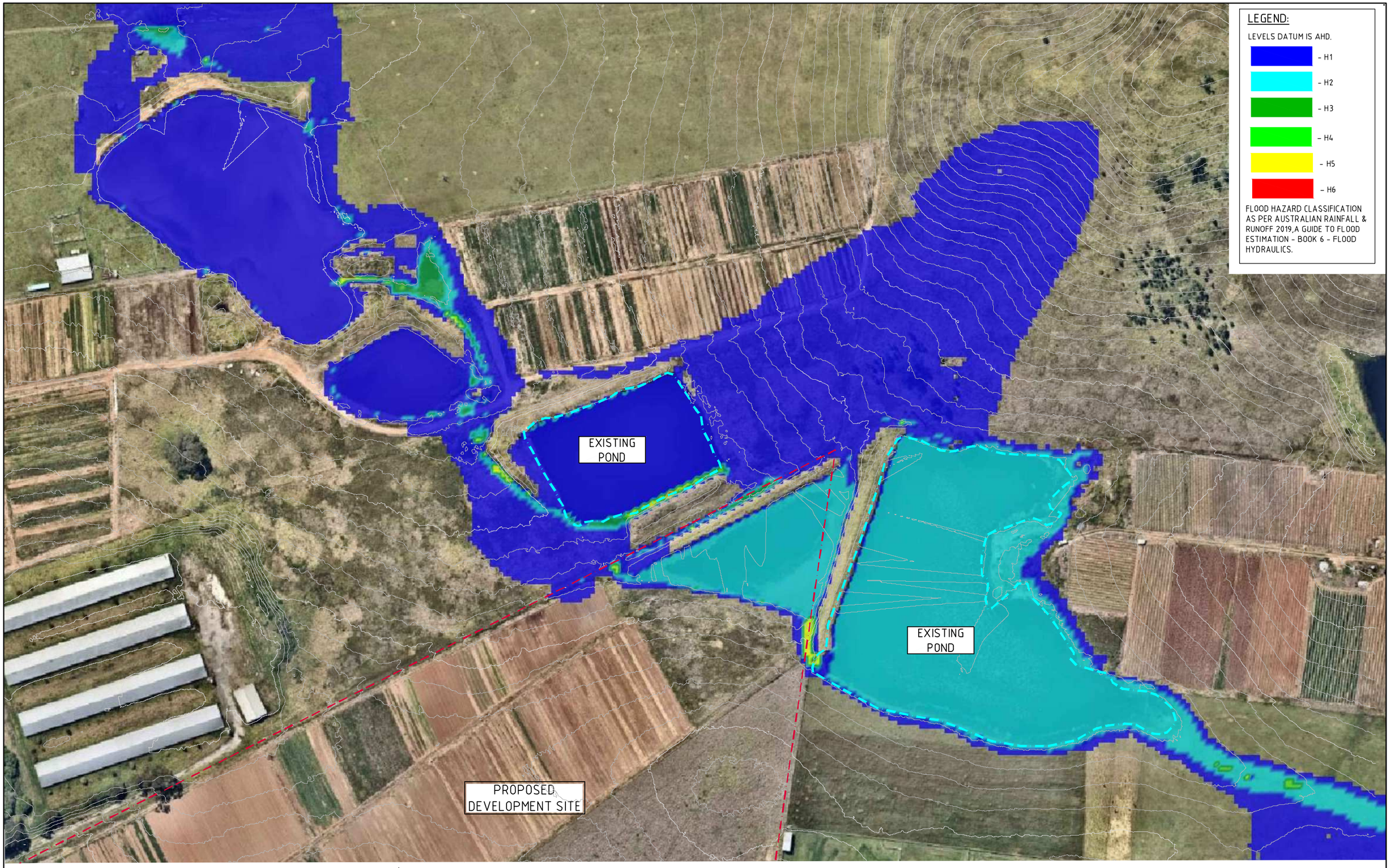
DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
MC	MC	OCT '20	MW	A0	AS SHOWN	C014021.00-F122

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PRECISION | COMMUNICATION | ACCOUNTABILITY

DRAWING TITLE
0.5% AEP VELOCITY AFFLUX

DRAWING No. C014021.00-F122
ISSUE A



0.5% AEP FLOOD HAZARD PLAN-PRE DEVELOPMENT

1:1000 SCALE

10m 0 10 20 30 40 50 60 70 80 90 100m

1:1000 SCALE AT A1 SHEET SIZE

FOR INFORMATION ONLY

ISSUED FOR INFORMATION	02.07.21	A
AMENDMENTS	DATE	ISSUE

AMENDMENTS	DATE	ISSUE

CLIENT
ALTIS PROPERTY PARTNERS

PROJECT
INFRASTRUCTURE DEVELOPMENT APPLICATION
884-928 MAMRE ROAD, KEMPS CREEK, NSW

CONSULT AUSTRALIA

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
MC	ME	OCT '20	MW	A0	AS SHOWN	C014021.00-F123

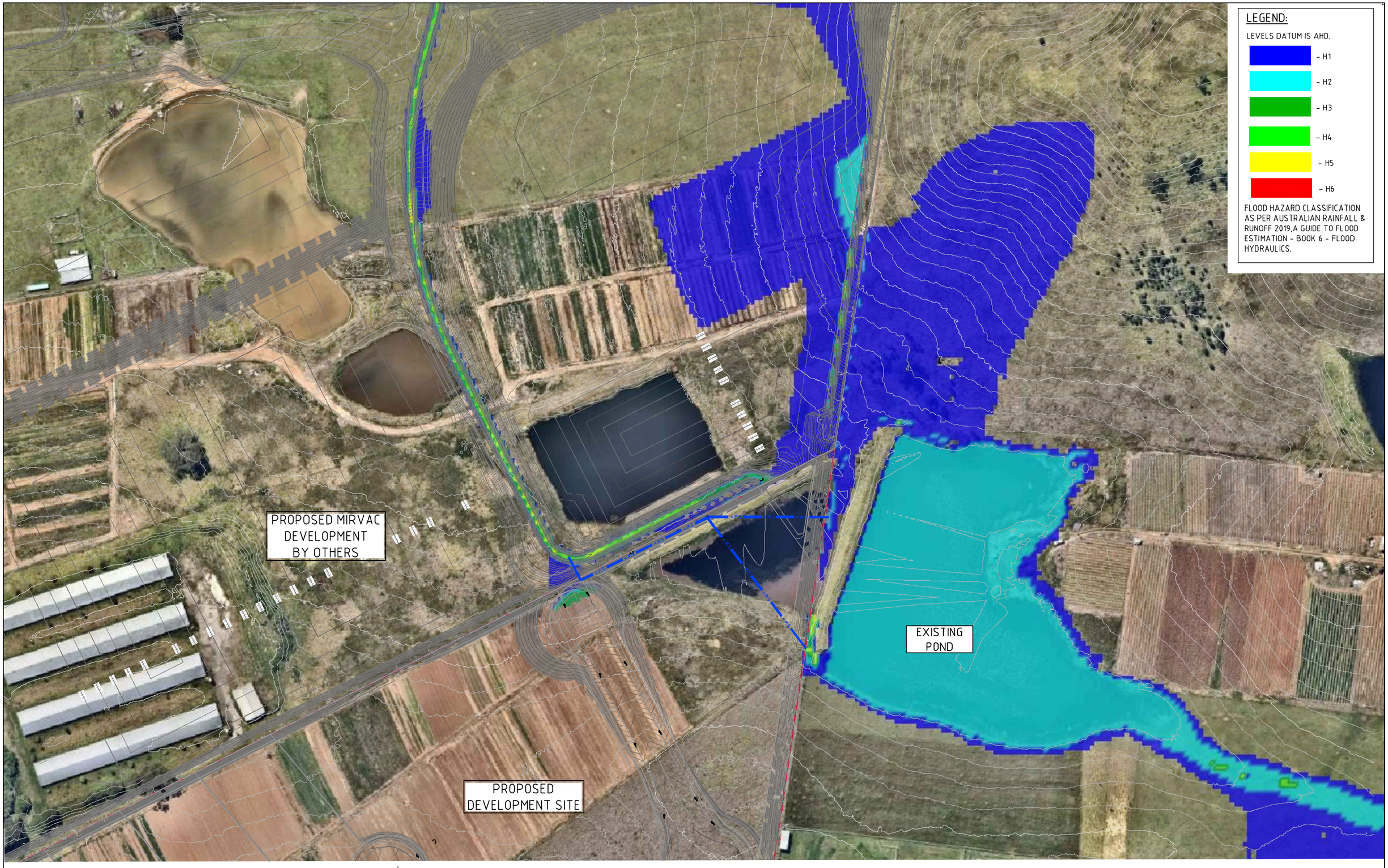
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DRAWING TITLE
0.5% AEP FLOOD HAZARD PRE DEVELOPMENT

DRAWING No. C014021.00-F123 ISSUE A



0.5% AEP FLOOD HAZARD PLAN-POST DEVELOPMENT
1:1000 SCALE

10m 0 10 20 30 40 50 60 70 80 90 100m
1:1000 SCALE AT A1 SHEET SIZE

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ISSUED FOR INFORMATION	02.07.21	A
AMENDMENTS	DATE	ISSUE

AMENDMENTS	DATE	ISSUE

CLIENT
ALTIS PROPERTY PARTNERS

PROJECT
INFRASTRUCTURE DEVELOPMENT APPLICATION
884-928 MAMRE ROAD, KEMPS CREEK, NSW

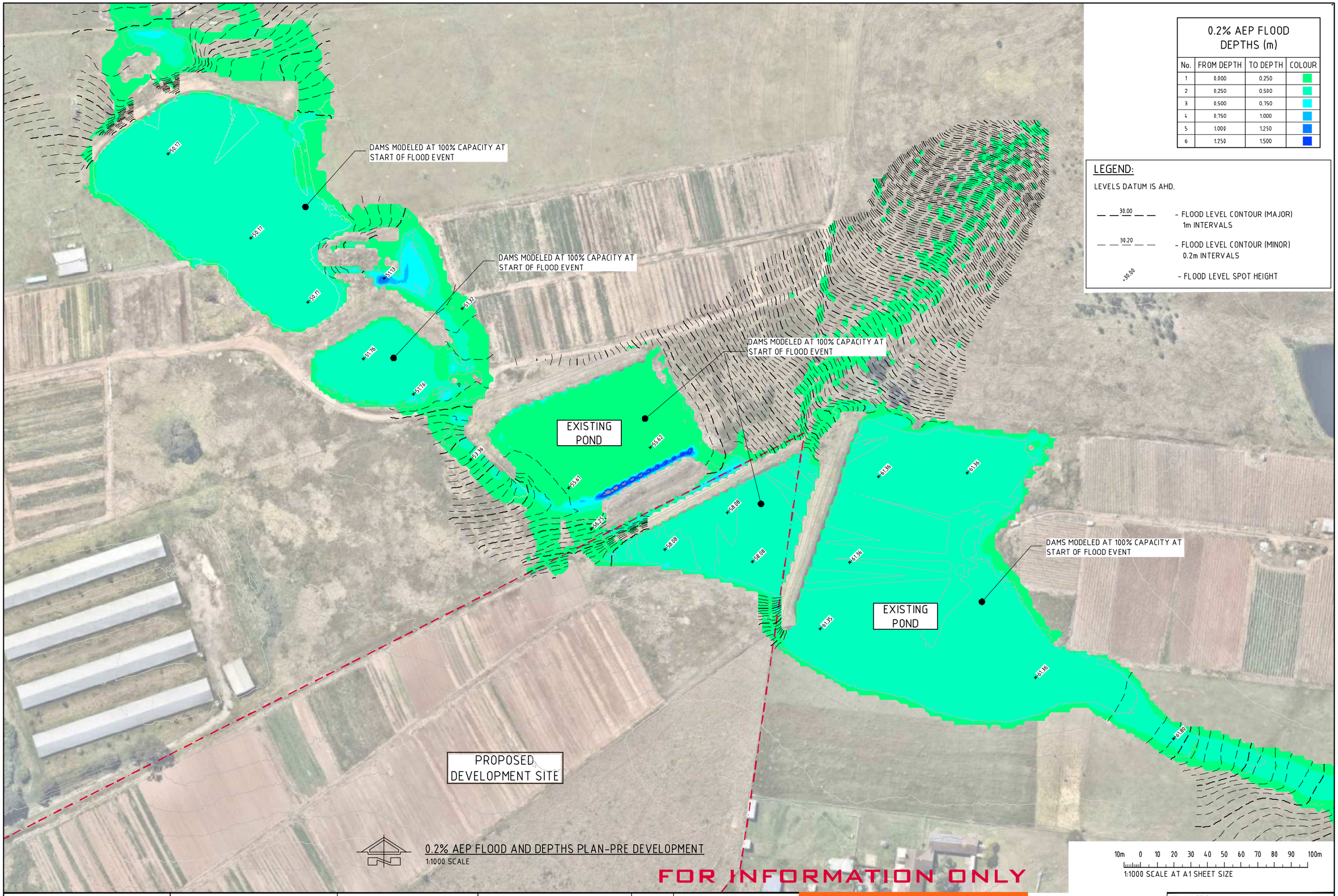
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MC	ME	OCT '20	MW	A0	AS SHOWN	C014021.00-F124

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DRAWING TITLE
0.5% AEP FLOOD HAZARD POST DEVELOPMENT

DRAWING No C014021.00-F124 ISSUE A



0.2% AEP FLOOD DEPTHS (m)			
No.	FROM DEPTH	TO DEPTH	COLOUR
1	0.000	0.250	
2	0.250	0.500	
3	0.500	0.750	
4	0.750	1.000	
5	1.000	1.250	
6	1.250	1.500	

LEGEND:

LEVELS DATUM IS AHD.

30.00 - FLOOD LEVEL CONTOUR (MAJOR) 1m INTERVALS

30.20 - FLOOD LEVEL CONTOUR (MINOR) 0.2m INTERVALS

+30.00 - FLOOD LEVEL SPOT HEIGHT

0.2% AEP FLOOD AND DEPTHS PLAN-PRE DEVELOPMENT

1:1000 SCALE

10m 0 10 20 30 40 50 60 70 80 90 100m

1:1000 SCALE AT A1 SHEET SIZE

FOR INFORMATION ONLY

AMENDMENTS	DATE	ISSUE
ISSUED FOR INFORMATION	02.07.21	A

AMENDMENTS	DATE	ISSUE

CLIENT: ALTIS PROPERTY PARTNERS

PROJECT: INFRASTRUCTURE DEVELOPMENT APPLICATION
884-928 MAMRE ROAD, KEMPS CREEK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
MC	MC	OCT '20	MW	A0	AS SHOWN	C014021.00-F125

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PRECISION | COMMUNICATION | ACCOUNTABILITY

DRAWING TITLE: 0.2% AEP FLOOD LEVELS & DEPTHS PRE DEVELOPMENT

DRAWING No: C014021.00-F125 ISSUE: A

0.2% AEP FLOOD DEPTHS (m)			
No.	FROM DEPTH	TO DEPTH	COLOUR
1	0.000	0.250	
2	0.250	0.500	
3	0.500	0.750	
4	0.750	1.000	
5	1.000	1.250	
6	1.250	1.500	

LEGEND:

LEVELS DATUM IS AHD.

30.00 - FLOOD LEVEL CONTOUR (MAJOR) 1m INTERVALS

30.20 - FLOOD LEVEL CONTOUR (MINOR) 0.2m INTERVALS

+30.00 - FLOOD LEVEL SPOT HEIGHT

+54.70
+55.78
+55.19
+55.63
+61.36
+61.36
+61.34
+61.35
+61.36
+61.60
PROPOSED BOX CULVERT 750x600
PROPOSED BOX CULVERT 1200x600
DAMS MODELED AT 100% CAPACITY AT START OF FLOOD EVENT
PROPOSED MIRVAC DEVELOPMENT BY OTHERS
EXISTING POND
PROPOSED DEVELOPMENT SITE

0.2% AEP FLOOD AND DEPTHS PLAN-POST DEVELOPMENT

1:1000 SCALE

10m 0 10 20 30 40 50 60 70 80 90 100m

1:1000 SCALE AT A1 SHEET SIZE

FOR INFORMATION ONLY

ISSUED FOR INFORMATION	02.07.21	A
AMENDMENTS	DATE	ISSUE

AMENDMENTS	DATE	ISSUE

CLIENT: ALTIS PROPERTY PARTNERS

PROJECT: INFRASTRUCTURE DEVELOPMENT APPLICATION
884-928 MAMRE ROAD, KEMPS CREEK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
MC	ME	OCT '20	MW	A0	AS SHOWN	C014021.00-F126

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DRAWING TITLE: 0.2% AEP FLOOD LEVELS & DEPTHS POST DEVELOPMENT

DRAWING No: C014021.00-F126

ISSUE: A



0.2% AEP FLOOD AFFLUX (m)			
No.	FROM DEPTH	TO DEPTH	COLOUR
1	-5.000	-0.010	
2	0.010	0.020	
3	0.020	0.030	
4	0.030	0.040	
5	0.040	0.050	
6	0.050	0.060	
7	0.060	0.070	
8	0.070	0.080	
9	0.080	0.090	
10	0.090	0.100	
11	0.100	0.200	
12	0.200	1.000	

0.2% AEP FLOOD AFFLUX PLAN-POST DEVELOPMENT
SCALE 1:1000

10m 0 10 20 30 40 50 60 70 80 90 100m
1:1000 SCALE AT A1 SHEET SIZE

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AMENDMENTS	DATE	ISSUE
ISSUED FOR INFORMATION	02.07.21	A

AMENDMENTS	DATE	ISSUE

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PROJECT
INFRASTRUCTURE
DEVELOPMENT APPLICATION
884-928 MAMRE ROAD, KEMPS CREEK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
MC	ME	OCT '20	MW	A0	AS SHOWN	C014021.00-F127

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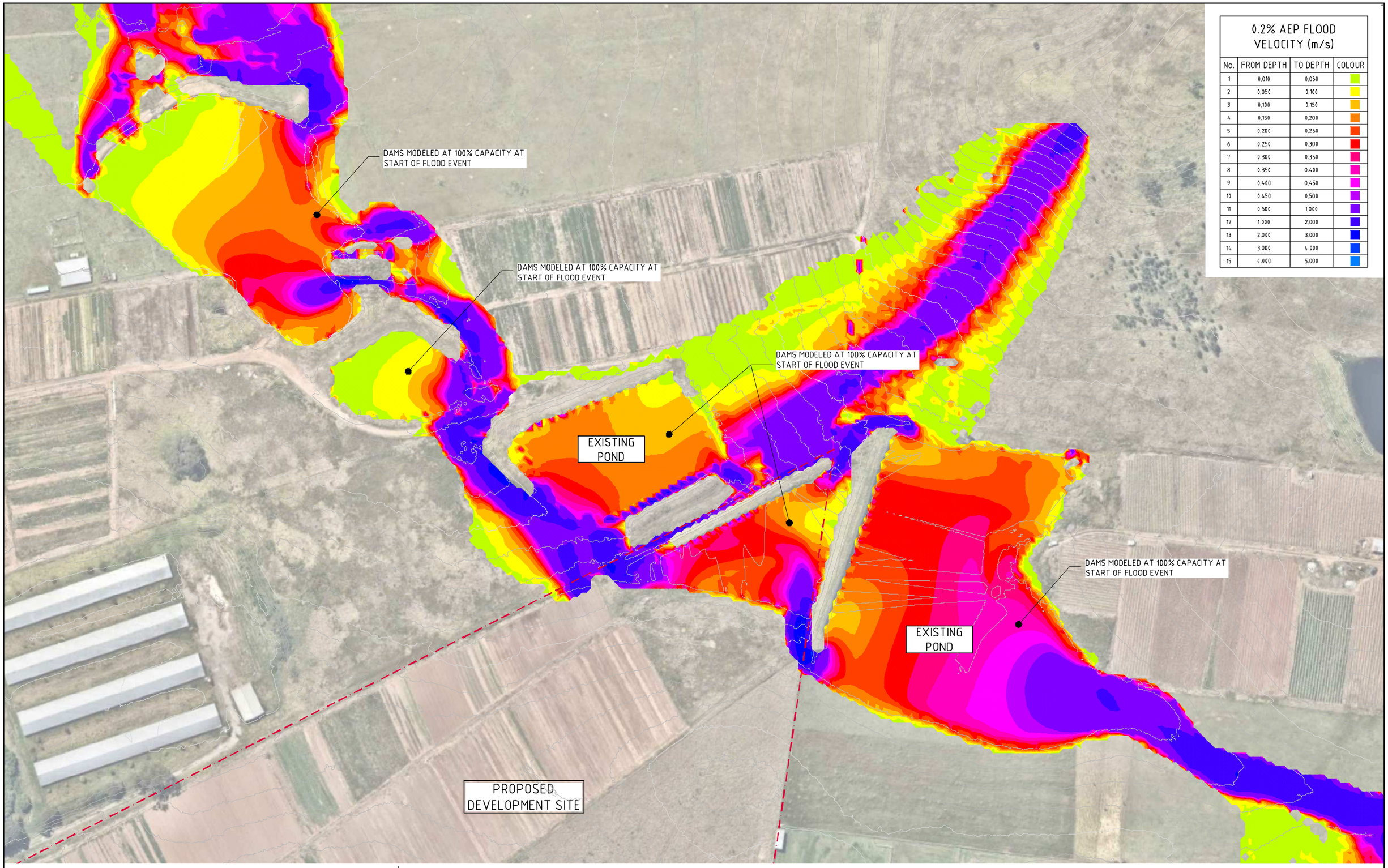
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PRECISION | COMMUNICATION | ACCOUNTABILITY

DRAWING TITLE
0.2% AEP FLOOD AFFLUX
POST DEVELOPMENT

DRAWING No C014021.00-F127

ISSUE A



0.2% AEP FLOOD VELOCITY (m/s)			
No.	FROM DEPTH	TO DEPTH	COLOUR
1	0.010	0.050	
2	0.050	0.100	
3	0.100	0.150	
4	0.150	0.200	
5	0.200	0.250	
6	0.250	0.300	
7	0.300	0.350	
8	0.350	0.400	
9	0.400	0.450	
10	0.450	0.500	
11	0.500	1.000	
12	1.000	2.000	
13	2.000	3.000	
14	3.000	4.000	
15	4.000	5.000	

0.2% AEP FLOOD VELOCITY PLAN-PRE DEVELOPMENT

1:1000 SCALE

10m 0 10 20 30 40 50 60 70 80 90 100m

1:1000 SCALE AT A1 SHEET SIZE

FOR INFORMATION ONLY

AMENDMENTS	DATE	ISSUE
ISSUED FOR INFORMATION	02.07.21	A

AMENDMENTS	DATE	ISSUE

CLIENT: ALTIS PROPERTY PARTNERS

PROJECT: INFRASTRUCTURE DEVELOPMENT APPLICATION
884-928 MAMRE ROAD, KEMPS CREEK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
MC	MC	OCT '20	MW	A0	AS SHOWN	C014021.00-F128

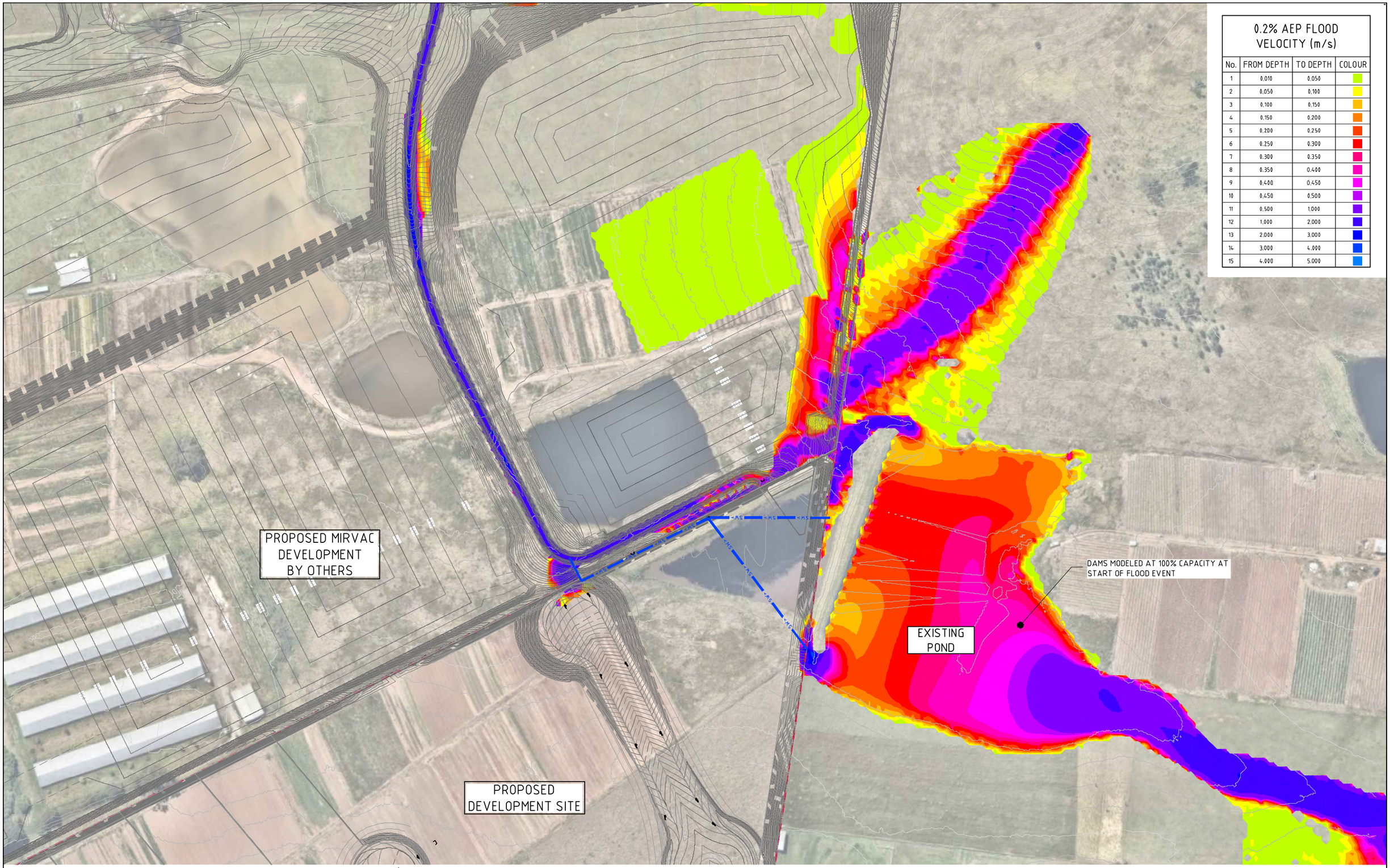
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DRAWING TITLE: 0.2% AEP FLOOD VELOCITY PRE DEVELOPMENT

DRAWING No: C014021.00-F128 ISSUE: A



0.2% AEP FLOOD VELOCITY (m/s)

No.	FROM DEPTH	TO DEPTH	COLOUR
1	0.010	0.050	
2	0.050	0.100	
3	0.100	0.150	
4	0.150	0.200	
5	0.200	0.250	
6	0.250	0.300	
7	0.300	0.350	
8	0.350	0.400	
9	0.400	0.450	
10	0.450	0.500	
11	0.500	1.000	
12	1.000	2.000	
13	2.000	3.000	
14	3.000	4.000	
15	4.000	5.000	

0.2% AEP FLOOD VELOCITY PLAN-POST DEVELOPMENT
1:1000 SCALE

10m 0 10 20 30 40 50 60 70 80 90 100m
1:1000 SCALE AT A1 SHEET SIZE

FOR INFORMATION ONLY

AMENDMENTS	DATE	ISSUE
ISSUED FOR INFORMATION	02.07.21	A

AMENDMENTS	DATE	ISSUE

CLIENT
ALTIS PROPERTY PARTNERS

PROJECT
INFRASTRUCTURE DEVELOPMENT APPLICATION
884-928 MAMRE ROAD, KEMPS CREEK, NSW

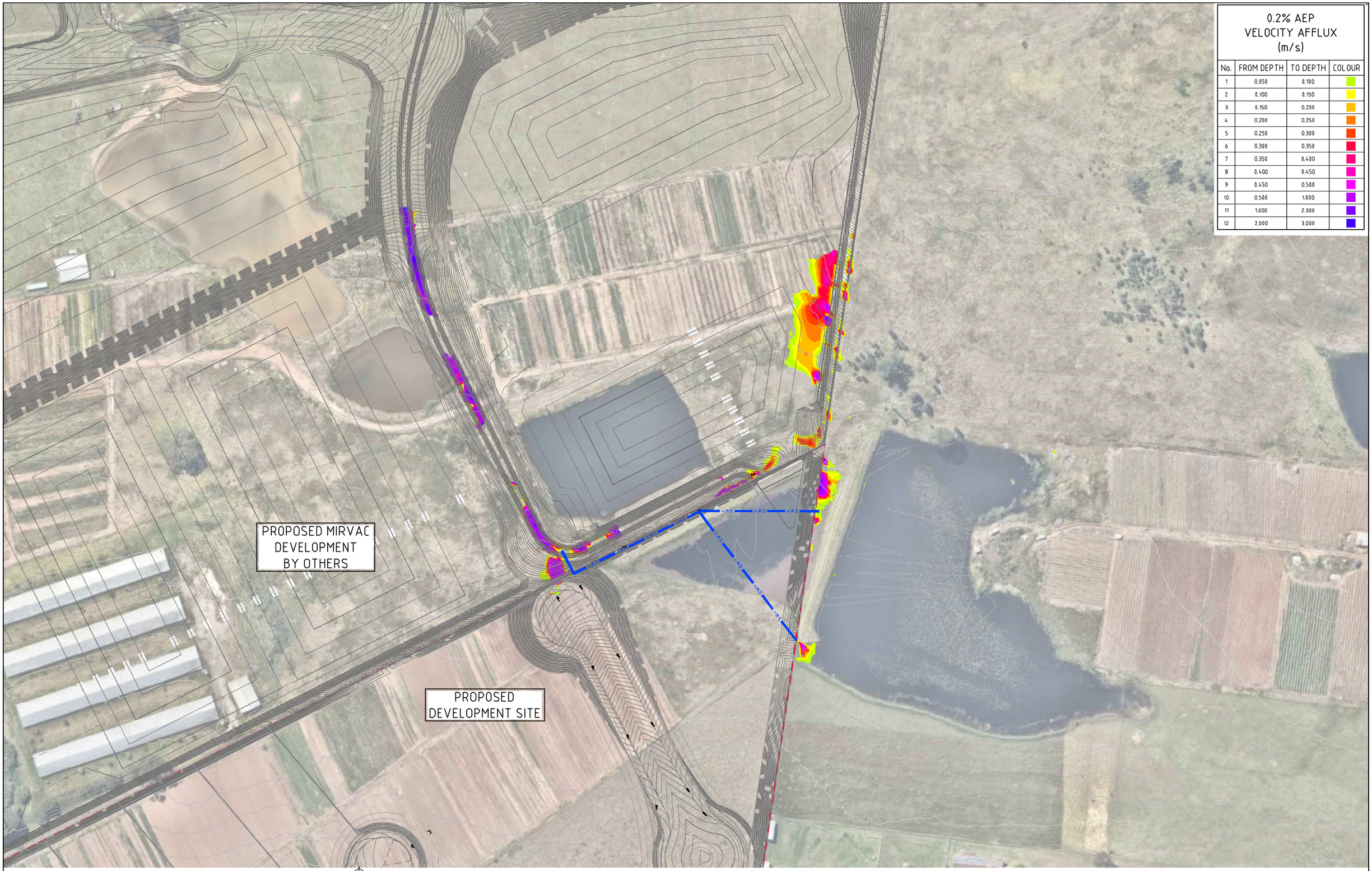
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DRAWING TITLE
0.2% AEP FLOOD VELOCITY POST DEVELOPMENT

DRAWING No C014021.00-F129
ISSUE A



0.2% AEP VELOCITY AFFLUX (m/s)			
No.	FROM DEPTH	TO DEPTH	COLOUR
1	0.050	0.100	
2	0.100	0.150	
3	0.150	0.200	
4	0.200	0.250	
5	0.250	0.300	
6	0.300	0.350	
7	0.350	0.400	
8	0.400	0.450	
9	0.450	0.500	
10	0.500	1.000	
11	1.000	2.000	
12	2.000	3.000	

0.2% AEP VELOCITY AFFLUX
1:1000 SCALE

10m 0 10 20 30 40 50 60 70 80 90 100m
1:1000 SCALE AT A1 SHEET SIZE

FOR INFORMATION ONLY

ISSUED FOR INFORMATION	02.07.21	A
AMENDMENTS	DATE	ISSUE

AMENDMENTS	DATE	ISSUE

CLIENT
ALTIS PROPERTY PARTNERS

PROJECT
INFRASTRUCTURE DEVELOPMENT APPLICATION
884-928 MAMRE ROAD, KEMPS CREEK, NSW

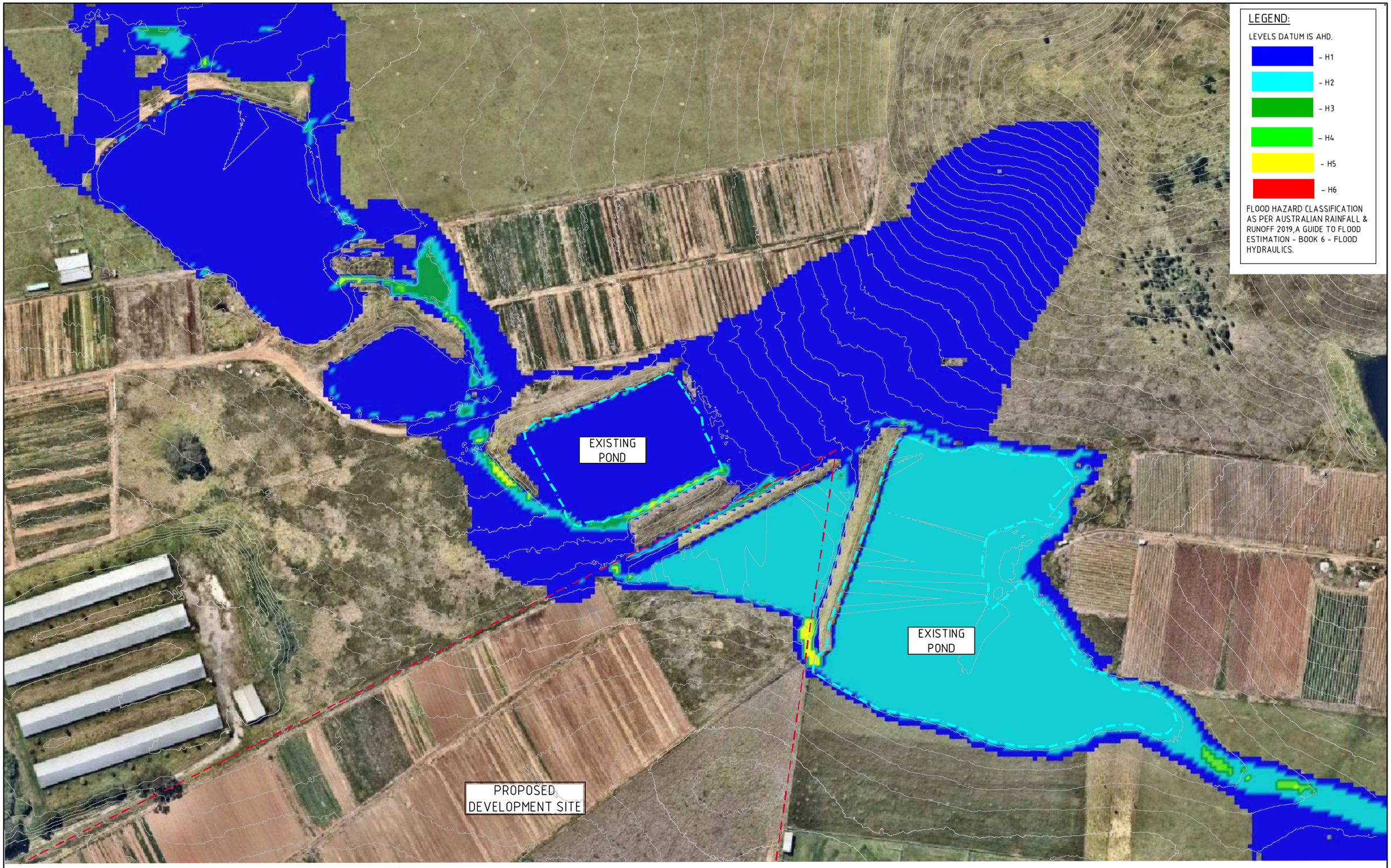
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MC	MC	OCT '20	MW	A0	AS SHOWN	C014021.00-F130

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DRAWING TITLE
0.2% AEP VELOCITY AFFLUX

DRAWING No. C014021.00-F130
ISSUE A



0.2% AEP FLOOD HAZARD PLAN-PRE DEVELOPMENT
1:1000 SCALE

10m 0 10 20 30 40 50 60 70 80 90 100m
1:1000 SCALE AT A1 SHEET SIZE

FOR INFORMATION ONLY

AMENDMENTS	DATE	ISSUE
ISSUED FOR INFORMATION	02.07.21	A

AMENDMENTS	DATE	ISSUE

CLIENT
ALTIS PROPERTY PARTNERS

PROJECT
INFRASTRUCTURE DEVELOPMENT APPLICATION
884-928 MAMRE ROAD, KEMPS CREEK, NSW

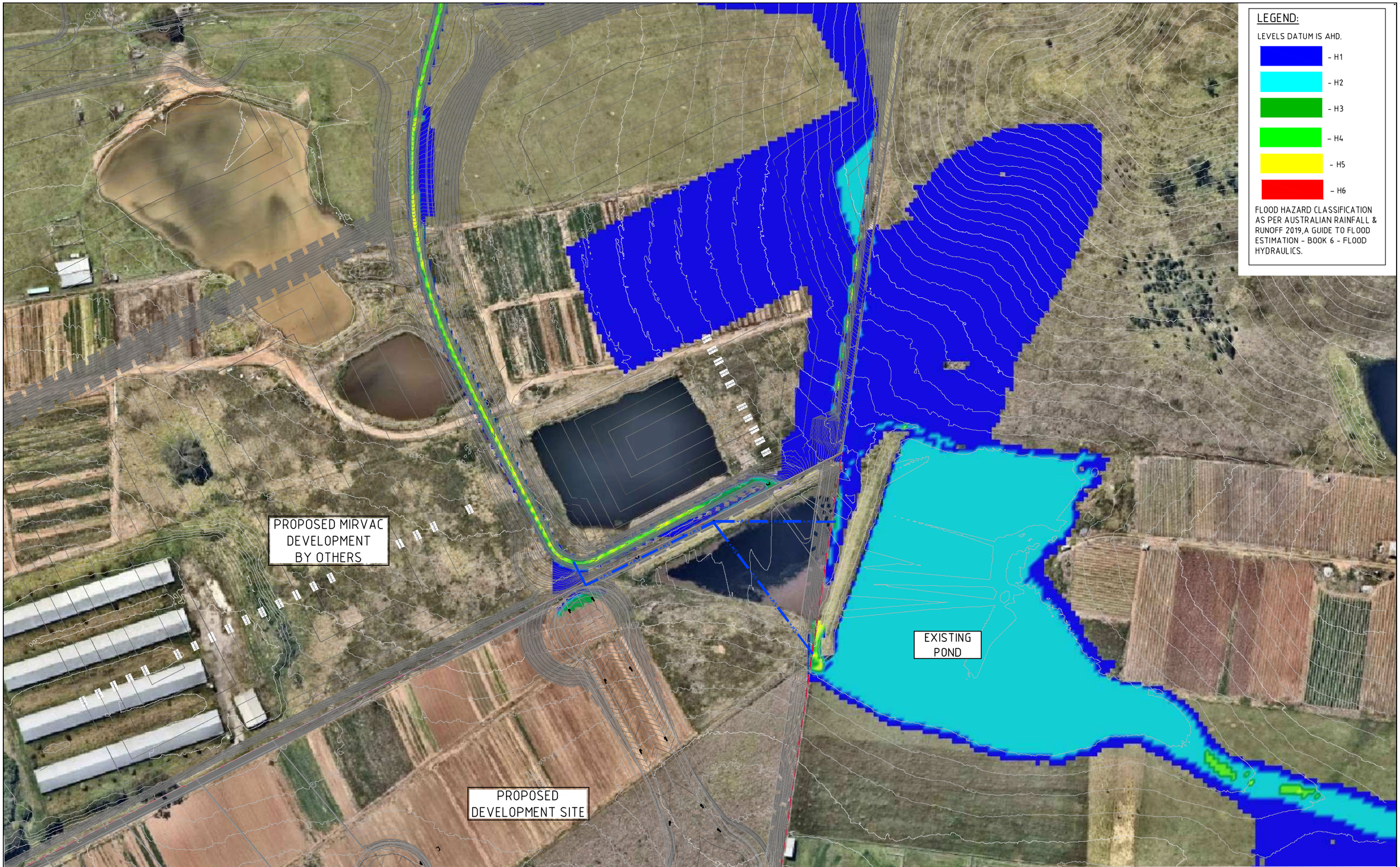
DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
MC	ME	OCT '20	MW	A0	AS SHOWN	C014021.00-F131

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DRAWING TITLE
0.2% AEP FLOOD HAZARD PRE DEVELOPMENT

DRAWING No C014021.00-F131 ISSUE A



0.2% AEP FLOOD HAZARD PLAN-POST DEVELOPMENT
1:1000 SCALE

10m 0 10 20 30 40 50 60 70 80 90 100m
1:1000 SCALE AT A1 SHEET SIZE

FOR INFORMATION ONLY

AMENDMENTS	DATE	ISSUE
ISSUED FOR INFORMATION	02.07.21	A

AMENDMENTS	DATE	ISSUE

CLIENT
ALTIS PROPERTY PARTNERS

PROJECT
INFRASTRUCTURE DEVELOPMENT APPLICATION
884-928 MAMRE ROAD, KEMPS CREEK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
MC	MC	OCT '20	MW	A0	AS SHOWN	C014021.00-F132

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DRAWING TITLE
0.2% AEP FLOOD HAZARD POST DEVELOPMENT

DRAWING No C014021.00-F132
ISSUE A

PMF FLOOD DEPTHS (m)			
No.	FROM DEPTH	TO DEPTH	COLOUR
1	0.000	0.250	
2	0.250	0.500	
3	0.500	0.750	
4	0.750	1.000	
5	1.000	1.250	
6	1.250	1.500	

LEGEND:

LEVELS DATUM IS AHD.

30.00 - FLOOD LEVEL CONTOUR (MAJOR) 1m INTERVALS

30.20 - FLOOD LEVEL CONTOUR (MINOR) 0.2m INTERVALS

+30.00 - FLOOD LEVEL SPOT HEIGHT

+55.46
+56.52
+55.85
+55.16
+61.95
+61.95
+61.95
+61.94
+61.93
+61.93
+62.12

PROPOSED BOX CULVERT 750x600

PROPOSED BOX CULVERT 1200x600

DAMS MODELED AT 100% CAPACITY AT START OF FLOOD EVENT

PROPOSED MIRVAC DEVELOPMENT BY OTHERS

EXISTING POND

PROPOSED DEVELOPMENT SITE

PMF FLOOD AND DEPTHS PLAN-POST DEVELOPMENT
1:1000 SCALE

10m 0 10 20 30 40 50 60 70 80 90 100m
1:1000 SCALE AT A1 SHEET SIZE

FOR INFORMATION ONLY

AMENDMENTS	DATE	ISSUE
ISSUED FOR INFORMATION	02.07.21	A

AMENDMENTS	DATE	ISSUE

CLIENT: ALTIS PROPERTY PARTNERS

PROJECT: INFRASTRUCTURE DEVELOPMENT APPLICATION
884-928 MAMRE ROAD, KEMPS CREEK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
MC	MC	OCT '20	MW	A0	AS SHOWN	C014021.00-F134

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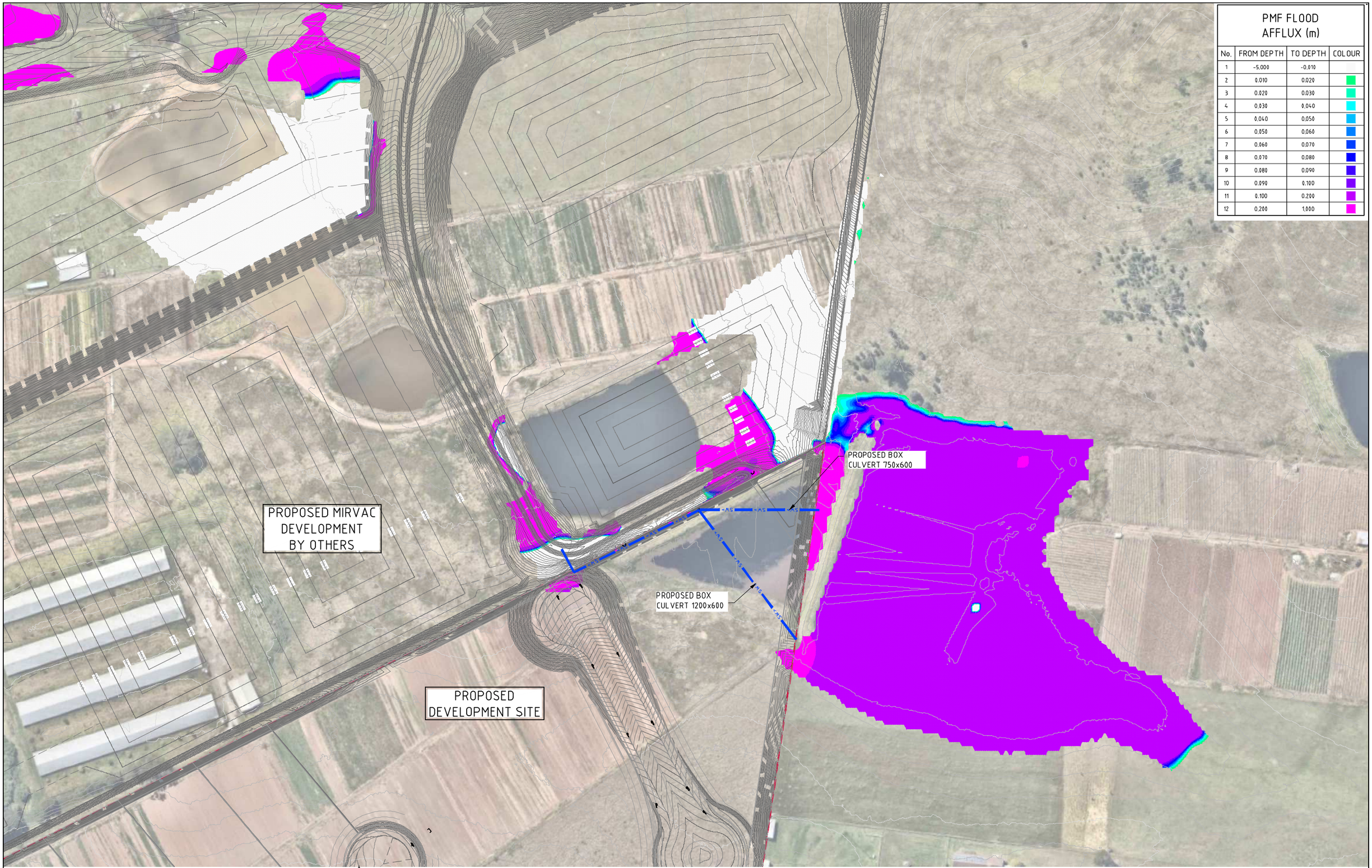
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PRECISION | COMMUNICATION | ACCOUNTABILITY

DRAWING TITLE: PMF FLOOD LEVELS & DEPTHS POST DEVELOPMENT

DRAWING No: C014021.00-F134

ISSUE: A



PMF FLOOD AFFLUX PLAN-POST DEVELOPMENT
SCALE 1:1000

10m 0 10 20 30 40 50 60 70 80 90 100m
1:1000 SCALE AT A1 SHEET SIZE

FOR INFORMATION ONLY

ISSUED FOR INFORMATION	02.07.21	A
AMENDMENTS	DATE	ISSUE
AMENDMENTS	DATE	ISSUE

CLIENT: ALTIS PROPERTY PARTNERS

PROJECT: INFRASTRUCTURE DEVELOPMENT APPLICATION
884-928 MAMRE ROAD, KEMPS CREEK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
MC	MC	OCT '20	MW	A0	AS SHOWN	C014021.00-F135

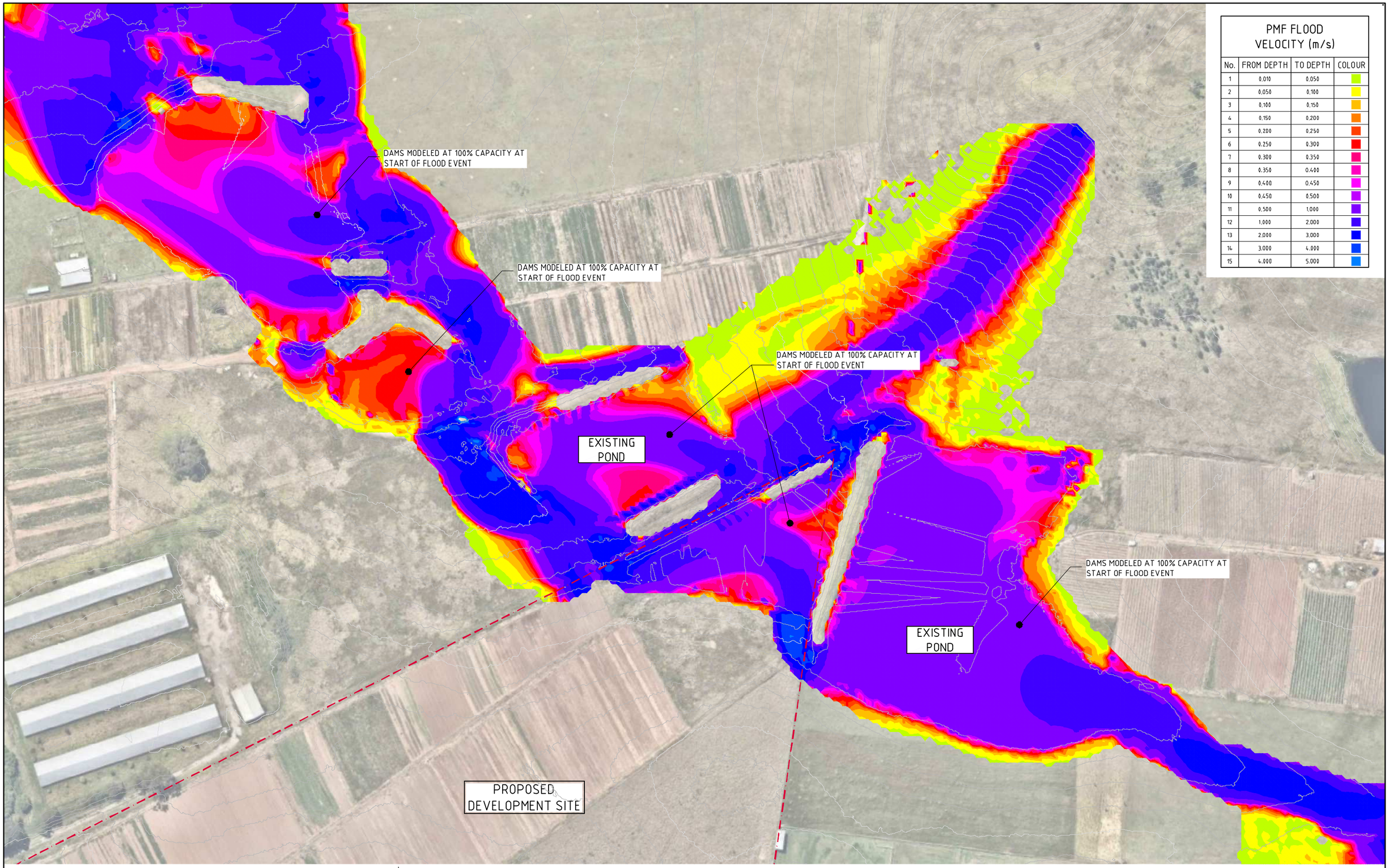
CONSULT AUSTRALIA

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DRAWING TITLE: PMF FLOOD AFFLUX POST DEVELOPMENT

DRAWING No: C014021.00-F135 ISSUE: A



PMF FLOOD VELOCITY (m/s)			
No.	FROM DEPTH	TO DEPTH	COLOUR
1	0.010	0.050	
2	0.050	0.100	
3	0.100	0.150	
4	0.150	0.200	
5	0.200	0.250	
6	0.250	0.300	
7	0.300	0.350	
8	0.350	0.400	
9	0.400	0.450	
10	0.450	0.500	
11	0.500	1.000	
12	1.000	2.000	
13	2.000	3.000	
14	3.000	4.000	
15	4.000	5.000	

PMF FLOOD VELOCITY PLAN-PRE DEVELOPMENT
1:1000 SCALE

10m 0 10 20 30 40 50 60 70 80 90 100m
1:1000 SCALE AT A1 SHEET SIZE

FOR INFORMATION ONLY

AMENDMENTS	DATE	ISSUE
ISSUED FOR INFORMATION	02.07.21	A

AMENDMENTS	DATE	ISSUE

CLIENT
ALTIS PROPERTY PARTNERS

PROJECT
INFRASTRUCTURE DEVELOPMENT APPLICATION
884-928 MAMRE ROAD, KEMPS CREEK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
MC	MC	OCT '20	MW	A0	AS SHOWN	C014021.00-F136

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DRAWING TITLE
PMF FLOOD VELOCITY
PRE DEVELOPMENT

DRAWING No C014021.00-F136
ISSUE A

PMF FLOOD VELOCITY (m/s)			
No.	FROM DEPTH	TO DEPTH	COLOUR
1	0.010	0.050	
2	0.050	0.100	
3	0.100	0.150	
4	0.150	0.200	
5	0.200	0.250	
6	0.250	0.300	
7	0.300	0.350	
8	0.350	0.400	
9	0.400	0.450	
10	0.450	0.500	
11	0.500	1.000	
12	1.000	2.000	
13	2.000	3.000	
14	3.000	4.000	
15	4.000	5.000	

PROPOSED MIRVAC DEVELOPMENT BY OTHERS

PROPOSED DEVELOPMENT SITE

EXISTING POND

DAMS MODELED AT 100% CAPACITY AT START OF FLOOD EVENT

PMF FLOOD VELOCITY PLAN-POST DEVELOPMENT

1:1000 SCALE

10m 0 10 20 30 40 50 60 70 80 90 100m

1:1000 SCALE AT A1 SHEET SIZE

FOR INFORMATION ONLY

ISSUED FOR INFORMATION	02.07.21	A
AMENDMENTS	DATE	ISSUE

AMENDMENTS	DATE	ISSUE

CLIENT: ALTIS PROPERTY PARTNERS

PROJECT: INFRASTRUCTURE DEVELOPMENT APPLICATION
884-928 MAMRE ROAD, KEMPS CREEK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
MC	MC	OCT '20	MW	A0	AS SHOWN	C014021.00-F137

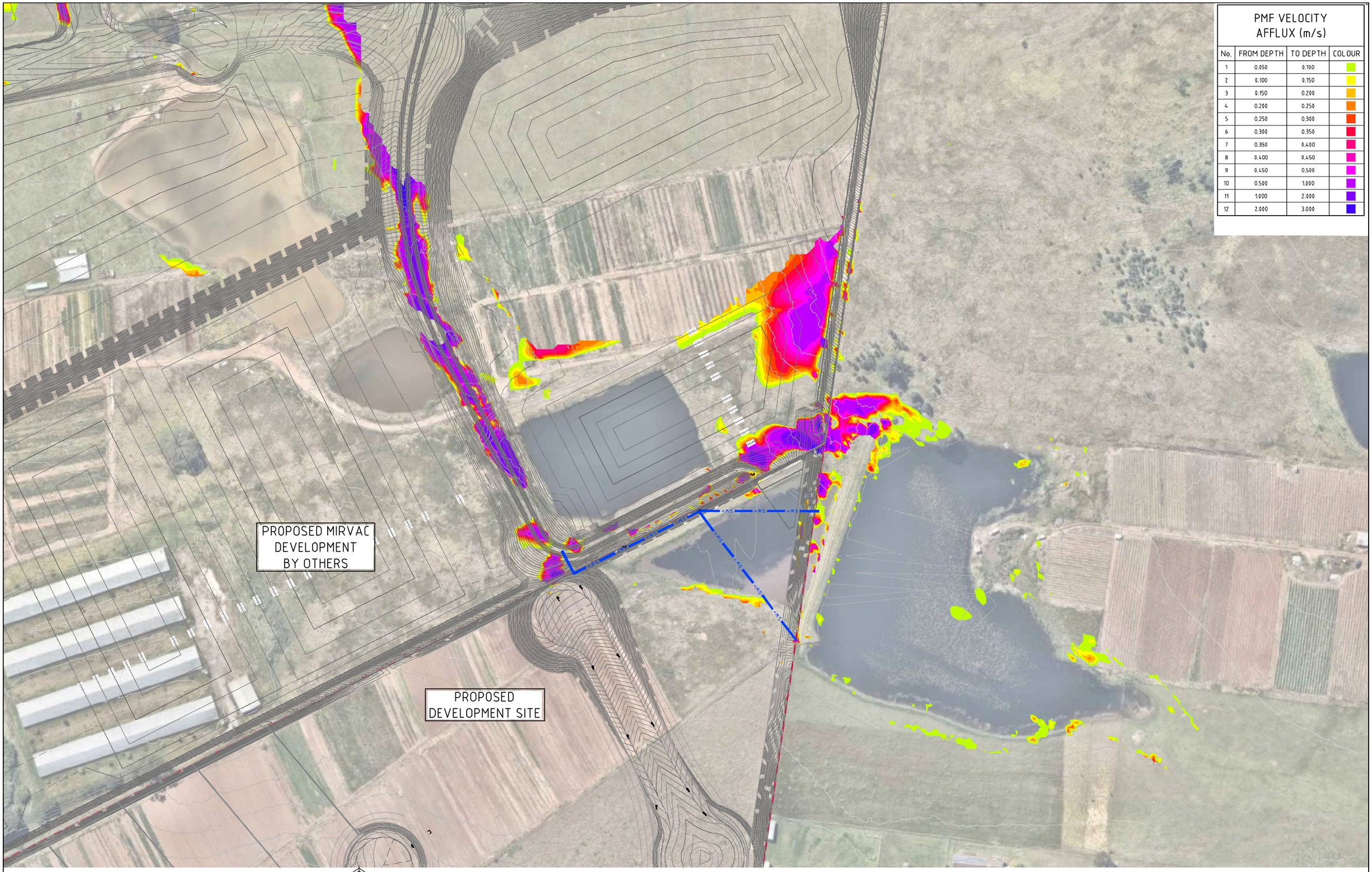
Costin Roe Consulting Pty Ltd.
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DRAWING TITLE: PMF FLOOD VELOCITY POST DEVELOPMENT

DRAWING No: C014021.00-F137 ISSUE: A



PMF VELOCITY AFFLUX (m/s)			
No.	FROM DEPTH	TO DEPTH	COLOUR
1	0.050	0.100	
2	0.100	0.150	
3	0.150	0.200	
4	0.200	0.250	
5	0.250	0.300	
6	0.300	0.350	
7	0.350	0.400	
8	0.400	0.450	
9	0.450	0.500	
10	0.500	1.000	
11	1.000	2.000	
12	2.000	3.000	

PMF VELOCITY AFFLUX
1:1000 SCALE

10m 0 10 20 30 40 50 60 70 80 90 100m
1:1000 SCALE AT A1 SHEET SIZE

FOR INFORMATION ONLY

ISSUED FOR INFORMATION	02.07.21	A	
AMENDMENTS	DATE	ISSUE	AMENDMENTS DATE ISSUE

CLIENT
ALTIS PROPERTY PARTNERS

PROJECT
INFRASTRUCTURE DEVELOPMENT APPLICATION
884-928 MAMRE ROAD, KEMPS CREEK, NSW

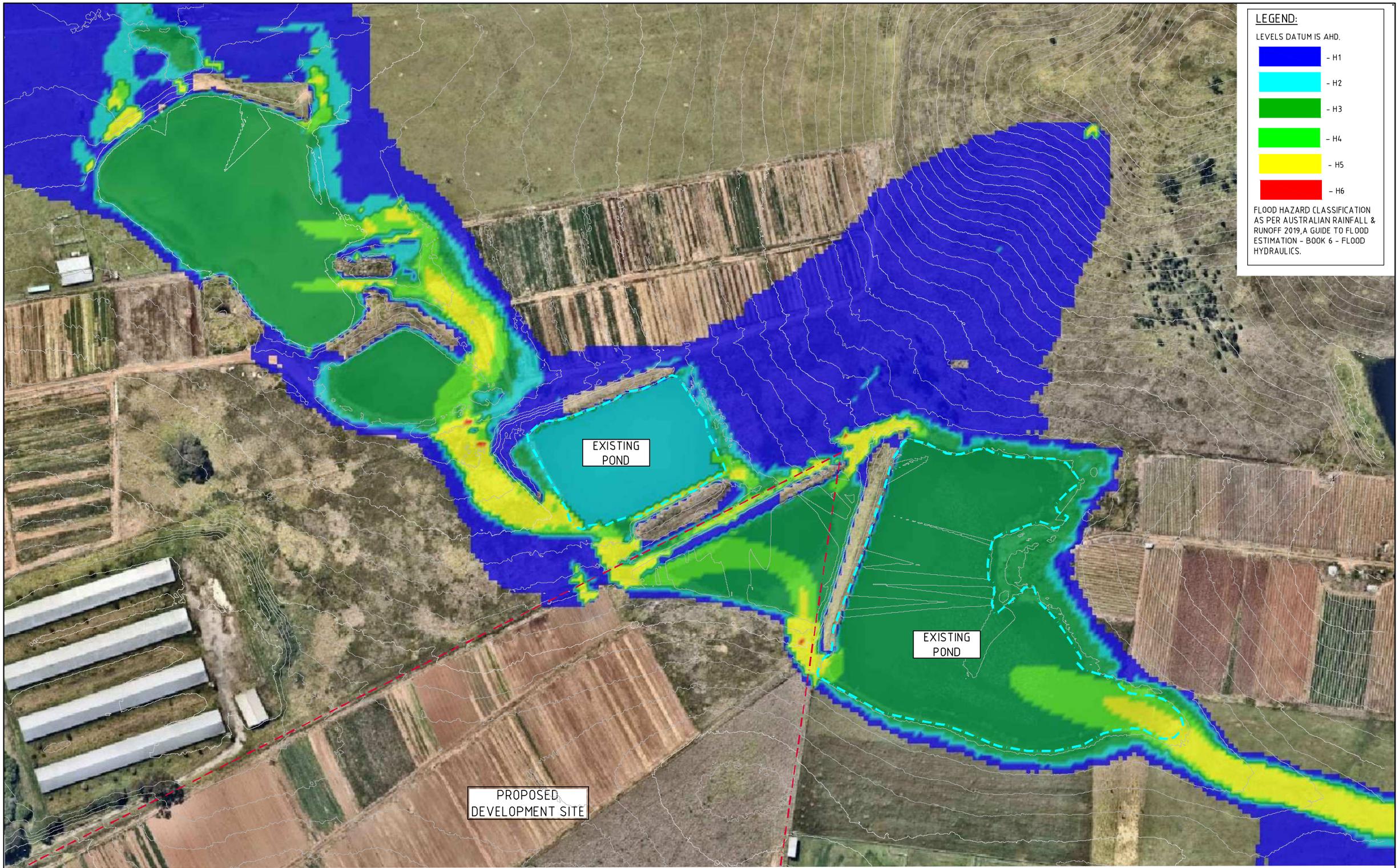
DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
MC	MC	OCT '20	MW	A0	AS SHOWN	C014021.00-F138

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DRAWING TITLE
PMF VELOCITY AFFLUX

DRAWING No C014021.00-F138
ISSUE A



PMF FLOOD HAZARD PLAN-PRE DEVELOPMENT
1:1000 SCALE

10m 0 10 20 30 40 50 60 70 80 90 100m
1:1000 SCALE AT A1 SHEET SIZE

FOR INFORMATION ONLY

AMENDMENTS	DATE	ISSUE
ISSUED FOR INFORMATION	02.07.21	A

AMENDMENTS	DATE	ISSUE

CLIENT
ALTIS PROPERTY PARTNERS

PROJECT
INFRASTRUCTURE DEVELOPMENT APPLICATION
884-928 MAMRE ROAD, KEMPS CREEK, NSW

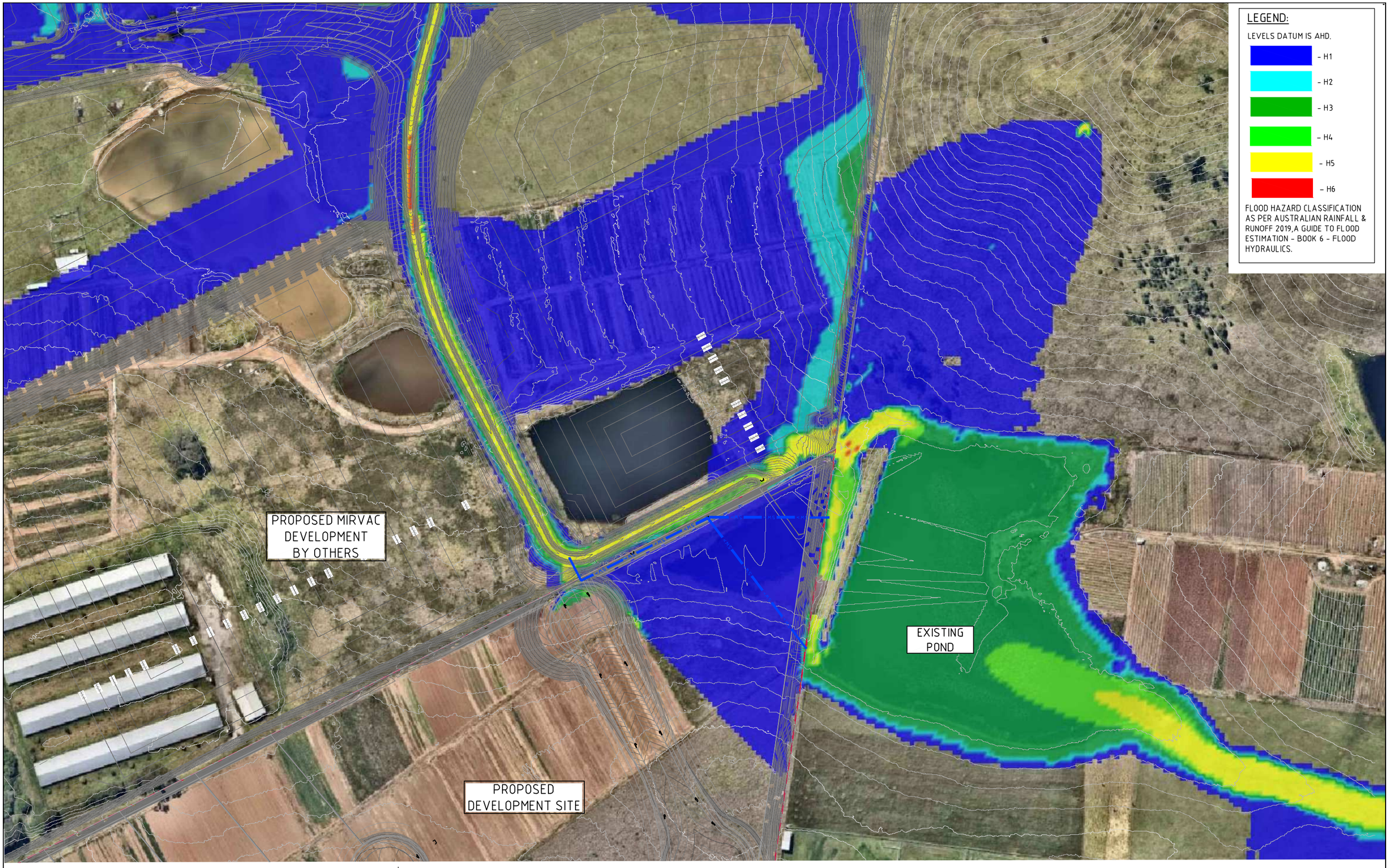
DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
MC	ME	OCT '20	MW	A0	AS SHOWN	C014021.00-F139

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DRAWING TITLE
PMF FLOOD HAZARD
PRE DEVELOPMENT

DRAWING No C014021.00-F139
ISSUE A



PMF FLOOD HAZARD PLAN-POST DEVELOPMENT
1:1000 SCALE

10m 0 10 20 30 40 50 60 70 80 90 100m
1:1000 SCALE AT A1 SHEET SIZE

FOR INFORMATION ONLY

AMENDMENTS	DATE	ISSUE
ISSUED FOR INFORMATION	02.07.21	A

AMENDMENTS	DATE	ISSUE

CLIENT
ALTIS PROPERTY PARTNERS

PROJECT
INFRASTRUCTURE DEVELOPMENT APPLICATION
884-928 MAMRE ROAD, KEMPS CREEK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
MC	MC	OCT '20	MW	A0	AS SHOWN	C014021.00-F140

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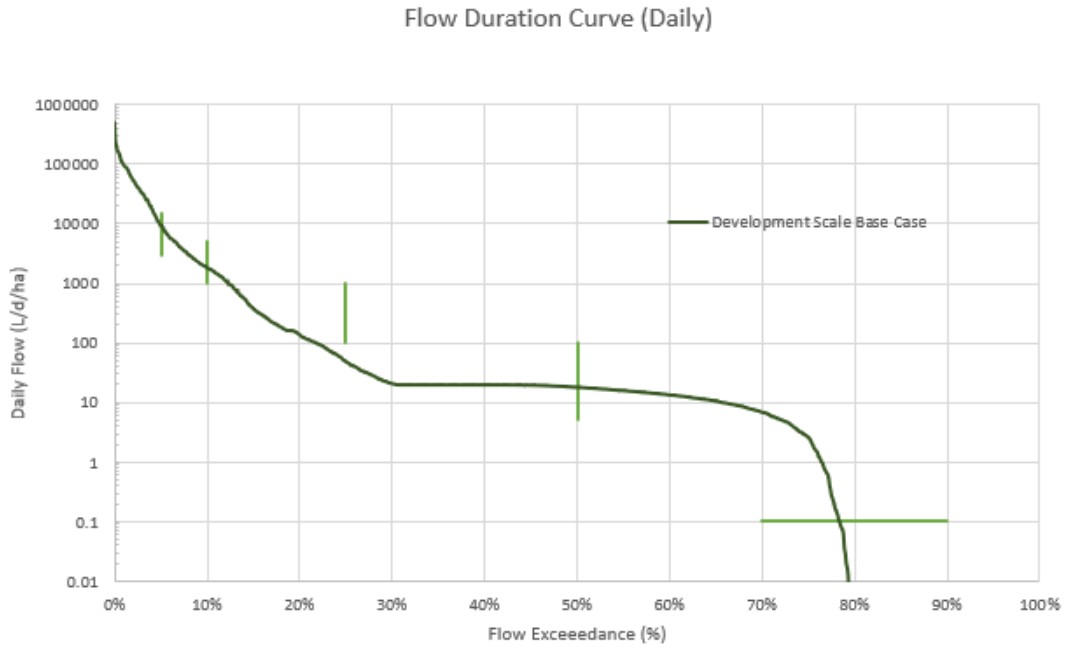
DRAWING TITLE
PMF FLOOD HAZARD POST DEVELOPMENT

DRAWING No.	ISSUE
C014021.00-F140	A

Appendix F

EES MUSIC MODELLING TOOLKIT RESULTS
ESTATE MODEL

Targets Alternative 2			
Indice	**Result**	**Comply**	**Target**
MARV (ML/ha/yr)	1.27	Yes	≤ 2
90%ile	1826	Yes	1000 to 5000 L/ha/day
50%ile	18	Yes	5 to 100 L/ha/day
10%ile	0	Yes	0 L/ha/day



Percentile	Flow (L/ha/day)
0.0%	491405.8063
0.1%	247966.7361
0.2%	202232.566
0.3%	172083.0208
0.4%	158002.7593
0.5%	149750.566
0.6%	135602.8042
0.7%	113391.4499
0.8%	109294.4799
0.9%	100347.8705
1.0%	95466.11546
1.1%	90860.84857
1.2%	88987.74244
1.3%	86304.48538
1.4%	81039.85385
1.5%	76706.09017
1.6%	68826.97214
1.7%	65685.05499
1.8%	59908.37271
1.9%	57131.71364
2.0%	54079.61221
2.1%	51325.84342
2.2%	48628.40234
2.3%	45139.47236
2.4%	42730.7009
2.5%	40191.67486
2.6%	38667.03126
2.7%	37769.60551
2.8%	34897.29446
2.9%	33261.64618
3.0%	32227.12683
3.1%	30450.10617
3.2%	29637.28032
3.3%	27231.19501
3.4%	25651.80317
3.5%	25307.73193
3.6%	24386.22137
3.7%	21910.88405
3.8%	20242.49532
3.9%	19543.4986
4.0%	17936.43406
4.1%	17153.86096
4.2%	15454.38351
4.3%	14416.80355
4.4%	13609.58502
4.5%	12751.60176
4.6%	11461.78597
4.7%	11121.04359
4.8%	10372.34496
4.9%	9752.441674
5.0%	9343.286469
5.1%	9235.927206
5.2%	8792.878706
5.3%	7942.877131
5.4%	7773.340604
5.5%	7171.22165
5.6%	6897.682075
5.7%	6638.075293
5.8%	6306.942533
5.9%	6020.558498
6.0%	5659.307015
6.1%	5575.475732
6.2%	5494.143237
6.3%	5343.978149
6.4%	5138.127065
6.5%	4991.746178
6.6%	4905.813216
6.7%	4714.620207
6.8%	4564.794314
6.9%	4185.723626
7.0%	4102.178427
7.1%	4012.301165
7.2%	3847.97431
7.3%	3768.311247
7.4%	3643.867727
7.5%	3531.174739
7.6%	3468.893894
7.7%	3389.521382
7.8%	3263.928276
7.9%	3065.102216
8.0%	3009.883777
8.1%	2920.779398
8.2%	2845.027388
8.3%	2787.103256
8.4%	2702.548485
8.5%	2618.723502
8.6%	2551.670763
8.7%	2495.557887
8.8%	2408.650621
8.9%	2339.056289
9.0%	2300.405139
9.1%	2219.633887
9.2%	2135.463173
9.3%	2096.514828
9.4%	2058.283786
9.5%	2024.914116
9.6%	1971.737965
9.7%	1941.691625
9.8%	1926.555725
9.9%	1870.042925
10.0%	1825.863386
10.1%	1769.35056
10.2%	1736.453854
10.3%	1716.605759
10.4%	1680.125943
10.5%	1659.585094
10.6%	1622.695779
10.7%	1576.217502
10.8%	1552.846673
10.9%	1498.400649
11.0%	1452.794461
11.1%	1422.141202
11.2%	1407.796395
11.3%	1353.958735
11.4%	1315.206153
11.5%	1293.390544
11.6%	1272.611642
11.7%	1226.87272
11.8%	1177.378543
11.9%	1134.566078
12.0%	1098.112271
12.1%	1064.213384
12.2%	1047.234067
12.3%	980.4595276
12.4%	969.2077717
12.5%	941.3449712
12.6%	932.7193849
12.7%	899.1549619
12.8%	869.8477639

Percentile	Flow (L/ha/day)
12.9%	813.677894
13.0%	785.7400973
13.1%	763.9955303
13.2%	739.5739048
13.3%	731.5166422
13.4%	675.5827591
13.5%	646.0322104
13.6%	627.7448962
13.7%	603.5491064
13.8%	586.7022373
13.9%	575.0932906
14.0%	553.4864256
14.1%	540.2834327
14.2%	512.3365913
14.3%	491.0649473
14.4%	459.3123151
14.5%	440.168482
14.6%	424.0746794
14.7%	417.2236711
14.8%	400.6956919
14.9%	389.799798
15.0%	372.1249513
15.1%	361.4717998
15.2%	349.4168833
15.3%	340.0178752
15.4%	333.7869502
15.5%	327.2626829
15.6%	318.4323257
15.7%	310.8281984
15.8%	302.1505713
15.9%	297.4815928
16.0%	289.984104
16.1%	286.6116274
16.2%	277.5010425
16.3%	271.1118439
16.4%	263.7383344
16.5%	257.7317057
16.6%	249.8656578
16.7%	240.6501437
16.8%	233.7735292
16.9%	228.9464991
17.0%	223.3758538
17.1%	219.2441406

Percentile	Flow (L/ha/day)
17.2%	214.1130891
17.3%	211.8427346
17.4%	208.0000594
17.5%	204.1938383
17.6%	199.9000333
17.7%	195.7600217
17.8%	188.8867983
17.9%	186.501702
18.0%	181.2517356
18.1%	178.0892204
18.2%	174.1983504
18.3%	171.3293645
18.4%	168.4075123
18.5%	163.9356747
18.6%	160.7951402
18.7%	160.7930435
18.8%	160.7916417
18.9%	160.7896642
19.0%	160.7882181
19.1%	160.7471824
19.2%	160.3516002
19.3%	159.033104
19.4%	157.6648377
19.5%	153.7789408
19.6%	151.9741351
19.7%	148.5844586
19.8%	143.320851
19.9%	140.3553132
20.0%	136.456166
20.1%	132.9150296
20.2%	127.6761911
20.3%	125.5435462
20.4%	124.2899049
20.5%	121.7710693
20.6%	119.2895607
20.7%	117.2730742
20.8%	115.3950366
20.9%	113.0399724
21.0%	111.5993047
21.1%	110.5635112
21.2%	109.0932917
21.3%	107.2537651
21.4%	105.511225

Percentile	Flow (L/ha/day)
21.5%	104.3635013
21.6%	102.1872996
21.7%	100.429784
21.8%	98.32626343
21.9%	96.60091418
22.0%	95.85106823
22.1%	93.98764484
22.2%	93.16898437
22.3%	91.13240042
22.4%	89.4512789
22.5%	88.51651625
22.6%	85.50511807
22.7%	83.89923016
22.8%	81.86456615
22.9%	80.23185425
23.0%	78.00154363
23.1%	75.67831458
23.2%	74.05620032
23.3%	72.2258282
23.4%	71.14949944
23.5%	69.54372382
23.6%	68.62165881
23.7%	66.98238085
23.8%	65.63788915
23.9%	65.28095161
24.0%	63.28089437
24.1%	61.53168939
24.2%	60.08804112
24.3%	59.25055097
24.4%	57.99294731
24.5%	56.38908393
24.6%	53.96852161
24.7%	51.59773701
24.8%	50.76656049
24.9%	49.3470617
25.0%	48.47611763
25.1%	47.4384196
25.2%	46.3938412
25.3%	45.22013637
25.4%	43.97183066
25.5%	43.22687766
25.6%	42.29908031
25.7%	41.47209178

Percentile	Flow (L/ha/day)
25.8%	40.83306758
25.9%	40.10524949
26.0%	39.8467738
26.1%	39.10419275
26.2%	37.96790394
26.3%	37.43579535
26.4%	36.24816805
26.5%	35.54390318
26.6%	34.40320313
26.7%	34.09825241
26.8%	33.64842638
26.9%	33.34578397
27.0%	32.74231975
27.1%	32.23224135
27.2%	31.72342718
27.3%	31.3470218
27.4%	30.86510352
27.5%	30.2984302
27.6%	29.44276569
27.7%	29.14869392
27.8%	28.91343311
27.9%	28.47862783
28.0%	27.73549807
28.1%	27.32754926
28.2%	26.89587741
28.3%	26.29137603
28.4%	25.57605126
28.5%	25.26020872
28.6%	24.78416775
28.7%	24.40733159
28.8%	24.29712515
28.9%	23.86259769
29.0%	23.34324153
29.1%	22.93488428
29.2%	22.72812406
29.3%	22.5200529
29.4%	22.22928511
29.5%	22.00034129
29.6%	21.68356724
29.7%	21.267113
29.8%	21.06287614
29.9%	20.96729158
30.0%	20.78638288

Percentile	Flow (L/ha/day)
30.1%	20.58021499
30.2%	20.39872008
30.3%	20.24361442
30.4%	20.05254323
30.5%	19.93033272
30.6%	19.88688823
30.7%	19.85622793
30.8%	19.83042344
30.9%	19.82997626
31.0%	19.82917287
31.1%	19.82882334
31.2%	19.82862091
31.3%	19.82851546
31.4%	19.8284273
31.5%	19.8283385
31.6%	19.82799813
31.7%	19.82787685
31.8%	19.82772449
31.9%	19.82763378
32.0%	19.82745274
32.1%	19.82730325
32.2%	19.82719987
32.3%	19.82710143
32.4%	19.8270562
32.5%	19.82699694
32.6%	19.82690234
32.7%	19.8268278
32.8%	19.82676824
32.9%	19.82662475
33.0%	19.82655897
33.1%	19.82647007
33.2%	19.82642796
33.3%	19.82635443
33.4%	19.82628295
33.5%	19.82614405
33.6%	19.82604462
33.7%	19.82599494
33.8%	19.82593412
33.9%	19.82584822
34.0%	19.82580893
34.1%	19.8257671
34.2%	19.82572306
34.3%	19.82567196

Percentile	Flow (L/ha/day)
34.4%	19.82558479
34.5%	19.82551284
34.6%	19.82549394
34.7%	19.82541531
34.8%	19.82526665
34.9%	19.82523305
35.0%	19.82512871
35.1%	19.82495727
35.2%	19.82490487
35.3%	19.82481094
35.4%	19.82475073
35.5%	19.82470372
35.6%	19.82467025
35.7%	19.82461589
35.8%	19.82448824
35.9%	19.82442562
36.0%	19.82441309
36.1%	19.82436819
36.2%	19.82435288
36.3%	19.82431605
36.4%	19.82426276
36.5%	19.82421587
36.6%	19.82408349
36.7%	19.82401506
36.8%	19.82393689
36.9%	19.82382621
37.0%	19.82379133
37.1%	19.8237512
37.2%	19.82371762
37.3%	19.82368951
37.4%	19.8235971
37.5%	19.82352105
37.6%	19.82344656
37.7%	19.82337307
37.8%	19.82329492
37.9%	19.82321085
38.0%	19.82318576
38.1%	19.82316288
38.2%	19.82308051
38.3%	19.82303818
38.4%	19.8229506
38.5%	19.82291529
38.6%	19.82287506

Percentile	Flow (L/ha/day)
38.7%	19.82281413
38.8%	19.82266609
38.9%	19.82247688
39.0%	19.82237364
39.1%	19.82228826
39.2%	19.82215298
39.3%	19.82202839
39.4%	19.82194622
39.5%	19.82191617
39.6%	19.82174262
39.7%	19.82160646
39.8%	19.82156207
39.9%	19.8214451
40.0%	19.82133171
40.1%	19.82120453
40.2%	19.82110674
40.3%	19.82100021
40.4%	19.82084482
40.5%	19.8207652
40.6%	19.82069054
40.7%	19.82061729
40.8%	19.82045064
40.9%	19.82030126
41.0%	19.82004863
41.1%	19.81989959
41.2%	19.819591
41.3%	19.8194249
41.4%	19.81913947
41.5%	19.81879845
41.6%	19.81796828
41.7%	19.81745739
41.8%	19.81696536
41.9%	19.81592831
42.0%	19.8150796
42.1%	19.81412564
42.2%	19.81286264
42.3%	19.81093383
42.4%	19.80763047
42.5%	19.80393226
42.6%	19.80103135
42.7%	19.79704278
42.8%	19.79435191
42.9%	19.7907606

Percentile	Flow (L/ha/day)
43.0%	19.78505579
43.1%	19.77378981
43.2%	19.76716919
43.3%	19.76221057
43.4%	19.75722957
43.5%	19.75031959
43.6%	19.74468378
43.7%	19.73149234
43.8%	19.72580262
43.9%	19.71724051
44.0%	19.70363839
44.1%	19.68952016
44.2%	19.68177382
44.3%	19.66940865
44.4%	19.66460745
44.5%	19.65478731
44.6%	19.64548772
44.7%	19.62684577
44.8%	19.61802457
44.9%	19.59628066
45.0%	19.5882391
45.1%	19.57699346
45.2%	19.55339475
45.3%	19.53832729
45.4%	19.5238097
45.5%	19.51261955
45.6%	19.49190867
45.7%	19.46488165
45.8%	19.42071475
45.9%	19.39812164
46.0%	19.37585383
46.1%	19.35853275
46.2%	19.34350983
46.3%	19.3119409
46.4%	19.28325869
46.5%	19.24980054
46.6%	19.22768253
46.7%	19.1999738
46.8%	19.18295683
46.9%	19.16710166
47.0%	19.12407395
47.1%	19.09243783
47.2%	19.01353408

Percentile	Flow (L/ha/day)
47.3%	18.97120979
47.4%	18.95096633
47.5%	18.91432161
47.6%	18.88855521
47.7%	18.87042205
47.8%	18.84180578
47.9%	18.81442225
48.0%	18.78893923
48.1%	18.77549922
48.2%	18.76718368
48.3%	18.75049196
48.4%	18.72699052
48.5%	18.64669338
48.6%	18.59359228
48.7%	18.50933847
48.8%	18.46504403
48.9%	18.43147743
49.0%	18.40752883
49.1%	18.35335674
49.2%	18.31205486
49.3%	18.2155808
49.4%	18.1893381
49.5%	18.1649232
49.6%	18.11997535
49.7%	18.0772247
49.8%	18.06524031
49.9%	18.02997305
50.0%	17.99293805
50.1%	17.98802055
50.2%	17.95561413
50.3%	17.89873388
50.4%	17.87508897
50.5%	17.86343695
50.6%	17.8202904
50.7%	17.78385239
50.8%	17.73970339
50.9%	17.67506133
51.0%	17.59248194
51.1%	17.5381265
51.2%	17.50568795
51.3%	17.48665269
51.4%	17.46931412
51.5%	17.44264189

Percentile	Flow (L/ha/day)
51.6%	17.40374013
51.7%	17.34282355
51.8%	17.30644115
51.9%	17.25944694
52.0%	17.22229577
52.1%	17.20678332
52.2%	17.1363835
52.3%	17.03270219
52.4%	17.0145507
52.5%	16.98846743
52.6%	16.91337241
52.7%	16.87215816
52.8%	16.83669834
52.9%	16.7880628
53.0%	16.76845604
53.1%	16.75144233
53.2%	16.6793099
53.3%	16.62125575
53.4%	16.56565333
53.5%	16.48344566
53.6%	16.43927326
53.7%	16.40966098
53.8%	16.34773208
53.9%	16.33453762
54.0%	16.23433339
54.1%	16.18832658
54.2%	16.1650735
54.3%	16.12451328
54.4%	16.08293941
54.5%	16.04414227
54.6%	15.98224672
54.7%	15.97811868
54.8%	15.92970925
54.9%	15.88786967
55.0%	15.86237562
55.1%	15.83317647
55.2%	15.78967512
55.3%	15.73206823
55.4%	15.68274432
55.5%	15.6050231
55.6%	15.5154683
55.7%	15.48311359
55.8%	15.4617373
55.9%	15.43216466
56.0%	15.40046399
56.1%	15.35524642
56.2%	15.3048969
56.3%	15.24840931
56.4%	15.20778894
56.5%	15.18960317
56.6%	15.10073035
56.7%	15.01020877
56.8%	14.98349668
56.9%	14.91418577
57.0%	14.85156784
57.1%	14.82557349
57.2%	14.77641741
57.3%	14.75738133
57.4%	14.74040376
57.5%	14.66777687
57.6%	14.61978519
57.7%	14.59460631
57.8%	14.52756448
57.9%	14.45810229
58.0%	14.40876718
58.1%	14.38036427
58.2%	14.33331399
58.3%	14.29620638
58.4%	14.20637143
58.5%	14.16039328
58.6%	14.11286939
58.7%	14.04847272
58.8%	14.0079224
58.9%	13.96725192
59.0%	13.92918229
59.1%	13.88485438
59.2%	13.84922132
59.3%	13.83339742
59.4%	13.7713956
59.5%	13.72221327
59.6%	13.62074784
59.7%	13.50822627
59.8%	13.47361936
59.9%	13.45279474
60.0%	13.42006827
60.1%	13.3796246
60.2%	13.31282478
60.3%	13.28756261
60.4%	13.23561775
60.5%	13.19468646
60.6%	13.16645966
60.7%	13.08168125
60.8%	13.00269063
60.9%	12.97142542
61.0%	12.89414917
61.1%	12.82405222
61.2%	12.76423317
61.3%	12.74625012
61.4%	12.72937725
61.5%	12.67014119
61.6%	12.60489751
61.7%	12.50778515
61.8%	12.4387071
61.9%	12.38691736
62.0%	12.32231268
62.1%	12.22911532
62.2%	12.17252551
62.3%	12.12771482
62.4%	12.03906141
62.5%	11.97835004
62.6%	11.94033941
62.7%	11.87819436
62.8%	11.83402279
62.9%	11.7932703
63.0%	11.76168928
63.1%	11.71002825
63.2%	11.61490576
63.3%	11.51060471
63.4%	11.46692458
63.5%	11.44583686
63.6%	11.40970036
63.7%	11.37116629
63.8%	11.31174707
63.9%	11.27390839
64.0%	11.21810173
64.1%	11.18291739
64.2%	11.09516751
64.3%	10.97670846
64.4%	10.94361766

Percentile	Flow (L/ha/day)
64.5%	10.87685698
64.6%	10.81793938
64.7%	10.77556047
64.8%	10.74125144
64.9%	10.71255996
65.0%	10.59357313
65.1%	10.46812282
65.2%	10.35085181
65.3%	10.30592713
65.4%	10.19127124
65.5%	10.13676717
65.6%	10.00143488
65.7%	9.946422622
65.8%	9.901064532
65.9%	9.842420117
66.0%	9.800587773
66.1%	9.748911194
66.2%	9.673148637
66.3%	9.564635432
66.4%	9.460730023
66.5%	9.43667961
66.6%	9.386341384
66.7%	9.318012991
66.8%	9.270568016
66.9%	9.210808604
67.0%	9.171877924
67.1%	9.087102309
67.2%	8.984004369
67.3%	8.951346744
67.4%	8.85073501
67.5%	8.805123599
67.6%	8.746465283
67.7%	8.717719711
67.8%	8.588092198
67.9%	8.516102809
68.0%	8.397708908
68.1%	8.308630627
68.2%	8.288455988
68.3%	8.134768085
68.4%	8.063983161
68.5%	7.942310094
68.6%	7.85597762
68.7%	7.816272361

Percentile	Flow (L/ha/day)
68.8%	7.751080483
68.9%	7.701172312
69.0%	7.644411359
69.1%	7.494593747
69.2%	7.437220084
69.3%	7.388750234
69.4%	7.320569138
69.5%	7.243048918
69.6%	7.169683293
69.7%	7.094351948
69.8%	6.973245406
69.9%	6.940146659
70.0%	6.841203022
70.1%	6.794279525
70.2%	6.735869728
70.3%	6.69565927
70.4%	6.576729907
70.5%	6.505327266
70.6%	6.320774031
70.7%	6.274757306
70.8%	6.107080255
70.9%	5.977110845
71.0%	5.847035434
71.1%	5.80797486
71.2%	5.731650747
71.3%	5.677983304
71.4%	5.606283629
71.5%	5.432988644
71.6%	5.405566981
71.7%	5.335904297
71.8%	5.272211992
71.9%	5.189780734
72.0%	5.152290485
72.1%	5.076876988
72.2%	4.952354035
72.3%	4.919136687
72.4%	4.804806034
72.5%	4.766898664
72.6%	4.707390164
72.7%	4.644070799
72.8%	4.548519506
72.9%	4.443240059
73.0%	4.285257333

Percentile	Flow (L/ha/day)
73.1%	4.192042669
73.2%	4.075696775
73.3%	3.915799129
73.4%	3.82196192
73.5%	3.739604494
73.6%	3.664599912
73.7%	3.570043021
73.8%	3.393471748
73.9%	3.315825976
74.0%	3.265172043
74.1%	3.178530387
74.2%	3.152754441
74.3%	3.094563058
74.4%	2.95053162
74.5%	2.915219666
74.6%	2.841023215
74.7%	2.776886239
74.8%	2.692842379
74.9%	2.64882225
75.0%	2.51648104
75.1%	2.414751769
75.2%	2.241936167
75.3%	2.066371516
75.4%	1.940483334
75.5%	1.765293286
75.6%	1.676449221
75.7%	1.5821179
75.8%	1.514549054
75.9%	1.463407491
76.0%	1.258718466
76.1%	1.202155762
76.2%	1.130727459
76.3%	1.034686756
76.4%	0.996349661
76.5%	0.908644431
76.6%	0.811045448
76.7%	0.749088154
76.8%	0.707506801
76.9%	0.656163184
77.0%	0.625278755
77.1%	0.553422516
77.2%	0.415803241
77.3%	0.350861815

Percentile	Flow (L/ha/day)
77.4%	0.279508777
77.5%	0.255167651
77.6%	0.224633212
77.7%	0.203323438
77.8%	0.166944301
77.9%	0.158708095
78.0%	0.141235099
78.1%	0.127408536
78.2%	0.105968512
78.3%	0.099454384
78.4%	0.086454446
78.5%	0.079778494
78.6%	0.074759661
78.7%	0.063034456
78.8%	0.036594672
78.9%	0.030058837
79.0%	0.020707341
79.1%	0.017369285
79.2%	0.013141034
79.3%	0.005553071
79.4%	0.004098067
79.5%	0.002088676
79.6%	1.41213E-06
79.7%	0
79.8%	0
79.9%	0
80.0%	0
80.1%	0
80.2%	0
80.3%	0
80.4%	0
80.5%	0
80.6%	0
80.7%	0
80.8%	0
80.9%	0
81.0%	0
81.1%	0
81.2%	0
81.3%	0
81.4%	0
81.5%	0
81.6%	0

Percentile	Flow (L/ha/day)
81.7%	0
81.8%	0
81.9%	0
82.0%	0
82.1%	0
82.2%	0
82.3%	0
82.4%	0
82.5%	0
82.6%	0
82.7%	0
82.8%	0
82.9%	0
83.0%	0
83.1%	0
83.2%	0
83.3%	0
83.4%	0
83.5%	0
83.6%	0
83.7%	0
83.8%	0
83.9%	0
84.0%	0
84.1%	0
84.2%	0
84.3%	0
84.4%	0
84.5%	0
84.6%	0
84.7%	0
84.8%	0
84.9%	0
85.0%	0
85.1%	0
85.2%	0
85.3%	0
85.4%	0
85.5%	0
85.6%	0
85.7%	0
85.8%	0
85.9%	0

Percentile	Flow (L/ha/day)
86.0%	0
86.1%	0
86.2%	0
86.3%	0
86.4%	0
86.5%	0
86.6%	0
86.7%	0
86.8%	0
86.9%	0
87.0%	0
87.1%	0
87.2%	0
87.3%	0
87.4%	0
87.5%	0
87.6%	0
87.7%	0
87.8%	0
87.9%	0
88.0%	0
88.1%	0
88.2%	0
88.3%	0
88.4%	0
88.5%	0
88.6%	0
88.7%	0
88.8%	0
88.9%	0
89.0%	0
89.1%	0
89.2%	0
89.3%	0
89.4%	0
89.5%	0
89.6%	0
89.7%	0
89.8%	0
89.9%	0
90.0%	0
90.1%	0
90.2%	0

Percentile	Flow (L/ha/day)
90.3%	0
90.4%	0
90.5%	0
90.6%	0
90.7%	0
90.8%	0
90.9%	0
91.0%	0
91.1%	0
91.2%	0
91.3%	0
91.4%	0
91.5%	0
91.6%	0
91.7%	0
91.8%	0
91.9%	0
92.0%	0
92.1%	0
92.2%	0
92.3%	0
92.4%	0
92.5%	0
92.6%	0
92.7%	0
92.8%	0
92.9%	0
93.0%	0
93.1%	0
93.2%	0
93.3%	0
93.4%	0
93.5%	0
93.6%	0
93.7%	0
93.8%	0
93.9%	0
94.0%	0
94.1%	0
94.2%	0
94.3%	0
94.4%	0
94.5%	0

Percentile	Flow (L/ha/day)
94.6%	0
94.7%	0
94.8%	0
94.9%	0
95.0%	0
95.1%	0
95.2%	0
95.3%	0
95.4%	0
95.5%	0
95.6%	0
95.7%	0
95.8%	0
95.9%	0
96.0%	0
96.1%	0
96.2%	0
96.3%	0
96.4%	0
96.5%	0
96.6%	0
96.7%	0
96.8%	0
96.9%	0
97.0%	0
97.1%	0
97.2%	0
97.3%	0
97.4%	0
97.5%	0
97.6%	0
97.7%	0
97.8%	0
97.9%	0
98.0%	0
98.1%	0
98.2%	0
98.3%	0
98.4%	0
98.5%	0
98.6%	0
98.7%	0
98.8%	0

Percentile	Flow (L/ha/day)
98.9%	0
99.0%	0
99.1%	0
99.2%	0
99.3%	0
99.4%	0
99.5%	0
99.6%	0
99.7%	0
99.8%	0
99.9%	0
100.0%	0