

GENERAL NOTES

DIMENSIONS
ALL DIMENSIONS AND LEVELS SHALL BE VERIFIED BY THE CONTRACTOR BEFORE WORK IS COMMENCED. ALL THESE DRAWINGS SHALL NOT BE SCALED. ALL DIMENSION IN mm UNLESS NOTED OTHERWISE.

DUE CARE
DURING CONSTRUCTION. THE CONSTRCTOR/BUILDER SHALL BE RESPONSIBLE FOR MAINTAINING THE STRUCTURE AND ALL SURROUNDING PROPERTIES OR BUILDING IN A STABLE CONDITION AND ENSURING NO PART WILL BE OVER STRESSED DURING CONSTRUCTION ACTIVITIES.

WORKMANSHIP
WORKMANSHIP AND MATERIALS ARE TO BE IN ACCORDANCE WITH THE RELEVANT SAA CODES (INCLUDING ALL AMENDMENTS) AND ANY GOVERNMENTAL STATUTORU REQUIREMENTS EXCEPT WHERE VARIED BY CONTRACT DOCUMENTS.

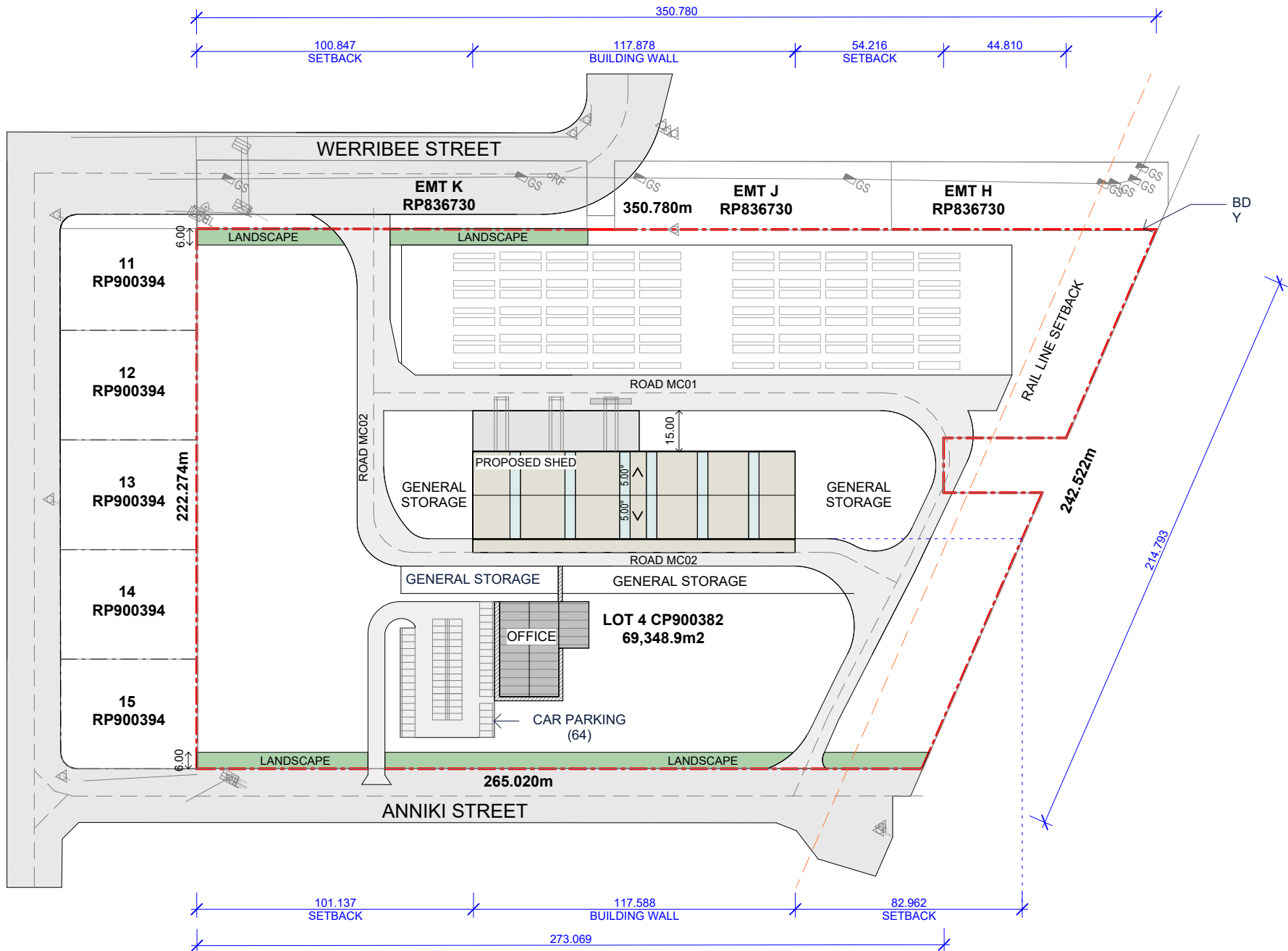
SERVICES
THE BUILDER IS RESPONSIBLE FOR LOCATING ALL EXISTING AND NEW SERVICES AND SHALL BE RESPONSIBLE FOR ANY DAMAGE TO THE SAME.

SITE MAINTAINANCE
THE OWNER IS RESPONSIBLE FOR THE MAINTAINANCE OF THE SITE AND SHOULD BE FAMILIAR WITH THE PERFORMANCE AND MAINTAINANCE REQUIREMENTS SET OUT IN THE CSIRO PUBLICATION IO-9' 'GUIDE TO HOME OWNERS ON FOUdANTION MAINTAINANCE AND FOOTING PERFORMANCE'.

TERMITE PROTECTION
TERMITE PROTECTION SHALL BE IN ACCORDANCE WITH A.S.3660.01
TERMITE BARRIERS SHALL BE INSTALLED BY A LICENCED CONTRACTOR IN ACCORDANCE WITH ABOVE
STANDARDS.
ALL NEW TIMBER TO BE CHEMICALLY TREATED TO APPROVED STANDARDS.

AREA SCHEDULE (SITE COVER)		
NAME	AREA	% SITE
SITE COVERED	5261.9 m ²	8.8%
SITE OPEN	54579.5 m ²	91.2%
	59841.4 m ²	100.0%

R.P.D.: Lot 4 CP900382
Local Authority: Rockhampton Regional Council
Area: 59842.4m²
Existing land use
Zone: Low Impact Industry Zone
Overlays:
Actual Acid sulfate soils 5> AHD
Potential Acid sulfate soils 5-20 AHD
Agricultural Land Classification:
Class A & B
Flood Level: Local Catchment DFE
Transport Corridor: Railway Noise Corridor:
Category 1,2,3 & 4
Climate Zone: 2



1 PROPOSED SITE
1 : 2000

North Orientation Note:
North as indicated on these drawings, is taken from surveyor's meridian. True North maybe somewhat varied.

ROCKHAMPTON REGIONAL COUNCIL
APPROVED PLANS
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Development Permit No.: D/196-2025
Dated: 31 March 2026

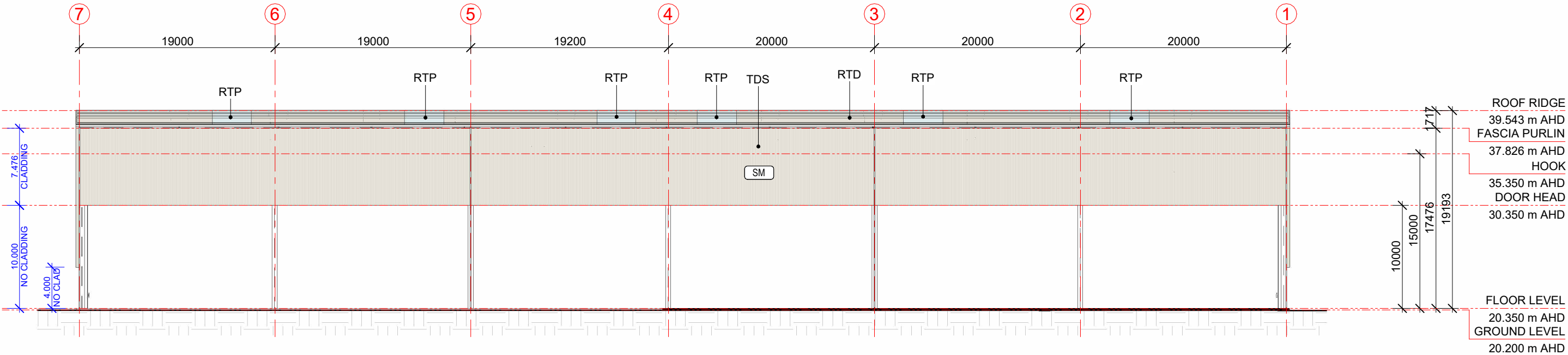
Issu	Date	Issue Description	Rev	Date	By	Description
DD	03/12/2025	PRELIMINARY	3	03.12.25	AH	DD FOR CLIENT APPROVAL
SK01	14/11/2025	CONCEPT DRAWINGS	2	12.11.25	AH	CLIENT MARK UP
SK01	4/11/2025	CONCEPT DRAWINGS	1	04.11.25	AH	CLIENT MARK UP
SK01	31/10/2025	CONCEPT DRAWINGS	0	31.10.25	AH	INITIAL ISSUE

PROJECT DESCRIPTION Rockhampton Ring Road-Pre-cast Yard Facility BMD BIELBY - ROCKYJV Lot 4 Werribee & Anniki Street Kawana QLD 4701 APPROVED FOR & ON BEHALF OF FORTY FOUR STUDIOS

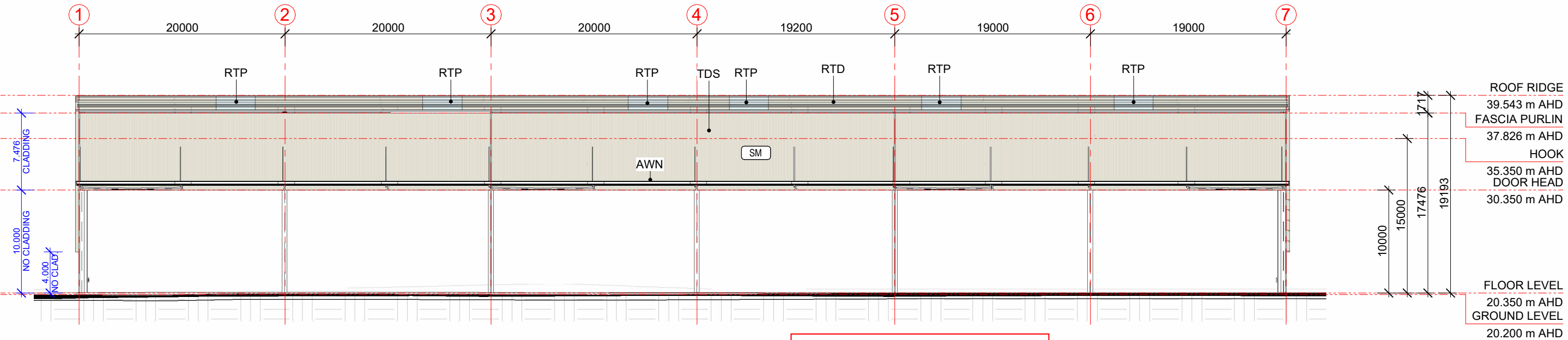
DRAWING TITLE SITE PLAN 1-2000 PRELIMINARY NOT FOR CONSTRUCTION
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SCALE AT A3 1 : 2000 DATE 03.12.25 DRAWN AH CHECKED JFA	PROJECT NUMBER CE25168 DRAWING NUMBER 102SP ISSUE DD01 REVISION 3
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FINISH MATERIAL			KEYNOTES LEGEND	
CODE	MATERIAL: DESCRIPTION	Material: Image	ITEM	DESCRIPTION
PLB	POLYCARBONATE		AWN	METAL AWNING SUPPORTED BY WALL MOUNTED TENSION RODS - TRIMDEK - 0.48BMT - COLORBOND
SM	COLORBOND SURFMIST		RTD	ROOF TRIMDEK 0.48BMT - COLORBOND
			RTP	TRIMDEK POLYCARBONATE CLEAR ROOFING SHEETS
			TDS	TRIMDEK-0.48BMT - CLADDING



E1 PROPOSED NORTH ELEVATION
1 : 400



E2 PROPOSED SOUTH ELEVATION
1 : 400

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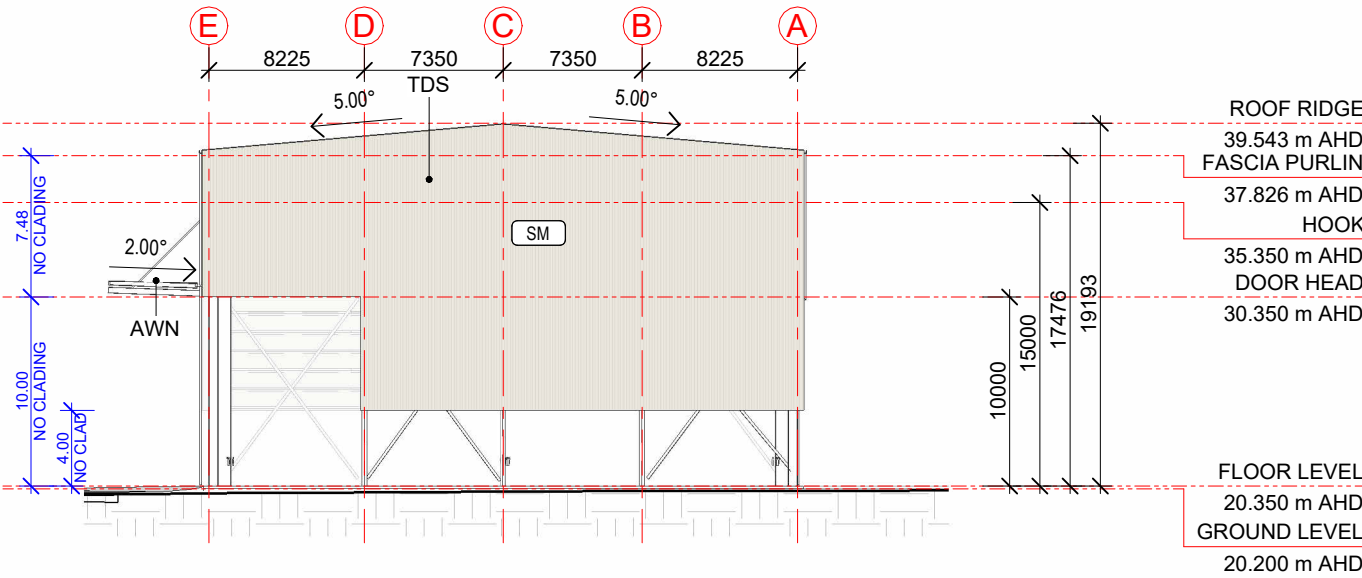
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Rockhampton Ring Road-Pre-cast Yard Facility BMD BIELBY - ROCKYJV Lot 4 Werribee & Anniki Street Kawana QLD 4701
APPROVED FOR & ON BEHALF OF FORTY FOUR STUDIOS

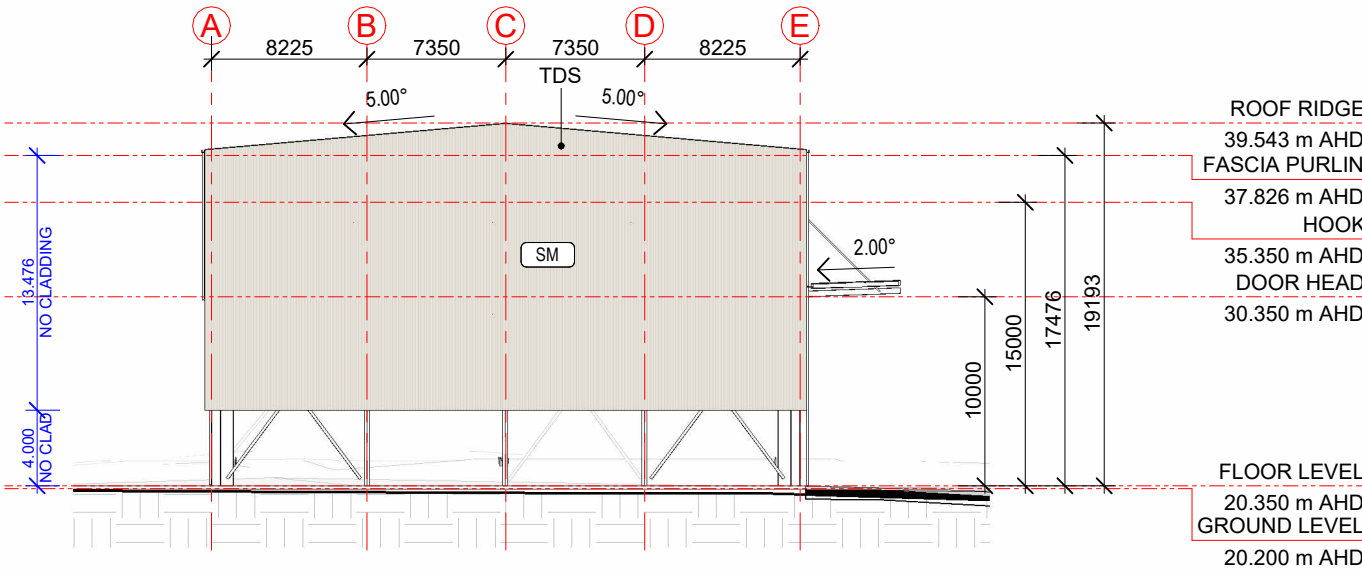
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ELEVATIONS 1 OF 2 PRELIMINARY NOT FOR CONSTRUCTION

SCALE AT A3
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DATE
03.12.25
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PROJECT NUMBER
CE25168
DRAWING NUMBER
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ISSUE
DD01
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SM	COLORBOND SURFMIST		TDS	TRIMDEK-0.48BMT - CLADDING



E3 PROPOSED EAST ELEVATION
1 : 400



E4 PROPOSED WEST ELEVATION
1 : 400

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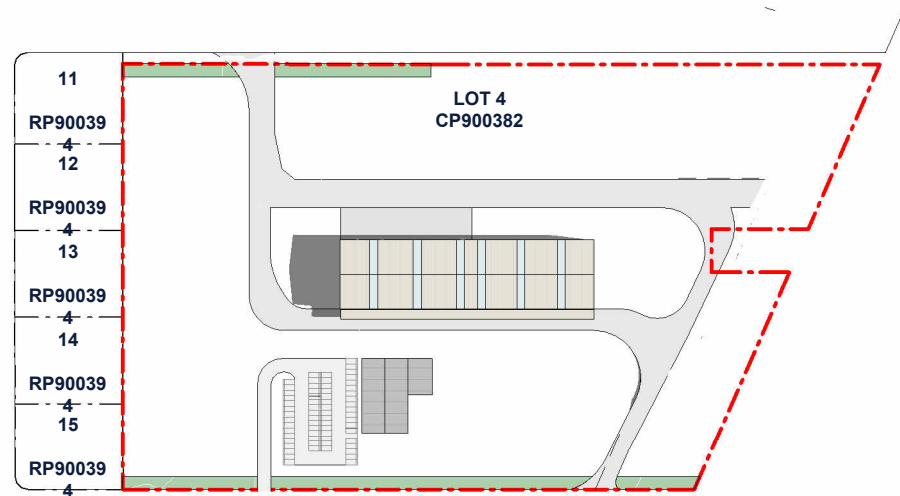
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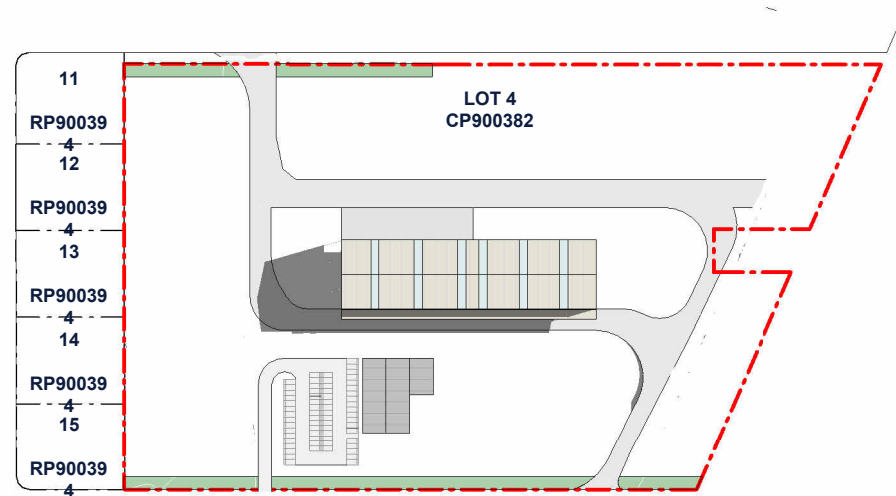
PROJECT DESCRIPTION
Rockhampton Ring Road-Pre-cast Yard Facility
BMD BIELBY - ROCKYJV
Lot 4 Werribee & Anniki Street Kawana QLD 4701
APPROVED FOR & ON BEHALF OF FORTY FOUR STUDIOS

DRAWING TITLE
ELEVATIONS 2 OF 2
PRELIMINARY
NOT FOR CONSTRUCTION

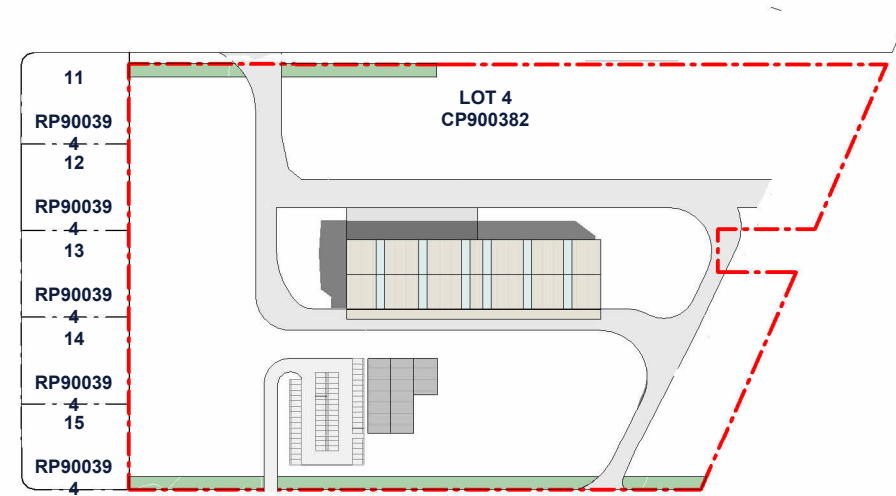
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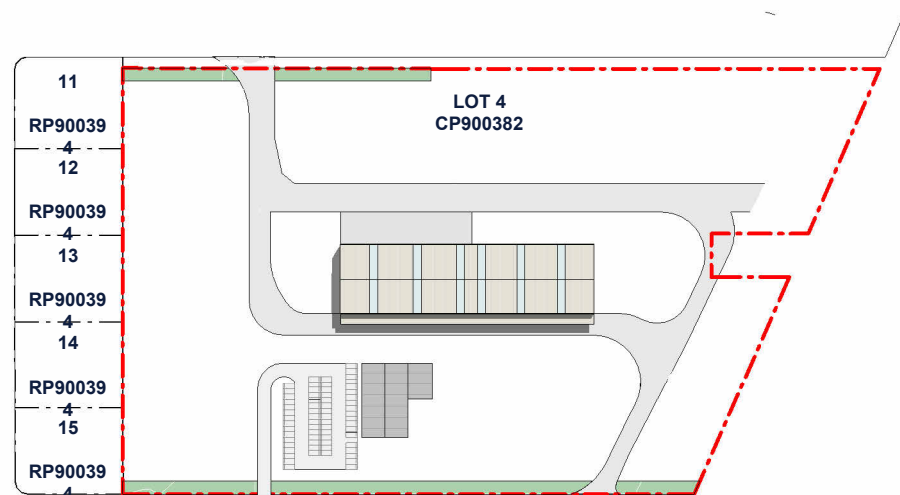
9AM-22-03-2025



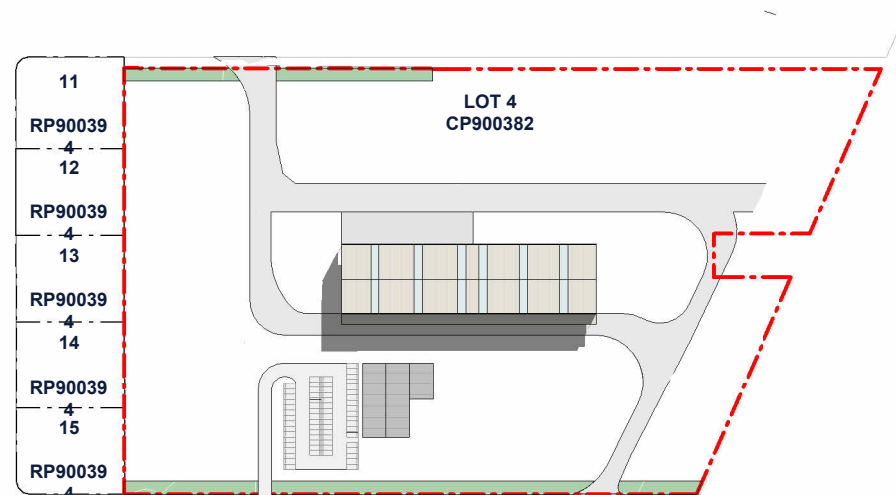
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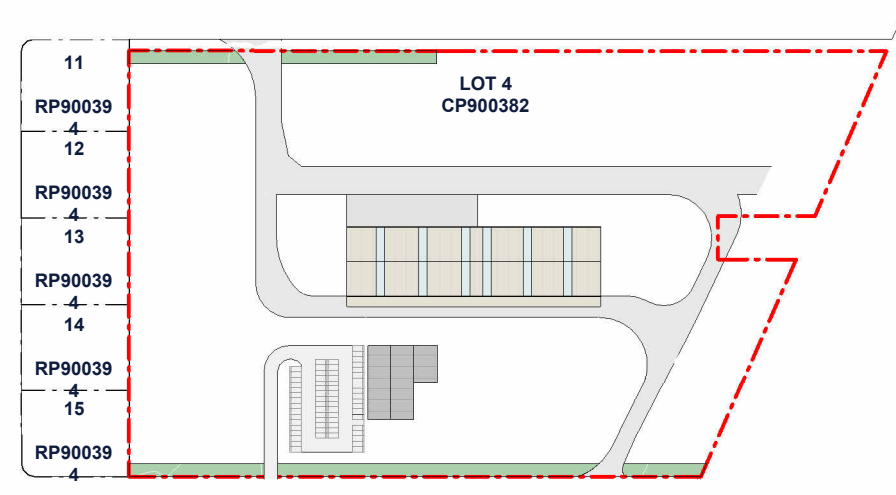
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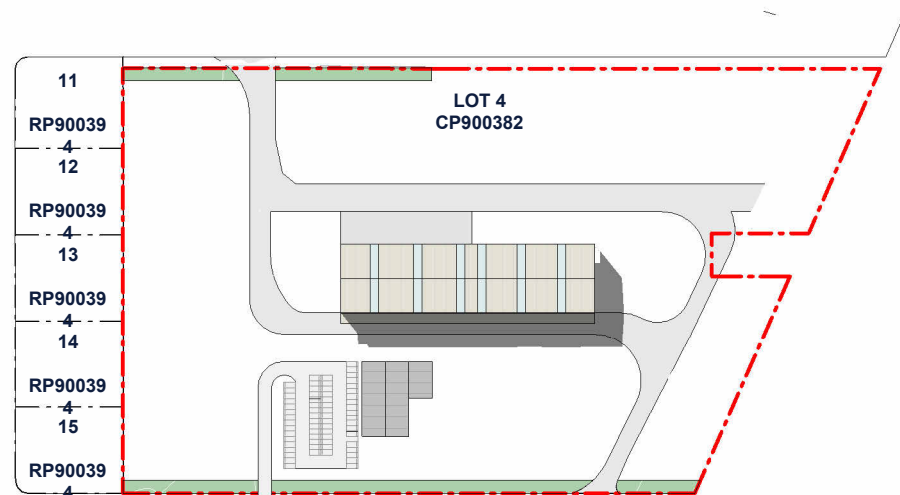
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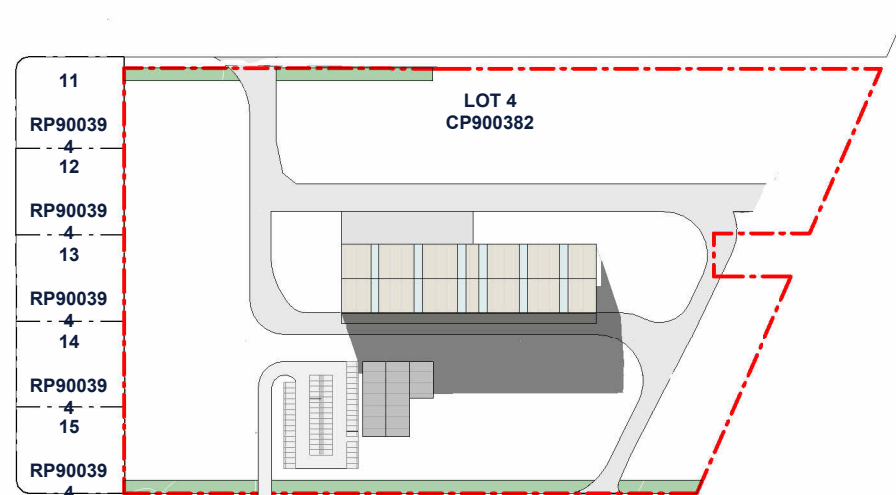
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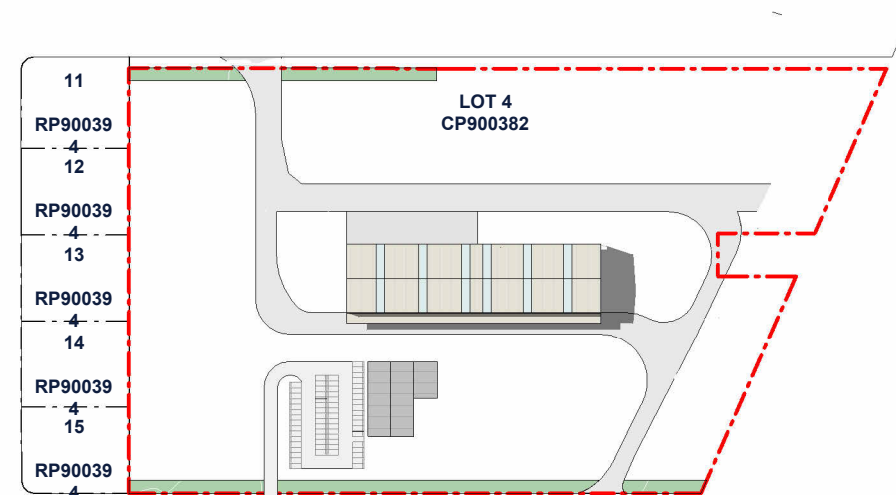
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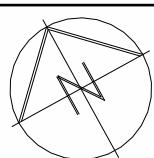


3PM-22-06-2025



3PM-22-12-2025

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SK01	31/10/2025	CONCEPT DRAWINGS	0	31.10.25	AH	INITIAL ISSUE

PROJECT DESCRIPTION
**Rockhampton Ring Road-Pre-cast
Yard Facility**
BMD|BIELBY - ROCKYJV
Lot 4 Werribee & Anniki Street
Kawana QLD 4701
APPROVED
FOR & ON BEHALF OF
FORTY FOUR STUDIOS

DRAWING TITLE	SCALE AT A3	PROJECT NUMBER
3D SHADOW STUDIES	1 : 3500	CE25168
Morning June 22 9am	DATE 03.12.25	DRAWING NUMBER 451PD
PRELIMINARY	DRAWN AH	ISSUE DD01
NOT FOR CONSTRUCTION	CHECKED JFA	REVISION 3

ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

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Development Permit No.: D/196-2025

Dated: 31 March 2026

Environmental Management Sub Plan - Waste and Recycling Management

Environmental Management Sub-Plan – Waste and Recycling Management

Scope

This plan has been developed to manage the project's construction activities with respect to waste and recycling management for the works on the Rockhampton Ring Road - Northern Section.

Objective

- To provide a strategic framework to enable construction of the project with minimal environmental impact due to the management or disposal of waste generated through project works.
- To ensure no potential risks to health or amenity occur due to construction related waste management and disposal.

References

Legislation
<i>Environmental Protection Act 1994</i>
<i>Environmental Protection Regulation 2019</i>
<i>Waste Reduction and Recycling Act 2011</i>
<i>Waste Reduction and Recycling Regulation 2011</i>
Australian Standards and Industry Guides
Project Specific Documents
<i>MRTS51 Environmental Management</i>
<i>Annexure MRTS51.1 Environmental Management</i>

Wastes represent lost or degraded material and energy resources. Improper waste management can impact on a range of environmental values including land, air quality, surface water and groundwater. Improper waste management can also cause a range of public health hazards.

Potential Impacts

The potential impacts generated by construction activities are outlined below in Table 1 including the preferred waste strategy. Waste classifications will be recorded on the live waste monitoring register in

accordance with the new risk-based classification framework prescribed in the Environmental Protection (Regulated Waste) Amendment Regulation 2018.

BBJV's environmental performance will be tracked against specific outcomes that ensure the environmental values are not adversely impacted. BBJV will aim to ensure the following outcomes are achieved: avoid adverse impacts of waste on land contamination, surface and groundwater quality and visual amenity; Minimise generation of waste in accordance with the waste management hierarchy.

Table 1: Potential Impacts

Activity	Potential Environmental Impact	Preferred Waste Measure
Vegetation waste	Fire hazard (Mulch stockpiling). Emissions of greenhouse gases as vegetation rots. Possible loss of nutrients in natural nutrient cycles. Spread of weeds. Visual impact. May harbour vermin (may also harbour native animals).	Stored in situ. Retained and reused on site for erosion and sediment control and during rehabilitation. Vegetation waste arising from clearing and grubbing will be free of biosecurity matter due to prior treatment(s), and therefore used in conjunction with soil erosion and sediment measures. Cumbersome species such as <i>Opuntia tomentosa</i> will be buried in-situ and GPS locations recorded.
Packaging waste	Lost resource. Visual impact. Source of litter. Plastics may entrap native animals.	Stored in dedicated skip bins. Disposal of any non-recyclable elements, otherwise recycle (e.g. pallets)
Waste concrete and concrete wash out waste	Localised increases in pH. Lost resource. Visual impact.	Stored in situ sump. Recycle as blocks for offsite use. Dispose of liquid waste as regulated waste.
Scrap metal	Loss of resource. Visual impact. Localised soil contamination with potential to leach to surface and groundwater. Human health risk (tetanus). Fauna entanglement (e.g. wiring)	Store in dedicated skip bin. Recycle if feasible.
Other building and demolition wastes including non-biodegradable erosion controls	Loss of resource. Visual impact.	Store in dedicated skip bins. Recycle if feasible. Dispose as required.
Waste oil and hydrocarbon contaminated wastes including separated oily water from workshop activities and greasy hoses	Contamination of soils, surface water and groundwater. Toxicity to plants and animals. Degradation of water resources. Loss of resource.	Storage in accordance with AS1940. Recycle if feasible. Reuse separated water for dust suppression. Dispose as required.
Waste solvents and paints	Contamination of soils, surface	Storage in accordance with SDS.

Activity	Potential Environmental Impact	Preferred Waste Measure
	water and groundwater. Toxicity to plants and animals. Degradation of water resources. Loss of resource.	Dispose as required.
Office wastes, recyclables, electrical waste	Litter. Loss of resource.	Store in dedicated bins. Recycle recyclables. Dispose as required.
Food wastes	May attract vermin Odour Disease, particularly through bacterial infection	Store in dedicated bins. Dispose as required.
Other domestic wastes	Loss of resource. Litter. Plastics may entrap animals.	Store in dedicated bins. Dispose as required.
Wastewater (toilets, showers, kitchen, laundry) Sewage and water treatment plant sludge Clinical waste	Contamination of land, surface and groundwater. Degradation of water resources. Inhibition of native plant growth. Increased nutrient levels in aquatic ecosystems, causing eutrophication and algal outbreaks. Spread of disease. Odour.	Store in septic rated tanks. Store in designated waste containers. Dispose as required.
Tyres	Fire hazard. Toxic smoke if fire occurs. Visual impact. Loss of resource. Collect water which may harbour mosquitoes and other biting insects.	Store in dedicated stockpiles. Dispose as required.
Batteries	Loss of resource. Release of acidic and/or metallic contaminants to land, surface water and groundwater. Toxicity to plants and animals. Degradation of water resources. Inhibition of native plant growth.	Store on pallets in bunded area. Recycle if feasible. Dispose as required.
Spoil	Contamination of land, surface and groundwater. Degradation of water resources. Visual impact. Inhibition of native plant growth. Dust generation.	Stored in situ. Treated for reuse within the project area. Moved offsite for burial at quarry. As agreed by the landholder

Waste Management Strategies

The handling, storage, transportation, and disposal of waste must consider mitigation measures outlined below, these will be periodically reviewed to assess for performance and suitability.

<i>Sources</i>	<i>Mitigation Measures</i>
Key sources of waste e.g. packaging, mobile plant, construction activities, office activities.	- Waste segregation and recycling opportunities scrap metal, paper, timber, aluminium cans etc. - High level of housekeeping maintained in work areas - Adequate bins supplied (with lids to prevent windblown litter and discourage animal scavenging) - Bins must be regularly emptied to prevent over-flowing - Use of licensed waste removal contractors to approved, licensed facilities - Waste tracking records must be retained for all controlled wastes as per regulatory requirements - Where unknown waste or potentially contaminated material is encountered, work in the immediate area must cease, the area barricaded, and an investigation undertaken to confirm contamination and identify disposal requirements - Temporary ablutions must have: - Timer taps - Scheduled servicing to prevent overflows - A high-level alarm fitted to storage tanks - A water tank which is smaller than the storage tank - And be protected from potential impacts and damage - Other requirements include concrete truck wash-out permitted in designated concrete wash-bays only, regular inspection of waste facilities etc. - Key long-term site locations for waste skips will include compounds and laydowns. Short-term locations will including areas within the main alignment to service adhoc work activities.



**Key long-term site locations for skip bins area indicated as per above.*

These areas are known, west to east, Abutment

- *Excess material on-site will be stored at laydowns e.g. Birkbeck and within the main alignment, for future use, as required.*

These mitigation measures listed above are to be supplemented by the management strategies listed.

These will include but not be limited to the:

General Refuse (food Litter and Other Waste)

The provision of waste receptacles which are clearly labelling and covered to prevent loss of waste across the sites. These bins will be monitored to ensure they are serviced and being used appropriately. The locations will be sited relevant to crib facilities, laydown yards and static sites (i.e., bridges) to ensure that the segregation and disposal of waste is easily undertaken by project personnel.

Waste Concrete

Waste concrete generation will be managed through the accurate estimation of concrete volumes required for scheduled pours. Where washout is required, these will be typically for chutes and empty bowls and will be completed at specific washout locations. Concrete disposal to ground will not be permitted on site and shall be preferentially reused (temporary lining of drains) or removed off site to the manufacturers disposal facility or undertaken at a designated disposal location on site. Where washout pits are required, these are to be constructed geo-fabric lined sumps appropriately located and sized for the washout activities.

Biosecurity Wastes

Biosecurity waste generation are to be managed using an initial dry clean down procedure as the first instance of completing weed hygiene activities. Once the majority of the retained soil is removed, a weed washdown will be completed. Light vehicles are to utilise a weed washdown facility where this does not contravene the requirements of the Biosecurity Act. Where the washdown is completed prior to topsoil stripping the waste generated will remain in place and managed during the topsoil stripping activities. Wash down procedures after the completion of topsoil stripping will be undertaken if required.

Regulated Waste (Contaminated Soils)

The contaminated soils identified on the site are impacted by hydrocarbons and will be incorporated into the embankment fill as a means of disposal. Where chemical or fuel spills occur, the impacted materials will be collected and dispose of by a licensed transporter at a licensed waste facility. Where the temporary storage on site is required, these shall be covered, contained and demarcated to prevent the interaction with rainfall or unintentional movement off the site. Waste Tracking documentation will be collected, retained on file and submitted as required.

Regulated Waste (Hazardous Waste)

All hazardous waste (including asbestos) is to be managed in accordance with Hazardous Materials and Chemicals Management Sub-Plan. Where required a specific procedure will be developed to direct the identification, treatment management transport and disposal of the hazardous materials (i.e., asbestos removal and disposal).

Regulated Wastewater (Sewage)

Amenities blocks and temporary port-a-loos will be managed on site through the establishment of a register to identify the location and servicing requirements. These will be set up in a way to prevent the potential for a spill. The holding tanks will be larger than the water tanks, the taps will be push type, and where necessary high-level alarms will be fitted. These will be serviced by a licensed contractor and any sludges; sewage residues or high soils will be disposed of at a licenced waste disposal facility and the applicable tracking documentation completed.

Waste Estimates

Initial estimates of types and volumes of waste generated onsite is shown below.

Potential Waste	Disposal Location/Bin Type	Quantity
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Excess earthworks (Soil)	To be determined	40,000 - 45,000 m3
General Waste	Landfill	252 m3
Recycled Waste	Recycling plant	120 m3
Green waste / vegetation	Reused (mulched)	1,400 tonnes
Topsoil	Reused	28,000 m3
Bituminous waste (incl. asphalt)	Recycling plant	100 - 130 Tonnes
Concrete waste	Recycling plant	800 - 1,000 tonnes
Steel / Metal	Recycling plant	75 - 100 tonnes

Waste and recycling bins will be predominately located at the main office compounds with small skip bins along the alignment.

Water Consumption

Water will be required for most construction activities however the below have been identified as activities that typically have a high water use:

- Earthworks including excavation, filling and compaction activities.
- Stockpiling activities.
- Construction of pavements, bridges and culverts.
- Operation of site compound and crib facilities.
- Landscaping and revegetation.

It is estimated that at least 300,000kL of water will be required for the project.. Key water sources to support construction will include:

1. Pink Lilly Sands (Construction Authority - Heidelberg Materials Australia) - BBJV (Contractor/subcontractor) - under OSW/2020/5467 Exemption requirements for constructing authorities for the take of water without a water entitlement (*Water Act 2000, Water Regulation 2016*)
2. Water Allocation WAN5079 (TMR) *Water Act 2000*

Potable water will be required to be supplied at the site compound and crib facilities. Potable water supplies will also be required to meet QA requirements associated with the construction of RSS walls. In addition to the above water sources, the project will maximise the reuse of stormwater captured onsite. Water use will be tracked through meters on the pumps from non-potable sources or through water cart usage tracking sheets.

Green Waste

Where possible, all vegetation waste from clearing and grubbing activities will be mulched on site and re-used for environmental controls as per Project ESCP. Any waste not able to be re-used will be disposed of at a council approved waste facility.

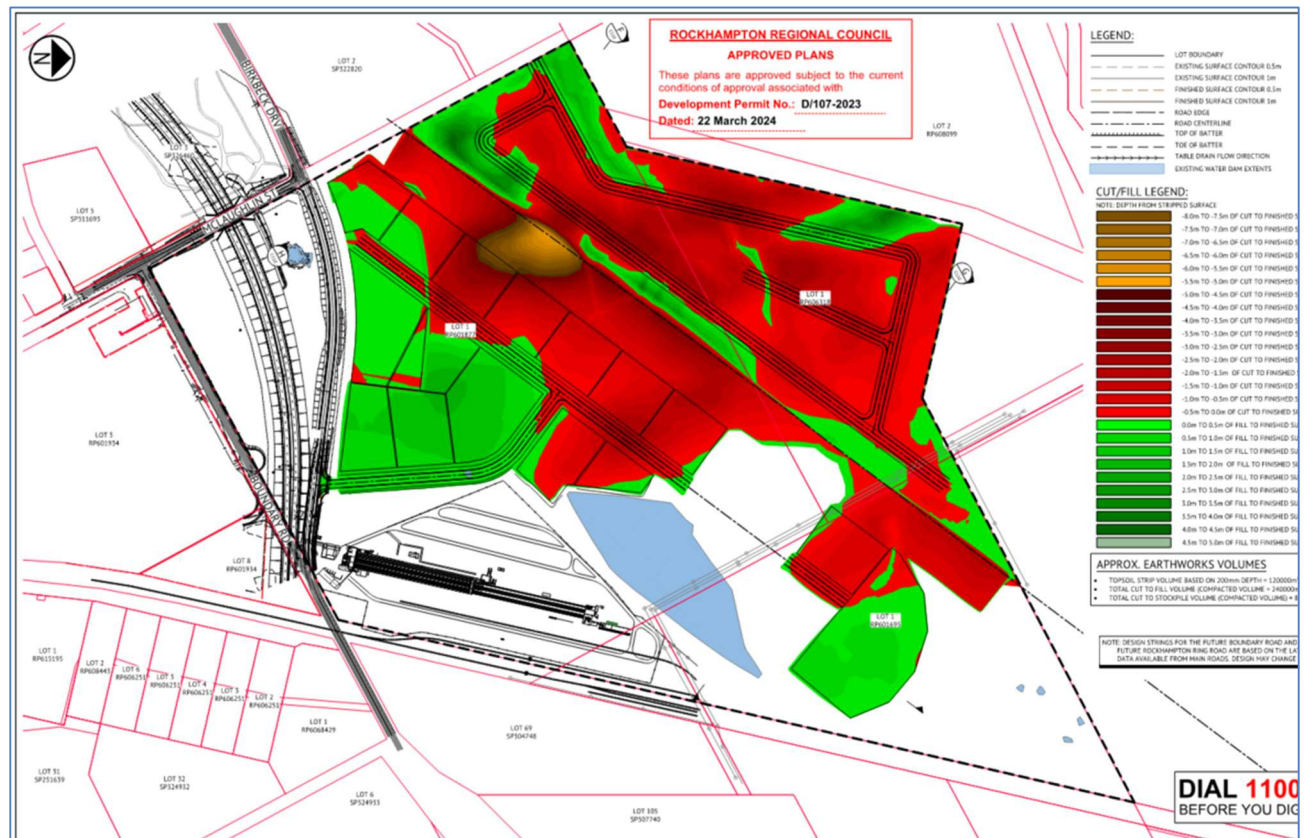
Requirement for development and implementation of a staged vegetation management/clearing plan that clearly delineates the extent of vegetation to be cleared.

Clearing plan to include:

- Hand clearing within riparian margins, where feasible.
- Vegetation areas to be retained, where feasible.
- No wet season clearing is to be undertaken.
- Location of stockpiles, laydown areas, etc. in previously cleared areas.

Material Sourcing

A number of materials will be required for construction of the project including gravels, fill and sand. The quarry material will be sourced from existing established quarries, such as Bushflower Quarry. It is estimated 769,000m³ of fill will be required over the life of the project. Materials will be transported via Truck and Dog (T&D) operation. Weed Hygiene Certificates will remain a biosecurity requirement as part of import.

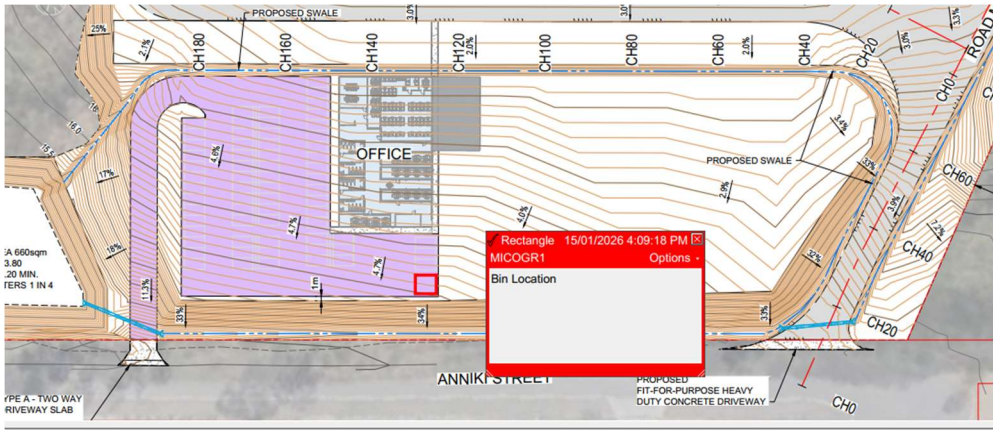


*Bushflower Quarry - proposed heat map of extraction.

Travel route for vehicles transporting materials to and from the quarry will be via approved haulage routes onto existing road network. Material quantities are illustrated within the individual Construction Methodologies.

Any materials determined to be unsuitable will be subject to CAV's direction.

Pre-cast Yard



Precast Yard Waste Management

The Werribee Street precast yard will generate waste streams primarily associated with concrete production and handling, including surplus concrete, concrete slurry and washout material, reinforcement steel off-cuts, formwork and mould materials, packaging waste and general industrial waste. Waste generation will be minimised through accurate batching, production planning and reuse of materials where practicable.

Dedicated waste segregation will be implemented within the precast yard, including clearly labelled, bins for general waste, recyclable materials (steel, timber and packaging) and concrete waste. Concrete washout will be undertaken within a designated, bunded and lined washout area located within the precast yard, designed to prevent infiltration to surrounding soils and runoff to stormwater. Hardened concrete will be recovered and reused on site where feasible or transported off-site to a licensed concrete recycling facility.

Bins associated with the precast yard will be serviced by a licensed waste contractor via internal haul routes using skip-lift or hook-lift collection vehicles. Servicing will occur on an as-required basis to prevent overflow, odour, litter or environmental nuisance. Bin cleaning and washdown will be undertaken by the licensed waste contractor as part of routine servicing. Kerbside bin collection will not be utilised for any waste stream associated with the development.

Based on the scale of anticipated precast operations, indicative waste generation from the precast yard over the construction period is provided in the table below.

Table: Estimated Waste Generation – Precast Yard

Waste Stream	Estimated Quantity	Bin Type / Storage Method	Disposal / Reuse Method
Surplus concrete, rejected precast elements and hardened washout material	150–250 tonnes	Concrete washout bay and hook-lift bins	Reused on-site where practicable or transported to licensed concrete recycling facility
Concrete slurry and washout water	Minor volumes (operational)	Bunded, lined concrete washout area	Solids managed as concrete waste; water managed in accordance with site controls
Reinforcement steel off-cuts	15–25 tonnes	Dedicated metal skip bin	Recycled off-site by licensed metal recycler
Formwork and mould materials (timber, plywood, composite)	40–60 m ³	Skip bins or designated stockpile	Reuse on-site where feasible; remainder disposed of at licensed facility
Packaging waste (plastic wrap, pallets, strapping, cardboard)	25–35 m ³	Mixed recycling skip bins	Segregated and recycled where practicable
General industrial waste	15–25 m ³	General waste skip bins	Transported to licensed landfill facility

Waste quantities will be monitored throughout precast yard operations and bin numbers, bin sizes and collection frequency will be adjusted as required to ensure ongoing compliance with environmental and amenity requirements.

Management

The management of the risks associated with this sub plan have been incorporated into the project [Work Method Statements](#) as per BMD [Risk Management Standard](#).

Performance Criteria	- The waste minimisation hierarchy of principles shall be integrated into all construction activities: - Avoid; - Reduce; - Reuse; - Recycle; and - Dispose. - Any opportunities to reuse or recycle construction materials to be identified and implemented. - Disposal of hazardous or contaminated wastes to be tracked and documented. - No complaints related to waste management or disposal from the local community.
Communication and Training	- Intent of this sub-plan will be communicated through the Site Induction process, to ensure all site personnel are aware and take ownership of sub-plan requirements relating to this element. - Requirements relating to this sub-plan to be revisited frequently through Toolbox and Prestart meetings.
Mitigation Measures	- The following waste streams will be managed as specified: - General and office waste: To be collected on-site using bins with appropriate lids, which will be emptied as required and transported to an approved landfill site by approved waste transporter. - Hazardous waste: To be appropriately contained and stored on-site in approved hazardous waste bins. Hazardous waste to be removed from site by accredited transporter to approved disposal facility. - Construction waste: Waste concrete, reinforcement steel, formwork off-cuts, and general industrial waste will be collected and contained in large skip-style bins. Skips will be removed and replaced on an as-needed basis, by an accredited waste transporter. - Concrete orders will be as precise as possible to limit excess. All waste concrete will be removed from site on a regular basis – no waste concrete to be disposed of anywhere on site.

Monitoring

- Housekeeping in site work areas will be regularly undertaken to ensure no waste materials cause littering.
- Works undertaken in or near waterways will be cleaned up on a daily basis to ensure no materials remain in a location where they could enter a waterway in the event of rainfall outside of work hours.
- Waste and recycling materials shall be transported to appropriately licenced facilities for disposal or reuse.
- Regulated waste materials (e.g asbestos, sewage pump out) shall be tracked utilising QLD waste tracking system with a record kept by the project as per regulatory requirements.
- Unsuitable or contaminated soil material shall be managed as per the project's Soil and Land Management Sub Plan.
- Reuse of captured site water for dust suppression on site where practical

- On-going visual checks will be carried out to ensure correct waste disposal is occurring. Additionally, the site shall be monitored for good housekeeping practices and littering. Weekly inspections will be performed by project staff and documented in BMD [Weekly Safety and Environmental Checklist](#).
- The procedure for measuring and recording wastes are tracked and recorded via Appendix 17 - Monthly Reporting Template (BBJV Consultancy Agreement). Under this arrangement, it is a requirement of the Waste Services provider to complete and submit provided forms, in conjunction with the contractors monthly progress claim, which form a condition precedent to payment. For example:

MATERIAL USE SUMMARY

Subcontractors to report on materials used in the relevant reporting period. Only report on relevant materials that apply to contractors' requirements on the project.

TYPE	AMOUNT USED*	UNITS
Electricity Usage (from grid, only if metered)		
Non-renewable		KWh (kilowatt hours)
Renewable (e.g. GreenPower)		KWh (kilowatt hours)
Electricity Generation		
Generators 500 kVA and larger		KWh (kilowatt hours)
EXPLOSIVES		
ANFO		T (tonnes)
Heavy ANFO		T (tonnes)
Emulsion		T (tonnes)
Water		
Water treatment chemical		
Potable (i.e. drinking water)		kL (kilolitres)
Non-potable (recycled/reclaimed wastewater)		kL (kilolitres)
Non-potable (sediment ponds, rainwater)		kL (kilolitres)
Non-potable (ground water (bore))		kL (kilolitres)
Materials		
Total Volume of Steel		T (tonnes)
Total Volume of Concrete		T (tonnes)
Total Volume of Timber		T (tonnes)
Concrete Batching (type & group)		
Volume/quantity of concrete		m3 (cubic meters)
Water		L (litres)
Sand		Kg (kilograms)
Concrete		Kg (kilograms)
Reagents, accelerants - by type		L (litres)

- This data is then recorded in the Waste and Recycling Register in the project's SharePoint site.

	The procedure for measuring and recording recyclables wastes, such as, cans/bottles is undertaken through a BBJV arrangement with Containers for Change, with monies donated to local charity groups. Data is recorded in the BBJV Initiatives Register Containers for change on Sharepoint. Coffee grounds are collected and donated to Rockhampton Home Support Association, with data recorded in sharepoint.
Responsible Persons	- All site personnel are responsible for their General Environmental Duty, and shall ensure that their or others' actions do not cause environmental nuisance or harm at any level. - Foremen and Leading Hands are responsible for ensuring compliant management of waste materials and housekeeping within any works areas under their control. - Environmental Representative is responsible for routine surveillance and monitoring, communication of requirements of this sub-plan, identification of waste disposal locations and recycling opportunities, and all other responsibilities related to waste and recycling management identified within this sub-plan and overall IPMP. - Project Manager is responsible for overseeing implementation of this Sub-Plan and overall EMP.
Reporting	- Incidents and Accidents shall be reported as per the EMP Section 7.1. - All complaints shall be managed as per the EMP Section 7.3. - Monthly reporting to the Client on this aspect will be recorded through Project Monthly Reports.
Corrective Actions	- Where assessment of housekeeping proves unsatisfactory, personnel in the vicinity will be directed to improve standard of work area immediately. - Where assessment of waste segregation proves unsatisfactory, segregation methods and sub-plan requirements will be revisited via a specific Toolbox meeting to address issue. - Where assessment of waste minimisation and reuse proves unsatisfactory, work area will be directed to modify current procedures to improve minimisation, reuse and waste generation. - Where an incident or complaint has been received regarding the offsite disposal, transport to that location shall cease until an investigation has been undertaken by the project team regarding the material.

- In the event of a complaint or incident, an investigation will be undertaken to determine the cause of the problem, through which processes or activities will be modified if required.
- All corrective actions are to be managed as per the BMD [Incident and Accident Management Standard](#) and recorded in the [Corrective and Improvement Action Database](#).



MOLONEY & SONSTM
ENGINEERING

ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

These plans are approved subject to the current conditions of approval associated with

Development Permit No.: D/196-2025

Dated: 31 March 2026

DETAIL DESIGNSTORMWATER MANAGEMENT PLAN

Werribee Street & Anniki Street, Kawana QLD 4701

BMD BIELBY – ROCKY JV

28 January 2026

CE25168.1 – SBSWMP

Contract No. CE25168.1

A/ PO BOX 3203 RED HILL ROCKHAMPTON Q 4701
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TABLE OF CONTENTS

COMMERCIAL IN CONFIDENCE	2
Table of Contents.....	3
1. Introduction	6
1.1. Project Commission	6
1.2. Project Background.....	6
1.2.1. Project Location.....	6
1.2.2. Existing Site and Land Use.....	7
1.3. Description of Proposed Project.....	8
1.4. Proposed Conceptual Drainage	8
2. SITE HYDROLOGY.....	9
2.1. Background.....	9
2.2. Pre-Development SCENARIO	10
2.2.1. Catchment Definition.....	10
2.2.2. Rational Method.....	10
2.3. Post-Development SCENARIO	11
2.3.1. Catchment Definition.....	11
2.3.2. Rational Method.....	12
2.4. Change in Flow Rates.....	13
3. STORMWATER QUANTITY management plan.....	14
3.1. Water Quantity Objectives	14
3.2. Stormwater Mitigation.....	14
3.3. 1D Modelling Assumptions & Methodology.....	14
3.4. XP-SWMM Input Parameters	15
3.5. XP-SWMM Analysis.....	16
3.6. On Site Detention (OSD) Details.....	24
4. STORMWATER QUALITY management plan	26
4.1. Site Specific Objectives	26
4.2. MUSIC Water Quality Analysis Methodology	26
4.3. Treatment Train	29
4.4. MUSIC Modelling Results	29



5.	OPERATIONAL PHASE MAINTENACE REQUIREMENTS.....	33
5.1.	Construction Phase.....	33
5.2.	Operation Phase.....	33
6.	CONCLUSION.....	35
	APPENDIX A – Proposed Layout.....	36
	APPENDIX B – Stormwater Catchment Plan Drawings.....	37
	APPENDIX B – Stormwater Catchment Plan Drawings.....	38

FIGURES

Figure 1: Locality Plan	7
Figure 2: Site Elevation.....	8
Figure 3: Pre, Post and Mitigated Flow Rates for the critical duration of the 1% AEP Design Storm Event at LPD A	18
Figure 4: Pre, Post and Mitigated Flow Rates for the critical duration of the 2% AEP Design Storm Event at LPD A	18
Figure 5: Pre, Post and Mitigated Flow Rates for the 5% AEP Design Storm Event at LPD A	19
Figure 6: Pre, Post and Mitigated Flow Rates for the 10% AEP Design Storm Event at LPD A	19
Figure 7: Pre, Post and Mitigated Flow Rates for the 0.2EY AEP Design Storm Event at LPD A.....	20
Figure 8: Pre, Post and Mitigated Flow Rates for the 0.5EY AEP Design Storm Event at LPD A.....	20
Figure 9: Pre, Post and Mitigated Flow Rates for the critical duration of the 1% AEP Design Storm Event at LPD B.....	21
Figure 10: Pre, Post and Mitigated Flow Rates for the critical duration of the 2% AEP Design Storm Event at LPD B.....	21
Figure 11: Pre, Post and Mitigated Flow Rates for the 5% AEP Design Storm Event at LPD B.....	22
Figure 12: Pre, Post and Mitigated Flow Rates for the 10% AEP Design Storm Event at LPD B.....	22
Figure 13: Pre, Post and Mitigated Flow Rates for the 0.2EY AEP Design Storm Event at LPD B.....	23
Figure 14: Pre, Post and Mitigated Flow Rates for the 0.5EY AEP Design Storm Event at LPD B.....	23
Figure 15: Proposed Site WSUD Sub-Catchments.....	27
Figure 16: Treatment Train Layout and MUSIC Results.....	30
Figure 17: Bioretention Basin A.....	31
Figure 18: Swale A.....	32

TABLES

Table 1: Intensity Frequency Duration Data.....	9
Table 2: Pre-Development Time of Concentration.....	10



Table 3: Pre Development Peak Flow Estimation – Rational Method.....	11
Table 4: Post Development Time of Concentration.....	12
Table 5: Post Development Peak Flow Estimation – Rational Method.....	12
Table 6: Change in Peak Flow Rate	13
Table 7: Adopted Initial & Continuing Losses	15
Table 8: Catchment Parameters.....	15
Table 9: Rational Method vs XP-SWMM Generated Peak Discharges for LPD A	16
Table 10: Rational Method vs XP-SWMM Generated Peak Discharges for LPD B.....	17
Table 11: Comparison of Pre – Mitigated flow rates – Extracted from XP-SWMM Model (m3/s).....	17
Table 12: Detention System Volumes.....	24
Table 13: Depth - Area Relationship Adopted for the Basin	24
Table 14: Adopted Outlet Configuration.....	24
Table 15: Outlet Configuration Results	25
Table 16: Post Development Sub-Catchments Parameters.....	27
Table 17: Catchment Runoff Generation Parameters.....	28
Table 18: Pollutant Export Relationships – Split and Lump Land Uses.....	28
Table 19: Treatment Train Effectiveness at Receiving Node	29
Table 20: Bio-Retention Basin Inspection & Maintenance Requirements	34



1. INTRODUCTION

1.1. PROJECT COMMISSION

Moloney & Sons Engineering was commissioned by BMD Bielby – Rocky JV to prepare a Site Based Stormwater Management Plan (SBSWMP) in support of a Development Application – Material Change of Use, at lot 4 CP900382; known as Werribee Street & Anniki Street, Kawana, QLD 4701.

Currently the development site areas for a single 55,280m². The Site is currently a vacant Lot, is located within the Rockhampton Regional Council (RRC) and has a Land Use Zoning of “Low Impact Industry”. The proposed development intends to develop the land to include an Industrial Shed Structure.

1.2. PROJECT BACKGROUND

1.2.1. PROJECT LOCATION

The subject site is located at Werribee Street & Anniki Street, Kawana, QLD 4701 (at 4 CP900382), is zoned Low Impact Industry Code in the suburb of Rockhampton Regional Council, QLD and has an area of approximately 5.528 hectares.

The site is bounded by Anniki Street to the south, Werribee Street to the north, neighbouring industrial properties to the west and railway in the east. The easement ensures functional access and must be preserved in any future development plans.

Figure 1 shows the site and easement location.



Figure 1: Locality Plan

1.2.2. EXISTING SITE AND LAND USE

At the time of writing this report, the site is currently vacant, covered with a mix of grass, scattered trees, and localized patches of scrub vegetation.

The site's terrain is relatively sloped. This site is divided into three directions. The site has a slope of approximately 5% from the center towards the northern boundary, and about 6% from the center towards the southern boundary.

A topographic view of the site is illustrated in *Figure 2*.

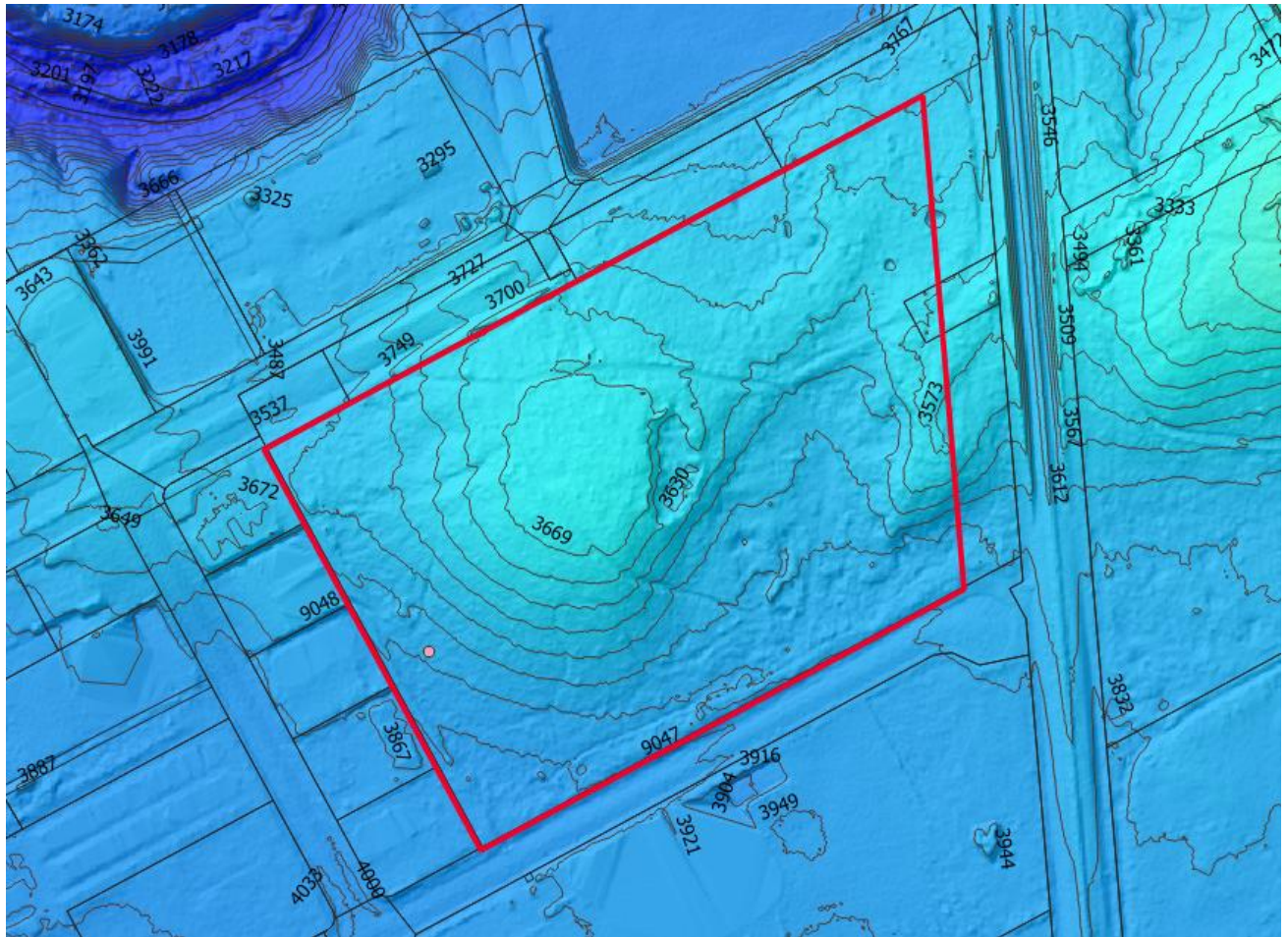


Figure 2: Site Elevation

1.3. DESCRIPTION OF PROPOSED PROJECT

The sites' proposed use is to house a new high impact industrial facility, including a large concrete reinforcement & casting shed, large laydown storage areas, small site office and LV carpark. Site access/entry will be limited to Anniki St for all heavy & light vehicles with a one-way Heavy Vehicle exit onto Werribee St. The proposed development site accommodates two primary buildings:

- ~3700sqm Reinforcement & Casting Shed and
- ~930sqm Temporary Demountable Site Office building and associated LV parking.

Please refer to Proposed Site General Arrangement included as **APPENDIX A** – Proposed Layout for further details of the proposed layout.

1.4. PROPOSED CONCEPTUAL DRAINAGE

It is proposed that stormwater flow generated from the internal hardstands, impervious areas and site catchments will be captured by the proposed drainage network and discharged to a new proposed bioretention/ detention at the southwest corner.



2. SITE HYDROLOGY

2.1. BACKGROUND

This section of the SBSWMP defines the method and parameters applied in the hydrological assessment of the location to simulate the expected flow pattern and maximum discharge at the Lawful Point of Discharge (LPoD).

For evaluating the peak flow rates before and after development, a Rational Method computation is presented as a reference.

The Rational Method, as discussed in Section 4.3 of the Queensland Urban Drainage Manual 2017 (QUDM), is a feasible and reliable method for approximation, owing to its adaptability to the available data and its ability to generate suitable approximations of the maximum site discharge based on the data inputs mentioned below:

- specific intensity frequency duration (IFD) data;
- length/type of flow path;
- contributing catchment areas; and
- coefficient of discharge.

IFD data for the hydrologic modelling was obtained from the Bureau of Meteorology website. The IFD data is summarised in *Table 1*.

Table 1: Intensity Frequency Duration Data

Duration (min)	63 % (mm/hr)	0.5 EY (mm/hr)	0.2 EY (mm/hr)	10 % (mm/hr)	5 % (mm/hr)	2 % (mm/hr)	1 % (mm/hr)
5	116.00	143.00	175.00	201.00	231.00	271.00	303.00
10	96.50	119.00	146.00	168.00	193.00	227.00	255.00
15	82.50	102.00	124.00	143.00	165.00	195.00	218.00
20	72.10	89.00	109.00	125.00	144.00	170.00	191.00
25	64.10	79.20	96.70	111.00	128.00	152.00	170.00
30	57.90	71.50	87.40	101.00	116.00	137.00	154.00
45	45.10	55.80	68.40	79.00	91.00	108.00	121.00
60	37.30	46.20	56.80	65.70	75.80	89.70	101.00



2.2. PRE-DEVELOPMENT SCENARIO

2.2.1. CATCHMENT DEFINITION

The pre-development catchment has been analysed as three (3) catchments (A, B and C) with contributing areas of 3.889 hectares, 1.110 hectares and 0.529 hectares respectively. The catchment boundary and LPoD for the pre-development plan will be shown in Moloney & Sons Engineering Drawing CE25168-600-DR in **APPENDIX B – Stormwater Catchment Plan Drawings**

2.2.2. RATIONAL METHOD

The pre-development coefficient of runoff (C year) was determined on the fraction impervious method specified in QUDM. Based on the detailed survey information provided, the pre-development catchments (A, B and C) have an impervious area of 0 ha, which equates to a fraction impervious of 0% respectively.

Using the Rational Method, C_{10} value of 0.66 have been adopted for the three catchments, and a corresponding 60 minute ten-year rainfall intensity (I_{10}) of 65.7 mm/hr was calculated.

After reviewing Section 4.6.6 of QUDM – Overland Flow, Friend's Equation has been applied to determine time of concentration (ToC) for the pre development catchment as **Table 2**.

Table 2: Pre-Development Time of Concentration

Catchment	Overland Flow	Channel/Creek Flow	Total ToC
A	Horton's (n) = 0.045 L = 100m Slope = 6% t = 15.59 minutes	2.5 minutes	18 minutes
B	Horton's (n) = 0.045 L = 100m Slope = 3.5% t = 17.37 minute	0.83 minutes	18 minutes
C	Horton's (n) = 0.045 L = 100m Slope = 4.5% t = 16.52 minutes	0.71 minutes	17 minutes

The pre-development peak flow rates have been calculated for the selected storms, by utilising the Bureau of Meteorology IFD data design rainfall intensities.

To determine the design peak flow rates for the site, the Rational Method (i.e. $Q = 2.78 \times 10^{-3} CIA$) has been applied.

The coefficient of runoff, time of concentration and peak flow rate are presented in **Table 3** for the standard Annual Exceedance Probability (AEP) design storms of 39%, 10%, 5% and 1% (corresponding to the 2, 10, 20 and 100 year Average Recurrence Interval (ARI) storms).



Table 3: Pre Development Peak Flow Estimation – Rational Method

PRE – DEVELOPMENT SCENARIO A					
Annual Exceedance Probability	AEP	39%	10%	5%	1%
Coefficient of Runoff	C	0.56	0.66	0.69	0.79
Area of Catchment (ha)	A	3.889	3.889	3.889	3.889
Average Rainfall Intensity (mm/h)	I	93.8	132.0	152.0	201.0
Peak Flow Rate (m3/s)	Q	0.568	0.941	1.138	1.720
PRE – DEVELOPMENT SCENARIO B					
Annual Exceedance Probability	AEP	39%	10%	5%	1%
Coefficient of Runoff	C	0.56	0.66	0.69	0.79
Area of Catchment (ha)	A	1.110	1.110	1.110	1.110
Average Rainfall Intensity (mm/h)	I	93.8	132.0	152.0	201.0
Peak Flow Rate (m3/s)	Q	0.162	0.269	0.325	0.491
PRE – DEVELOPMENT SCENARIO C					
Annual Exceedance Probability	AEP	39%	10%	5%	1%
Coefficient of Runoff	C	0.56	0.66	0.69	0.79
Area of Catchment (ha)	A	0.529	0.529	0.529	0.529
Average Rainfall Intensity (mm/h)	I	96.3	135.0	156.0	206.0
Peak Flow Rate (m3/s)	Q	0.079	0.131	0.159	0.240

2.3. POST-DEVELOPMENT SCENARIO

2.3.1. CATCHMENT DEFINITION

The post-development catchments will be analysed as two (2) catchments (A and B), having contributing area of 5.431 hectares and 0.097 hectares respectively.

It is proposed that stormwater flow generated from the internal hardstands, impervious areas and site catchments will be captured by the proposed drainage network and discharged to the new proposed bioretention/ detention basin at the southwest corner.

The catchment boundary and LPoD for the post-development plan will be shown in CE25168-601-DR in *APPENDIX B – Stormwater Catchment Plan Drawings*



2.3.2. RATIONAL METHOD

The post-development coefficient of runoff (C year) was determined based on the fraction impervious method specified in QUDM.

The post-development catchments A and B have a fraction impervious of 16% and 0% respectively.

Using the Rational Method, the corresponding 60 minute ten-year rainfall intensity (I_{10}) was calculated to be 65.70 mm/hr and C_{10} value of 0.70 and 0.66 has been adopted for these catchments respectively.

After reviewing Section 4.6.6 of QUDM – Overland Flow, Friend's Equation has been applied to determine time of concentration (ToC) for the pre development catchment as

Table 4.

Table 4: Post Development Time of Concentration

Catchment	Overland Flow	Channel/Creek Flow	Total ToC
A	Horton's (n) = 0.0275 L = 100m Slope = 6% t = 9.53 minutes	7.14 minutes	17 minutes
B	Horton's (n) = 0.035 L = 100m Slope = 5% t = 9.25 minute	-	9 minutes

The peak flow rates for the post development scenario, have been calculated for the selected storms by utilising the Bureau of Meteorology IFD Data design rainfall intensities. Similar to pre-development peak flow calculations, the Rational Method (i.e. $Q = 2.78 \times 10^{-3} CIA$) has been applied for the post-development scenario.

The coefficient of runoff, time of concentration and peak flow rate are presented in Table 5 for the standard Annual Exceedance Probability (AEP) design storms of 39%, 10%, 5% and 1% (corresponding to the 2, 10, 20 and 100 year Average Recurrence Interval (ARI) storms).

Table 5: Post Development Peak Flow Estimation – Rational Method

POST – DEVELOPMENT CATCHMENT A					
Annual Exceedance Probability	AEP	39%	10%	5%	1%
Coefficient of Runoff	C	0.60	0.70	0.74	0.84
Area of Catchment (ha)	A	96.3	135.0	156.0	206.0
Average Rainfall Intensity (mm/h)	I	5.431	5.431	5.431	5.431
Peak Flow Rate (m ³ /s)	Q	0.864	1.426	1.730	2.611
POST – DEVELOPMENT CATCHMENT B					
Annual Exceedance Probability	AEP	39%	10%	5%	1%
Coefficient of Runoff	C	0.56	0.66	0.69	0.79



Area of Catchment (ha)	A	123.0	173.0	200.0	263.0
Average Rainfall Intensity (mm/h)	I	0.097	0.097	0.097	0.097
Peak Flow Rate (m3/s)	Q	0.019	0.031	0.037	0.056

2.4. CHANGE IN FLOW RATES

Rational Method assessment aims to evaluate the change in flow rates calculated from the pre and post development catchments. From Table 3 and Table 5, the peak flow rate for AEP design storms of 39%, 10%, 5% and 1% are compared in *Table 6*.

Table 6: Change in Peak Flow Rate

A					
Annual Exceedance Probability	AEP	39%	10%	5%	1%
Pre-Developed Peak Flow Rate (m3/s)	Q	0.568	0.941	1.138	1.720
Post-Developed Peak Flow Rate (m3/s)	Q	0.864	1.426	1.730	2.611
Change in Peak Flow Rates (m3/s)	Q	0.296	0.484	0.592	0.891
B					
Annual Exceedance Probability	AEP	39%	10%	5%	1%
Pre-Developed Peak Flow Rate (m3/s)	Q	0.162	0.269	0.325	0.491
Post-Developed Peak Flow Rate (m3/s)	Q	0.019	0.031	0.037	0.056
Change in Peak Flow Rates (m3/s)	Q	-0.144	-0.238	-0.287	-0.435

Table 6 shows that post-catchment A has demonstrated via a Rational Method assessment an increase in peak flow rates discharging from pre-development, therefore on-site detention is deemed required to mitigate flows to pre-development conditions. While post-catchment B demonstrated via a Rational Method assessment no increase in peak flow rates discharging from pre-development, therefore on-site detention is not required to mitigate flows to pre-development conditions.



3. STORMWATER QUANTITY MANAGEMENT PLAN

3.1. WATER QUANTITY OBJECTIVES

The following objective has been set for post development stormwater discharge from the site:

- No net increase in peak flows from the subject site, for all durations up to the 1% AEP design storm event, during the post-developed condition.

This objective shall be demonstrated through hydrologic and hydraulic models by developing on-site detention measures. XP-SWMM has been used to mitigate any increase in total site discharge rates.

3.2. STORMWATER MITIGATION

Stormwater runoff within the site will be directed to a detention system before being discharged via staged outlets to the respective Lawful Point of Discharge (LPoD). Stormwater flow generated from the new development will be discharged to the LPoDs at flow rates equal to or below predevelopment rates.

Major & Minor Systems have been classified and adopted in accordance with CMDG Stormwater Drainage Design Guidelines under “Industrial” Table D05-04.1 as 1% AEP & 39% AEP (2yr ARI) respectively.

3.3. 1D MODELLING ASSUMPTIONS & METHODOLOGY

The following modelling assumptions were used to create the XP-SWMM Models

- Two (2) separate scenarios were generated, which were:
 - Pre-Development (which included all points of discharge); and
 - Post-Development (which included all points of discharge).
- Each model included runoff nodes for each contributing sub-catchment
- The sub-catchment areas were split into Industrial Land Uses with absolute values adopted for percentages impervious as specified in *Table 8*.
- Infiltration uniform losses were applied to the pervious areas of the sub-catchments
- The models were run at various durations for a constant ARI to determine the critical storm event.



3.4.XP-SWMM INPUT PARAMETERS

In this study, the “Laurenson” routing method was applied to XP-SWMM for hydrograph generation. To enable this method to be used, each catchment must be split into pervious (undeveloped) and impervious (developed) portions. Adopted parameters for the Laurenson routing method included:

The fraction impervious has been determined by analysis of aerial photographs and the proposed development layout;

- Manning Roughness coefficient (n):
 - Pervious portion: 0.045 and 0.055;
 - Impervious portion: 0.015.

AR&R 2019 Initial Loss (IL) and Continuing Losses (CL) have been applied to the hydrologic model. Details of IL and CL parameters applied in the XP-SWMM model are presented in *Table 7*.

Table 7: Adopted Initial & Continuing Losses

Impervious Area		Pervious Area	
IL (mm)	CL (mm/hr)	IL (mm)	CL (mm/hr)
0	0	10	2.0

Analysis of the catchment has been undertaken to determine the average slope, with the results of this being applied to the model.

Table 8: Catchment Parameters

Scenario	Catchment	Impervious Area			Pervious Area		
		Area (ha)	Fraction Impervious (%)	Slope (m/m)	Area (ha)	Fraction Impervious (%)	Slope (m/m)
Pre-Development	A	0	100 %	6%	3.889	0%	6%
	B	0	100 %	4%	1.110	0%	4%
	C	0	100 %	5%	0.529	0%	5%
Post-Development	A	0.836	100 %	6%	4.389	0%	6%
	Bypass A	0	100 %	6%	0.206	0%	6%
	B	0	100 %	4%	0.097	0%	4%



3.5.XP-SWMM ANALYSIS

A XP-SWMM model has been adopted at the preliminary planning stage to ensure that the storage volume is estimated with a higher degree of confidence. Laurenson's Hydrology has been used as the routing method within XP-SWMM. Sub-catchment routing in this method is carried out using the Muskingum procedure, which is a storage routing method based on the storage equation.

A range of storm events up to 1% AEP design storm events were analysed for all standard durations ranging from 10 minutes to 360 minutes. The combined peak discharge rates for the site calculated by the XP-SWMM model are shown below for both scenarios.

A comparison between the peak discharge values obtained for the 1% through to the 39% AEP storm events using the Rational Method and the XP-SWMM model is contained in *Table 9* and *Table 10*. As can be seen, the peak discharges generated by the XP-SWMM model mostly compare well (~13% difference) to the values obtained from Rational Method calculations and are therefore considered appropriate for subsequent hydraulic analysis. It is noted that where higher differences occur this will result in a conservative approach.

Table 9: Rational Method vs XP-SWMM Generated Peak Discharges for LPD A

PRE-DEVELOPMENT LPD A							POST-DEVELOPMENT LPD A				
Event (ARI)	Event (AEP %)	Critical storm & temp pattern	Catch id	Rational method (m3/s)	XP-SWMM (m3/s)	Diff (%)	Critical storm & temp pattern	Catch id	Rational method (m3/s)	XP-SWMM (m3/s)	Diff (%)
100	1	ECN_1pct_25min_9	A	1.720	1.645	-4%	ECN_1pct_25min_4	A	2.611	2.442	-6%
50	2	ECN_2pct_25min_9	A	1.468	1.420	-3%	ECN_2pct_25min_4	A	2.235	2.135	-4%
20	5	ECN_5pct_30min_4	A	1.138	1.145	1%	ECN_5pct_30min_4	A	1.730	1.715	-1%
10	10	ECN_10pct_30min_4	A	0.941	0.954	1%	ECN_10pct_30min_4	A	1.426	1.459	2%
5	20	ECN_0.2EY_30min_8	A	0.772	0.768	-1%	ECN_0.2EY_30min_5	A	1.184	1.182	0%
2	39	ECN_0.5EY_30min_8	A	0.568	0.557	-2%	ECN_0.5EY_30min_5	A	0.864	0.858	-1%



Table 10: Rational Method vs XP-SWMM Generated Peak Discharges for LPD B

PRE-DEVELOPMENT B							POST-DEVELOPMENT B				
Event (ARI)	Event (AEP %)	Critical storm & temp pattern	Catch id	Rational method (m3/s)	XP-SWMM (m3/s)	Diff (%)	Critical storm & temp pattern	Catch id	Rational method (m3/s)	XP-SWMM (m3/s)	Diff (%)
100	1	ECN_1pct_25min_8	B	0.491	0.497	1%	ECN_1pct_10min_7	B	0.056	0.065	14%
50	2	ECN_2pct_25min_8	B	0.419	0.427	2%	ECN_2pct_10min_7	B	0.048	0.056	14%
20	5	ECN_5pct_30min_4	B	0.325	0.339	4%	ECN_5pct_10min_6	B	0.037	0.045	17%
10	10	ECN_10pct_30min_4	B	0.269	0.286	6%	ECN_10pct_20min_6	B	0.031	0.037	17%
5	20	ECN_0.2EY_30min_8	B	0.220	0.232	5%	ECN_0.2EY_30min_7	B	0.026	0.033	23%
2	39	ECN_0.5EY_30min_8	B	0.162	0.171	5%	ECN_0.5EY_30min_9	B	0.019	0.024	23%

The proposed development has demonstrated via a XP-SWMM assessment that an increase in peak flow rates discharging from Catchments A area anticipated, therefore On-Site Detention (OSD) is deemed required to mitigate flows to pre-development conditions. While, there is no increase in peak flow rates discharging from catchment B, so On-Site Detention (OSD) is not required to mitigate flows to pre-development conditions

A comparison of the pre-development catchment A and mitigated flow rates is shown in **Table 11**.

Table 11: Comparison of Pre – Mitigated flow rates – Extracted from XP-SWMM Model (m3/s)

A						
Annual Exceedance Probability	0.5EY	0.2EY	10%	5%	2%	1%
Pre Development	0.557	0.768	0.954	1.145	1.420	1.645
Post Development (Mitigated)	0.549	0.731	0.927	1.073	1.325	1.638

The hydrograph for the critical duration and the longer critical duration of the Mitigated 1% AEP storm event compared against the pre and post development catchment A and B is shown in **Figure 3** to **Figure 14**.

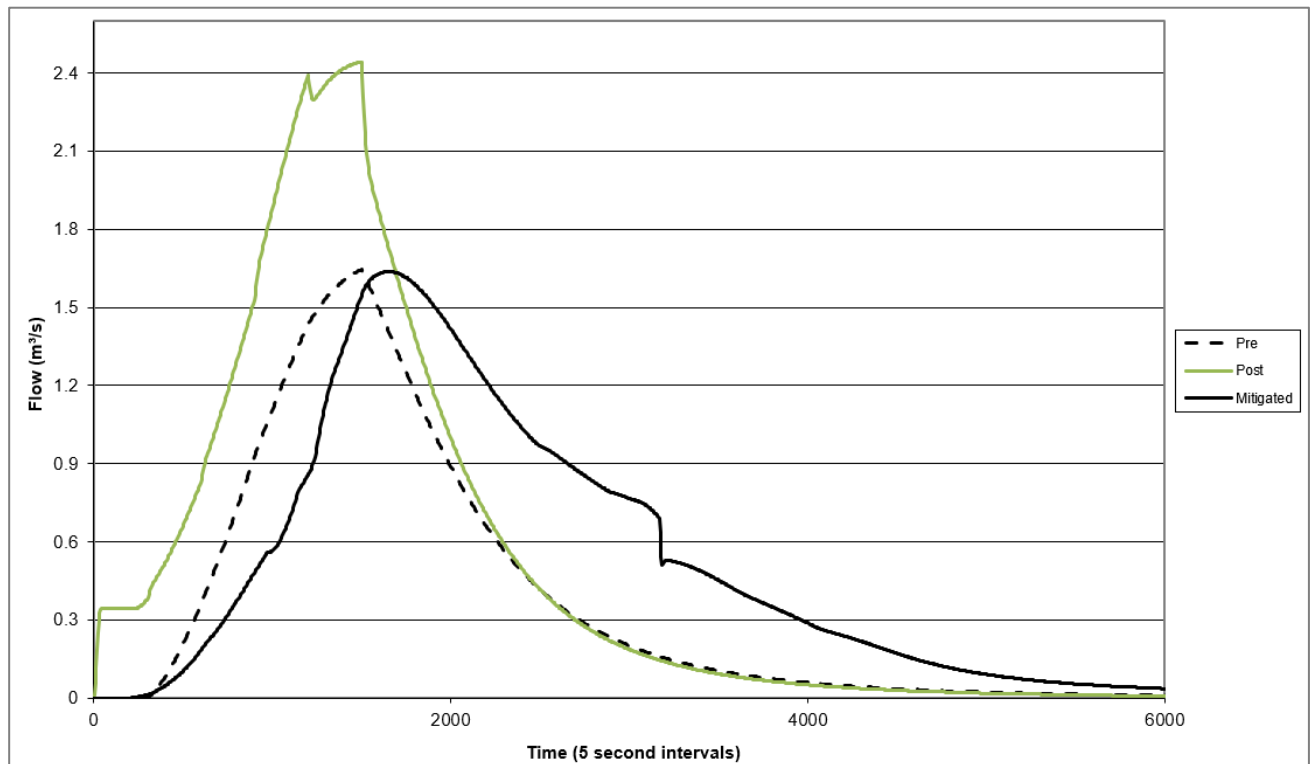


Figure 3: Pre, Post and Mitigated Flow Rates for the critical duration of the 1% AEP Design Storm Event at LPD A

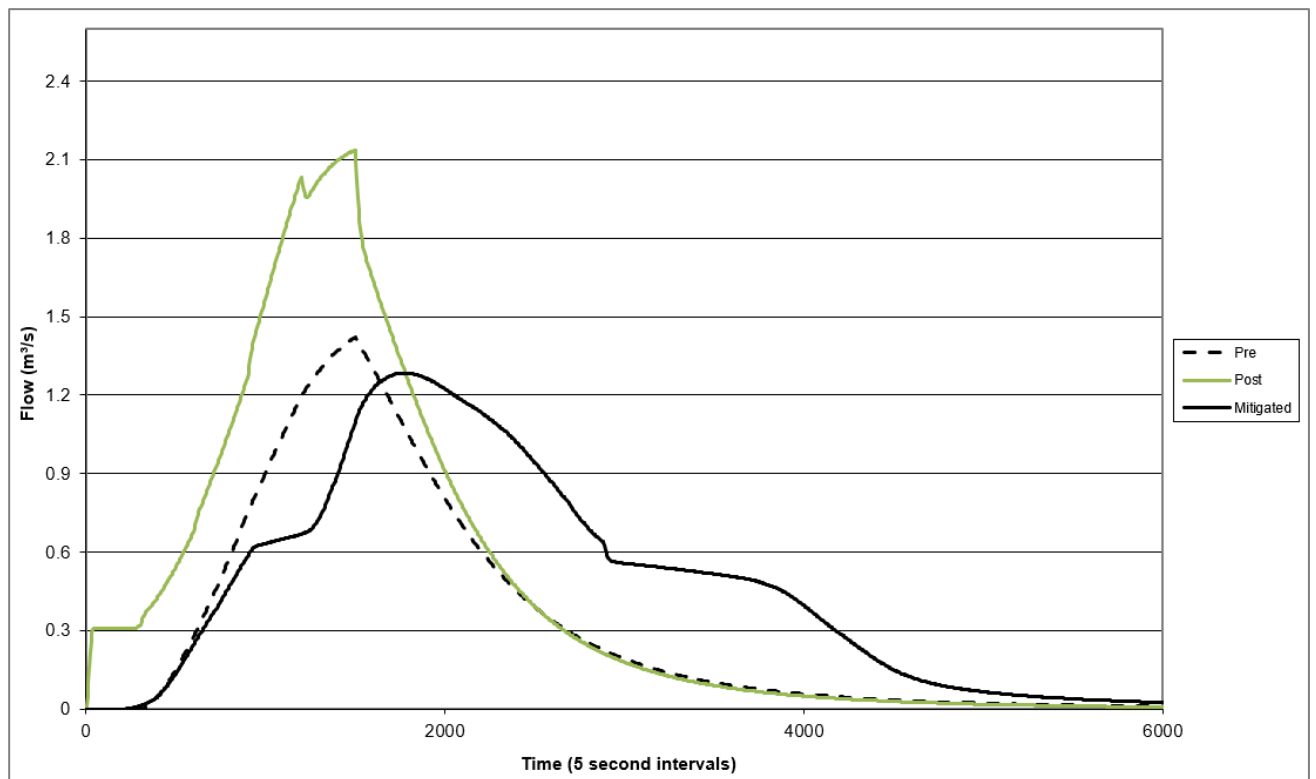


Figure 4: Pre, Post and Mitigated Flow Rates for the critical duration of the 2% AEP Design Storm Event at LPD A

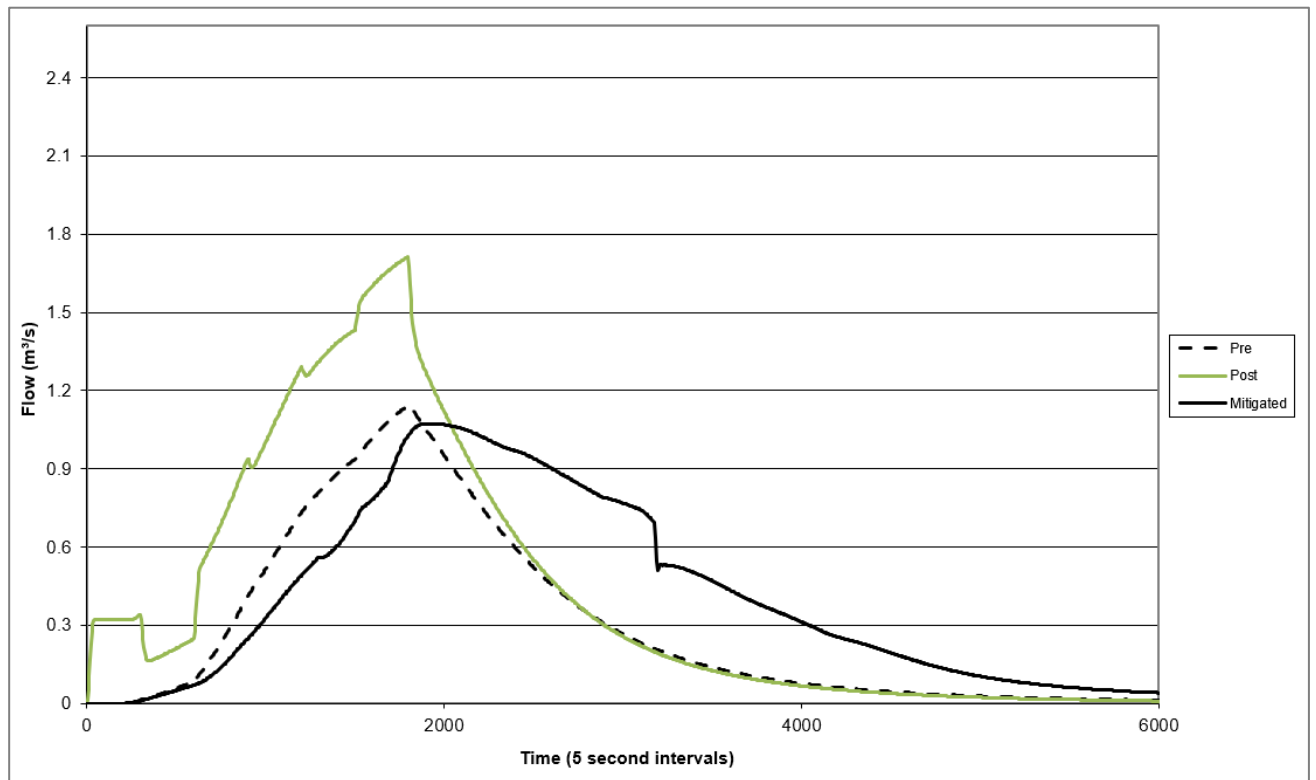


Figure 5: Pre, Post and Mitigated Flow Rates for the 5% AEP Design Storm Event at LPD A

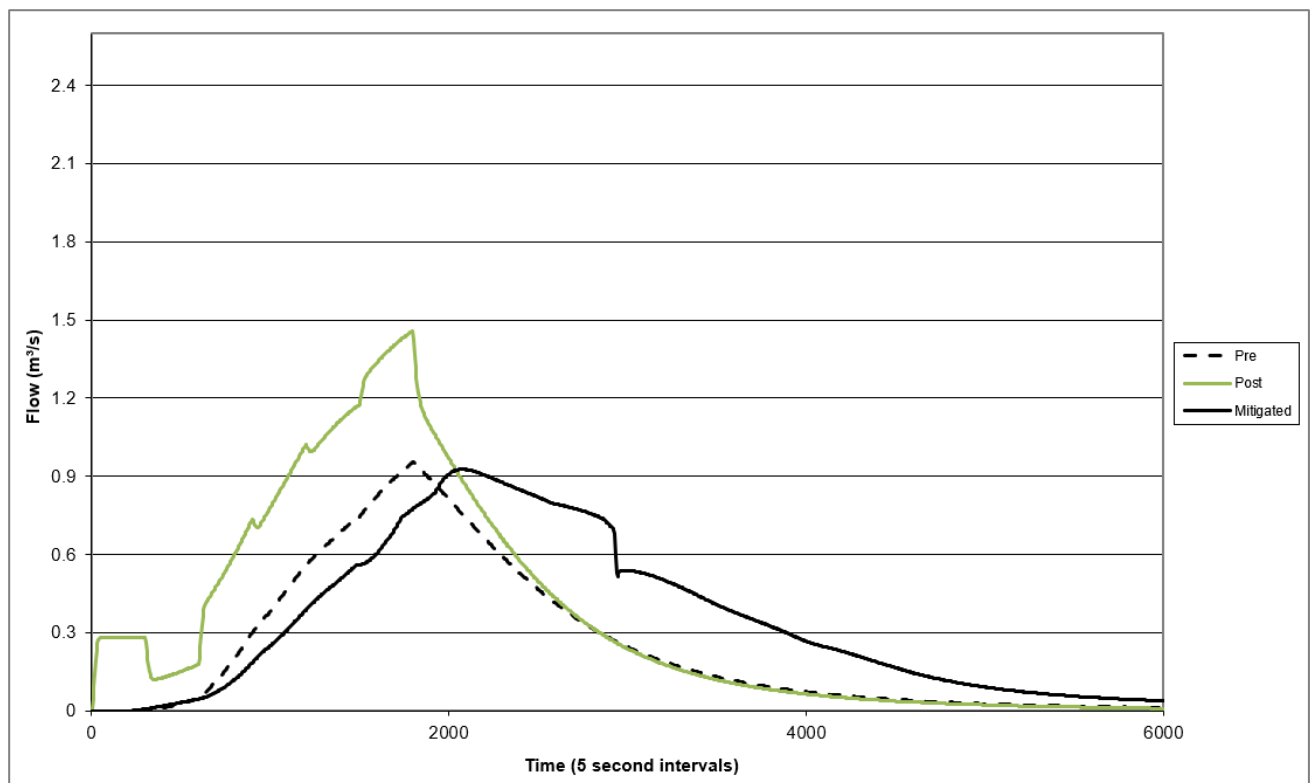


Figure 6: Pre, Post and Mitigated Flow Rates for the 10% AEP Design Storm Event at LPD A

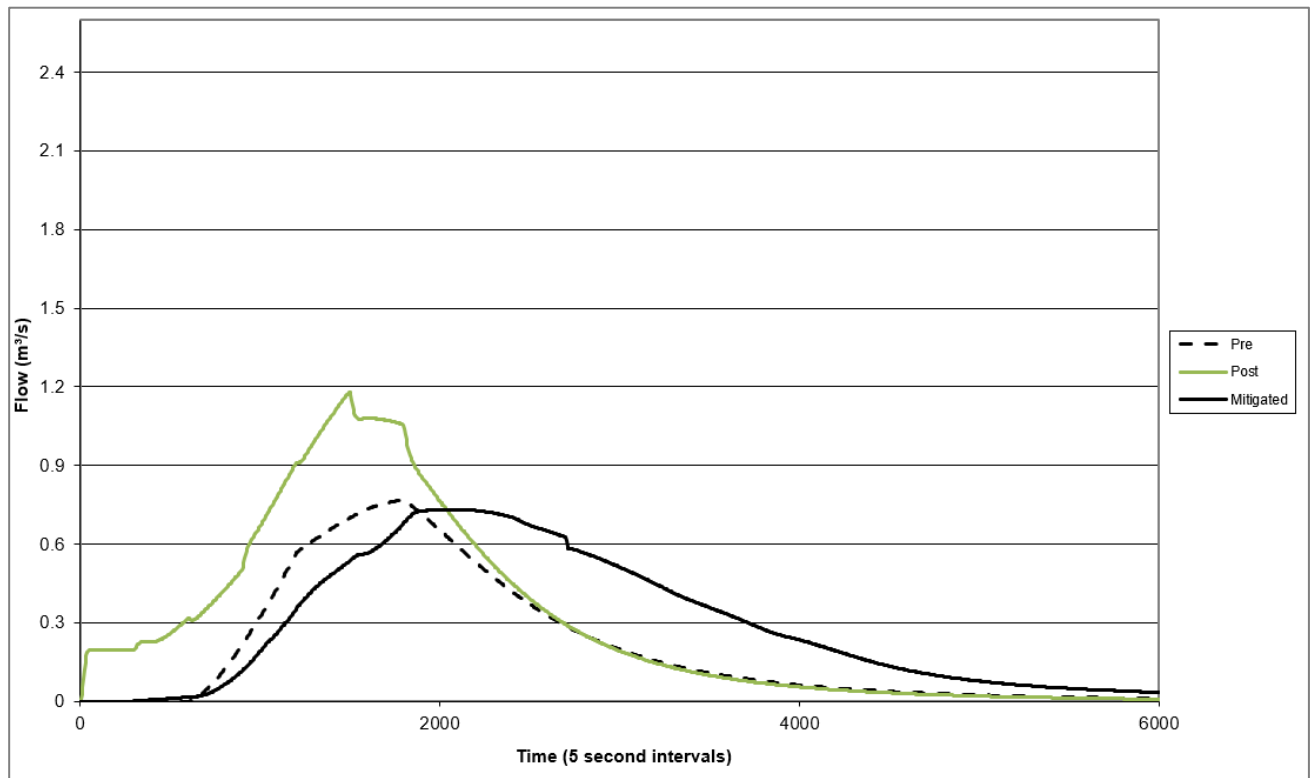


Figure 7: Pre, Post and Mitigated Flow Rates for the 0.2EY AEP Design Storm Event at LPD A

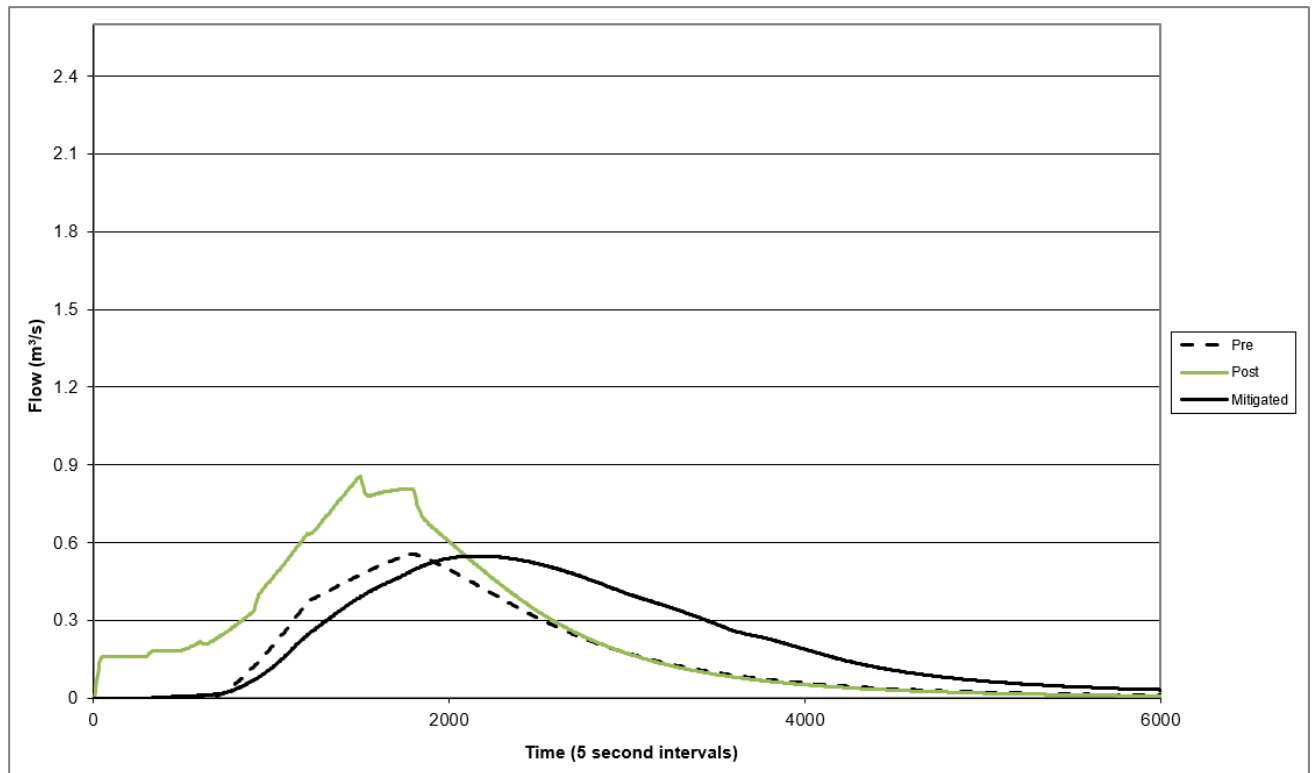


Figure 8: Pre, Post and Mitigated Flow Rates for the 0.5EY AEP Design Storm Event at LPD A

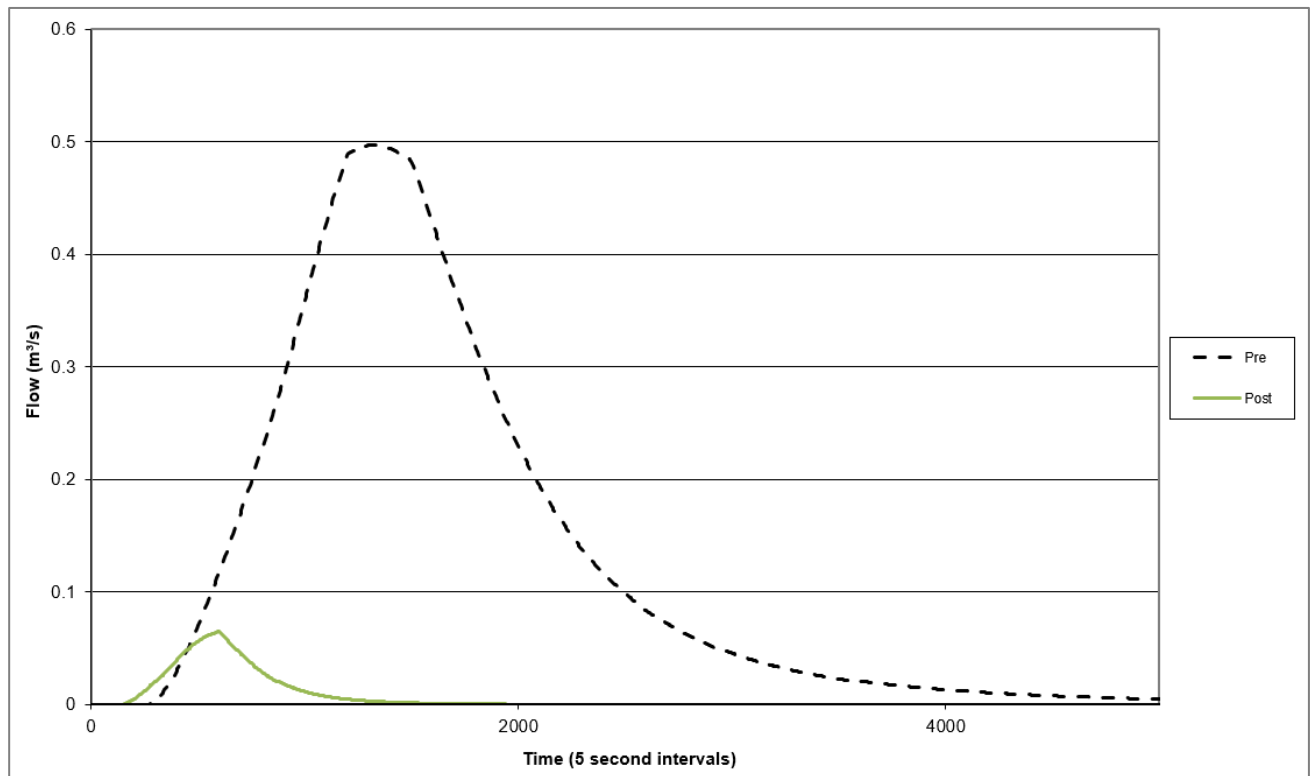


Figure 9: Pre, Post and Mitigated Flow Rates for the critical duration of the 1% AEP Design Storm Event at LPD B

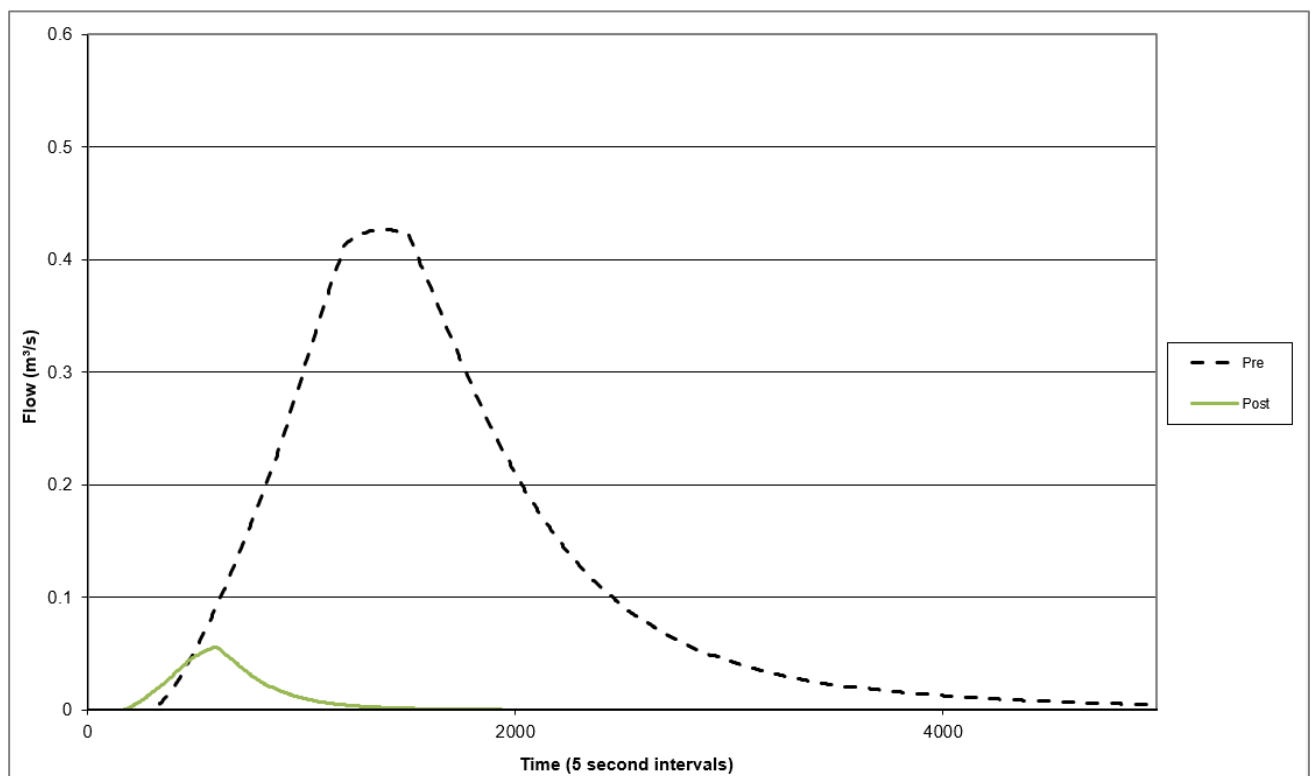


Figure 10: Pre, Post and Mitigated Flow Rates for the critical duration of the 2% AEP Design Storm Event at LPD B

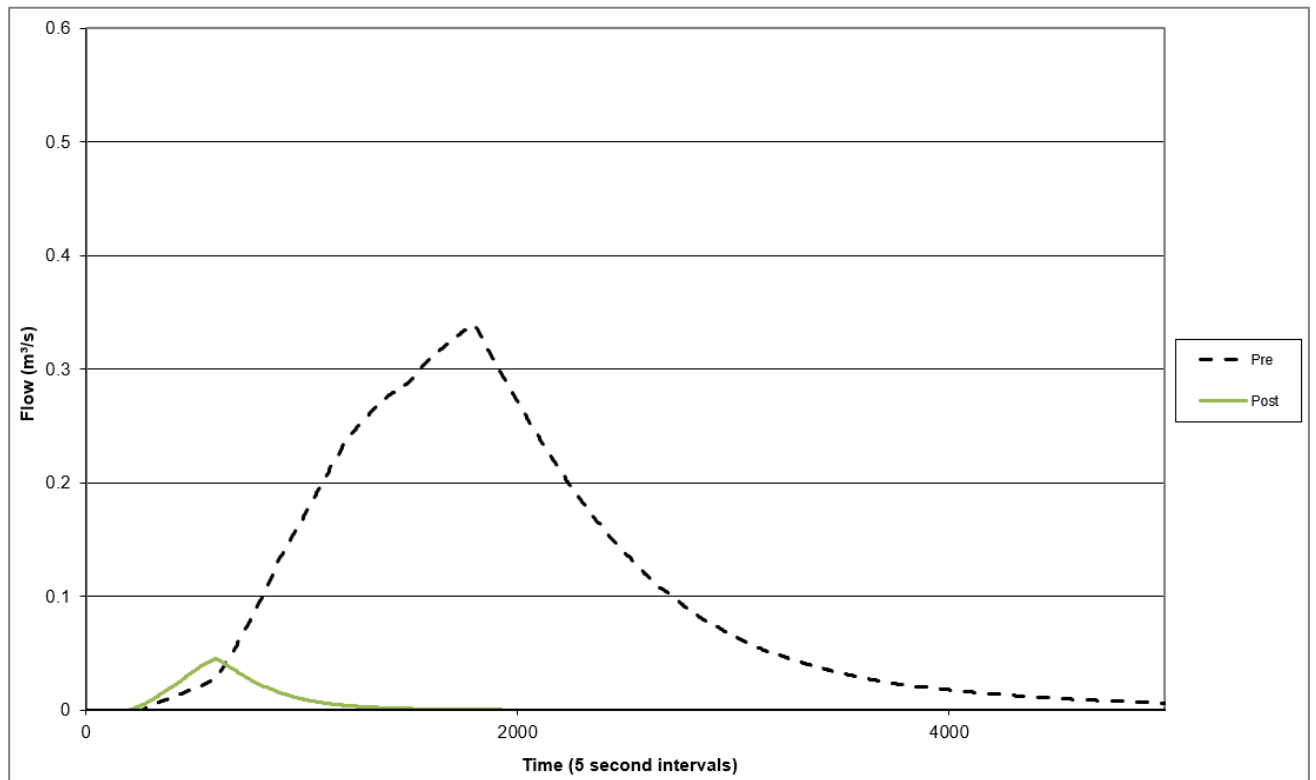


Figure 11: Pre, Post and Mitigated Flow Rates for the 5% AEP Design Storm Event at LPD B

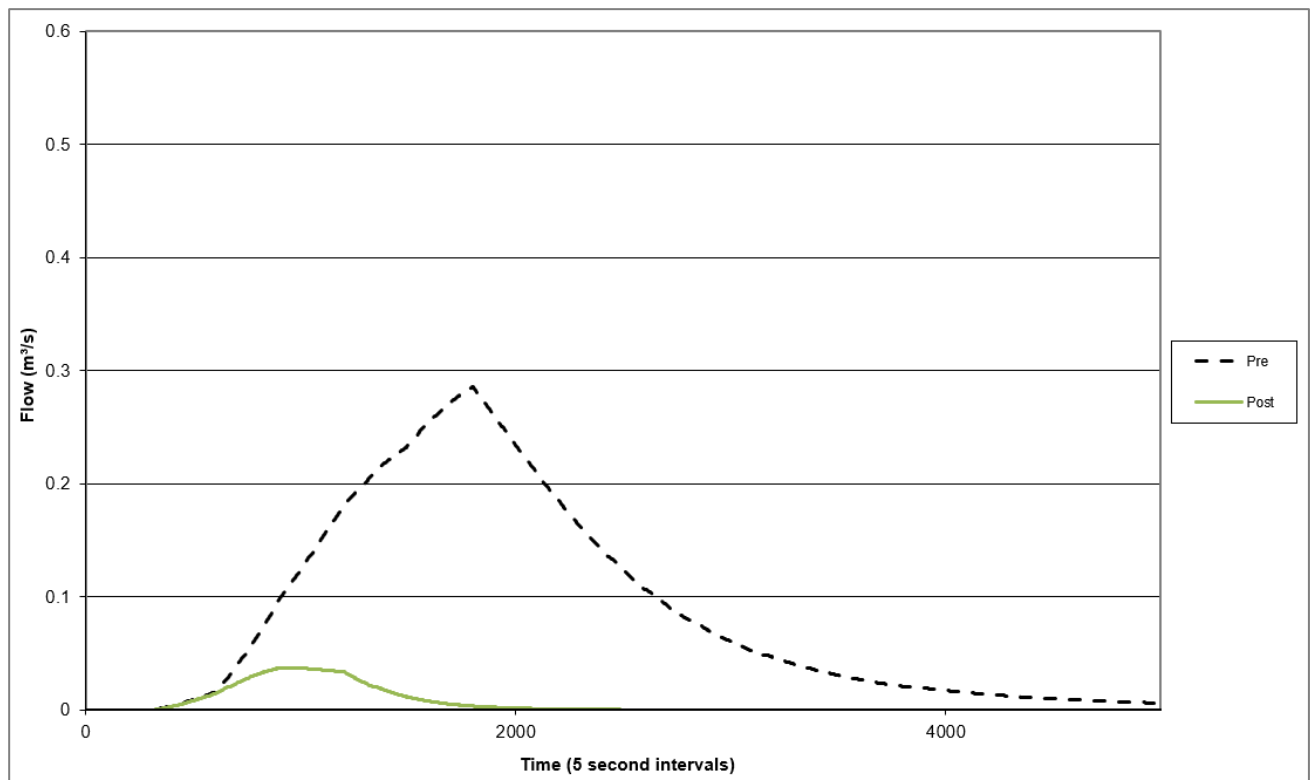


Figure 12: Pre, Post and Mitigated Flow Rates for the 10% AEP Design Storm Event at LPD B

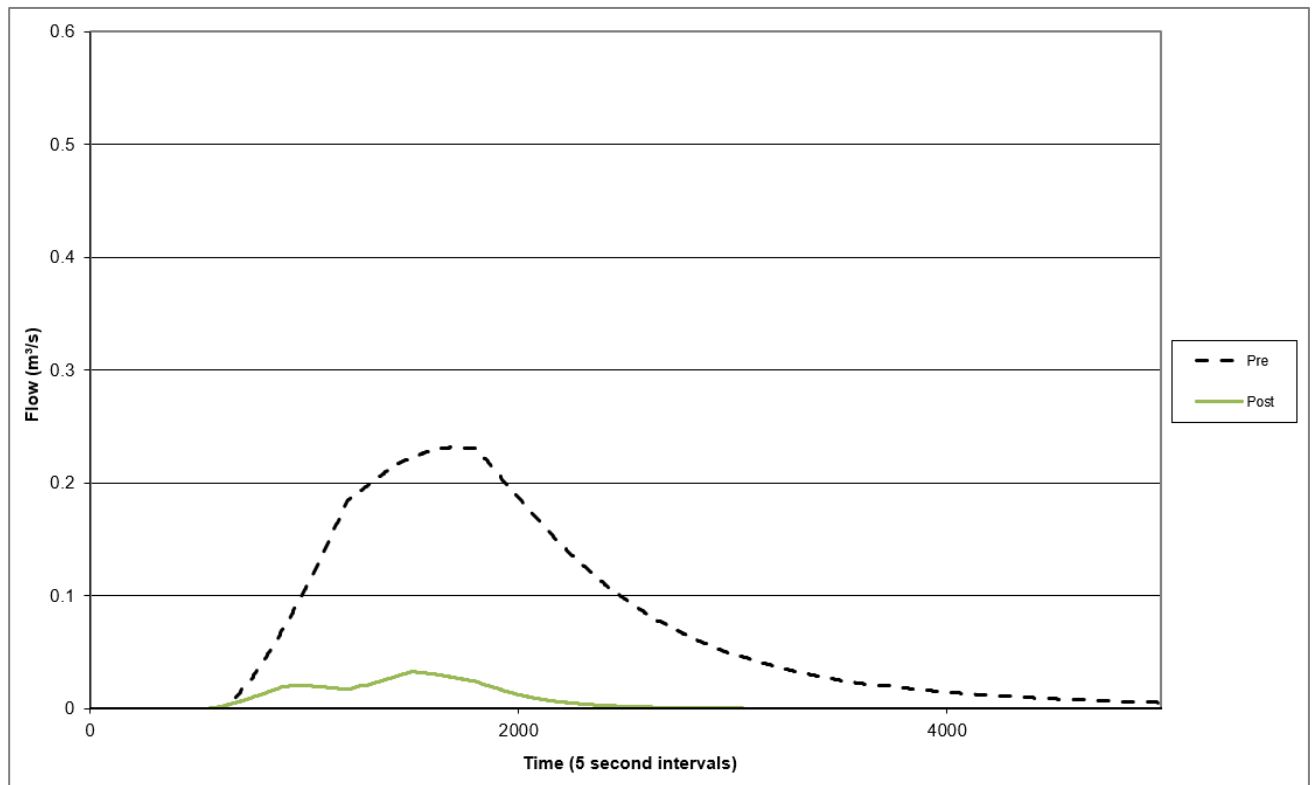


Figure 13: Pre, Post and Mitigated Flow Rates for the 0.2EY AEP Design Storm Event at LPDB

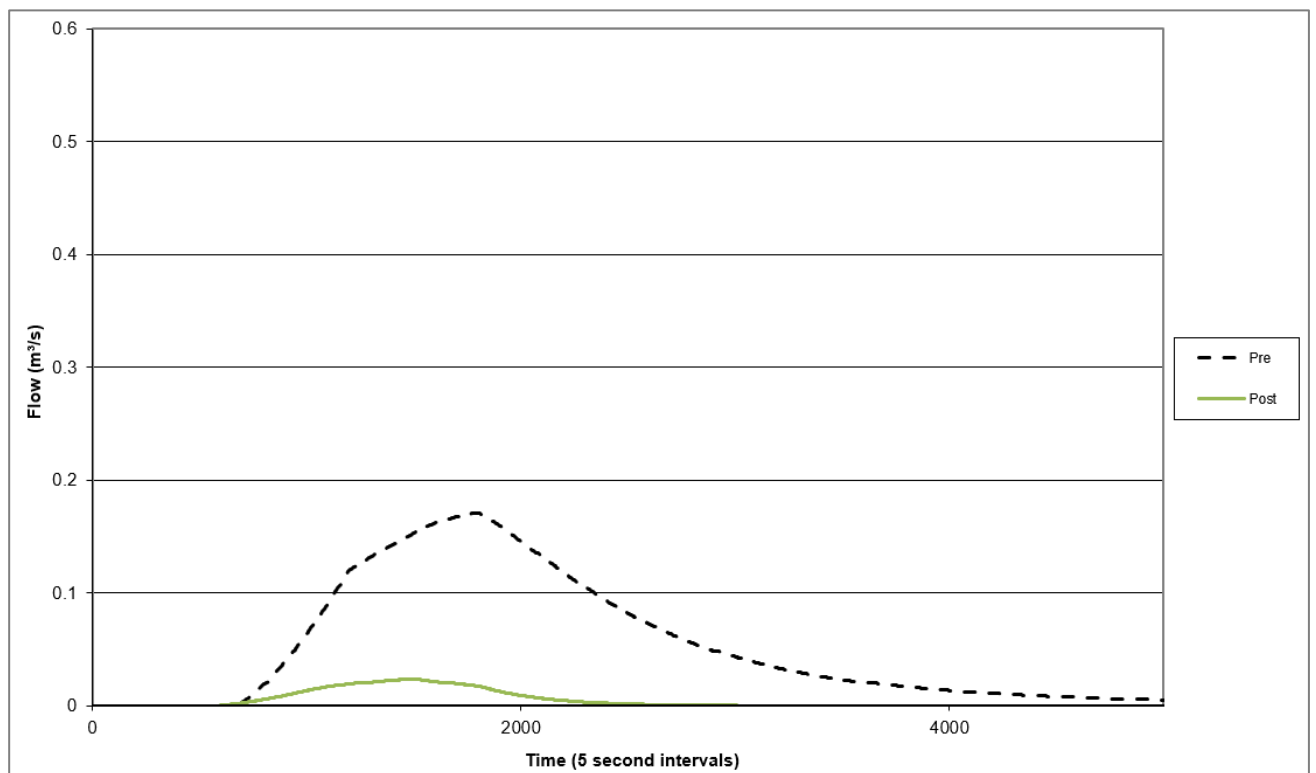


Figure 14: Pre, Post and Mitigated Flow Rates for the 0.5EY AEP Design Storm Event at LPDB



3.6. ON SITE DETENTION (OSD) DETAILS

The following detention storage parameters were adopted to achieve the target pre-development flow rates, via mitigation of the post-development flow rates. The proposed OSD system (combined bioretention/detention basin) is to be implemented to ensure a non-worsening of peak discharges at LPDs.

The storage volumes for the modelled detention system are presented in the *Table 12*.

Table 12: Detention System Volumes

I.D	Design Storm	Required Detention Volume (m ³)	Detention Depth (m)
Catchment A	1%	1,042	0.935

A summary of the modelled outlet configuration is provided in the *Table 13*:

Table 13: Depth - Area Relationship Adopted for the Basin

	Basin Depth (m)	Basin Area (m ²)
BASIN A	0	700
	0.1	749
	0.2	799
	0.3	851
	0.4	904
	0.5	958
	0.6	1,014
	0.7	1,071
	0.8	1,129
	0.9	1,189
	1	1,250
	1.1	1,312
	1.2	1,376
	1.3	1,441
	1.4	1,508
	1.5	1,575

Table 14: Adopted Outlet Configuration

I.D	Minor Event Overflow Weir	Major Event Overflow Weir
A	2 x 0.25 x 0.6m Orifices at 0.3m above base 0.9x0.9m Pit at 0.8m above base with 0.6m dia Outlet at 0.8m below base @ 1.083 m³/s	3.0m Wide High-flow Weir @ 1.02m above base @ 0.498m ³ /s



Table 15: Outlet Configuration Results

EVENT (ARI)	EVENT (AEP %)	CATCH ID	PRE-DEV FLOWS (m3/s)	POST-DEV FLOWS (m3/s)	TOTAL POST-DEV MITIGATED FLOWS (m3/s)	FLOW DIFFERENCE (m3/s)
100	1	A	1.645	2.442	1.638	-0.007
2	39	A	0.557	0.858	0.549	-0.008

The Outlet details and LPoD for the out-flow control will be shown in **APPENDIX B** – Stormwater Catchment Plan Drawings



4. STORMWATER QUALITY MANAGEMENT PLAN

4.1. SITE SPECIFIC OBJECTIVES

The site development may increase the pollutant loads within stormwater runoff and downstream watercourses. During the construction and operational phase, the site disturbance the site and soil exposure result in erosion and sediment transportation, causing erosive influence of the environment. As the development is Industrial in character, the water quality parameters of relevance to the site are suspended solids, nutrients (nitrogen and phosphorus), litter and faecal coliforms.

Of these parameters, the detailed modelling of litter and faecal coliforms is not possible at present, using the Industrial standard analysis package (MUSIC – refer below) due to the lack of information regarding export rates.

The modelling of defined water quality objectives has therefore necessarily focused on suspended solids and nutrients (nitrogen and phosphorus).

In the absence of Rockhampton Regional Council water quality objectives, load reduction targets stated in the “State Planning Policy” were adopted and are stated below:

- 85% Reduction of Total Suspended Solids
- 60% Reduction in Total Phosphorus
- 45% Reduction in Total Nitrogen
- 90% Reduction in Gross Pollutants

4.2. MUSIC WATER QUALITY ANALYSIS METHODOLOGY

In order to determine the effectiveness of different water quality treatment measures and meet the water quality objectives, a stormwater quality analysis was performed using the Model for Urban Stormwater Improvement Conceptualisation (MUSIC) Version 6.3.

The models consist of three types of nodes:

- Source nodes representing different land uses and defining size of sub catchments
- Treatment Node representing different types of water quality treatment measures
- Receiving nodes represent the outlet point for the catchment under consideration. Each model only has one receiving node

The model requires the user to specify meteorological data (rainfall and evaporation), soil properties and pollutant loads for each catchment. Suitable parameters for the MUSIC model were adopted in accordance with the recommendations of MUSIC Modelling Guidelines Version 3.0.2018.

The hydrologic routing option for the modelling was the “No Routing” option. This option generates more conservative results from the treatment measures as the runoff is modelled reaching the treatment measure all at the same time rather than allowing for travel and detention stages as the runoff progresses through the catchment.

A MUSIC model was created to determine the post development scenario with Water Sensitive Urban Design (WSUD) treatments.



Table 16: Post Development Sub-Catchments Parameters

CATCHMENT	CATCHMENT A AREA (ha)	% IMPERVIOUS
Roof	0.470	100%
Road Per	0.962	0%
Road Imper	0.338	100%
Ground	3.455	0%

Refer to **Figure 15** for identification of sub catchment zones / areas for post development condition. The MUSIC model is based on a split catchment approach and will incorporate various treatment nodes.

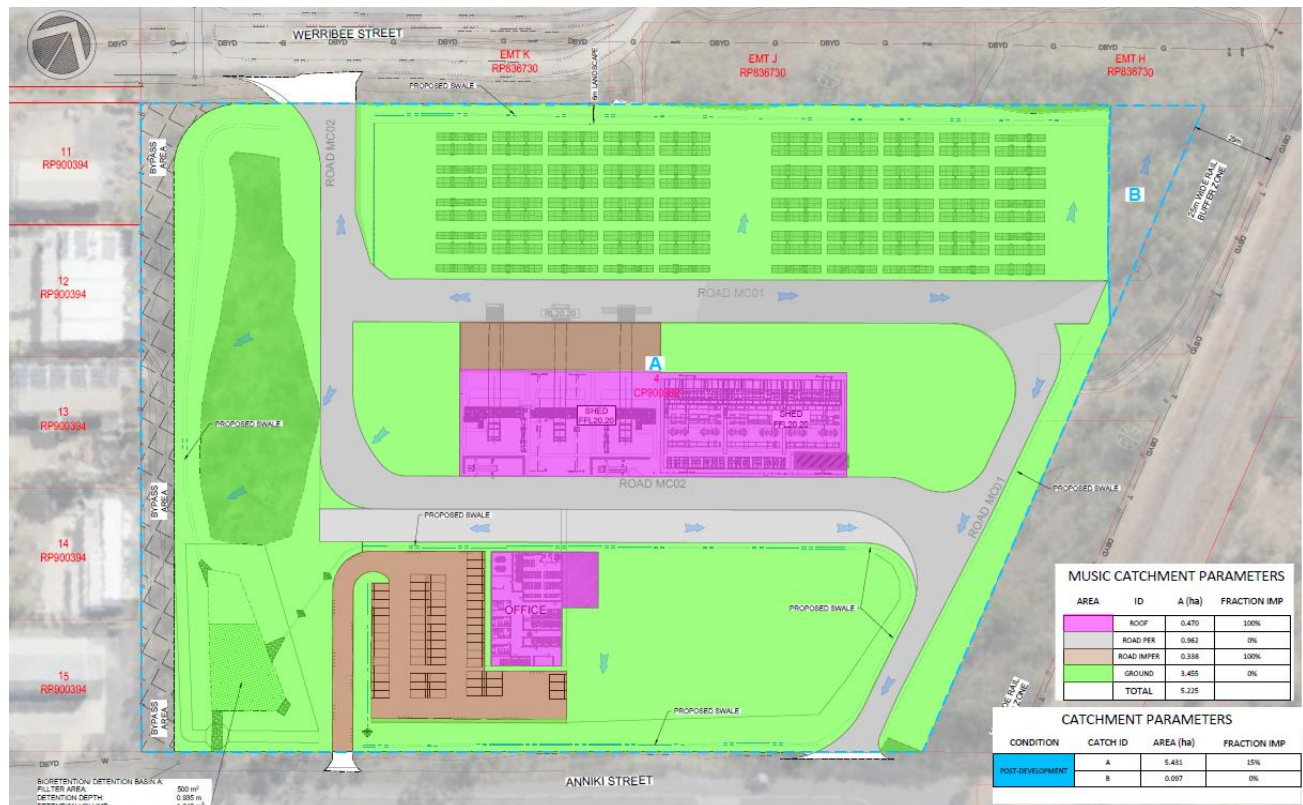


Figure 15: Proposed Site WSUD Sub-Catchments

The adopted MUSIC Runoff Generation Parameters used for the modelling are detailed in **Table 17**.



Table 17: Catchment Runoff Generation Parameters

PARAMETER	INDUSTRIAL
Field Capacity (mm)	80
Infiltration Capacity Coefficient A	243
Infiltration Capacity Exponent B	0.6
Rainfall Threshold (mm)	1
Soil Capacity (mm)	18
Initial Storage (%)	10
Daily Recharge Rate (%)	0
Daily Baseflow Rate (%)	31
Initial Depth (mm)	50
Daily Deep Seepage (%)	0

Table 18: Pollutant Export Relationships – Split and Lump Land Uses

LAND USE FOR MUSIC SOURCE NODE	PARAMETER	TOTAL SUSPENDED SOLIDS (LOG 10mg/L)		TOTAL PHOSPHORUS (LOG 10mg/L)		TOTAL NITROGEN (LOG 10mg/L)	
		BASE FLOW	STORM FLOW	BASE FLOW	STORM FLOW	BASE FLOW	STORM FLOW
Industrial- Roof	Mean	N/A	1.30	N/A	-0.89	N/A	0.25
	Std Deviation	N/A	0.44	N/A	0.36	N/A	0.32
Industrial – Road	Mean	0.78	2.43	-1.11	-0.30	0.14	0.25
	Std Deviation	0.45	0.44	0.48	0.36	0.20	0.32
Industrial – Ground	Mean	0.78	1.92	-1.11	-0.59	0.14	0.25



	Std Deviation	0.45	0.44	0.48	0.36	0.20	0.32
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4.3. TREATMENT TRAIN

The Model for Urban Stormwater Improvement Conceptualisation (MUSIC) software was used to propose a treatment train for the developed site, which was necessary to meet the Water Quality Objectives (WQOs) at the site's LPoD.

Rainfall data has been sourced from Rainfall Station 39083 Rockhampton using a date range from 1980 to 1989 and a 6 Minute Time Step.

The basin and grass swale will be designed in accordance with the Water by Design Technical Design Guidelines during the detailed design phase of the development (Water by Design, 2014).

4.4. MUSIC MODELLING RESULTS

Results of MUSIC modelling which has been modelled for this site are shown in the following tables below, and these results will also be compared with reduction target for TSS, TP, TN and gross pollutants shown in Section 4.1.

Table 19: Treatment Train Effectiveness at Receiving Node

Parameter	Sources	Residual Load	Reduction Achieved (%)	Water Quality Objective (%)
Flow (ML/yr)	19.7	18.7	5.1	-
TSS (kg/yr)	4,000	362	91	85
TP (kg/yr)	8.41	1.78	78.8	60
TN (kg/yr)	44.6	24.4	45.4	45
GP (kg/yr)	141	0	100	90



Arrangement of MUSIC model and treatment train effectiveness results are represented in *Figure 16* and bioretention/sediment basins data in figure *Figure 17 to Error! Reference source not found..*

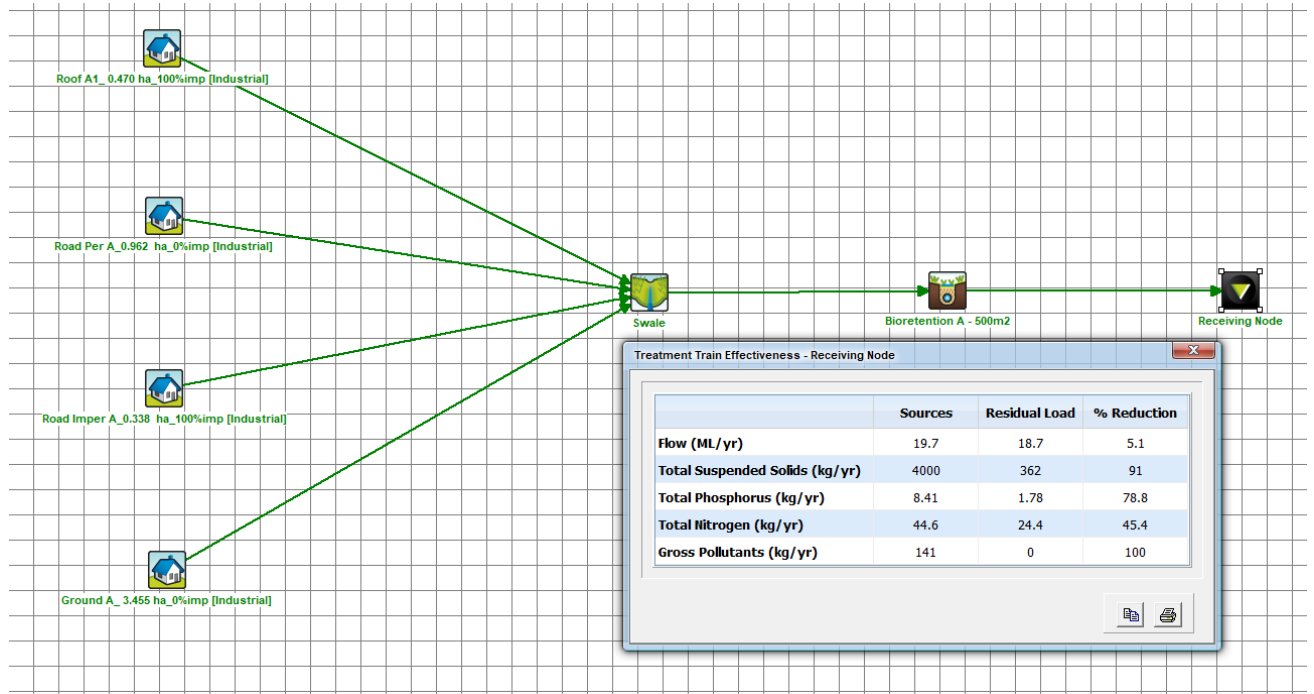


Figure 16: Treatment Train Layout and MUSIC Results



Properties of Bioretention A - 500m2

Location: [Products >>](#)

Inlet Properties	
Low Flow By-pass (cubic metres per sec)	0.000
High Flow By-pass (cubic metres per sec)	100.000
Storage Properties	
Extended Detention Depth (metres)	0.30
Surface Area (square metres)	500.00
Filter and Media Properties	
Filter Area (square metres)	500.00
Unlined Filter Media Perimeter (metres)	0.01
Saturated Hydraulic Conductivity (mm/hour)	100.00
Filter Depth (metres)	0.40
TN Content of Filter Media (mg/kg)	400
Orthophosphate Content of Filter Media (mg/kg)	30.0
Infiltration Properties	
Exfiltration Rate (mm/hr)	0.00

Lining Properties	
Is Base Lined?	☒ Yes ☐ No
Vegetation Properties	
☒ Vegetated with Effective Nutrient Removal Plants	
☐ Vegetated with Ineffective Nutrient Removal Plants	
☐ Unvegetated	
Outlet Properties	
Overflow Weir Width (metres)	10.00
Underdrain Present?	☒ Yes ☐ No
Submerged Zone With Carbon Present?	☐ Yes ☒ No
Depth (metres)	0.45

Figure 17: Bioretention Basin A



Properties of Swale

Location:

Inlet Properties

Low Flow By-Pass (cubic metres per sec):

Storage Properties

Length (metres)	500.0
Bed Slope (%)	2.00
Base Width (metres)	0.5
Top Width (metres)	4.5
Depth (metres)	0.50
Vegetation Height (metres)	0.087
Exfiltration Rate (mm/hr)	0.00

Calculated Swale Properties

Mannings N	0.035
Batter Slope	1:4
Velocity (m/s)	1.67
Hazard	0.835
Cross sectional Area (m ²)	1.25
Swale Capacity (cubic metres per sec)	2.088

Figure 18: Swale A



5. OPERATIONAL PHASE MAINTENANCE REQUIREMENTS

The following methodology will be followed through the construction and operational phase of the Bio-Retention Basins proposed as part of the development.

5.1. CONSTRUCTION PHASE

Construction of the development and the following building works on site has the potential to mobilise large quantities of sediment in runoff. For Bio-Retention Basins to perform as designed there is a need to protect filter media and basin vegetation during this phase of the development. Therefore, a Staged Construction and Establishment Method for construction of the Bio-Retention Basin will be followed. The stages for construction and establishment will be as follows:

- **Functional Installation** – Initially Bio-Retention Basin can be used as Sediment Basin. Once the majority of site construction works have been completed earthworks and shaping to create the layout and functional elements of the basin will be undertaken. This includes the installation of inlets, outlet structures, subsoil drainage, transition layers and filter media. The filter media is to be covered with a protective geofabric which is top-soiled and turfed or grass seeded. Silt fences are to be erected around the outside of the basin to exclude silt and restrict access to the basin.
- **Building Construction** – Protective erosion and sediment control measures are to remain in place as the basin is to function as temporary Sediment Basin for the duration of the Building Construction Phase. Access to the basin is to be restricted throughout the building construction phase.
- **Operational Establishment** - Following completion of the Building Construction Phase turf, topsoil and protective geofabric is removed and the basin re-planted with vegetation and landscaping as proposed. For vegetation to establish properly regular watering and removal of weeds is required following planting.

5.2. OPERATION PHASE

Following construction activities regular inspections of the Bio-Retention Basin are required in order to ensure vegetation establishes and the properties of the filter media remain effective. Procedures to be adopted for the carrying out inspections and maintenance of the basin are presented in *Table 20* on the following page.



Table 20: Bio-Retention Basin Inspection & Maintenance Requirements

Treatment Device / Property		Inspection	Inspection Frequency	Maintenance
Bio-Retention Basin				
Litter & Weeds	Visually check for litter, weeds and debris within the Bio-Retention Basin.	Quarterly for first year then annually after establishment. Also after flood events.*	Remove litter, weeds and debris from basin and dispose of at an approved waste disposal facility.	
Inlet and Outlet	Visually check for blockages within the inlet and outlet pits and blocked weep holes within inlet pits.	Quarterly for first year then annually after establishment. Also after flood events.*	Remove any blockages or debris within inlet pits or blockages to weep holes.	
Sedimentation	Visually check surface of Bio-Retention Basin for accumulation of sediment.	Quarterly for first year then annually after establishment. Also after flood events.*	Remove accumulated sediment where it is smothering vegetation.	
Scour, Erosion and Vehicle Damage	Visually check Bio-Retention Basin surface for scouring and areas of erosion or vehicle damage.	Quarterly for first year then annually after establishment. Also after flood events.*	Repair damage to Bio-Retention Basin surface and filter media if exposed. Undertake replanting if necessary and maintain frequent watering of area until vegetation has established.	
Vegetation	Visually check for any planted vegetation that has died.	Quarterly for first year then annually after establishment. Also after flood events.*	Remove dead vegetation and replace with stock of equivalent size and species as detailed in plant schedule. Maintain frequent watering until new vegetation has been established.	
	Photograph Bio-Retention Basin from same location for yearly review.	Annually during summer months.	N/A	
	Map propagation of Bio-Retention Basin vegetation for yearly review.	Annually during summer months.	N/A	
Filter Media	Check surface of Bio-Retention Basin for any isolated “boggy” areas.	Annually.	Increase infiltration rate by tilling the surface of the filter media.	
	Visually check and determine time of ponding within basin after a storm event.	Annually during wetter periods.	If duration of ponding exceeds 48 hours trail tilling of the surface of the filter media. If no improvement occurs, then dispose and replace the top 100 to 150mm layer of filter media.	
Subsoil Drainage	Check subsoil drainage for blockages.	Every 5 years during dry periods.	If blockage is discovered, remove by flushing subsoil drainage pipe. Collecting and dispose of flushed material appropriately.	

**Source: Water by design Maintaining Vegetated Stormwater Assets, February 2012.

* Note that inspections are to take place monthly and following flood events for first six (6) months of operation. Flood Event defined as period of rainfall with intensity greater than 50% AEP storm even



6. CONCLUSION

This Site Based Stormwater Management Plan has been prepared in support of BMD Bielby – Rocky JV at Werribee Street & Anniki Street, Kawana, QLD 4701

A hydrological analysis demonstrated that the anticipated post-development peak flow rates discharging from the site are higher than the pre-development flow rates. A hydraulic model was built using the XP-SWMM software program, to estimate the required detention volume and arrangement.

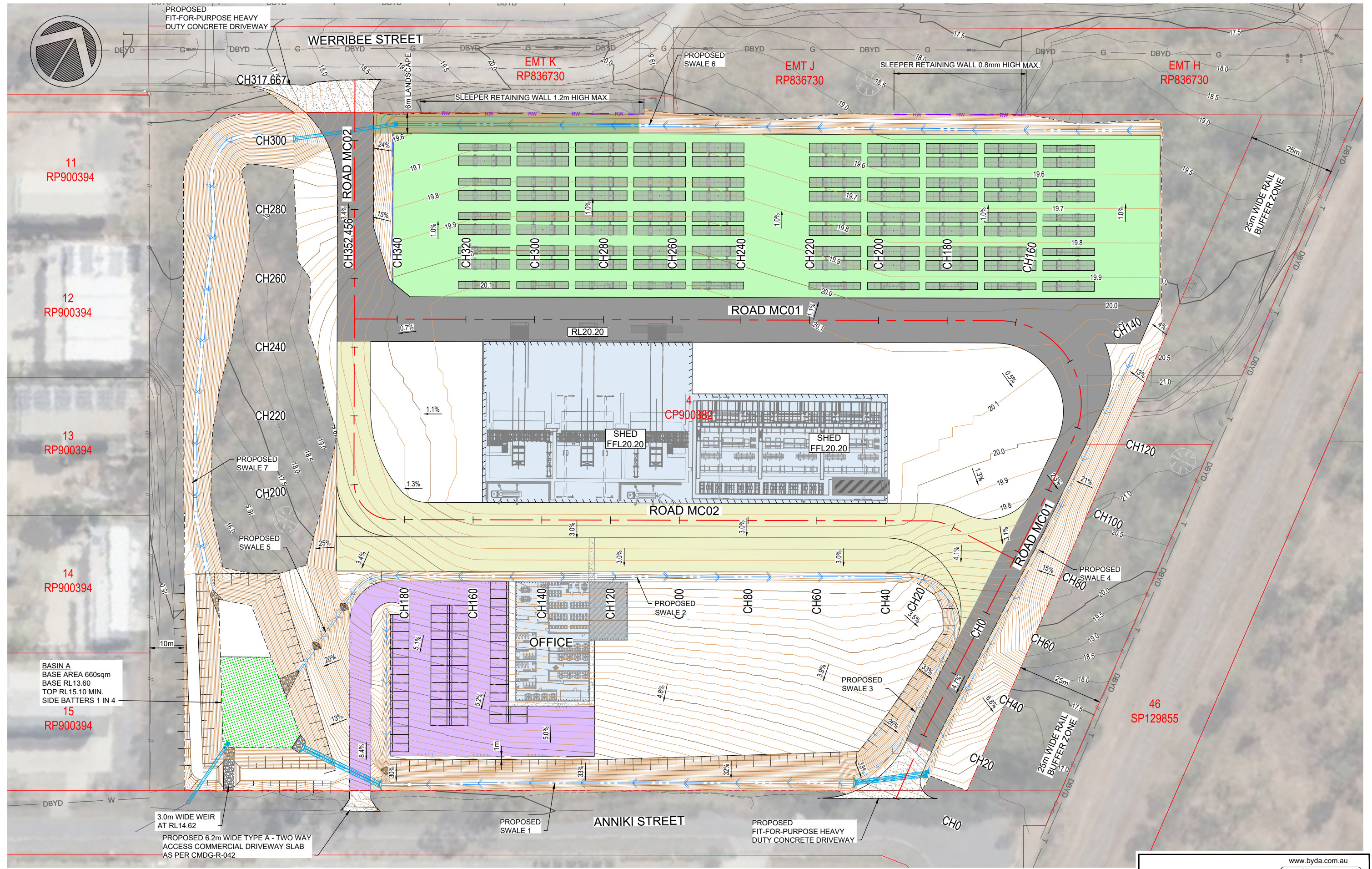
This report and stormwater management methodology have concluded that the following mitigation measures would be required:

1. A proposed detention basin with 1,042 m³ volume for quantity mitigation and detention.
2. A proposed bioretention basin with 500m² filter area for quality management measures.

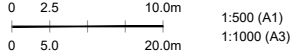
After reviewing the modelling results and subject to the detailed design and construction of the proposed stormwater management infrastructure, MSE are of the opinion that no actionable damage and/or nuisance would be generated to the subject property or external/neighboring property's and downstream infrastructure as a direct result of this development being approved.



APPENDIX A – PROPOSED LAYOUT



PROPOSED SITE
GENERAL ARRANGEMENT
SCALE 1:1000



ALL UNDERGROUND SERVICES
SHOULD BE LOCATED ON SITE
BEFORE ANY WORK IS COMMENCED



AMENDMENTS				DESIGN CHECK			
FIRST ISSUE	CALCS	DRAWN	DATE	AMENDMENT DETAILS			
A	LM	AW	10/25				
B	LM	AW	31/10/25	PRELIMINARY ISSUE			
C	LM	AW	07/11/25	PRELIMINARY ISSUE			
D	LM	AW	14/11/25	BULK EARTHWORKS OPW ISSUE			
E	LM	AW	27/01/26	RESPONSE TO INFORMATION REQUEST			

VS
VT
DRAWN CHECK

PROJECT No.
CE25168

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APPROVED
RPEQ 33682
FOR & ON BEHALF OF MOLONEY & SONS ENGINEERING

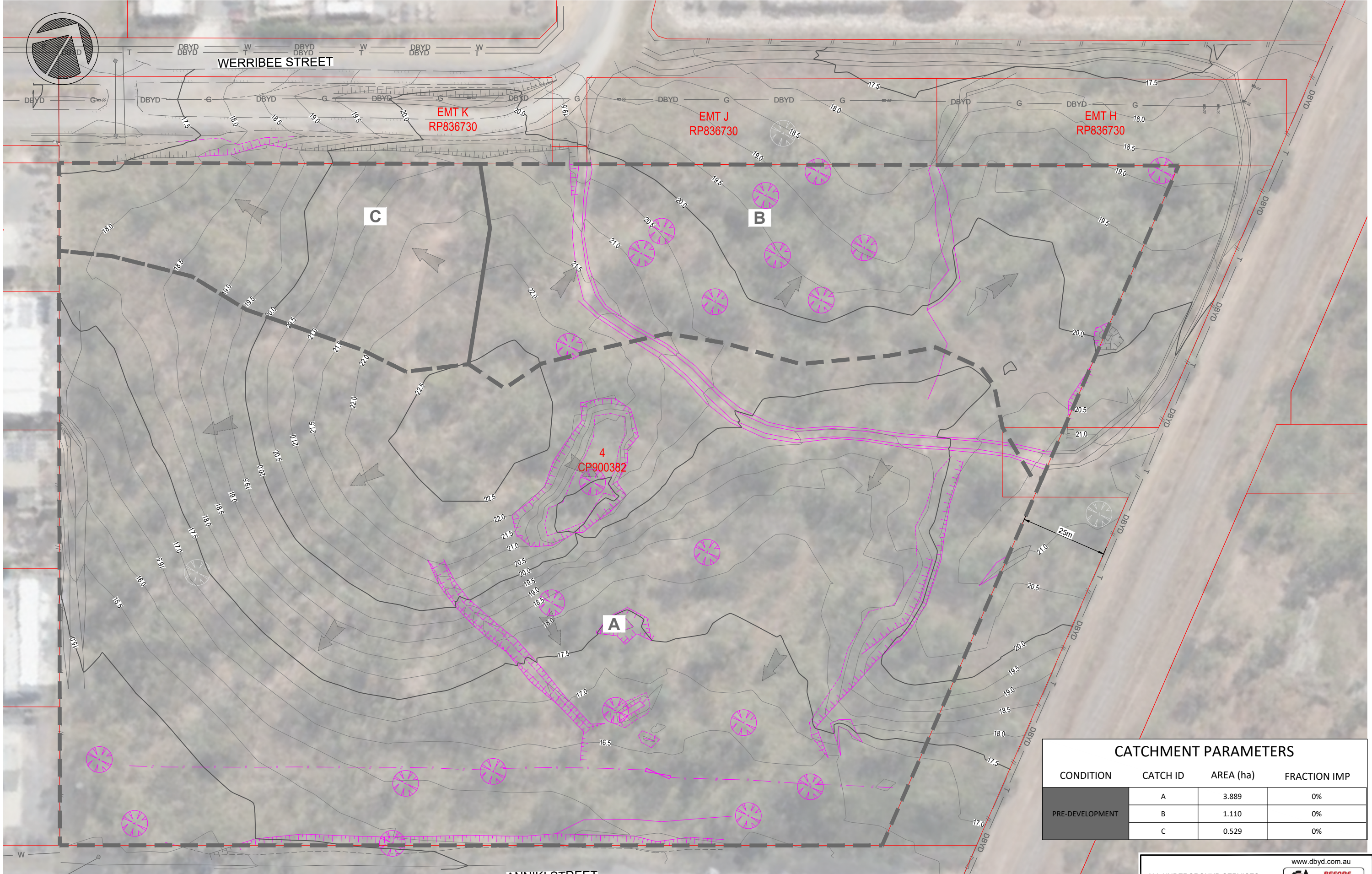
CLIENT
BMD BIELBY - ROCKYJV
PROJECT
LOT 4 CP900382
WERRIBEE STREET & ANNIKI STREET
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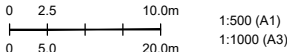


APPENDIX B – STORMWATER CATCHMENT PLAN DRAWINGS



CATCHMENT PARAMETERS			
CONDITION	CATCH ID	AREA (ha)	FRACTION IMP
PRE-DEVELOPMENT	A	3.889	0%
	B	1.110	0%
	C	0.529	0%

ANNIKI STREET
STORMWATER PRE DEVELOPMENT
CATCHMENT PLAN
SCALE 1:1000



ALL UNDERGROUND SERVICES
SHOULD BE LOCATED ON SITE
BEFORE ANY WORK IS COMMENCED



FIRST ISSUE	CALCS LM	DRAWN AW	DATE	AMENDMENT DETAILS
A	LM	AW	07/11/25	PRELIMINARY ISSUE
B	LM	AW	14/11/25	BULK EARTHWORKS OPW ISSUE
C	LM	AW	27/01/26	RESPONSE TO INFORMATION REQUEST

DESIGN CHECK VS
DRAWN CHECK VT

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DATUM

PROJECT No.
CE25168

ISSUED FOR APPROVAL

APPROVED
LC Moloney
FOR & ON BEHALF OF MOLONEY & SONS ENGINEERING

RPEQ 33682

CLIENT **BMD BIELBY - ROCKYJV**

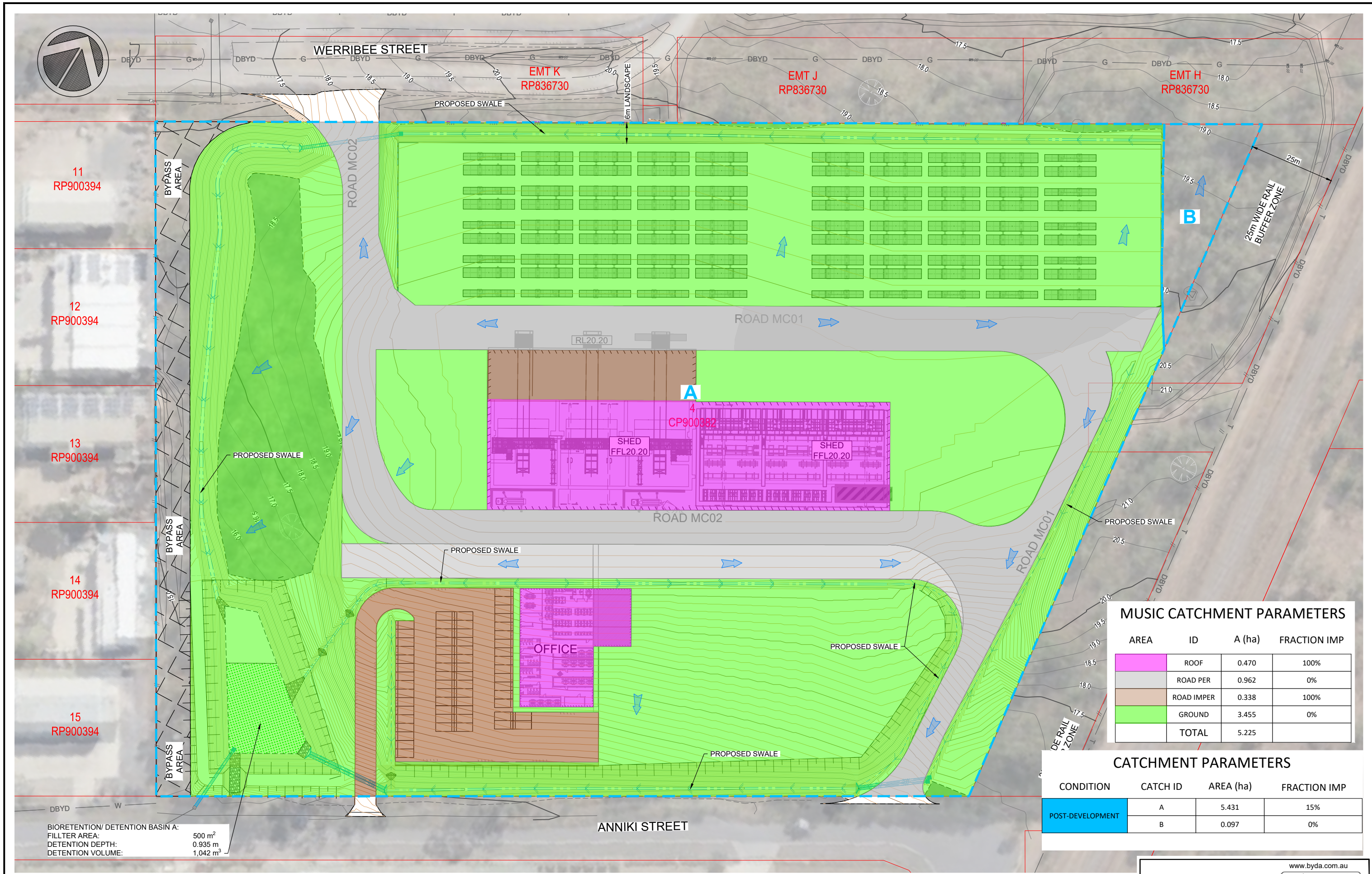
PROJECT **LOT 4 CP900382
WERRIBEE STREET & ANNIKI STREET
KAWANA QLD 4701**



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DRAWING TITLE		
STORMWATER PRE DEVELOPMENT CATCHMENT PLAN		
DRAWING NUMBER		ISSUE
CE25168-600-DR		C



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RP900394

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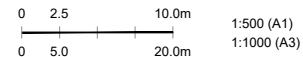
15
RP900394

BIORETENTION/ DETENTION BASIN A:
FILTER AREA: 500 m²
DETENTION DEPTH: 0.935 m
DETENTION VOLUME: 1,042 m³

MUSIC CATCHMENT PARAMETERS			
AREA	ID	A (ha)	FRACTION IMP
	ROOF	0.470	100%
	ROAD PER	0.962	0%
	ROAD IMPER	0.338	100%
	GROUND	3.455	0%
	TOTAL	5.225	

CATCHMENT PARAMETERS			
CONDITION	CATCH ID	AREA (ha)	FRACTION IMP
POST-DEVELOPMENT	A	5.431	15%
	B	0.097	0%

STORMWATER POST DEVELOPMENT
CATCHMENT PLAN
SCALE 1:1000



ALL UNDERGROUND SERVICES
SHOULD BE LOCATED ON SITE
BEFORE ANY WORK IS COMMENCED

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BEFORE YOU DIG
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<table><tr><th>FIRST ISSUE</th><th>CALCS DRAWN</th><th>DATE</th><th>AMENDMENT DETAILS</th></tr><tr><td>A</td><td>LM</td><td>AW</td><td>10/25</td></tr><tr><td>B</td><td>LM</td><td>AW</td><td>07/11/25</td></tr><tr><td>C</td><td>LM</td><td>AW</td><td>14/11/25</td></tr><tr><td>D</td><td>LM</td><td>AW</td><td>28/01/26</td></tr><tr><td>E</td><td>LM</td><td>AW</td><td>27/01/26</td></tr></table>	FIRST ISSUE	CALCS DRAWN	DATE	AMENDMENT DETAILS	A	LM	AW	10/25	B	LM	AW	07/11/25	C	LM	AW	14/11/25	D	LM	AW	28/01/26	E	LM	AW	27/01/26	<table><tr><th>DESIGN CHECK</th><th>COPYRIGHT</th><th>DATUM</th><th>PROJECT No.</th></tr><tr><td>VS</td><td>MOLONEY SOLUTIONS PTY LTD 2026</td><td></td><td>CE25168</td></tr><tr><td>VT</td><td></td><td></td><td></td></tr></table>	DESIGN CHECK	COPYRIGHT	DATUM	PROJECT No.	VS	MOLONEY SOLUTIONS PTY LTD 2026		CE25168	VT				<table><tr><th>CLIENT</th><th>PROJECT</th><th>APPROVED</th><th>RPEQ</th></tr><tr><td>BMD BIELBY - ROCKYJV</td><td>LOT 4 CP900382 WERRIBEE STREET & ANNIKI STREET KAWANA QLD 4701</td><td>LMoloney</td><td>33682</td></tr></table>	CLIENT	PROJECT	APPROVED	RPEQ	BMD BIELBY - ROCKYJV	LOT 4 CP900382 WERRIBEE STREET & ANNIKI STREET KAWANA QLD 4701	LMoloney	33682	<table><tr><th>DRAWING TITLE</th><th>DRAWING NUMBER</th><th>ISSUE</th></tr><tr><td>STORMWATER POST DEVELOPMENT CATCHMENT PLAN</td><td>CE25168-601-DR</td><td>D</td></tr></table>	DRAWING TITLE	DRAWING NUMBER	ISSUE	STORMWATER POST DEVELOPMENT CATCHMENT PLAN	CE25168-601-DR	D
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Technical Memorandum

ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

These plans are approved subject to the current conditions of approval associated with

Development Permit No.: D/196-2025

Dated: 31 March 2026

To:

Rockhampton Regional Council
PO Box 1860
Rockhampton, QLD 4700

From:

Chris Hewitt
Principal Civil Engineer
McMurtrie Consulting Engineers

RE: R20-23-24 - Casting Yard (Rockhampton Ring Road) – Werribee Street, Rockhampton

1 Introduction

1.1 Overview

McMurtrie Consulting Engineers (MCE) have been engaged to prepare a technical analysis of the proposed establishment of a concrete casting yard off Werribee Street. The assessment specifically addressed the impacts of the proposal on the function of the immediate road network, with a detailed analysis of internal arrangements and access points addressed during detailed design.

The following issues have been addressed as part of the study:

- Potential impact upon the local road network.
- Site access arrangements;
- Provision for service vehicle access;

1.2 Site Location

As shown in Figure 1.1, the site under investigation for the establishment of the casting yard is located within the low impact industry area on the eastern side of Alexandra Street. The site is bound by Werribee Street, Waurn Street and Anniki Street, with access gained via the Alexandra Street / Waurn Street intersection.

1.3 Road Network

The site is located approximately 1.3km south of the Rockhampton Ring Road project area off Alexandra Street at the alignment of Bush Crescent. Based on the configuration of the local road network, the following roads form part of the investigation:

Table 1.1: Road Network Detail

Street	Speed	Hierarchy	Formation
Alexandra Street	80km/hr	Urban Arterial	Undivided two lane road
Werribee Street	60km/hr	Local Road	Divided two lane road
Wade Street	60km/hr	Industrial Collector Road	Undivided two lane road
Boundary Road	60km/hr	Industrial Collector Road	Undivided two lane road
McLaughlin Street	60km/hr	Industrial Collector Road	Undivided two lane road

The above mentioned road network in the context of the proposed casting yard is shown in Figure 1.2.

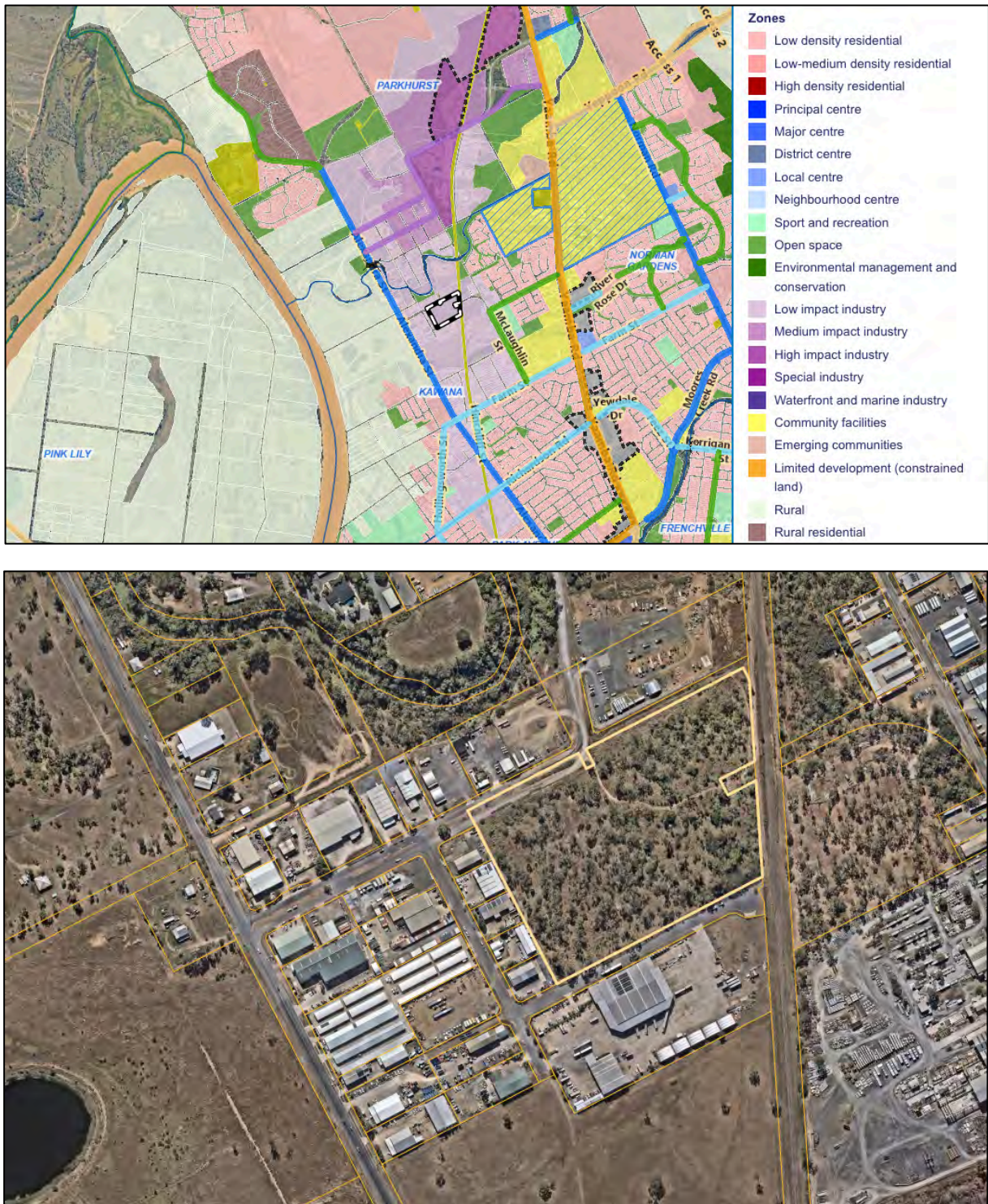


Figure 1.1 – Location of Subject Site

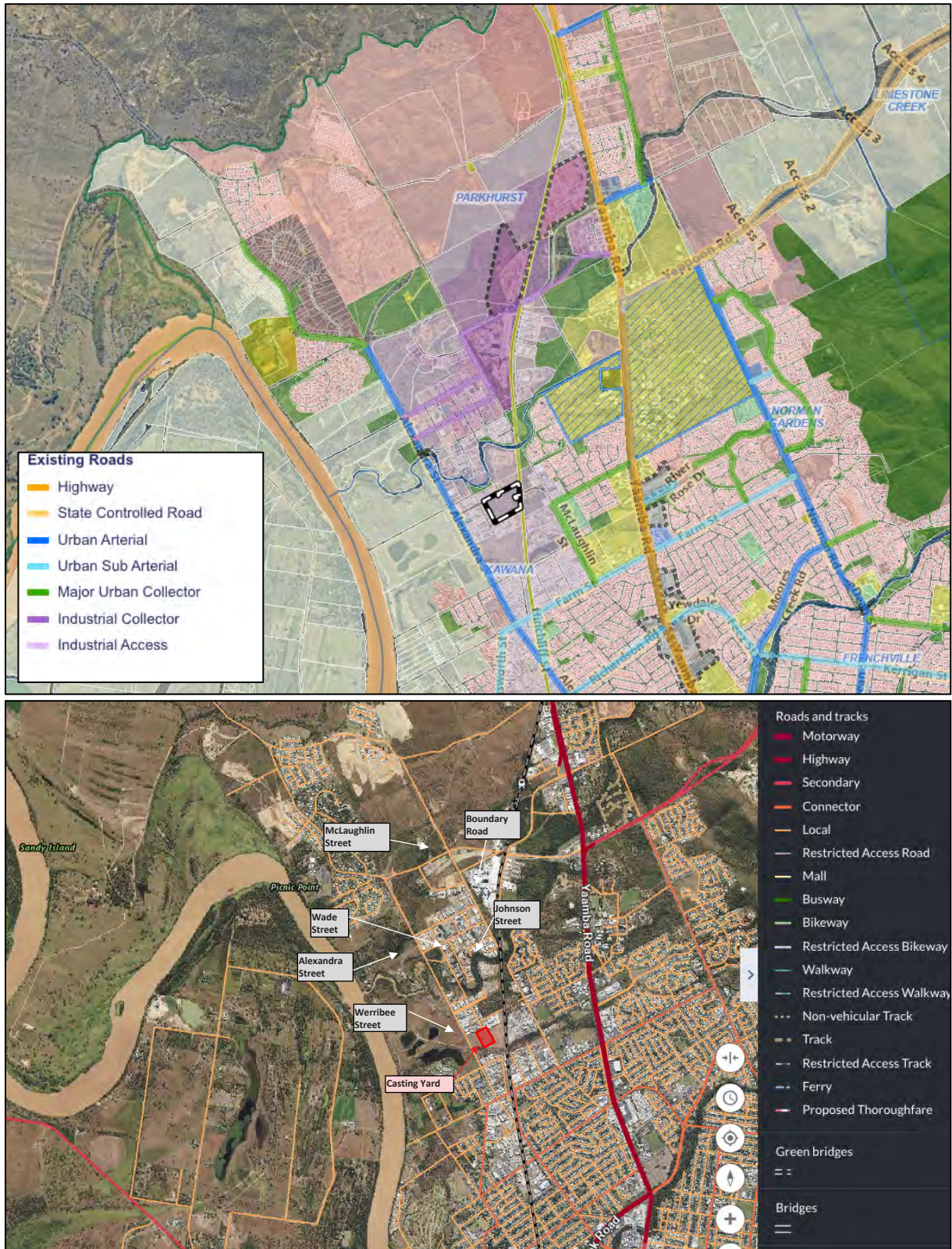


Figure 1.2 – Existing Road Network

1.4 Background Traffic Volumes

Traffic survey has been carried out at the Alexandra Street / Werribee Street intersection in September 2025. A summary of surveyed peak hour volumes is provided in Figure 1.3., with detailed survey results shown as Appendix A.

2025 SURVEYED TRAFFIC VOLUMES MORNING AND AFTERNOON PEAK HOUR

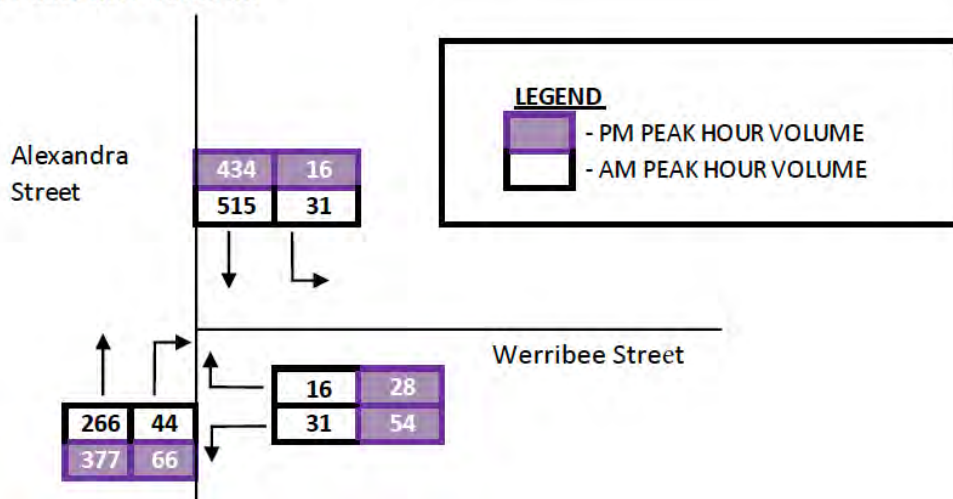


Figure 1.3 – 2025 Surveyed Traffic Demand

It is understood that the site will function in support of the Ring Road project for a duration of 2 years. For the purposes of the assessment, future traffic conditions at the Alexandra Street / Werribee Street intersection have been estimated with application of a 3% compounded growth factor from the surveyed year (2025). Estimated future traffic volumes are provided in Figure 1.4.

2027 BACKGROUND TRAFFIC ESTIMATES MORNING AND AFTERNOON PEAK HOUR @ 3.0% GROWTH FACTOR

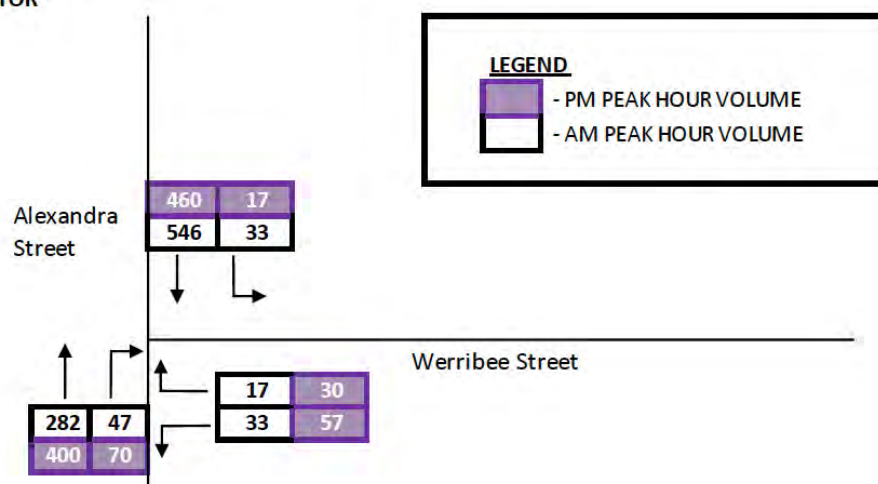


Figure 1.4 – Future Traffic Estimates
(Year 2027)

3 Traffic Impact

3.1 Traffic Generation

The traffic generation of the proposed casting yard has been derived from the estimated production capacity of the site and the anticipated number of staff needed for the daily operation of the facility.

Based on the preliminary configuration of the facility shown in Figure 2.1, the casting yard has been assessed assuming 3 production bays and a steady schedule of deliveries and dispatch over a 5 – 6 day working week. As such, the below estimates have been adopted.

- Staff
 - 5am: 30 personnel (FRP Workers) 60 daily trips
 - 6am: 5 – 8 personnel (General Operations) 16 daily trips
 - 11am: 20 personnel (Concrete Work) 40 daily trips
- Production (per segment)
 - Concrete: 8m³ Load 3 – 5 agitators 10 daily trips
 - Reo: 3-6 tonnes 1 trips / 5-10 segments 2-3 trips per week
 - Ancillary servicing / delivery: 2 trips per day

For the purposes of the assessment, it has been anticipated that 20% of staff related trips occur during peak hour periods, distributed in the order of 70 (arrival) /30 (departure) in the morning and mirrored in the afternoon. As indicated above, the scheduling of staff work periods is generally outside of peak commuter periods. Therefore, the anticipated demand adopted in the analysis is conservative.

Based on the above, under the anticipation of a steady production schedule, the site is estimated to generate in the order of 155 trips per day, of which 30 trips are estimated to be generated during peak hour periods.

Table 3.1: Development traffic generation estimates

Component	Daily Trips	Morning Peak Hour			Afternoon Peak Hour		
		In	Out	Total	In	Out	Total
Staff	116 trips	16	8	24	8	16	24
Production - Bay 1	15 trips	1	1	2	1	1	2
- Bay 2	15 trips	1	1	2	1	1	2
- Bay 3	15 trips	1	1	2	1	1	2
TOTAL	161 trips	19	11	30	11	19	30

3.2 Traffic Distribution

The directional distribution for the new trips generated by the proposed use is estimated based on the function of the immediate road network. A visual representation of the anticipated traffic distribution are shown in Figure 3.1, with the quantified estimate for the development trips are shown in Figure 3.2.

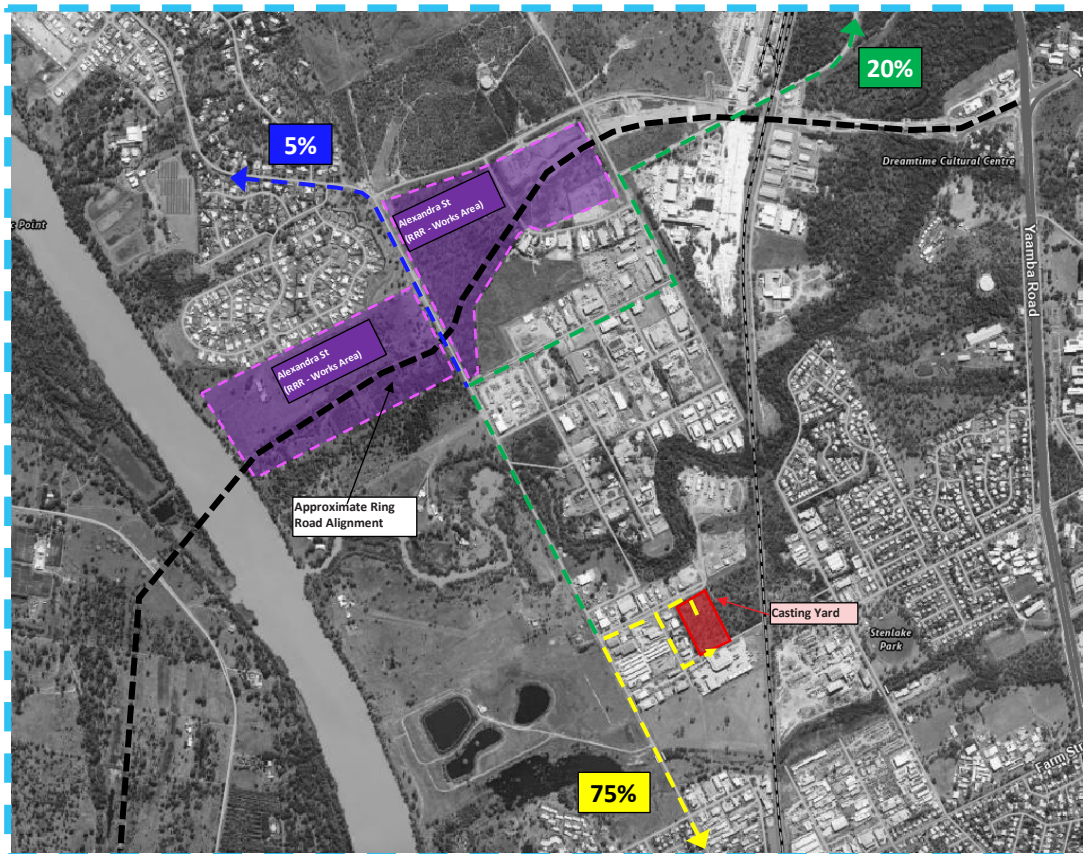
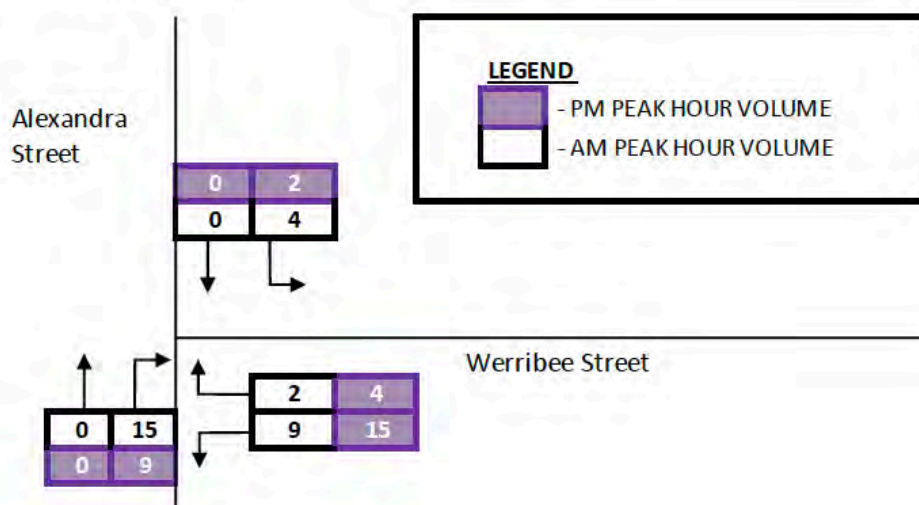


Figure 3.1 – Traffic Distribution within local Road Network
DEVELOPMENT TRAFFIC ESTIMATES
MORNING AND AFTERNOON PEAK HOUR



2027 DESIGN TRAFFIC ESTIMATES
MORNING AND AFTERNOON PEAK HOUR
(BACKGROUND TRAFFIC ESTIMATE + DEVELOPMENT TRAFFIC)

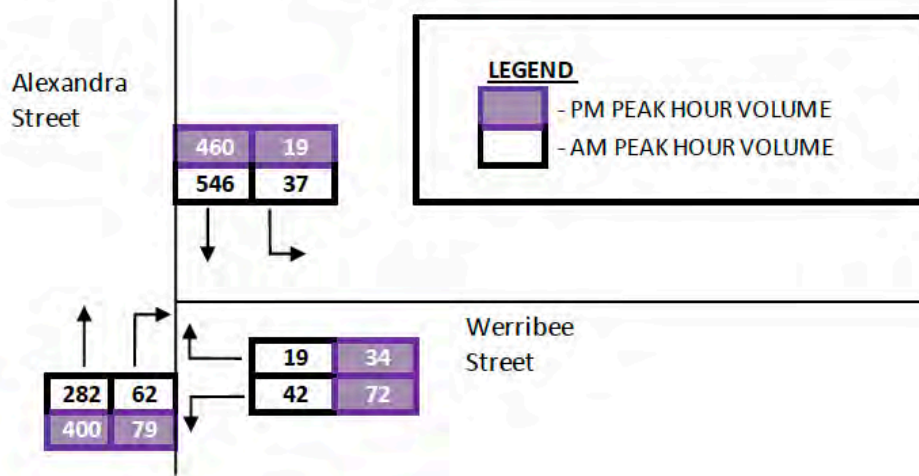


Figure 3.2: Traffic distribution estimates

3.3 Resultant Impact

3.3.1 Geometric Suitability

In the context of projected traffic conditions, the scale of the additional traffic generated by the proposal has been assessed in accordance with the TMR Guide to Traffic Generating Developments – 2018 (GTIA)

As indicated the proposal will generate significant demand at the Alexandra Street / Werribee Street intersection. As shown in Figure 3.3, the intersection currently functions as a T-intersection, with Alexandra Street forming the major approach. Werribee Street is the minor approach of the intersection and comprises of a divided two lane roadway.

As shown, Alexandra Street currently provides a basic right turn treatment for northbound traffic turning to Werribee Street.



Figure 3.3: Alexandra Street / Werribee Street Intersection Configuration

As swept path analysis has been carried out at the intersection based on the largest design vehicle anticipated for deliveries as well as an indicative assessment of the Over Size, Over Mass Vehicle (OSOM) expected for delivery of the components to the Ring Road.

As shown in Figures 3.4 and 3.5, the intersection can generally facilitate the movements for up to the size of a 20 metre long Articulated Vehicle, with some modification / mitigation required to facilitate the movements of the OSOM vehicle. However, the specific impacts and resultant mitigation of such to ensure the suitability for the intersection to accommodate the movement of the design OSOM vehicle is subject to detailed design.

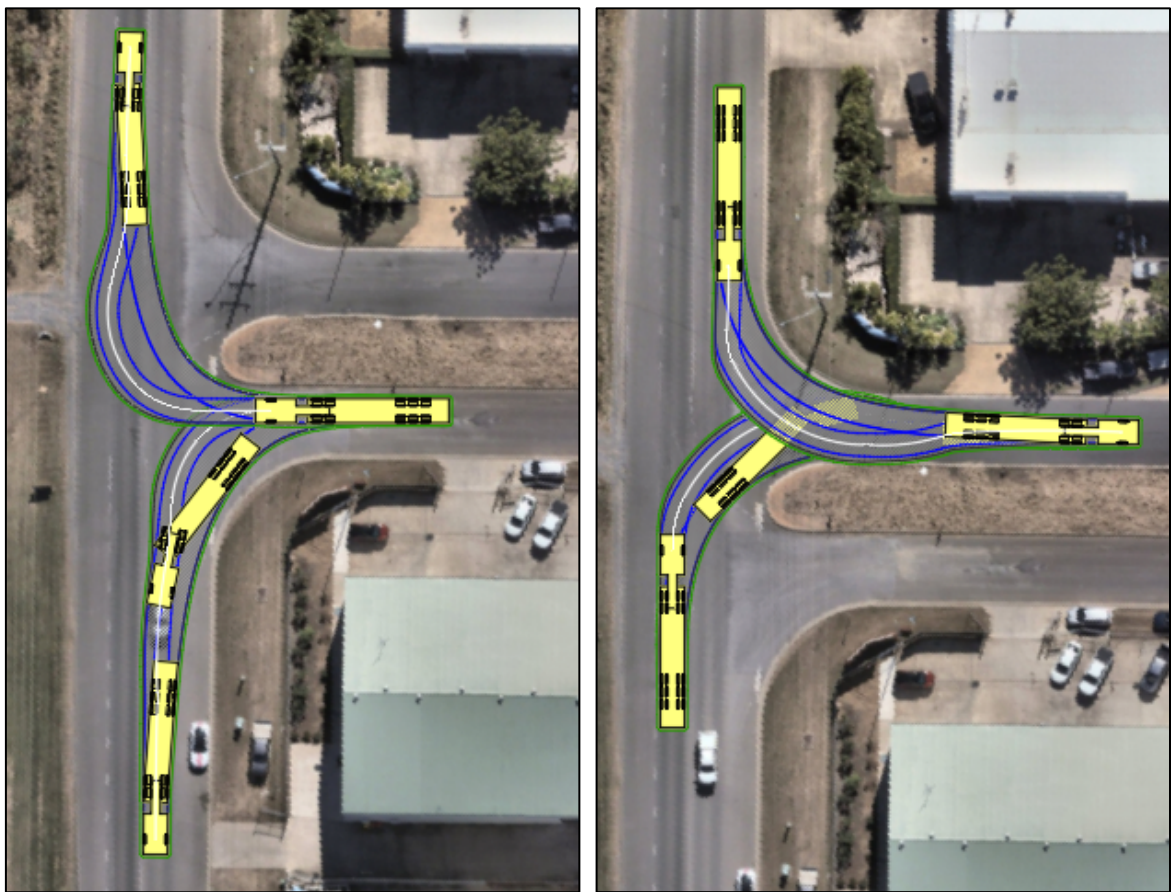


Figure 3.4: Alexandra Street / Werribee Street Intersection (AV Path)

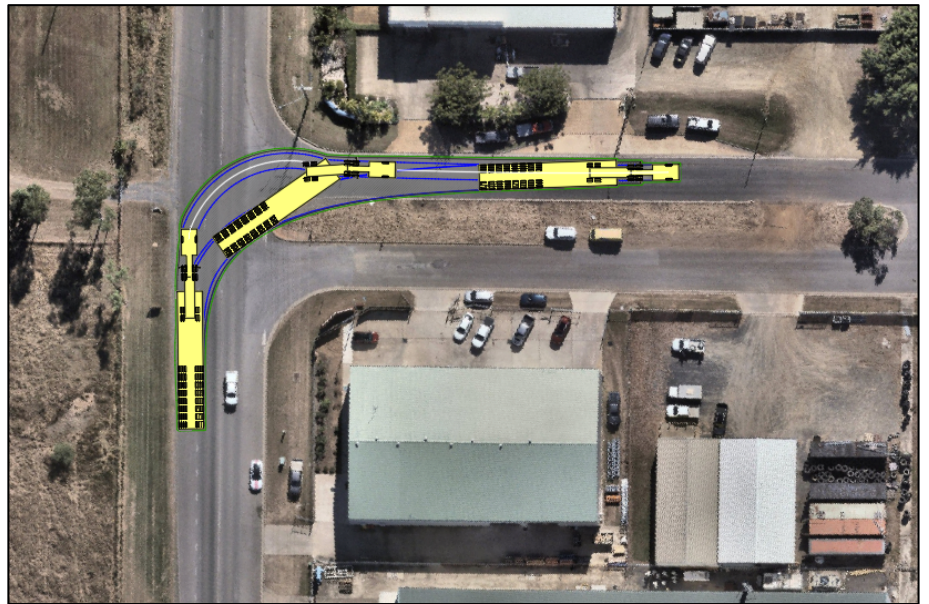


Figure 3.5: Alexandra Street / Werribee Street Intersection (OSOM Vehicle path)
(Indicative Only – Subject to Detailed Analysis)

3.3.2 Turn Warrants Analysis

A turn warrants analysis at the Alexandra Road / Werribee Street intersection has been carried out in accordance with the Austroads Guide to Traffic Management Part 6 for a posted speed limit of 80 km/h and the design traffic volumes based on future traffic conditions in year 2027.

As shown in Figure 3.6 the following turn treatments are warranted at the proposed access intersection:

2027 Design traffic conditions:

Left turn: Auxiliary left turn (AUL(S))
Right turn: Channelised Right Turn (CHR)

The design parameters of the Alexandra Street / Werribee Street intersection based on the warranted demand is provided in Figure 3.7. The treatments shown are based in Austroads Part 4A, allowing for an auxiliary left turn lane suitable for a design speed limit of 90 km/h.

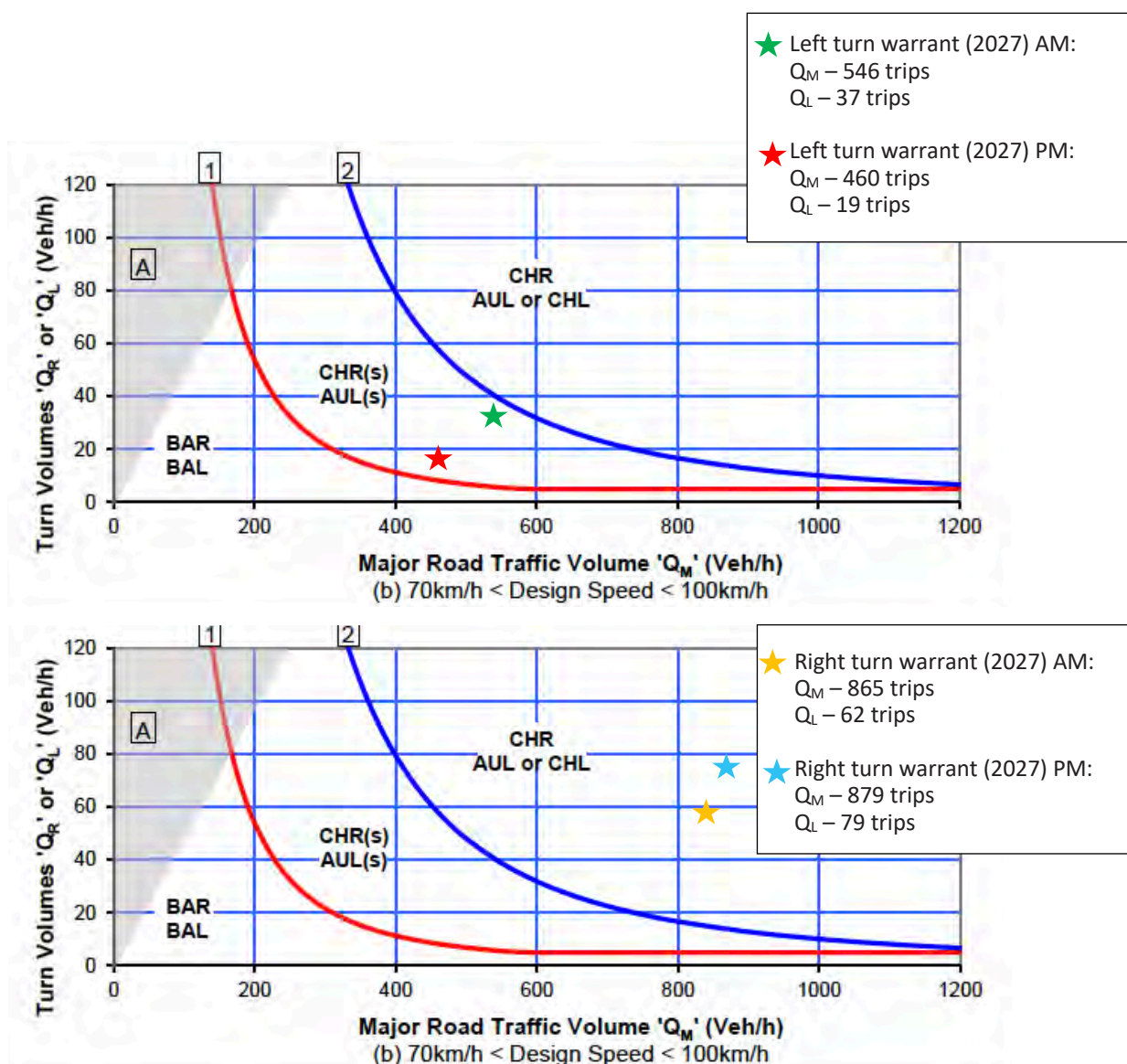
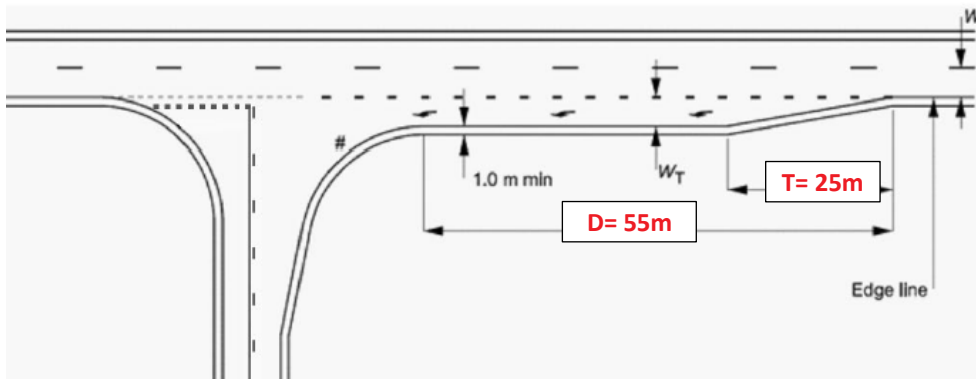


Figure 3.6: Turn warrants analysis at Alexandra Street / Werribee Street Intersection

LEFT TURN TREATMENT (AULS)



RIGHT TURN TREATMENT (CHR)

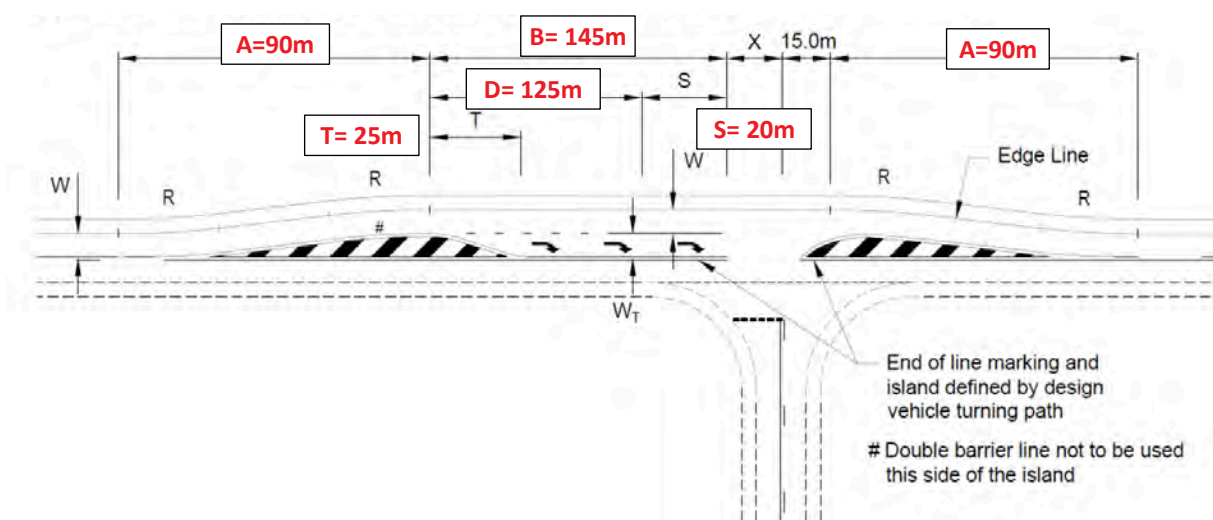


Figure 3.7: Extent of Works over the Alexandra Street / Werribee Street Intersection

Whilst it is noted that the warrants of the turn treatments over the intersection trigger an investigation for a higher service turn treatment, it is proposed that the site be considered based on its temporary function within the network. As such, it is proposed that the existing geometry of the intersection be retained with operational controls implemented over the site to limit the casting yards impact on the intersection during peak hour periods.

This is considered to be satisfactory on the basis of:

- The site will be subject to a specific traffic management plan when components are dispatched from the site.
- The site is proposing to limit site based impacts on the intersection via operational controls.
- The site will only be in operation to support the construction of the Ring Road and will therefore cease production upon the completion of the project.

3.3.3 Intersection Capacity

An intersection capacity analysis has been carried out at the Alexandra Street / Werribee Street intersection in its current form, only providing basic turn treatments from the major approaches. The analysis has been carried out using SIDRA software in accordance with the Guide to Traffic Impact Assessment (GTIA 2018). Given the relatively short duration of impact (temporary implementation of the site) the analysis has been based on the critical year 2027 traffic conditions.

The Alexandra Street / Werribee Street intersection has been assessed based on the estimated traffic conditions indicated in Figure 3.2. A summary of the results based on the below criteria is provided in Table 3.2, with detailed results of the assessment shown as Appendix B:

- 2027 AM peak background estimates without development;
- 2027 PM peak background estimates without development;
- 2027 AM peak design estimates with development;
- 2027 PM peak design estimates with development.

Table 3.2: SIDRA results summary (Alexandra Street / Werribee Street intersection)

Scenario	Degree of Saturation	Level of Service	Total Average Delay (seconds)	Queue Length (metres)
BACKGROUND VOLUMES / ESTIMATES				
2027 AM Peak [W/O dev]	0.333	C	2.3	5.4
2027 PM Peak [W/O dev]	0.280	C	2.7	6.8
DESIGN TRAFFIC ESTIMATES				
2027 AM Peak With Development	0.336	C	2.7	6.8
2027 PM Peak With Development	0.287	C	3.1	8.7

As demonstrated in Table 3.2, the Alexandra Street / Werribee Street intersection operates within acceptable criteria under the background and design traffic conditions. As mentioned, the design conditions adopted in the analysis represent a conservative outcome on the basis that staff generally arrive to the site outside of peak hour periods. Furthermore, the site is willing to implement operational controls to limit the traffic generation over the intersection to no more than 5 trips during peak commuter periods.

It is therefore considered that the intersection geometry as is currently functional with basic left and right turn treatments is satisfactory to accommodate the demand generated by the proposed development, with the casting yard not anticipated to cause a significant impact on the existing function and safety of the local road network.

4 Access and Parking

4.1 Proposed Access Arrangements

As shown in Figure 4.1, it is proposed that access to the site will be gained via two separate crossovers off Anniki Street, separating heavy vehicle and light vehicle movements. It is proposed that a single point of access will be provided for service the car park (light vehicle), with a third crossover proposed to be provided of Werribee Street to facilitate heavy vehicle egress movements.

The design of the crossovers is anticipated to be such to facilitate the needs for the largest design vehicle and generally designed in accordance with the Australian Standards AS2890.1 and AS2890.2.

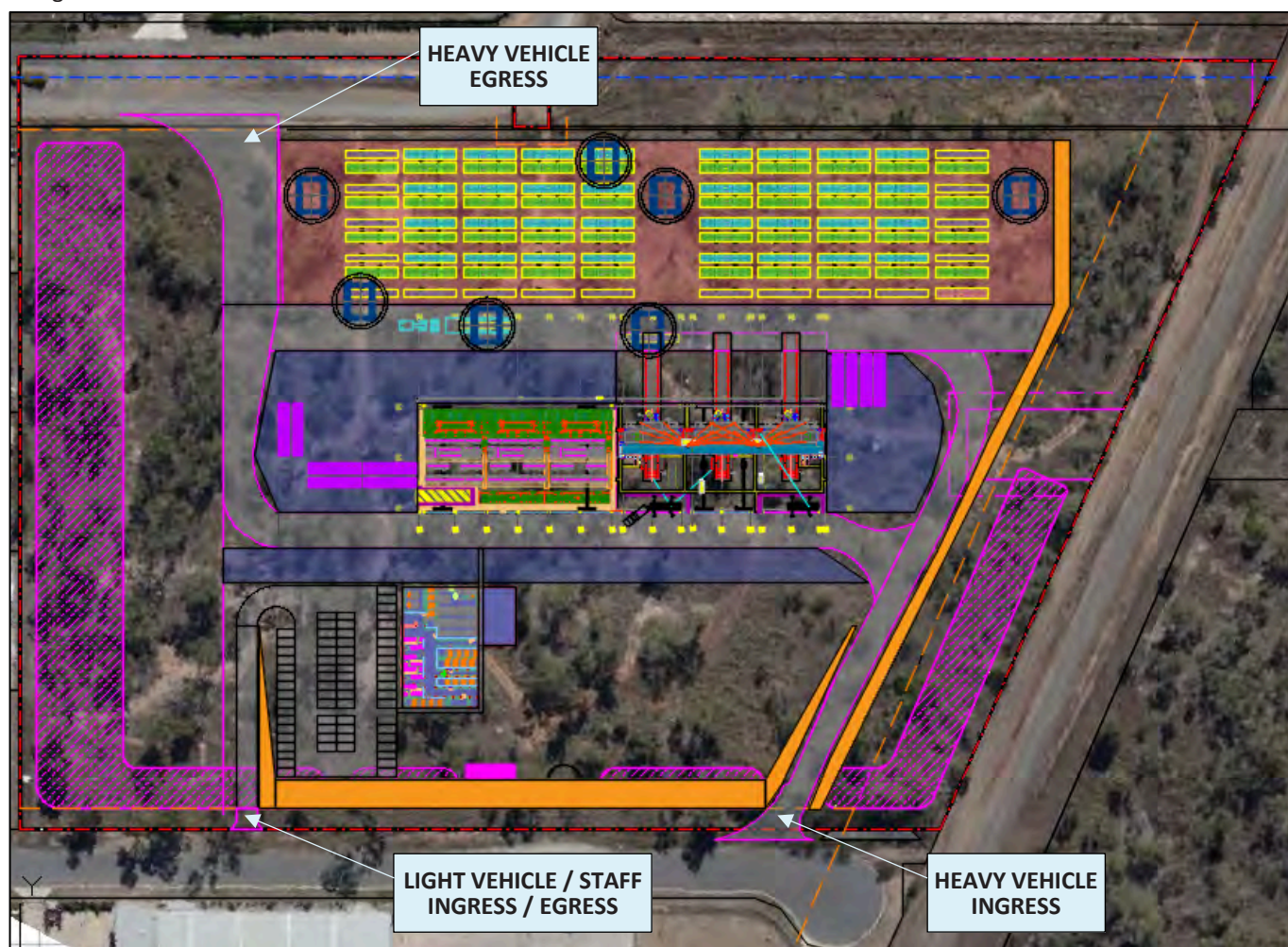


Figure 4.1: Proposed Access Location

Swept paths for heavy vehicles negotiating the immediate road network on the approach and departure of the site are shown in Figures 4.2 – 4.5. As shown, the design vehicle is required to encroach into the opposing side of the roadway when negotiating the turns at the Waurn Street / Anniki Street intersection. It is considered on the basis of Anniki Street only provides limited access with no through connection, the movements can be managed under temporary traffic management without the need for an upgrade of the intersections.

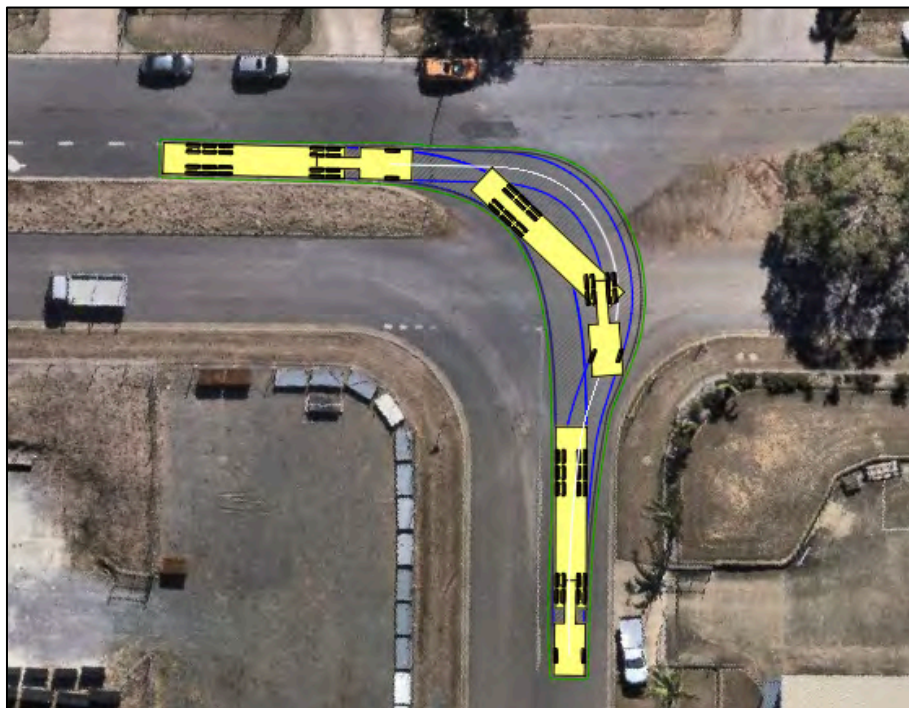


Figure 4.2: Articulated Vehicle Manoeuvring Werribee Street / Waurn Street Intersection



Figure 4.3: Articulated Vehicle Manoeuvring Waurn Street / Anniki Street Intersection

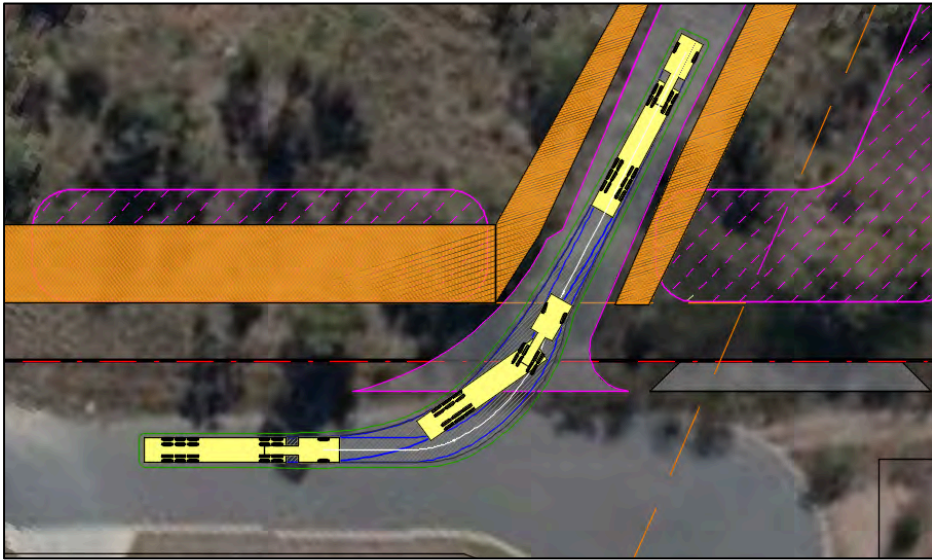


Figure 4.4: Articulated Vehicle Manoeuvring Site Entry
(Anniki Street)



Figure 4.5: Heavy Vehicle Manoeuvring Site Exit
(Werribee Street)

4.2 Car Parking Supply and Design

It is proposed that the car parking arrangements will be designed in accordance with AS2890.1:2004. The proposed arrangements allow for up to 68 car parking spaces to be supplied on-site to facilitate the parking demand generated by staff associated with the site.

A concept plan of the proposed car parking arrangements is shown in Figure 4.6.



5 SUMMARY

Based on the assessment contained within this report, it is concluded that:

- It is proposed that a casting yard be established off Werribee Street to support the construction of the Rockhampton Ring Road. Such is situated approximately 1.3 kilometres south of the Alexandra Street works area.
- Heavy vehicle activity associated with the site are estimated to be:
 - Concrete deliveries: 9–15 agitator trucks per day (45–75 trucks per week).
 - Reinforcement deliveries: approximately 2–3 trucks per week.
 - Ancillary servicing / delivery: 1 trucks per day (5 trucks per week).
- Staff-related traffic will generate additional movements outside of peak periods. When combined with production vehicle activity, the yard is estimated to generate approximately 155 daily trips under steady-state operations, of which only a proportion occurs during the critical peak periods of the local road network.
- Intersection analysis indicates that, while OSOM vehicles will require targeted operational management, the Alexandra Street / Werribee Street intersection and associated local network can accommodate the projected traffic demand. Minor mitigation (auxiliary turn treatments) may be warranted under Austroads criteria but can be managed via temporary operational controls rather than permanent upgrades given the site's temporary function.
- The overall traffic impact of the casting yard is considered manageable and acceptable, subject to:
 - Preparation and implementation of a traffic management plan specifically addressing OSOM dispatch operations.
 - Ongoing coordination with project logistics to ensure outbound OSOM volumes are aligned with site capacity and construction staging.
 - Continued use of operational controls to limit peak-hour conflicts on the local road network.

Please contact the undersigned in relation to the above information.

Yours sincerely



Chris Hewitt

Principal Civil Engineer RPEQ NO. 5141

ATTACHMENTS

ATTACHMENT A – SURVEYED TRAFFIC DEMAND

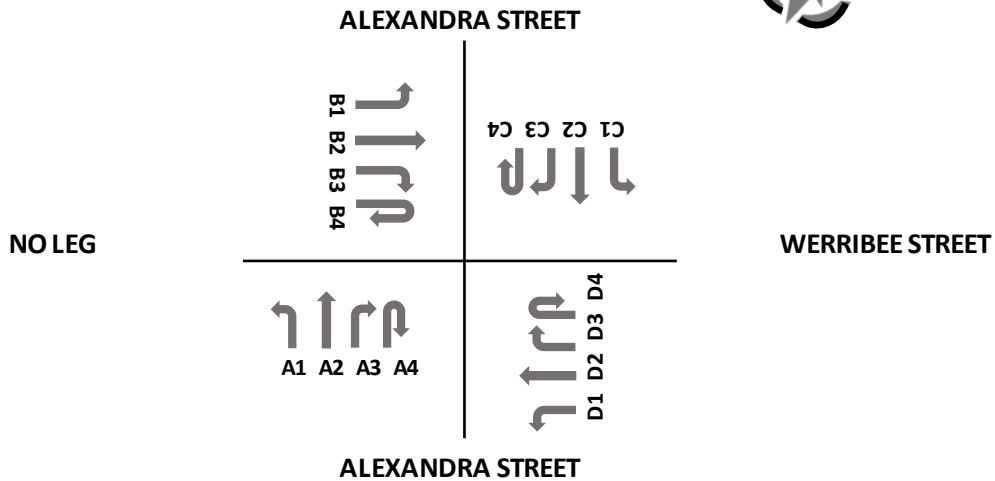
ATTACHMENT B – DETAILED SIDRA OUTPUT

ATTACHMENT A – SURVEYED TRAFFIC DEMAND

INTERSECTION REFERENCE

SITE DETAIL

Method: TRAFFIC CAM SURVEY
Location: Alexandr Street / Werribee Street Intersection
Survey Date: 2nd & 3rd September 2025



PEAK HOUR VOLUME SUMMARY

SITE DETAIL

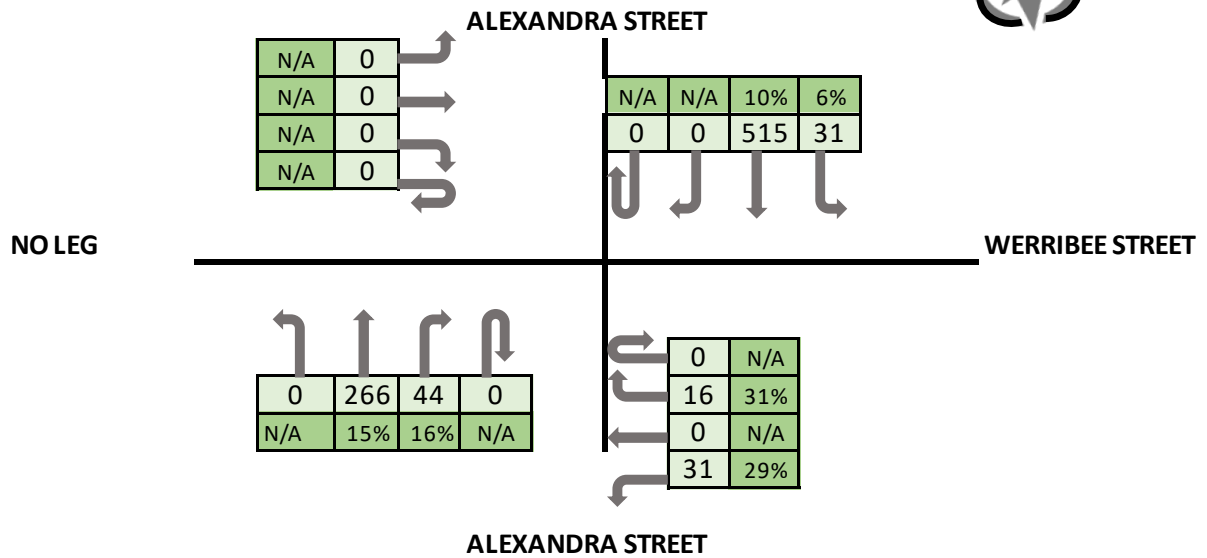
SURVEY DATE: 2nd & 3rd September 2025

LEGEND

XX	- TOTAL COUNT
XX	- HV %

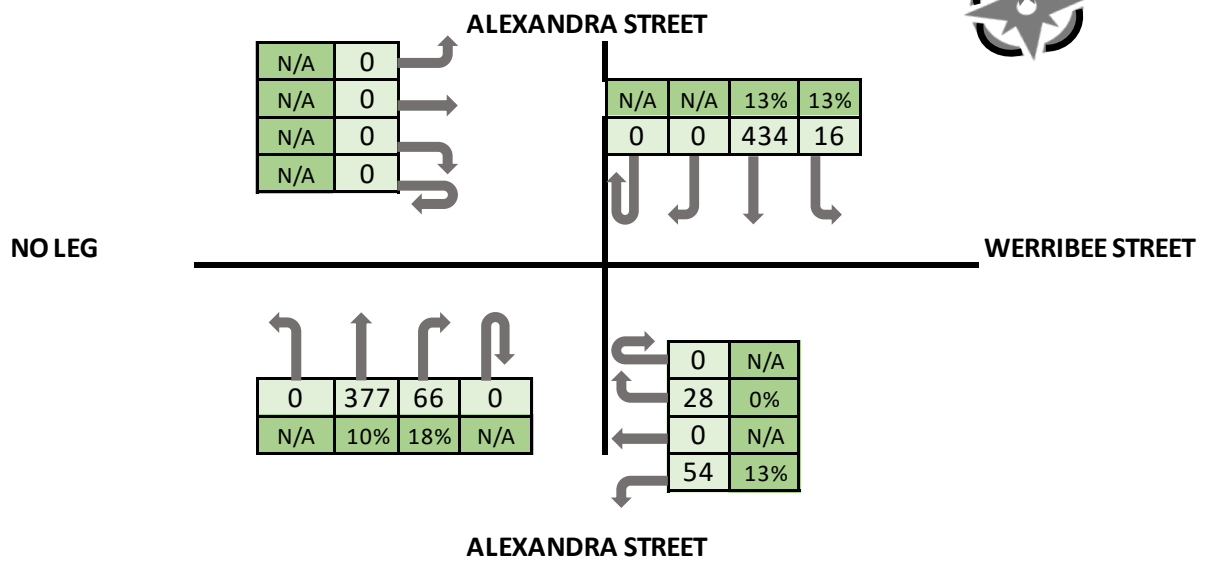
AM PEAK HOUR

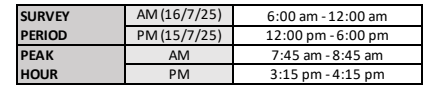
7:45 am - 8:45 am



PM PEAK HOUR

3:15 pm - 4:15 pm





TIME (PERIOD END)	NORTHBOUND LEFT (A1)	NORTHBOUND THROUGH (A2)	NORTHBOUND RIGHT (A3)	NORTHBOUND U-TURN (A4)	EASTBOUND LEFT (B1)	EASTBOUND THROUGH (B2)	EASTBOUND RIGHT (B3)	EASTBOUND U-TURN (B4)	SOUTHBOUND LEFT (C1)	SOUTHBOUND THROUGH (C2)	SOUTHBOUND RIGHT (C3)	SOUTHBOUND U-TURN (C4)	WESTBOUND LEFT (D1)	WESTBOUND THROUGH (D2)	WESTBOUND RIGHT (D3)	WESTBOUND U-TURN (D4)	TOTAL	TOTAL HOUR	
5:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
6:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15	0	72	7	0	0	0	0	0	0	55	0	0	12	0	2	0	148	148	
6:30	0	78	14	0	0	0	0	0	3	61	0	0	8	0	0	0	164	312	
6:45	0	63	15	0	0	0	0	0	4	42	0	0	9	0	5	0	138	450	
7:00	0	68	19	0	0	0	0	0	17	58	0	0	8	0	0	0	170	620	
7:15	0	82	17	0	0	0	0	0	13	72	0	0	8	0	2	0	194	666	
7:30	0	73	11	0	0	0	0	11	8	116	0	0	9	0	0	0	217	719	
7:45	0	66	2	0	0	0	0	0	0	84	0	0	11	0	3	0	166	747	
8:00	0	60	10	0	0	0	0	0	14	141	0	0	8	0	0	0	233	810	
8:15	0	54	16	0	0	0	0	0	7	176	0	0	11	0	8	0	272	888	
8:30	0	65	8	0	0	0	0	0	4	127	0	0	1	0	4	0	209	880	
8:45	0	87	10	0	0	0	0	10	6	71	0	0	11	0	4	0	189	903	
9:00	0	81	11	0	0	0	0	0	5	51	0	0	16	0	0	0	164	834	
9:15	0	55	15	0	0	0	0	0	2	65	0	0	6	0	5	0	148	710	
9:30	0	62	4	0	0	0	0	0	8	62	0	0	11	0	2	0	149	650	
9:45	0	60	17	0	0	0	0	0	6	72	0	0	12	0	2	0	169	630	
10:00	0	56	15	0	0	0	0	0	6	69	0	0	18	0	3	0	167	633	
10:15	0	47	16	0	0	0	0	0	4	81	0	0	7	0	6	0	161	646	
10:30	0	68	5	0	0	0	0	0	4	80	0	0	6	0	7	0	170	667	
10:45	0	64	13	0	0	0	0	0	2	68	0	0	3	0	6	0	156	654	
11:00	0	69	8	0	0	0	0	0	3	83	0	0	4	0	4	0	171	658	
11:15	0	59	14	0	0	0	0	0	7	75	0	0	19	0	5	0	179	676	
11:30	0	51	10	0	0	0	0	0	5	75	0	0	10	0	8	0	159	665	
11:45	0	65	7	0	0	0	0	0	9	69	0	0	9	0	2	0	161	670	
12:00	0	71	24	0	0	0	0	0	4	93	0	0	6	0	2	0	200	699	
12:15	0	90	17	0	0	0	0	0	1	62	0	0	9	0	6	0	185	705	
12:30	0	66	13	0	0	0	0	0	4	61	0	0	3	0	3	0	150	696	
12:45	0	51	18	0	0	0	0	0	4	82	0	0	8	0	1	0	164	699	
13:00	0	72	15	0	0	0	0	0	2	61	0	0	14	0	3	0	167	666	
13:15	0	74	10	0	0	0	0	0	4	53	0	0	19	0	4	0	164	645	
13:30	0	79	4	0	0	0	0	0	9	58	0	0	3	0	1	0	154	649	
13:45	0	78	11	0	0	0	0	0	5	71	0	0	13	0	2	0	180	665	
14:00	0	57	25	0	0	0	0	0	11	83	0	0	5	0	1	0	182	680	
14:15	0	69	12	0	0	0	0	0	7	75	0	0	16	0	5	0	184	700	
14:30	0	63	11	0	0	0	0	11	4	70	0	0	6	0	0	0	154	700	
14:45	0	70	12	0	0	0	0	0	5	104	0	0	16	0	3	0	210	730	
15:00	0	60	12	0	0	0	0	0	6	121	0	0	7	0	1	0	207	755	
15:15	0	70	14	0	0	0	0	0	11	84	0	0	14	0	1	0	194	765	
15:30	0	106	22	0	0	0	0	0	5	106	0	0	9	0	3	0	251	862	
15:45	0	96	6	0	0	0	0	0	5	103	0	0	16	0	13	0	239	891	
16:00	0	99	25	0	0	0	0	0	5	101	0	0	16	0	6	0	252	936	
16:15	0	76	13	0	0	0	0	0	1	124	0	0	13	0	6	0	233	975	
16:30	0	89	8	0	0	0	0	0	2	88	0	0	12	0	5	0	204	928	
16:45	0	113	5	0	0	0	0	0	7	85	0	0	7	0	4	0	221	910	
17:00	0	105	0	0	0	0	0	0	2	73	0	0	5	0	2	0	187	845	
17:15	0	117	3	0	0	0	0	0	1	49	0	0	12	0	8	0	190	802	
17:30	0	112	1	0	0	0	0	0	0	83	0	0	6	0	2	0	204	802	
17:45	0	98	2	0	0	0	0	0	1	63	0	0	2	0	1	0	167	748	
18:00	0	70	1	0	0	0	0	0	0	62	0	0	0	0	0	0	133	694	
18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	504	
18:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	300	
18:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	133	
19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

SURVEY PERIOD	AM (16/7/25)	6:00 am - 12:00 am
	PM (15/7/25)	12:00 pm - 6:00 pm
PEAK HOUR	AM	7:45 am - 8:45 am
	PM	3:15 pm - 4:15 pm

ATTACHMENT B – DETAILED SIDRA OUTPUT

SITE LAYOUT

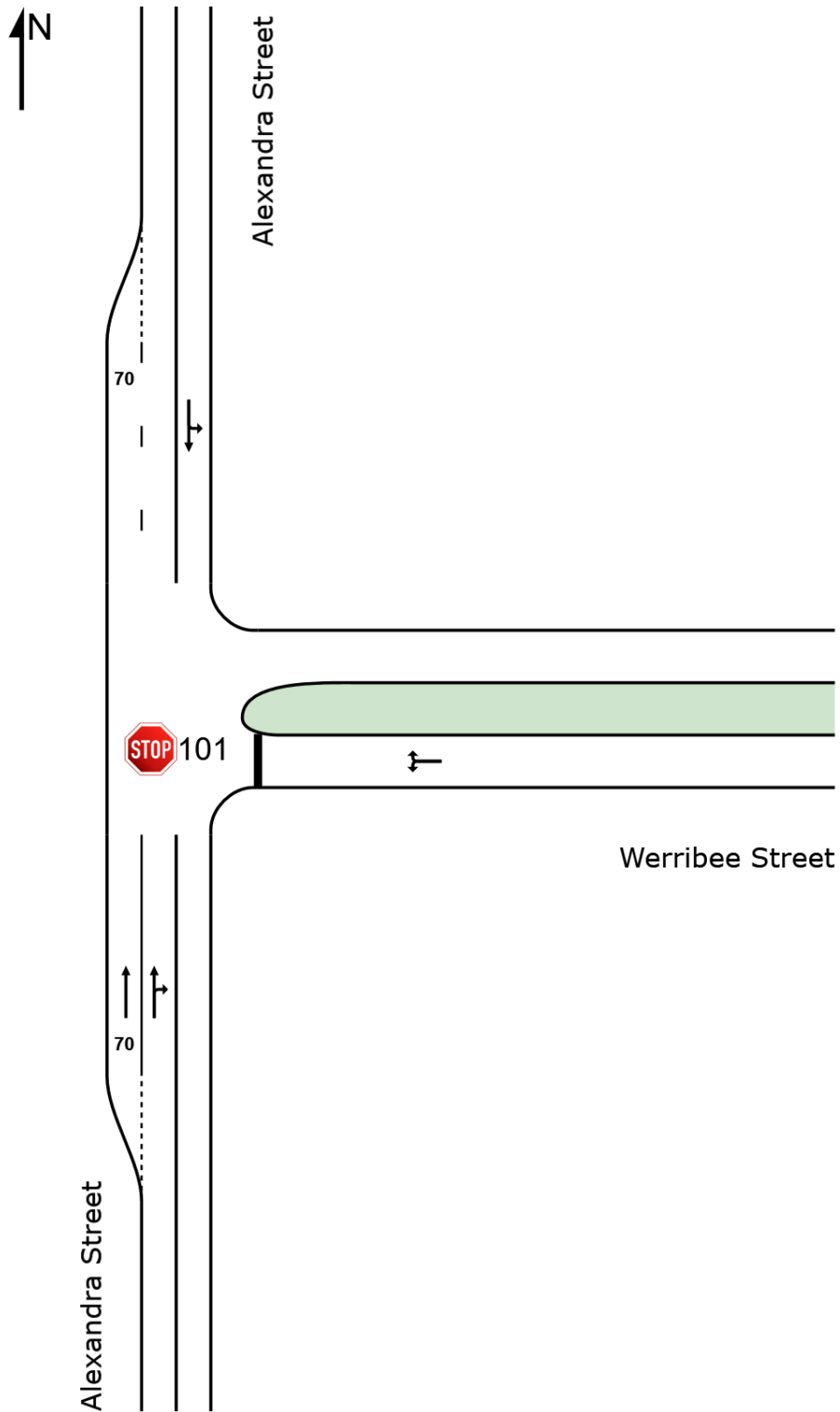
 **Site: 101 [AM Peak 2027 Background Traffic - Without Development (Site Folder: General)]**

Alexandra Street / Werribee Street Intersection

Site Category: (None)

Stop (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

 **Site: 101 [AM Peak 2027 Background Traffic - Without Development (Site Folder: General)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Alexandra Street / Werribee Street Intersection

Site Category: (None)

Stop (Two-Way)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows [Total HV] veh/h %		Arrival Flows [Total HV] veh/h %		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. Dist] veh m		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Alexandra Street															
2	T1	All MCs	297	15.0	297	15.0	0.164	1.2	LOS A	0.7	5.2	0.20	0.24	0.20	58.1
3	R2	All MCs	49	16.0	49	16.0	0.164	9.8	LOS A	0.7	5.2	0.34	0.40	0.34	54.0
Approach			346	15.1	346	15.1	0.164	2.4	NA	0.7	5.2	0.22	0.26	0.22	57.4
East: Werribee Street															
4	L2	All MCs	35	29.0	35	29.0	0.197	15.1	LOS C	0.6	5.4	0.74	1.02	0.78	43.1
6	R2	All MCs	18	31.0	18	31.0	0.197	37.2	LOS E	0.6	5.4	0.74	1.02	0.78	43.1
Approach			53	29.7	53	29.7	0.197	22.6	LOS C	0.6	5.4	0.74	1.02	0.78	43.1
North: Alexandra Street															
7	L2	All MCs	35	6.0	35	6.0	0.333	5.7	LOS A	0.0	0.0	0.00	0.03	0.00	56.8
8	T1	All MCs	575	10.0	575	10.0	0.333	0.1	LOS A	0.0	0.0	0.00	0.03	0.00	59.5
Approach			609	9.8	609	9.8	0.333	0.4	NA	0.0	0.0	0.00	0.03	0.00	59.3
All Vehicles			1008	12.7	1008	12.7	0.333	2.3	NA	0.7	5.4	0.11	0.16	0.12	57.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

SIDRA INTERSECTION 9.1 | Copyright © 2000-2024 Akcelik and Associates Pty Ltd | sidrasolutions.com

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Project: \\Mac\iCloud\Documents\Parallels\TEMP - 25-151 SIDRA Werribee\Project1.sip9

MOVEMENT SUMMARY

 **Site: 101 [PM Peak 2027 Background Traffic - Without Development (Site Folder: General)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Alexandra Street / Werribee Street Intersection
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows [Total HV] veh/h %		Arrival Flows [Total HV] veh/h %		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. Dist] veh m		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Alexandra Street															
2	T1	All MCs	421	10.0	421	10.0	0.222	1.1	LOS A	0.9	6.8	0.19	0.22	0.19	58.3
3	R2	All MCs	74	18.0	74	18.0	0.222	9.0	LOS A	0.9	6.8	0.33	0.38	0.33	54.3
Approach			495	11.2	495	11.2	0.222	2.3	NA	0.9	6.8	0.21	0.25	0.21	57.7
East: Werribee Street															
4	L2	All MCs	60	13.0	60	13.0	0.240	12.6	LOS B	0.9	6.8	0.69	1.03	0.76	45.6
6	R2	All MCs	32	5.0	32	5.0	0.240	27.8	LOS D	0.9	6.8	0.69	1.03	0.76	45.9
Approach			92	10.2	92	10.2	0.240	17.8	LOS C	0.9	6.8	0.69	1.03	0.76	45.7
North: Alexandra Street															
7	L2	All MCs	18	13.0	18	13.0	0.280	5.8	LOS A	0.0	0.0	0.00	0.02	0.00	56.6
8	T1	All MCs	484	13.0	484	13.0	0.280	0.1	LOS A	0.0	0.0	0.00	0.02	0.00	59.6
Approach			502	13.0	502	13.0	0.280	0.3	NA	0.0	0.0	0.00	0.02	0.00	59.5
All Vehicles			1088	11.9	1088	11.9	0.280	2.7	NA	0.9	6.8	0.15	0.21	0.16	57.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY



**Site: 101 [AM Peak 2027 Design Traffic - With Development
(Site Folder: General)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Alexandra Street / Werribee Street Intersection
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows [Total HV] veh/h %		Arrival Flows [Total HV] veh/h %		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. Dist] veh m		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Alexandra Street															
2	T1	All MCs	297	15.0	297	15.0	0.178	1.4	LOS A	0.8	6.5	0.23	0.27	0.23	57.7
3	R2	All MCs	65	16.0	65	16.0	0.178	9.8	LOS A	0.8	6.5	0.42	0.49	0.42	53.3
Approach			362	15.2	362	15.2	0.178	2.9	NA	0.8	6.5	0.26	0.31	0.26	56.9
East: Werribee Street															
4	L2	All MCs	44	29.0	44	29.0	0.237	15.6	LOS C	0.8	6.8	0.75	1.04	0.84	42.9
6	R2	All MCs	20	31.0	20	31.0	0.237	39.5	LOS E	0.8	6.8	0.75	1.04	0.84	42.9
Approach			64	29.6	64	29.6	0.237	23.0	LOS C	0.8	6.8	0.75	1.04	0.84	42.9
North: Alexandra Street															
7	L2	All MCs	39	6.0	39	6.0	0.336	5.7	LOS A	0.0	0.0	0.00	0.04	0.00	56.7
8	T1	All MCs	575	10.0	575	10.0	0.336	0.1	LOS A	0.0	0.0	0.00	0.04	0.00	59.4
Approach			614	9.7	614	9.7	0.336	0.5	NA	0.0	0.0	0.00	0.04	0.00	59.2
All Vehicles			1040	12.9	1040	12.9	0.336	2.7	NA	0.8	6.8	0.14	0.19	0.14	57.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

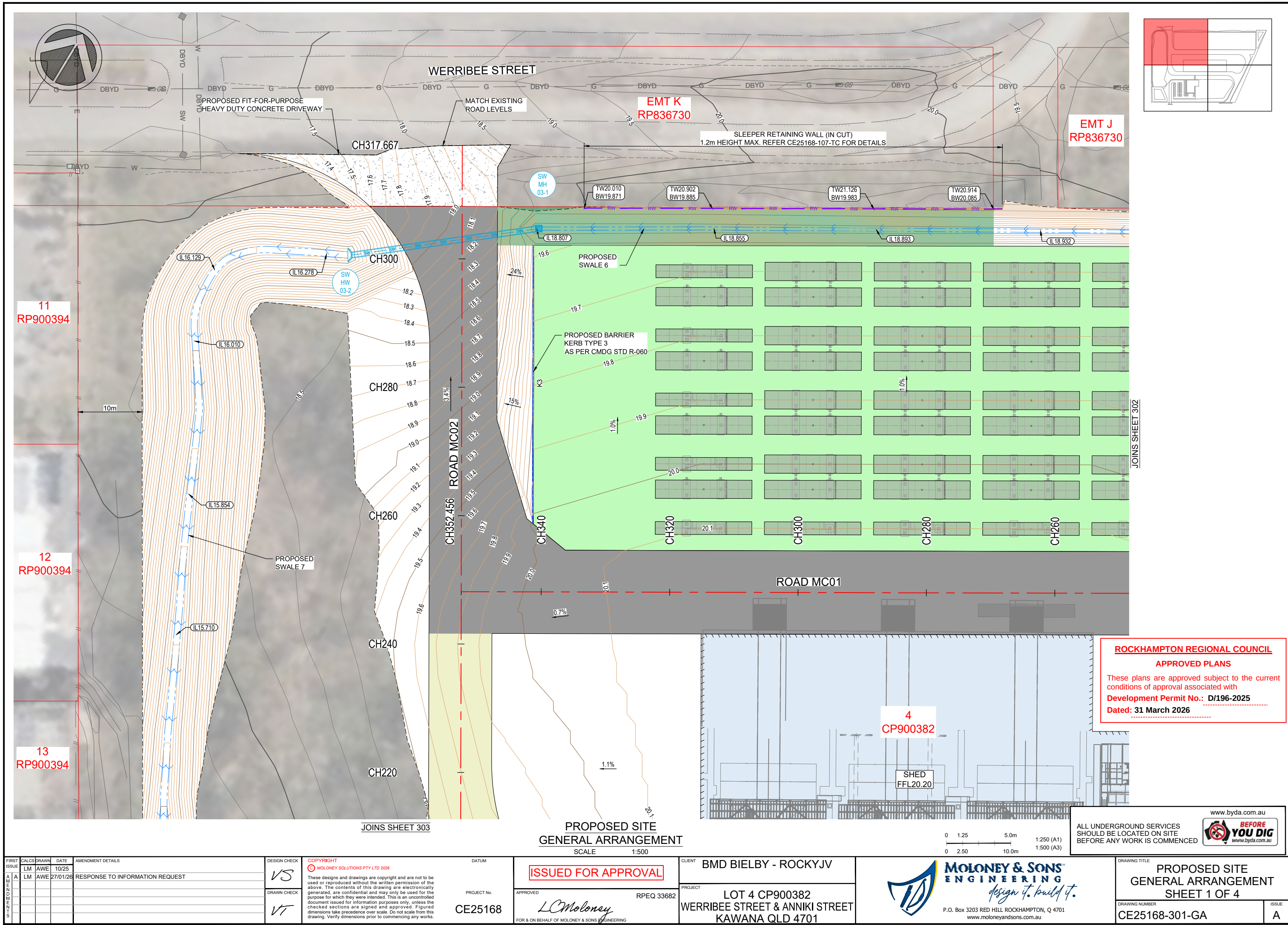
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(Site Folder: General)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

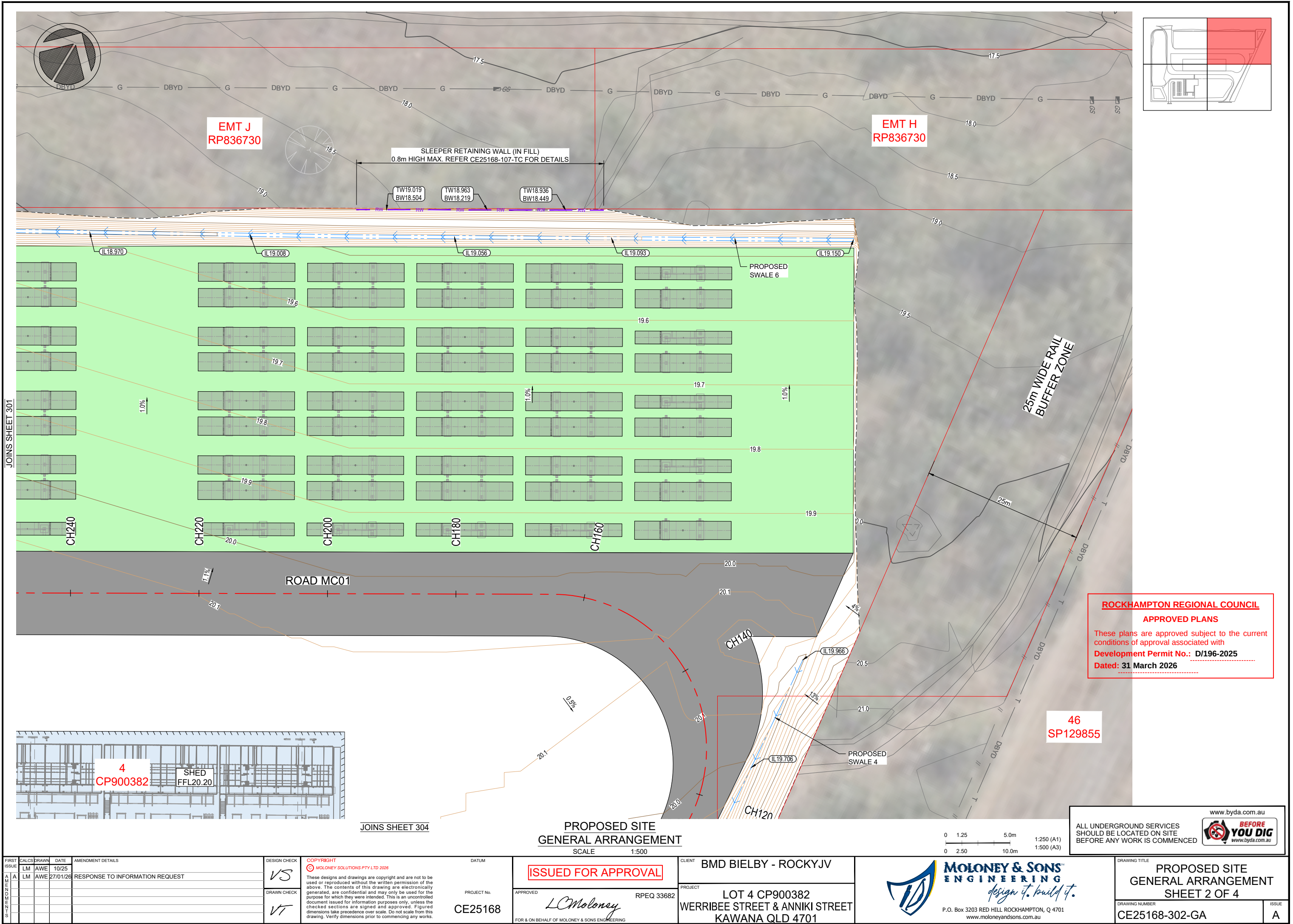
Alexandra Street / Werribee Street Intersection
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows [Total HV] veh/h %		Arrival Flows [Total HV] veh/h %		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. Dist] veh m		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Alexandra Street															
2	T1	All MCs	421	10.0	421	10.0	0.230	1.2	LOS A	1.0	7.5	0.21	0.24	0.21	58.2
3	R2	All MCs	83	18.0	83	18.0	0.230	9.0	LOS A	1.0	7.5	0.36	0.41	0.36	54.0
Approach			504	11.3	504	11.3	0.230	2.5	NA	1.0	7.5	0.23	0.27	0.23	57.4
East: Werribee Street															
4	L2	All MCs	76	13.0	76	13.0	0.287	13.0	LOS B	1.1	8.7	0.69	1.05	0.82	45.4
6	R2	All MCs	36	5.0	36	5.0	0.287	29.2	LOS D	1.1	8.7	0.69	1.05	0.82	45.7
Approach			112	10.4	112	10.4	0.287	18.2	LOS C	1.1	8.7	0.69	1.05	0.82	45.5
North: Alexandra Street															
7	L2	All MCs	20	13.0	20	13.0	0.281	5.8	LOS A	0.0	0.0	0.00	0.02	0.00	56.6
8	T1	All MCs	484	13.0	484	13.0	0.281	0.1	LOS A	0.0	0.0	0.00	0.02	0.00	59.6
Approach			504	13.0	504	13.0	0.281	0.3	NA	0.0	0.0	0.00	0.02	0.00	59.5
All Vehicles			1120	12.0	1120	12.0	0.287	3.1	NA	1.1	8.7	0.17	0.23	0.19	56.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.



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AMENDMENTS	FIRST ISSUE	CALCS DRAWN		DATE	AMENDMENT DETAILS
		LM	AWE		
				10/25	
				27/01/26	RESPONSE TO INFORMATION REQUEST

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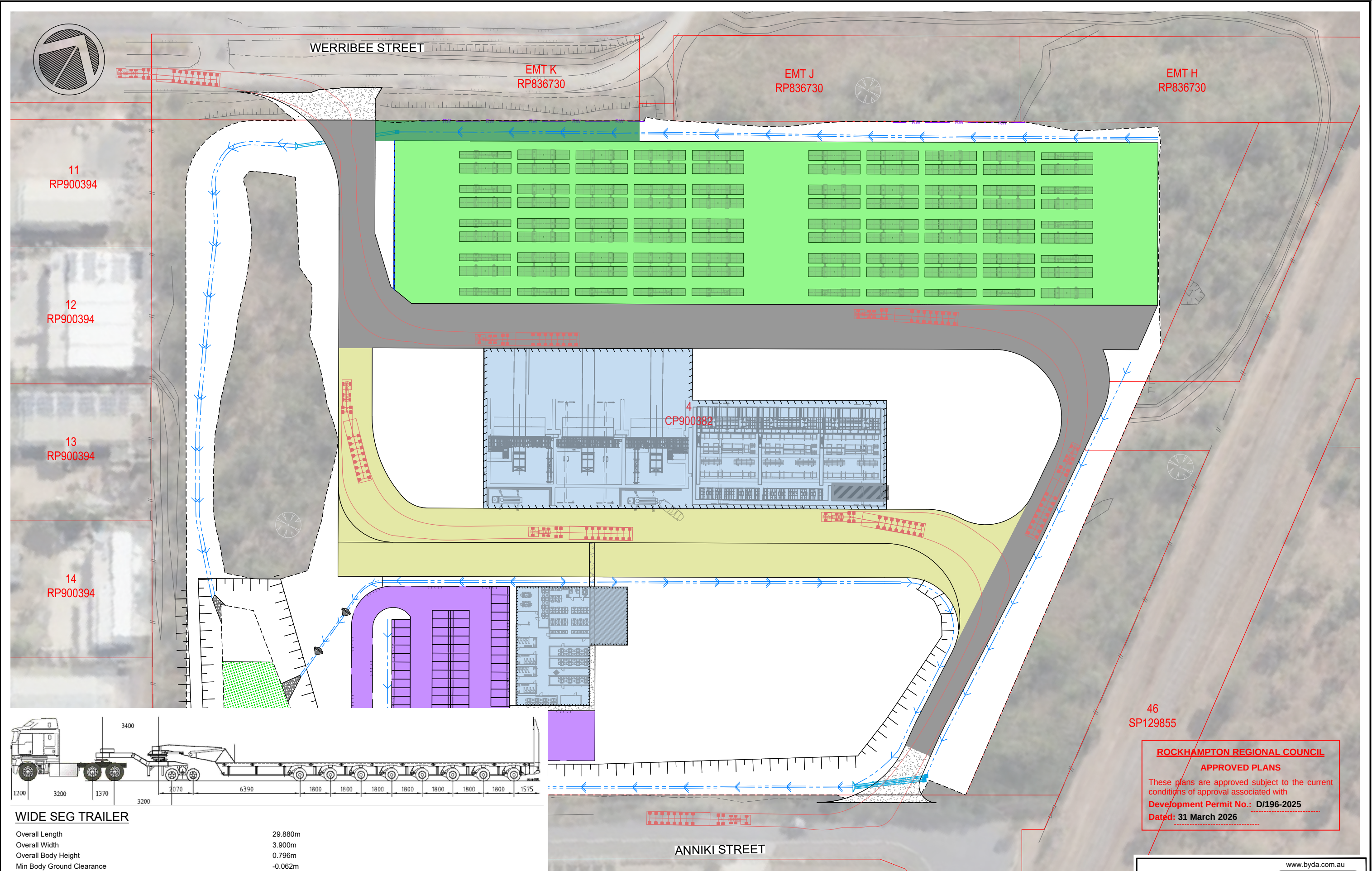
CLIENT	BMD BIELBY - ROCKYJV
PROJECT	LOT 4 CP900382 WERRIBEE STREET & ANNIKI STREET KAWANA QLD 4701



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DRAWING TITLE		ISSUE
PROPOSED SITE GENERAL ARRANGEMENT SHEET 2 OF 4		
DRAWING NUMBER		A
CE25168-302-GA		



WIDE SEG TRAILER

Overall Length	29.880m
Overall Width	3.900m
Overall Body Height	0.796m
Min Body Ground Clearance	-0.062m
Max Track Width	3.700m
Lock-to-lock time	4.00s
Wall to Wall Turning Radius	10.000m

FIRST ISSUE	CALCS	DRAWN	DATE	AMENDMENT DETAILS
A	LM	AWE	10/25	
B	LM	AWE	31/10/25	PRELIMINARY ISSUE
C	LM	AWE	07/11/25	PRELIMINARY ISSUE
D	LM	AWE	14/11/25	BULK EARTHWORKS OPW ISSUE
E	LM	AWE	27/01/26	RESPONSE TO INFORMATION REQUEST

DESIGN CHECK	VS
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CLIENT	BMD BIELBY - ROCKYJV
PROJECT	LOT 4 CP900382 WERRIBEE STREET & ANNIKI STREET KAWANA QLD 4701

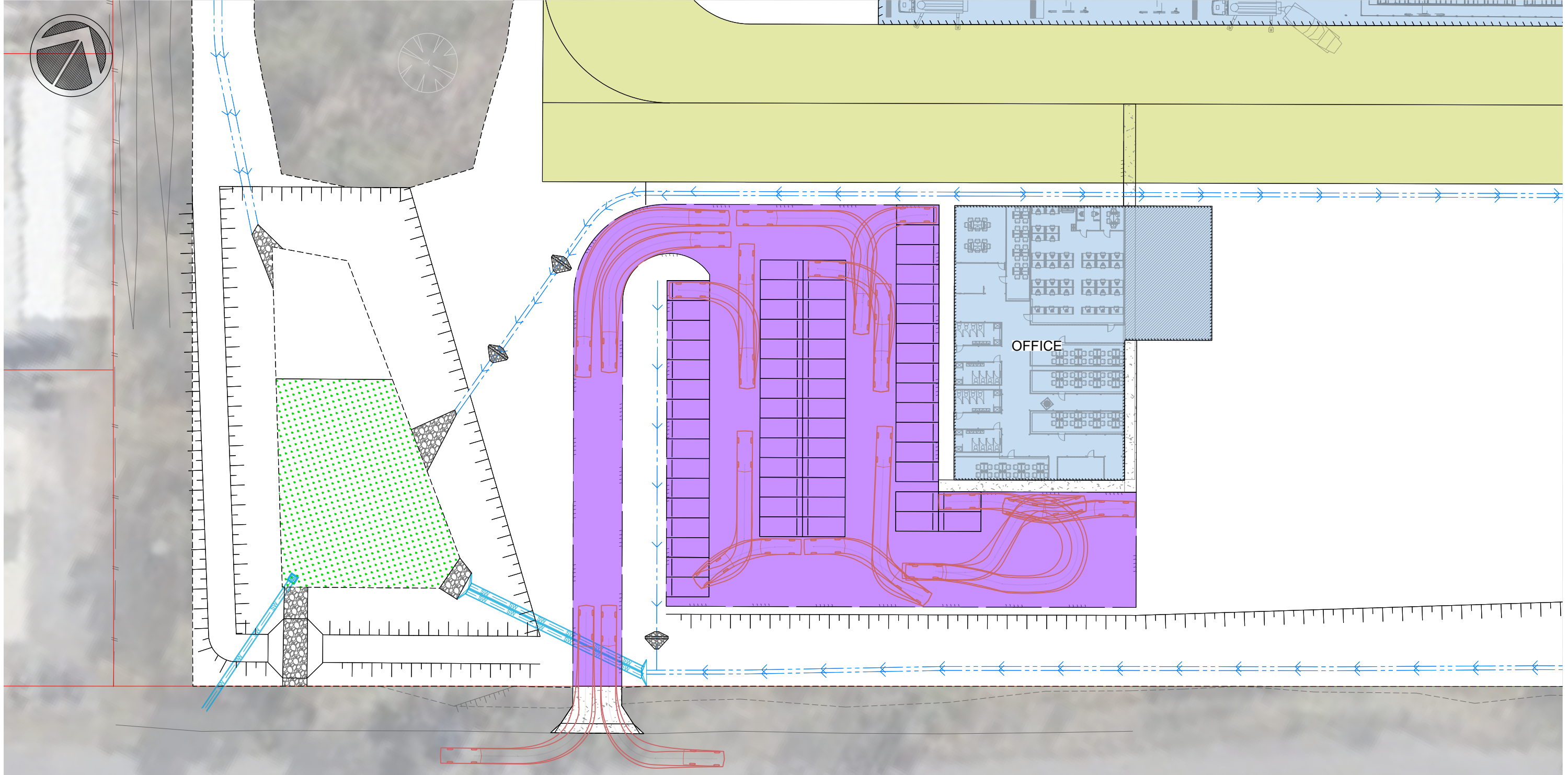
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DRAWING TITLE	PROPOSED SITE SWEEP PATHS WIDE SEG TRAILER 8x8
DRAWING NUMBER	CE25168-320-GA
ISSUE	D

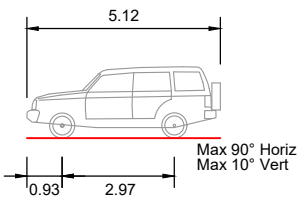
ROCKHAMPTON REGIONAL COUNCIL
APPROVED PLANS
These plans are approved subject to the current conditions of approval associated with
Development Permit No.: D/196-2025
Dated: 31 March 2026

ALL UNDERGROUND SERVICES
SHOULD BE LOCATED ON SITE
BEFORE ANY WORK IS COMMENCED





ANNIKI STREET



VEHICLE PROFILE - 4x4 Vehicle

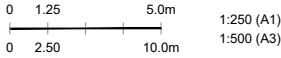
4X4 STANDARD VEHICLE (5.12m)	
OVERALL LENGTH	5.120m
OVERALL WIDTH	1.940m
OVERALL BODY HEIGHT	1.888m
MIN BODY GROUND CLEARANCE	0.283m
TRACK WIDTH	1.910m
LOCK-TO-LOCK TIME	4.00s
CURB TO CURB TURNING RADIUS	6.100m

ROCKHAMPTON REGIONAL COUNCIL
APPROVED PLANS

These plans are approved subject to the current conditions of approval associated with
Development Permit No.: D/196-2025
Dated: 31 March 2026

PROPOSED SITE
SWEEP PATHS CAR

SCALE 1:500



ALL UNDERGROUND SERVICES
SHOULD BE LOCATED ON SITE
BEFORE ANY WORK IS COMMENCED



FIRST ISSUE	CALCS	DRAWN	DATE	AMENDMENT DETAILS
LM	LM	LM	10/25	
LM	LM	LM	27/01/26	RESPONSE TO INFORMATION REQUEST

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APPROVED	RPEQ 33682
FOR & ON BEHALF OF MOLONEY & SONS ENGINEERING	

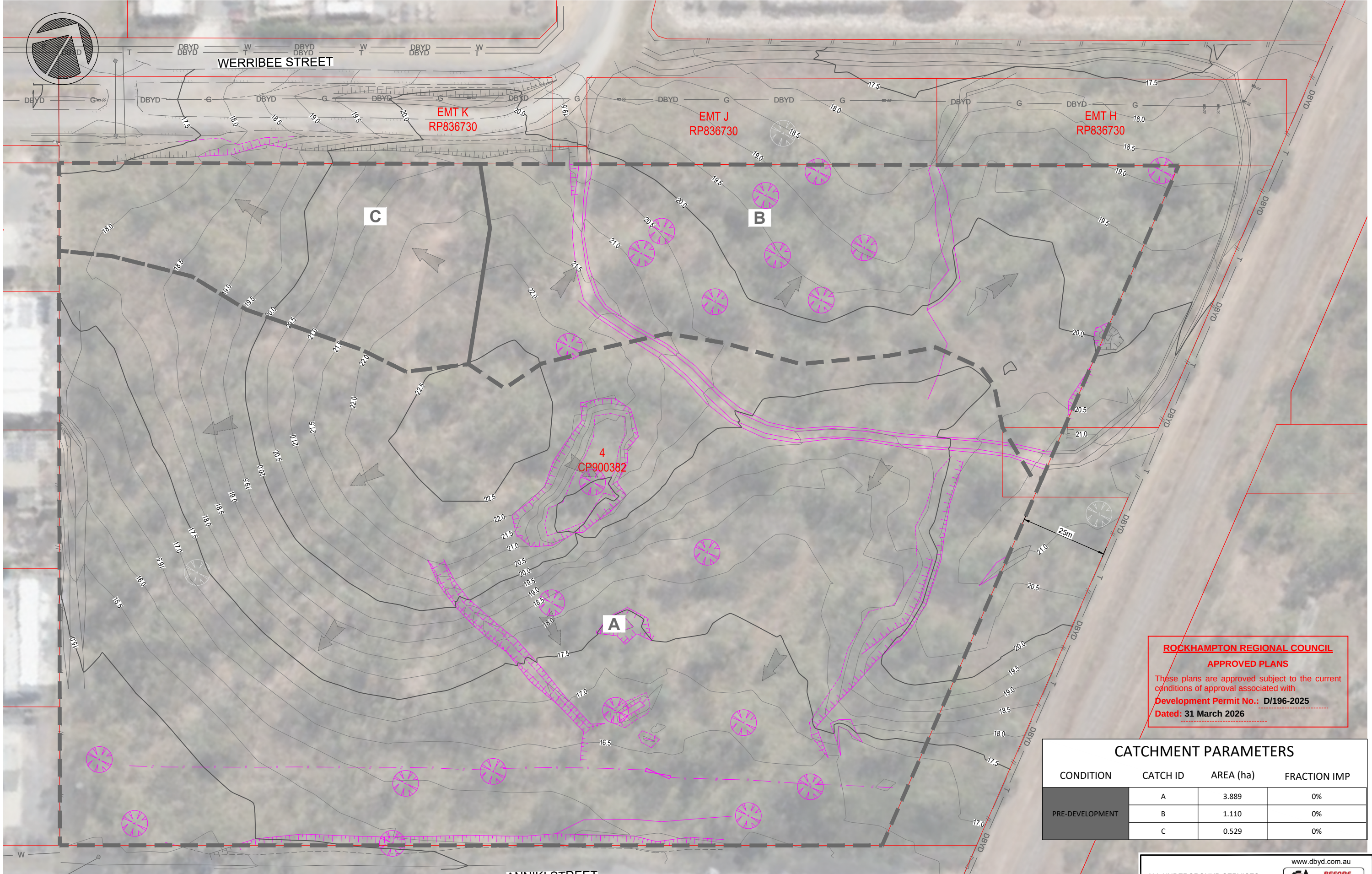
CLIENT	BMD BIELBY - ROCKYJV
PROJECT	LOT 4 CP900382 WERRIBEE STREET & ANNIKI STREET KAWANA QLD 4701



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DRAWING TITLE	PROPOSED SITE SWEEP PATHS CAR
DRAWING NUMBER	CE25168-322-GA
ISSUE	A



ROCKHAMPTON REGIONAL COUNCIL
APPROVED PLANS
These plans are approved subject to the current conditions of approval associated with
Development Permit No.: D/196-2025
Dated: 31 March 2026

CATCHMENT PARAMETERS			
CONDITION	CATCH ID	AREA (ha)	FRACTION IMP
PRE-DEVELOPMENT	A	3.889	0%
	B	1.110	0%
	C	0.529	0%

ALL UNDERGROUND SERVICES
SHOULD BE LOCATED ON SITE
BEFORE ANY WORK IS COMMENCED



0 2.5 10.0m
0 5.0 20.0m
1:500 (A1)
1:1000 (A3)

FIRST ISSUE	CALCS LM	DRAWN AW	DATE	AMENDMENT DETAILS
A	LM	AW	07/11/25	PRELIMINARY ISSUE
B	LM	AW	14/11/25	BULK EARTHWORKS OPW ISSUE
C	LM	AW	27/01/26	RESPONSE TO INFORMATION REQUEST

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DATUM
PROJECT No. CE25168

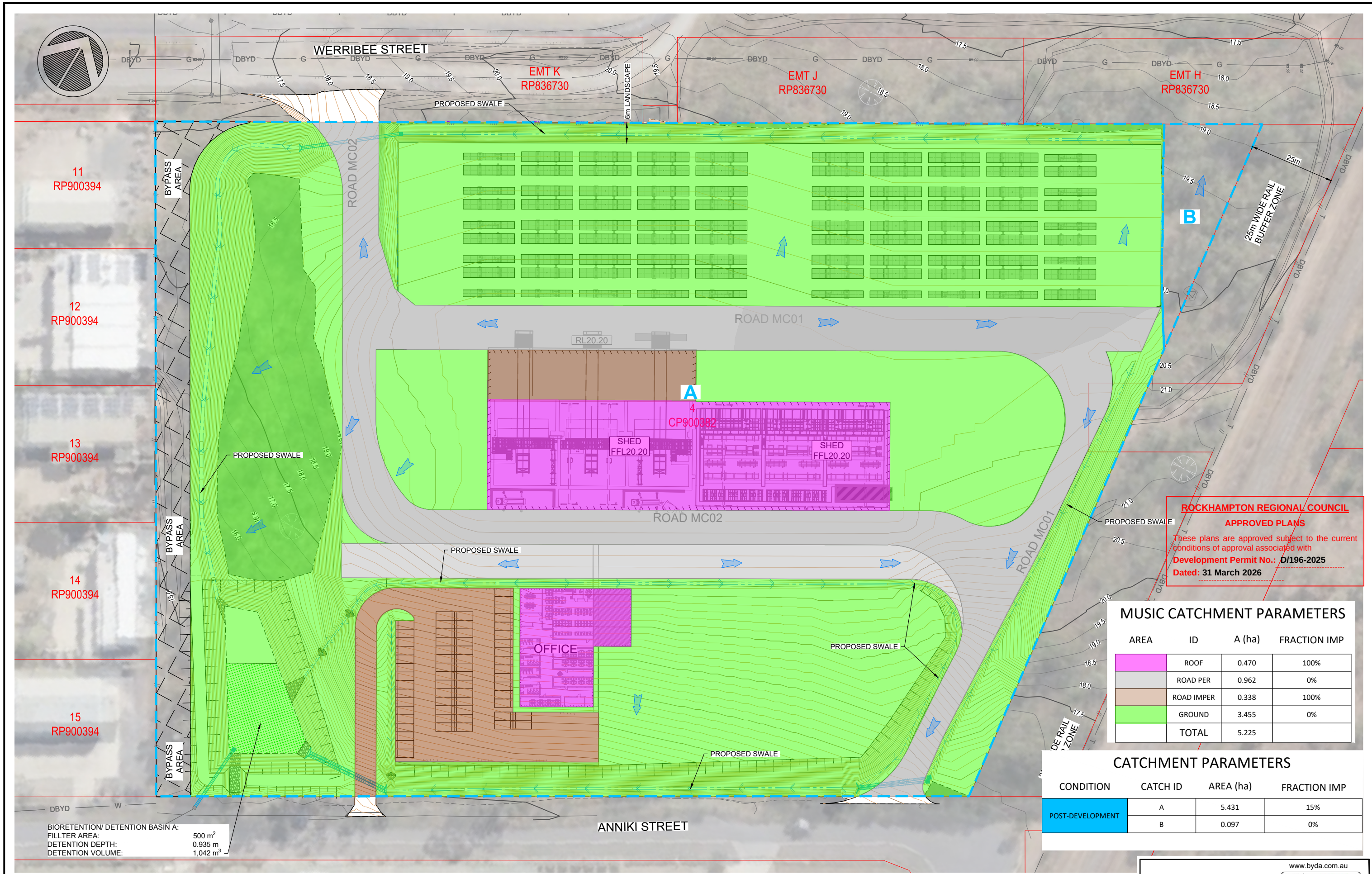
ISSUED FOR APPROVAL	
APPROVED <i>LC Moloney</i>	RPEQ 33682
FOR & ON BEHALF OF MOLONEY & SONS ENGINEERING	

CLIENT BMD BIELBY - ROCKYJV
PROJECT LOT 4 CP900382 WERRIBEE STREET & ANNIKI STREET KAWANA QLD 4701



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DRAWING TITLE STORMWATER PRE DEVELOPMENT CATCHMENT PLAN	
DRAWING NUMBER CE25168-600-DR	ISSUE C



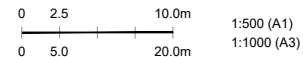
ROCKHAMPTON REGIONAL COUNCIL
APPROVED PLANS
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Development Permit No.: D/196-2025
Dated: 31 March 2026

MUSIC CATCHMENT PARAMETERS			
AREA	ID	A (ha)	FRACTION IMP
	ROOF	0.470	100%
	ROAD PER	0.962	0%
	ROAD IMPER	0.338	100%
	GROUND	3.455	0%
	TOTAL	5.225	

CATCHMENT PARAMETERS			
CONDITION	CATCH ID	AREA (ha)	FRACTION IMP
POST-DEVELOPMENT	A	5.431	15%
	B	0.097	0%

BIORETENTION/ DETENTION BASIN A:
FILTER AREA: 500 m²
DETENTION DEPTH: 0.935 m
DETENTION VOLUME: 1,042 m³

**STORMWATER POST DEVELOPMENT
CATCHMENT PLAN**
SCALE 1:1000



ALL UNDERGROUND SERVICES
SHOULD BE LOCATED ON SITE
BEFORE ANY WORK IS COMMENCED



<table><tr><th>FIRST ISSUE</th><th>CALCS DRAWN</th><th>DATE</th><th>AMENDMENT DETAILS</th></tr><tr><td>A</td><td>LM</td><td>AWE 10/25</td><td></td></tr><tr><td>B</td><td>LM</td><td>AWE 07/11/25</td><td>PRELIMINARY ISSUE</td></tr><tr><td>C</td><td>LM</td><td>AWE 14/11/25</td><td>PRELIMINARY ISSUE</td></tr><tr><td>D</td><td>LM</td><td>AWE 28/01/26</td><td>BULK EARTHWORKS OPW ISSUE</td></tr><tr><td>E</td><td>LM</td><td>AWE 27/01/26</td><td>RESPONSE TO INFORMATION REQUEST</td></tr></table>	FIRST ISSUE	CALCS DRAWN	DATE	AMENDMENT DETAILS	A	LM	AWE 10/25		B	LM	AWE 07/11/25	PRELIMINARY ISSUE	C	LM	AWE 14/11/25	PRELIMINARY ISSUE	D	LM	AWE 28/01/26	BULK EARTHWORKS OPW ISSUE	E	LM	AWE 27/01/26	RESPONSE TO INFORMATION REQUEST	<table><tr><th>DESIGN CHECK</th><th>COPYRIGHT</th><th>DATUM</th><th></th></tr><tr><td>VS</td><td>© MOLONEY SOLUTIONS PTY LTD 2026</td><td></td><td></td></tr><tr><td>DRAWN CHECK</td><td></td><td>PROJECT No.</td><td></td></tr><tr><td>VT</td><td></td><td>CE25168</td><td></td></tr></table>	DESIGN CHECK	COPYRIGHT	DATUM		VS	© MOLONEY SOLUTIONS PTY LTD 2026			DRAWN CHECK		PROJECT No.		VT		CE25168		<table><tr><td colspan="2">ISSUED FOR APPROVAL</td><td colspan="2">CLIENT BMD BIELBY - ROCKYJV</td></tr><tr><td colspan="2">APPROVED LCMoloney RPEQ 33682</td><td colspan="2">PROJECT LOT 4 CP900382 WERRIBEE STREET & ANNIKI STREET KAWANA QLD 4701</td></tr><tr><td colspan="2">FOR & ON BEHALF OF MOLONEY & SONS ENGINEERING</td><td colspan="2"></td></tr></table>	ISSUED FOR APPROVAL		CLIENT BMD BIELBY - ROCKYJV		APPROVED LCMoloney RPEQ 33682		PROJECT LOT 4 CP900382 WERRIBEE STREET & ANNIKI STREET KAWANA QLD 4701		FOR & ON BEHALF OF MOLONEY & SONS ENGINEERING				<table><tr><td colspan="2"></td><td colspan="2">DRAWING TITLE STORMWATER POST DEVELOPMENT CATCHMENT PLAN</td></tr><tr><td colspan="2">P.O. Box 3203 RED HILL ROCKHAMPTON, Q 4701 www.moloneyandsons.com.au</td><td colspan="2">DRAWING NUMBER CE25168-601-DR</td></tr><tr><td colspan="2"></td><td colspan="2">ISSUE D</td></tr></table>			DRAWING TITLE STORMWATER POST DEVELOPMENT CATCHMENT PLAN		P.O. Box 3203 RED HILL ROCKHAMPTON, Q 4701 www.moloneyandsons.com.au		DRAWING NUMBER CE25168-601-DR				ISSUE D	
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