03 April 2024

Attention: Chief Executive Officer
Douglas Shire Council
64-66 Front Street
Mossman QLD 4873
Our reference: 016-2304

Operational Works Application - 42-52 Mitre Street

On behalf of Allaro Homes, please find enclosed an Operational Works Application for the above-mentioned development for your consideration and approval:

- DA Form 1. – Development Application Details
- FNQROC Development Manual Statement of Compliance.
- Engineering drawings.
- Site Based Stormwater Management Plan

We have calculated the application assessment fee in the amount of $21,930.00 ($4,260 base fee plus $570 per lot x 31 lots) based on Council's current schedule of fees and charges.

To assist with your approval of this application we are happy to attend a lodgement meeting to discuss the application details. Should you require any additional information, please do not hesitate to me on 0402 568 698 or the email address below.

Yours sincerely

Craig Caplick
Principal Engineer | RPEng RPEQ 25102
craig@consultneon.com.au | 0402 568 698

DA Form 1

DA Form 1 – Development application details

Approved form (version 1.4 effective 15 December 2023) made under section 282 of the Planning Act 2016.

This form **must** be used to make a development application **involving code assessment or impact assessment**, except when applying for development involving only building work.

For a development application involving **building work only**, use *DA Form 2 – Building work details*.

For a development application involving **building work associated with any other type of assessable development (i.e. material change of use, operational work or reconfiguring a lot)**, use this form (*DA Form 1*) **and** parts 4 to 6 of *DA Form 2 – Building work details.*

Unless stated otherwise, all parts of this form **must** be completed in full and all required supporting information **must** accompany the development application.

One or more additional pages may be attached as a schedule to this development application if there is insufficient space on the form to include all the necessary information.

This form and any other form relevant to the development application must be used to make a development application relating to strategic port land and Brisbane core port land under the *Transport Infrastructure Act 1994*, and airport land under the *Airport Assets (Restructuring and Disposal) Act 2008.* For the purpose of assessing a development application relating to strategic port land and Brisbane core port land, any reference to a planning scheme is taken to mean a land use plan for the strategic port land, Brisbane port land use plan for Brisbane core port land, or a land use plan for airport land.

Note: *All terms used in this form have the meaning given under the Planning Act 2016, the Planning Regulation 2017, or the Development Assessment Rules (DA Rules).*

PART 1 – APPLICANT DETAILS

1) Applicant details	
Applicant name(s) *(individual or company full name)*	***Allaro Homes***
Contact name *(only applicable for companies)*	
Postal address *(P.O. Box or street address)*	***c-/ Neon Consulting – 11 Rosemont Court***
Suburb	***Mooroobool***
State	***Queensland***
Postcode	***4870***
Country	***Australia***
Contact number	***0402 568 698***
Email address *(non-mandatory)*	***Craig@ConsultNeon.com.au***
Mobile number *(non-mandatory)*	
Fax number *(non-mandatory)*	
Applicant's reference number(s) *(if applicable)*	***016-2304***

2) Owner's consent
2.1) Is written consent of the owner required for this development application?
☐ Yes – the written consent of the owner(s) is attached to this development application ☒ No – proceed to 3)

PART 2 – LOCATION DETAILS

3) Location of the premises *(complete 3.1) or 3.2), and 3.3) as applicable)*

***Note**: Provide details below and attach a site plan for any or all premises part of the development application. For further information, see DA Forms Guide: Relevant plans.*

3.1) Street address and lot on plan

☒ Street address **AND** lot on plan (*all lots must be listed*), ***or***

☐ Street address **AND** lot on plan for an adjoining or adjacent property of the premises *(appropriate for development in water but adjoining or adjacent to land e.g. jetty, pontoon. All lots must be listed).*

a)	Unit No.	Street No.	Street Name and Type	Suburb
		42-52	***Mitre Street***	***Craiglie***
	Postcode	Lot No.	Plan Type and Number *(e.g. RP, SP)*	Local Government Area(s)
	4877	***900***	***SP342106***	***Douglas Shire Council***
b)	Unit No.	Street No.	Street Name and Type	Suburb
	Postcode	Lot No.	Plan Type and Number *(e.g. RP, SP)*	Local Government Area(s)

3.2) Coordinates of premises *(appropriate for development in remote areas, over part of a lot or in water not adjoining or adjacent to land e.g. channel dredging in Moreton Bay)*

***Note**: Place each set of coordinates in a separate row.*

☐ Coordinates of premises by longitude and latitude

Longitude(s)	Latitude(s)	Datum	Local Government Area(s) *(if applicable)*
		☐ WGS84 ☐ GDA94 ☐ Other:	

☐ Coordinates of premises by easting and northing

Easting(s)	Northing(s)	Zone Ref.	Datum	Local Government Area(s) *(if applicable)*
		☐ 54 ☐ 55 ☐ 56	☐ WGS84 ☐ GDA94 ☐ Other:	

3.3) Additional premises

☐ Additional premises are relevant to this development application and the details of these premises have been attached in a schedule to this development application

☒ Not required

4) Identify any of the following that apply to the premises and provide any relevant details

☐ In or adjacent to a water body or watercourse or in or above an aquifer

Name of water body, watercourse or aquifer:

☐ On strategic port land under the *Transport Infrastructure Act 1994*

Lot on plan description of strategic port land:

Name of port authority for the lot:

☐ In a tidal area

Name of local government for the tidal area *(if applicable)*:

Name of port authority for tidal area *(if applicable)*:

☐ On airport land under the *Airport Assets (Restructuring and Disposal) Act 2008*

Name of airport:	
☐ Listed on the Environmental Management Register (EMR) under the *Environmental Protection Act 1994*	
EMR site identification:	
☐ Listed on the Contaminated Land Register (CLR) under the *Environmental Protection Act 1994*	
CLR site identification:	

5) Are there any existing easements over the premises?

Note: Easement uses vary throughout Queensland and are to be identified correctly and accurately. For further information on easements and how they may affect the proposed development

☒ Yes – All easement locations, types and dimensions are included in plans submitted with this development application

☐ No

PART 3 – DEVELOPMENT DETAILS

Section 1 – Aspects of development

6.1) Provide details about the first development aspect

a) What is the type of development? *(tick only one box)*

☐ Material change of use ☐ Reconfiguring a lot ☒ Operational work ☐ Building work

b) What is the approval type? *(tick only one box)*

☒ Development permit ☐ Preliminary approval ☐ Preliminary approval that includes a variation approva

c) What is the level of assessment?

☒ Code assessment ☐ Impact assessment *(requires public notification)*

d) Provide a brief description of the proposal *(e.g. 6 unit apartment building defined as multi-unit dwelling, reconfiguration of 1 lot into 3 lots)*:

Works associated housing development

e) Relevant plans

***Note**: Relevant plans are required to be submitted for all aspects of this development application. For further information, see DA Forms guide: Relevant plans.*

☒ Relevant plans of the proposed development are attached to the development application

6.2) Provide details about the second development aspect

a) What is the type of development? *(tick only one box)*

☐ Material change of use ☐ Reconfiguring a lot ☐ Operational work ☐ Building work

b) What is the approval type? *(tick only one box)*

☐ Development permit ☐ Preliminary approval ☐ Preliminary approval that includes a variation approval

c) What is the level of assessment?

☐ Code assessment ☐ Impact assessment *(requires public notification)*

d) Provide a brief description of the proposal *(e.g. 6 unit apartment building defined as multi-unit dwelling, reconfiguration of 1 lot into 3 lots)*:

e) Relevant plans

***Note**: Relevant plans are required to be submitted for all aspects of this development application. For further information, see DA Forms Guide: Relevant plans.*

☒ Relevant plans of the proposed development are attached to the development application

6.3) Additional aspects of development

☐ Additional aspects of development are relevant to this development application and the details for these aspects that would be required under Part 3 Section 1 of this form have been attached to this development application

☒ Not required

Section 2 – Further development details

7) Does the proposed development application involve any of the following?	
Material change of use	☐ Yes – complete division 1 if assessable against a local planning instrument
Reconfiguring a lot	☐ Yes – complete division 2
Operational work	☒ Yes – complete division 3
Building work	☐ Yes – complete *DA Form 2 – Building work details*

Division 1 – Material change of use

***Note**: This division is only required to be completed if any part of the development application involves a material change of use assessable against a local planning instrument.*

8.1) Describe the proposed material change of use			
Provide a general description of the proposed use	Provide the planning scheme definition *(include each definition in a new row)*	Number of dwelling units *(if applicable)*	Gross floor area (m^2) *(if applicable)*

8.2) Does the proposed use involve the use of existing buildings on the premises?
☐ Yes
☐ No

Division 2 – Reconfiguring a lot

***Note**: This division is only required to be completed if any part of the development application involves reconfiguring a lot.*

9.1) What is the total number of existing lots making up the premises?

9.2) What is the nature of the lot reconfiguration? *(tick all applicable boxes)*	
☐ Subdivision *(complete 10))*	☐ Dividing land into parts by agreement *(complete 11))*
☐ Boundary realignment *(complete 12))*	☐ Creating or changing an easement giving access to a lot from a constructed road *(complete 13))*

10) Subdivision				
10.1) For this development, how many lots are being created and what is the intended use of those lots:				
Intended use of lots created	Residential	Commercial	Industrial	Other, please specify:
Number of lots created				

10.2) Will the subdivision be staged?	
☐ Yes – provide additional details below ☐ No	
How many stages will the works include?	
What stage(s) will this development application apply to?	

11) Dividing land into parts by agreement – how many parts are being created and what is the intended use of the parts?				
Intended use of parts created	Residential	Commercial	Industrial	Other, please specify:

Number of parts created				

12) Boundary realignment

12.1) What are the current and proposed areas for each lot comprising the premises?

Current lot		Proposed lot	
Lot on plan description	Area (m^2)	Lot on plan description	Area (m^2)

12.2) What is the reason for the boundary realignment?

13) What are the dimensions and nature of any existing easements being changed and/or any proposed easement? *(attach schedule if there are more than two easements)*

Existing or proposed?	Width (m)	Length (m)	Purpose of the easement? *(e.g. pedestrian access)*	Identify the land/lot(s) benefitted by the easement

Division 3 – Operational work

***Note**: This division is only required to be completed if any part of the development application involves operational work.*

14.1) What is the nature of the operational work?

☒ Road work	☒ Stormwater	☒ Water infrastructure
☒ Drainage work	☒ Earthworks	☒ Sewage infrastructure
☒ Landscaping	☒ Signage	☒ Clearing vegetation
☐ Other – please specify:		

14.2) Is the operational work necessary to facilitate the creation of new lots? *(e.g. subdivision)*

☒ Yes – specify number of new lots:

☐ No

14.3) What is the monetary value of the proposed operational work? *(include GST, materials and labour)*

$3,500,000

PART 4 – ASSESSMENT MANAGER DETAILS

15) Identify the assessment manager(s) who will be assessing this development application

Douglas Shire Council

16) Has the local government agreed to apply a superseded planning scheme for this development application?

☐ Yes – a copy of the decision notice is attached to this development application

☐ The local government is taken to have agreed to the superseded planning scheme request – relevant documents attached

☒ No

PART 5 – REFERRAL DETAILS

17) Does this development application include any aspects that have any referral requirements?

***Note**: A development application will require referral if prescribed by the* Planning Regulation 2017.

☒ No, there are no referral requirements relevant to any development aspects identified in this development application – proceed to Part 6

Matters requiring referral to the **Chief Executive of the *Planning Act 2016***:

☐ Clearing native vegetation
☐ Contaminated land *(unexploded ordnance)*
☐ Environmentally relevant activities (ERA) *(only if the ERA has not been devolved to a local government)*
☐ Fisheries – aquaculture
☐ Fisheries – declared fish habitat area
☐ Fisheries – marine plants
☐ Fisheries – waterway barrier works
☐ Hazardous chemical facilities
☐ Heritage places – Queensland heritage place *(on or near a Queensland heritage place)*
☐ Infrastructure-related referrals – designated premises
☐ Infrastructure-related referrals – state transport infrastructure
☐ Infrastructure-related referrals – State transport corridor and future State transport corridor
☐ Infrastructure-related referrals – State-controlled transport tunnels and future state-controlled transport tunnels
☐ Infrastructure-related referrals – near a state-controlled road intersection
☐ Koala habitat in SEQ region – interfering with koala habitat in koala habitat areas outside koala priority areas
☐ Koala habitat in SEQ region – key resource areas
☐ Ports – Brisbane core port land – near a State transport corridor or future State transport corridor
☐ Ports – Brisbane core port land – environmentally relevant activity (ERA)
☐ Ports – Brisbane core port land – tidal works or work in a coastal management district
☐ Ports – Brisbane core port land – hazardous chemical facility
☐ Ports – Brisbane core port land – taking or interfering with water
☐ Ports – Brisbane core port land – referable dams
☐ Ports – Brisbane core port land – fisheries
☐ Ports – Land within Port of Brisbane's port limits *(below high-water mark)*
☐ SEQ development area
☐ SEQ regional landscape and rural production area or SEQ rural living area – tourist activity or sport and recreation activity
☐ SEQ regional landscape and rural production area or SEQ rural living area – community activity
☐ SEQ regional landscape and rural production area or SEQ rural living area – indoor recreation
☐ SEQ regional landscape and rural production area or SEQ rural living area – urban activity
☐ SEQ regional landscape and rural production area or SEQ rural living area – combined use
☐ SEQ regional landscape and rural production area or SEQ rural living area – community activity
☐ SEQ regional landscape and rural production area or SEQ rural living area – indoor recreation
☐ SEQ regional landscape and rural production area or SEQ rural living area – urban activity
☐ SEQ regional landscape and rural production area or SEQ rural living area – combined use
☐ Tidal works or works in a coastal management district
☐ Reconfiguring a lot in a coastal management district or for a canal
☐ Erosion prone area in a coastal management district
☐ Urban design
☐ Water-related development – taking or interfering with water
☐ Water-related development – removing quarry material *(from a watercourse or lake)*
☐ Water-related development – referable dams
☐ Water-related development –levees *(category 3 levees only)*
☐ Wetland protection area

Matters requiring referral to the **local government:**

☐ Airport land
☐ Environmentally relevant activities (ERA) (*only if the ERA has been devolved to local government)*
☐ Heritage places – Local heritage places

Matters requiring referral to the **Chief Executive of the distribution entity or transmission entity:**

☐ Infrastructure-related referrals – Electricity infrastructure

Matters requiring referral to:
- The **Chief Executive of the holder of the licence**, if not an individual
- The **holder of the licence**, if the holder of the licence is an individual

☐ Infrastructure-related referrals – Oil and gas infrastructure

Matters requiring referral to the **Brisbane City Council:**
☐ Ports – Brisbane core port land

Matters requiring referral to the **Minister responsible for administering the *Transport Infrastructure Act 1994*:**
☐ Ports – Brisbane core port land *(where inconsistent with the Brisbane port LUP for transport reasons)*
☐ Ports – Strategic port land

Matters requiring referral to the **relevant port operator**, if applicant is not port operator**:**
☐ Ports – Land within Port of Brisbane's port limits *(below high-water mark)*

Matters requiring referral to the **Chief Executive of the relevant port authority:**
☐ Ports – Land within limits of another port *(below high-water mark)*

Matters requiring referral to the **Gold Coast Waterways Authority:**
☐ Tidal works or work in a coastal management district *(in Gold Coast waters)*

Matters requiring referral to the **Queensland Fire and Emergency Service:**
☐ Tidal works or work in a coastal management district *(involving a marina (more than six vessel berths))*

18) Has any referral agency provided a referral response for this development application?

☐ Yes – referral response(s) received and listed below are attached to this development application
☒ No

Referral requirement	Referral agency	Date of referral response

Identify and describe any changes made to the proposed development application that was the subject of the referral response and this development application, or include details in a schedule to this development application *(if applicable).*

PART 6 – INFORMATION REQUEST

19) Information request under Part 3 of the DA Rules

☒ I agree to receive an information request if determined necessary for this development application
☐ I do not agree to accept an information request for this development application

***Note**: By not agreeing to accept an information request I, the applicant, acknowledge:*
- *that this development application will be assessed and decided based on the information provided when making this development application and the assessment manager and any referral agencies relevant to the development application are not obligated under the DA Rules to accept any additional information provided by the applicant for the development application unless agreed to by the relevant parties*
- *Part 3 of the DA Rules will still apply if the application is an application listed under section 11.3 of the DA Rules.*

Further advice about information requests is contained in the DA Forms Guide.

PART 7 – FURTHER DETAILS

20) Are there any associated development applications or current approvals? *(e.g. a preliminary approval)*

☐ Yes – provide details below or include details in a schedule to this development application
☒ No

List of approval/development application references	Reference number	Date	Assessment manager

☐ Approval ☐ Development application			
☐ Approval ☐ Development application			

21) Has the portable long service leave levy been paid? *(only applicable to development applications involving building work or operational work)*

☐ Yes – a copy of the receipted QLeave form is attached to this development application

☒ No – I, the applicant will provide evidence that the portable long service leave levy has been paid before the assessment manager decides the development application. I acknowledge that the assessment manager may give a development approval only if I provide evidence that the portable long service leave levy has been paid

☐ Not applicable *(e.g. building and construction work is less than $150,000 excluding GST)*

Amount paid	Date paid (dd/mm/yy)	QLeave levy number (A, B or E)
$		

22) Is this development application in response to a show cause notice or required as a result of an enforcement notice?

☐ Yes – show cause or enforcement notice is attached

☒ No

23) Further legislative requirements

Environmentally relevant activities

23.1) Is this development application also taken to be an application for an environmental authority for an **Environmentally Relevant Activity (ERA)** under section 115 of the *Environmental Protection Act 1994*?

☐ Yes – the required attachment (form ESR/2015/1791) for an application for an environmental authority accompanies this development application, and details are provided in the table below

☒ No

***Note**: Application for an environmental authority can be found by searching "ESR/2015/1791" as a search term at www.qld.gov.au. An ERA requires an environmental authority to operate. See www.business.qld.gov.au for further information.*

Proposed ERA number:		Proposed ERA threshold:	
Proposed ERA name:			

☐ Multiple ERAs are applicable to this development application and the details have been attached in a schedule to this development application.

Hazardous chemical facilities

23.2) Is this development application for a **hazardous chemical facility**?

☐ Yes – *Form 69: Notification of a facility exceeding 10% of schedule 15 threshold* is attached to this development application

☒ No

***Note**: See www.business.qld.gov.au for further information about hazardous chemical notifications.*

Clearing native vegetation

23.3) Does this development application involve **clearing native vegetation** that requires written confirmation that the chief executive of the *Vegetation Management Act 1999* is satisfied the clearing is for a relevant purpose under section 22A of the *Vegetation Management Act 1999*?

☐ Yes – this development application includes written confirmation from the chief executive of the *Vegetation Management Act 1999* (s22A determination)

☒ No

***Note**: 1. Where a development application for operational work or material change of use requires a s22A determination and this is not included, the development application is prohibited development.*

2. See https://www.qld.gov.au/environment/land/vegetation/applying for further information on how to obtain a s22A determination.

Environmental offsets

23.4) Is this development application taken to be a prescribed activity that may have a significant residual impact on a **prescribed environmental matter** under the *Environmental Offsets Act 2014*?

☐ Yes – I acknowledge that an environmental offset must be provided for any prescribed activity assessed as having a significant residual impact on a prescribed environmental matter

☒ No

***Note**: The environmental offset section of the Queensland Government's website can be accessed at www.qld.gov.au for further information on environmental offsets.*

Koala habitat in SEQ Region

23.5) Does this development application involve a material change of use, reconfiguring a lot or operational work which is assessable development under Schedule 10, Part 10 of the Planning Regulation 2017?

☐ Yes – the development application involves premises in the koala habitat area in the koala priority area

☐ Yes – the development application involves premises in the koala habitat area outside the koala priority area

☒ No

***Note**: If a koala habitat area determination has been obtained for this premises and is current over the land, it should be provided as part of this development application. See koala habitat area guidance materials at www.des.qld.gov.au for further information.*

Water resources

23.6) Does this development application involve **taking or interfering with underground water through an artesian or subartesian bore, taking or interfering with water in a watercourse, lake or spring, or taking overland flow water under the *Water Act 2000***?

☐ Yes – the relevant template is completed and attached to this development application and I acknowledge that a relevant authorisation or licence under the *Water Act 2000* may be required prior to commencing development

☒ No

***Note**: Contact the Department of Natural Resources, Mines and Energy at www.dnrme.qld.gov.au for further information.*

DA templates are available from https://planning.dsdmip.qld.gov.au/. If the development application involves:

- *Taking or interfering with underground water through an artesian or subartesian bore: complete DA Form 1 Template 1*
- *Taking or interfering with water in a watercourse, lake or spring: complete DA Form1 Template 2*
- *Taking overland flow water: complete DA Form 1 Template 3.*

Waterway barrier works

23.7) Does this application involve **waterway barrier works?**

☐ Yes – the relevant template is completed and attached to this development application

☒ No

DA templates are available from https://planning.dsdmip.qld.gov.au/. For a development application involving waterway barrier works, complete DA Form 1 Template 4.

Marine activities

23.8) Does this development application involve **aquaculture, works within a declared fish habitat area or removal, disturbance or destruction of marine plants?**

☐ Yes – an associated *resource* allocation authority is attached to this development application, if required under the *Fisheries Act 1994*

☒ No

***Note**: See guidance materials at www.daf.qld.gov.au for further information.*

Quarry materials from a watercourse or lake

23.9) Does this development application involve the **removal of quarry materials from a watercourse or lake** under the *Water Act 2000?*

☐ Yes – I acknowledge that a quarry material allocation notice must be obtained prior to commencing development

☒ No

***Note**: Contact the Department of Natural Resources, Mines and Energy at www.dnrme.qld.gov.au and www.business.qld.gov.au for further information.*

Quarry materials from land under tidal waters

23.10) Does this development application involve the **removal of quarry materials from land under tidal water** under the *Coastal Protection and Management Act 1995?*

☐ Yes – I acknowledge that a quarry material allocation notice must be obtained prior to commencing development

☒ No

***Note**: Contact the Department of Environment and Science at www.des.qld.gov.au for further information.*

Referable dams

23.11) Does this development application involve a **referable dam** required to be failure impact assessed under section 343 of the *Water Supply (Safety and Reliability) Act 2008* (the Water Supply Act)?

☐ Yes – the 'Notice Accepting a Failure Impact Assessment' from the chief executive administering the Water Supply Act is attached to this development application

☒ No

***Note**: See guidance materials at www.dnrme.qld.gov.au for further information.*

Tidal work or development within a coastal management district

23.12) Does this development application involve **tidal work or development in a coastal management district**?

☐ Yes – the following is included with this development application:

- ☐ Evidence the proposal meets the code for assessable development that is prescribed tidal work *(only required if application involves prescribed tidal work)*
- ☐ A certificate of title

☒ No

***Note**: See guidance materials at www.des.qld.gov.au for further information.*

Queensland and local heritage places

23.13) Does this development application propose development on or adjoining a place entered in the **Queensland heritage register** or on a place entered in a local government's **Local Heritage Register**?

☐ Yes – details of the heritage place are provided in the table below

☒ No

***Note**: See guidance materials at www.des.qld.gov.au for information requirements regarding development of Queensland heritage places.*

Name of the heritage place:		Place ID:	

Brothels

23.14) Does this development application involve a **material change of use for a brothel**?

☐ Yes – this development application demonstrates how the proposal meets the code for a development application for a brothel under Schedule 3 of the *Prostitution Regulation 2014*

☒ No

Decision under section 62 of the *Transport Infrastructure Act 1994*

23.15) Does this development application involve new or changed access to a state-controlled road?

☐ Yes – this application will be taken to be an application for a decision under section 62 of the *Transport Infrastructure Act 1994* (subject to the conditions in section 75 of the *Transport Infrastructure Act 1994* being satisfied)

☒ No

Walkable neighbourhoods assessment benchmarks under Schedule 12A of the Planning Regulation

23.16) Does this development application involve reconfiguring a lot into 2 or more lots in certain residential zones (except rural residential zones), where at least one road is created or extended?

☒ Yes – Schedule 12A is applicable to the development application and the assessment benchmarks contained in schedule 12A have been considered

☐ No

***Note**: See guidance materials at www.planning.dsdmip.qld.gov.au for further information.*

PART 8 – CHECKLIST AND APPLICANT DECLARATION

24) Development application checklist	
I have identified the assessment manager in question 15 and all relevant referral requirement(s) in question 17 ***Note**: See the Planning Regulation 2017 for referral requirements*	☒ Yes
If building work is associated with the proposed development, Parts 4 to 6 of *DA Form 2 – Building work details* have been completed and attached to this development application	☐ Yes ☒ Not applicable
Supporting information addressing any applicable assessment benchmarks is with the development application ***Note**: This is a mandatory requirement and includes any relevant templates under question 23, a planning report and any technical reports required by the relevant categorising instruments (e.g. local government planning schemes, State Planning Policy, State Development Assessment Provisions). For further information, see DA Forms Guide: Planning Report Template.*	☒ Yes
Relevant plans of the development are attached to this development application ***Note**: Relevant plans are required to be submitted for all aspects of this development application. For further information, see DA Forms Guide: Relevant plans.*	☒ Yes
The portable long service leave levy for QLeave has been paid, or will be paid before a development permit is issued (*see 21*)	☒ Yes ☐ Not applicable

25) Applicant declaration
☒ By making this development application, I declare that all information in this development application is true and correct ☒ Where an email address is provided in Part 1 of this form, I consent to receive future electronic communications from the assessment manager and any referral agency for the development application where written information is required or permitted pursuant to sections 11 and 12 of the *Electronic Transactions Act 2001* ***Note**: It is unlawful to intentionally provide false or misleading information.*
Privacy – Personal information collected in this form will be used by the assessment manager and/or chosen assessment manager, any relevant referral agency and/or building certifier (including any professional advisers which may be engaged by those entities) while processing, assessing and deciding the development application. All information relating to this development application may be available for inspection and purchase, and/or published on the assessment manager's and/or referral agency's website. Personal information will not be disclosed for a purpose unrelated to the *Planning Act 2016*, Planning Regulation 2017 and the DA Rules except where: • such disclosure is in accordance with the provisions about public access to documents contained in the *Planning Act 2016* and the Planning Regulation 2017, and the access rules made under the *Planning Act 2016* and Planning Regulation 2017; or • required by other legislation (including the *Right to Information Act 2009*); or • otherwise required by law. This information may be stored in relevant databases. The information collected will be retained as required by the *Public Records Act 2002.*

PART 9 – FOR COMPLETION OF THE ASSESSMENT MANAGER – FOR OFFICE USE ONLY

Date received: | Reference number(s):

Notification of engagement of alternative assessment manager	
Prescribed assessment manager	
Name of chosen assessment manager	
Date chosen assessment manager engaged	
Contact number of chosen assessment manager	
Relevant licence number(s) of chosen assessment manager	

QLeave notification and payment *Note: For completion by assessment manager if applicable*			
Description of the work			
QLeave project number			
Amount paid ($)		Date paid (dd/mm/yy)	
Date receipted form sighted by assessment manager			
Name of officer who sighted the form			

03 April 2024
Operational Works Application - 42-52 Mitre Street

Statement of Compliance

FNQROC DEVELOPMENT MANUAL

Council *Douglas Shire Council*
(INSERT COUNCIL NAME)

STATEMENT OF COMPLIANCE
OPERATIONAL WORKS DESIGN

This form duly completed and signed by an authorised agent of the Designer shall be submitted with the Operational Works Application for Council Approval.

Name of Development *42-52 Mitre Street*

Location of Development *42-52 Mitre Street (Lot 900 SP342106)*

Applicant *Allaro Homes*

Designer *Neon Consulting*

It is hereby certified that the Calculations, Drawings, Specifications and related documents submitted herewith have been prepared, checked and amended in accordance with the requirements of the FNQROC Development Manual and that the completed works comply with the requirements therein, **except** as noted below.

Compliance with the requirements of the Operational Works Design Guidelines	**Non-Compliance refer to non-compliance report / drawing number**
Plan Presentation	*Generally complies*
Geotechnical requirements	*Generally complies*
Geometric Road Design	*Generally complies*
Pavements	*Generally complies*
Structures / Bridges	*n/a*
Subsurface Drainage	*Generally complies*
Stormwater Drainage	*Generally complies*
Site Re-grading	*Generally complies*
Erosion Control and Stormwater Management	*Generally complies*
Pest Plant Management	*Generally complies*
Cycleway / Pathways	*Generally complies*

Landscaping	***n/a***
Water Source and Disinfection/Treatment Infrastructure (if applicable)	***n/a***
Water Reticulation, Pump Stations and water storages	***Generally complies***
Sewer Reticulation and Pump Stations	***Generally complies***
Electrical Reticulation and Street Lighting	***n/a***
Public Transport	***n/a***
Associated Documentation/ Specification	***Generally complies***
Priced Schedule of Quantities	***n/a***
Referral Agency Conditions	***Generally complies***
Supporting Information (AP1.08)	***Generally complies***
Other	***n/a***

Conscientiously believing the above statements to be true and correct, signed on behalf of:

Designer *Consult Neon Pty Ltd* **RPEQ No** *25102*

Name in Full *Craig John Caplick*

Signature  **Date** *03 April 2024*

03 April 2024
Operational Works Application - 42-52 Mitre Street

Site Based Stormwater Management Plan

Mitre Street Development

Site Based Stormwater Management Plan

016-2304-R-002| Revision A

3 April 2024

Allaro Homes

Project Name	Mitre Street Development
Project Address	42-52 Mitre Street, Craiglie (Lot 900 SP342106)
Project No:	016-2304
Document Title:	Site Based Stormwater Management Plan
Document No.:	016-2304-R-002
Revision:	A
Date:	3/04/2024
Client Name:	Allaro Homes

Report prepared by
Craig Caplick | Principal Engineer | RPEng RPEQ 25102 | +61 402 568 698 | Craig@ConsultNeon.com.au

Revision History

Rev	Date	Description
A	03/04/2024	For approval

Contents

1. Introduction

Neon Consulting Engineers have prepared this report addressing the Stormwater Management for a proposed development at 42-52 Mitre Street, Craiglie (Lot 900 SP342106) in conjunction with an Operational Works Application.

This report has been prepared to collate the proposed stormwater management at the site to show how the various requirements for flooding and drainage are to be met.

2. Flood Assessment

2.1 Storm Time

The site is situated within the Medium Storm Tide Hazard zone and is at risk of inundation in the year 2100 1% AEP event. Searches with the 'Douglas Shire Council and JB Pacific Storm Tide Inundation Methodology Study' tool indicate that Lots 1 & 2 C2253 are not subject to inundation, whilst Lot 6 C2253 has a required finished floor level (FFL) of RL 3.548m AHD inclusive of a 500mm freeboard to the calculated level. This level is considered appropriate and will be applied over the whole site as the minimum finished floor level.

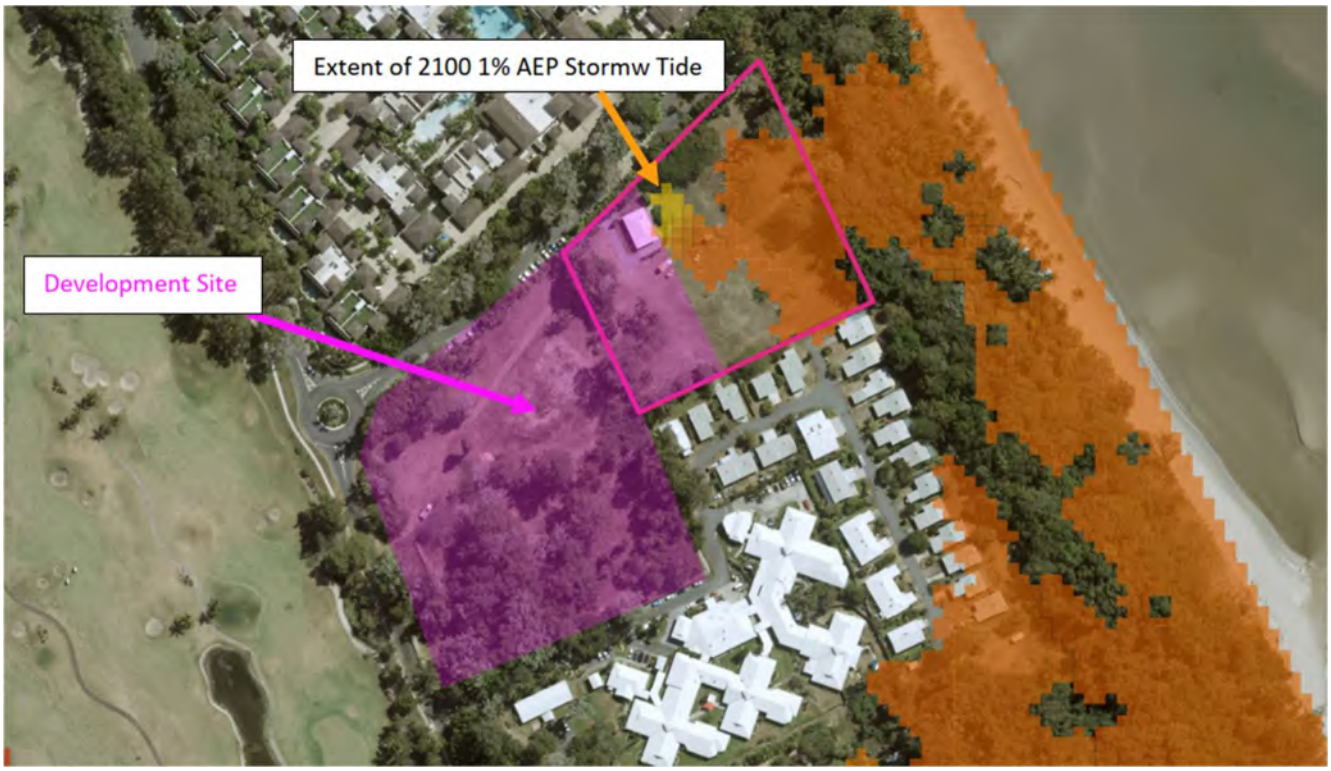


Figure 1 – Year 2100 1% AEP Storm Tide Extent (Extract from Douglas Shire Council and JB Pacific Storm Tide Inundation Methodology Study)

2.2 Regional Flood

The property is not shown to flood in a 1% AEP event in the Port Douglas Flood Study. The site will be filled to provide immunity from the storm tide and will therefore be further above the flood level, and an assessment of flood storage losses is not considered appropriate.

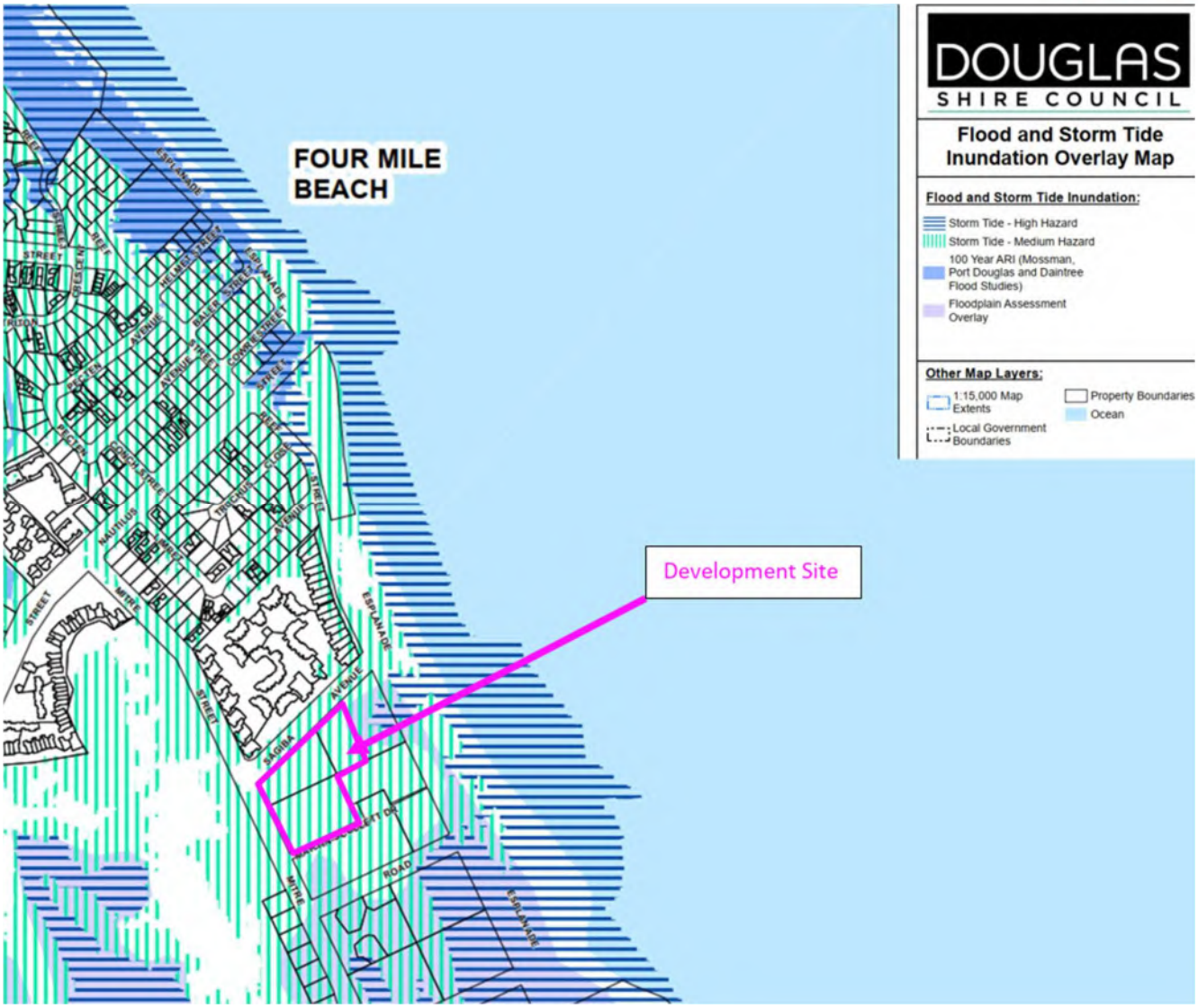


Figure 2 – 100 Year ARI Flood Extent (Extract from DSC Flood and Storm Tide Innundation Overlay Map.

3. Drainage Design

3.1 Hydrology Parameters

The stormwater system for the subject site has been designed to cater for the relevant minor event in accordance with FNQROC and QUDM guidelines as follows.

- Major System Design Event – 1% AEP (100 year ARI)
- Minor System Design Event – 18% AEP (5 year ARI)

Detailed design of the stormwater drainage system has been undertaken utilising various programs. The inputs and parameters used in the programs and calculations are listed below. The calculations and outputs are summarised on sketches within Appendix A for ease of reference where practical.

3.1.1 Time of Concentration

Per QUDM Section 4.6.4, a standard inlet time of 15 minutes generally applies based on the average slope of the development for the initial upstream catchments within the development. Downstream catchments have been adjusted to include travel times within pipes, kerbs, channels, detention basins, and table drains.

3.1.2 Coefficient of runoff

A fraction impervious (fi) of 0.88 has been adopted for the proposed development with the following runoff coefficients used for the relevant stormwater event.

Post Development

- 1% AEP Runoff Coefficient – 1.00
- 18% AEP Runoff Coefficient – 0.84

The following runoff coefficients have adopted for pre development calculations based on a faction impervious (fi) of 0.70.

Pre Development

- 1% AEP Runoff Coefficient – 0.84
- 18% AEP Runoff Coefficient – 0.67

3.1.3 Rainfall intensity

2016 rainfall intensities have been extracted from the BOM website and have been utilised for the subject site.

3.1.4 Catchment Areas

Catchment areas have been determined from the topological shape of the existing and proposed surfaces and shown on the catchment plans contained within Appendix A.

3.2 Assessment of Post Development Flows

An expected condition of development is to demonstrate that no increase or worsening of flows occurs to surrounding properties, and that all stormwater discharged to the north east via Sagiba Avenue to reduce current drainage issues in Martin Scullet Drive.

As demonstrated by the pre and post development catchment plans, any land within the development footprint which previously discharged to the south (Martin Scullet Drive) has been re-routed to discharge north east via Sagiba Avenue. This effectively improves the post development conditions to the south (Martin Scullet Drive). As a consequence flows to the north east have increased in the

post development case. A review of the adjacent development to the east (Lucas Lane) showed that allowance was made for this subject site, and further calculations have been attached demonstrating the following:

- The existing culverts at Lucas Lane have a capacity of 1.30m3/s, and as a result of this development, the expected 1%AEP flow at this location is 1.23m3/s.

- The existing drain downstream of Lucas Lane has a capacity of 1.45m3/s (no road reserve encroachment), and as a result of this development, the expected 1%AEP flows at this location are 1.34m3/s. Furthermore, the capacity within the drain plus a small portion of the adjacent road is greater than 3m3/s.

The catchment plans note the expected change in flows for the major and minor events.

3.3 Non-compliance

All stormwater elements of the development have been designed in accordance with the FNQROC Development Manual, Queensland Urban Drainage Manual (QUDM) and AS3500 where relevant.

To achieve stormwater conveyance within the limited downstream grade as well as water quality improvements by way of bioretention basins a minor non-compliance with QUDM road flow widths has been calculated. Specifically, flows can potentially be higher than the road crown if the bioretention basin flows are ignored from Lot 8 to 4. This non-compliance does not impact the safety or functionality of the development and is considered appropriate in the private road. To remove this non-compliance would require raising the site by a further metre which is considered onerous on the developer who has already lifted the site significantly to divert stormwater to Sagiba Avenue to improve an existing drainage problem in Martin Scullet Drive.

3.4 Severe Impact Statement

To account for events larger than the 1% AEP event or blockages, passive design safety elements will be incorporated into the layout and designed to ensure that a larger than design event will not cause catastrophic failure of key infrastructure or potential loss of life. To mitigate against such a scenario:

- The allotments are typically all built up and fall towards the road frontages.
- The internal roads are free draining to legal points of discharge
- Major flows are conveyed within road reserves and flow paths which are less susceptible to blockage.

4. Lawful Point of Discharge

The existing road frontage to Sagiba Avenue will remain and will become the outlet for the site stormwater via overland flow and roof water pipes to the kerb. The road frontage is the lawful point of discharge for the site.

5. Stormwater Quality

The detailed design site grading has determined that the most efficient site layout is to provide two zones for bio retention as part of the treatment train. The area of bio retention provided is 550m2 (over 2 zones), and is greater than the minimum recommendation of 400m2 defined in the Technical Memorandum contained in **Error! Reference source not found.**.

All stormwater runoff from impervious areas of the development will be directed to the stormwater treatment train per the council conditions.

6. Groundwater

The development involved construction above the current ground surface level with limited disturbance to the groundwater system. It is, therefore, not expected to impact the groundwater conditions. Refer to the technical memorandum in Appendix C for details.

7. Erosion and Sediment Control

The development will be programmed so that the restoration of ground cover by paving or revegetation is complete within the shortest period of time and by avoiding the tropical wet season. Potential causes of erosion for this site by wind erosion or precipitation are:

- Stripping and removal of topsoil
- Removal of fill
- Other earthwork operations
- Heavy vehicle use on site

The proposed erosion and sediment control methods are shown on the plans attached in Appendix D. The contractor will revise these plans prior to commencing on-site. No clearing will be undertaken unless preceded or accompanied by the installation of adequate runoff and sediment control measures.

Following practical completion of the project, a minimum of 70% coverage of all soil with ground cover (i.e. topsoiling and seeding) shall be provided within 30 calendar days.

During the demolition and construction phases, spraying of water will be used with care to act as a dust suppression method.

Monitoring and Maintenance Programs

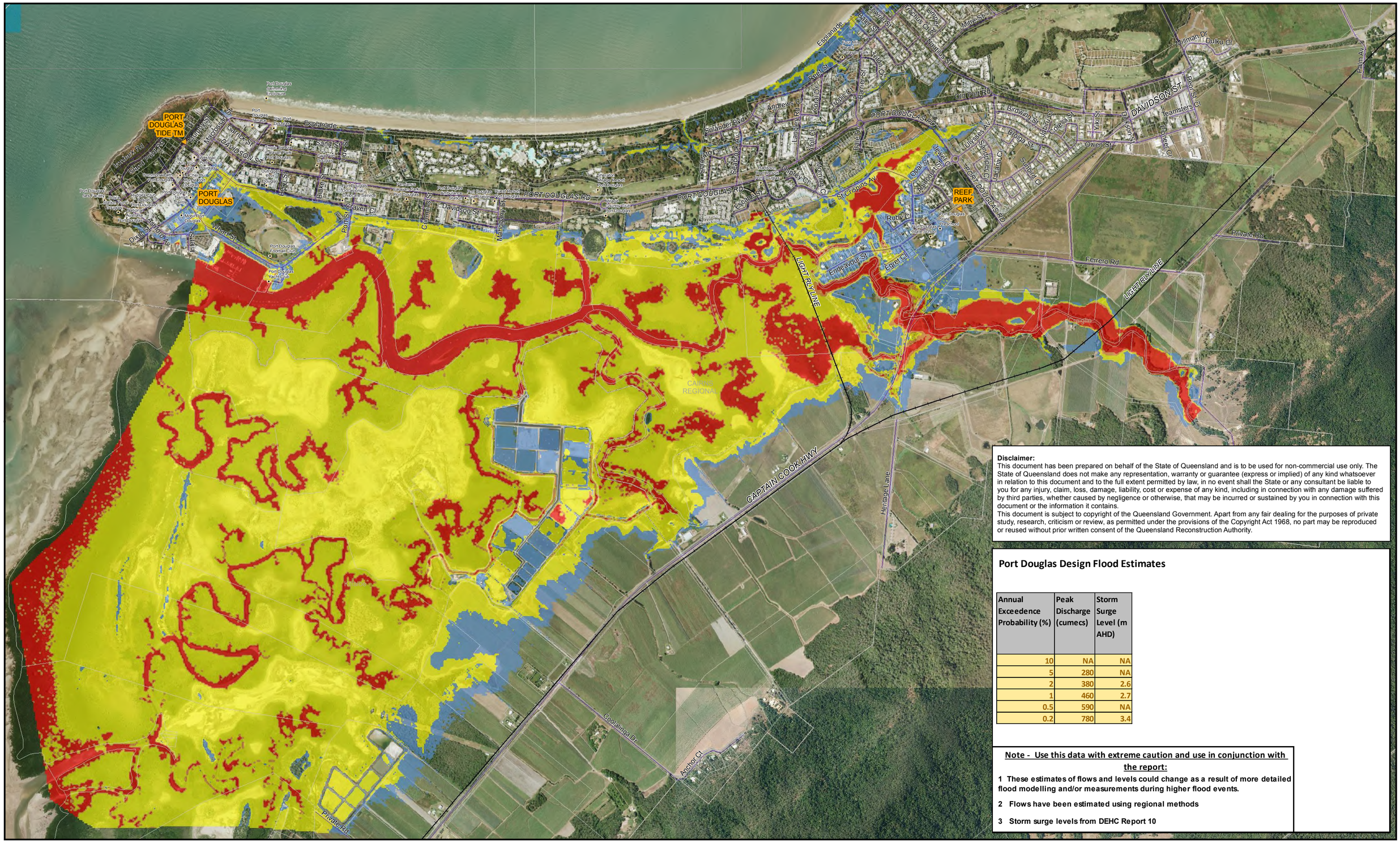
Water discharge from the site will always adhere to a total suspended solid content of less than 50 milligrams per litre and a pH range of between 6.5 and 8.5. If the pH of the flocculated water is not achieved, then pH adjustments will be required. This could possibly be done by a dosing of lime.

Site personnel will inspect all erosion and control measures at least at the following frequencies:

- Daily during construction works,
- Weekly when construction works are not happening,
- Within 24 hours of expected rain, and
- Within 18 hours of an impacting rainfall event.

All erosion and sediment control measures that have an order of efficiency below 75% will be corrected by the end of that working day

Appendix A. Flood Assessment Report



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Port Douglas Design Flood Estimates

Annual Exceedence Probability (%)	Peak Discharge (cumecs)	Storm Surge Level (m AHD)
10	NA	NA
5	280	NA
2	380	2.6
1	460	2.7
0.5	590	NA
0.2	780	3.4

Note - Use this data with extreme caution and use in conjunction with the report:

1 These estimates of flows and levels could change as a result of more detailed flood modelling and/or measurements during higher flood events.

2 Flows have been estimated using regional methods

3 Storm surge levels from DEHC Report 10

AECOM
www.aecom.com

- Points of interest
- Roads
- Rail
- BoM gauging station
- NRM gauging station
- Cadastre

Flood Hazard
- Low
- Significant
- High
- Extreme

Local Authority: Cairns Regional
Locality: Port Douglas
Projection: GDA 1994 MGA Zone 55
Datum: GDA 1994

Queensland Reconstruction Authority
1800 110 841
www.qldreconstruction.org.au

Queensland Reconstruction Authority

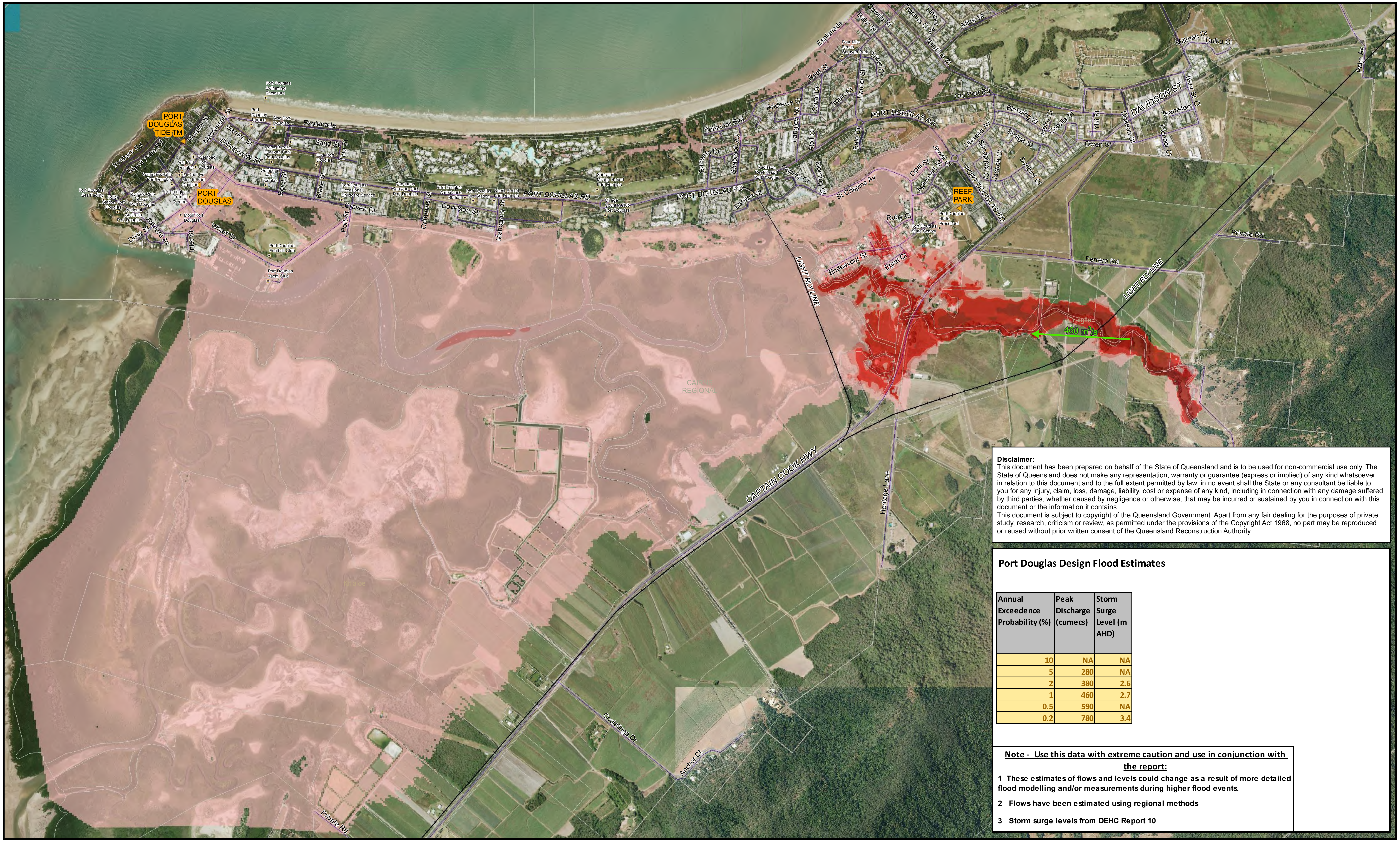
0 0.25 0.5
Kilometres

Scale at A2 - 1:15,000

Port Douglas Flood Investigation
Flood Hazard Map 1% AEP Event

16/04/2013

06



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AECOM
www.aecom.com

Points of interest
Roads
Rail
BoM gauging station
NRM gauging station
Cadastre

Velocity
0 - 0.5
0.5 - 1
1 - 1.5
1.5 - 2
>2

Local Authority: Cairns Regional
Locality: Port Douglas
Projection: GDA 1994 MGA Zone 55
Datum: GDA 1994

Queensland Reconstruction Authority
1800 110 841
www.qldreconstruction.org.au

Queensland Reconstruction Authority

0 0.25 0.5
Kilometres

Scale at A2 - 1:15,000

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This map is based on or contains data provided by the State of Queensland (Department of Natural Resources and Mines) 2012.

Port Douglas Flood Investigation
Flood Hazard Map
Velocity Component
1% AEP Event

16/04/2013

08

Search for a Property

Storm Tide Inundation Property Report

The following report has been automatically generated to provide a general indication of development related information applying to the nominated land parcel.

For more information refer to the JB Pacific Storm Tide Inundation Methodology Study This report is not intended to replace the need for carrying out a detailed assessment of Council and State controls or the need to seek your own professional advice on any town planning instrument, local law or other controls that may impact on the existing or intended use of the premise mentioned in this report. For further information please contact Council by phone: 07 4099 9444 or 1800 026 318 or email enquiries@douglas.qld.gov.au.

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JB Pacific Storm Tide Inundation Methodology Study

The purpose of the Douglas Shire Storm Tide Inundation Methodologies Study was to review and analyse different methodologies, identify a best practise model for the Shire's coastal urban areas, run this preferred best practise model and calculate the minimum heights for the 1% AEP (Annual Exceedance Probability) storm tide inundation for the year 2100 having regard to a 0.8m sea level rise for urban coastal properties.

Excerpt from the JB Pacific Storm Tide Inundation Methodology Report -

Storm Tide Inundation

The Douglas Shire coastline experiences a range of hydrodynamic, waves, and morphologic processes that are linked through dependant and independent variables. This includes the underlying astronomical tide, the passage of local storms and cyclones, the interaction of storm surges along the open coastline, the local wave climate, any sheltering provided by nearshore reefs, and the role of nearshore and dune vegetation. A range of these coastal processes are shown in Figure 2-1.

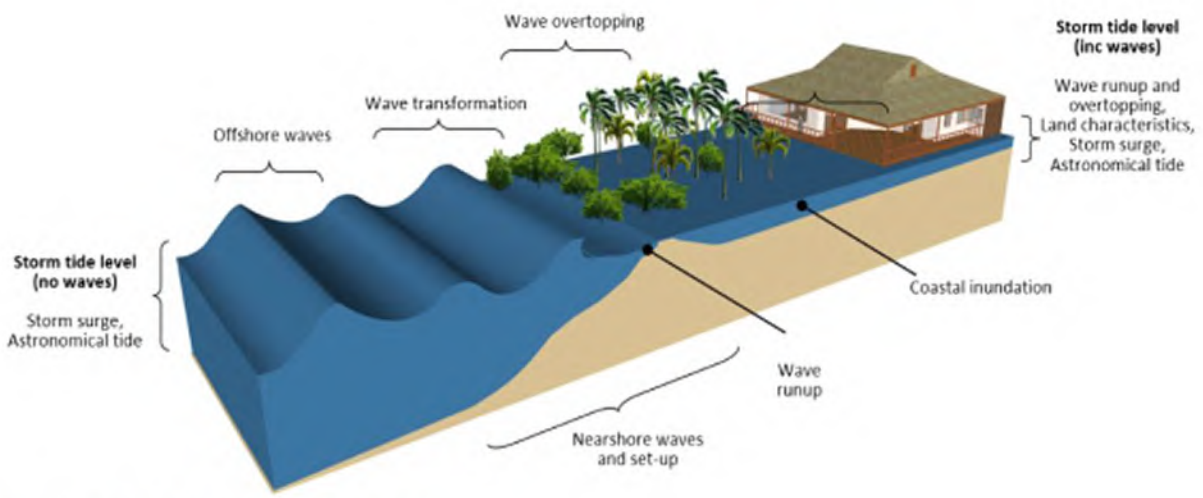


Figure 2-1: Drivers of coastal risk

Importantly storm tide inundation can be from the overtopping at the foreshore as well as wave runup through estuaries and inundate from "behind" a locality. Check out the animation of this activity through the local estuaries in the animation on Council's website.

Future Year 2100 Projected Levels

On 2 July 2017 the Planning Act 2016 came into effect as part of the Queensland Government's commitment to delivering planning reform across the State and the State Planning Policies reinstating the need to consider the 1% AEP (Average Exceedance Probability) Storm Tide Inundation level for the year 2100 with a 0.8m sea level rise. The 1% AEP is referred to as the one in one hundred year event. The 1%AEP is the minimum we need to consider and plan for.

Freeboard

There are numerous variants that can affect the modelled levels. To account for the differences in these variants a "freeboard" is applied. For the JB Pacific Storm Tide Inundation Methodology Study these differences have been considered within a nominal 0.5m freeboard level. Minimum levels for habitable rooms need to consider the Finished Floor Level (FFL) being the 1%AEP level plus the 0.5m freeboard. This value is a measurement at AHD (Australian Height Datum).

AHD Levels

A Licensed Surveyor should be engaged to determine the accurate AHD for a property. Contours and levels identified through Queensland Globe are estimated from LIDAR calculations and may not be 100% accurate.

Property Information

Property Address
42-44 Mitre Street CRAIGLIE

Lot Plan
(- m^2)

Jump to
Storm Tide Inundation Study
Property Information
Storm Tide Information
Storm Tide Range Overview
Construction Level

Selected Property | Easements | Property

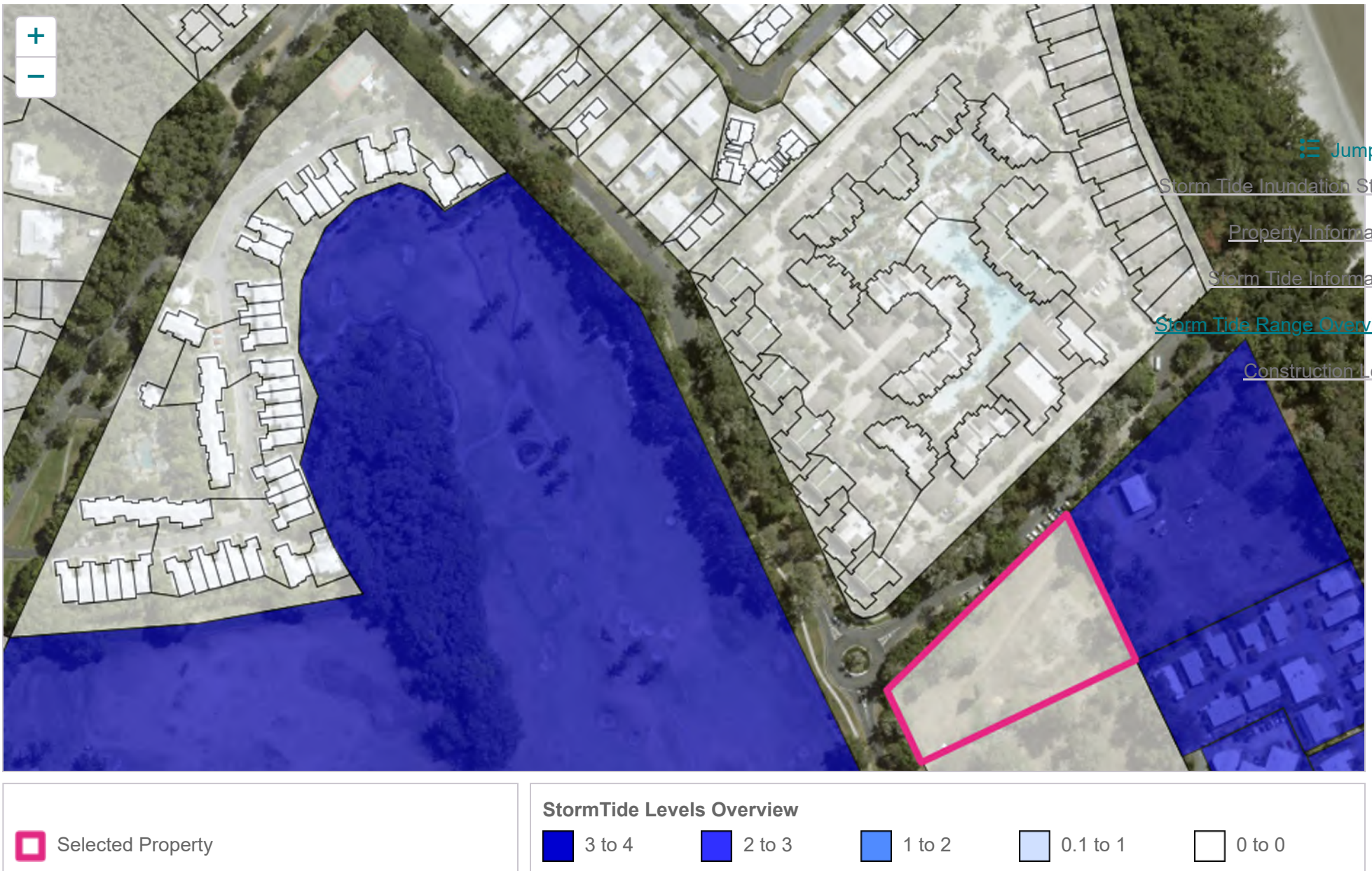
Storm Tide Inundation Property Information

The information below provides details of the projected Future Year 2100 Storm Tide Inundation Level that considers a Sea Level Rise of 0.8m AHD

This property is not affected by the 1 % AEP Event for the year 2100

JBPacific summary Information

Jump to
Storm Tide Inundation Study
Property Information
Storm Tide Information
Storm Tide Range Overview
Construction Level



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Search for a Property

Jump to
Storm Tide Inundation Study
Property Information
Storm Tide Information
Storm Tide Range Overview
Construction Level

Lot Plan 2C2253

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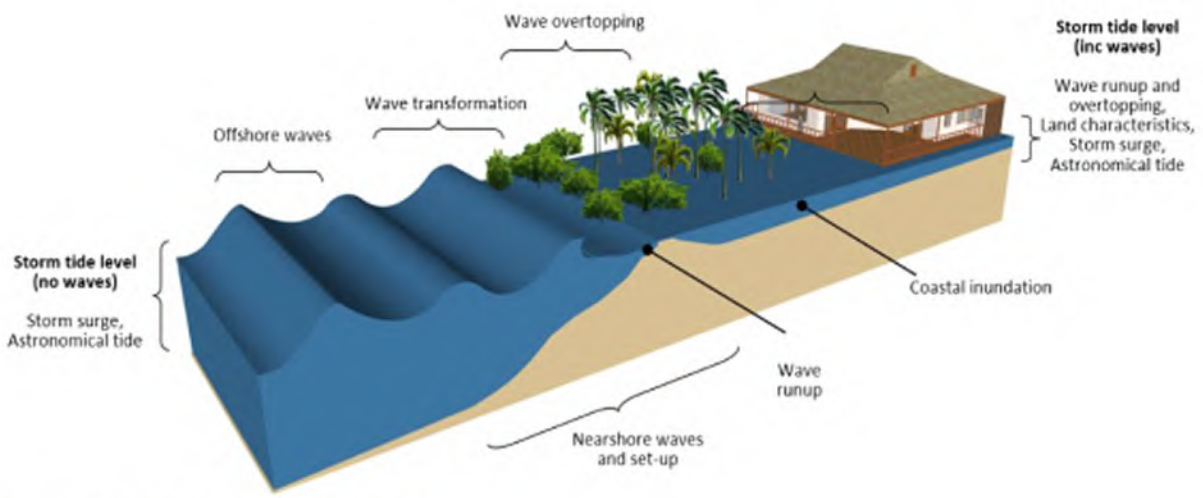

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46-52 Mitre Street CRAIGLIE

Lot Plan
(- m^2)

Jump to
Storm Tide Inundation Study
Property Information
Storm Tide Information
Storm Tide Range Overview
Construction Level

Selected Property | Easements | Property

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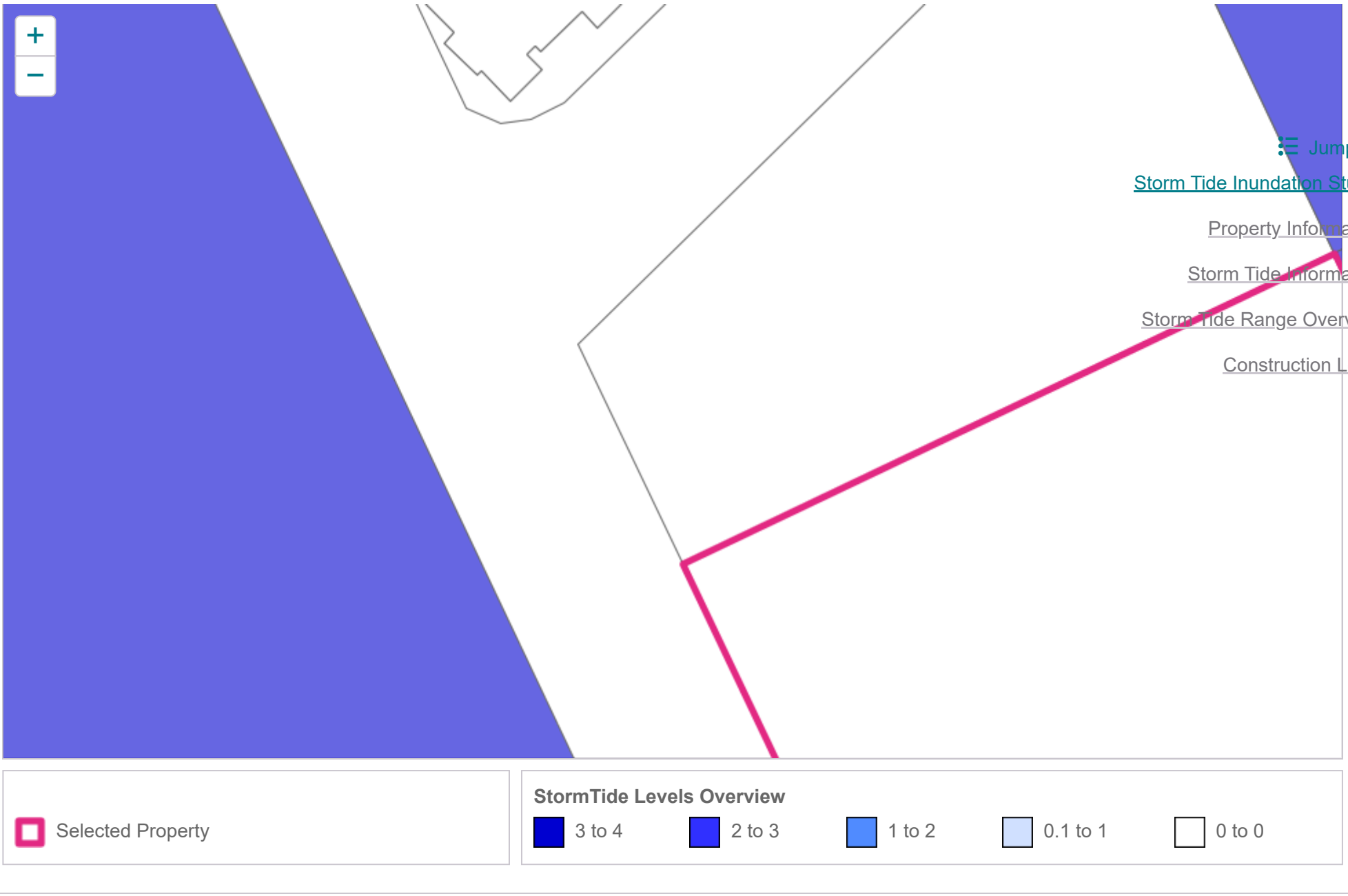

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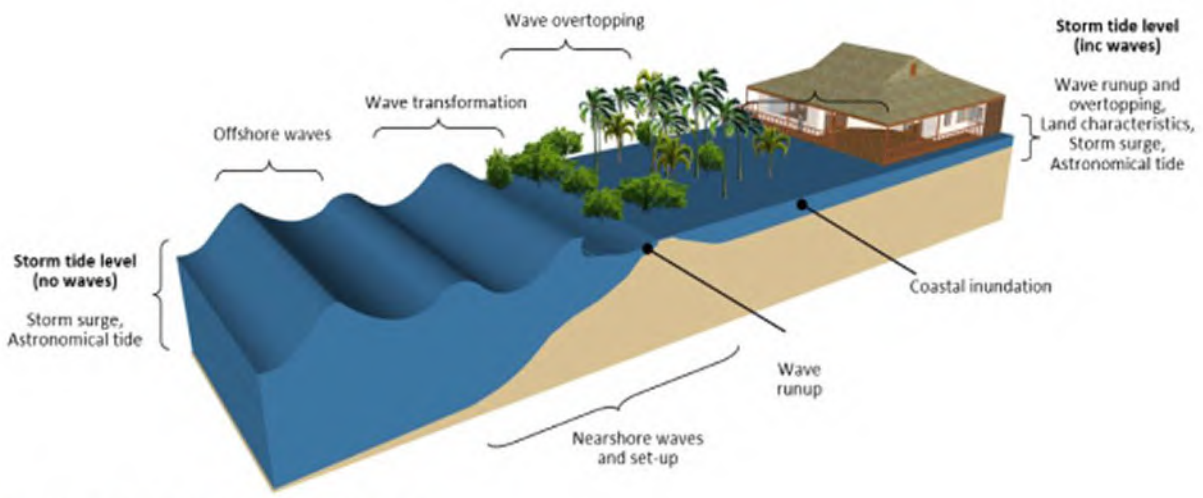


Figure 2-1: Drivers of coastal risk

Importantly storm tide inundation can be from the overtopping at the foreshore as well as wave runup through estuaries and inundate from "behind" a locality. Check out the animation of this activity through the local estuaries in the animation on Council's website.

Future Year 2100 Projected Levels

On 2 July 2017 the Planning Act 2016 came into effect as part of the Queensland Government's commitment to delivering planning reform across the State and the State Planning Policies reinstating the need to consider the 1% AEP (Average Exceedance Probability) Storm Tide Inundation level for the year 2100 with a 0.8m sea level rise. The 1% AEP is referred to as the one in one hundred year event. The 1%AEP is the minimum we need to consider and plan for.

Freeboard

There are numerous variants that can affect the modelled levels. To account for the differences in these variants a "freeboard" is applied. For the JB Pacific Storm Tide Inundation Methodology Study these differences have been considered within a nominal 0.5m freeboard level. Minimum levels for habitable rooms need to consider the Finished Floor Level (FFL) being the 1%AEP level plus the 0.5m freeboard. This value is a measurement at AHD (Australian Height Datum).

AHD Levels

A Licensed Surveyor should be engaged to determine the accurate AHD for a property. Contours and levels identified through Queensland Globe are estimated from LIDAR calculations and may not be 100% accurate.

Property Information

Property Address
The Beach Residences

Jump to
Storm Tide Inundation Study
Property Information
Storm Tide Information
Storm Tide Range Overview
Storm Tide Range Detailed
Construction Level

Lot Plan
(- m^2)

Selected Property | Easements | Property

Storm Tide Inundation Property Information

The information below provides details of the projected Future Year 2100 Storm Tide Inundation Level that considers a Sea Level Rise of 0.8m AHD

Selected Property

Affected by the 1 % AEP Event for the year 2100

Jump to
Storm Tide Inundation Study
Property Information
Storm Tide Information
Storm Tide Range Overview
Storm Tide Range Detailed
Construction Level

JBPacific summary Information

Selected Property

StormTide Levels Overview

3 to 4 | 2 to 3 | 1 to 2 | 0.1 to 1 | 0 to 0

Storm Tide Range Detailed

Selected Property

StormTide Levels Detailed

Below 0.33000 | 2.16968 | 2.32640 | 2.47331 | 2.76642 | 2.91969 | 3.18777 and above

Jump to
Storm Tide Inundation Study
Property Information
Storm Tide Information
Storm Tide Range Overview
Storm Tide Range Detailed
Construction Level

The Level for Construction – for Storm Tide Inundation Considerations

The lot is affected by storm tide inundation for the Year 2100, 1 in 100 (1% AEP) event. The 1% AEP for the year 2100 (including a Sea Level Rise of 0.8m) is at **3.048** (without freeboard).The Freeboard for the Study is 0.5m and is applied to determine Finished Floor Level for habitable rooms.

Finished Floor Level

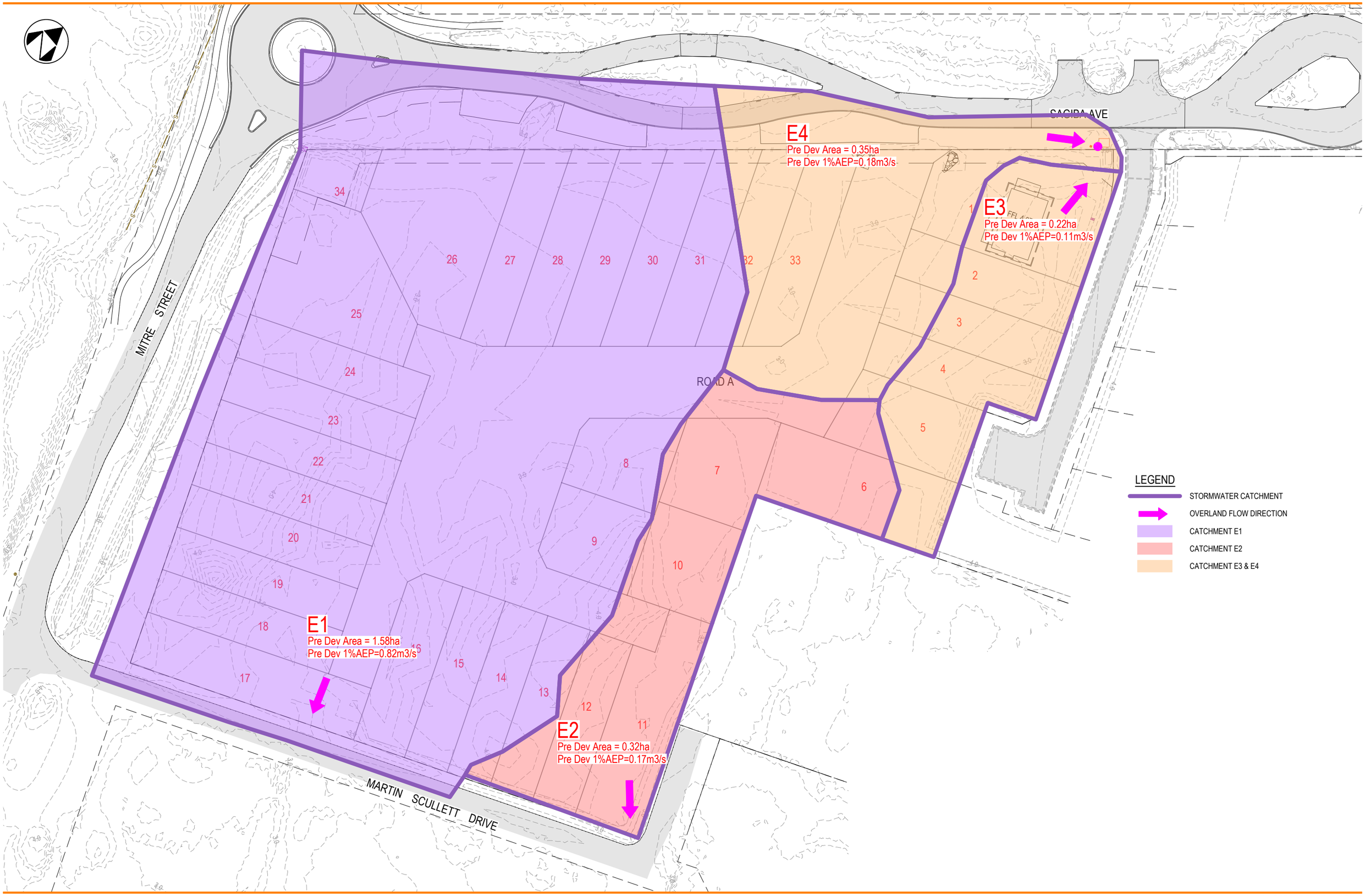
The total required Finished Floor Level for habitable rooms is 3.548 m AHD

Note - Finished floor level is usually 225mm above the pad level.

Disclaimer

The maps show the estimated areas of inundation for the 1% AEP projected for the year 2100 having regard to a sea level rise of 0.8m. The report nominates required minimum habitable room minimum finished floor level. This minimum level is determined from the best data to date held by Council. This storm tide inundation flood level, for a particular property, may change if more detailed information becomes available or changes are made in the method of calculating flood levels. Storm tide Inundation analysis is based on comprehensive computer modelling calibrated against actual storm tides. The website provides locations, street names, aerial photography and available storm tide inundation data for the Shire areas that were included in the JB Pacific Storm Tide Inundation Methodologies Study. This property reporting tool is not a substitute for a detailed Coastal Engineering analysis of a property and should not be relied upon where the reliance may result in loss, damage or injury. While every effort is taken to ensure the information in this report is accurate and up to date, Douglas Shire Council makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs that may occur as a result of the report being inaccurate or incomplete in any way or for any reason.

Appendix B. Drainage Calculations



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Rev	Date	Revision Notes
A	27.03.24	INITIAL ISSUE

NEON CONSULTING

ALLARO HOMES

MITRE STREET SUBDIVISION

PRE DEVELOPMENT CATCHMENT PLAN AND OVERLAND FLOWS

Drawn	Design	Check'd	Appov'd	RPEQ 25102	A3 Full Size (Scale as shown)	
PAM	PAM	CJC	CJC	C.J.CAPLICK	27.03.24	016-2304-01-SK-1001 A

27/03/2024 1:38:47 PMFile: I:\016\016-2304\01 Drawings\01 Drawings\016-2304-01-SK-1001_SWC.dwg

OVERLAND CAPACITY: Road A2
1.40m³/s (Minor Capacity to Crown)
3.40m³/s (Major Capacity to 250mm depth on road, 550mm in 300mm deep drain)
3.45m³/s (Severe Capacity to full verge)
[need to check the 300mm deep drain]

CULVERT APPROACH FLOWS:
CAPACITY TO RL3.31 = 0.68m³/s
1% AEP 1.07m³/s
10% AEP 0.69m³/s
18% AEP 0.59m³/s
39% AEP 0.45m³/s

CULVERT CAPACITY (NO OVERTOPPING) EX 3/600x450 RCBC
1.30m³/s (TO RL3.35)

1% AEP 1.23m³/s
10% AEP 0.80m³/s
18% AEP 0.68m³/s
39% AEP 0.52m³/s

OVERLAND CAPACITY SAGIBA2
DRAIN CAPACITY (NO ROAD RESERVE) = 1.45m³/s
DRAIN CAPACITY WITH 1 x ROAD LANE = 3.25m³/s

1% AEP 1.34m³/s
10% AEP 0.87m³/s
18% AEP 0.74m³/s
39% AEP 0.57m³/s

CAP Sagiba 1

CAP Sagiba 2

SAGIBA AVE

MITRE STREET

ROAD A

MARTIN SCULLETT DRIVE

P1
Post Dev Area = 0.0ha
Post Dev 1%AEP=0.0m3/s

P2
Post Dev Area = 0.0ha
Post Dev 1%AEP=0.0m3/s

No flow discharges to Martin Scullet Drive at P1 & P2

P3
Post Dev Area = 2.19ha

P4
Post Dev Area = 2.41ha

P3.1.1
+1.30ha
+1.30ha

P3.1.2
+0.46ha

P3.1.3
+0.13ha

P3.2
+0.16ha

P3.3
+0.15ha

FFL 4.07

LEGEND
- STORMWATER CATCHMENT
- OVERLAND FLOW DIRECTION
- CATCHMENT P3.x

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Rev	Date	Revision Notes
A	27.03.24	INITIAL ISSUE

NEON CONSULTING

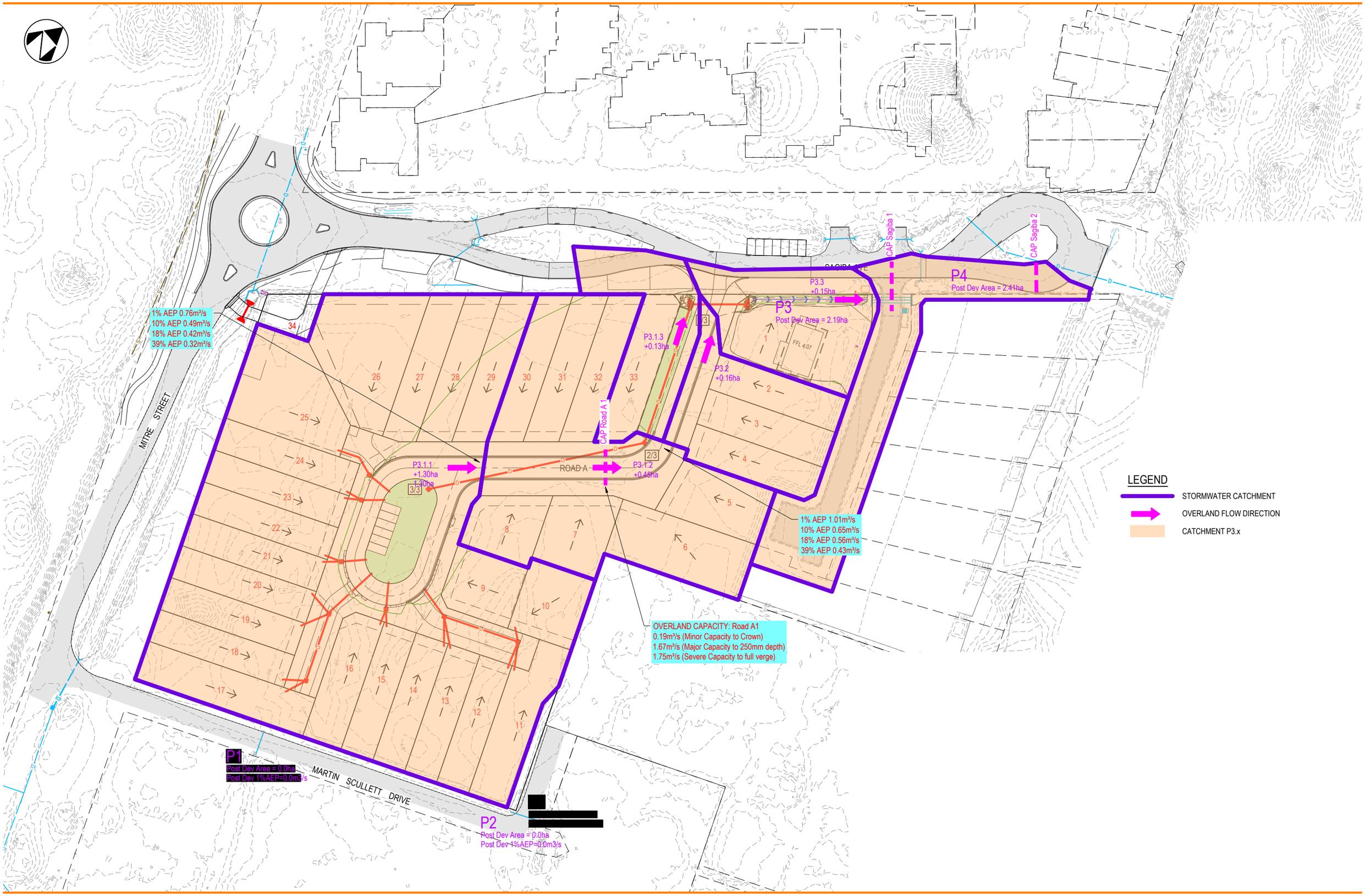
ALLARO HOMES

MITRE STREET SUBDIVISION

POST DEVELOPMENT CATCHMENT PLAN AND OVERLAND FLOWS

Drawn	Design	Check'd	Apprv'd	RPEQ: 25102	A3 Full Size (Scale as shown)	016-2304-01-SK-1002	A
PAM	PAM	CJC	CJC	C.J.CAPLICK	27.03.24		

27/03/2024 1:38:48 PMFile: I:\016\016-2304\01 Drawings\01 Drawings\016-2304-01-SK-1001_SWC.dwg



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Rev	Date	Revision Notes
A	27.03.24	INITIAL ISSUE

NEON CONSULTING

ALLARO HOMES

MITRE STREET SUBDIVISION

POST DEVELOPMENT CATCHMENT PLAN AND OVERLAND FLOWS
INTERNAL ROAD

Drawn	Design	Check'd	Apprv'd	RPEQ: 25102	A3 Full Size (Scale as shown)		
PAM	PAM	CJC	CJC	C.J.CAPLICK	27.03.24	016-2304-01-SK-1003	A

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Appendix C. Stormwater Quality & Groundwater Report

Technical Memorandum

To:	Troy Cavallaro	**From:**	Nadja Kunz
Company:	Allaro Homes	**SLR Consulting Australia**	
cc:	Craig Caplick, Evan Yelavich	**Date:**	21 December 2023
		Project No.	620.040627.00001

RE: Surface and groundwater hydrological assessment "Port Douglas DA approval for Allaro Homes"

Summary

SLR was contracted by Allaro Homes to assist in analyzing two items raised in the last advice notice associated with their Development Application (DA), which were associated with PO3 and PO4 of State Code 9. This document summarizes our response to those items, as detailed below.

- **Item 2:**
  - **Issue:** "*The application has not demonstrated compliance with PO3 of the SDAP, State code 9. It is noted that the response to SARA's information request states the proposed development drains to Sagiba Avenue and that stormwater quality improvement measures will be installed. However, PO3 relates to surface and groundwater hydrology, and no information has been provided with respect to these aspects."*
  - **Action:** "*It is recommended that you provide additional information, including a surface and groundwater hydrological assessment prepared by a suitably qualified professional, demonstrating how the application complies with PO3 of State code 9. Information on how to respond to PO3 can be found in the Guideline: State Development Assessment Provisions, State code 9: Great Barrier Reef wetland protection areas."*

Our review of the terrain data and location of the High Ecological Value (HEV Wetlands) indicated that the hydrological influences on the wetland area adjacent to the site would most likely be associated with flood flows for the larger unnamed sub catchment as well as tidal influences. Therefore, runoff from the proposed development is not likely to have significant impact on the hydrologic regimes within the wetland.

Streamflow gauge records for the Mossman Basin within which the Allaro proposed development lies are limited. Our assessment of the surface water hydrology (detailed in **Section 1**) finds that the catchment area of the streamflow gauge on the Mossman River is 106 km^2. The proposed site lies in a smaller catchment to the south with an area of 6.5 km^2 or approximately 6% of the Mossman River catchment ant the gauge location. As data was limited to the Mossman Basin, a scaled version of the flow data was used to analyse the area. The proposed site has an area that represents approximately 0.35% of this catchment and is therefore not considered to represent a tipping point for the larger scale basin. Pre-development discharge rates scaled to the catchment size and were compared to a post-development rate which were calculated by increasing the flow to include the land development as percent impervious. Further analysis found that, changes were not highly

reflected in the results with no flow difference in the high-flow duration curves, low-flow duration curves, and low-spell duration curves, and can be therefore determined to have little effect on the drainage catchment at the downstream receiving environment.

Regarding the groundwater hydrology (detailed in **Section 2**), the proposed development by Allaro Homes requires no direct (or indirect) take from the groundwater system. All infrastructure works will be completed above ground, and thus, there is no need for underground dewatering/stabilisation. Potential disturbance to the existing hydrogeological conditions is low risk and limited to changes in recharge and evapotranspiration rates through reshaped ground cover and vegetation. Isolated contamination events during the construction phase are considered very low risk as they will be managed under the specific site risks management plan during construction.

Baseline groundwater flow regime and water quality are not expected to change as a result of the proposed development, and therefore, the risk of impact to the adjacent wetland system is considered to be low.

- **Item 3:**
    - **Issue: "***The application has not demonstrated compliance with PO4 of the SDAP, State code 9. The application material, including the Engineering Services Report prepared by Neon Consulting and the information request response, identifies that stormwater will be discharged to Sagiba Avenue which in turn discharges to the east – towards the mapped wetland/wetland buffer. The application material does not include detailed information demonstrating how stormwater will be treated to ensure the development does not result in unacceptable impacts on water quality in the wetland and wetland buffer."*
    - **Action: "***It is recommended that you provide additional information demonstrating how the application complies with PO4 of State code 9. Generally, PO4 can be satisfied through the following measures:*
        - *Designing stormwater networks which avoids direct discharge to the wetland;*
        - *Adequately treating stormwater discharge which ultimately drains to the wetland;*
        - *Locating any stormwater treatment systems or devices outside the wetland; and*
        - *Locating any stormwater treatment systems or devices within the buffer where there is no detrimental impact on the buffers ability to protect wetland values (i.e. not disturbing existing vegetation, not being located in areas subject to seasonal inundation).*

      In responding to PO4, it is advisable to include a site-based stormwater management plan that has been prepared in accordance with Section 2.3 of the Queensland Urban Drainage Manual (https://www.ipweaq.com/qudm). When preparing management plans, note that 'adverse impact' will be measured against pre-development water quality conditions. Catchment specific 2308-36408 SRA State Assessment and Referral Agency Environmental Values (EVs) and Water Quality Objectives (WQOs) have been prepared for most Queensland water catchments (refer to Schedule 1 in Environmental Protection (Water and Wetland) Biodiversity Policy 2019. The water quality guidelines provide EVs and WQOs for waters where no catchment-specific values have been established."

In response to the above item, a stormwater management plan is provided in **Section 3** to assess the potential impacts on water quality in the wetland as the main receiver and illustrate the development incorporating a proposed Water Sensitive Urban Design (WSUD) treatment train, will comply with the WQOs required for protection of the water quality of the wetland.

A Model for Urban Stormwater Improvement Conceptualisation (MUSIC) model (Version 6.3) was established to reduce post-development pollutant loads as dictated by State Planning Policy (SPP) (State of Queensland, 2017) and QWQG (DERM, 2009).

The outcome of the water quality assessment showed that the proposed stormwater management treatment train consisting of distributed bioretention filtration systems will provide sufficient pollutant removal in accordance with water quality objectives for pollutant load reductions as outlined in QWQG.

1.0 Surface Water Assessment

1.1 Background Assessment

This assessment investigates how the proposed works affect the existing surface water hydrological regime. In particular the assessment considers the impacts to areas mapped as High Ecological Value (HEV) Wetlands, referred to herein as sensitive receptors.

The project lies in the Mossman Drainage Basin. The Allaro site (Project Area) is located within a small unnamed sub-catchment near the town of Craiglie approximately 5 km south of Port Douglas. The catchment is approximately 6.5 km^2 and is characterised by natural wetlands and cane farms. The closest streamflow gauge is 4 km south of the Project Area on the Mowbray River (station 109003A). This Mowbray River gauge has a catchment area of 68km^2. However, the station is now closed with a record length of only 6 years (1990 to 1996). The closest open streamflow gauge, 109001A, is situated on the Mossman River approximately 13 km Northwest of the Project Area. The Mossman River streamflow gauge has a 75-year record although records before 1976 are limited. **Figure 1-1** indicates the location of these gauges relative to the Project Area.

Figure 1-1: Mossman Drainage Basin and streamflow location (source: QLD Globe)

Observed streamflow data from both the Mossman River and Mowbray River gauges was reviewed. While the closed station is more ideal due to its upstream location parallel to the

catchment stream of the proposed site; it only contains 5 years of consistent data from 30 years ago. This was considered as insufficient to make an adequate analysis of flow regimes in the area. However, the flow duration curve of the 5 years is similar in pattern to the Mossman River gauge. Therefore, the analysis is based on the Mossman River streamflow data as it is considered representative of the catchment.

The proposed site falls within the Great Barrier Reef Wetland Protection Areas (WAP) and is subject to the State Development Assessment Provisions (SDAP) State Code 9. According to the code changes are considered minimised if:

- *There is no change to the reference high-flow duration frequency curve, the low-flow duration frequency curve, the low-spells frequency curve, and the mean annual flow to and from the wetland.*

The Project Area is 0.023 km^2, i.e. approximately 0.35% of the local catchment area, and intersects the trigger buffer area for a HEV Protected Wetland. The Project Area does not extend into the HEV Wetland itself. The HEV Wetland relative to the Project Area is illustrated in **Figure 1-2**. The Wetland mapping follows the lower elevation terrain and appears to be associated with the lower reaches of the unnamed catchment. Digital Elevation Model (DEM) 1-meter terrain over the area indicates that the Project Area has an elevation of 3.0 - 3.5 mAHD. The wetland immediately to the east of the Project Area lies at 1.4 m AHD and the mouth of the unnamed catchment at 2.5 mAHD.

The available DEM data suggests that surface water flows and flooding of the Wetland is likely to be dominated by the total creek catchment. That is, the most important hydrological impacts are probably associated with any potential change to the flooding regime of the unnamed creek that would change the frequency or duration of water ponding into the floodplain/wetland area. The proposed development is located in the lower reaches of the catchment and as previously noted represents less than 0.5% of the creek catchment area, therefore any changes in peak flows produced due the development will have no significant impact on flow hydrographs or peak flows in the HEV wetland.

The potential for the proposed development at the Project Area to impact the flood regime at the catchment outlet was therefore assessed using the available gauge data at the Mossman River, scaled by catchment size, as representative of the flow behaviour smaller unnamed catchment.

336000
337000
338000
8173000
8172000
8171000

1.4 mAHD

2.5 mAHD

1.4 mAHD

Level (mAHD)

0 0.05 0.1 0.2 km

Coordinate System:	GDA 1994 MGA Zone 55
Scale:	1:8,000 at A3
Project Number:	620.04067
Date:	21-Dec-2023
Drawn by:	SS

LEGEND

- Site Boundary
- Wetlands of high ecological significance
- Trigger area
- Elevation Points

Allaro Homes
Surface Water Assessment

Site Elevation

Figure 1.2

H:\Projects-SLR\620-BNE\620.040627.00001 Allaro Homes Surface Groundwat\06 SLR Data\01 CADGIS\GIS\SW Assessment\620XXXXX_MapTemplate_A3P_v006.mxd

1.2 River Analysis Package (RAP)

As shown above, key variables within PO3 of State Code 9 require an assessment of the surface hydrology of a wetland. This was evaluated using eWater CRC's River Analysis Package (RAP). This software assisted in the analysis of:

- a high-flow duration frequency curve,
- a low-flow duration frequency curve,
- a low-spells frequency curve,
- and a mean annual flow to and from the wetland.

Note that a Low Spells Analysis calculates statistics based on when the stream flow drops to or below a predefined lower limit within a time series or hydrograph. These statistics were calculated for the overlapping period of record.

The outcomes of this analysis allow the identification of any periods where the proposed site may potentially impact the minimum stream flow of the wetland.

1.2.1 Streamflow Data

Daily streamflow data was taken from the Queensland Government Water Monitoring Information Portal for the Mossman gauge (Easting: 326121.432, Northing: 8180196.269) from 1988 to 2023. The total catchment area of the Mossman River gauge is 106 km^2.The general statistics of the Mossman Stream Flow Data are as follows:

Mossman Stream Flow Statistics	Value (ML/day)
Minimum	1.79
Maximum	6.821
Q5%	1.99
Q90%	3.035
Mean	2.489
Median	2.394
CV[1]	0.198

[1] The coefficient of variation is calculated by dividing the mean by the value of the standard deviation.

Table 1: Mossman Stream Gauge Statistics

The Mossman Drainage Basin encapsulates several smaller catchments, and the Project Area lies in a minor unnamed catchment which was delineated using DEM data determined as 6.5 km^2. The proposed site has an area of 0.023 km^2, 0.35% of the unnamed watercourse catchment.

Pre-development is the natural landscape and has been conservatively considered to be 0% impervious. Pre-development values were estimated for the unnamed catchment from the Mossman River stream gauge (109001A) which was down scaled to the size of the smaller development catchment.

Post-development values were reviewed by using the same scaled flow data but with an increase in flow determined by the changes in land use development seen in **Table 2**.

Table 2: Split Catchment Assumptions

Development	Lot	Road	Vegetation
Area (km^2)	0.017	0.004	0.002
% of Catchment	0.2%	0.06%	0.03%
% Impervious	80%	60%	0%

Pre-development and post-development values were analysed and reviewed in the frequency curves below. The change in impervious area from the development of the catchment would be expected to increase the volume of runoff and peak of the flow hydrograph.

Importantly it is noted that this analysis is considered conservative as the proposed development includes bio retention basins which will retain flows attenuating the peak flows from the Project Area and reducing the impact of the increased impervious area on the flow hydrographs.

1.2.2 Duration Frequency Curves

Duration curves of the Mossman Stream gauge are illustrated in **Figure 1-3**, the scaled smaller development catchment in **Figure 1-4**. The comparison to the frequency curves for the Mowbray River is shown in **Figure 1-5**. The curves delineate the flow rate relative to the percentage of time the value is exceeded or a proportion of time.

To enhance granularity, the graphs were reviewed by season and then into months to determine appropriate high and low flow sets. Notably, spring and winter have low flow seasons while autumn and summer are characterized by higher flow rates. March has the highest flow rates and the November and October have the lowest flows.

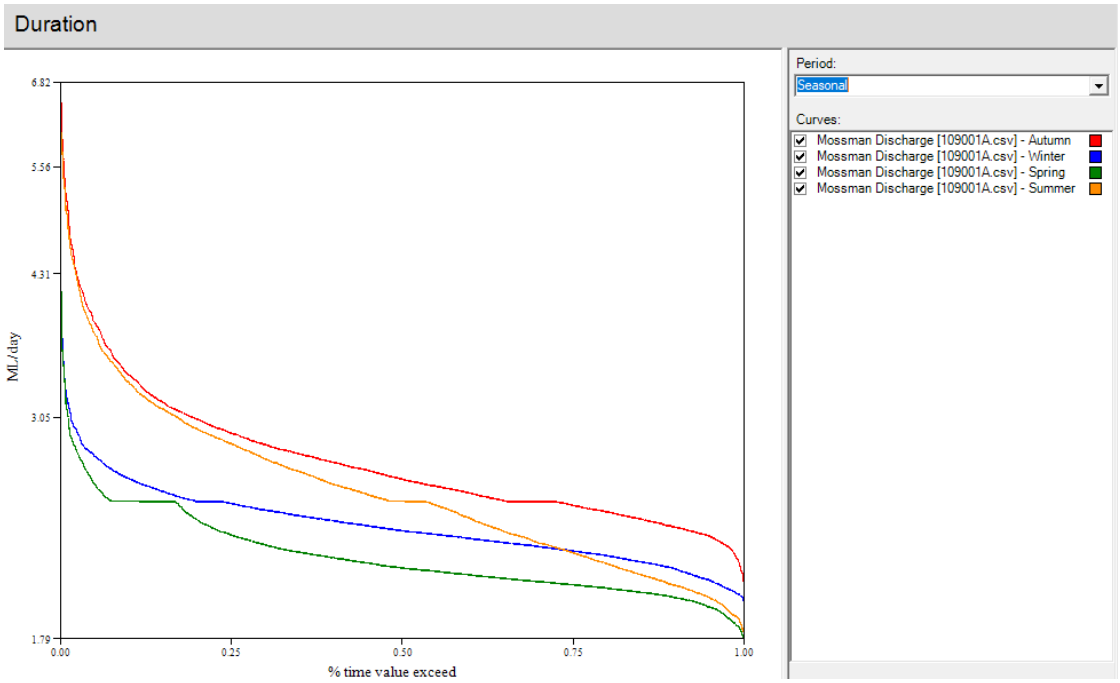


Figure 1-3: Raw Mossman Stream Seasonal Duration Curve

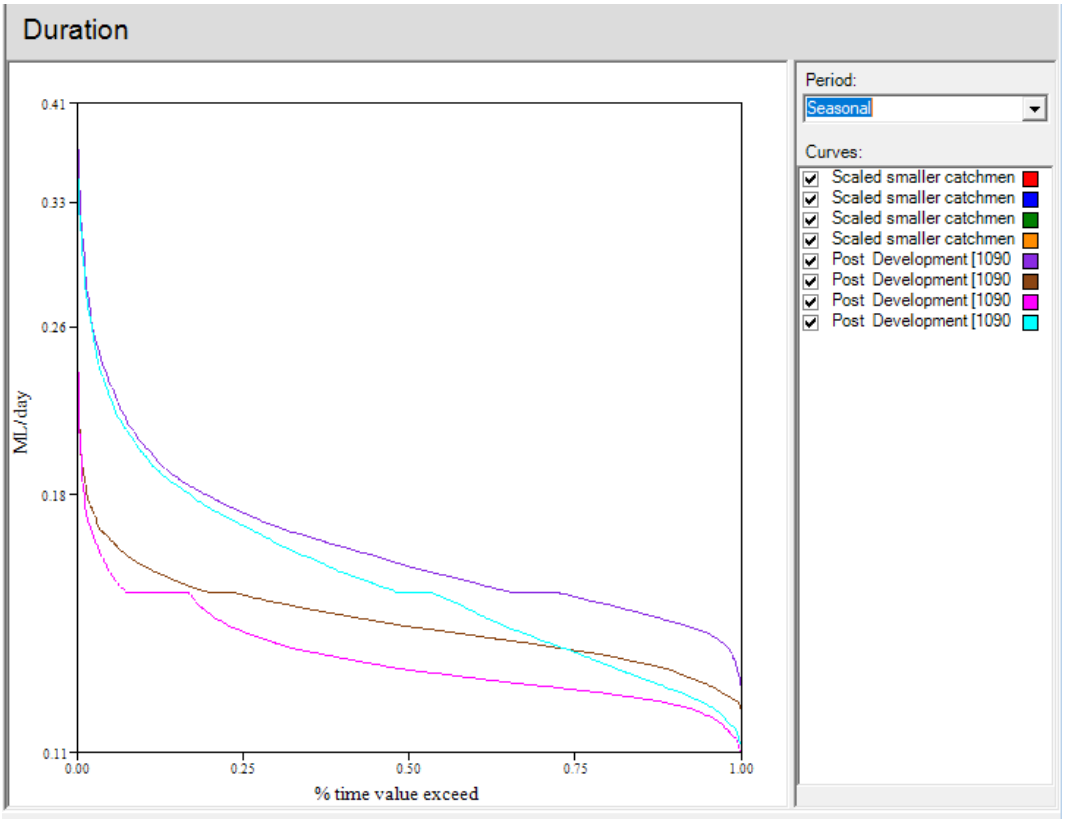


Figure 1-4: Scaled Mossman Seasonal Duration Frequency Curve

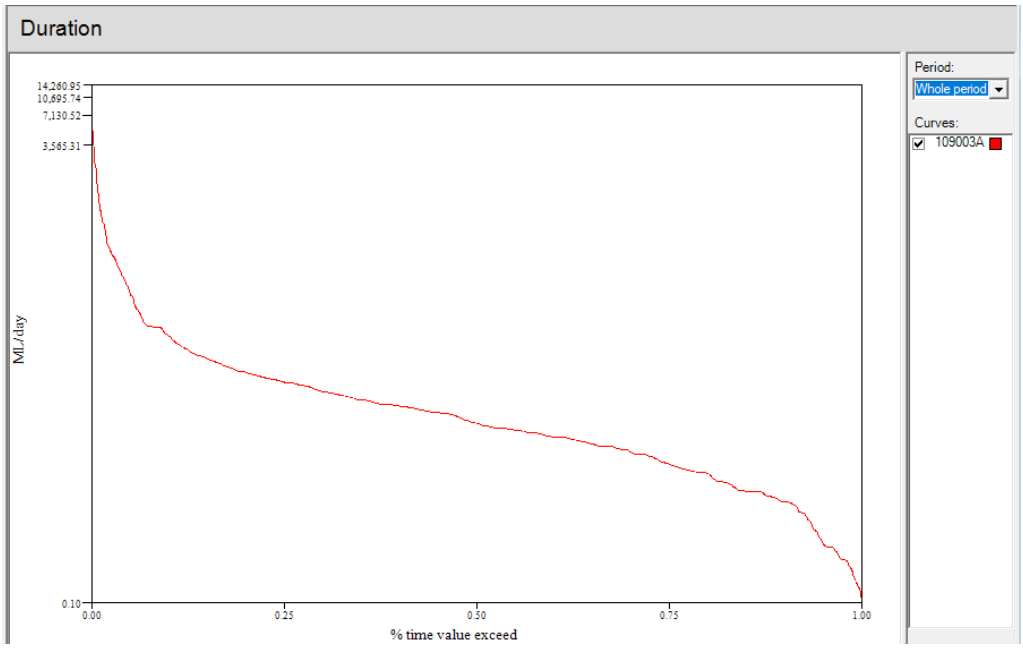


Figure 1-5: Mowbray River Median Duration Frequency Curve

1.2.2.1 High-Flow Duration Frequency Curve

A high flow duration frequency curve represents the percentage of time a particular flow rate is exceeded or equaled over a specified time period. It is used to assess high-flow events in a stream and helps understand the frequency and duration of high-flow events. For high-flow durations, the 90% percentile of flow will be used (Q90%) or around 0.182 ML/d.

Table 3: High-Flow Duration Frequency Curve

Seasonal High Flow Spell Results	Pre-Development	Post-Development
High Spell Threshold (ML/day)	0.182	0.182
Number of High Spells over the historical record	143	143
Total of periods Between High Spells[1]	12128	12128
Mean period Between High Spells (days)	85.408	85.408
Mean Duration of High Spells (days)	3.909	3.909
Mean of High Spell Peaks (ML/day)	0.232	0.232

[1] The recorded values are the total number of days over the historical record from 1988 to 2023.

The difference in high-flow duration frequency curves can be seen in **Table 3**. There is no change determined in the catchment from Pre-Development to Post-Development.

1.2.2.2 Low-Flow Duration Frequency Curve

The low flow duration frequency curve represents the percentage of time a particular low flow rate is equaled or lowered. The results are useful for identifying the frequency and duration of periods with low flow to determine potential ecological impacts. The low flow was determined to be 10th percentile, or around 0.122 ML/day flow.

Table 4: Low Flow Spell Results

Low Flow Spell Result	Pre-Development	Post-Development
Low Spell Threshold (ML/day)	0.122	0.122
Number of Low Spell over the historical record	68	68
Total Periods Between Low Spells[1]	10527	10527
Mean period Between Low Spells (days)	157.119	157.119
Mean Duration of Low Spell (days)	7.456	7.456
Mean of Low Spell Troughs (ML/day)	0.119	0.119

[1] The recorded values are the total number of days over the historical record from 1988 to 2023.

Similar to the high-flow duration frequency, there is little to no change from pre-development to post-development as seen in **Table 4**. Changes were not highly reflected in the results and can be determined to have little effect on the rest of the drainage catchment.

1.2.3 Low-Spells Frequency Curve

A spell is a period of consecutive timesteps (usually hours or days) where the discharge remains either entirely above or entirely below a given threshold. In hydrology, spell analysis is a way of looking at periods in which flows are above or below chosen thresholds and is a common way to consider the extremes of the hydrograph. Low Spell Analysis calculates statistics based on when the stream flow drops to or below a predefined threshold level. The

analysis allows the determination of the frequency and duration of a spell as well as the volume. The spells analysis also assists in defining what constitutes independent flow events compared to baseflow.

The pre-development and post-development spill duration flow curves are seen in **Figure 1-6**. The change is very small and can only be seen once zoomed in to 0.01 increments where the post-development lies slightly above.

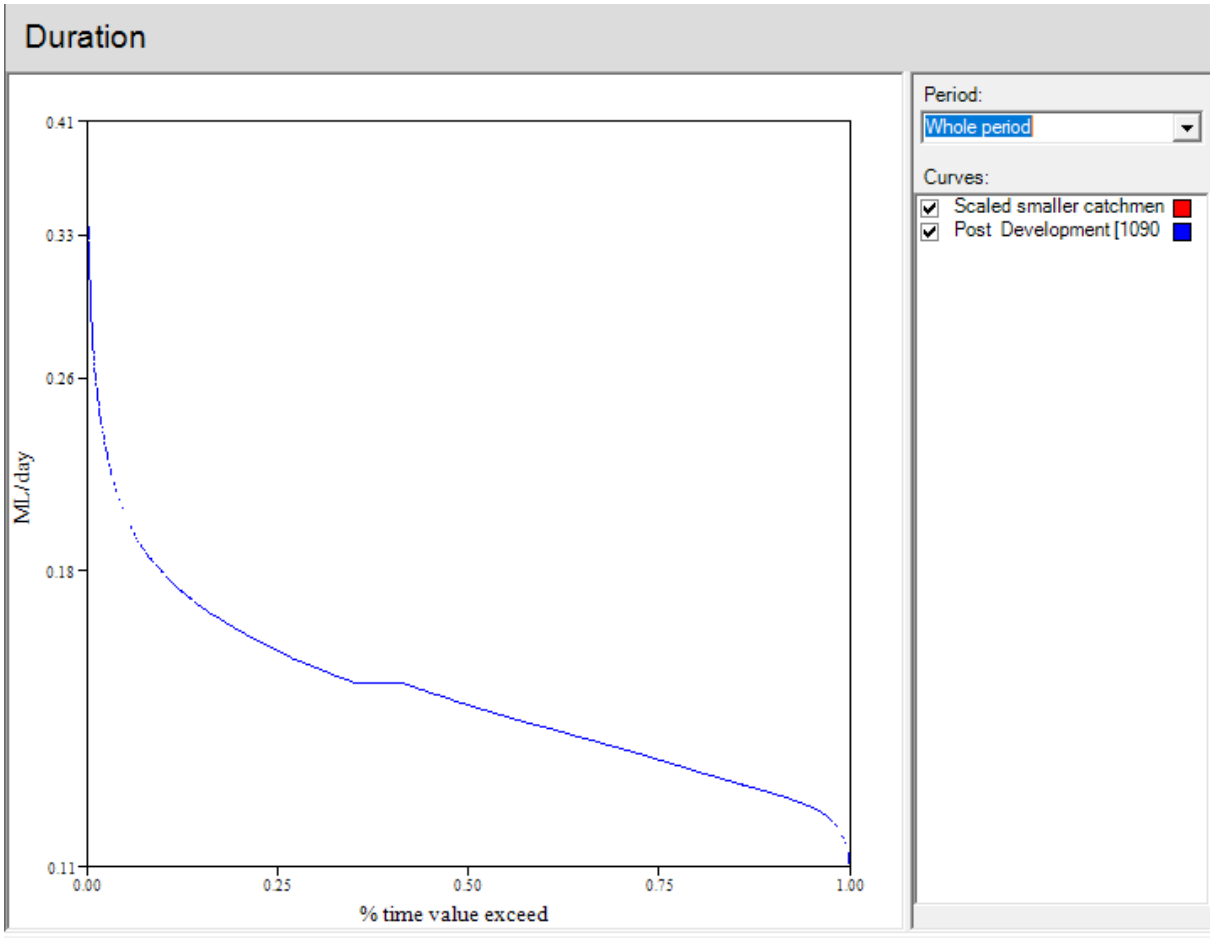


Figure 1-6: Low Spill Duration Flow Curve

1.2.4 Mean Annual Flow

The average annual stream flow hydrograph of the Mossman River over the historic data is shown in **Table 5** below. Changes from pre-development and post-development are very small.

Table 5: Mossman River Mean Annual Flow rates (ML/day)

Year	Pre-development	Post-development
Median for 1988	0.15	0.15
Median for 1989	0.143	0.143
Median for 1990	0.146	0.146
Median for 1991	0.136	0.136

Year	Pre-development	Post-development
Median for 1992	0.149	0.149
Median for 1993	0.148	0.148
Median for 1994	0.14	0.14
Median for 1995	0.137	0.137
Median for 1996	0.149	0.149
Median for 1997	0.149	0.149
Median for 1998	0.145	0.145
Median for 1999	0.157	0.157
Median for 2000	0.149	0.149
Median for 2001	0.126	0.126
Median for 2002	0.132	0.132
Median for 2003	0.137	0.137
Median for 2004	0.141	0.141
Median for 2005	0.15	0.15
Median for 2006	0.139	0.139
Median for 2007	0.136	0.136
Median for 2008	0.143	0.143
Median for 2009	0.151	0.151
Median for 2010	0.151	0.151
Median for 2011	0.149	0.149
Median for 2012	0.14	0.14
Median for 2013	0.149	0.149
Median for 2014	0.136	0.136
Median for 2015	0.147	0.147
Median for 2016	0.143	0.143
Median for 2017	0.139	0.139
Median for 2018	0.153	0.153
Median for 2019	0.137	0.137
Median for 2020	0.146	0.146
Median for 2021	0.143	0.143

1.3 Summary

The catchment area of the Mossman River Gauge is 106 km^2. The Project Area lies in a smaller catchment area that is 6% of the size. As data was limited to the Mossman River Gauge, a scaled version of the flow data was used to analyse the area.

The pre-development site condition was established as 0% impervious and post-development area was represented as an increase between 0-80% impervious area due to the land use change. Theses changes were not highly reflected in the results with no observed flow difference in the high-flow duration curves, low-flow duration curves, and low-spell duration curves, and can be determined to have little effect on the rest of the drainage catchment.

2.0 Groundwater Assessment

The following section aims to provide a detailed response to Item 2 of the Advice Notice given to Allaro Homes as a part of their DA application: "*It is recommended that you provide additional information, including a surface and groundwater hydrological assessment prepared by a suitably qualified professional, demonstrating how the application complies with PO3 of State code 9*".

PO3 of state code 9 defines that "*Development maintains or improves the existing surface and groundwater hydrology in a wetland protection area*".

For the purposes of this technical memo, the "Project Area" refers to the area covered by the proposed infrastructure boundary by Allaro Homes.

2.1 Climate and seasonal patterns

The climate in the Port Douglas area is tropical, with higher temperatures, higher rainfall and higher evaporation occurring over the summer months (December to February). The closest Bureau of Meteorology (BoM) station is located at Reef Park (31204), approximately 1 km to the west of the Project Area. The second closest weather station with a longer data record is Port Douglas – Warner St (station 31052) located approximately 5 km north of the Project Area. From **Table 2-1**, the average annual site rainfall ranges between 2028 and 2156 millimetres (mm) at Port Douglas and Reef Park stations, respectively, with nearly 77% and 82% of the rainfall concentrated between December and April, and the lowest monthly rainfall values observed between July and September. SILO Grid point data (Latitude: -16.50, Longitude: 145.45) was used to assess long-term rainfall trends in the vicinity of the Project Area. This dataset is interpolated from quality-checked observational time series data collected at nearby stations by the BoM and shows an average annual value of 2054 mm.

Average annual evapotranspiration for the Project Area is high, with a recorded annual average of 2045 mm recorded through SILO Grid point data (Latitude: -16.50, Longitude: 145.45) (see **Table 2-2**).

Table 2-1 Average Monthly Rainfall

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Reef Park (1996-2023)	408.2	418.6	418.8	134.9	62.7	44.5	29.6	13.5	38.8	61.1	82.4	290.0	2155.5
Port Douglas (1884-2022)	395.8	422.0	429.4	203.3	72.8	47.7	26.4	23.3	32.1	53.1	106.1	213.5	2028.4
SILO Data (1975-2023)	415	421	396	201	80	41	32	27	32	69	112	228	2054

Source: http://www.bom.gov.au/climate/data/index.shtml
Note: SILO Grid point data coordinates are Latitude: -16.50 and Longitude: 145.45.

Table 2-2 Average Monthly Evapotranspiration

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
SILO Data (1975-2023)	186	153	164	148	137	125	136	160	189	221	218	208	2045
Note: SILO Grid point data coordinates are Latitude: -16.50 and Longitude: 145.45.													

Rainfall trends for the Project Area since 1975 are indicated by analysis of the Cumulative Rainfall Departure (CRD) trend for monthly rainfall data (**Figure 2-1**). Positive gradients on this curve (rising limbs) confirm wetter than normal climatic conditions, while negative gradients (falling limbs) indicate drier conditions. Average rainfall conditions are inferred during periods of stable residual mass. **Figure 2-1** shows that, over the past 50 years, the wettest periods occurred during 1979-1981, 2010-2012, and recently across 2018-2020. The driest periods were 1991-1994 and 2001-2003.

Since 2022, the Project Area experienced wetter than average conditions before drier than average conditions prevailed between February 2023 and present.

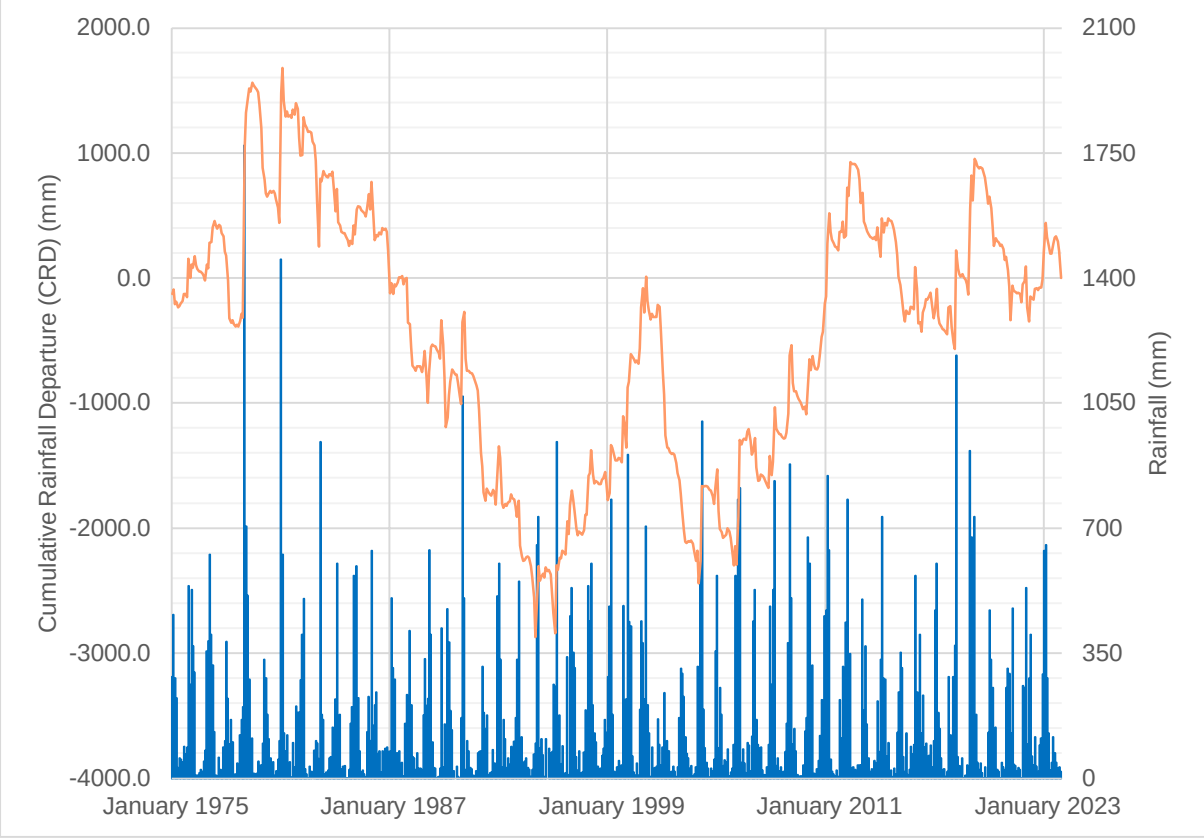


Figure 2-1 Long term Monthly Rainfall and Cumulative Rainfall Departure

The temporal variability in recorded groundwater levels can be expected to mimic the pattern of recharge from rainfall. Typically, changes in groundwater elevation will reflect the deviation between the long-term average rainfall and the actual rainfall as illustrated by the rainfall CRD. The CRD can therefore be used as proxy for the temporal variation of rainfall

recharge to groundwater. Groundwater hydrographs showing the relationship between rainfall and groundwater levels are assessed in **Section 2.3**.

2.2 Hydrogeological Features

The Project Area is located adjacent to Four Mile Beach, directly south of Port Douglas. This area is dominated by Quaternary aged alluvium deposits overlying rocks of the Devonian aged Hodgkinson Formation.

Alluvium deposits consist of moderately, to fine grained quartzose to shelly sand, silt, mud, and clays. The underlying Hodgkinson Formation is comprised of mainly dark grey, thin bedded, mudstone, subordinate thin to thick bedded arenite beds, minor chert, and basalt (Department of Resources, 2022).

The subsurface conditions encountered within the boreholes closest to the Project Area (10900069 and 10900063) generally comprised of ~2.5 m of sands, followed by sequences of clays mixed with sand, mud and shells; with a total thickness of alluvium being approximately 30 m. Sand and gravels were encountered at roughly 20 m for both bores, with weathered slate, quartz and schist being intercepted at ~30 m to the depth investigated for bore 1090063.

For bores outside of the immediate Project Area zone, increased distance to the west was associated with thinner alluvial cover and generally less clays before intercepting the Hodgkinson Formation. Alluvium for bores >1km from the Project Area was approximately half (~15 m) the thickness of those closest to the Project Area. Despite the difference in thickness, alluvium across the greater Project Area appeared to follow the same sequence of deposition: sand, followed by clays and gravel.

The subsurface conditions encountered within the greater Project Area are consistent with published data. Upper sand sequences are likely to be high-yielding, with hydraulic conductivities estimated to sit in the range of 1-100 m/day (Fitts, 2013). Subsequent clay-dominated layers are likely to have significantly less hydraulic conductivity than clean sands; However, flow demonstrated through bores within these clay sequences (10900026 and 10900034) indicate that hydraulic conductivities are towards the higher end of the clay spectrum (potential 0.01 to 1 m/day). Deeper, gravel-dominated layers are likely to produce the highest hydraulic conductivities, with estimates exceeding 100 m/day (Fitts, 2013), therefore, reflecting the primary aquifer in the alluvium. Due to the igneous and metamorphic nature of the Hodgkinson Formation, estimates of hydraulic conductivities can vary over several orders of magnitude (10^{-12} to 10 m/day), however, reported groundwater yields by AGSO (1995) indicate that yields being produced are on the higher end of this spectrum (ranging between 0.5 L/s – 30 L/s, but more commonly 5 L/s). Increased clay with depth in the alluvial aquifer is considered to result in a reduced vertical connection between the underlying Hodgkinson Formation; with groundwater likely to be confined under pressure in the upper ~20m of sediment.

It is anticipated that the proposed works will have a negligible impact on these hydrogeological features in the wetland area as no alterations to the main hydraulic properties in the alluvial aquifers is foreseen.

2.3 Groundwater Levels and Flow Paths

Historical groundwater levels within a 5 km radius of the Project Area have been collected through BoM Australian Groundwater Explorer (**Table 2-3** and **Table 2-4**). **Table 2-3** shows the details for the observation bores, aquifer formations, and depths. **Table 2-4** displays a summary of groundwater level information, including first and final monitoring date, number of monitoring points, minimum and maximum water levels, and a general assessment of

water level trend. As illustrated in these summaries, groundwater depth in the greater area ranges between 0.05 and 14.63 m below ground level (mbGL), with generally increasing groundwater depth with distance (to the west) to the Project Area. Within the immediate footprint of the Project Area, captured by bores 10900069 and 10900063, groundwater is seen to fluctuate over time in the range of 0.28-3.16 m.

Figure 2-2 and **Figure 2-3** show hydrographs for bores 10900069 and 10900063, which are closest to the Project Area. The CRD curve is also included in these figures to assess the impact of monthly rainfall variations in the groundwater hydrographs. Groundwater levels fluctuate significantly, which is considered to be a combined effect of rainfall and seasonality. Though there may be some tidal influence observed in this data, the seasonality and lack of data density obscured the quantification of this stressor.

Water level change is observed at both of the monitoring locations through two fluctuation amplitudes; seasonal 0.5 to 1 metre oscillation, and 1.5 to 2 metre spikes immediately following high-intensity rainfall events. Wet season influence is observed with generally higher groundwater levels following the summer months (December through to February), and lower groundwater levels following the winter dry season (**Figure 2-4**).

Table 2-3 Project Area Nearby Groundwater Monitoring Network Details

Site ID	Bore Depth (m)	Drilled Depth (m)	Drilled Date	Easting MGA2020	Northing MGA2020	TOC Reference Elevation (mAHD)	Stick Up (m)	Geology	Status
10900069	19.7	20.1	5/06/1976	337109	8172052	3.2	0.45	Alluvium	Decommissioned
10900063	31.0	38.4	1/06/1976	337103	8172052	3.3	0.41	Alluvium	Decommissioned
92999	39.5	41.0	8/09/1999	336521	8171783	3.8	n.a.	Alluvium	Functional
10900068	32.7	33.5	7/06/1976	336516	8172470	4.1	0.27	Hodgkinson Formation	Functional
10900037	25.2	42.7	6/06/1975	336506	8172495	4.0	0.43	Alluvium	Functional
10900028	15.2	42.7	5/06/1975	336129	8171657	7.2	0.52	Alluvium	Functional
10900057	UNK	23.2	7/07/1976	336086	8171713	7.1	n.a.	Alluvium	Abandoned
10900036	6.9	51.8	9/06/1975	334592	8173334	4.4	0.43	Alluvium	Decommissioned
10900026	10.7	36.6	8/01/1975	335058	8172943	9.5	0.49	Alluvium	Abandoned
10900034	6.8	18.9	10/06/1975	335070	8171398	15.1	0.45	Hodgkinson Formation	Abandoned
10900035	24.1	24.4	9/06/1975	335546	8170885	14.3	0.40	Hodgkinson Formation	Functional
10900029	15.8	15.8	5/06/1975	336889	8170420	6.0	0.42	Alluvium	Functional

TOC: top of casing
Note: Grey highlight signifies bores closest to the Project Area
UNK: Unknown information
n.a.: not available

Table 2-4 Groundwater Level Information

Site ID	First Monitoring Date	Final Monitoring Date	Number of Monitoring Points	Minimum Water Level (mbGL)	Maximum Water Level (mbGL)	Trend
10900069	5/06/1976	9/11/2005	71	0.28	3.00	Decreasing
10900063	1/06/1976	9/11/2005	79	0.43	3.16	Minor Decreasing Trend
92999	23/09/1999	n.a.	1	n.a.	n.a.	n.a.
10900068	7/06/1976	16/05/2023	118	0.03	2.35	Decreasing
10900037	1/06/1976	16/05/2023	49	0.05	2.18	Increasing
10900028	15/06/1975	16/05/2023	151	0.67	8.04	Decreasing
10900057	12/07/1976	3/09/1985	407	3.15	7.60	Decreasing
10900036	9/06/1975	14/12/1987	53	1.74	4.50	No Trend
10900026	8/01/1976	25/06/1997	67	6.16	9.22	Decreasing
10900034	10/06/1975	15/06/2006	75	11.01	13.95	Decreasing
10900035	9/06/1975	16/05/2023	114	9.13	14.63	No Trend
10900029	5/06/1975	16/05/2023	136	1.29	5.88	Minor Decreasing Trend

Examining the temporal distribution of groundwater levels at these two bore locations shows that fluctuations in the levels generally remain roughly within a 2.5 m range (0.5 – 3 m), with sharp, positive inflections driven by high-intensity rainfall events within the previous week before measurement. These short-term peaks bring the groundwater level to within 0.2 metres of the ground surface, and it is possible that groundwater daylighting may occur shortly after significant rainfall input.

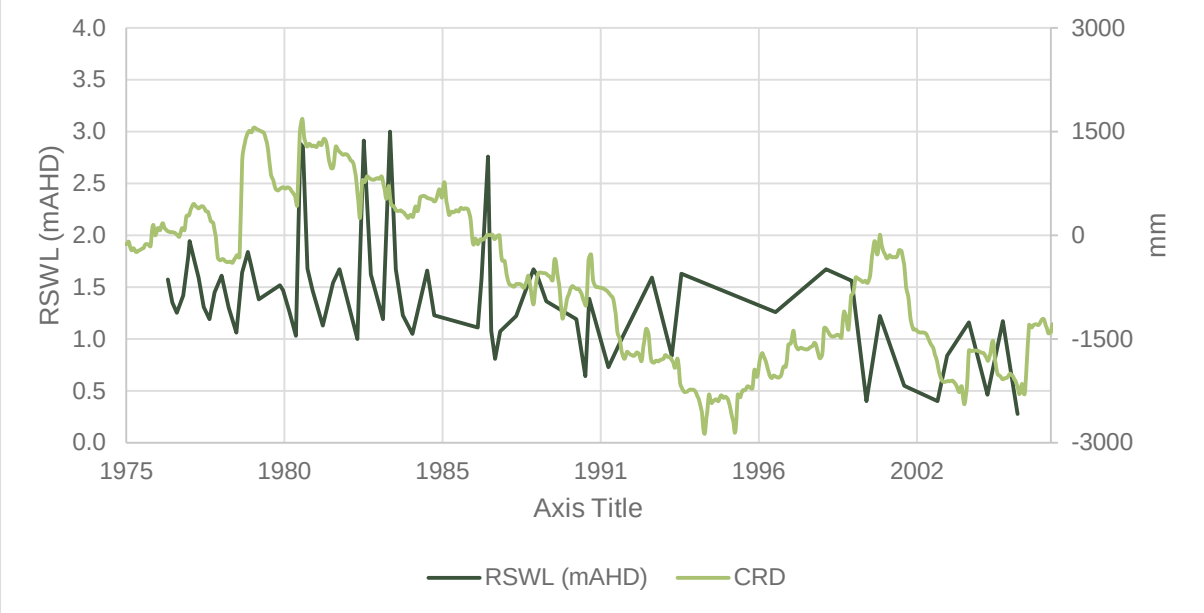


Figure 2-2 Groundwater level monitoring bore 10900069 hydrograph

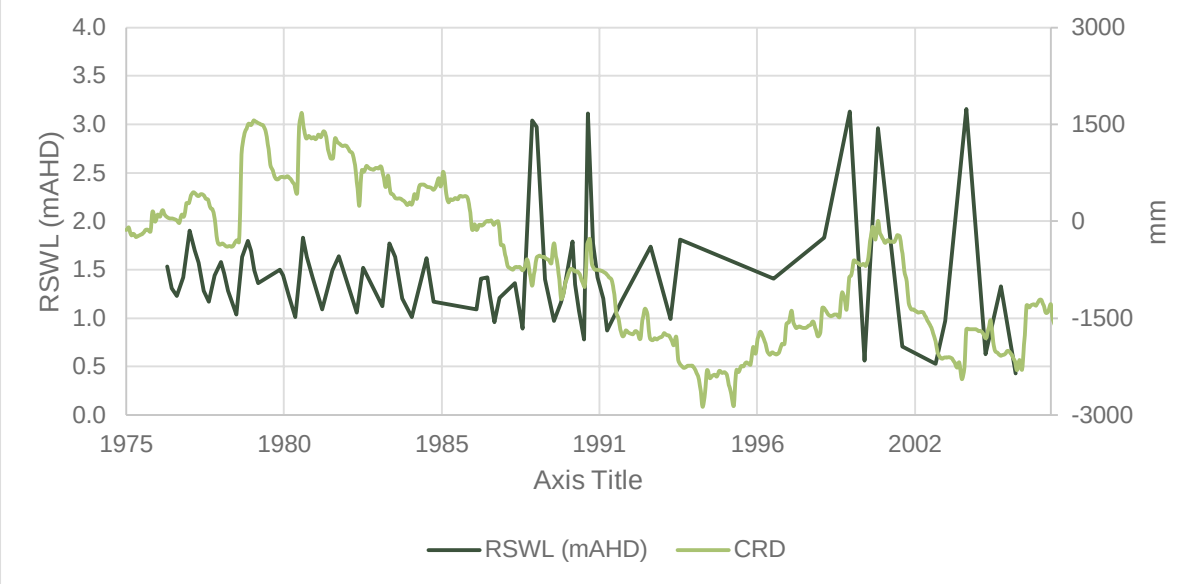


Figure 2-3 Groundwater level monitoring bore 10900063 hydrograph

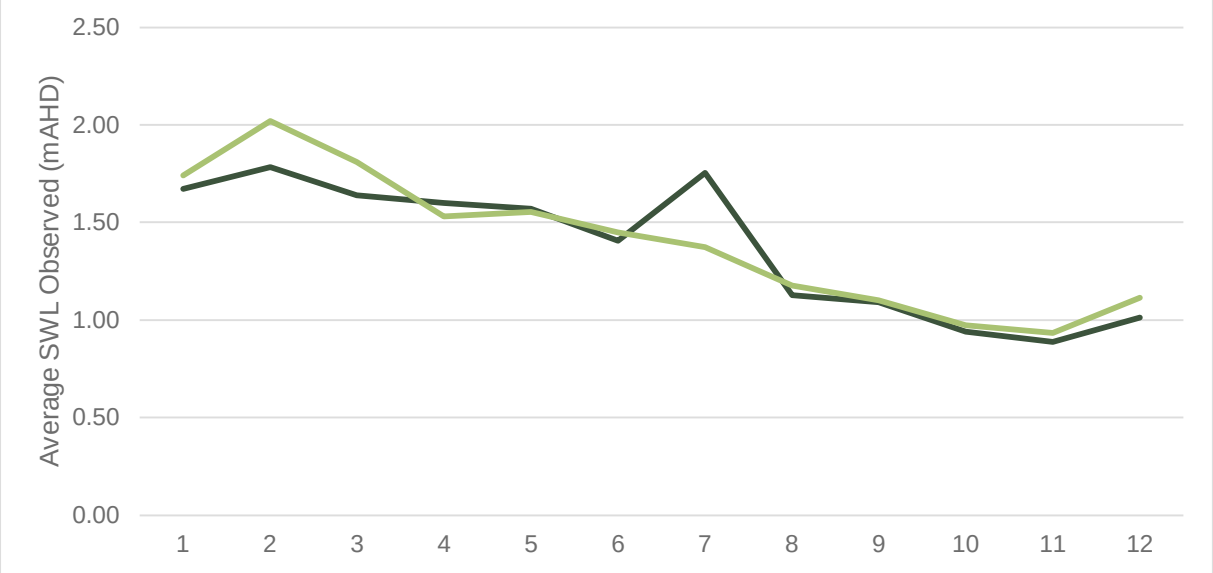


Figure 2-4 Seasonality in average water level monitoring at 10900069 and 10900063

Groundwater flow is observed to be generally west to east in the vicinity of the Project Area, shown by the contours presented in **Figure 2-5** and **Figure 2-6**. Two time slices of contours are presented to demonstrate potential changes in flow regime and groundwater levels over the 48 years of monitoring. Overall, both contours show dominant flow direction as a subdued reflection of topographic relief in the area, indicating that groundwater discharge occurs to the east of the Project Area through lateral flow into the Pacific Ocean. Reduced groundwater levels in **Figure 2-6** are likely a temporary response to recent climate conditions and therefore, do not reflect a change in flow gradient with time. The continuity of aquifer units, and the consistent groundwater contours indicates that there are no preferential flow zones that are of consequence to the groundwater assessment.

As the groundwater table is approximately 1 mAHD across the Project Area, and the closest bores to the Project Area (10900069 and 10900063) have a TOC elevation of approximately 3.2 mAHD, excavations beyond 2 m, especially to the east of the Project Area during the wet season, could potentially lead to groundwater inflow that will require dewatering.

Allaro Homes are intending to complete infrastructure works above surface and therefore depressurization of aquifers is not expected to lead to any local drawdown of the water table. No infrastructure works are expected to cause changes in the groundwater flow regime around or within the Project site.

Given the proximity to the coast it would be anticipated to observe some tidal influence in the reported groundwater levels. This, however, is not observed given the coarse frequency of data reporting.

0 250 500 m

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:15,000 at A4
Project Number:	620.040627.00001
Date Drawn:	20-Dec-2023
Drawn by:	AS

LEGEND

- RDMW GWDB Bore
- Project Area
- Groundwater Contour (mAHD)

ALLARO HOMES
GROUNDWATER ASSESSMENT

MAY 1976
GROUNDWATER CONTOURS

SLR

FIGURE 2-4

Path: H:\Projects-SLR\620-BNE\620-BNE\620.040627.00001 Allaro Homes Surface Groundwat\06 SLR Data\01 CADGIS\GIS\Allaro Homes Groundwater Assessment\Allaro Homes Groundwater Assessment.aprx\620040627_GW_F2_04_May_1976_Groundwater_Contours

0 100 200 m

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:10,000 at A4
Project Number:	620.040627.00001
Date Drawn:	20-Dec-2023
Drawn by:	AS

LEGEND

- RDMW GWDB Bore
- Groundwater Contour (mAHD)
- Project Area

ALLARO HOMES
GROUNDWATER ASSESSMENT

MAY 2023
GROUNDWATER CONTOURS

SLR

FIGURE 2-5

Path: H:\Projects-SLR\620-BNE\620-BNE\620.040627.00001 Allaro Homes Surface Groundwat\06 SLR Data\01 CADGIS\GIS\Allaro Homes Groundwater Assessment\Allaro Homes Groundwater Assessment.aprx\620040627_GW_F2_05_May_2023_Groundwater_Contours

2.3.1 Groundwater Dependent Ecosystems (GDEs)

High annual rainfall and relatively shallow groundwater systems are believed to support a range of Wetland systems within the Port Douglas Shire (Wetland Rehabilitation Guidelines, 2008). Ecologically significant wetland areas have been mapped in close proximity and within the proposed Project Area, denoted as intertidal wetland areas within the larger Mossman River catchment (BoM GDE Atlas, 2012). This mapping was provided by BoM's online GDE Atlas tool, with **Figure 2-7** showing the extent of these wetland zones (Mossman River Wetland) relative to the Project Area.

As groundwater is usually the most significant contributor to a wetland's ongoing presence and function, it is critical to understand how groundwater flows into these systems. Contours have been generated using historical data to determine flow direction relative to the Project Area.

It can be assumed that the GDE area mapped in **Figure 2-7** is supported by groundwater levels varying between 0.28 and 3.16 mbgl. The most recent readings from the closest bores to the Project Area suggest that present-day wetland ecosystems / GDEs are supported by groundwater depths in the order of 3 m. Water level rise associated with high-intensity rainfall is likely to cause close-to-complete saturation of the shallow subsurface. This process is likely to be connected to sustaining the wetland ecosystem. Recharge to the shallow groundwater system is understood to occur throughout the surface water catchment, and groundwater level contours indicate the proposed development area is in the downstream area of the flow paths, therefore it is considered unlikely that development works will change recharge patterns or groundwater availability for the wetland area.

Given data limitations it is not possible to assess the impacts of tidal effects on the wetland-groundwater interaction. Despite this limitation, it is anticipated that any impacts between the wetland-groundwater interactions due to tidal variations will be included in the seasonal variability discussed above.

0 100 200 m

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:10,000 at A4
Project Number:	620.040627.00001
Date Drawn:	20-Dec-2023
Drawn by:	AS

LEGEND

- Minor Watercourse
- Main Road
- Project Area

Aquatic GDE

- High potential GDE

ALLARO HOMES
GROUNDWATER ASSESSMENT

MAPPED AQUATIC GDE'S IN RELATION TO PROJECT AREA (BOM, GDE ATLAS TOOL)

SLR

FIGURE

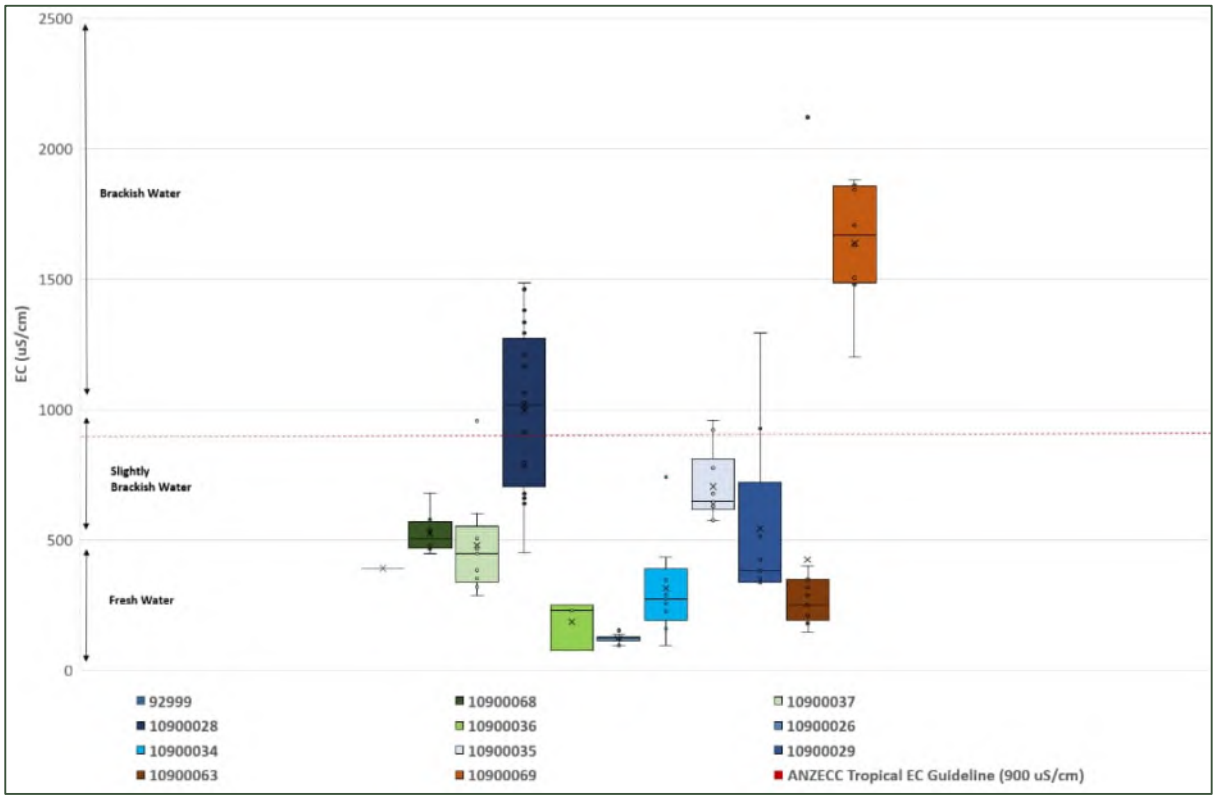
Path: H:\Projects-SLR\620-BNE\620-BNE\620.040627.00001 Allaro Homes Surface Groundwat\06 SLR Data\01 CADGIS\GIS\Allaro Homes Groundwater Assessment\Allaro Homes Groundwater Assessment.aprx\620040627_GW_FXX_Mapped_Aquatic_GDEs_in_relation_to_Project_Area

2.4 Groundwater Quality

Primary salinity data collected for the Project Area is presented in **Figure 2-8** and indicates the following:

- Alluvium/Beach Deposits: Variable salinity, ranging from fresh to brackish (75 to 2,120 mg/L Total Dissolved Solids (TDS), averaging 624 mg/L TDS) and neutral to moderately alkaline pH (6.7 to 8.3, averaging 7.53); and
- Hodgkinson Formation: Generally low salinity, ranging from fresh to slightly brackish (96 to 960 mg/L TDS, averaging 520 mg/L TDS).

Figure 2-8 Individual Bore Salinity Ranges



Historical water quality records show relatively low EC values being returned for bores screened within the Hodgkinson Formation, with slightly elevated EC results for those screened in the shallower alluvium. Thick clay sequences (mentioned in the 10900063 bore log) at relatively shallow depths (<20 m) are believed to be inhibiting mixing of the denser, more saline waters in the alluvium with the deeper, fresher waters of the Hodgkinson Formation. Comparing available data to the relevant protection guideline levels, the summary results indicate that pH within the alluvium is generally suitable for wetland ecosystems in Northern Queensland (see **Table 2-5** below), however, EC and nitric oxide (NO) values are outside of the Wetlands Guideline Value according to historical monitoring data. It can be concluded that the GDE, in its current status, is supported by groundwater chemistries in the current range, and the proposed development is not expected to influence groundwater chemistry through contaminant discharge, increased evaporation, or recharge interruption.

Table 2-5 Default trigger values for physical and chemical stressors for Tropical Ecosystems compared to closest bores (taken from ANZECC Guidelines, 2018)

Reference	NO (mg/L)	pH (-)	EC (µS/cm)
Wetlands Guideline Value	0.01	6-8	900
10900069	2.27	7.68	1,310
10900063	2.89	7.43	615

2.5 Groundwater Assessment Summary

The groundwater system within the study area consists of alluvial sediments overlying the Hodgkinson Formation. Gravels within the lower profile of the alluvium and the weathered profile of the Hodgkinson Formation are expected to be the primary aquifers within the Project Area. Proposed works are not expected to impact the wetland hydrogeological features by altering these alluvial aquifers through excavations, major earthworks or large-scale soil compaction.

Groundwater flow paths indicate west-to-east flows with the Project Area located at the end section of the natural discharge path into the wetland/Ocean. Proposed works are not expected to impact these groundwater flow paths or discharge patterns as they are dominated by hydrogeological features located upgradient of the Project Area.

The fluctuation of groundwater levels under natural conditions in the Project Area reaches up to 2.5 m between the wetting and drying cycles on a sub-annual scale. These cycles are not observed on a regular year-to-year basis on the hydrographs as they are expected to occur following high-intensity rainfall events. It can be concluded that the wetland / GDE area present in the Project Area is supported by groundwater levels varying between 0.5 and 3.0 mAHD, with maximum seasonal fluctuations of 2.5 m in groundwater levels. It is anticipated that tidal effects potentially impacting the wetland-groundwater interaction, will be subdued by the seasonal fluctuations described above as they will be considerably lower in magnitude (<3.0 m). Proposed works are not expected to impact the groundwater levels in the Project Area given the small project footprint. Similarly, the proposed works are not expected to impact the groundwater-wetland interaction or the wetting and drying cycles as these are driven by upgradient flow regimes, which will remain unaltered.

Groundwater quality in the area ranges between fresh and brackish. Since no pumping is expected for dewatering purposes, no changes are anticipated in the background salinity levels in the project area due to saltwater intrusion / encroachment. The wetland / GDE, in its current status, is supported by observed groundwater chemistries in the current range. Proposed works are not expected to alter baseline groundwater chemistry through contaminant discharge, increased evaporation, or recharge interruption.

The proposed works involve a construction development above ground with limited to non-existing disturbance to the groundwater system as there are no major earthworks, excavations or dewatering plans anticipated in the Project Area. Any compaction for the purpose of soil stabilisation will have a negligible impact on hydrostatic pressure in the aquifer. Evidence from the most recent available data suggests that impacts of the proposed works on the baseline groundwater flow paths, levels and chemistry, the groundwater-wetland interaction, and the wetland hydrogeology are unlikely and of minor consequence, thus resulting in very low risk to the wetland.

3.0 Water Quality Assessment

This section assesses the potential impacts from the proposed development on water quality condition of the site and provides a Stormwater Management Plan to illustrate the development incorporating a proposed WSUD treatment train, will comply with design water quality objectives required for protection of the water quality of the wetland as the main receiver.

3.1 Methodology

A stormwater quality treatment system is proposed to reduce the post-development pollutant loads as dictated in Queensland Water Quality Guidelines (QWQG) (DERM, 2009). A stormwater quality analysis was undertaken to investigate the predicted performance of the proposed treatment train.

Details of the scope, methodology and results of the assessment are provided in the following sections.

3.2 Stormwater Management Design Objectives

The design water quality objectives for stormwater quality for the Wet Tropics region have been adopted for the operational phases of the development and are detailed in **Table 6**.

Table 6 Stormwater Management Design Objectives from QWQG (Table 8.2.2)

Parameter	Reductions in mean annual load compared with that in untreated stormwater runoff (%)
Suspended Solids	80
Total Phosphorus	65
Total Nitrogen	40
Gross pollutants	90

3.3 MUSIC Modelling

A Model for Urban Stormwater Improvement Conceptualisation (MUSIC) model (Version 6.3) was established to reduce post-development pollutant loads as dictated by State Planning Policy (SPP) (State of Queensland, 2017) and QWQG (DERM, 2009). The MUSIC model was developed using a split catchment approach in accordance with the MUSIC Modelling Guidelines (Water by Design 2018).

3.3.1 Meteorological Data

The rainfall and evapotranspiration data adopted in the model is listed in **Table 7**.

Table 7 Meteorological Data

Parameter	Value
Model time step	6 minutes
Modelling period	10 May 1996 – 10 May 2006
Mean annual rainfall	2156 mm
Annual evapotranspiration	1919 mm

Six-minute rainfall data and daily evapotranspiration data from the station at Reef Park (031204) was used in the analysis. All available data was used over the 10 years, which is representative of the site including wet and dry years and mean rainfall.

3.3.2 Catchment Breakdown

A split catchment approach, as described in the MUSIC Modelling Guidelines (Water by Design, 2018), was adopted for the assessment. The catchment was recognised based on the stormwater catchment provided by NEON Consulting (received on 28th December 2023), and Information Request Response (dated 18th October 2023) which was provided by NEON Consulting in relation to the water quality of the proposed development of the site. All stormwater will outlet to Sagiba Avenue to avoid adversely affecting surrounding properties to the south of the site, along Martin Scullet Drive, mentioned in the Information Request Response (dated 18th October 2023) for the lates DA application.

The stormwater catchment was then delineated into three stormwater sub-catchments to enable incorporating adequate treatment devices particularly in the vegetated areas within the site. Each sub-catchment was divided into different land uses including roof, road and open space based on the site layout provided by the client. **Figure 3-1** illustrates the stormwater sub-catchments and the land use areas used in the MUSIC model.

Source nodes were incorporated in the model to represent the land uses. In accordance with the MUSIC Modelling Guidelines, the Urban Residential source nodes were adopted.

Table 8 details the land use areas and imperviousness used for them in the site. Pollutant export load parameters for Total Suspended Solids, Total Phosphorous and Total Nitrogen were applied as per the Urban Residential use category, which generally provides the largest volume of nutrient loads of the various land use categories outlined in the MUSIC Modelling Guidelines. All roads around in the site were taken into account as having road land use pollutant loads with 100% fraction imperviousness. The lots were assumed to include roof and ground land use types (70% roof type vs. 30% ground type) with 100% and 15% fraction imperviousness respectively. The ground areas in the site were considered to have ground land use pollutant loads with 15% impervious source nodes.

Table 8 Catchment Breakdown Details for Sub-catchments A, B and C.

Land Use	Total Area (ha)	Fi (%)
A_Imperv_Roof	0.552	100
A_Imperv_Road	0.101	100
A_Perv_OpenSpace	0.371	15
B_Imperv_Roof	0.284	100
B_Imperv_Road	0.074	100
B_Perv_OpenSpace	0.188	15
C_Imperv_Roof	0.228	100
C_Imperv_Road	0.072	100
C_Perv_OpenSpace	0.159	15
Total Treated Area	**2.029**	

The recommended rainfall-runoff parameters for Urban Residential land use were applied, as recommended in the MUSIC Modelling Guidelines. The adopted parameters are shown in **Table 9**.

The parameters were applied to each land use source node based on the relevant roof, road or ground category as per the MUSIC Modelling Guidelines.

Table 9 Source Node Rainfall-Runoff Parameters

Parameter	Adopted Value
Impervious Area - Rainfall Threshold (mm/day)	1
Pervious Area - Soil Storage Capacity (mm)	400
Pervious Area - Initial Storage (% of Capacity)	10
Pervious Area - Field Capacity (mm)	200
Pervious Area - Infiltration Capacity Coefficient - a	211
Pervious Area - Infiltration Capacity Exponent - b	5
Groundwater Properties - Initial Depth (mm)	50
Groundwater Properties - Daily Recharge Rate (%)	28
Groundwater Properties - Daily Baseflow Rate (%)	27
Groundwater Properties - Daily Deep Seepage Rate (%)	0

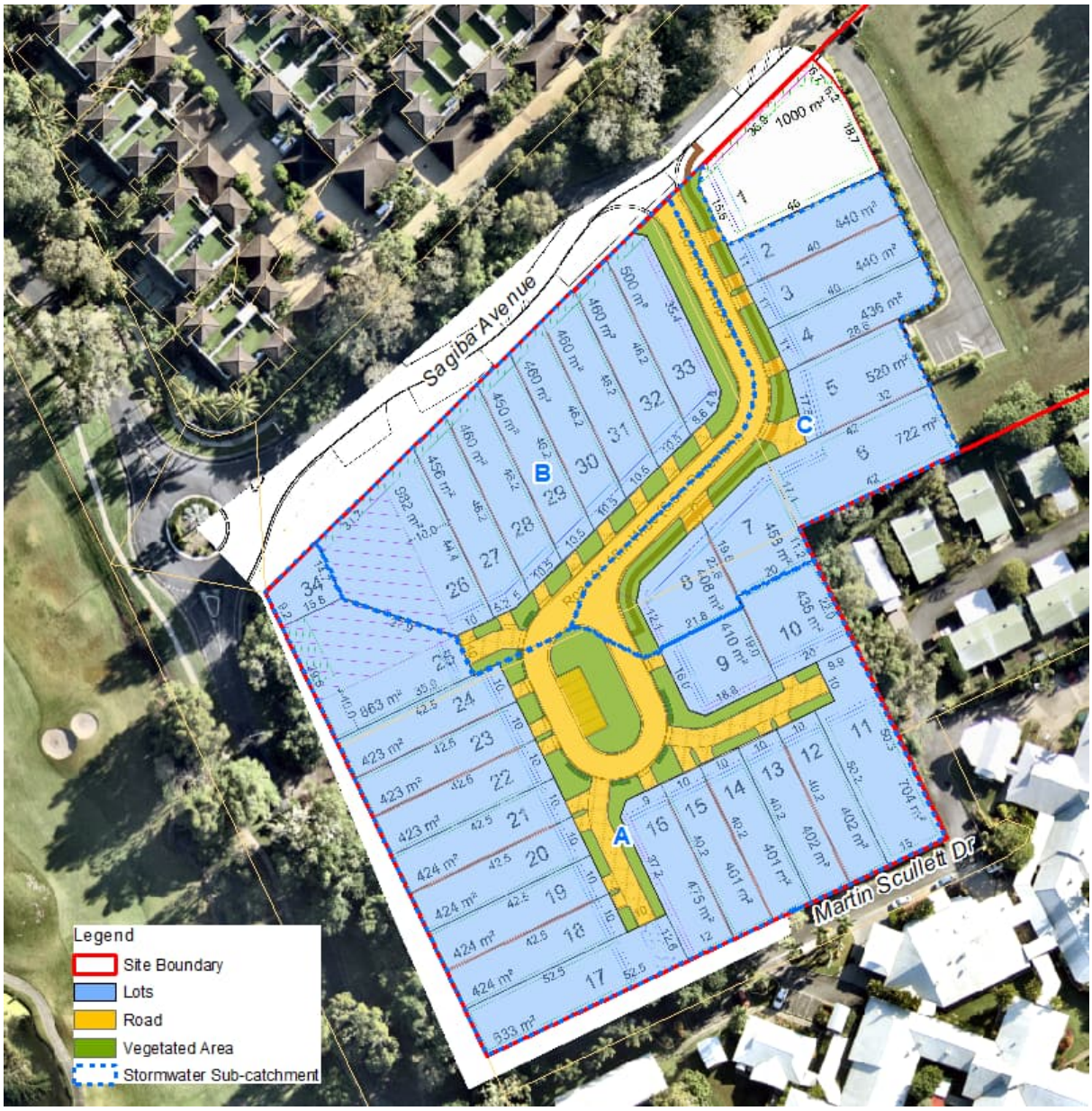


Figure 3-1 MUSIC Model Layout – Stormwater Catchment and Land Uses

3.4 Proposed Treatment Train

3.4.1 Bioretention

A bioretention basin is a vegetated area where stormwater runoff is filtered through a filter media layer (e.g. sandy loam) as it percolates downwards. The runoff is then collected via under-drains and flows to downstream waterways.

Bioretention areas are proposed as part of the conceptual treatment train, to receive stormwater runoff from the site. The bioretention areas for the proposed development were incorporated into the MUSIC model using bioretention treatment nodes for each stormwater catchment.

The MUSIC model schematisation of catchment is illustrated in **Figure 3-2**.

The adopted bioretention design parameters presented below were based on the recommended and acceptable values in accordance with the MUSIC Modelling Guidelines.

It is proposed that the bioretention areas will be distributed across available areas, either within the internal road verge and / or within individual lots. The specific location and design parameters of the bioretention basins will be finalised during detailed design.

Concept design details of the proposed bioretention systems, as adopted in the MUSIC model, are provided in **Table 10**.

As illustrated **Table 10**, the proposed treatment trains will remove an adequate pollutant load from the runoff produced by the proposed development, in accordance with the water quality objectives for pollutant load reductions as outlined in Queensland Water Quality Guidelines (QWQG) for Wet Tropics region.

Figure 3-2 MUSIC Model Schematisation

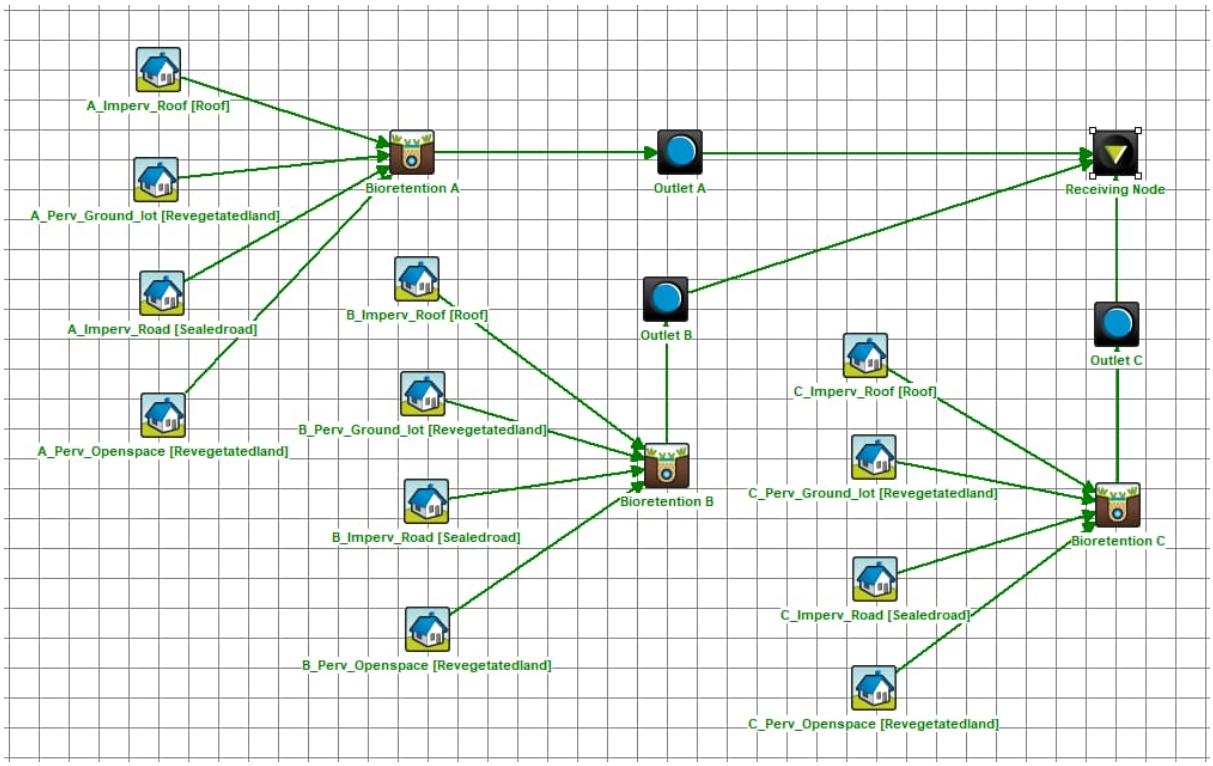


Table 10 Bioretention Design Details

Parameter	Bioretention A	Bioretention B	Bioretention C
Surface area (m^2)	200	110	80
Filter area (m^2)	200	110	80
Extended detention depth (m)	0.2	0.2	0.2
Filter media depth (m)	0.4	0.4	0.4
Saturated Hydraulic Conductivity (mm/h)	200	200	200

Parameter	Bioretention A	Bioretention B	Bioretention C
TN content of filter media (mg/kg)	400	400	400
OP content of filter media (mg/kg)	30	30	30
Overflow weir width (m)	20	11	8

As outlined above, it is envisaged that the total footprint of bioretention will be distributed across suitably available areas including within individual lots and the internal road verge. On a lot-by-lot basis the distributed area for bioretention is approximately 13 m2 per lot.

3.5 Results

The results of the MUSIC model are detailed in **Table 11**.

Table 11 MUSIC Model Results – Receiving node

Pollutant	Sources	Residual Load	% Reduction	% Reduction Target –WQO
Total Suspended Solids (kg/yr)	3720	732	80.3	80
Total Phosphorus (kg/yr)	8.65	2.56	70.4	65
Total Nitrogen (kg/yr)	61.6	31.8	48.4	40
Gross Pollutants (kg/yr)	485	0	100	90

As shown in **Table 11**, the proposed stormwater management treatment train consisting of bioretention systems with a combined filter area of 200 m^2, 110 m^2 and 80 m^2 for catchments A, B and C respectively will provide sufficient pollutant removal in accordance with water quality objectives for pollutant load reductions as outlined in QWQG.

3.6 Summary

This section responds to the queries raised in the latest Advice Notice in relation to water quality at the proposed development site (State Code 9, PO4). In the most recent DA application by Allaro Homes, Douglas Shire Council (Council) has requested that all stormwater flows outlet at Sagiba Avenue. Allaro Homes has responded to Council's queries, but requires assistance with Item 3 of the Advice Notice which read as follows:

Issue: "The application has not demonstrated compliance with PO4 of the SDAP, State code 9. The application material, including the Engineering Services Report prepared by Neon Consulting and the information request response, identifies that stormwater will be discharged to Sagiba Avenue which in turn discharges to the east – towards the mapped wetland/wetland buffer. The application material does not include detailed information demonstrating how stormwater will be treated to ensure the development does not result in unacceptable impacts on water quality in the wetland and wetland buffer."

A stormwater management plan has been provided to assess the potential impacts on water quality downstream of the site including the wetland area and illustrate that the development, incorporating a proposed WSUD treatment train, will comply with the water quality objectives required for protection of the water quality of the wetland.

A Model for Urban Stormwater Improvement Conceptualisation (MUSIC) model (Version 6.3) was established to reduce post-development pollutant loads as dictated by State Planning Policy (SPP) (State of Queensland, 2017) and QWQG (DERM, 2009). Three bioretention systems were proposed as part of the conceptual treatment train and incorporated into the MUSIC model in accordance with the MUSIC Modelling Guidelines (Water by Design 2018).

The outcome of the water quality assessment showed that the proposed stormwater management treatment train consisting of bioretention systems with a combined filter area of 200 m^2, 110 m^2 and 80 m^2 for catchments A, B and C respectively will provide sufficient pollutant removal in accordance with water quality objectives for pollutant load reductions as outlined in QWQG.

4.0 References

DERM, 2009, Queensland Water Quality Guidelines, Version 3. ISBN 978-0-9806986-0-2, Department of Environment and Resource Management.

State of Queensland, 2017, State Planning Policy.

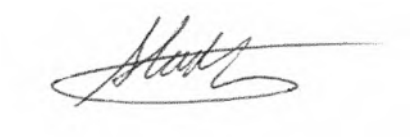
Water by Design, 2018, MUSIC Modelling Guidelines version 3 Consultation Draft.

5.0 Closure

This report has been prepared by SLR including suitably qualified staff with 10-20+ years experience in hydrogeological and hydrological assessments and stormwater management.

Regards,

SLR Consulting Australia



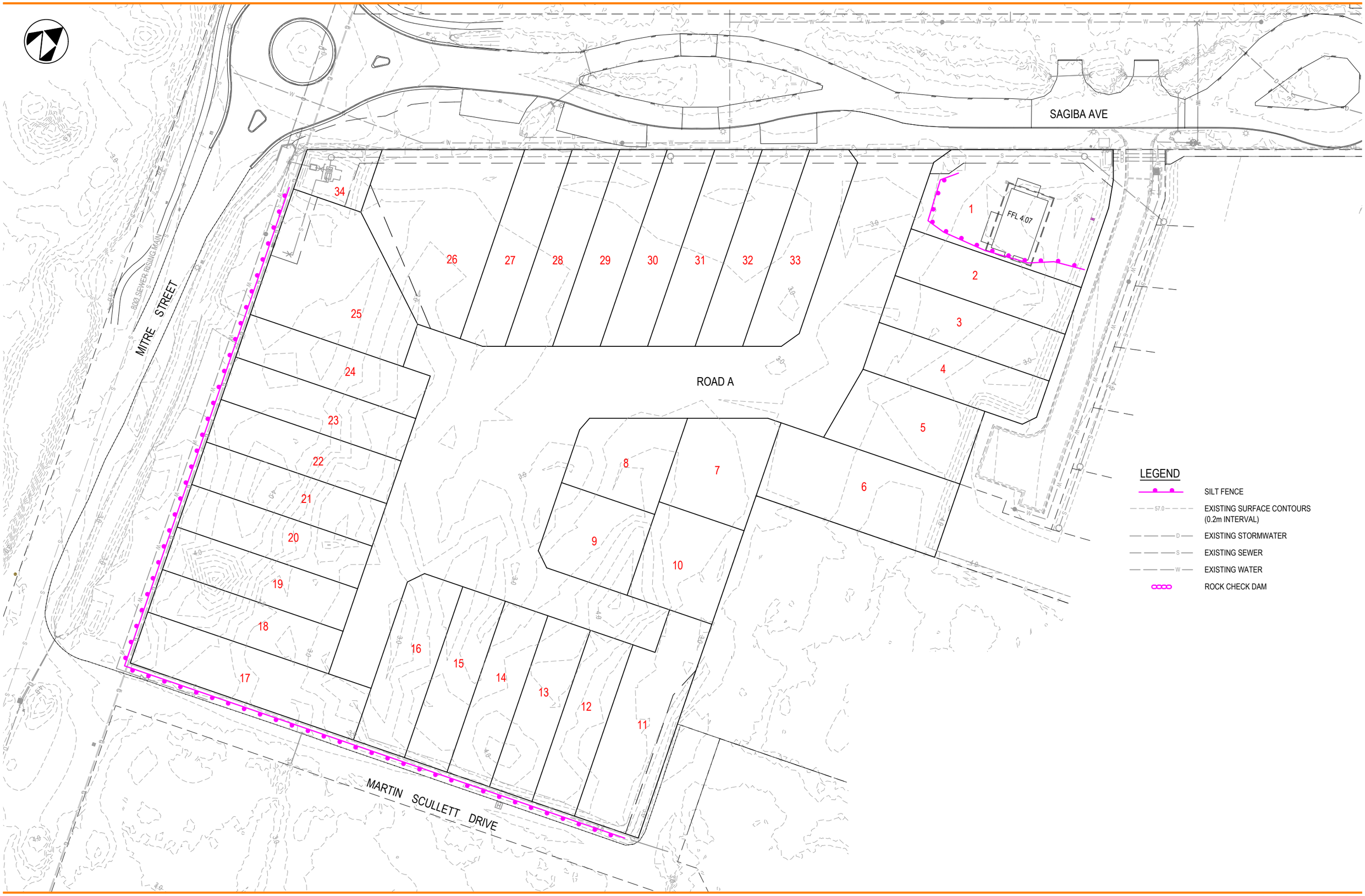
Fiona Stark, RPEQ
Technical Director

Surface Water Engineer

Rodrigo Rojas, PhD
Principal Consultant –

Hydrology & Hydrogeology

Appendix D. Erosion and Sediment Control Plans



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Rev	Date	Revision Notes
A	27.03.24	INITIAL ISSUE

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ALLARO HOMES

MITRE STREET SUBDIVISION

SITE BASED STORMWATER MANAGEMENT PLAN
PHASE 1: TOPSOIL STRIPPING

Drawn	Design	Check'd	Appv'd	RPEQ: 25102	A3 Full Size (Scale as shown)		
PAM	PAM	CJC	CJC	C.J.CAPLICK	27.03.24	016-2304-01-DRG-0701	A

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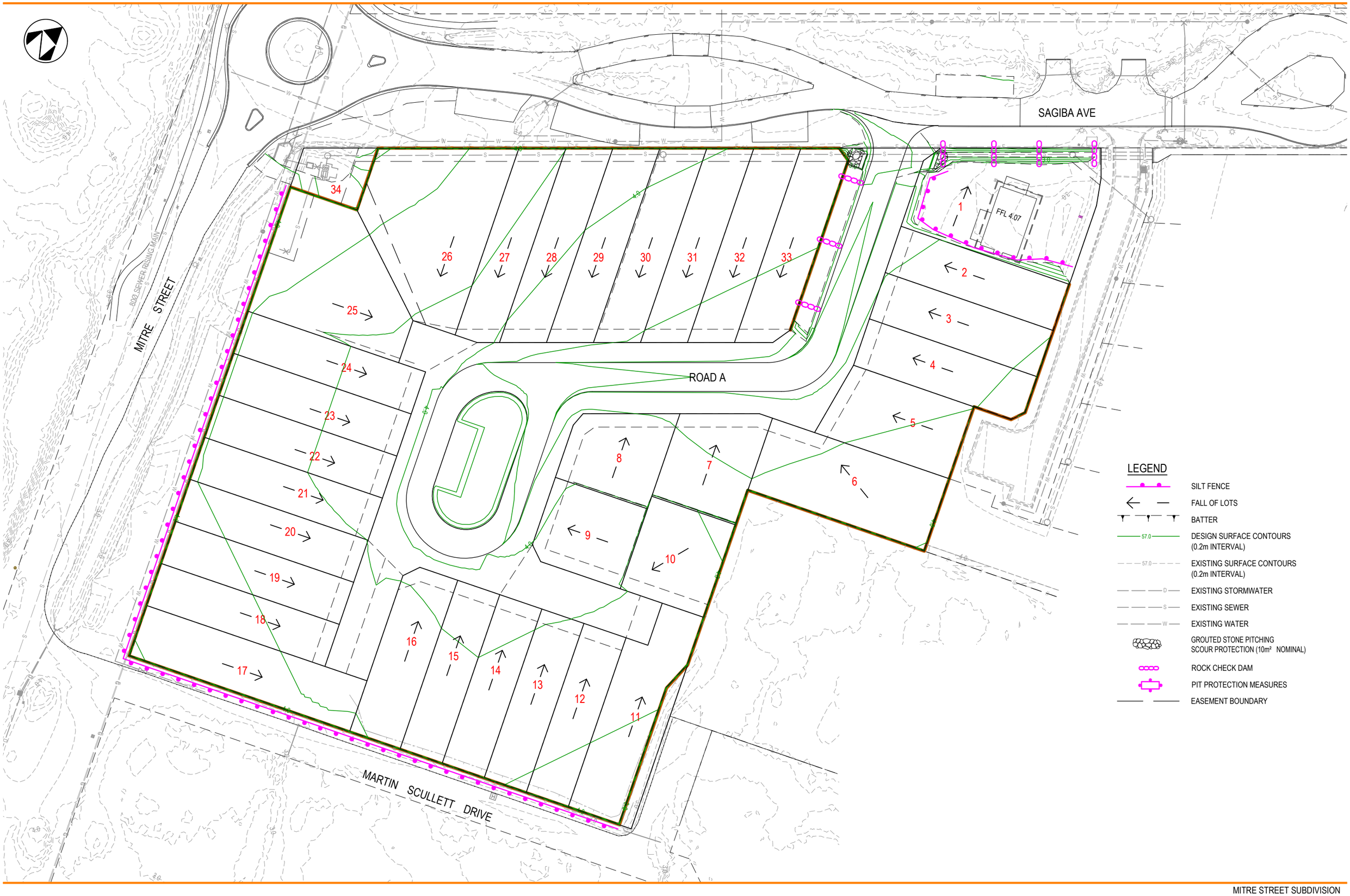

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Rev	Date	Revision Notes
A	27.03.24	INITIAL ISSUE

NEON CONSULTING

ALLARO HOMES

MITRE STREET SUBDIVISION

SITE BASED STORMWATER MANAGEMENT PLAN
PHASE 2: EARTHWORKS

Drawn	Design	Check'd	Apprv'd	RPEQ: 25102	A3 Full Size (Scale as shown)		
PAM	PAM	CJC	CJC	C.J.CAPLICK	27.03.24	016-2304-01-DRG-0702	A

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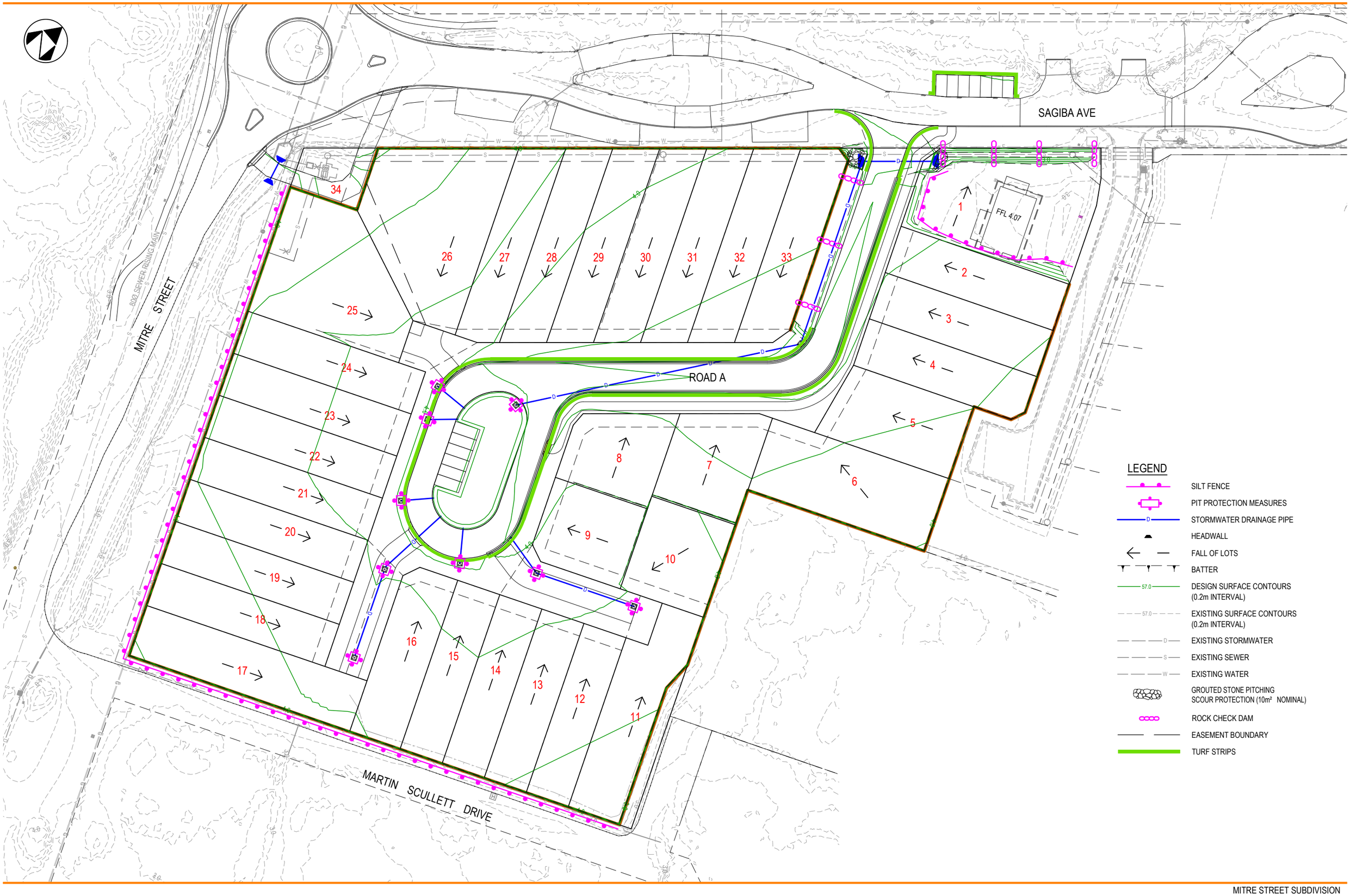

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Rev	Date	Revision Notes
A	27.03.24	INITIAL ISSUE

NEON CONSULTING

ALLARO HOMES

MITRE STREET SUBDIVISION

SITE BASED STORMWATER MANAGEMENT PLAN
PHASE 3: ROADWORKS

Drawn	Design	Check'd	Apprv'd	RPEQ: 25102	A3 Full Size (Scale as shown)	
PAM	PAM	CJC	CJC	C.J.CAPLICK	27.03.24	016-2304-01-DRG-0703 A

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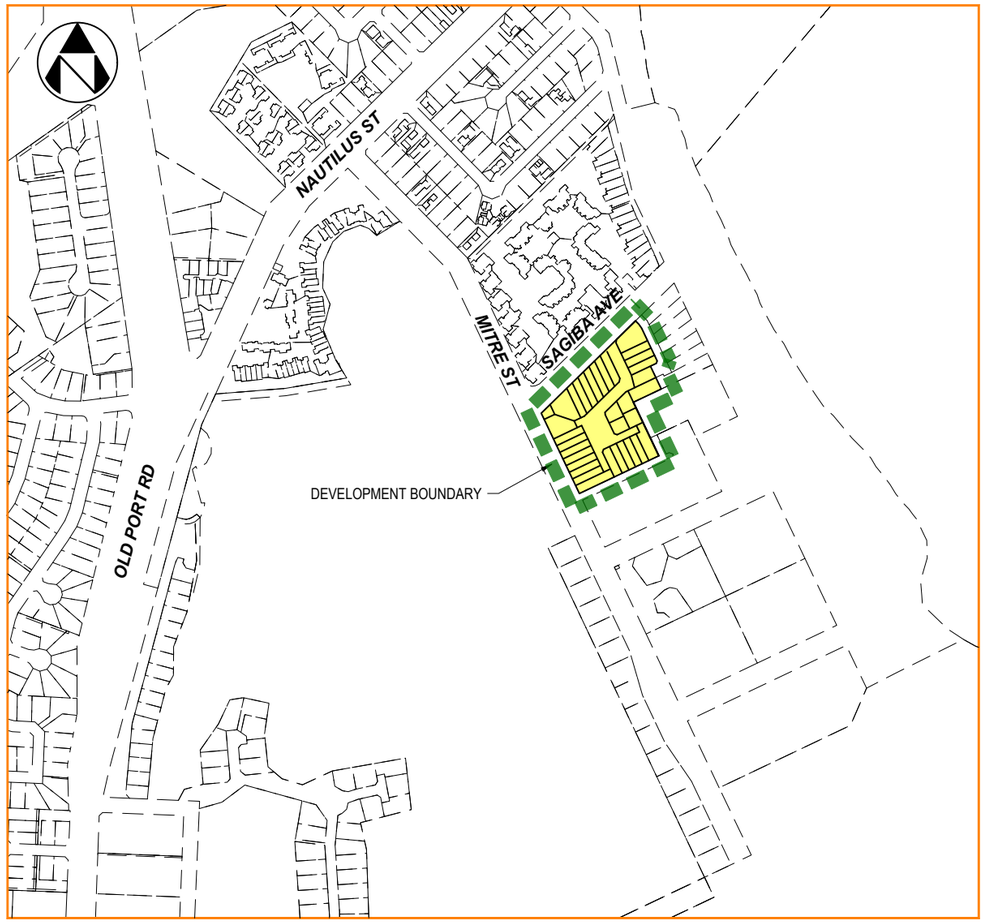
03 April 2024
Operational Works Application - 42-52 Mitre Street

Civil Engineering Drawings

MITRE STREET SUBDIVISION, CRAIGLIE
CIVIL WORKS

LOCALITY PLAN



DRAWING INDEX

DRAWING No.	DRAWING TITLE
016-2304-01-DRG-0101	LOCALITY PLAN
016-2304-01-DRG-0102	PROJECT NOTES
016-2304-01-DRG-0103	GENERAL ARRANGEMENT
016-2304-01-DRG-0201	EARTHWORKS PLAN
016-2304-01-DRG-0402	EARTHWORKS DETAILS
016-2304-01-DRG-0301	TYPICAL SECTIONS AND DETAILS, SHEET 1 OF 2
016-2304-01-DRG-0302	TYPICAL SECTIONS AND DETAILS, SHEET 2 OF 2
016-2304-01-DRG-0303	INTERSECTION DETAILS, SHEET 1 OF 2
016-2304-01-DRG-0304	INTERSECTION DETAILS, SHEET 2 OF 2
016-2304-01-DRG-0305	INTERSECTION LINEMARKING DETAILS
016-2304-01-DRG-0401	STORMWATER DRAINAGE PLAN
016-2304-01-DRG-0402	STORMWATER DETAILS
016-2304-01-DRG-0501	SEWERAGE PLAN
016-2304-01-DRG-0502	SEWERAGE LONGITUDINAL SECTIONS, SHEET 1 OF 2
016-2304-01-DRG-0503	SEWERAGE LONGITUDINAL SECTIONS, SHEET 2 OF 2
016-2304-01-DRG-0601	WATER RETICULATION
016-2304-01-DRG-0701	SITE BASED STORMWATER MANAGEMENT PLAN, PHASE 1: TOPSOIL STRIPPING
016-2304-01-DRG-0702	SITE BASED STORMWATER MANAGEMENT PLAN, PHASE 2: EARTHWORKS
016-2304-01-DRG-0703	SITE BASED STORMWATER MANAGEMENT PLAN , PHASE 3: ROADWORKS
016-2304-01-DRG-0801	MASTER SERVICES PLAN
016-2304-01-DRG-0901	ROAD A LONGITUDINAL SECTION
016-2304-01-DRG-0902	ROAD A CROSS SECTIONS

INSTITUTE OF PUBLIC WORKS ENGINEERING AUSTRALIA STANDARD DRAWINGS

DRAWING No.	DRAWING TITLE
D-0040	SEDIMENT CONTROL DEVICES - SEDIMENT FENCE, ENTRY/EXIT SEDIMENT TRAP
D-0041	SEDIMENT CONTROL DEVICES - KERB AND FIELD INLETS, CHECK DAMS & STRAW BALE BANKS

FNQROC STANDARD DRAWINGS

DRAWING No.	DRAWING TITLE
S1000 - S1110	ROADWORKS AND DRAINAGE
S2000 - S2025	WATER
S3000 - S3015	SEWERAGE

https://www.fnqroc.qld.gov.au/regional-programs/regional-development-manual/

Rev	Date	Revision Notes
A	05.04.24	INITIAL ISSUE

NEON CONSULTING

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MITRE STREET SUBDIVISION

LOCALITY PLAN

Drawn	Design	Check'd	Appr'd	RPEQ: 28102	A3 Full Size (Scale as shown)		
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GENERAL ARRANGEMENT

GENERAL

G1. ALL WORKS ARE TO BE IN ACCORDANCE WITH THE FNQROC DEVELOPMENT MANUAL SPECIFICATIONS S1 TO S8.

G2. CONTRACTOR TO PROVIDE PUBLIC NOTIFICATION/SIGNS (REFER FNQROC DEVELOPMENT MANUAL CP1.11).

G3. CLEARED VEGETATION SHALL BE MULCHED ON SITE BY THE CONTRACTOR.

G4. FOR KERB PROFILE DETAILS REFER FNQROC STD DRG S1000 & DRG-0301.

G5. FOR KERB RAMP DETAILS REFER FNQROC STD DRG S1016. KERB RAMPS ARE TO ALIGN DIRECTIONALLY WITH THE RAMP ON THE OPPOSING SIDE OF THE ROAD.

G7. FOR STREET NAME POST DETAILS REFER FNQROC STD DRG S1040.

G8. FOR CONCRETE PATHWAY DETAILS REFER FNQROC STD DRG S1035.

G9. FOR CONCRETE DRIVEWAY DETAILS REFER FNQROC STD DRG S1110.

EXISTING SERVICES

ES1. EXISTING SERVICES ARE PLOTTED FROM THE BEST INFORMATION AVAILABLE. NO RESPONSIBILITY IS TAKEN BY THE PRINCIPAL OR SUPERINTENDENT FOR THE ACCURACY AND COMPLETENESS OF THE INFORMATION SHOWN.

ES2. PRIOR TO THE COMMENCEMENT OF CONSTRUCTION THE CONTRACTOR IS TO ESTABLISH ON SITE THE EXACT POSITION OF ALL UNDERGROUND SERVICES IN THE PROPOSED WORKS AREA. METHODS FOR ACHIEVING THIS WILL INCLUDE BUT NOT BE LIMITED TO:-
- CAREFUL EXAMINATION OF THE CONTRACT DRAWINGS.
- CONSULTATION WITH THE RELEVANT SERVICE AUTHORITIES.
- COMPREHENSIVELY SCANNING THE AFFECTED AREAS WITH A CABLE DETECTOR AND MARKING ON THE GROUND THE POSITION OF ALL SERVICES.
- HAND EXCAVATING TO EXPOSE ALL SUCH SERVICES WHICH MAY BE AFFECTED BY THE PROPOSED WORKS UNDER THE DIRECTION OF THE RELEVANT SERVICE AUTHORITY.

ES3. THE CONTRACTOR IS TO BRING TO THE SUPERINTENDENT'S ATTENTION ANY DISCREPANCIES BETWEEN THE EXISTING SERVICES THUS IDENTIFIED AND DOCUMENTED SERVICES WHICH MIGHT AFFECT THE PROPOSED WORKS. APPROPRIATE MEASURES TO RESOLVE ANY CONFLICTS WILL BE DOCUMENTED BY THE SUPERINTENDENT.

VEGETATION & CLEARING

VC1. PRIOR TO THE REMOVAL OF ANY TREE. AN INSPECTION MUST BE CARRIED OUT OF ANY SIGNS OF PROTECTED WILDLIFE INCLUDING NESTS AND ANIMAL HABITATS. SHOULD ANY RECENT WILDLIFE ACTIVITY BE IDENTIFIED, REMOVAL OF THE TREE MUST NOT OCCUR UNTIL THE ANIMAL HAS VACATED THE AREA OF IMMEDIATE DANGER. IF THE ANIMAL DOES NOT MOVE FROM THE AREA OF DANGER, THE QUEENSLAND PARKS AND WILDLIFE MUST BE CONTACTED FOR ADVICE.

VC1. AN ASSESSMENT IS TO BE UNDERTAKEN BY A SUITABLY QUALIFIED AND EXPERIENCED SPOTTER/CATCHER TO DETERMINE THE POSSIBLE PRESENCE OF NATIVE WILDLIFE. THE ASSESSMENT MUST INCLUDE THE IDENTIFICATION OF ANY BREEDING PLACES FOR ANY ENDANGERED/VULNERABLE OR NEAR THREATENED ANIMAL SPECIES, SPECIAL LEAST CONCERN OR COLONIAL BREEDING SPECIES PRIOR TO THE REMOVAL OF ANY TREE AND/OR VEGETATION AS PER THE REQUIREMENTS OF SECT. 332 OF THE NATURE CONSERVATION (WILDLIFE MANAGEMENT) REGULATION 2006 (CONDITION 59).

VC2. COUNCIL MUST BE NOTIFIED TWO DAYS PRIOR TO THE PROPOSED DATE OF COMMENCEMENT OF ANY APPROVED VEGETATION CLEARING TO FACILITATE COMMUNITY AWARENESS OF SUCH WORKS.

VC3. VEGETATION TO BE RETAINED MUST BE ADEQUATELY DEFINED BY FENCING, FLAGGING OR BARRIER MESH FOR PROTECTION PURPOSES PRIOR TO CONSTRUCTION COMMENCING ON SITE.

VC4. A MINIMUM 2m WIDE BUFFER SHALL BE PROVIDED AROUND THE VEGETATION TO BE RETAINED. THIS BUFFER MUST CONSIST OF SUITABLE FENCING, FLAGGING OR BARRIER MESH TO ENSURE THAT MACHINERY, EQUIPMENT OR CONSTRUCTION MATERIALS ARE NOT STORED OR USED WITHIN THIS AREA. THIS BUFFER IS TO BE ESTABLISHED PRIOR TO THE COMMENCEMENT OF ANY WORKS ON SITE AND MUST BE MAINTAINED AT ALL TIMES FOR THE DURATION OF CONSTRUCTION.

VC5. CLEARED VEGETATION TO BE MULCHED AND SPREAD OVER THE CLEARED AREA FOR EROSION AND SEDIMENT CONTROL OR LANDSCAPING PURPOSES.

EARTHWORKS

E1. ALL BATTERS TO ROAD FRONTAGES OF LOTS ARE 1 ON 4 OR FLATTER. ALL OTHER BATTERS ARE 1 0N 1 U.N.O.

E2. UPON COMPLETION ALL BATTERS STEEPER THAN 1 IN 2 AND HIGHER THAN 1.5m SHALL REQUIRE CERTIFICATION BY A GEOTECHNICAL ENGINEER.

INTERSECTION DETAILS

I1. ALL KERB SETOUT DETAILS REFER TO THE LIP OF KERB AND CHANNEL OR FACE OF KERB AS APPLICABLE.

I2. FOR KERB PROFILE DETAILS REFER FNQROC STD DRG S1000.

3. ALL TRAFFIC SIGNS AND PAVEMENT MARKING TO BE IN ACCORDANCE WITH 'T.M.R. MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES' PARTS 1-15.

4. ALL REGULATORY, WARNING AND HAZARD SIGNS TO BE SIZE 'A' UNLESS NOTED OTHERWISE.

5. SUPERFLUOUS LINEMARKING TO BE REMOVED BY ABRASIVE OR WATER BLASTING AS PER DTMR STANDARDS (MRTS45 CLAUSE 7.10) TO ACHIEVE A PERMANENT REMOVAL.

6. NEW LINEMARKING WORKS TO BE 2 COAT APPLICATION OF WATERBORNE PAINT AS PER DTMR STANDARDS (MRTS45 CLAUSE 6.1.2)

STORMWATER DRAINAGE

D1. FOR STANDARD STORMWATER DRAINAGE DETAILS REFER FNQROC STD. DRGS. S1045-S1100 INCLUSIVE.

D2. SUBSURFACE DRAINS TO BE CONSTRUCTED IN ACCORDANCE WITH STANDARD SPECIFICATION, FLUSHING POINTS IN ACCORDANCE WITH FNQROC STD DRG S1095.

D3. PRIOR TO COMMENCEMENT OF PIPEWORK, THE CONTRACTOR IS TO CONFIRM THE INVERT LEVEL OF DOWNSTREAM DRAINAGE TO ENSURE THE STORMWATER SYSTEM CAN DRAIN SATISFACTORILY. REFER ANY DISCREPANCY TO THE SUPERINTENDENT.

D4. CCTV INSPECTIONS ARE TO BE CONDUCTED FOR ALL NEW STORMWATER PIPES FOR COUNCIL ASSESSMENT.

D5. ALL STORMWATER PIPES SHALL BE EITHER REINFORCED CONCRETE PIPE (RCP) OR POLYPROPOLENE (PP). RCP PIPES SHALL BE CLASS 2 FJ UNLESS NOTED OTHERWISE. PP PIPES SHALL BE BLACKMAX OR STORMPRO. REFER DRG-0302 FOR PP BEDDING DETAILS. CONCRETE PIPES BELOW RL 1.80 ARE TO HAVE SALTWATER COVER TO REINFORCEMENT.

D6. WHERE ANY PART OF THE STORMWATER PIT IS BELOW RL 1.80 THE CONCRETE GRADE AND COVER TO REINFORCEMENT SHALL BE IN ACCORDANCE WITH FNQROC REQUIREMENTS.

D7. DOMESTIC ALLOTMENT PITS TO BE ACO 450x450mm WITH GALV. GRATE OR APPROVED EQUIVALENT. OUTLET PIPE TO BE 2 x 80Ø uPVC CLASS SH (MIN GRADE 0.5%) TO KERB AND CHANNEL. THE PIT IS TO BE LOCATED AT THE LOWEST CORNER OF THE ALLOTMENT.

SEWERAGE

S1. ALL SEWER PIPES SHALL BE 150Ø uPVC CLASS 'S.N.8.' (U.N.O.).

S2. FOR STANDARD DETAILS OF SEWER MAINS, ETC. REFER FNQROC STD. DRGS. S3000 TO S3015 INCLUSIVE.

S3. ALL WORKS ARE TO BE IN ACCORDANCE WITH FNQROC DEVELOPMENT MANUAL SPECIFICATION S6.

S4. CONNECTIONS TO EXISTING COUNCIL MAINS TO BE MADE BY COUNCIL.

S5. CONNECTION OF SEWER TO EXISTING MANHOLE SHALL BE IN ACCORDANCE WITH FNQROC's REQUIREMENTS. CONNECTION TO MANHOLE TO BE MADE WITH SAND-SOCKETED PIPES (TO BE CONFIRMED WITH COUNCIL PRIOR TO CONSTRUCTION).

S6. CCTV INSPECTIONS ARE TO BE CONDUCTED FOR ALL NEW SEWERS FOR COUNCIL ASSESSMENT.

S7. MANHOLES ADJACENT ROAD BOUNDARIES SHALL BE ON A 1.5m ALIGNMENT U.N.O. MANHOLES ADJACENT SIDE AND REAR BOUNDARIES SHALL BE ON A 0.8m ALIGNMENT U.N.O.

S8. SEWER MANHOLES SHALL BE FINISHED 50mm MAX ABOVE FINISHED SURFACE LEVEL IN ALLOTMENTS AND FLUSH IN ROAD RESERVES.

S9. HOUSE DRAINS ARE TO EXTEND 1.5m CLEAR OF ANY EARTHWORKS BATTER THAT IS STEEPER THAN 1 ON 2 AND OVER 1.5m HIGH. AN INSPECTION OPENING IS TO BE PROVIDED AT THE DOWNSTREAM END OF ANY EXTENDED HOUSE DRAIN.

S10. ALL HOUSE CONNECTION BRANCHES ARE REQUIRED TO BE BROUGHT TO WITHIN A MAXIMUM OF 300mm OF THE FINISHED SURFACE LEVEL AND A GLUED CAP INSTALLED. THE RISER MUST BE CONNECTED TO A MARKER PEG WITH PLASTIC COATED WIRE. THE MARKER PEG IS TO BE OF HARDWOOD MATERIAL, PROTRUDING 20mm ABOVE THE GROUND AND SHALL BE INSTALLED IMMEDIATELY ADJACENT TO THE RISER IN ACCORDANCE WITH FNQROC DRAWING S3005-CRC.

S11. ALL VERTICAL DROPS SHALL BE CONSTRUCTED USING FIBREGLASS HEAVY DUTY DEEP SEWER DROPS.

S12. STAINLESS STEEL 'WYE' JUNCTION TO BE USED FOR HOUSE CONNECTION BRANCHES TO EXISTING LINES.

WATER

W1. ALL WATER MAINS ARE ON A 2.8m ALIGNMENT FROM BOUNDARY U.N.O.

W2. FOR STANDARD DETAILS REFER FNQROC. STD. DRGS. S2000 TO S2035 INCLUSIVE.

W3. ALL WORKS ARE TO BE IN ACCORDANCE WITH FNQROC DEVELOPMENT MANUAL SPECIFICATION S5.

W4. CONNECTIONS TO EXISTING COUNCIL MAINS TO BE MADE BY COUNCIL AND REQUIRE 30 DAYS NOTICE.

W5. PROVIDE 80mm PVC-U CLASS 6 CONDUIT UNDER CONCRETE FOOTPATH FOR WATER SERVICES AS PER FNQROC STD DRG S2038. FINAL LOCATION OF CONDUITS TO BE CONFIRMED ONCE ERGON PILLAR BOX LOCATIONS ARE AVAILABLE.

W6. ALL 63 OD PE 100 WATER MAINS LOCATED UNDER HARD STAND PARKING TO HAVE A 100 DIA uPVC ENVELOPING PIPE.

W7. TEARDROP MARKERS AND BLUE RETRO REFLECTIVE MARKERS TO BE IN ACCORDANCE WITH FNQROC STD DRG S2010 REVISION B.

W8. PROVIDE A COMPRESSIBLE LAYER BETWEEN ALL EXISTING AND PROPOSED HYDRANT OR VALVE SURROUNDS WITHIN AREAS OF CONCRETE.

W9. THRUST BLOCKS ARE TO BE INSTALLED AT VALVES IN ACCORDANCE WITH WSA STANDARD DRAWING SEQ-WAT-1206-1.

EROSION AND SEDIMENT CONTROL STRATEGY

SC1. SEQUENCING OF CONTROL MEASURES
a) INSTALL STABLE POINT OF ENTRY
b) INSTALL SILT FENCES
c) PROTECT TOPSOIL STOCKPILES
d) CONSTRUCT TEMPORARY SEDIMENT BASINS
e) INSTALL STORMWATER PIPES
f) IMPLEMENT PROTECTION MEASURES TO STORMWATER PITS
g) REVEGETATE BARE AREAS UPON COMPLETION OF EARTHWORKS
h) THE SEDIMENT CONTROL STRUCTURES ARE TO BE CLEANED & MAINTAINED AFTER EVERY SIGNIFICANT RAIN EVENT. ERODED SOILS SHALL BE STOCKPILED AS DIRECTED.

SC2. THE AMOUNT OF DISTURBANCE TO EXISTING VEGETATION BE KEPT TO A MINIMUM.

SC3. EXACT LOCATION OF SEDIMENT CONTROL STRUCTURES TO BE DETERMINED ON SITE BY COUNCIL & SUPERINTENDENT.

SC4. STOCKPILE LOCATIONS TO BE AGREED WITH COUNCIL & THE SUPERINTENDENT. STOCKPILES TO BE PROTECTED VIA DIVERSION DRAIN ON THE UPSLOPE & SILT FENCE ON THE DOWNSLOPE.

SC5. RETURNS IN SILT FENCE TO BE AT 20m INTERVALS WHEN INSTALLED ALONG THE CONTOUR. SPACING IS TO DECREASE TO 5-10m DEPENDING ON SLOPE IF THE SILT FENCE IS INSTALLED AT AN ANGLE TO THE CONTOUR. THE RETURN SHALL CONSIST OF EITHER:
- V-SHAPED SECTION EXTENDING AT LEAST 1.5m UP THE SLOPE; OR
- SANDBAG OR ROCK/AGGREGATE CHECK DAM A MINIMUM OF 1/3 AND MAXIMUM OF 1/2 FENCE HEIGHT, AND EXTENDING AT LEAST 1.5m UP THE SLOPE.

SC6. STORMWATER PIPES TO HAVE PIT PROTECTION MEASURES AS DETAILED IN FNQROC DEVELOPMENT MANUAL.

SC7. ALL SEDIMENT CONTROL MEASURES TO BE IN ACCORDANCE WITH THE CONTRACTORS ESC PLAN.

SC8. THE FOLLOWING REVEGETATION MEASURES ARE TO BE UNDERTAKEN IMMEDIATELY UPON COMPLETION OF EARTHWORKS.
a) CUT & FILL BATTERS STEEPER THAN 1 IN 4 TO BE HYDROMULCHED.
b) VERGES & ALLOTMENTS TO BE GRASS SEEDED.
c) PLACE TURF STRIPS BEHIND ALL KERB LINES.

SC9. REVEGETATION IS TO BE WATERED & MAINTAINED UNTIL GROWTH IS ESTABLISHED.

SC10. CONTRACTOR MUST IMPLEMENT A SUITABLE DUST MANAGEMENT STRATEGY TO MINIMISE DUST NUISANCE ON ADJACENT PROPERTIES. DETAILS OF THE DUST MANAGEMENT STRATEGY TO BE INCORPORATED INTO EROSION AND SEDIMENT CONTROL STRATEGY.

SC11. SEDIMENT BASIN
a) INLET PROTECTION TO MINIMISE SCOUR & EVENLY DISTRIBUTE FLOW THROUGH BASIN.
b) A MARKER PEG SHOULD BE INSTALLED TO SHOW THE STORAGE DEPTH. SEDIMENT SHALL BE REMOVED FROM BASIN WHEN 30% STORAGE DEPTH IS ENCROACHED & APPROPRIATELY DISPOSED ON SITE BY RESPREADING IN AREAS OF NON-EROSIVE FLOWS.

SC12. WATER QUALITY MONITORING SHOULD BE UNDERTAKEN DURING SIGNIFICANT RAINFALL EVENTS (I.E. > 10mm).

SC13. DESIGN CRITERIA FOR CONTRACTOR'S EROSION & SEDIMENT CONTROL PLAN TO BE IN ACCORDANCE WITH SECTION CP1.05 OF THE FNQROC DEVELOPMENT MANUAL.

SURVEY AND SETOUT

SS1. SURVEY, DATUM, LEVELS & SERVICES HAVE BEEN DERIVED FROM RPS CAD FILES.

MERIDIAN: IS170016
VERTICAL DATUM: AHD, OPM 109003 RL 3.589 AHD-D
SURVEYED BY: C&B, RPS

SS2. DIGITAL CAD FILES OF THE CIVIL WORKS WILL BE PROVIDED FOR SETOUT PURPOSES.

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A	05.04.24	INITIAL ISSUE

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MITRE STREET SUBDIVISION

PROJECT NOTES

Drawn	Design	Check'd	Appv'd	RPEQ: 25102	A3 Full Size (Scale as shown)		
PAM	PAM	CJC	CJC	C.J.CAPLICK	05.04.24	016-2304-01-DRG-0102	A

PROPOSED ON-STREET PARKING

PROPOSED DRIVE-THROUGH CONCRETE ACCESS TO SEWER PUMP STATION

EXISTING PARKING TO BE REMOVED

SAGIBA AVE

EXISTING SEWER PUMP STATION

EXISTING EASEMENT

SEWER EASEMENT

EXISTING EASEMENT MODFIED EASEMENT

GREEN SHADE DENOTES EXISTING VERGE TO BE REHABILATED TO REMOVE WEEDS AND ENSURE FREE DRAINING. FINAL EXTENT TO BE CONFIRMED AT PRE-START

FFL 4.07

EXISTING DWELLING TO REMAIN, EXISTING SAGIBA AVE ACCESS TO BE DEMOLISHED, PROVIDE NEW ACCESS TO ROAD A

MITRE STREET

800 SEWER

BIO-RETENTION 1 (357m²)

BIO-RETENTION 2 (200m²)

ROAD A

ON-STREET CAR PARKING

EXISTING DRAIN TO REMAIN

DRAINAGE EASEMENT

MARTIN SCULLETT DRIVE

LEGEND

- CONCRETE ROAD PAVEMENT
- CONCRETE DRIVEWAY (3.0m WIDE U.N.O.)
- ACCESS CROSSOVER
- STREET/PATHWAY SIGN
- EXISTING STORMWATER
- EXISTING SEWER
- EXISTING WATER
- EXISTING COMMS
- EXISTING ELECTRICAL
- RETAINING WALL
- EASEMENT BOUNDARY

1:750 0 7.5 15 22.5 30

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GENERAL ARRANGEMENT

Drawn	Design	Check'd	Apprv'd	RPEQ: 25102	A3 Full Size (Scale as shown)	
PAM	PAM	CJC	CJC	C.J.CAPLICK	05.04.24	016-2304-01-DRG-0103 A

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MITRE STREET SUBDIVISION

EARTHWORKS PLAN

Drawn	Design	Check'd	Appv'd	RPEQ: 25102	A3 Full Size (Scale as shown)		
PAM	PAM	CJC	CJC	C.J.CAPLICK	05.04.24	016-2304-01-DRG-0201	A

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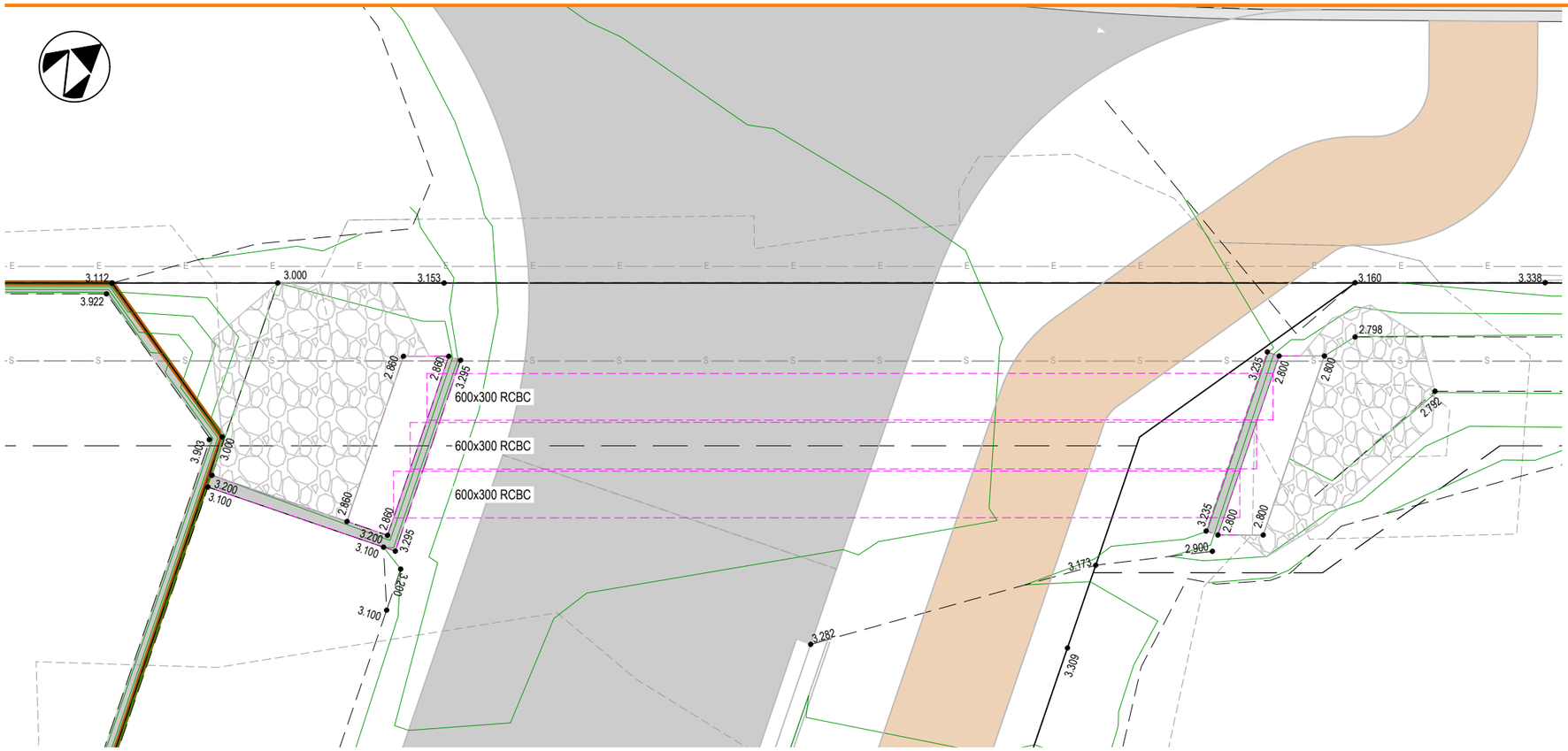

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MITRE STREET SUBDIVISION

EARTHWORKS DETAILS

Drawn	Design	Check'd	Appv'd	RPEQ: 25102	A3 Full Size (Scale as shown)	
PAM	PAM	CJC	CJC	C.J.CAPLICK	05.04.24	016-2304-01-DRG-0402 A

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CONTROL LINE ROAD A SETOUT

CHAINAGE	COORDINATES		BEARING DEG MIN SEC	RADIUS OF CURVATURE	TANGENT LENGTH	ARC LENGTH
	EASTING	NORTHING				
0.000	2022.220	4886.766	135° 39' 47"	STRAIGHT		
10.060	2029.251	4879.571	135° 39' 47"	30.000		
IP 13.552	2031.702	4877.062	-	30.000	3.507	6.983
17.044	2033.508	4874.055	149° 0' 0"	STRAIGHT		
59.864	2055.562	4837.352	149° 0' 0"	10.000		
IP 66.071	2059.245	4831.223	-	10.000	7.150	12.414
72.278	2054.637	4825.756	220° 7' 43"	STRAIGHT		
137.864	2012.366	4775.609	220° 7' 43"	-10.000		
IP 144.071	2007.758	4770.142	-	-10.000	7.150	12.414
150.279	2011.440	4764.013	149° 0' 0"	STRAIGHT		
168.736	2020.946	4748.192	149° 0' 0"	-10.400		
IP 176.904	2026.303	4739.278	-	-10.400	10.400	16.336
185.072	2035.217	4744.634	59° 0' 0"	-10.400		
IP 193.240	2044.132	4749.990	-	-10.400	10.400	16.336
201.409	2038.775	4758.905	220° 7' 43"	STRAIGHT		
123.033	2021.925	4786.949	220° 7' 43"	STRAIGHT		

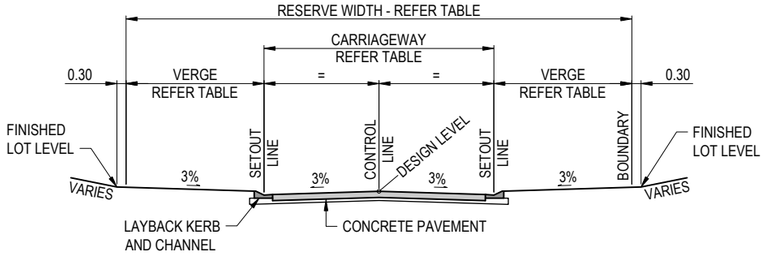
TABLE OF WIDTHS

ROAD	CARRIAGEWAY WIDTH (m)	VERGE WIDTH (m)		RESERVE WIDTH (m)
		LHS	RHS	
ROAD A (CH0 - 60)	6.50	4.50	5.00	16.00
ROAD A (CH60 - 120)	6.50	5.00	4.50	16.00
ROAD A (CH120 - END)	5.50	-	4.50	VARIES

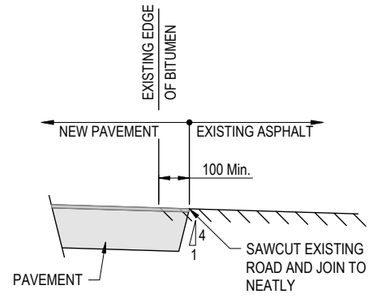
PROVISIONAL PAVEMENT DETAILS

LOCATION	SURFACING	BASE COURSE	SUBBASE COURSE
ROAD A	CONCRETE	200mm THICK N32	100mm THICK SAND

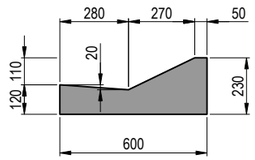
NOTES
PROVISIONAL PAVEMENT DESIGN IS BASED ON AN ASSUMED SUBGRADE SOAKED CBR OF 10. THE CONTRACTOR IS TO CONFIRM SUBGRADE CBR DURING CONSTRUCTION AND THE PAVEMENT DESIGN MAY BE AMENDED ACCORDINGLY BY THE COUNCIL.



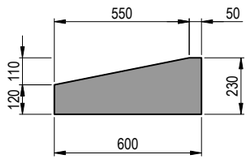
TYPICAL ROAD CROSS SECTION
N.T.S.



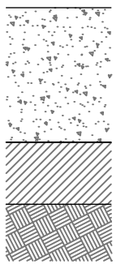
TYPICAL JOIN TO EXISTING ROAD
N.T.S.



LAYBACK KERB AND CHANNEL PROFILE
N.T.S.



ALTERNATE KERB PROFILE
N.T.S.



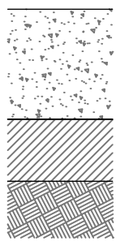
200mm N32 CONCRETE WITH SL82 MESH PLACED CENTRALLY. MAX AGG SIZE 20mm. SLUMP 80mm.

1 LAYER 0.2umm VISQUEEN PLASTIC

100mm TYPE 2.3 SUBBASE COMPACTED TO MIN DENSITY RATIO OF 100% SRDD

SUBGRADE (ASSUMED 4-DAY SOAKED CBR 10%) COMPACTED TO 98% SRDD

TYPICAL CONCRETE PAVEMENT DETAIL - ROADWAY
N.T.S.



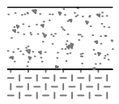
150mm N32 CONCRETE WITH SL82 MESH PLACED CENTRALLY. MAX AGG SIZE 20mm. SLUMP 80mm.

1 LAYER 0.2umm VISQUEEN PLASTIC

100mm TYPE 2.3 SUBBASE COMPACTED TO MIN DENSITY RATIO OF 100% SRDD

SUBGRADE (ASSUMED 4-DAY SOAKED CBR 10%) COMPACTED TO 98% SRDD

TYPICAL CONCRETE PAVEMENT DETAIL - DRIVEWAY/PARKING
N.T.S.

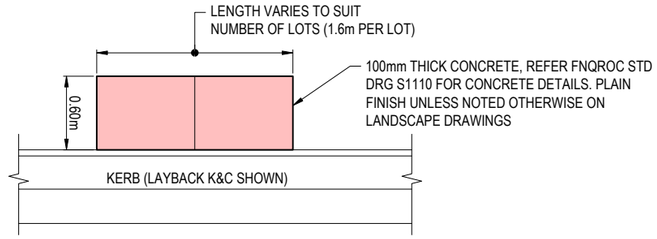


100mm THICK CONCRETE PATHWAY, REFER TO FNQROC STD DRG S1035 FOR DETAILS

1 LAYER 0.2umm VISQUEEN PLASTIC

50mm COMPACTED SAND BEDDING

TYPICAL CONCRETE PAVEMENT DETAIL - PATHWAYS
N.T.S.



TYPICAL BIN HARDSTAND DETAIL
N.T.S.

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TYPICAL SECTIONS AND DETAILS
SHEET 1 OF 2

Drawn	Design	Check'd	Appv'd	RPEQ: 25102	A3 Full Size (Scale as shown)		
PAM	PAM	CJC	CJC	C.J.CAPLICK	05.04.24	016-2304-01-DRG-0301	A

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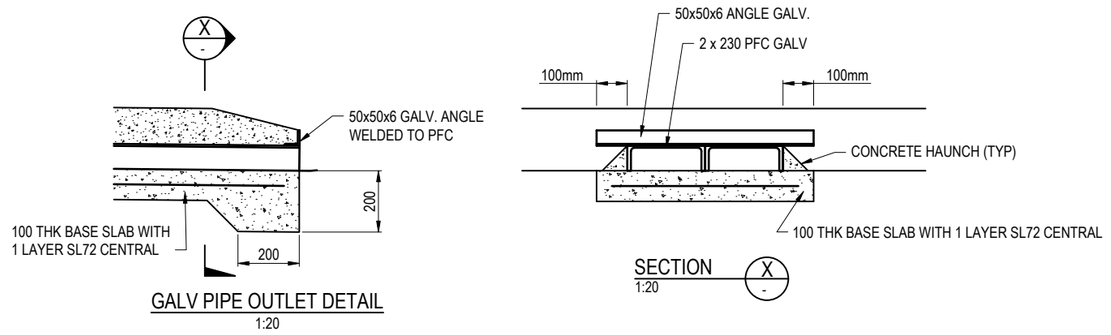
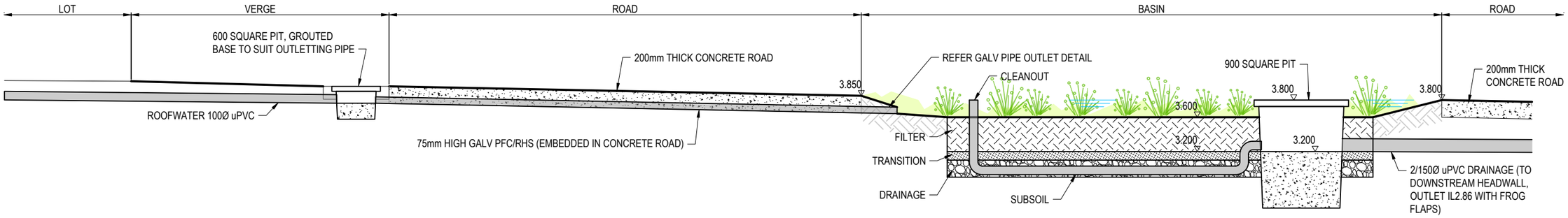


GALV PIPE OUTLET DETAIL
1:20



BASIN 1 - SCHEMATIC SECTION
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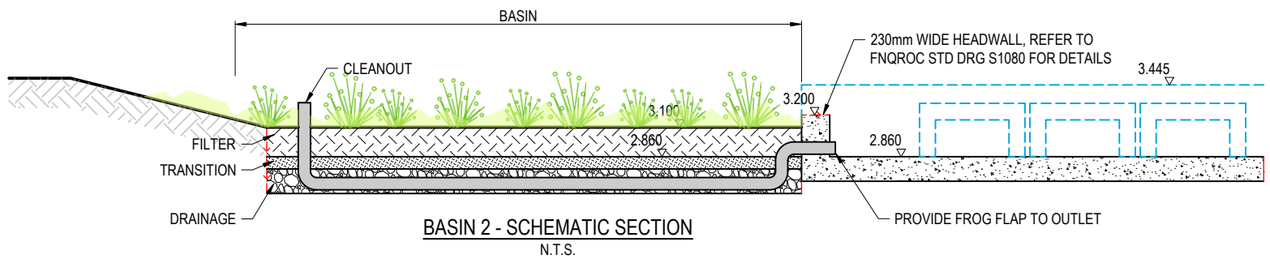

BASIN 2 - SCHEMATIC SECTION
N.T.S.

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MITRE STREET SUBDIVISION

TYPICAL SECTIONS AND DETAILS
SHEET 2 OF 2

Drawn	Design	Check'd	Appr'd	RPEQ: 23102	A3 Full Size (Scale as shown)		
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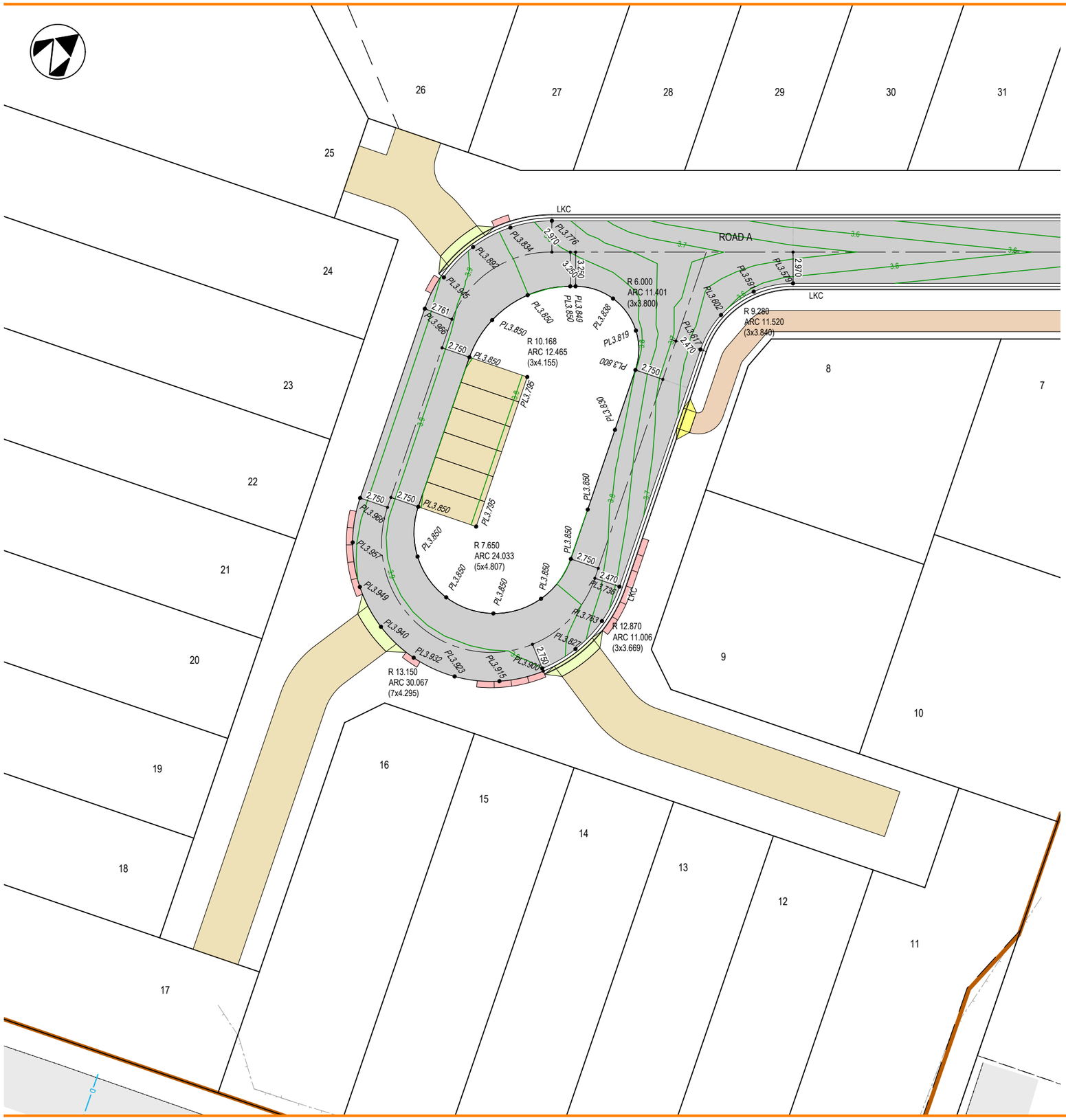

LEGEND

- PL43.956 — PAVEMENT LEVEL AT KERB
- LKC — LAYBACK KERB AND CHANNEL
- 57.0 — DESIGN SURFACE CONTOURS (0.1m INTERVAL)
- D — EXISTING STORMWATER
- STREET SIGN
- ACCESS CROSSOVER
- CONCRETE PAVEMENT
- CONCRETE DRIVEWAY/CARPARKS, SEE LANDSCAPE DRGS FOR FINISH
- CONCRETE BIN HARDSTAND (1.6 x 0.6m PER LOT), SEE DRG-0301 FOR DETAIL
- KERB RAMP

1:750 0 7.5 15 22.5 30

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MITRE STREET SUBDIVISION

INTERSECTION DETAILS
SHEET 1 OF 2

Drawn	Design	Check'd	Apprv'd	RPEQ: 25102	A3 Full Size (Scale as shown)		
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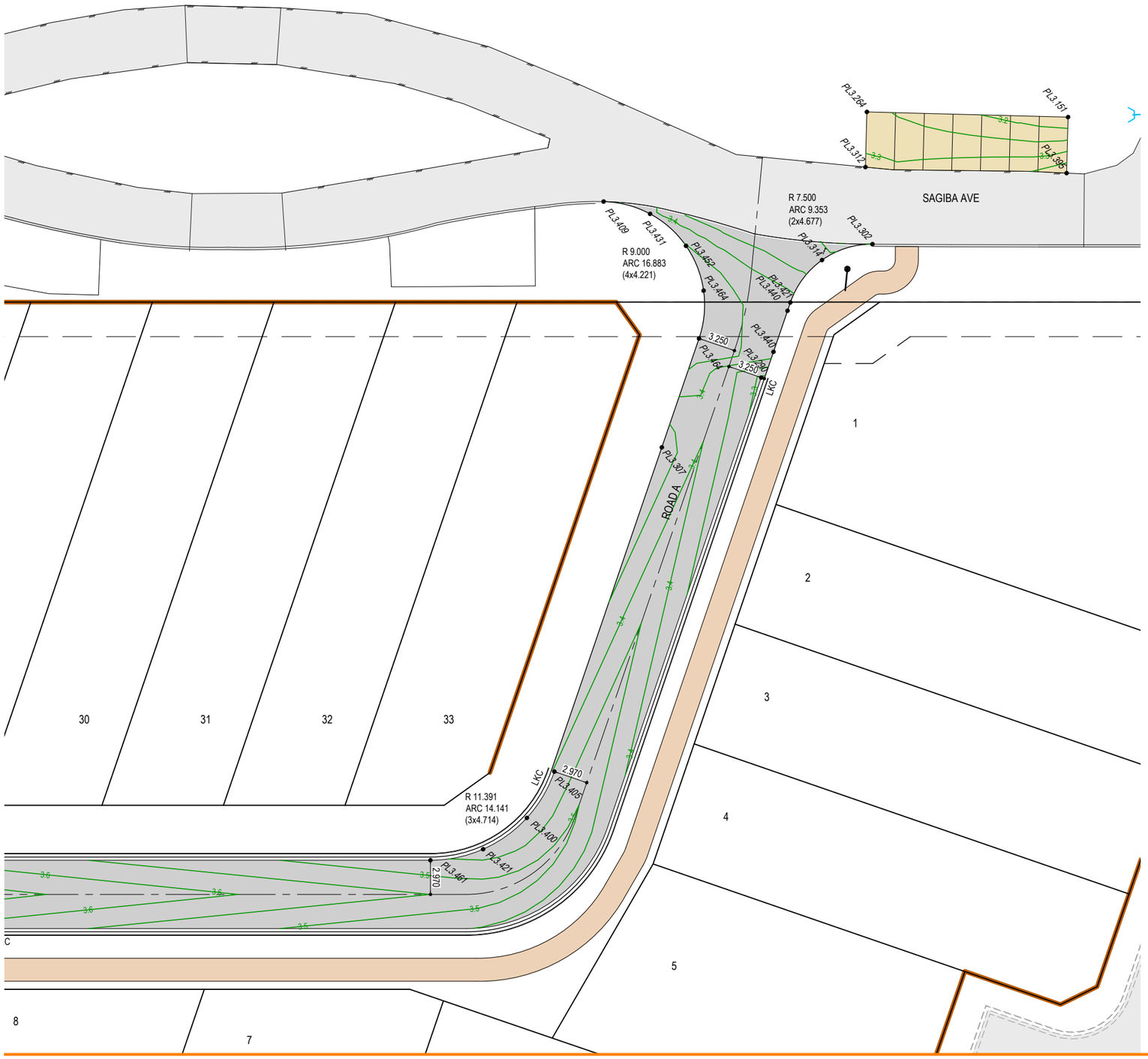

NOTE

FOR LEGEND REFER TO SHEET 1.

1:400 0 4 8 12 16

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Rev Date Revision Notes

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MITRE STREET SUBDIVISION

INTERSECTION DETAILS
SHEET 2 OF 2

Drawn	Design	Check'd	Appn'd	RPEQ: 25102	A3 Full Size (Scale as shown)		
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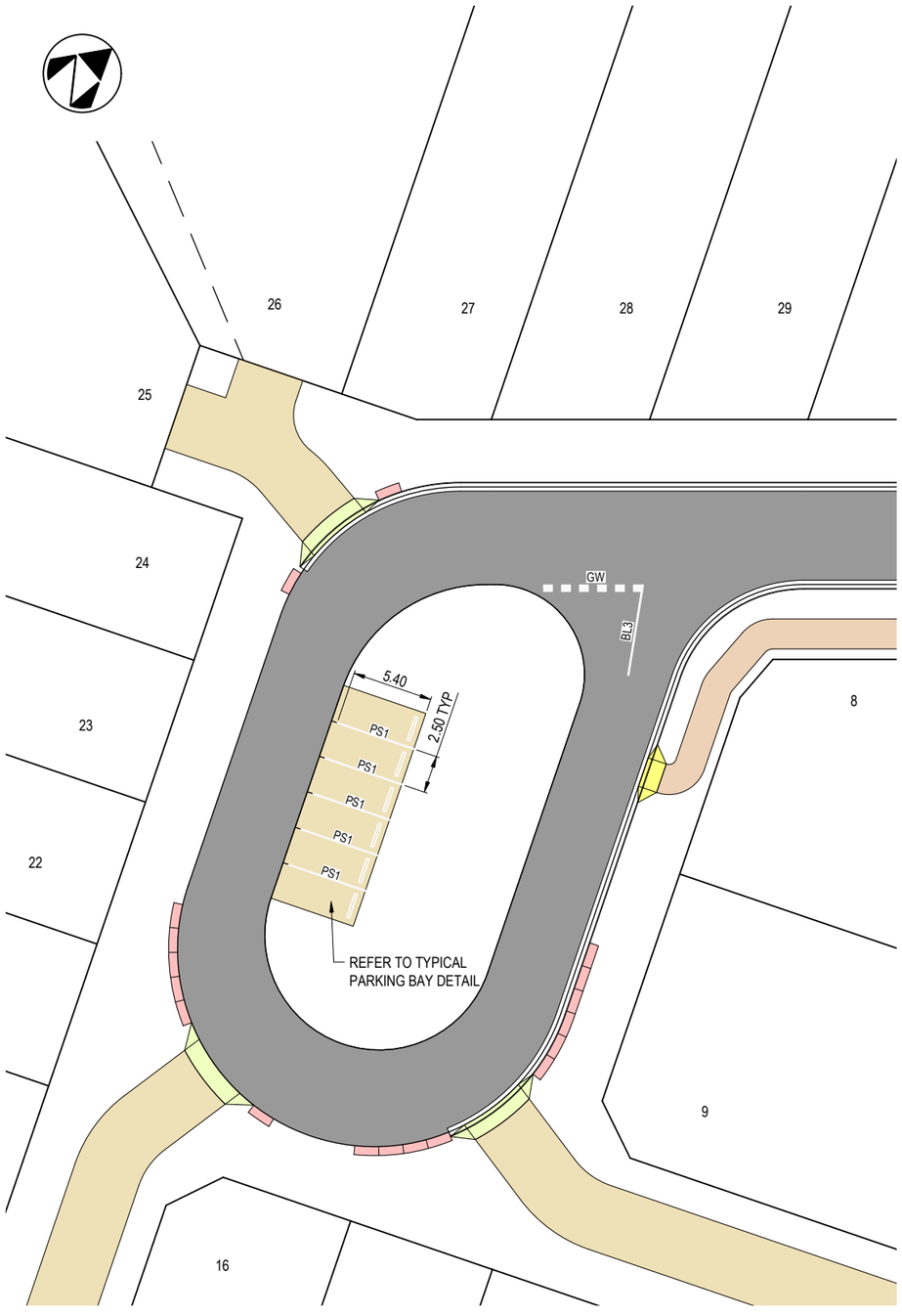

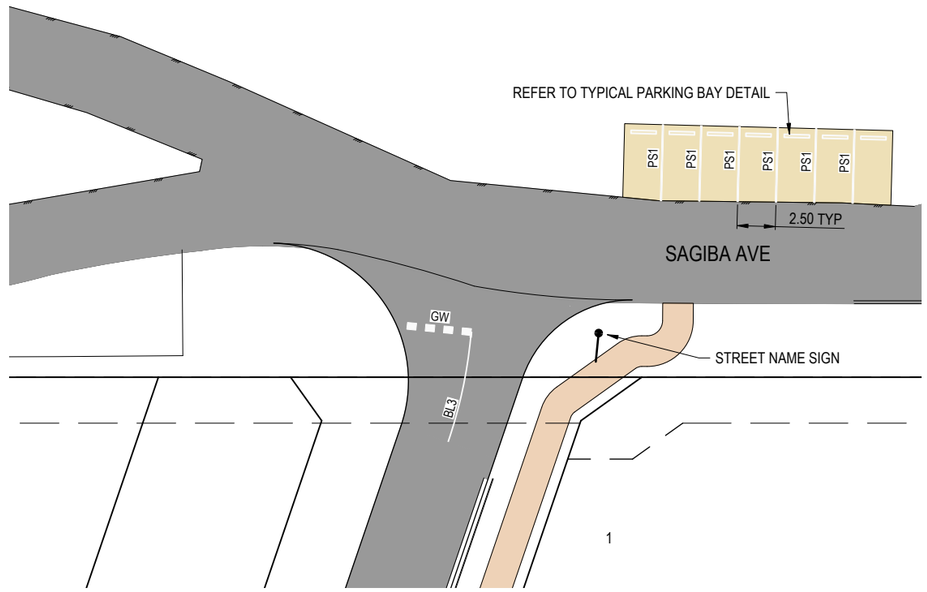

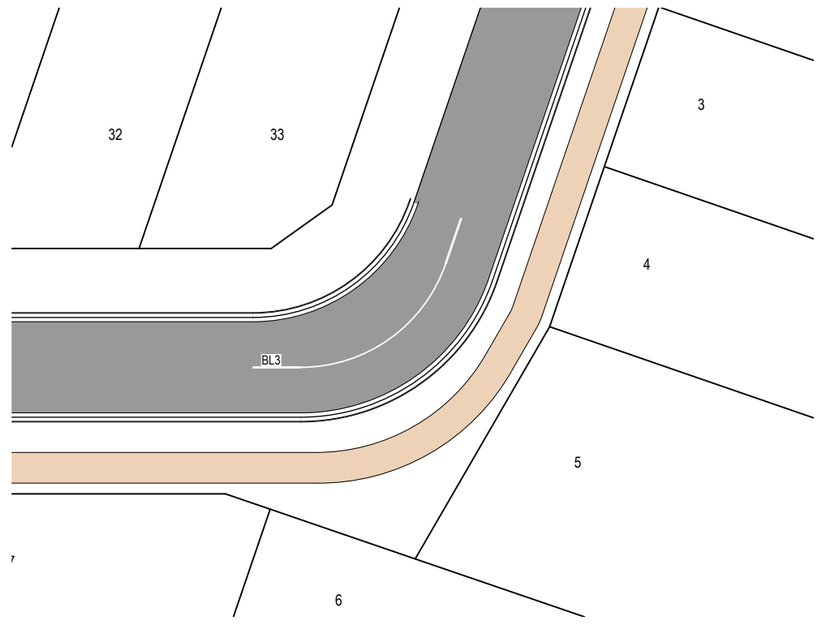

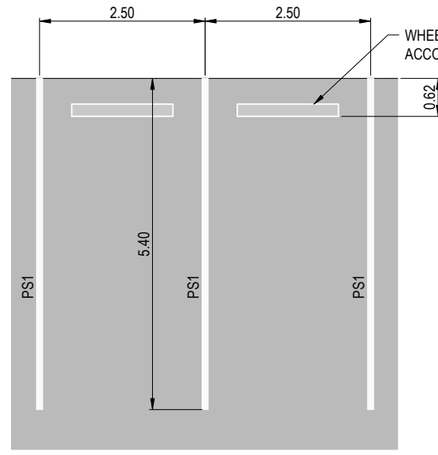

TYPICAL PARKING BAY DETAIL
1:100

LEGEND FOR PAVEMENT MARKING

DIVIDING LINES

SINGLE TWO-WAY BARRIER LINE — BL3 — 100mm

TRANSVERSE LINES

GIVE WAY LINE — GW — 600mm STRIPE AND GAP — 450mm

PARKING CONTROLS

CONTINUOUS LINE - PARKING SPACE — PS1 — 100mm

1:400 0 4 8 12 16

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INTERSECTION LINEMARKING DETAILS

Drawn	Design	Check'd	Appv'd	RPEQ: 25102	A3 Full Size (Scale as shown)		
PAM	PAM	CJC	CJC	C.J.CAPLICK	05.04.24	016-2304-01-DRG-0305	A

EX 1800x600 RCBC

EX 450x225 RCBC

SAGIBA AVE

3/600x300 RCBC, SEE CULVERT 1 DETAIL ON DRG-0404

4.8m LONG 1800x600 RCBC, SEE CULVERT 2 DETAIL ON DRG-0404

EASEMENT FOR DRAINAGE

EX 3/600x450 RCBC

EXISTING EASEMENT FOR DRAINAGE

FFL 4.07

MITRE STREET

600 SEWER RISING MAIN

BASIN 2, SEE DETAIL ON DRG-0302

2/150 DIA uPVC PIPE AT 0.3% TO 3/600x300 HEADWALL

ROAD A

GALV PIPE UNDER CONCRETE ROADWAY (TYPICAL), SEE DETAIL ON DRG-0302

BASIN 1, SEE DETAIL ON DRG-0302

EX 375 RCP

EX 450x300 RCBC

MARTIN SCULLETT DRIVE

LEGEND

2/1	LINE NUMBER / STRUCTURE No.
	STORMWATER DRAINAGE PIPE & MANHOLE
	PROPOSED SEWER
	HEADWALL
	FALL OF LOTS
57.0	DESIGN SURFACE CONTOURS (0.2m INTERVAL)
57.0	EXISTING SURFACE CONTOURS (0.2m INTERVAL)
D	EXISTING STORMWATER
S	EXISTING SEWER
W	EXISTING WATER
	RETAINING WALL
	GROUTED STONE PITCHING SCOUR PROTECTION (10m² NOMINAL)
	EASEMENT BOUNDARY
	EVERHARD SERIES 600 STORMWATER PIT AND GRATE CONNECTED TO Ø80 uPVC PIPE DRAINING TO KERB (OR GALV PIPE UNDER ROADWAY TO BASIN)
	2 x Ø80uPVC TO STORMWATER PIT
	PROVIDE 3x80Ø uPVC ROOFWATER PIPES AS PER FNQROC STD DRG 1035

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MITRE STREET SUBDIVISION

STORMWATER DRAINAGE PLAN

Drawn	Design	Check'd	Apprv'd	RPEQ: 25102	A3 Full Size (Scale as shown)		
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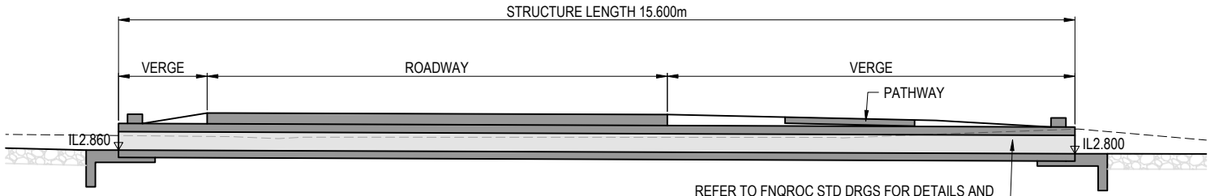

CULVERT 1 - 3/600x300 RCBC
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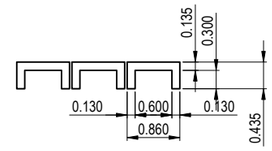
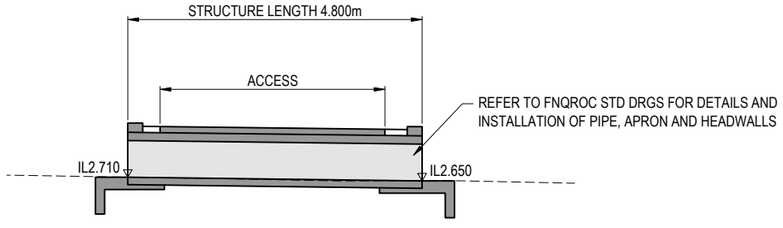


600x300 RCBC - DIMENSIONS
1:50



CULVERT 2 - 1800x600 RCBC
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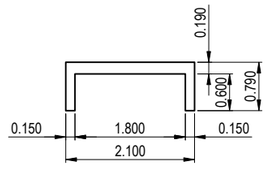
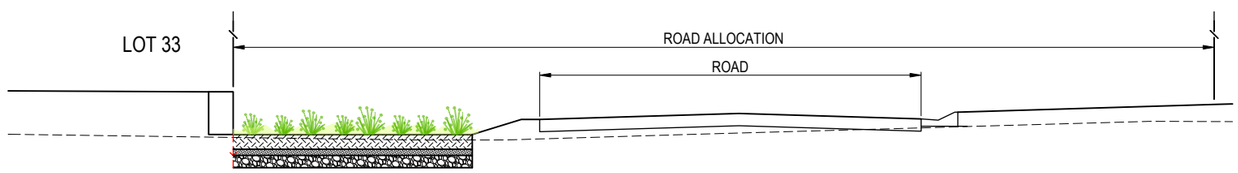
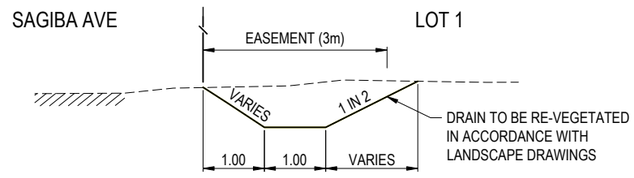


1800x600 RCBC - DIMENSIONS



SECTION A
N.T.S.
201



SECTION B
N.T.S.
201

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MITRE STREET SUBDIVISION

STORMWATER DETAILS

Drawn	Design	Check'd	Apprv'd	RPEQ: 25102	A3 Full Size (Scale as shown)	
PAM	PAM	CJC	CJC	C.J.CAPLICK	05.04.24	016-2304-01-DRG-0402 A

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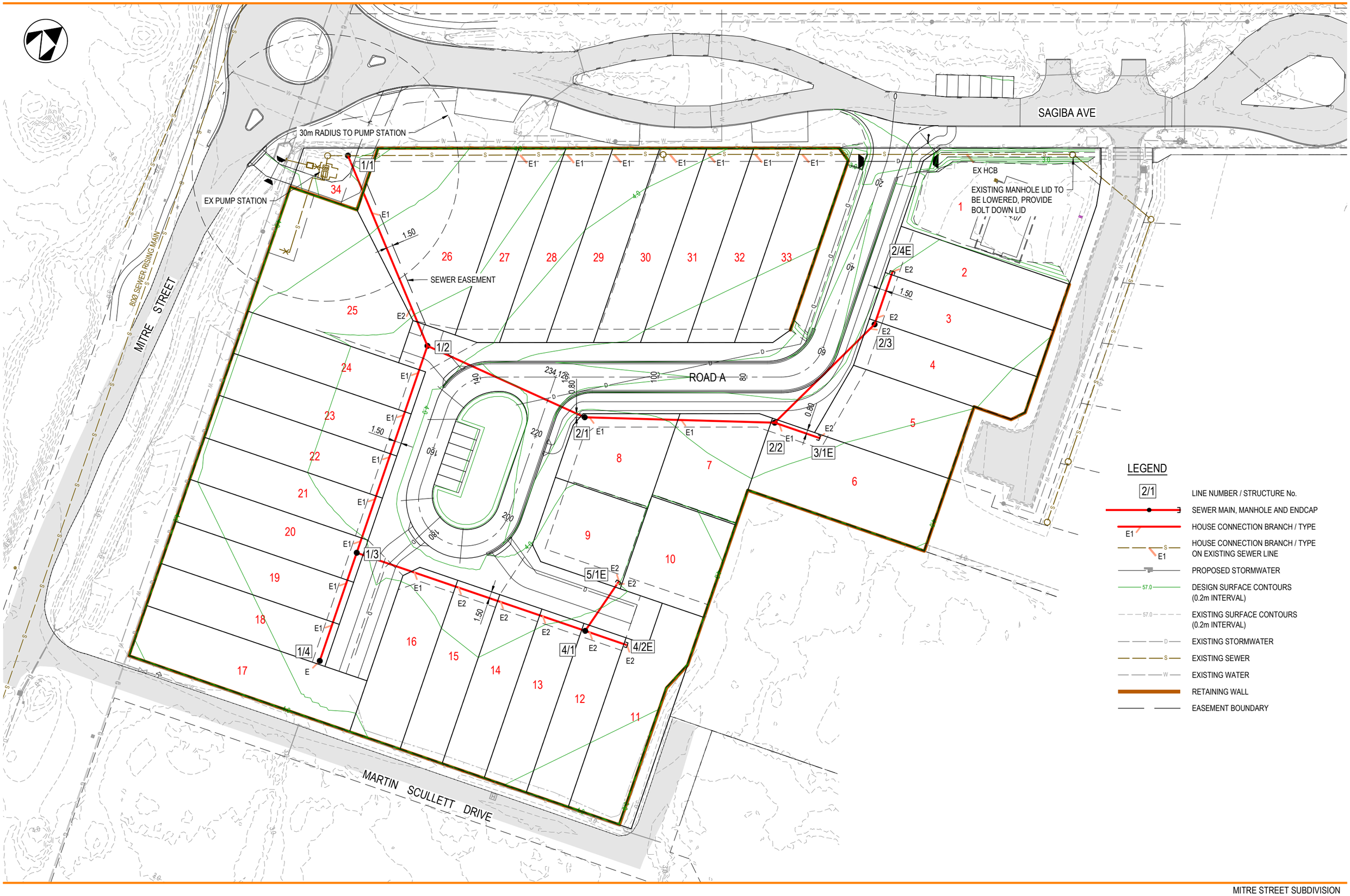

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A	05.04.24	INITIAL ISSUE

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ALLARO HOMES

MITRE STREET SUBDIVISION

SEWERAGE PLAN

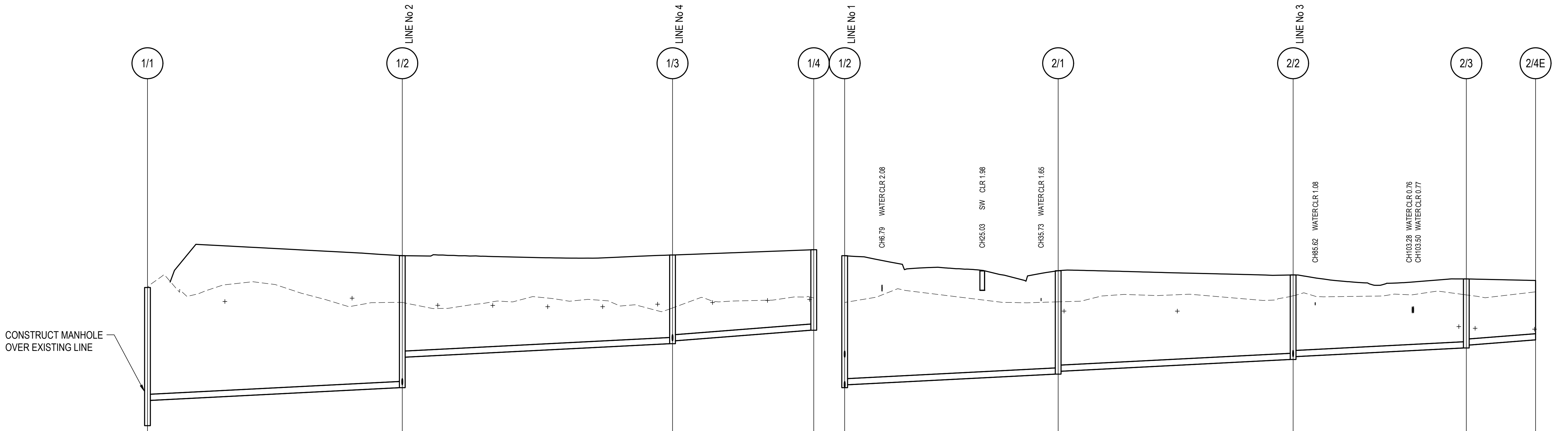
Drawn	Design	Check'd	Appr'd	RPEQ: 25102	A3 Full Size (Scale as shown)	
PAM	PAM	CJC	CJC	C.J.CAPLICK	05.04.24	016-2304-01-DRG-0501 A

LEGEND

\+ HOUSE CONNECTION BRANCH

NOTES

1. ALL MANHOLE DIAMETERS, DROP TYPES AND COVERS TO BE IN ACCORDANCE WITH FNQROC STD DRG S3000.
2. FINISHED SURFACE AT ENDCAPS IS TO BE NO GREATER THAN 1.5m ABOVE INVERT.



LINE 1

	1/1		1/2		1/3		1/4
GRADE (1 in "X")		150		150		100.0	
PIPE SIZE (mm)		150		150		150	
DATUM RL	-3.0						
DEPTH TO INVERT	3.35 / 2.74		3.20 / 2.46		2.15 / 2.08		1.95
INVERT LEVEL	0.077 / 0.690		0.999 / 1.739		2.067 / 2.137		2.394
DESIGN SURFACE LEVEL	3.43		4.20		4.22		4.35
EXISTING SURFACE LEVEL	3.43		3.07		2.93		3.18
SETOUT COORDINATES	E 1953.752 N 4783.320		E 1997.985 N 4769.417		E 2023.309 N 4727.271		E 2036.546 N 4705.242
CHAINAGE	0.00	46.37	46.37	49.17	95.54	25.70	121.24

LINE 2

	1/2		2/1		2/2		2/3		2/4E
GRADE (1 in "X")		150		150		150		100.0	
PIPE SIZE (mm)		150		150		150		150	
DATUM RL	-3.0								
DEPTH TO INVERT	3.20 / 3.13		2.51 / 2.44		2.05 / 1.98		1.68 / 1.61		1.44
INVERT LEVEL	0.999 / 1.069		1.328 / 1.398		1.683 / 1.753		1.963 / 2.033		2.159
DESIGN SURFACE LEVEL	4.20		3.84		3.74		3.64		3.60
EXISTING SURFACE LEVEL	3.07		3.08		3.23		3.25		3.33
SETOUT COORDINATES	E 1997.985 N 4769.417		E 2033.056 N 4786.113		E 2061.528 N 4818.004		E 2059.098 N 4849.426		E 2052.609 N 4860.227
CHAINAGE	0.00	38.84	38.84	42.75	81.59	31.52	113.11	12.60	125.71

1:100 0 1 2 3 4

1:750 0 7.5 15 22.5 30

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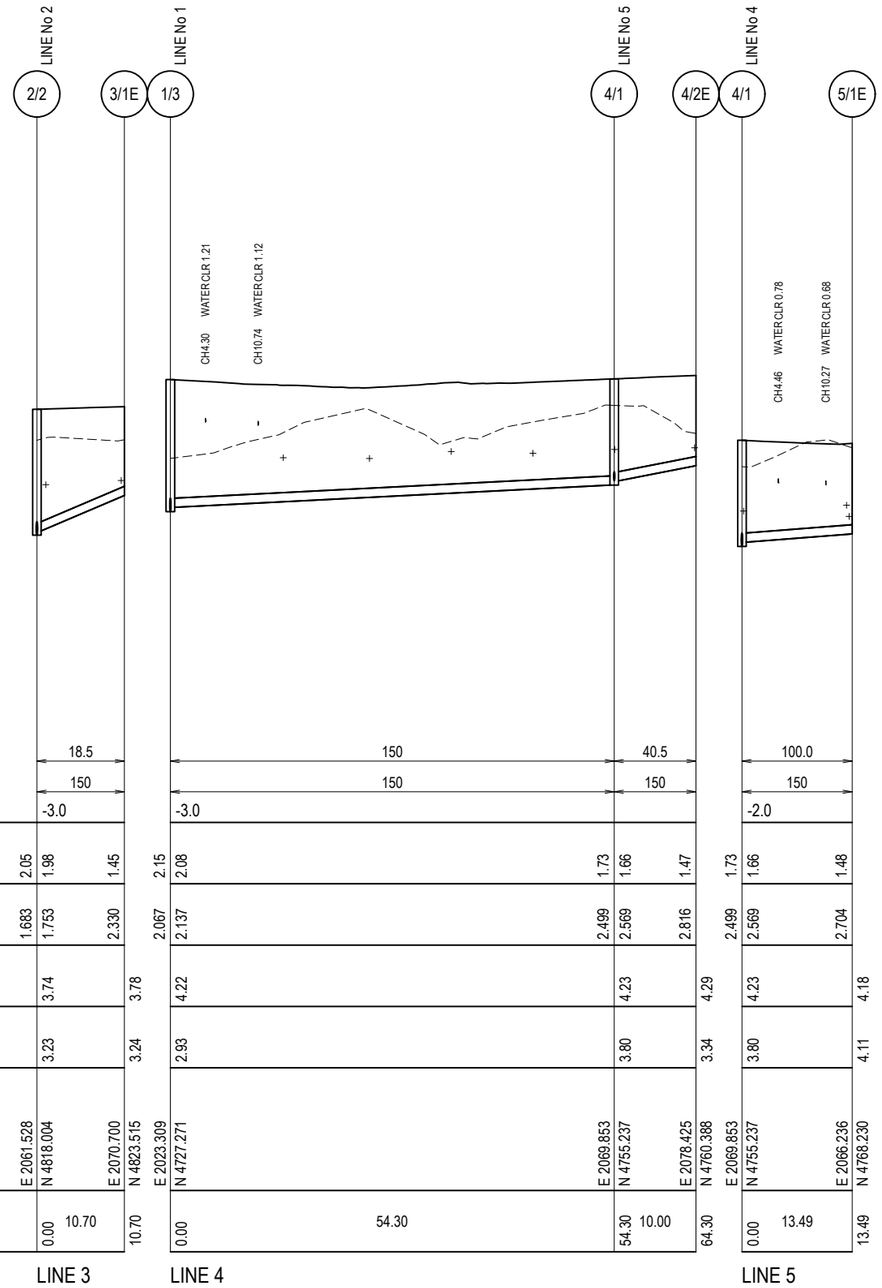
MITRE STREET SUBDIVISION

SEWERAGE LONGITUDINAL SECTIONS
SHEET 1 OF 2

Drawn	Design	Check'd	Appr'd	RPEQ: 25102	A3 Full Size (Scale as shown)		
PAM	PAM	CJC	CJC	C.J.CAPLICK	05.04.24	016-2304-01-DRG-0502	A



GRADE (1 in "X")			18.5				150					40.5				100.0								
PIPE SIZE (mm)			150				150					150				150								
DATUM RL			-3.0				-3.0									-2.0								
DEPTH TO INVERT	2.05		1.98		1.45	2.15	2.08				1.73	1.66		1.47	1.73	1.66		1.48						
INVERT LEVEL	1.683		1.753		2.330	2.067	2.137				2.499	2.569		2.816	2.499	2.569		2.704						
DESIGN SURFACE LEVEL			3.74			3.78	4.22					4.23			4.29	4.23			4.18					
EXISTING SURFACE LEVEL			3.23			3.24	2.93					3.80			3.34	3.80			4.11					
SETOUT COORDINATES	E 2061.528		N 4818.004		E 2070.700	N 4823.515	E 2023.309	N 4727.271			E 2069.853	N 4755.237		E 2078.425	N 4760.388	E 2069.853	N 4755.237		E 2066.236	N 4768.230				
CHAINAGE		0.00		10.70		10.70	0.00		54.30			54.30	10.00		64.30	0.00		13.49			13.49			
		LINE 3					LINE 4									LINE 5								

LEGEND

\+ HOUSE CONNECTION BRANCH

NOTES

1. ALL MANHOLE DIAMETERS, DROP TYPES AND COVERS TO BE IN ACCORDANCE WITH FNQROC STD DRG S3000.
2. FINISHED SURFACE AT ENDCAPS IS TO BE NO GREATER THAN 1.5m ABOVE INVERT.

1:100 0 1 2 3 4

1:750 0 7.5 15 22.5 30

Rev	Date	Revision Notes
A	05.04.24	INITIAL ISSUE

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MITRE STREET SUBDIVISION

SEWERAGE LONGITUDINAL SECTIONS
SHEET 2 OF 2

Drawn	Design	Check'd	Apprv'd	RPEQ: 25102	A3 Full Size (Scale as shown)		
PAM	PAM	CJC	CJC	C.J.CAPLICK	05.04.24	016-2304-01-DRG-0503	A

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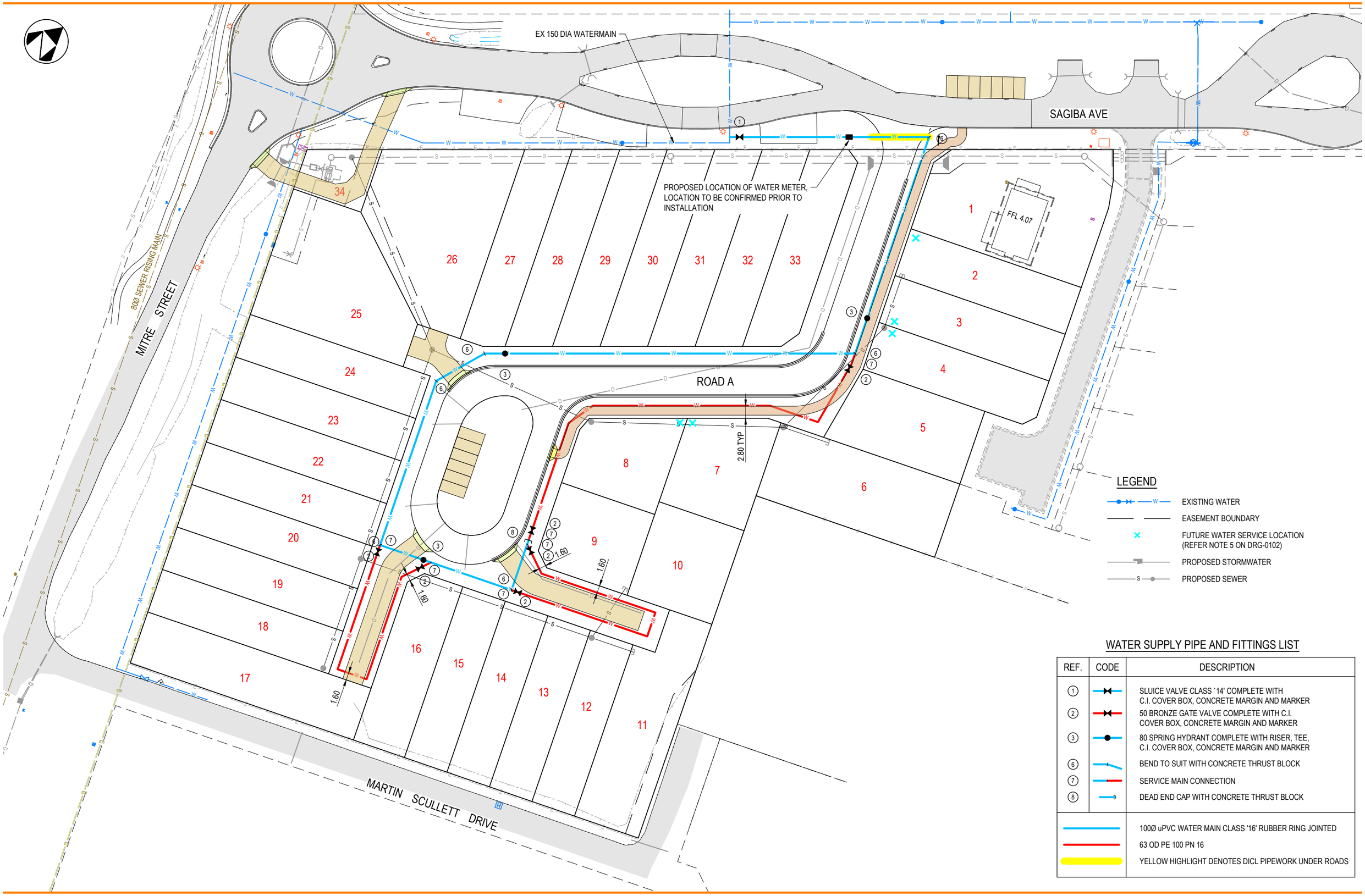

WATER SUPPLY PIPE AND FITTINGS LIST

REF.	CODE	DESCRIPTION
1		SLUICE VALVE CLASS `14' COMPLETE WITH C.I. COVER BOX, CONCRETE MARGIN AND MARKER
2		50 BRONZE GATE VALVE COMPLETE WITH C.I. COVER BOX, CONCRETE MARGIN AND MARKER
3		80 SPRING HYDRANT COMPLETE WITH RISER, TEE, C.I. COVER BOX, CONCRETE MARGIN AND MARKER
6		BEND TO SUIT WITH CONCRETE THRUST BLOCK
7		SERVICE MAIN CONNECTION
8		DEAD END CAP WITH CONCRETE THRUST BLOCK
		100Ø uPVC WATER MAIN CLASS '16' RUBBER RING JOINTED
		63 OD PE 100 PN 16
		YELLOW HIGHLIGHT DENOTES DICL PIPEWORK UNDER ROADS

1:750 0 7.5 15 22.5 30

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MITRE STREET SUBDIVISION

WATER RETICULATION

Drawn	Design	Check'd	Apprv'd	RPEQ: 25102	A3 Full Size (Scale as shown)	
PAM	PAM	CJC	CJC	C.J.CAPLICK	05.04.24	016-2304-01-DRG-0601 A

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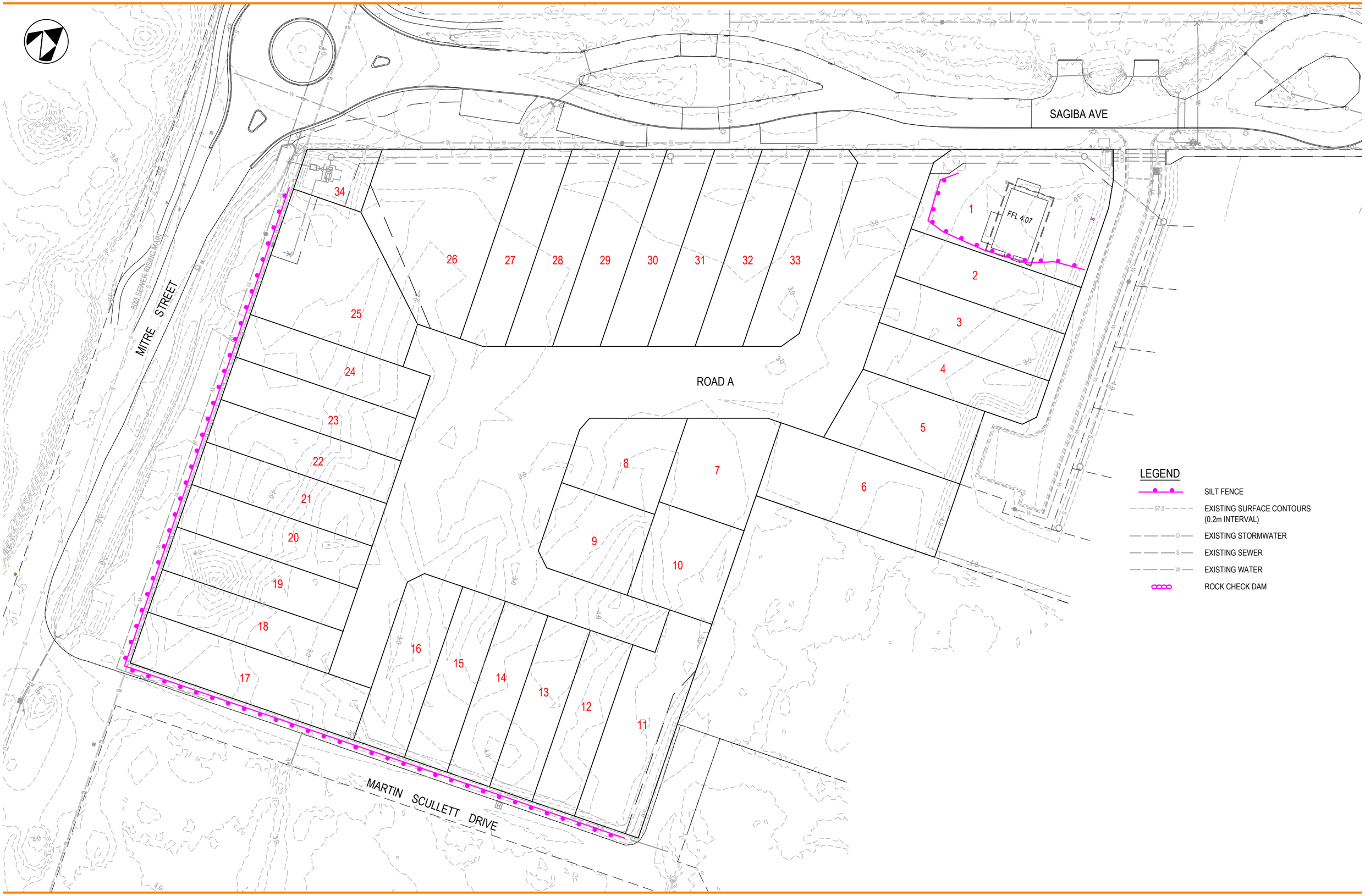

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A	05.04.24	INITIAL ISSUE

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MITRE STREET SUBDIVISION

SITE BASED STORMWATER MANAGEMENT PLAN
PHASE 1: TOPSOIL STRIPPING

Drawn	Design	Check'd	Appv'd	RPEQ: 25102	A3 Full Size (Scale as shown)		
PAM	PAM	CJC	CJC	C.J.CAPLICK	05.04.24	016-2304-01-DRG-0701	A

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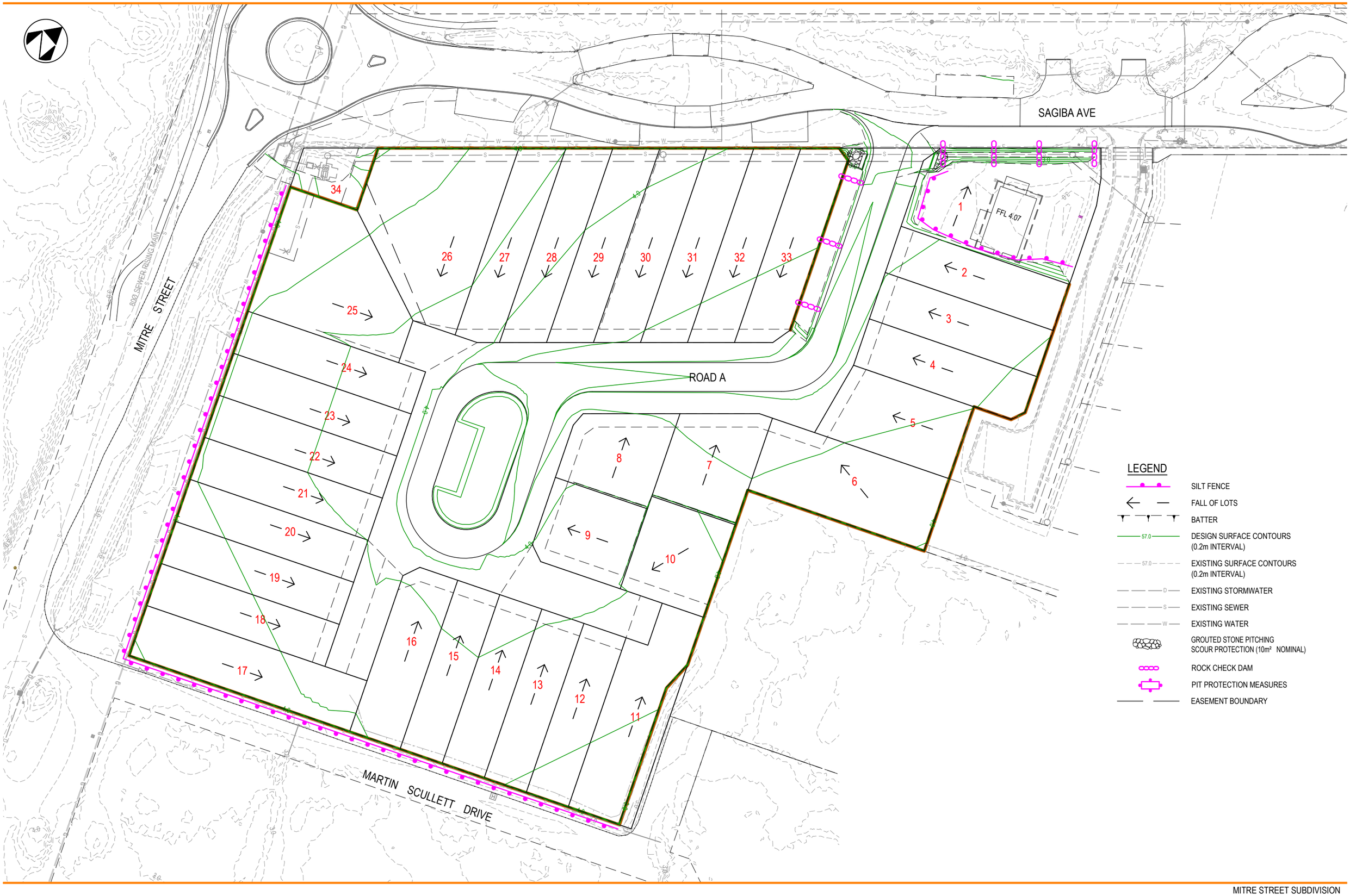

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Rev	Date	Revision Notes
A	05.04.24	INITIAL ISSUE

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MITRE STREET SUBDIVISION

SITE BASED STORMWATER MANAGEMENT PLAN
PHASE 2: EARTHWORKS

Drawn	Design	Check'd	Apprv'd	RPEQ: 25102	A3 Full Size (Scale as shown)	
PAM	PAM	CJC	CJC	C.J.CAPLICK	05.04.24	016-2304-01-DRG-0702 A

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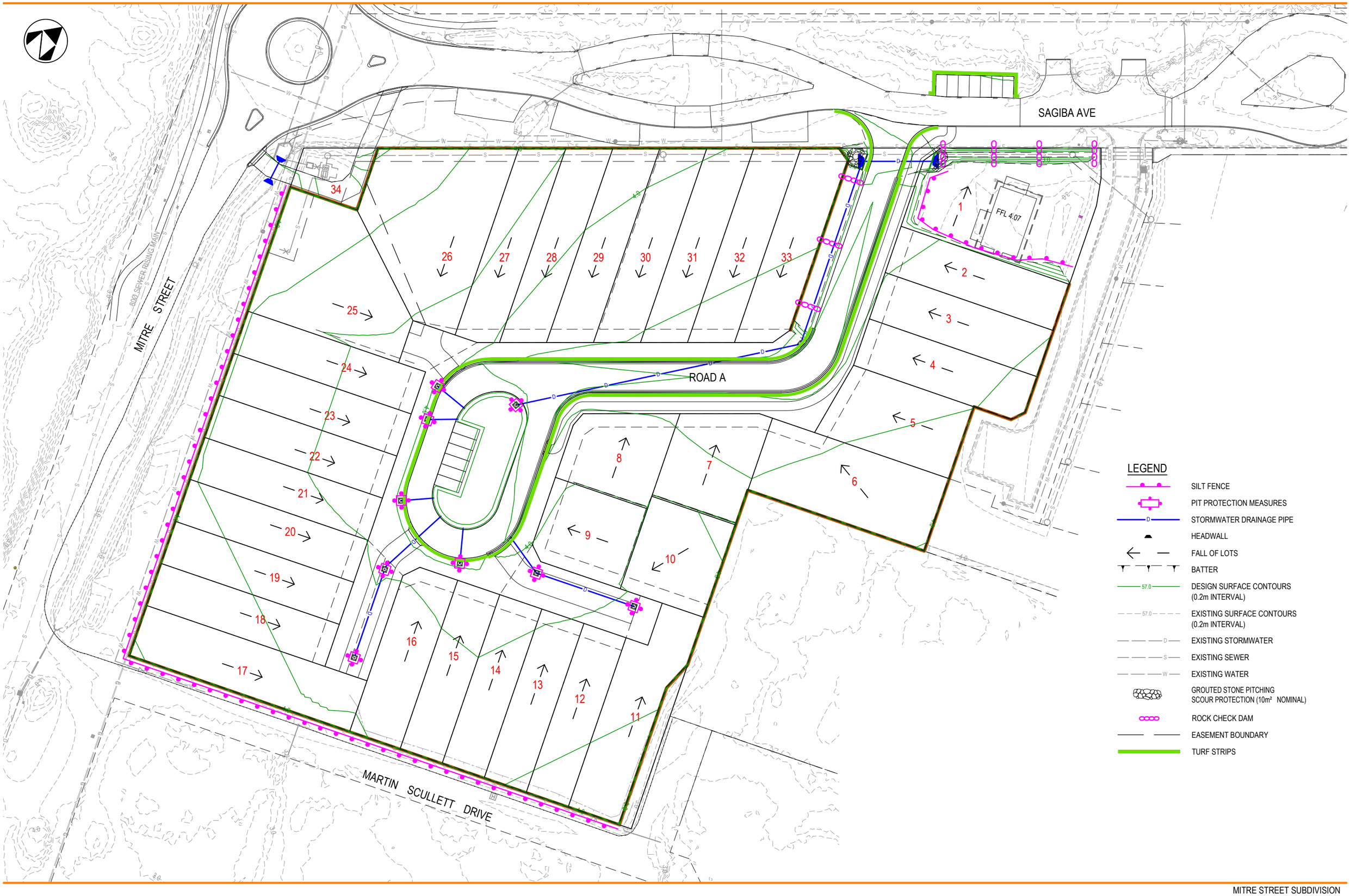

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Rev	Date	Revision Notes
A	05.04.24	INITIAL ISSUE

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MITRE STREET SUBDIVISION

SITE BASED STORMWATER MANAGEMENT PLAN
PHASE 3: ROADWORKS

Drawn	Design	Check'd	Apprv'd	RPEQ: 25102	A3 Full Size (Scale as shown)	
PAM	PAM	CJC	CJC	C.J.CAPLICK	05.04.24	016-2304-01-DRG-0703 A

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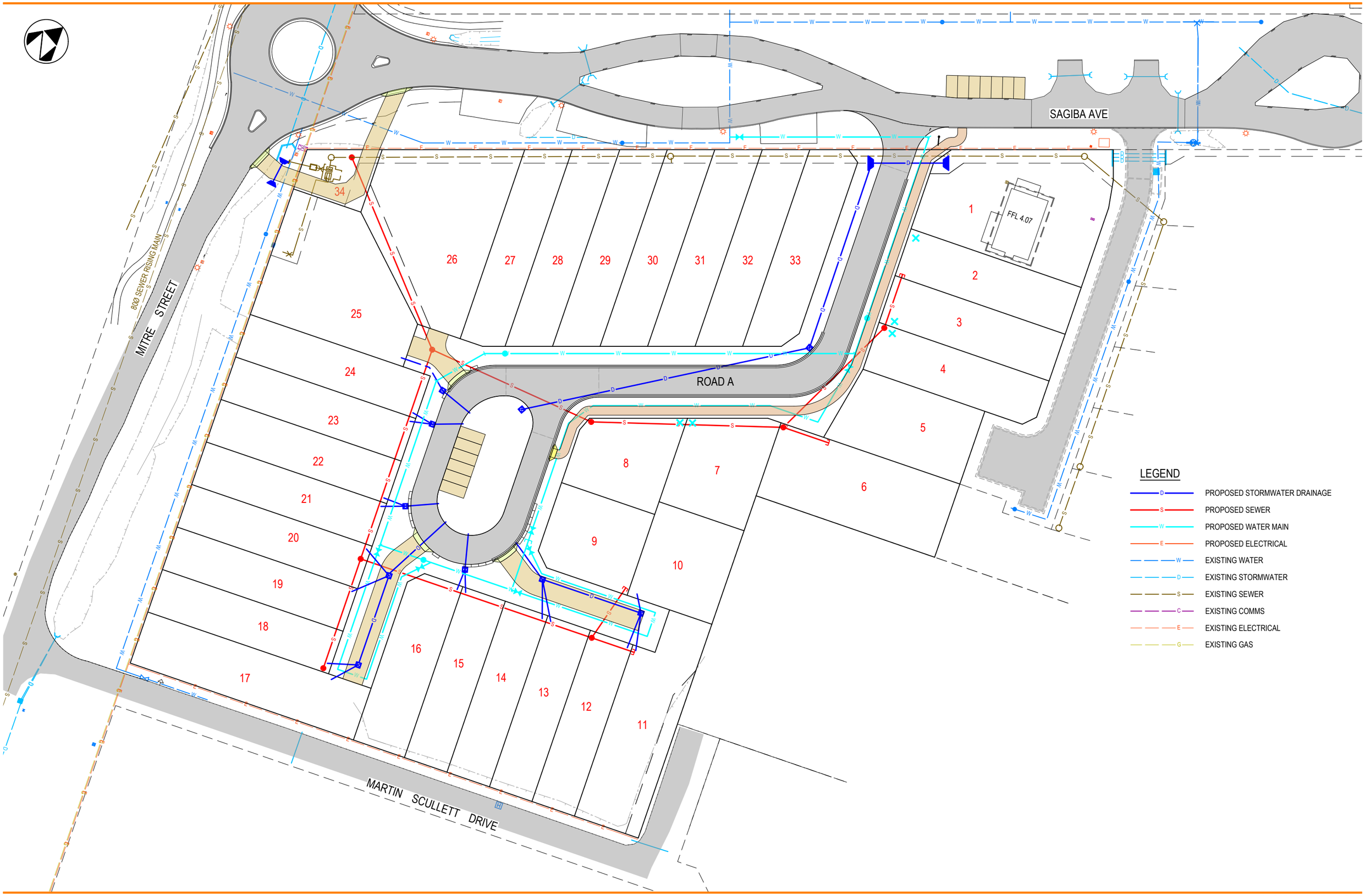

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Rev	Date	Revision Notes
A	05.04.24	INITIAL ISSUE

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MITRE STREET SUBDIVISION

MASTER SERVICES PLAN

Drawn	Design	Check'd	Appov'd	RPEQ 25102	A3 Full Size (Scale as shown)		
PAM	PAM	CJC	CJC	C.J.CAPLICK	05.04.24	016-2304-01-DRG-0801	A

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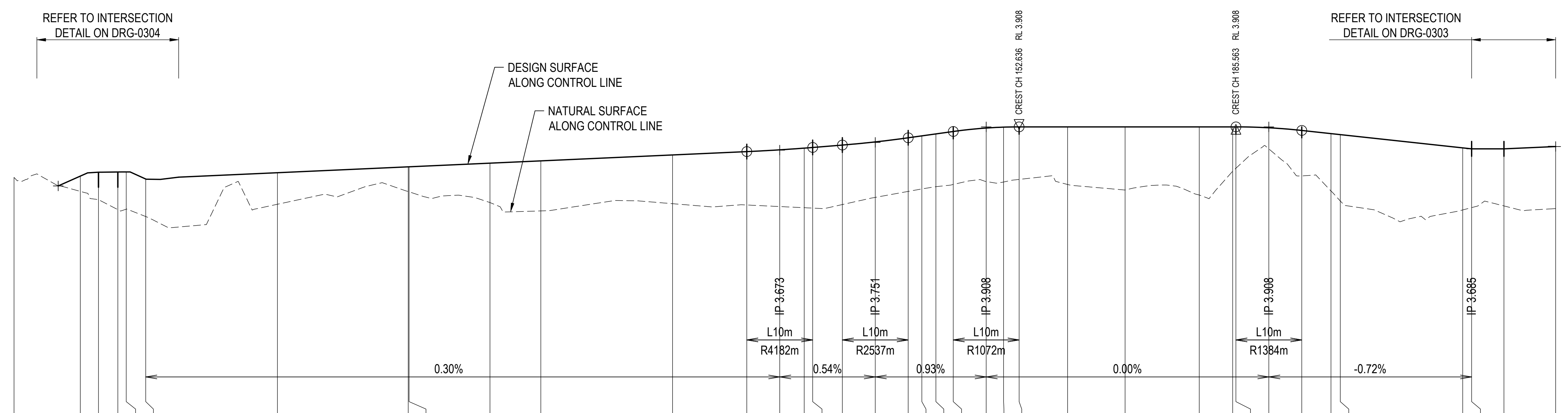

CHAINAGE	EXISTING SURFACE LEVEL	DESIGN SURFACE LEVEL	CUT - FILL +
0.000	3.396		
10.060	3.255		
12.826	3.171		
15.764	3.069		
17.044	3.075		
20.000	3.000		
40.000	3.124	3.444	0.320
59.864	3.253	3.503	0.250
60.000	3.250	3.504	0.253
72.278	3.142	3.541	0.399
80.000	3.057	3.564	0.507
100.000	3.130	3.624	0.494
111.283	3.117	3.658	0.541
116.283	3.101	3.676	0.575
120.000	3.089	3.693	0.603
121.283	3.085	3.700	0.614
125.795	3.121	3.724	0.603
130.795	3.194	3.756	0.562
135.795	3.255	3.797	0.543
137.864	3.280	3.817	0.537
140.000	3.302	3.837	0.534
142.636	3.326	3.861	0.536
147.636	3.354	3.896	0.543
150.279	3.350	3.905	0.556
152.636	3.376	3.908	0.532
160.000	3.325	3.908	0.583
168.736	3.269	3.908	0.639
180.000	3.218	3.908	0.690
185.072	3.459	3.908	0.449
185.563	3.492	3.908	0.416
190.563	3.684	3.899	0.215
195.563	3.409	3.872	0.463
200.000	3.258	3.840	0.582
201.409	3.157	3.830	0.672
220.000	3.067	3.695	0.628
221.359	3.091	3.685	0.595
226.266	3.107		
234.126	3.080		

LONGITUDINAL SECTION ROAD A

SCALE 1:750H
1:50V

1:50 0 0.5 1 1.5 2
1:750 0 7.5 15 22.5 30

Rev	Date	Revision Notes
A	05.04.24	INITIAL ISSUE

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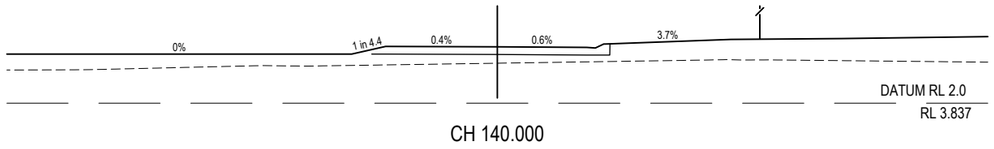
MITRE STREET SUBDIVISION

ROAD A LONGITUDINAL SECTION

Drawn	Design	Check'd	Appr'd	RPEQ: 25102	A3 Full Size (Scale as shown)
PAM	PAM	CJC	CJC	C.J.CAPLICK	05.04.24

016-2304-01-DRG-0901 A



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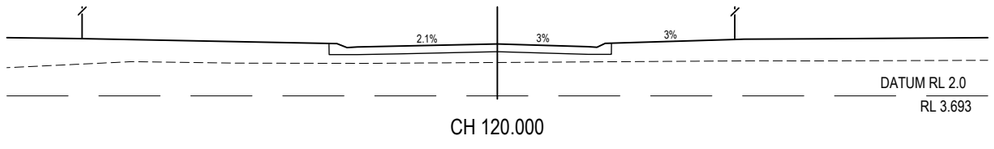

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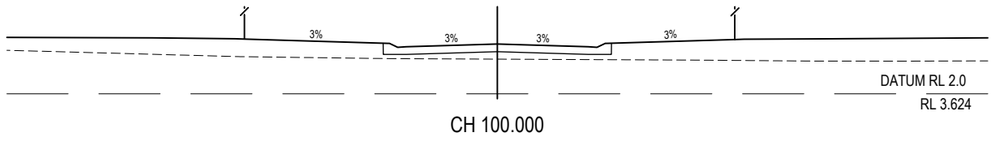

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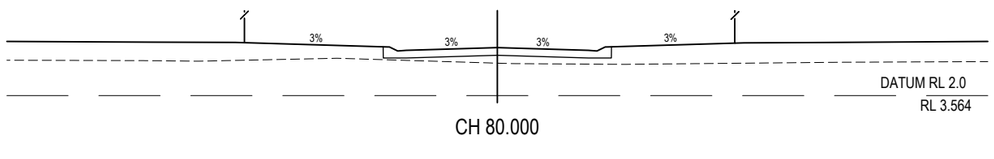

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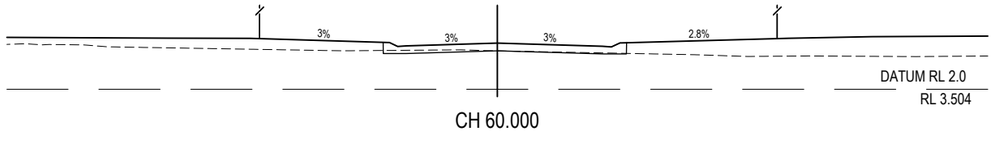

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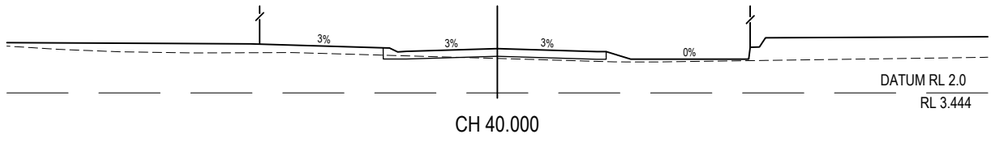

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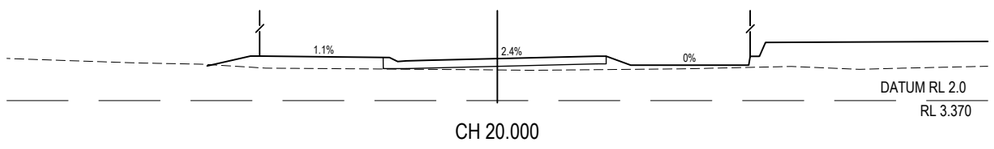

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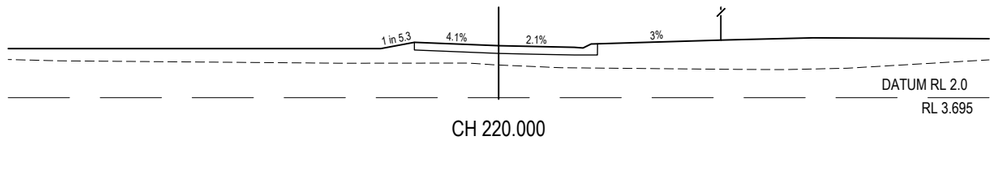

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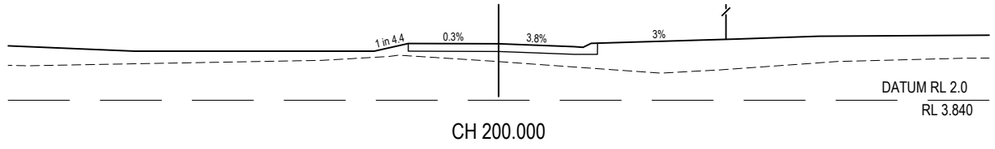

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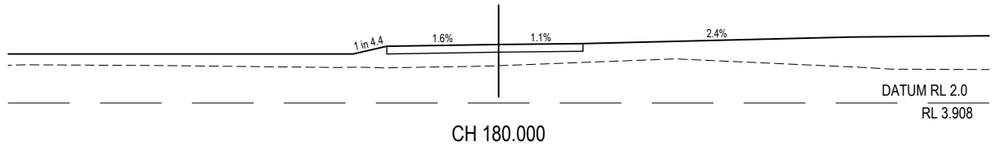

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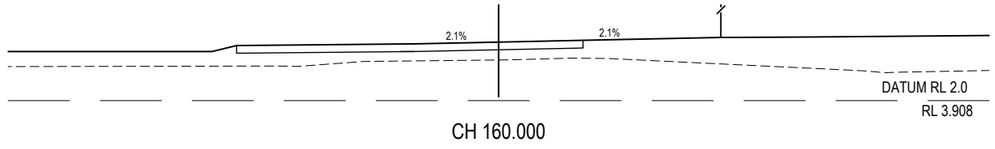

CH 160.000

1:100 0 1 2 3 4

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ALLARO HOMES

MITRE STREET SUBDIVISION

ROAD A CROSS SECTIONS

Rev	Date	Revision Notes
A	05.04.24	INITIAL ISSUE

Drawn	Design	Check'd	Appv'd	RPEQ: 25102	A3 Full Size (Scale as shown)	
PAM	PAM	CJC	CJC	C.J.CAPLICK	05.04.24	016-2304-01-DRG-0902 A

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