

QUILL STREET MAREEBA

OPERATIONAL WORKS APPLICATION

FILE NO: 160-001-R001

MSC REF: OPW210006

CLIENT:





Prepared by:

ERSCON PTY. LTD. T/as ERSCON Consulting Engineers PO Box 7890 CAIRNS QLD 4870





DOCUMENT ISSUE RECORD

Revision Code	Date Revised	Revision Details	Author	Checked	Approved
A	1/06/23	OPERATIONAL WORKS SUBMISSION	MG	MF	JDM
В	23/02/24	REVISION B	MG	MF	JDM

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- APPENDIX B Q100 Design Sketches
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1 SUMMARY

1.1 DEVELOPMENT APPLICATION DETAILS

Type of approval sought:Operational WorksSite address:Quill Street, MareebaReal property description:Lot 22 on SP217220Site area:8,401 m²Assessment manager:Mareeba Shire CouncilOwner details:Conmat Pty LtdOwner details:Conmat Pty LtdPO BOX 7890 CAIRNS QLD 4870CAIRNS QLD 4870	Proposed development:	Land development on Quill Street, Mareeba. Works include earthworks, sewer connection, overland stormwater drainage and driveway.
Site address:Quill Street, MareebaReal property description:property Lot 22 on SP217220Site area:8,401 m²Assessment 	Type of approval sought:	Operational Works
Real description:property description:Lot 22 on SP217220Site area:8,401 m²Assessment manager:Mareeba Shire CouncilOwner details:Conmat Pty LtdApplicant details:Conmat Pty LtdCONMAT Pty LtdC/-ERSCON PTY. LTD.PO BOX 7890CAIRNS QLD 4870	Site address:	Quill Street, Mareeba
Site area:8,401 m²Assessment manager:Mareeba Shire CouncilOwner details:Conmat Pty LtdApplicant details:Conmat Pty LtdC/-ERSCON PTY. LTD.PO BOX 7890CAIRNS QLD 4870	Real property description:	Lot 22 on SP217220
Assessment manager:Mareeba Shire CouncilOwner details:Conmat Pty LtdApplicant details:Conmat Pty LtdC/-ERSCON PTY. LTD.PO BOX 7890CAIRNS QLD 4870	Site area:	8,401 m²
Owner details:Conmat Pty LtdApplicant details:Conmat Pty LtdC/-ERSCON PTY. LTD.PO BOX 7890CAIRNS QLD 4870	Assessment manager:	Mareeba Shire Council
Applicant details:Conmat Pty LtdC/-ERSCON PTY. LTD.PO BOX 7890CAIRNS QLD 4870	Owner details:	Conmat Pty Ltd
C/-ERSCON PTY. LTD. PO BOX 7890 CAIRNS QLD 4870	Applicant details:	Conmat Pty Ltd
PO BOX 7890 CAIRNS QLD 4870		C/-ERSCON PTY. LTD.
CAIRNS QLD 4870		PO BOX 7890
		CAIRNS QLD 4870

1.2 PLANNING INSTRUMENT DETAILS

Planning scheme:
Zone:
Local plan:
Level of assessment:
Applicable codes:

Mareeba Shire Council Planning Scheme 2016 Medium Density Residential Nil Code Assessment Nil

1.3 REFERRAL AGENCIES

Referral agency and role

Nil



2 SITE DETAILS

2.1 SITE DESCRIPTION

The site is located at the northern end of Quill Street, Mareeba. This application seeks operational works approval to complete construction of the land development as approved for re-configuration by Council. The entire works area has previously had an operational works approval (OPW 210006) dated 17th December 2021. This was originally for 4 lots, however, have now been combined into 1 lot. This operational works application seeks approval to construct the single lot.

Table 1: Site description

Site characteristic	Description
Existing land use	The existing land use has been a vacant lot.
Existing structures	There is an existing driveway, sewer, water and stormwater services constructed which will be utilised for this lot. Some temporary structures also exist that will be removed.
Frontage and access	The site has frontage to Quill Street and will be connected by a gravel driveway.
Topography and views	The lot varies in level from approximately RL391m to RL399m AHD. The lot maintains visual amenity to the local area through existing vegetation.
Existing vegetation	The lot is predominantly trees with open grassed areas and other overgrown vegetation.
Existing waterways	Site stormwater discharges through the existing drainage easement that runs through the lot and to the existing stormwater system in Quill Street.





Figure 1: Aerial View of Site Identification Source: DA Mapping System



Figure 2: Satellite View of Site Identification Source: QLD Globe



2.2 SURROUNDING LAND USES

Table 2: Surrounding land uses

Surrou	Surrounding land uses					
North	Existing residential area					
South	Existing residential area					
East	Existing residential area					
West	Existing residential area and school					



3 PROPOSED DEVELOPMENT DETAILS

The purpose of this application is to amend the previous application made by GHD Pty Ltd from a four (4) lot subdivision to a single (1) lot land development for residential use. This submission is generally in accordance with the council conditions mentioned in the RAL210012, relevant specifications and standards with allowances made for a single lot only.

Table 3: Summary of development aspects

Building or operational work					
Operational work	Land development and earthworks				
Value of proposed work	Approx \$178,000				



4 DEVELOPMENT APPLICATION FORM 1

DA Form 1 – Development application details

Approved form (version 1.3 effective 28 September 2020) 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).

1) Applicant details ERSCON Consulting Engineers Pty Ltd Applicant name(s) (individual or company full name) Contact name (only applicable for companies) Monique Gambin Postal address (P.O. Box or street address) PO Box 7890 Suburb Cairns City State QLD 4870 Postcode Country Australia Contact number 0478 759 910 Email address (non-mandatory) moniquegambin@erscon.com.au 0478 759 910 Mobile number (non-mandatory) Fax number (non-mandatory) Applicant's reference number(s) (if applicable) 160-001

PART 1 – APPLICANT DETAILS

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

 \boxtimes 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 <u>DA</u> Forms Guide: Relevant plans.										
3.1) St	reet addres	s and lo	ot on pla	an						
Stre	eet address eet address er but adjoining	AND lo AND lo or adjac	ot on pla ot on pla cent to lan	an (all lo an for a ad e.g. je	ots must be liste an adjoining etty, pontoon. A	ed), or or adja <i>Il lots mu</i>	cent pro st be listed	perty of the	premises (appropriate for development in	
	Unit No.	Street	No.	Stree	Street Name and Type Suburb					
		2-4		Quill Street Mareeba				Mareeba		
a)	Postcode	Lot No	Lot No. Plan Type and Num			umber (mber (e.g. RP, SP)		Local Government Area(s)	
	4880	22		SP21	7220				Mareeba Shire Council	
	Unit No.	Street	No.	Stree	t Name and	Туре			Suburb	
b)										
0)	Postcode	Lot No	D.	Plan	Type and Nu	umber (e.g. RP, S	SP)	Local Government Area(s)	
3.2) C e.g Note: P	oordinates o g. channel dreo lace each set o	of premi Iging in M f coordina	iSES (app loreton Ba ates in a s	propriate ay) separate	e for developme e row.	ent in ren	note areas,	, over part of a	n lot or in water not adjoining or adjacent to land	
	ordinates of	premis	es by lo	ongitud	le and latitud	le				
Longit	ude(s)		Latitud	le(s)		Datur	n		Local Government Area(s) (if applicable)	
						GS84		Mareeba Shire Council		
							DA94			
	ordinates of	premis	es by ea	astina	and northing	<u>יט בו </u>	iner:	3DA2020		
Eastin	a(s)	North	ina(s)		Zone Ref.	Datur	n		Local Government Area(s) (if applicable)	
	5(-)		54		WGS84					
				\Box 55		GDA94				
				56		Other:				
3.3) Ao	dditional pre	mises								
 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) Ider	ntify any of t	ne follov	wina tha	at ann	ly to the prer	nises a	nd provi	de anv rele	vant details	
\square In c	or adjacent t	o a wat	er bodv	or wa	tercourse or	in or a	bove an	aquifer		
Name	of water boo	dv wate		e or ac	nuifer [.]	in or a	Barron	River 0100	 ז	
Darron River Q100										
	nlan descrir	ntion of	stratedi	ic nort	land.	n aotai		<u> </u>		
Name of port authority for the lot:										
	tidal area		the lot.							
Name	of local dov	ornmon	t for the	le hit a	area (if annlic	able).				
Name	of port auth	ority for	tidal ar		andicable).	abie).				
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, see <u>DA Forms Guide</u>.

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
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):
1 residential lot
e) Relevant plans
Note: Relevant plans are required to be submitted for all aspects of this development application. For further information, see <u>DA Forms guide:</u> <u>Relevant plans</u> .
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 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):
e) Relevant plans Note : Relevant plans are required to be submitted for all aspects of this development application. For further information, see <u>DA Forms Guide:</u> <u>Relevant plans.</u>
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	\boxtimes 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 char	nge 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 <i>(if applicable)</i>	Gross floor area (m²) (<i>if applicable</i>)
8.2) Does the proposed use involve the u	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? (tic	k all applicable boxes)
Subdivision (complete 10))	Dividing land into parts by agreement (complete 11))
Boundary realignment <i>(complete 12))</i>	Creating or changing an easement giving access to a lot from a constructed road <i>(complete 13))</i>

10) Subdivision				
10.1) For this development, how	many lots are being	g created and what	is the intended use	e 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 developm apply to?	ent application			

11) Dividing land into parts by ag parts?	reement – how mar	ny parts are being c	created and what is	the intended use of the
Intended use of parts created	Residential	Commercial	Industrial	Other, please specify:
Number of parts created				

12) Boundary realignment			
12.1) What are the current a	nd proposed areas for each lo	t comprising the premises?	
Curre	ent lot	Propo	osed lot
Lot on plan description	Area (m²)	Lot on plan description	Area (m²)
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)					
\$178,000 (approximate only)					

PART 4 – ASSESSMENT MANAGER DETAILS

15) Identify the assessment manager(s) who will be assessing this development application
Mareeba 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 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 departing any changes made to the proposed development application that was the subject of the			

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 <u>DA Forms Guide</u>.

PART 7 – FURTHER DETAILS

20) Are there any associated dev	elopment applications or curre	nt approvals? (e.g. a preliminary app	proval)
Yes – provide details below of No	r include details in a schedule to	o this development application	
List of approval/development application references	Reference number	Date	Assessment manager
Approval	OPW210006 RAL210012	17/12/2021 22/06/2021	Mareeba Shire Council
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 attachr accompanies this develop	nent (form ESR/2015/1791) for ment application, and details	or an application for an enviro are provided in the table below	nmental authority v
🖂 No			
Note : Application for an environment requires an environmental authority	tal authority can be found by searchir to operate. See <u>www.business.qld.gc</u>	ng "ESR/2015/1791" as a search tern w.au for further information.	n at <u>www.qld.gov.au</u> . An ERA
Proposed ERA number:		Proposed ERA threshold:	
Proposed ERA name:			
Multiple ERAs are applica this development applicat	ble to this development applic ion.	cation and the details have be	en attached in a schedule to
Hazardous chemical faciliti	es		
23.2) Is this development app	olication for a hazardous che	mical facility?	
Yes – Form 69: Notificatio application	n of a facility exceeding 10%	of schedule 15 threshold is at	tached to this development

🛛 No

Note: See <u>www.business.gld.gov.au</u> 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 <i>Vegetation Management Act 1999</i> is satisfied the clearing is for a relevant purpose under section 22A of the <i>Vegetation Management Act 1999</i> ?
Yes – this development application includes written confirmation from the chief executive of the <i>Vegetation Management Act 1999</i> (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 <u>https://www.qld.gov.au/environment/land/vegetation/applying</u> 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 <i>Environmental Offsets Act 2014</i> ?
 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 <u>www.qld.gov.au</u> 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 <u>www.des.qld.gov.au</u> 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 <i>Water Act 2000</i> ?
Yes – the relevant template is completed and attached to this development application and I acknowledge that a relevant authorisation or licence under the <i>Water Act 2000</i> may be required prior to commencing development
No
DA templates are available from https://planning.dsdmip.gld.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
DA templates are available from <u>https://planning.dsdmip.qld.gov.au/</u> . 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 <i>resource</i> allocation authority is attached to this development application, if required under the <i>Fisheries Act 1994</i>
No Note: See guidance materials at <u>www.daf.gld.gov.au</u> for further information.

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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 <i>Water Act 2000?</i>						
Yes – I acknowledge that a	Yes – I acknowledge that a quarry material allocation notice must be obtained prior to commencing development No					
Note: Contact the Department or wat information.	ural Resources, mines and Energy a	at <u>www.dnrme.qia.gov.au</u> ana <u>www.r</u>	DUSINESS.qld.qov.au TOF Turtner			
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 <i>Coastal Protection and Management Act 1995?</i>						
☐ Yes – I acknowledge that a quarry material allocation notice must be obtained prior to commencing development ☑ No						
Note: Contact the Department of Env	Note: Contact the Department of Environment and Science at <u>www.des.gld.gov.au</u> 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 <i>Water Supply (Safety and Reliability) Act 2008</i> (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 <u>www.dnrme.gld.gov.au</u> 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 <u>www.des.gld.gov.au</u> 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	<u>v.des.qld.gov.au</u> for information requ		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 <i>Prostitution Regulation 2014</i> 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 <i>Transport</i> <i>Infrastructure Act 1994</i> (subject to the conditions in section 75 of the <i>Transport Infrastructure Act 1994</i> 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?

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 <u>www.planning.dsdmip.qld.gov.au</u> 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 <i>Note</i> : See the Planning Regulation 2017 for referral requirements	⊠ Yes				
If building work is associated with the proposed development, Parts 4 to 6 of <u>DA Form 2 –</u> <u>Building work details</u> 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 <u>DA</u> <u>Forms Guide: Planning Report Template</u> .	⊠ 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 <u>DA Forms Guide: Relevant plans</u> .	⊠ 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 numb	er(s):				
Notification of engagement of alternative assessment manager							
Prescribed asses	sment manager						
Name of chosen	assessment manager						
Date chosen assessment manager engaged							
	6 1						

 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				



5 LAND DEVELOPMENT

5.1 ENGINEERING CONDITION CONFIRMATION

Each of the conditions from Decision Notice RAL210012, that relate to the original proposed development of Reconfiguring a Lot - Subdivision (1 lot into 4) at Quill Street, have been addressed for the development of a single lot only. The following addresses the conditions with respect to the single lot development only.

Condition 1 – Development Assessment Against the Planning Scheme

- 1. Development must be carried out generally in accordance with the approved plans and the facts and circumstances of the use as submitted with the application, and subject to any alterations:
 - found necessary by the Council's delegated officer at the time of examination of the engineering plans or during construction of the development because of particular engineering requirements; and
 - to ensure compliance with the following conditions of approval.

Development works will be carried out generally in accordance with specifications, facts and circumstances as set out in the application submitted to Council, including recommendations and findings confirmed within technical reports.

Condition 2 – Timing of Effect

2.1 The conditions of the development permit must be complied with to the satisfaction of Council's delegated officer prior to the endorsement of the plan of survey of the development, except where specified otherwise in these conditions of approval.

The conditions of the Development Permit will be complied to. The current design is for the development of the lot for a single lot and the conditions mentioned in the decision notice is for the lot to be subdivided into 4. This submission incorporates all the conditions relevant for a single lot land development.

Condition 3 – General

3.1 The applicant/developer is responsible for the cost of necessary alterations to existing public utility mains, services or installations required by works in relation to the proposed development or any works required by condition(s) of this approval.

Agreed.

3.2 All payments or bonds required to be made to the Council pursuant to any condition of this approval must be made prior to the endorsement of the plan of survey and at the rate applicable at the time of payment.

Agreed.

3.3 The developer must relocate (in accordance with FNQROC standards) any services such as water, sewer, drainage, telecommunications and electricity that are not wholly located within the lots that are being created/serviced where required by the relevant authority, unless approved by Council's delegated officer.

There are no service relocations required.

3.4 Where utilities (such as sewers on non-standard alignments) traverse lots to



service another lot, easements must be created in favour of Council for access and maintenance purposes. The developer is to pay all costs (including

Council's legal expenses) to prepare and register the easement documents.

A single E2 service branch will be included for the sewer and does not cross any property boundaries.

3.5 All works must be designed, constructed and carried out in accordance with FNQROC Development Manual requirements (as amended) and to the satisfaction of Council's delegated officer.

Agreed.

3.6 Charges All outstanding rates, charges, and expenses pertaining to the land are to be paid in full.

Agreed.

Condition 4 – Infrastructure Services and Standards

Condition 4.1 – Access

- 4.1 Access
 - (a) Access must be provided/constructed to each allotment in accordance with the FNQROC Development Manual, to the satisfaction of Council's delegated officer.

This development is now one (1) lot and a single access will be constructed.

(b) An asphalt sealed or concrete driveway shall be provided for each lot generally to the extent shown on Plan Sketch 12552164-SK002 C to the satisfaction of Councils delegated officer.

The property owner has elected to incorporate a gravel driveway to access the building pad.

Condition 4.2 – Quill street

A one (1) metre concrete backing strip is to be provided behind the kerb to extend the cul-de-sac radius of Quill Street.

This development is now one (1) lot and requires a single access. This development does not require kerb restoration on the cul-de-sac head.

Condition 4.3 – Earthworks

As part of a subsequent application for Operational Works, an earthworks plan (including the building pads on proposed Lots 1 to 4) is to be submitted, prepared by a suitably qualified RPEQ demonstrating compliance with the Works, Services and Infrastructure Code including the following detail:

Application os for a sin

 Maintenance of access roads to and from the site such that they remain free of all fill material and are cleaned as necessary;



The earthworks have been balanced and may not require any external fill being brought to site.

- Preservation of all drainage structures from the effects of structural loading generated by the earthworks; Agreed
- Protection of adjoining properties and roads from ponding or nuisance from stormwater;
 - Agreed
- Prevention of the spread of weeds Agreed; and
- Use of uncontaminated fill material.
 Agreed
- All site earthworks, drainage and pavement construction are to be designed and supervised by a RPEQ. Testing is to be carried out by NATA Registered Laboratories and results submitted as part of the As Constructed information. The Supervising Engineer must submit a certificate demonstrating that all work has been satisfactorily completed to the quality control criteria for the site and in accordance with AS3798 (as amended).
 Agreed

An earthworks plan has been submitted as part of the Operational Works application.

Condition 4.4 – Stormwater Drainage

(a) The applicant/developer must take all necessary steps to ensure a non worsening effect on surrounding land as a consequence of the development.

Q100 flooding level nominated by council has been determined to be RL 395.593m AHD. Overland flow Q100 levels through the rock drain has been calculated to be 0.524m above the drain invert which is less than the Q100 flood level of 395.593m.

(b) Prior to works commencing the applicant must submit a Stormwater Management Plan and Report prepared and certified by a suitably qualified design engineer (RPEQ) that meets or exceeds the standards of design and construction set out in the Queensland Urban Drainage Manual (QUDM) and the FNQROC Development Manual to the satisfaction of Council's delegated officer.

A Stormwater Management Plan signed by a RPEQ has been submitted.

(c) Prior to works commencing the applicant must submit a Stormwater Quality Management Plan and Report prepared and certified by a suitably qualified design engineer (RPEQ) that meets or exceeds the standards of design and construction set out in the Urban Stormwater Quality Planning Guideline and the Queensland Water Quality Guideline to the satisfaction of Council's delegated officer.

A Stormwater Quality Management Plan and Report is not required as the overland flow is being diverted to open drains across the grassed surface.



(d) The Stormwater Quality Management Plan must include an Erosion and Sediment Control Plan that meets or exceeds the Soil Erosion and Sedimentation Control Guidelines (Institute of Engineers Australia) to the satisfaction of Council's delegated officer.

A SWQMP includes an Erosion and Sediment Control Plan.

(e) The applicant/developer must construct the stormwater drainage infrastructure in accordance with the approved Stormwater Management Plan and/or Stormwater Quality Management Plan and Report. Drainage works are to be constructed as part of this operational works and in accordance with this condition.

The open drains will be constructed in accordance with the plans.

Condition 4.5 – Water Supply

- (a) The existing reticulated water supply is of adequate capacity to service the lot.
- (b) A water service connection will be provided to the proposed lot in accordance with FNQROC Development Manual standards.

Condition 4.6 – Sewerage Connection

The developer will connect the proposed development to Council's reticulated sewerage system in accordance with FNQROC Development Manual standards.

Condition 4.7 – Electricity Provision/Supply

Service conduits/pits exist adjacent the access driveway (in easement).

Condition 4.8 – Telecommunications

Service conduits/pits exist adjacent the access driveway (in easement).

Condition 4.9 – Building Envelopes and Required Flood Immunity

- (a) The approved building envelopes for the proposed lot are the building pads shown on Plan Drawing 160-001-C103.
- (b) The building enveloped will be filled to reach a minimum height of RL 395.593m AHD.
- (c) The building envelopes will be pegged and an envelope drawing prepared by the surveyor as part of as-constructed works. This will be provided to Council prior to lodging of Survey Plan.
- (d) All buildings will be located within the approved building envelopes.

Condition 4.10 – Haulage of Fill Material

(a) Haulage of fill material will occur during the times of 9:00am to 2:00pm Monday to Friday and 7:00am to 1:00pm Saturday.



- (b) Haulage of fill material to the site will follow the haul route:
 - Byrnes Street;
 - either Rankin or Herberton Street;
 - Constance Street;
 - Hastie Street; and
 - Quill Street.

Empty haul trucks shall travel from the site via the same route.

Condition 4.11 – Dust Management

A management plan for dust and air pollutants will be prepared and implemented during the onsite earthworks to ensure emissions do not cause significant environmental harm or nuisance impacts.



6 STORMWATER MANAGEMENT PLAN

6.1 DESIGN METHOD

The stormwater design has been carried out using the Rational Method, in accordance with the Queensland Urban Drainage Manual (QUDM).

In accordance with the QUDM recommendations, the major system design has been calculated based on a 100-year recurrence interval (1 in 100 ARI / 1% AEP), using overland flow.

Runoff has been calculated using IFD Chart 15 of the FNQROC Development Manual. Runoff Coefficients have been determined in accordance with QUDM.



6.2 CATCHMENT AREAS

Four external catchments and one internal catchment have been channelled into the open drain system which dissects the lot (refer Appendix E – Catchment Plan).

- Catchment A is the capture of surface water from the major earth pad.
- Catchment B, C and D collect surface water from the existing lots and St Thomas' Primary School which is contained within the boundaries of Constance, Hastie and Atherton Street.
- Catchment E encompasses the western side of Quill Street for its full length.

Modelling and observations indicated that the external roadworks are captured via the kerb and channel and drained away from the site.



Figure 3 Catchment Areas for Quill Street



6.3 HYDROLOGICAL DESIGN PHILOSOPHY

The major drainage system consists of a combination of grass swale drains and a rock lined open drain. The flooded inundation of the site is separated into two assessments.

Firstly, the overland flow combinations from the catchments and secondly the backflow from the Barron River. Both scenarios have been modelled for a Q100 event and achieve immunity from the lots being flooded.

Coefficients of Discharge have been determined in accordance with Section 4.5 of QUDM assuming an Urban Residential – Low Density (Including roads) Development Category. Rainfall intensities have been obtained from BOM IFD rainfall charts and IFD Chart 15 from FNQROC Section D4 Appendix A.

Times of Concentration have been determined in accordance with Section 4.6 of QUDM. Specifically, the recommended Overland Sheet Flow Times detailed in Table 4.6.4.

The Hydrological Analysis undertaken including the catchment area and flow widths for the rock lined and swale drain layout are shown in the calculation tables contained in Appendix F.

6.3.1 Overland Flow Contributions

The overland flow paths of a Q100 event from the catchment areas A, C, D and E, which diverge prior to the access cross over to the main pad, show the water level in the drain below the freeboard level of approximately 300mm below the lip level. Freeboard below 300mm also occurs when catchment B diverges with the drain, post the lot access (refer Appendix F – 160-001-SK06 - Q100 +300mm Freeboard Plan).

6.3.2 Barron River Flooded Backflow

The second assessment is based on the backflow from the Barron River when in flood. The level required for the lots to have flood immunity is RL 395.593m AHD as supplied by MSC. The lots are above this level by a minimum of 100mm at the front of the lots (refer Appendix F – 160-001-SK07 – Building Pad Height vs Nominated Minimum RL 395.593.)

6.3.3 Hydrological Analysis

Stream velocities and volumes were calculated for the 5 contributing catchments for AEP values of 83%, 39%, 18%, 10%, 5%, 2% and 1%. Accumulated values were then determined when flow paths converged as they descended through the catchment. The greatest contributing catchment was D (which includes St Stephen's School) where flows volumes were determined as 1.39m³/s and a velocity of 2.042m/s for the 5% AEP and 1.96m³/s and 2.263m/s for the 1% AEP. (Refer Appendix E - Hydrological Analysis).

The combined catchments of A, C, D and E, converge prior to the access crossing to the main pad and had flow volumes of 2.14m³/s and a velocity of 2.365m/s for a 5%AEP and 3.02m³/s and 2.614m/s for a 1% AEP.

Downstream from the $2x450\emptyset$ and access crossing to the main pad, the combined catchments produce flow volumes of $3.27m^3$ /s and a velocity of 2.633m/s for a 5% AEP and $4.61m^3$ /s and 2.722m/s for a 1% AEP.



Mareeba Shire Council have determined the lot levels are to be above RL 395.593 to ensure flood immunity for a Q100 event.

6.3.4 Hydraulic Analysis

The site uses a combination of different sized open table drains to channel the overland flow to the legal point of discharge located at the boundary with Lot 1 on SP163448. Flow depths and velocities were determined using ERSCON's Super Drain spreadsheet. These values are calculated by inputting the drain profile, flow volume (m³/s) and relative slope along the travelled path.

Flow paths from Catchments B and C diverge at the western boundary with Lot 5 on RP 716383. The volumes for both paths are similar with Catchment B flowing north for a 1% AEP at 0.59m³/s at 1.439m/s and height of 0.310m. Catchment C flow contributes to the southern drain, along the western boundary at 0.65m³/s at 1.562m/s and a height of 0.361m for a 1% AEP.

The rear table drain is designed with a 0.5m wide base and a 1 in 2 batter to the design surface with a 1 in 6 max. grade to the rear boundary. The longitudinal fall of the drain is 1% both north and south of the catchment interface. Table 9.5.2 of QUDM nominates a maximum velocity of 2.8m/s for a grassed channel with 100% cover of a couch grass (buffalo grass). The rear table drain shape and grass lining are suitable to handle a 1% AEP flow.

The rock drain profile has both a primary and secondary flow profile. The low flow capture consists of a concrete invert drain which channels the combined minor flows from catchments C and D initially. The secondary flow profile has a 2.10m wide and 0.60m deep rock channel with a 200mm nominal diameter stone in the base and a 450mm nominal rock on the sides with grasses of Lomandra Hystrix growing throughout.

The rock channel has been designed to cater for a Q100 of 4.61m³/s with velocities of 2.722m/s. Based on 6.25Ha and a 0.06m³/s for a .001m³/s/ha contribution, low flow channels require a minimum channel size of 2.0m base width, 0.45m deep and side slopes of 1 on 1 (refer QUDM Table 9.8.1). The rock drain for the low flow is suitable to handle a 10% AEP flow.

The cross section profile for the 600m deep rock drain for a 1% AEP is capable of taking a 0.576m prior to the 2 x 450Ø at the property access. Below the property access, the 1% AEP has a height of 0.751m where the rock drain is 0.9m deep. **The rock drain size and material type are suitable to handle a 1% AEP flow.**

A hydraulic analysis has been calculated and located in Appendix F.

6.4 MINOR DRAINAGE

The minor drainage system involves overland flow on the access driveway. The minor drainage system has a capacity of Q5.

6.4.1 Overland Flow

In accordance with the requirements of QUDM, the minor drainage system, which incorporates overland flow along the access driveway, has been designed for a recurrence interval of 5



years (1% AEP). The runoff will be carried by the minor drainage system in the driveway table drain and discharged into the rock lined drain.

Depth by velocity calculations for half the road flow have been undertaken and all drains produce satisfactory results regarding pedestrian safety.



7 SEWERAGE RETICULATION

The existing sewer reticulation is to be utilised in accordance with the FNQROC Development Manual – Design Guidelines D7 – Sewerage System.

House Connections

A single house connection to the sewer main has been designed based on control to the lowest point of the lot. The sewer is to be deep enough to control the whole property at a minimum grade of 1 in 60 after allowing a depth to invert of 550mm at the start of the drain plus a drop of 150mm from the invert of the house connection to the sewer.



8 SOIL AND WATER MANAGEMENT

A Soil and Water Management Strategy (SWMS) has been produced that identifies policies and development conditions relevant to the site and recommend measures required to satisfy those requirements. In accordance with the FNQROC Section D5. The strategy consists of:

- A Concept Report that identifies the constraints of the site and recommends measures to address those constraints; and
- Soil and Water Management Plan (SWMP) providing measures that can be adopted to address those constraints.

The following documents have been referenced in preparing this SWMP:

- ERSCON Pty Ltd construction drawings;
- FNQROC Development Manual;
- IEAust Soil Erosion and Sediment Control Guidelines;
- NSW DLWC Construction and Sediment Control (Course Notes);
- Queensland Urban Drainage Manual; and
- Australian and New Zealand Guidelines for Freshwater and Marine Water Quality.

8.1 EROSION AND SEDMENT CONTROL STANDARDS

8.1.1 Duty of Care

In accordance with the Environmental Protection Act, 1994 (the Act), all Queenslanders have a legal duty to take all reasonable and practicable measures to minimise or prevent environmental harm.

In accordance with the Integrated Planning Act, 1997, it is a requirement to comply with Council's Planning Scheme and conditions issued in Development Permits.

This SWMP considers environmental harm caused by sediment-laden runoff from the subject site entering stormwater drains and/or waterways.

8.2 CONCEPT REPORT

8.2.1 Site Conditions

The subject site is currently generally well vegetated with medium slopes.

8.2.2 Control Measures

Erosion and sediment control measures are to be designed and constructed in accordance with the FNQROC Development Manual. Specific requirements are provided on drawing 160-001-C111 & C112.



8.2.3 Water Quality Strategy

In accordance with the requirements of the Queensland Urban Drainage Manual, management of water quality involves:

- Identifying and enhancing environmental values;
- Establishing objectives to achieve the required level of protection;
- Establishing water quality management strategies;
- Monitoring and surveillance programs;
- Research.

8.2.4 Water Quality Monitoring

The soil and water management strategy requires water sampling 50m downstream of the point where stormwater drainage discharges. Sampling is required only after significant rainfall i.e. 10mm.

8.3 EROSION AND SEDIMENT CONTROL PLAN

Erosion and sediment control measures are to be designed and constructed in accordance with the FNQROC Development Manual, as detailed in the Soil and Water Management Strategy, and 160-001-C111 "Erosion and Sediment Control Plan" and 160-001-C112 "Erosion and Sediment Control Notes".

The Contractor shall take all reasonable precautions to minimise erosion and prevent sediment-laden runoff from leaving the site. This goal will be monitored to ensure minimal erosion on site and no visible siltation of waterways by implementing effective erosion and sediment control.

The purpose of this SWMP is to ensure the Contractor meets the following objectives:

- Comply with all relevant legislation;
- Ensure erosion and sedimentation is controlled in an appropriate and cost-effective manner;
- Maintain and if possible, enhance the existing environment;
- Reinforce and improve environmental awareness within the workforce and the general community.



8.3.1 Environmental Responsibilities of Key Staff

Inspection Officer

The Inspection Officer is to be nominated by the Contractor.

Project Manager (PM)

The Project Manager will be responsible for:

- Coordinating the response to any major environmental incident and reporting serious or material harm to the Inspection Officer, Council, EPA and/or other agencies as appropriate;
- Monitoring, review and continuous improvement of the SWMP;
- Assess the need and if required ensure the proper completion of all internal and subcontractor audits;
- Ensuring compliance of construction activities with the EP Act and other relevant legislation, codes and specifications;
- Liaison with all external authorities and stakeholders;
- Investigating and addressing complaints in the shortest possible time frame;
- Ensuring appropriate document control is maintained and;
- Supporting and providing advice to the project team.

Contractor Environmental Representative (CER):

The Contractors Environmental Representative will be responsible for:

- The implementation and operation of the environmental control measures as detailed in the SWMP;
- Monitoring the effectiveness of control measures;
- Recording and reporting non-conformances to the SWMP;
- Recording and reporting environmental complaints and incidents;
- Advising the PM and Inspection Officer of all environmental issues;
- Ensuring all staff on-site receive an appropriate environmental induction;
- Taking all reasonable and practical measures to prevent or minimise environmental harm occurring at jobsites under his/her supervision and;
- Seeking advice from the Project Manager if uncertain of environmental requirements.

Works Supervisor (WS):

The Works Supervisor will assist the CER in the implementation of the SWMP, and the ongoing awareness of environmental issues for the Construction Workforce. The overseer shall:

- Have a full understanding of the SWMP;
- Be fully aware of all environmental issues associated with the project; and
- Be responsible for the maintenance of control measures.

Construction Workforce:

Each member of the construction workforce will be responsible for:

- Ensuring they have a full understanding of their own environmental responsibilities;
- Assist in the implementation and maintenance of environmental protection measures in accordance with the SWMP and as directed by the CER; and
- Immediately reporting environmental complaints and incidents to the Environmental Supervisor.


Environmental Organisation Structure





8.3.2 Erosion Potential

Observations from site inspections concur that the risk of sediment laden runoff leaving site is low. The site is naturally well vegetated.

Short sharp rainfall events will create silt/sediment that can be trapped on site. In the event of catastrophic failure of sediment control structures (due to vandalism or other undefined event) clean up operations would quickly mitigate the impacts.

The risk of long-term environmental impacts due to sedimentation from the proposed works is considered very low if the SWMP is fully implemented.

8.3.3 Evaluation of the Project

Investigation into erosion and sedimentation control has been reviewed as follows:

Timing of the Works:

Construction works are will be timed to coincide with a moderate to low rainfall month. Stormwater and sewer works will be constructed first which provide a low risk in terms of erosion and sediment control. Once these works are completed, an assessment of the potential rainfall will be made in consultation with Council to determine if bulk earthworks and road construction will proceed immediately after.

Works Program:

It is expected the works will be completed as follows:

- Approval to proceed;
- Install erosion sediment control devices and site facilities;
- Strip and grub;
- Install Services;
- Commence bulk earthworks (after assessment of potential rainfall);
- Construct Roads;
- Turf batters;
- Grass footpath and other exposed areas;
- Complete works; and
- Hand over.

8.3.4 Best Management Practice

The review of this site has been made in conjunction with the Institute of Engineers Australia "Soil Erosion and Sediment Control Guidelines." All erosion and sedimentation control works are to be completed in accordance with that publication.

The selection methodology for the most appropriate control methods has due regard to costeffectiveness, availability of materials, feasibility, durability, and compatibility. The most significant of the above is compatibility (i.e. has the system been used and proved on previous local works).

Perimeter Channel and Bunds

Diversion Channels and Cut Off Bunds are to be constructed to direct clean water away from the works and through culvert structures. The surrounding landform is steep with good vegetal



cover. Overland flow velocities will be maintained at less than 2.31 m/s, which is considered acceptable (refer IEAust Table A8.5 given full cover).

Permanent Stabilisation Measures

The proposed works do not include hard "engineered" stabilisation methods. It is not considered appropriate (cost effective) to construct "engineered" stabilisation as the existing (where undisturbed) vegetation cover provides appropriate and visually attractive stabilisation.

As part of this SWMP, rehabilitation of vegetation by seeding, drill seeding, turfing and hydro mulching, at an early stage is considered vital to the successful control of erosion (and capture of sedimentation).

Site Office

The site office and plant compound shall be fully fenced with all fuels and hazardous liquids shall be stored in a bunded area 110% the volume of stored liquid. All parking areas shall be maintained in a stable condition including surfacing as required.

Site Entry Points

There shall be only one site entry and exit point. All vehicles must enter and leave the site at these locations only. Site entry points shall also have a wash down area adjacent when stripping, and clearing and grubbing works expose plant and equipment to transportation of weeds.

The following items are proposed for incorporation into the works and details of their use and limitations have been assessed as part of the design process:

- Construction Exits (A5-C3)
- Sediment Fences (A5-C10)
- Catch Drains and Perimeter Banks (A5-A1)
- Rock Check Dams (A5-A2)

8.3.5 Erosion and Sediment Control Plan

For ESCP drawing, refer 160-001-C111 & C112

8.3.6 Implementation, Monitoring and Review

It is the responsibility of the CER to correctly implement and monitor this ESCP. It is also critical that the CER reviews and documents and provide appropriate suggestions for improvements through the project life.

8.3.7 Implementation Strategies

To ensure the objectives of the Erosion and Sediment Control Plan (ESCP) check list of responsibilities and requirements are provided below.

Actions	Locations	Timing	Responsibility
Induct all personnel as appropriate	All	Prior to Disturbance	CER



Flag the limits of disturbance and advise workforce of these	Each stage of	Prior to	CER
limits.	excavation.	disturbance.	OEN
Divert clean water around site using lined or vegetated drains.	Perimeter of site.	Prior to disturbance.	CER
Install sediment control devices.	As per ESCP.	Prior to disturbance.	CER
Flag limits of stockpile sites clear of drainage paths and enclose with sediment fence.	As approved	Duration of works	CER
Prevent stormwater from running over exposed batters by installing catch banks/drains and directing into a stabilized batter chute or off site.	All exposed batters.	As work progresses.	WS
Install check dams in bare earth table drains if required.	Bare earth table drains	As soon as practicable.	WS
Topsoil shall be stockpiled and respread over bare areas prior to grassing to assist re-vegetation.	Bare batters and footpaths	After earthworks are completed	WS
As far as possible, the surface of batters and drains should be left in a roughened state to reduce runoff velocity and promote re-vegetation.	Earth batters and drains	As earthworks proceed.	WS
Bare earth batters to be hydro mulched to protect the surfaces using suitable species mix and application rates.	Earth Batters	As works progress or immediately following final trim of an area.	WS
Footpaths and disturbed areas to be seeded within 1 week of final trim	All exposed areas	As works progress	WS
All ESC devices to remain in place until at least 70% vegetation cover	All exposed areas	At completion of project	WS



8.3.8 Monitoring Requirements

Parameter / Item	Locations	Timing	Responsibility
Visually assess condition of erosion and sediment control devices, clean out sediment (if required), and repair any damage.	All job sites	Daily	WS
Visually inspect the turbidity of runoff leaving the site to determine effectiveness of erosion and sediment controls devices.	All job sites.	During and following any significant rainfall/runoff event.	WS
Record turbidity (photo of turbidity tube) of water over topping sediment control devices.	Downstream of structure.	During and following any significant rainfall/runoff event.	CER
Measure turbidity 50m upstream and 50m downstream.	Downstream of site.	Following rainfall event >10mm	CER
Obtain regular weather forecasts from the Bureau of Meteorology to assess risk.	Forecasts for Cairns district.	Daily.	WS

8.3.9 Reporting

The CER shall maintain appropriate records of each inspection and/or action and shall report any non-conformance incidents to the PM and Inspection Officer for action.

8.3.10 Audit

Auditing shall be completed by the PM following a major non-conformance and during random inspections if deemed necessary.

The PM shall report audit findings to the CER for action.

8.3.11 Emergency Procedures

In the event that a significant failure occurs, and that sediment-laden runoff is leaving the site the CER shall immediately protect the erosion source by:

- Covering the affected area with plastic or geofabric if localised;
- Reducing the flow velocities by installing check dams;
- Rock armour channels where velocities and turbulence are excessive;
- Other methods as deemed appropriate;

The PM shall be notified to jointly assess clean up requirements and if further action is required.

8.3.12 Corrective Action

The CER shall record any non-conformance with the EMP(C) on the Non-Conformance Report (NCR) located within Council's Quality System and notify the Inspection Officer.

8.3.13 Environmental Site Induction

All personnel (staff, workforce, sub-contractors, and plant operators) working on site are to receive appropriate induction as to the requirements of this SWMP.



It is the responsibility of the CER to ensure all site personnel receive appropriate awareness training and induction prior to or as soon as practicable after, commencement on site. The induction shall include instruction regarding the following:

- Environmental objectives and policies;
- Due diligence;
- Environmental duty of care;
- Duties and responsibilities of environmental officers;
- Key environmental issues relating to this project;
- Project specific requirements contained in the Management Plans;

Where deemed appropriate for short-term personnel (including visitors), the CER may elect to provide a brief environmental explanation/induction and control access to the site.

The CER shall maintain a register, signed by all inductees. The CER shall also monitor the existing workforce to ascertain if additional training is required.

8.3.14 Environmental Reporting

The Inspection Officer shall submit an Environmental Report on a monthly basis that will cover the following items:

- Results of all monitoring;
- NCR's against the EMP(C) in accordance with the Quality procedures;
- Monthly EMP(C) review and revisions;
- Results of internal and external audits.

Where an event of potential or actual serious environmental harm is identified, the CER shall immediately inform the PM. The PM shall inform the Inspection Officer (or his representative), Council and the EPA as soon as practicable (but no later than 24 hours).

The PM shall monitor environmental performance throughout the project to determine if and when additional Environmental Audits are required.

8.3.15 Environmental Audits

Environmental Audits of the EMP(C) shall be completed by the PM at the following times:

- Following and event of potential or actual serious environmental harm;
- Prior to submission of "Practical Completion";
- As deemed necessary.





CONMAT PTY LTD QUILL STREET LAND DEVELOPMENT



PROJECT DRAWINGS LIST

160-001-C100	COVER SHEET, LC
160-001-C101	GENERAL NOTES
160-001-C102	CLEARING PLAN
160-001-C103	GENERAL LAYOUT
160-001-C104	GRADING PLAN
160-001-C105	DRIVEWAY PLAN
160-001-C106	DRIVEWAY LONGI
160-001-C107	DRAIN LONGITUDI
160-001-C108	DRAIN LONGITUDI
160-001-C109	SEWER RETICULA
160-001-C110	LANDSCAPE PLAN
160-001-C111	EROSION AND SEI
160-001-C112	EROSION AND SEI

OCALITY PLAN AND DRAWINGS LIST

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DIMENT CONTROL PLAN DIMENT CONTROL DETAILS



GENERAL NOTES:

1. LEVEL DATUM : AHD 2. ORIGIN OF LEVELS:

NUMBER	EASTING	NORTHING	RL	LOCATION
OPM9892	4945.296	10182.504	398.261	QUILL STREET, MAREEBA

- 3. EXISTING CONDITIONS HAVE BEEN BASED ON SURVEY DATA COLLECTED BY RPS. NO RESPONSIBILITY IS TAKEN FOR THE ACCURACY OF THE INFORMATION SHOWN. 4. THE CONTRACTOR TO LIAISE WITH RPS TO ESTABLISH SITE SURVEY CONTROLS.
- 5. DETAILS OF SERVICES ARE PROVIDED FOR INFORMATION ONLY, AND NO RESPONSIBILITY IS TAKEN FOR THE ACCURACY AND COMPLETENESS OF THE INFORMATION. POSITIONS OF SERVICE CROSSINGS SHALL BE RECORDED AND CHECKED BY THE CONTRACTOR. NOT ALL CROSSINGS HAVE NECESSARILY BEEN SHOWN ON THE DRAWINGS. THE CONTRACTOR IS TO CHECK SERVICES ON
- SITE PRIOR TO COMMENCEMENT OF CONSTRUCTION. 6. FOR ALL SPECIFICATIONS REFER TO FNORCC STANDARD SPECIFICATIONS. 7. INSPECTION AND TEST PLANS ARE TO BE UNDERTAKEN BY CONTRACTOR IN ACCORDANCE WITH
- ENOROC DEVELOPMENT MANUAL
- 8. AS CONSTRUCTED DATA TO BE PREPARED AND SUBMITTED BY THE CONTRACTOR IN ACCORDANCE WITH FNQROC DEVELOPMENT MANUAL

EARTHWORKS NOTES:

- 1. ALL EARTHWORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE CURRENT FNQROC DEVELOPMENT MANUAL SPECIFICATION - S1 'EARTHWORKS'.
- FNQROC SPECIFICALLY REFERENCES AS 3798 'GUIDELINES ON EARTHWORKS FOR COMMERCIAL AND RESIDENTIAL DEVELOPMENTS' IN RELATION TO ALL EARTHWORK OPERATIONS INCLUDING APPROPRIATE METHODS OF TESTING, FREQUENCY OF TESTING AND REPORTING PROCEDURES. GEOTECHNICAL TESTING SERVICES SHALL BE AS DETERMINED BY LEVEL 1 IN ACCORDANCE WITH AS 3798. ALL CERTIFICATION AND TEST RESULTS ARE TO BE COMPILED AND PROVIDED TO THE SUPERINTENDENT PRIOR TO WORKS ACCEPTANCE.
- ALL BATTERS SHALL BE 1 IN 3 MAX UNLESS NOTED OTHERWISE ON THE PROJECT DRAWINGS. FINISHED SURFACE LEVELS SHOWN ON PROJECT DRAWINGS ARE AFTER ALL EARTHWORKS ARE COMPLETE INCLUDING TOPSOILING. ALL AREAS ARE TO BE GRADED EVENLY BETWEEN FINISHED
- SURFACE LEVELS UNLESS NOTED OTHERWISE. DRY DENSITY RATIO AS REFERRED TO IN THESE NOTES IS THE RATIO DETERMINED IN ACCORDANCE WITH AS1289.5.4.1 OF COMPACTED DRY DENSITY IN ACCORDANCE WITH AS1289.5.3.1 OR AS1289.5.8.1 TO THE STANDARD MAXIMUM DRY DENSITY DETERMINED IN ACCORDANCE WITH AS1259.5.1.11 (STANDARD COMPACTION).
- NO VEGETATION SHALL BE REMOVED WITHOUT PRIOR APPROVAL OF THE SUPERINTENDENT UNLESS NOTED ON THE PROJECT DRAWINGS.
- ALL VEGETAL MATTER, TOPSOIL AND OTHER UNSUITABLE MATERIAL SHALL BE STRIPPED/REMOVED FROM AREAS TO BE EXCAVATED OR FILLED. ALL VECETAL MATTER AND UNSUITABLE MATERIAL SHALL BE DISPOSE OF OFF-SITE UNLESS ADVISED OTHERWISE BY THE SUPERINTENDENT. SHALL BE STOCKPILED ON-SITE FOR REUSE. SURPLUS TOPSOIL SHALL BE DISPOSED TOPSOIL OF OFF-SITE.
- SHOULD ANY SOFT OR UNSUITABLE MATERIAL BE IDENTIFIED, THE CONTRACTOR SHALL INFORM THE SUPERINTENDENT IMMEDIATELY AND SEEK THE ADVICE OF THE SUPERINTENDENT OR GITA. COMPACT FILL TO 95% DRY DENSITY RATIO IN LAYERS OF THICKNESS APPROPRIATE TO THE 9.
- COMPACTION PLANT EMPLOYED BT NOT EXCEEDING 300mm. 10. ROAD VERGE SHALL BE FULLY TURFED ON COMPLETION OF TOPSOILING. ELSEWHERE, DISTURBED AREAS 1:3 OR FLATTER SHALL BE GRASS SEEDED AND AREAS STEEPER THAN 1:3 SHALL BE HYDROMULCHED (UNLESS NOTED OTHERWISE).

CONCRETE NOTES:

1. ALL CONCRETE WORKS INCLUDING SUPPLY, PLACEMENT, COMPACTION, REINFORCEMENT AND FINISHING SHALL BE CARRIED OUT IN ACCORDANCE WITH THE CURRENT FNQROC DEVELOPMENT MANUAL SPECIFICATION - S7 CONCRETE WORKS

DRAINAGE NOTES:

- 1. ALL STORMWATER DRAINAGE WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE
- CURRENT FNQROC DEVELOPMENT MANUAL SPECIFICATION S4 'STORMWATER DRAINAGE'. ALL REINFORCED CONCRETE PIPES SHALL BE CLASS 2 UNLESS NOTED OTHERWISE. ALTERNATIVE MATERIAL TYPES SUCH AS HDPE OR FRC MAY BE USED SUBJECT TO 2.
- SUPERINTENDENTS/COUNCIL APPROVAL. ALL PVC PIPES SHALL BE CLASS SN4 MINIMUM SWJ UNLESS NOTED OTHERWISE
- EXCAVATION, BEDDING AND BACKFILL FOR CONCRETE PIPES SHALL BE CARRIED OUT IN ACCORDANCE WITH FNQROC STANDARD DRAWING S1046. EXCAVATION, BEDDING AND BACKFILL FOR PVC PIPES TO BE IN ACCORDANCE WITH AS/NZS 5.
- 2566.2 "BURIED FLEXIBLE PIPES PART 2 INSTALLATION" ALL KERB INLET PITS TO BE CONSTRUCTED IN ACCORDANCE WITH FNOROC STD DRG'S S1050
- 6. AND \$1060
- 7. ALL PRECAST HEADWALLS SHALL BE PROVIDED WITH A CUT-OFF WALL IN ACCORDANCE WITH FNQROC STD DRG S1075.

EROSION AND SEDIMENT CONTROL NOTES:

- PRIOR TO CONSTRUCTION COMMENCING, THE CONTRACTOR MUST PREPARE AN EROSION & 1. SEDIMENT CONTROL PLAN (ESCP) TO MANAGE THE SITE DURING CONSTRUCTION AND THE DEFECT LIABILITY PERIOD.
- THE ESCP MUST BE CONSISTENT WITH THE APPROVED EROSION & SEDIMENT CONTROL STRATEGY (ESCS) AND SHALL TAKE INTO CONSIDERATION THE CONTRACTOR'S PROPOSED
- STRATEGY (ESCS) AND SHALL TAKE INTO CONSIDERATION THE CONTRACTOR'S PROPOSED CONSTRUCTION METHODOLOGY AND PROGRAM. AN ESCP THAT DIFFERS TO THE APPROVED ESCS MUST BE SUBMITTED TO THE SUPERINTENDENT FOR APPROVAL PRIOR TO SUBMITTING TO COUNCIL. NO EARTHWORKS SHALL COMMENCE ON ANY PART OF THE SITE PRIOR TO APPROPRIATE 3. 4.
- EROSION AND SEDIMENT CONTROL MEASURES BEING INSTALLED DOWNSTREAM OF THE SITE AND IN ACCORDANCE WITH THE APPROVED ESCP.
- AT ALL TIMES THE CONTRACTOR SHALL MONITOR THE PREVAILING WEATHER CONDITIONS AND TAKE ALL NECESSARY PRECAUTIONS TO CONTROL EROSION AND DOWNSTREAM SEDIMENTATION DURING ALL STAGES OF CONSTRUCTION.
- THE IMPACT ON THE ENVIRONMENT SHALL BE MINIMISED BY OBSERVING THE FOLLOWING CONSTRUCTION PRACTICES:
 - AREAS DISTURBED BY CONSTRUCTION TRAFFIC AND PROCEDURES SHALL BE MINIMISED. • MINIMISE TRAFFIC MOVEMENTS AND SPEEDS ON EXPOSED SURFACES.
 - REVEGETATION OF DISTURBED AREAS SHALL BE CARRIED OUT SOON AFTER THE COMPLETION OF TOPSOIL PLACEMENT
 - · FLOW DIVERSION SHALL BE CARRIED OUT BY EARLY INSTALLATION OF DRAINS ALONG TOPS OF BATTERS WITH APPROPRIATE SILTATION CONTROL DEVICES.
 - SEDIMENT INTERCEPTION BY THE PLACEMENT OF SUITABLE RETENTION SYSTEMS ACROSS DRAINAGE LINES AND AT INTERCEPTION POINTS FOR BOTH THE CONSTRUCTION AND STOCKPILE AREAS.
- ALL ACCESS TO AND FROM THE SITE SHALL BE VIA A TEMPORARY CONSTRUCTION ENTRY/EXIT THE CONTRACTOR SHALL NOMINATE A PROPOSED ACCESS LOCATION ON THE ESC PLAN FOR PROVAL BY THE SUPERINTENDENT.
- STOCKPILES SHALL ONLY BE LOCATED IN AREAS NOMINATED ON THE PROJECT DRAWINGS OR APPROVED BY THE SUPERINTENDENT. ALL STOCKPILES MUST HAVE APPROPRIATE ESC MEASURES INSTALLED TO PREVENT SEDIMENT TRANSPORT. THE MAXIMUM HEIGHT OF ALL STOCKPILES MUST BE LIMITED TO 2.0m
- ALL PERMANENT AND TEMPORARY UNLINED SWALES AND DRAINS MUST HAVE APPROPRIATE EMPORARY EROSION PROTECTION.
- ALL PARTIALLY CONSTRUCTED DRAINAGE STRUCTURES MUST BE PROTECTED AGAINST SEDIMENT INFILTRATION DURING CONSTRUCTION.
- ALL COMPLETED DRAINAGE STRUCTURES MUST BE PROTECTED AGAINST SEDIMENT INFILTRATION UNTIL GRASSING IS ESTABLISHED.
- THE CONTRACTOR IS RESPONSIBLE FOR THE CONTROL OF DUST EMANATING FROM THE SITE AT ALL TIMES FOR THE DURATION OF CONSTRUCTION. WET SUPPRESSION METHODS TO BE USED
- 10. ALL EROSION AND SEDIMENT CONTROL MEASURES MUST BE CHECKED FOR DAMAGE, CLEANED OUT AND FULLY REINSTATED AFTER EACH RAINFALL EVENT RESULTING IN RUNOFF 11. IF EROSION AND SEDIMENT CONTROL DEVICES HAVE BEEN FOUND TO BE DEFICIENT OR FAILED
- SERVICE, DUE TO UNFORESEEN CIRCUMSTANCES, CORRECTIVE ACTION IS TO BE UNDERTAKEN IMMEDIATELY WHICH MAY INCLUDE AMENDMENTS/ADDITIONS TO THE ORIGINAL APPROVED FROSION CONTROL PLANS.
- 12. THE INSTALLATION, REMOVAL, RELOCATION OR MODIFICATION TO EROSION AND SEDIMENT CONTROL DEVICES MAY BE MADE BY COUNCIL IF DEEMED NECESSARY AND RELEVANT. 13. EROSION AND SEDIMENT CONTROL DEVICES SHALL REMAIN IN PLACE UNTIL THE TREATMENT
- AREA IS SUITABLY STABILISED/VEGETATED. THE CONTRACTOR SHALL UNDERTAKE A FORMAL COMPLIANCE AUDIT OF THE ESC AT SIX WEEKS INTERVALS DURING THE CONSTRUCTION PERIOD OF THE PROJECT. RECORDS OF THE AUDIT SHALL BE RETAINED ON SITE. WHERE IDENTIFIED AS PART OF THE AUDIT THE ESCP SHALL BE UPDATED AND PROVIDED TO THE SUPERINTENDENT

SEWER NOTES:

- ALL SEWER WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE CURRENT FNQROC DEVELOPMENT MANUAL SPECIFICATION S6 'SEWERAGE RETICULATION'.
 ALL NEW SEWER MAINS AND MANHOLES TO BE CONSTRUCTED IN ACCORDANCE WITH FNQROC
- STD DRAWINGS 3000 AND S3015.
- 3. ALL SEWER MANHOLE COVERS SHALL BE CIRCULAR UNLESS NOTED OTHERWISE. COVERS SHALL BE TYPE B INSIDE PROPERTIES AND TYPE C ELSEWHERE. ALL SEWER MANHOLE COVER LEVELS TO BE 50mm ABOVE FINISHED SURFACE LEVEL UNLESS
- NOTED OTHERWISE. 5. ALL HOUSE CONNECTION BRANCHES TO NEW SEWER MAINS TO BE CONSTRUCTED IN
- ACCORDANCE WITH THE PROJECT DRAWINGS AND FNQROC STD DRAWING S3005. BRANCHES SHALL BE CLEARLY MARKED IN ACCORDANCE WITH THE SPECIFICATION.
- SHALL BE CLEARLT MARKED IN ACCORDANCE WITH THE SPECIFICATION. COUNCIL MUST BE CONTACTED TO PERFORM ANY DIRECT CONNECTION TO LIVE SEWER MAINS. THE CONTRACTOR SHALL LODGE WITH COUNCIL THE APPROPRIATE APPLICATION FORMS AND FEES FOR THESE WORKS TO BE COMPLETED. IT MAY BE POSSIBLE FOR SOME WORKS TO BE PERFORMED BY THE CONTRACTOR UNDER SPECIAL CIRCUMSTANCES AND SUBJECT TO APPROPRIATE CONDITIONS AGREED TO WITH COUNCIL. THE CONTRACTOR SHALL CARRY OUT A CCTV INSPECTION THROUGH ALL SEWERS WITHIN THE
- DEVELOPMENT BOTH PRIOR TO COMMENCING WORKS AND ALSO ON COMPLETION OF CONSTRUCTION ACTIVITY ON THE SITE. THE FOOTAGE TO THE SUPERINTENDENT FOR ASSESSMENT. ANY SECTIONS OF SEWER CONSIDERED TO BE DAMAGED DURING CONSTRUCTION SHALL BE RECTIFIED TO THE SATISFACTION OF COUNCIL

WATER NOTES:

- AND DUCTILE IRON COMPATIBLE.
- & S2016. ENSURE COVER TO WATER MAINS IS 800mm MINIMUM UNDER ROADWAYS AND 600mm MINIMUM ELSEWHERE.
- IS TO BE WRAPPED ONCE AROUND ALL HYDRANTS AND VALVES. 6. COUNCIL MUST BE CONTACTED TO PERFORM ANY DIRECT CONNECTION OR ALTERATION TO LIVE

LANDSCAPING NOTES:

- DEVELOPMENT MANUAL SPECIFICATION S8 'LANDSCAPING
- ADVANCE TO ENSURE AVAILABILITY

- SERVICES
- STREET TREES FINAL LOCATION SHALL BE IN ACCORDANCE WITH THE FOLLOWING: b. GREATER THAN 7.5m FROM STREET LIGHTS c. GREATER THAN 2.0m FROM STORMWATER DRAINAGE PITS
- d. GREATER THAN 3.0m FROM DRIVEWAYS

MG

MF

RAWING

DESIGNED

PERIOD

	03/04/23	INITIAL ISSUE		
).	DATE	DESCRIPTION	DESIGN	APPROVED





CLIENT

NTS

SCALE

DRAWN APPROVED	MF	
CIVIL SIGNOFF	APPROVAL	

MG

ALL WATER RETICULATION WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE CURRENT FNQROC DEVELOPMENT MANUAL SPECIFICATION - S5 'WATER RETICULATION'. ALL PVC AND PE PIPES SHALL BE CLASS PN16. PVC PIPES SHALL BE RUBBER RING JOINTED

3. FOR MAIN TRENCHING, BEDDING & ANCHORAGE DETAILS REFER FNQROC STD DRAWINGS S2015

ALL WATER MAINS SHALL BE INSTALLED ON A STANDARD 2.0m OFFSET FROM THE PROPERTY BOUNDARY UNLESS NOTED OTHERWISE ON PLANS.

WHERE NON-METALLIC PIPES ARE LAID, A CONTINUOUS STEEL WIRE, 1.6mm MIN DIAMETER, SHALL BE LAID IMMEDIATELY ABOVE THE FILL SAND TO ASSIST IN FUTURE LOCATING. THIS WIRE

WATER MANS. THE CONTRACTOR SHALL LODGE WITH COUNCIL THE APPROPRIATE APPLICATION FORMS AND FEES FOR THESE WORKS TO BE COMPLETED. IT MAY BE POSSIBLE FOR SOME VORKS TO BE PERFORMED BY THE CONTRACTOR UNDER SPECIAL CIRCUMSTANCES AND SUBJECT TO APPROPRIATE CONDITIONS AGREED TO WITH COUNCIL.

ALL HYDRANTS AND VALVES TO BE LOCATED OPPOSITE PROPERTY BOUNDARY TRUNCATIONS AND CORNERS, UNLESS NOTED OTHERWISE ON PLANS. FOR VALVES & HYDRANT BOXES INSTALLATION DETAILS REFER FNQROC STD DRAWINGS S2000 AND S2005.

HYDRANTS OR VALVES CONSTRUCTED IN CONCRETE ARE TO HAVE A COMPRESSIBLE LAYER (ABLEFLEX) INSTALLED ON THE SURROUND. REFER FNQROC STD DRAWING \$2000. THE MINIMUM TEST PRESSURE FOR ALL PIPES SHALL BE 1250 KPa. THE GIVE COUNCILS WATER OFFICER 24 HOURS NOTICE PRIOR TO TESTING. PERIOD. THE CONTRACT SHALL

1. ALL LANDSCAPING WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE CURRENT FNQROC

ALL PLANTS MUST BE ORDER SUPPLIED BY A REPUTABLE NURSERY, AND ORDERED WELL IN TURF TO BE USED SHALL BE ROLLED B GRADE TURF MIX OF SPECIES 80% BUFFALO GRASS

(AXONOPUS COMPRESSUS) AND 20% COUCH GRASS VARIETIES. STREET TREES SHALL BE PROVIDED WHERE INDICATED ON PLAN. FINAL LOCATION TO BE DETERMINED ON SITE FOLLOWING INSTALLATION OF DRIVEWAYS AND CONFIRMATION OF SITE

a. GREATER THAN 4.0m FROM ELECTRICITY OR TELECOMMUNICATION POLES OR PILLARS.

e A MINIMUM OF 0.8m AND A MAXIMUM OF 1.0m FROM THE BACK OF KERB TEMPORARY IRRIGATION SHALL BE INSTALLED TO ENABLE WATERING DURING THE ESTABLISHMENT



REF	CONMAT PTY LTD		
	QUILL STREET LAND DEVELOPME	NT	
REF	GENERAL NOTES		
NO	160-001-C101	SIZE A3	REVISION







1 RP700513



4 SP163448



<u>LEGEND</u>

	STAGE BOUNDARY
	PROPOSED TOP OF BATTER
	PROPOSED BOTTOM OF BATTER
	EXISTING SEWER EASEMENT
——— E ———	EXISTING ELECTRICITY (A/G)
S	EXISTING SEWER MAIN
W	EXISTING WATER MAIN
— т —	EXISTING TELSTRA
_///	EXISTING FENCE
	EXISTING BUILDING
	PAD BOUNDARY
	WORKS AREA



F	CONMAT PTY LTD		
	QUILL STREET LAND DEVELOPME	NT	
F	GENERAL LAYOUT PLAN		
	160-001-C103	SIZE A3	REVISION







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PROPOSED MAJOR CONTOURS (1.0m INTERVAL) PROPOSED MINOR CONTOURS (0.1m INTERVAL) PAD BOUNDARY PROPOSED TOP OF BATTER PROPOSED BOTTOM OF BATTER EXISTING SEWER MAIN SEWER EASEMENT PROPOSED FILL

SP163448

SP163448

PAD SETOUT						
POINT NUMBER	EASTING	NORTHING	HEIGHT			
1	4903.079	10237.163	395.624			
2	4907.599	10223.085	395.624			
3	4908.123	10218.001	395.639			
4	4910.710	10169.102	395.760			
5	4909.473	10165.081	395.784			
6	4893.069	10159.875	395.956			
7	4872.232	10222.442	395.964			
8	4872.321	10224.414	395.959			
9	4873.084	10225.948	395.948			
10	4874.286	10227.121	395.930			
11	4877.179	10228.286	395.910			
12	4897.243	10235.899	395.712			
13	4900.155	10236.678	395.652			
14	4977.753	10245.366	395.770			
15	4981.675	10233.038	395.900			
16	4946.039	10220.952	395.900			
17	4942.936	10230.709	395.780			
18	4947.128	10238.517	395.740			
19	4962.896	10243.590	395.740			

ROCK LINED DRAIN - CONTROL LINE

١G	NORTHING	BEARING	RAD/SPIRAL	A.LENGTH	DEFL.ANGLE
40	10158.029	72°12'00.00"			
61	10161.375	72°12'00.00"			
06	10163.669		-10	12.876	73°46'35.22"
00	10171.171	358*25'24.78"			
90	10186.084	358 25'24.78"			
27	10188.348		20	4.510	12*55'08.29"
44	10190.594	11*20'33.07"			
49	10237.807	11*20'33.07"			
88	10240.510		15	8.153	31°08'25.05"
42	10244.954	42°28'58.12"			
10	10246.073	42°28'58.12"			

BATTER TOP - CONTROL LINE

١G	NORTHING	BEARING	RAD/SPIRAL	A.LENGTH	DEFL.ANGLE
45	10157.398				
34	10221.908	342 11'59.95"	13	19.415	85*34'09"
93	10237.915	67°46'09.17"			
35	10246.884	67°46'09.17"			6'08'36"
63	10249.055	73*54'45.16"			

CATCH DRAIN - CONTROL LINE

١G	NORTHING	BEARING	RAD/SPIRAL	A.LENGTH	DEFL.ANGLE
82	10159.080			64.654	
18	10220.639 342*12'01.66"		7	10.594	86*42'55"
65	10229.310	68°54'56.20"	7	19.146	
29	10236.198	68°54'56.20"	100	10.889	6'14'21"
82	10239.555	75°09'17.28"	100	50.147	
56	10252.403	75'09'17.28"			



CONMAT PTY LTD

QUILL STREET LAND DEVELOPMENT

GRADING PLAN

160-001-C104

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LOT 1 DRIVEWAY

THING	BEARING	RAD/SPIRAL	A.LENGTH	DEFL.ANGLE
04.914	312*02'53.90"			
20.765	342*12'00.00"			
27.561		R = -12.000	12.879	61*29'32.69"
28.888	280*42'27.31"			
29.675	280*42'27.31"			
30.525		R = -18.000	8.956	28°30'27.31"
29.127	252*12'00.00"			
25.976	252*12'00.00"			

LEGEND

	STAGE BOUNDARY
1.0	PROPOSED MAJOR CONTOURS (1.0m INTERVAL)
	PROPOSED MINOR CONTOURS (0.1m INTERVAL)
_///	EXISTING FENCE
	EXISTING BUILDING
	PAD BOUNDARY
_//	NEW HANDRAIL
s	EXISTING SEWER MAIN
	NEW GRAVEL DRIVEWAY
	EXISTING CONCRETE SPANNING SLAB
\bullet	PROPOSED GUIDE POSTS



CONMAT PTY LTD QUILL STREET LAND DEVELOPMENT

DRIVEWAY PLAN

160-001-C105

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		QUILL STREET CH.0.145/VTP396.942 CH.2.759/IP396.706	373/NTP396.289 9			COMPACT TO 98% SRDD MIN. CBR 5 FOR SUBGRADE. GRAVEL DRIVEW SCALE
			CH.5.	CH. 18.03/IP394.266	CH.31.128/VTP393.775	2211.4665d1//197.665.HD EXISTING SURFACE
160-001-C106 DRIVEWAY LONG.dwg	Horizontal Curve Data Vertical Geometry Grade Vertical Grade Length Vertical Curve Length (m Vertical Curve Radius (m DATUM RL388.000	(%) = 9.008 % 2.759m) = 5.228m VC R = 75	-15.978 % 15.271m	9.176m VC R = 75		R-18m 13.219 % 14.493m R = 50 R = 50
sion\Drawings\	CUT/FILL	2 0.15 2 0.083 1 0.011	9 0.048 0.226	7 -0.05 5 -0.056 8 -0.048 4 0.058	4 0.296 0.242 5 0.373	9 0.878 1 0.376 2 0.469 4 0.496 7 0.911
uill St Subdivi	CENTRELINE	05 396.95 09.396.95 00 396.66	394,999	37 394.40 1 394.23 16 394.23 16 394.23	8 393.81. 8 393.81. 2 393.73	1 393.77 15 393.77 15 393.77 16 394.27 18 394.77
onmat\001 Q	NATURAL SUR		396.24	394.45 394.45 394.26 394.26	393.51 393.51 393.35	392.90 393.41 393.70 393.70 393.70
rrscon)/160 C	CHAINAGE	0 0.145 2.759	5.373 5.3742 13.442	18.03 18.578 20 220 22.618	30.111 31.28 33.152	35.233 35.233 35.52 39.761 40 40 44.189 44.189
) PM box\Erscon (∈				LOT 1 DRIVE	WAY - LONGITUDINAL SECTION	
PLOT DATE3/04/2024 2:32:0 FILE LOCATIOND'/ERSCON Droi REVISIONS	A 03/04/24 INITIAL ISSUE NO. DATE DESCRIPTION	DESIGN APPROVED			SCALE 1:200 0 2 3 4 5 7 A3 HORIZONTAL 1:5 0 0.05 0.1 0.15 0.2 0.25 0.3 A3 VERTICAL ALL DIMENSIONS IN METRES UNLESS NOTED OTHERWISE	DRAWN MG DESIGNED MG PROJECT DRAWN MF DESIGN MF DESIGN MF CMUL SIGNOFF APPROVAL DRAWING DRAWING DRAWING DRAWING DATE: RPEQ: DRAWING DRAWING DRAWING DRAWING



TYPE 2.3 200mm THICK GRAVEL DRIVEWAY, – REFER FNQROC STD DWG S1110.

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		CONSTRU		
F	CONMAT PTY	LTD		
	QUILL STREET LAND D	EVELOPMEI	NT	
F	SEWER RETICULAT	TION PLAN		
	160-001-C109		A3	



PROPOSED MAJOR CONTOURS (1.0m INTERVAL) PROPOSED MINOR CONTOURS (0.1m INTERVAL) PAD BOUNDARY EXISTING BUILDING EXISTING SEWER NEW CONCRETE DRIVEWAY

EXISTING DN150 PVC SEWER (PLOTTED APPROXIMATELY ONLY)

4 SP163448

1 SP163448

1 RP700513







LEGEND

1.0	PROPOSED MAJOR CONTOURS (1.0m INTERVAL)
	PROPOSED MINOR CONTOURS (0.1m INTERVAL)
1.0	EXISTING MAJOR CONTOURS (1.0m INTERVAL)
	EXISTING MINOR CONTOURS (0.1m INTERVAL)
	EXTENT OF DISTURBANCE
	CLEAN WATER DIVERSION BUND
	TEMPORARY CONSTRUCTION ENTRY / EXIT
SF	SEDIMENT FENCING
	ROCK FILTER DAM



CONMAT PTY LTD QUILL STREET LAND DEVELOPMENT

EROSION AND SEDIMENT CONTROL PLAN

|--|

A3

A3 REVISION A

SEDIMENT FENCE

MATERIAI

EABRIC: POLYPROPYLENE, POLYAMIDE, NYLON, POLYESTER, OR POLYETHYLENE WOVEN OR NON-WOVEN FABRIC, AT LEAST 700mm IN WIDTH AND A MINIMUM UNIT WEIGHT OF 1406SM. ALL FABRICS TO CONTAIN ULTRAVIOLET INHIBITORS AND STABILISERS TO PROVIDE A MINIMUM OF 6 MONTHS OF USEABLE CONSTRUCTION LIFE (ULTRAVIOLET STABILITY EXCEEDING 70%).

FABRIC REINFORCEMENT: WIRE OR STEEL MESH MINIMUM 14-GAUGE WITH A MAXIMUM MESH SPACING OF 200mm.

SUPPORT POSTS/STAKES:

1500mm² (MIN) HARDWOOD, 2500mm² (MIN) SOFTWOOD, OR 1.5kg/m (MIN) STEEL STAR PICKETS SUITABLE FOR ATTACHING FABRIC.

- INSTALLATION
- REFER TO APPROVED PLANS FOR LOCATION, EXTENT AND REQUIRED TYPE OF FABRIC (IF SPECIFIED). IF THERE ARE QUESTIONS OR PROBLEMS WITH THE LOCATION, EXTENT, FABRIC TYPE, OR METHOD OF INSTALLATION CONTACT THE ENGINEER OR RESPONSIBLE ON-SITE OFFICIER FOR ASSISTANCE.
 TO THE MAXIMUM DEGREE PRACTICAL, AND WHERE THE PLANS ALLOW, ENSURE THE FENCE IS LOCATED:

 TOTALLY WITHIN THE PROPERTY BOUNDARIES;
 ALONG A LINE OF CONSTANT ELEVATION WHEREVER PRACTICAL;
 TOTALLY EFOLVED FOR ASSISTANCE OF MAXIMUM DEGREE OF AND AND WHEREVER PRACTICAL;

- iii. AT LEAST 2m FROM THE TOE OF ANY FILLING OPERATIONS THAT MAY RESULT IN SHIFTING SOIL/FILL
- iii. AT LEASI 2m FROM THE TOE OF ANY FILLING OPERATIONS THAT MAY RESULT IN SHIFTING SUIL/FILL DAMAGING THE FEROLE.
 iii) INSTALL RETURNS WITHIN THE FENCE AT MAXIMUM 20m INTERVALS IF THE FENCE IS INSTALLED ALONG THE CONTOUR, OR 5 TO 10m MAXIMUM SPACING (DEPENDING ON SLOPE) IF THE FENCE IS INSTALLED AT AN ANGLE TO THE CONTOUR. THE 'RETURN'S SHALL CONSIST OF EITHER:
 ii) V-SHAPED SECTION EXTENDING AT LEAST 1.5m UP THE SLOPE; OR

- V-SHAPED SECTION EXTENDING AT LEAST 1.5m UP THE SLOPE; OR
 SANDBAG OR ROCK/AGGREGATE CHECK DAM A MINIMUM 1/3 AND MAXIMUM 1/2 FENCE HEIGHT, AND EXTENDING AT LEAST 1.5m UP THE SLOPE.
 ENSURE THE EXTREME ENDS OF THE FENCE ARE TURNED UP THE SLOPE AT LEAST 1.5m, OR AS NECESSARY, TO MINIMISE WATER BYPASSING AROUND THE FENCE.
 ENSURE THE SEDIMENT FENCE IS INSTALLED IN A MANNER THAT AVOIDS THE CONCENTRATION OF FLOW ALONG THE FENCE, AND THE UNDESIGNABLE DISCHARGE OF WATER AROUND THE ENDS OF THE FENCE.
 IF THE SEDIMENT FENCE IS TO BE INSTALLED ALONG THE EDGE OF EXISTING TREES, ENSURE CARE IS TAKEN TO PROTECT LEE TREES, AND THEIP POOT SYSTEME DIRIGN. BUILD ALONG THE FENCE.

- PROTECT THE TREES AND THEIR ROOT SYSTEMS DURING INSTALLATION OF THE FENCE. DO NOT ATTACH THE FABRIC TO THE TREES
- FABRIC TO THE TREES. 1. UNLESS DIRECTED BY THE SITE SUPERVISOR OR THE APPROVED PLANS, EXCAVATE A 200mm WIDE BY 200mm DEEP TRENCH ALONG THE PROPOSED FENCE LINE, PLACING THE EXCAVATED MATERIAL ON THE UP-SLOPE SIDE OF THE TRENCH. 8. ALONG THE LOWER SIDE OF THE TRENCH, APPROPRIATELY SECURE THE STAKES INTO THE GROUND SPACED NO GREATER THAN 3m IF SUPPORTED BY A TOP SUPPORT WIRE OR WEIR MESH BACKING, OTHERWISE NO GREATER THAN 3M IF SUPPORTED BY A TOP SUPPORT WIRE OR WEIR MESH BACKING, OTHERWISE NO GREATER
- 9. IF SPECIFIED, SECURELY ATTACH THE SUPPORT WIRE OR MESH TO THE UP-SLOPE SIDE OF THE STAKES WITH THE
- MESH EXTENDING AT LEAST 200mm INTO THE EXCAVATED TRENCH, ENSURE THE MESH AND FABRIC IS ATTACHED TO THE UP-SLOPE SIDE OF THE STAKES EVEN WHEN DIRECTING A FENCE AROUND A CORNER OR SHARP CHANGE 10. WHEREVER POSSIBLE, CONSTRUCT THE SEDIMENT FENCE FROM A CONTINUOUS ROLL OF FABRIC. TO JOIN FABRIC
- EITHER: ATTACH EACH END TO TWO OVERLAPPING STAKES WITH THE FABRIC FOLDING AROUND THE ASSOCIATED STAKE ONE TURN, AND WITH THE TWO STAKES TIED TOGETHER WITH WIRE; OR I. OVERLAP THE FABRIC TO THE VERYL ADJACENT SUPPORT POST. 11. SECURELY ATTACH THE FABRIC TO THE SUPPORT POSTS USING 25 X 12.5mm STAPLES, OR TIE WIRE AT MAXIMUM
- 150mm SPACING.

- SECURELY ATTACH THE FABRIC TO THE SUPPORT WIRE/MESH (IF ANY) AT A MAXIMUM SPACING OF 1m.
 SECURELY ATTACH THE FABRIC TO THE SUPPORT WIRE/MESH (IF ANY) AT A MAXIMUM SPACING OF 1m.
 ENSURE THE COMPLETED SEDIMENT FENCE IS AT 450mm, BUT NOT MORE THAN 700mm HIGH. IF A SPILL-THOUGH WEIR IS INSTALLED, ENSURE THE CREST OF THE WEIR IS AT LEAST 300mm ABOVE GROUND LEVEL.
 BACKFILL THE TRENCH AND TAMP THE FILL TO FIRMLY ANCHOR THE BOTTOM OF THE FABRIC AND MESH TO PREVENT WATER FROM FLOWING UNDER THE FENCE.
- ADDITIONAL REQUIREMENTS FOR THE INSTALLATION OF SPILL-THROUGH WEIR
- ADDITIONAL REQUIREMENTS FOR THE INSTALLATION OF SFILL-THROUGH WEIR 15. LOCATE THE SPILL -THROUGH WEIR SUCH THAT THE WEIR CREST WILL BE LOWER THAN THE GROUND LEVEL AT EACH END OF THE FENCE. 16. ENSURE THE CREST OF THE SPILL-THROUGH WEIR IS AT LEAST 300mm THE GROUND ELEVATION. 17. SECURELY THE A HORIZONTAL CROSS MEMBER (WEIR) TO THE SUPPORT POSTS/STAKES EACH SIDE OF THE WEIR. CUT THE FABRIC DOWN THE SIDE OF EACH POST AND FOLD THE FABRIC OVER THE CROSS MEMBER AND MEMBER AND
- APPROPRIATELY SECURE THE FABRIC
- 18. INSTALL A SUITABLE SPLASH PAD AND/OR CHUTE IMMEDIATELY DOWN-SLOPE OF THE SPILL-THROUGH WEIR TO CONTROL SOIL EROSION AND APPROPRIATELY DISCHARGE THE CONCENTRATED FLOW PASSING OVER THE WEIR. MAINTENANCE
- 19. INSPECT THE SEDIMENT FENCE AT LEAST WEEKLY AND AFTER ANY SIGNIFICANT RAIN. MAKE NECESSARY REPAIRS
- IMMEDIATELY. 20. REPAR ANY TORN SECTIONS WITH A CONTINUOUS PIECE OF FABRIC FROM POST TO POST. 21. WHEN MAKING REPAIRS, ALWAYS RESTORE THE SYSTEM TO ITS ORIGINAL CONFIGURATION UNLESS AN AMENDED LAYOUT IS REQUIRED OR SPECIFIED. 22. IF THE FENCE IS SAGGING BETWEEN STAKES, INSTALL ADDITIONAL SUPPORT POSTS.
- 23. REMOVE ACCUMULATED SEDIMENT IF THE SEDIMENT DEPOSIT EXCEEDS A DEPTH OF 1/3 THE HEIGHT OF THE
- FENCE. 24. DISPOSE OF SEDIMENT IN A SUITABLE MANNER THAT WILL NOT CAUSE AN EROSION OR POLLUTION HAZARD. 25. REPLACE THE FABRIC IS THE SERVICE LIFE OF THE EXISTING FABRIC EXCEEDS 6 MONTHS.
- REMOVAL
- 26. WHEN DISTURBED AREAS UP-SLOPE OF THE SEDIMENT FENCE ARE SUFFICIENTLY STABILISED TO RESTRAIN
- WHEN DISTORED AREAS OF SLOPE OF THE SEMENT FENCE ARE SUFFICIENTLY STABILISED TO RESTRAIN EROSION, THE FENCE MUST BE REMOVED.
 REMOVE MATERIALS AND COLLECTED SEDIMENT AND DISPOSE OF IN A SUITABLE MANNER THAT WILL NOT CAUSE AN EROSION OR POLLUTION HAZARD.
- 28. REHABILITATE/REVEGETATE THE DISTURBED GROUND AS NECESSARY TO MINIMISE THE EROSION HAZARD.





- WHEN CONSTRUCTION WORK WITHIN THE DRAINAGE AREA ABOVE THE FILTER DAM HAS BEEN COMPLETED, AND THE DISTURBED AREAS AND THE DRAINAGE CHANNEL ARE SUFFICIENTLY STABILISED TO RESTRAIN EROSION, ALL TEMPORARY CHECK DAMS MUST BE SUFFICIENTLY STABILISED TO RESTRAIN EROSION, ALL TEMPORARY CHECK DAMS MUST E REMOVED. REMOVE THE FILTER DAM AND ASSOCIATED SEDIMENT AND DISPOSE OF IN A SUITABLE MANNER THAT WILL NOT CAUSE AN EROSION OR POLLUTION HAZARD. 2.

1. THE SPACING OF C EXCEED THE MAXIMUM SPACING WHERE: H IS THE HORI BY H(H):1(V) AND (% SL

MING

SPACING



3.Gn
Lenigration
50–75MM CRUSHED ROCK (200MM MINIMUM),
GEOTEXTILE FILTER MATERIAL UNDER WHEN
WORKING ON CLAYEY SOILS OR WHERE DIRECTED
300MM HIGH RUNOFF DIVERSION BUND
المحتمد المحتم المحتمد المحتمد المحتم المحتمد المحتمد المحتم المحتمد المحتمد المحتم المح المحتمد المحتمد المحتم المحتمد المحتمد المحتم المحتمد المحتمد المحتمد المحتمد المحتمد المحتمد المحتمد المحتم المحتمد المحتمد المحتمد المحتمد المحتمد المحتم المحتمد المحتمد المحتمد المحتمد المحتمد المحتمد المحتمد المح المحتمد المحتم المحتم المحتمد المحتمد المحتمد المحتمد المحتمد المحتمد المحتم المحتم المحتم المحتم المحتم المحت المحتم المحت
LOCATED DOWN-SLOPE OF THE SOIL DISTURBANCE.
CONSTRUCTION ENTRY / EXIT
NOT TO GOALE
EROSION RESISTANT ROCK, NOMINAL DIAMETER OF 50 TO 75mm (SMALL mm (LARGE DISTURBANCES). ALL REASONABLE MEASURES MUST BE TAKEN TO I SIZE.
E: EGATE.
NON-WOVEN FILTER CLOTH ('BIDIM' A24 OR EQUIVALENT).
FOR LOCATION AND DIMENSIONAL DETAILS. IF THERE ARE QUESTIONS OR ON DIMENSIONS, OR METHOD OF INSTALLATION. CONTACT THE FACINEER OR
ER FOR ASSISTANCE. IE ROCK PAD, REMOVING STUMPS, ROOTS AND OTHER VEGETATION TO PROVIDE A THE ROCK PAD, REMOVING STUMPS, ROOTS AND OTHER VEGETATION TO PROVIDE A
HEL ROOK IS NOT RESIDED INTO SUPT ORDINUL CLEAR SUPPORTING INTO THE REAL ON NOT CLEAR REQUIRED EROSION AND SEDIMENT CONTROL DEVICES ARE IN PLACE.
)FT, PLASTIC OR CLAYEY, PLACE A SUB-BASE OF CRUSHED ROCK OR A LAYER ITH TO PROVIDE A FIRM FOUNDATION. IMIG A MINIMUM 200mm THICK LAYER OF CLEAN, OPEN-VOID ROCK.
UCTION SITE IS UP-SLOPE OF THE ROCK PAD, THUS CAUSING STORMWATER THE ROCK PAD, THEN FORM A MINIMUM 300mm HIGH FLOW CONTROL BERM DUFFT SILVE JININGET FOR A SUITABLE SEDIMENT TRAP
AD SHOULD BE AT LEAST 15M WHERE PRACTICABLE, AND AS WISE AS THE OR EXIT AND AT LEAST 3m. THE ROCK PAD SHOULD COMMENCE AT THE EDGE
KOAD OR PAVEMENT. CK PAD WHERE IT MEETS THE PAVEMENT SO THAT THE WHEELS OF TURNING VER UNPROTECTED SOIL.
TO PEDESTRIAN MOVEMENT, THE COVER THE COARSE ROCK WITH FINE AGGREGATE TAKE WHATEVER MEASURES ARE NEEDED TO MAKE THE AREA SAFE.
ID EXIT POINTS PRIOR TO FORECAST RAIN, DAILY DURING EXTENDED PERIODS OF PRODUCING RAINFALL, OR OTHERWISE AT FORTNIGHTLY INTERVALS. R MUD IS TRACKED OR WASHED ONTO THE ADJACENT SEALED ROADWAY, THEN HYSICALLY REMOVED, FIRST USING A SOURRE-EDGED SHOVEL, AND THEN A D THEN BY A MECHANICAL VACUUM UNIT, IF AVAILABLE. REASONS, THE ROADWAY SHALL ONLY DE WASHED CLEAN AFTER ALL REASONABLE TO SHOVEL AND SWEEP THE MATERIAL FROM THE ROADWAY. THE ROACK BECOMES FILLED WITH MATERIAL FROM THE ROADWAY. THE ROCK BECOMES FILLED WITH MATERIAL AND THE EFFECTIVENESS OF THE A POINT WHERE SEDIMENT IS BEING TRACKED OFF THE SITE. A NEW 100MM DDED AND/OR THE ROCK PAD MUST BE EXTENDED. ANIAGE CONTROL MEASURES (e.g., FLOW CONTROL BERM) ARE MAINTAINED IN ESIRED OPERATIONAL CONDITIONS. DEBRIS IN A MANNER THAT WILL NOT CREATE AN EROSION OR POLLUTION
REMOVED ONLY AFTER IT IS NO LONGER NEEDED AS A SEDIMENT TRAP. LLECTED SEDIMENT AND DISPOSE OF IN A SUITABLE MANNER THAT WILL NOT LUTION HAZARD. HE DISTURBED GROUND AS NECESSARY TO MINIMISE THE EROSION HAZARD.
RECTION OF FLOW
0.6m MIN 0.5m UNDISTURBED AREA
DIVERSION DRAINS
ED WEEKLY NT SHOULD BE REMOVED TO AVOID PONDING 'S OR DAMAGE
CATCH DRAINS DOWN EXPOSED SLOPES SHOULD NOT DISTANCE DEFINED BY:
71 – 48 [LOG(% SLOPE)] METRES ZONTAL SLOPE COMPONENT AS DEFINED
OPE)= 100 CONSTRUCTION
QUILL STREET LAND DEVELOPMENT
EROSION AND SEDIMENT
160-001-C112 A3 A







<u>LEGEND</u>

1 RP700513

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	_					

PAD BOUNDARY PROPOSED TOP OF BATTER PROPOSED BOTTOM OF BATTER EXISTING SEWER MAIN SEWER EASEMENT Q100 LEVEL

1 SP163448

4 SP163448

CONMAT PTY LTD		
QUILL STREET LAND DEVELOPMEN	T٧	
Q100 PLAN		
160-001-SK05	A3	REVISION 1
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<u>LEGEND</u>

1 RP700513

	PAD BOUNDARY
	PROPOSED TOP OF BATTER
	PROPOSED BOTTOM OF BATTER
s	EXISTING SEWER MAIN
	SEWER EASEMENT
	Q100 + 300mm FREEBOARD LEVEL

1 SP163448

4 SP163448

ÆF	CONMAT PTY LTD		
	QUILL STREET LAND DEVELOPME	NT	
EF	Q100 + 300mm FREEBOARD PLAN	١	
10	160-001-SK06	SIZE A3	revision 1







LEGEND

1 RP700513

1 SP163448

4 SP163448

	PAD BOUNDARY
	PROPOSED TOP OF BATTER
	PROPOSED BOTTOM OF BATTER
s	EXISTING SEWER MAIN
	SEWER EASEMENT
	HEIGHT (RL 395.593)

REF	CONMAT PTY LTD		
	QUILL STREET LAND DEVELOPME	NT	
REF	BUILDING PAD HEIGHT VS.		
	NOMINATED MINIMUM RL 395.593	3	
NO	160-001-SK07	SIZE A3	REVISION 1





FNQROC DEVELOPMENT MANUAL

Council Mareeba 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 Quill Street Subdivision

Location	of	Development
	Lot 22 of SP217220, Quill Str	eet, Mareeba, QLD, 4880
Applicant	Monique Gambin	
Designer	ERSCON Consulting Engineers	
5		

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	
Geotechnical requirements	
Geometric Road Design	
Pavements	
Structures / Bridges	
Subsurface Drainage	
Stormwater Drainage	
Site Re-grading	
Erosion Control and Stormwater Management	
Pest Plant Management	
Cycleway / Pathways	

Landscaping	
Water Source and Disinfection/Treatment Infrastructure (if applicable)	
Water Reticulation, Pump Stations and water storages	
Sewer Reticulation and Pump Stations	
Electrical Reticulation and Street Lighting	
Public Transport	
Associated Documentation/ Specification	
Priced Schedule of Quantities	
Referral Agency Conditions	
Supporting Information (AP1.08)	
Other	
Conscientiously believing the above sta of:	tements to be true and correct, signed on behalf
Designer ERSCON Consulting E	ngineers RPEQ No 05085
Name in Full John Martin	
Signature	Date







DATE 2:

LOT

<u>LEGEND</u>

1.0	PROPOSED MAJOR CONTOURS (1.0m INTERVAL)
	PROPOSED MINOR CONTOURS (0.1m INTERVAL)
	PAD BOUNDARY
	PROPOSED TOP OF BATTER
	PROPOSED BOTTOM OF BATTER
s	EXISTING SEWER MAIN
	SEWER EASEMENT
	PROPOSED FILL

CATCHMENT AREAS

CATCHMENT	AREA (m²)	FLOW LENGTH (km)
A	0.30	0.10
В	1.02	0.21
С	1.08	0.21
D	3.47	0.275
E	0.38	0.24
TOTAL	6.25	

REF	CONMAT PTY LTD		
	QUILL STREET SUBDIVISION		
REF	CATCHMENT PLAN		
NO	160-001-SK08	SIZE A3	REVISION 1

160-001 Quill Street, Mareeeba Path A



Time of concentration Calculation

(Using Bransby-Williams' Equation)

Proportionality Factor	P=	58	(for Ha)
Length of Flow Path	L=	0.096	km
Top of Catchment (RL)	RL =	396	m
Area of Catchment	A =	0.30	На

Catchment Profile		396 [to utilise graph area better]				
Chainage	RL	RL	Area under Gra	ph (m²)		
0	392.871	-3.129				
52	393.5	-2.5	-146			
73	394.02	-1.98	-47			
79	395.8	-0.2	-7			
79	395.8	-0.2	0			
79	395.8	-0.2	0			
79	395.8	-0.2	0			
79	395.8	-0.2	0			
79	395.8	-0.2	0			
96	396	0	-2			
Total area uno Area below ou Area above ou	der graph utlet level utlet		-202 -300 99		m² m² m²	
Height for ave	rage slope		e _	2.06 2 1	m •⁄-	
Average Sit	hc .		5 =	∠ . I	/0	

Average Slope Calculation					
Outlet Chainag	е	0			
Catchment leng	96				
Outlet RL	-3				
Top RL (Av Slo	-1.1				
Tc = PxL					
(A ^ 0.1) x (S ^ 0.2)					

Tc = 5.4 min

Adpoted Tc 6.0 min



Flow Calculation for Upstream Catchment

Catchment A

Fraction Impervious =	
1 hour @ 10 year ARI =	

 $f_i = 0.7$ ${}^1I_{10} = 63.5$ $C_{10} = 0.84$

Table Below (QUDM Table 4.5.3)mm/hr(IFD CHARTS)(QUDM Table 4.5.3)

AEP		63%	39%	18%	10%	5%	2%	1%		
Design ARI		1	2	5	10	20	50	100		
Frequency Factor	F _Y	0.8	0.85	0.95	1	1.05	1.15	1.2		(QUDM Table 4.5.2)
Coefficient of Discharge	C _Y	0.672	0.714	0.798	0.84	0.882	0.966	1		(QUDM Equation 4.3)
Time of Concentration	Т _с	6	6	6	6	6	6	6	min	
Rainfall Intensity	^{6min} l ₁₀	95	108	145	168	189	216	236	mm/hr	(IFD CHARTS)
Area	А	0.3	0.3	0.3	0.3	0.3	0.3	0.30	Ha	
Path A Flow		0.05	0.06	0.10	0.12	0.14	0.17	0.20	m³/s	
Velocity		1.385	1.438	1.527	1.562	1.599	1.613	1.640	m/s	Taken from ERSCON
Height		0.089	0.096	0.113	0.100	0.131	0.138	0.149	m	Super Drain Table

160-001 Quill Street, Mareeeba Path B



Time of concentration Calculation

(Using Bransby-Williams' Equation)

Proportionality Factor	P=	58	(for Ha)
Length of Flow Path	L=	0.23	km
Top of Catchment (RL)	RL =	404.069	m
Area of Catchment	A =	1.02	На

Catchment Profile		405 [to utilise graph area better]		
Chainage	RL	RL	Area under Graph	(m²)
0	392.722	-12.278		
28	395.246	-9.754	-308	
67	395.504	-9.496	-375	
100	400.967	-4.033	-223	
121	402.744	-2.256	-66	
170	403.592	-1.408	-90	
206	403.894	-1.106	-45	
206	403.894	-1.106	0	
206	403.894	-1.106	0	
228	404.069	-0.931	-22	
Total area und	der graph		-1131	m
Area below ou	utlet level		-2799	m
Area above ou	utlet		1669	m
Height for ave	rage slope		14.	64 m
Average Slo	ope		S = 6.	4 %

Average Slope Calculation				
Outlet Chainage 0				
Catchment length	228			
Outlet RL	-12			
Top RL (Av Slope)	2.4			
$Tc = \frac{P \times L}{(A^{0.1}) \times (S^{0.2})}$				

Tc = 9.1 min

Adpoted Tc 10.0 min



Flow Calculation for Upstream Catchment

Catchment B

Fraction Impervious =	$f_i = 0.7$	Table Drain	(QUDM Table 4.5.3)
1 hour @ 10 year ARI =	${}^{1}I_{10} = 63.5$	mm/hr	(IFD CHARTS)
	C _{10 =} 0.84		(QUDM Table 4.5.3)

AEP		63%	39%	18%	10%	5%	2%	1%		
Design ARI		1	2	5	10	20	50	100		
Frequency Factor	F _Y	0.8	0.85	0.95	1	1.05	1.15	1.2		(QUDM Table 4.5.2)
Coefficient of Discharge	C _Y	0.672	0.714	0.798	0.84	0.882	0.966	1		(QUDM Equation 4.3)
Time of Concentration	Т _с	10.0	10	10	10	10	10	10.0	min	
Rainfall Intensity	^{10min} ₁₀	84	95	128	149	168	192	209	mm/hr	(IFD CHARTS)
Area	A	1.02	1.02	1.02	1.02	1.02	1.02	1.02	Ha	
Path B Flow		0.16	0.19	0.29	0.35	0.42	0.53	0.59	m³/s	
Velocity		1.003	1.063	1.188	1.260	1.313	1.393	1.149	m/s	Taken from ERSCON
Height		0.159	0.176	0.217	0.242	0.261	0.292	0.397	m	Super Drain Table

160-001 Quill Street, Mareeeba Path C



Time of concentration Calculation

(Using Bransby-Williams' Equation)

Proportionality Factor	P=	58	(for Ha)
Length of Flow Path	L=	0.210	km
Top of Catchment (RL)	RL =	404.1	m
Area of Catchment	A =	1.08	На

Catchment Profile		405 [to utilise graph area better]			<u>-]</u>
Chainage	RL	RL	Area under Gra	iph (m²)	
0	392.752	-12.248			
27	395.253	-9.747	-297		
67	395.524	-9.476	-386		
74	397.428	-7.572	-60		
80	397.7	-7.3	-39		
100	401	-4	-116		
121	402.735	-2.265	-66		
206	404	-1	-139		
206	404	-1	0		
210	404	-1	-4		
Total area under graph Area below outlet level			-1107 -2572		m ² m ²
Area above outlet			1465	13.95	m² m
Average Slo	one		S =	6.6	%
			-		, ,

Average Slope Calculation					
Outlet Chain	age	0			
Catchment le	ength	210			
Outlet RL		-12			
Top RL (Av	1.7				
Tc = PxL					
(A ^ 0.1) x (S ^ 0.2)					
Tc =	min				

Adpoted Tc 9.0 min



Flow Calculation for Upstream Catchment

Catchment C

Fraction Impervious =	$f_i = 0.7$	Table Drain	(QUDM Table 4.5.3)
1 hour @ 10 year ARI =	¹ I ₁₀ = 63.5	mm/hr	(IFD CHARTS)
	$C_{10} = 0.84$		(QUDM Table 4.5.3)

AEP		63%	39%	18%	10%	5%	2%	1%			
Design ARI		1	2	5	10	20	50	100			
Frequency Factor	F _Y	0.8	0.85	0.95	1	1.05	1.15	1.2		(QUDM Table 4.5.2)	
Coefficient of Discharge	C _Y	0.672	0.714	0.798	0.84	0.882	0.966	1		(QUDM Equation 4.3)	
Time of Concentration	Т _с	9	9	9	9	9	9	9	min		
Rainfall Intensity	^{9min} I ₁₀	87	98	132	154	173	198	216	mm/hr	(IFD CHARTS)	
Area	A	1.08	1.08	1.08	1.08	1.08	1.08	1.08	На		
Path C Flow		0.18	0.21	0.32	0.39	0.46	0.57	0.65	m³/s		
Velocity	Velocity		1.160	1.303	1.368	1.432	1.514	1.562	m/s	Taken from ERSCON	
Height		0.193	0.202	0.340	0.410	0.490	0.341	0.361	m	Super Drain Table	

160-001 Quill Street, Mareeeba Path D



Time of concentration Calculation

(Using Bransby-Williams' Equation)

Proportionality Factor	P=	58	(for Ha)
Length of Flow Path	L=	0.275	km
Top of Catchment (RL)	RL =	405.532	m
Area of Catchment	A =	3.47	Ha

Catchment P	rofile	406 [to utilise graph area bette				
Chainage	RL	RL	Area under Gra	iph (m²)		
0	394.5	-11.5				
21	395.79	-10.21	-228			
50	396.198	-9.802	-290			
125	398.9	-7.1	-634			
156	401.5	-4.5	-180			
204	403	-3	-180			
215	404.4	-1.6	-25			
258	405.4	-0.6	-47			
258	405.4	-0.6	0			
275	406	-0.468	-9			
T ()	1		4500		2	
l otal area uno	ler graph		-1593		m-	
Area below outlet level			-3163		m²	
Area above ou	utlet		1569		m²	
Height for ave	rage slope			11.41	m	
Average Slope			S =	4.1	%	

Average Slope Calculation									
Outlet Chainage	1	0							
Catchment lengt	275								
Outlet RL		-12							
Top RL (Av Slop	be)	-0.1							
Tc =	Р	хL							
	(A ^ 0.1) x (S ^ 0.2)								
Tc =	10.6	min							

Adpoted Tc 11.0 min



Flow Calculation for Upstream Catchment Catchment D

Fraction Impervious =	$f_i = 0.7$	Table Drai	n (QUDM Table 4.5.3)
1 hour @ 10 year ARI =	${}^{1}I_{10} = 63.5$	mm/hr	(IFD CHARTS)
	$C_{10} = 0.84$		(QUDM Table 4.5.3)

AEP		63%	39%	18%	10%	5%	2%	1%			
Design ARI		1	2	5	10	20	50	100			
Frequency Factor	F _Y	0.8	0.85	0.95	1	1.05	1.15	1.2		(QUDM Table 4.5.2)	
Coefficient of Discharge	C _Y	0.672	0.714	0.798	0.84	0.882	0.966	1		(QUDM Equation 4.3)	
Time of Concentration	T _c	11.0	11	11	11	11	11	11	min		
Rainfall Intensity	$^{11min}I_{10}$	82	93	125	145	164	187	204	mm/hr	(IFD CHARTS)	
Area	A	3.47	3.47	3.47	3.47	3.47	3.47	3	На		
Path D Flow		0.53	0.64	0.96	1.17	1.39	1.74	1.96	m³/s		
Velocity		1.503	1.599	1.821	1.937	2.042	2.185	2.263	m/s	Taken from ERSCON	
Height		0.188	0.209	0.960	0.290	0.319	0.359	0.382	m	Super Drain Table	

160-001 Quill Street, Mareeeba Path E



Time of concentration Calculation

(Using Bransby-Williams' Equation)

Proportionality Factor	P=	58	(for Ha)
Length of Flow Path	L=	0.236	km
Top of Catchment (RL)	RL =	401.105	m
Area of Catchment	A =	0.38	Ha

Catchment P	rofile	402 [to utilise graph area better]				
Chainage	RL	RL	Area under Gra	ıph (m²)		
0	392.286	-9.714				
24	396.8	-5.2	-177			
34	397.9	-4.1	-48			
67	398.8	-3.2	-118			
67	398.8	-3.2	0			
67	398.8	-3.2	0			
67	398.8	-3.2	0			
67	398.8	-3.2	0			
67	398.8	-3.2	0			
236	401	-0.895	-347			
Total area uno	der graph		-690		m²	
Area below ou	utlet level		-2293		m²	
Area above or	utlet		1602		m²	
Height for ave	rage slope			13.58	m	
Average Slo	ope		S =	5.8	%	

Average Slope Calculation									
Outlet Chainage		0							
Catchment lengt	th	236							
Outlet RL	-10								
Top RL (Av Slop	3.9								
Tc =	Р	хL							
	(A ^ 0.1) x (S ^ 0.2)								
Tc =	10.6	min							

Adpoted Tc 11.0 min



Flow Calculation for Upstream Catchment Catchment E

Fraction Impervious =	$f_i = 0.7$	Table Drain	(QUDM Table 4.5.3)	Rock Lined Drain
1 hour @ 10 year ARI =	${}^{1}I_{10} = 63.5$	mm/hr	(IFD CHARTS)	
	$C_{10} = 0.84$		(QUDM Table 4.5.3)	

AEP		63%	39%	18%	10%	5%	2%	1%		
Design ARI		1	2	5	10	20	50	100		
Frequency Factor	F _Y	0.8	0.85	0.95	1	1.05	1.15	1.2		(QUDM Table 4.5.2)
Coefficient of Discharge	C _Y	0.672	0.714	0.798	0.84	0.882	0.966	1		(QUDM Equation 4.3)
Time of Concentration	T _C	11	11	11	11	11	11	11	min	
Rainfall Intensity	$^{9min}I_{10}$	82	93	125	145	164	187	204	mm/hr	(IFD CHARTS)
Area	A	0.38	0.38	0.38	0.38	0.38	0.38	0.38	Ha	
Path E Flow		0.06	0.07	0.10	0.13	0.15	0.19	0.21	m³/s	
Velocity		1.110	1.177	1.348	1.488	1.570	1.714	1.779	m/s	Taken from ERSCON
Height		0.034	0.038	0.047	0.054	0.059	0.068	0.072	m	Super Drain Table

JOB NO:	160-001
JOB:	Quill Street, Mareeeba
TITLE :	Combined Path of A, C, D and E



Time of concentration Calculation (Using Bransby-Williams' Equation)

Proportionality Factor	P=	58	(for Ha)
Length of Flow Path	L=	0.275	km
Top of Catchment (RL)	RL =	405.532	m
Area of Catchment	A =	4.02	Ha

Catchment Profile		406 [to utilise graph area better]			
Chainage	RL	RL	Area under Graph (m ²)	Ĩ	
0	394.5	-11.5		ľ	
21	395.79	-10.21	-228		
50	396.198	-9.802	-290		
125	398.9	-7.1	-634		
156	401.5	-4.5	-180	1	
204	403	-3	-180		
215	404.4	-1.6	-25		
258	405.4	-0.6	-47		
258	405.4	-0.6	0		
275	406	-0.468	-9		
				-	
Total area uno	der graph		-1593	m²	
Area below ou	ıtlet level		-3163	m²	
Area above o	utlet		1569	m²	
Height for ave	rage slope		11.41	m	

Average Slope Calculation								
Outlet Chainage	Outlet Chainage 0							
Catchment leng	gth	275						
Outlet RL		-12						
Top RL (Av Slo	-0.1							
Tc =	Р	хL						
	(A ^ 0.1)	x (S ^ 0.2)						
Tc =	10.4 min							

Adpoted Tc	11.0	min
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Flow Calculation for Upstream Catchment Catchment A, C, D and E

-	-
Fraction	Impervious =
1 hour @) 10 year ARI =

$f_i = 0.7$	Table Drai
¹ I ₁₀ = 63.5	mm/hr
C ₁₀ = 0.84	

Drain (QUDM Table 4.5.3) (IFD CHARTS) (QUDM Table 4.5.3) Rock Lined Drain

AEP		63%	39%	18%	10%	5%	2%	1%		
Design ARI		1	2	5	10	20	50	100		
Frequency Factor	F _Y	0.8	0.85	0.95	1	1.05	1.15	1.2		(QUDM Table 4.5.2)
Coefficient of Discharge	C _Y	0.672	0.714	0.798	0.84	0.882	0.966	1		(QUDM Equation 4.3)
Time of Concentration	T _c	11.0	11	11	11	11	11	11	min	
Rainfall Intensity	$^{11\text{min}}$ I $_{10}$	82	93	125	145	164	187	204	mm/hr	(IFD CHARTS)
Area	A	4.02	4.02	4.02	4.02	4.02	4.02	4	Ha	
Path D Flow		0.62	0.74	1.11	1.36	1.61	2.02	2.27		
Path C Flow Path A Flow Path E Flow Total of A, C, D and E		0.18	0.21	0.32	0.39	0.46	0.57	0.65		
		0.05	0.06	0.10	0.12	0.14	0.17	0.20	m³/s	Taken from ERSCON
		0.06	0.07	0.10	0.13	0.15	0.19	0.21		Super Drain Table
		0.90	1.09	1.63	1.99	2.36	2.96	3.33		
Velocity		1.787	1.882	2.123	2.252	2.365	2.525	2.614	m/s	
Height		0.311	0.337	0.408	0.449	0.486	0.543	0.576	m	
160-001 Quill Street, Mareeeba Combined Total Catchments A, B, C, D and E



Time of concentration Calculation (Using Bransby-Williams' Equation)

JOB NO:

JOB:

TITLE :

Proportionality Factor	P=	58	(for Ha)
Length of Flow Path	L=	0.275	km
Top of Catchment (RL)	RL =	405.532	m
Area of Catchment	A =	5.23	На

Catchment P	rofile	406 [to utilise graph area better]					
Chainage	RL	RL	Area under Gra	ıph (m²)			
0	394.5	-11.5					
21	395.79	-10.21	-228				
50	396.198	-9.802	-290				
125	398.9	-7.1	-634				
156	401.5	-4.5	-180				
204	403	-3	-180				
215	404.4	-1.6	-25	5			
258	405.4	-0.6	-47				
258	405.4	-0.6	0				
275	406	-0.468	-9				
Total area uno Area below ou Area above ou	der graph utlet level utlet		-1593 -3163 1569		m² m² m²		
Height for ave	erage slope			11.41	m		
Average Slo	ppe		S =	4.1	%		

Average Slope Calculat	ion
Outlet Chainage	0
Catchment length	275
Outlet RL	-12
Top RL (Av Slope)	-0.1

PxL
(A ^ 0.1) x (S ^ 0.2)
10.2 min





Flow Calculation for Upstream Catchment Catchment A, B, C, D and E			
Fraction Impervious =	$f_i = 0.7$	Table Drain (QUDM Table 4.5.3)	Rock Lined Drain
1 hour @ 10 year ARI =	¹ I ₁₀ = 63.5	mm/hr (IFD CHARTS)	

 $C_{10} = 0.84$

(QUDM Table 4.5.3)

AEP	63% 39% 18% 10% 5% 2% 1%									
Design ARI		1	2	5	10	20	50	100		
Frequency Factor	F _Y	0.8	0.85	0.95	1	1.05	1.15	1.2		(QUDM Table 4.5.2)
Coefficient of Discharge	C _Y	0.672	0.714	0.798	0.84	0.882	0.966	1		(QUDM Equation 4.3)
Time of Concentration	T _c	11.0	11	11	11	11	11	11	min	
Rainfall Intensity	$^{11\text{min}}$ I $_{10}$	82	93	125	145	164	187	204	mm/hr	(IFD CHARTS)
Area	A	5.23	5.23	5.23	5.23	5.23	5.23	5	Ha	
Path D Flow		0.80	0.96	1.44	1.77	2.10	2.62	2.96		
Path B Flow		0.16	0.19	0.29	0.35	0.42	0.53	0.59		
Path C Flow0.18Path A Flow0.05Path E Flow0.06Combined Total Catchment of A, B, C, D and E1.25		0.18	0.21	0.32	0.39	0.46	0.57	0.65		
		0.05	0.06	0.10	0.12	0.14	0.17	0.20	m³/s	Taken from ERSCON
		0.06	0.07	0.10	0.13	0.15	0.19	0.21		Super Drain Table
		1.50	2.25	2.76	3.27	4.09	4.61			
Velocity		1.868	1.971	2.219	2.354	2.471	2.633	2.722	m/s	
Height		0.397	0.433	0.526	0.581	0.632	0.707	0.751	m	







PROJECT DRAIN Qxxx FLOW

Q =	0.65	Slope 1	1 %	Depth	0.248	n 0.016	q 0.65	A 0.378	v 1.7205
Label Constraint	s Horizontal (m) Vertical (m) Grade %	Surface	n				1	
	1			Î	•				
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	3 5. 2 0.2	5 0.88 169	Earth, uniform section - Clean, recently completed	0.017	Left c			0.5	
	Invert Line						\backslash		
	2 0.2	5 0 0.09	Earth, uniform section - Clean, recently completed	0.017	nvert		\backslash		
	- 1. 1	8 0.9 50%	6 Clean, recently completed	0.017	nt of			0.4	
	1				Righ		\backslash	`	
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Q = 4.6	61	Slope	1 %	Depth	0.735	n 0.0206	q 4.6099	A 1.645	v 2.8027
Label Constraints	Horizontal (m) 1	Orpe /ertical (m) Grade % /ertical (m) Grade % 0.75 25.00 0.6 100.0 0.1 13.3 0 0.0 0.075 30.0 0.075 30.0 0.1 13.3 0.6 100.0 0.1 5.00 0.2 20	Surface Surface % Average Grassed % Rock % Rock % Concrete % Concrete % Concrete % Concrete % Rock % Rock % Average Grassed % Average Grassed % Average Grassed	n 0.045 0.035 0.035 0.013 0.013 0.013 0.013 0.035 0.035 0.045 0.045	Right of Invert Left of Invert				

CONMAT PTY LTD QUILL STREET LAND DEVELOPMENT



PROJECT DRAWINGS LIST

160-001-C100	COVER SHEET, LOCALITY
160-001-C101	GENERAL NOTES
160-001-C102	CLEARING PLAN
160-001-C103	GENERAL LAYOUT PLAN
160-001-C104	GRADING PLAN
160-001-C105	DRIVEWAY PLAN
160-001-C106	DRIVEWAY LONGITUDINAL
160-001-C107	ROCK LINED DRAIN LONG
160-001-C108	REAR CATCH DRAIN LONG
160-001-C109	SEWER RETICULATION PL
160-001-C110	EROSION AND SEDIMENT
160-001-C111	EROSION AND SEDIMENT

PLAN AND DRAWINGS LIST

L SECTION AND DETAIL SITUDINAL SECTION AND DETAIL GITUDINAL SECTION AND DETAIL LAN CONTROL PLAN CONTROL DETAILS



GENERAL NOTES:

1. LEVEL DATUM : AHD 2. ORIGIN OF LEVELS:

NUMBER	EASTING	NORTHING	RL	LOCATION
OPM9892	4945.296	10182.504	398.261	QUILL STREET, MAREEBA

- 3. EXISTING CONDITIONS HAVE BEEN BASED ON SURVEY DATA COLLECTED BY RPS. NO RESPONSIBILITY IS TAKEN FOR THE ACCURACY OF THE INFORMATION SHOWN. 4. THE CONTRACTOR TO LIAISE WITH RPS TO ESTABLISH SITE SURVEY CONTROLS.
- 4. THE CONTRACTOR TO LIASE WITH RPS TO ESTABLISH STIE SURVEY CONTROLS.
 5. DETAILS OF SERVICES ARE PROVIDED FOR INFORMATION ONLY, AND NO RESPONSIBILITY IS TAKEN FOR THE ACCURACY AND COMPLETENESS OF THE INFORMATION. POSITIONS OF SERVICE CROSSINGS SHALL BE RECORDED AND CHECKED BY THE CONTRACTOR. NOT ALL CROSSINGS HAVE NECESSARILY BEEN SHOWN ON THE DRAWINGS. THE CONTRACTOR IS TO CHECK SERVICES ON SITE PRIOR TO COMMENCEMENT OF CONSTRUCTION. 6. FOR ALL SPECIFICATIONS REFER TO FNORCE STANDARD SPECIFICATIONS. 7. INSPECTION AND TEST PLANS ARE TO BE UNDERTAKEN BY CONTRACTOR IN ACCORDANCE WITH
- ENOROC DEVELOPMENT MANUAL
- 8. AS CONSTRUCTED DATA TO BE PREPARED AND SUBMITTED BY THE CONTRACTOR IN ACCORDANCE WITH FNQROC DEVELOPMENT MANUAL.

EARTHWORKS NOTES:

- ALL EARTHWORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE CURRENT FNQROC 1. DEVELOPMENT MANUAL SPECIFICATION - S1 'EARTHWORKS'
- FNQROC SPECIFICALLY REFERENCES AS 3798 'GUIDELINES ON EARTHWORKS FOR COMMERCIAL AND RESIDENTIAL DEVELOPMENTS' IN RELATION TO ALL EARTHWORK OPERATIONS INCLUDING APPROPRIATE METHODS OF TESTING, FREQUENCY OF TESTING AND REPORTING PROCEDURES. GEOTECHNICAL TESTING SERVICES SHALL BE AS DETERMINED BY LEVEL 1 IN ACCORDANCE WITH AS 3798. ALL CERTIFICATION AND TEST RESULTS ARE TO BE COMPILED AND PROVIDED TO THE SUPERINTENDENT PRIOR TO WORKS ACCEPTANCE. ALL BATTERS SHALL BE 1 IN 3 MAX UNLESS NOTED OTHERWISE ON THE PROJECT DRAWINGS.
- FINISHED SURFACE LEVELS SHOWN ON PROJECT DRAWINGS ARE AFTER ALL EARTHWORKS ARE COMPLETE INCLUDING TOPSOILING. ALL AREAS ARE TO BE GRADED EVENLY BETWEEN FINISHED
- SURFACE LEVELS UNLESS NOTED OTHERWISE. DRY DENSITY RATIO AS REFERRED TO IN THESE NOTES IS THE RATIO DETERMINED IN ACCORDANCE WITH AS1289.5.8.1 OF COMPACTED DRY DENSITY IN ACCORDANCE WITH AS1289.5.8.1 TO THE STANDARD MAXIMUM DRY DENSITY DETERMINED IN ACCORDANCE WITH AS1259.5.1.11 (STANDARD COMPACTION).
- NO VEGETATION SHALL BE REMOVED WITHOUT PRIOR APPROVAL OF THE SUPERINTENDENT UNLESS NOTED ON THE PROJECT DRAWINGS.
- ALL VEGETAL MATTER, TOPSOIL AND OTHER UNSUITABLE MATERIAL SHALL BE STRIPPED/REMOVED FROM AREAS TO BE EXCAVATED OR FILLED. ALL VECETAL MATTER AND UNSUITABLE MATERIAL SHALL BE DISPOSE OF OFF-SITE UNLESS ADVISED OTHERWISE BY THE SUPERINTENDENT. TOPSOIL SHALL BE STOCKPILED ON-SITE FOR REUSE. SURPLUS TOPSOIL SHALL BE DISPOSED OF OFF-SITE.
- SHOULD ANY SOFT OR UNSUITABLE MATERIAL BE IDENTIFIED, THE CONTRACTOR SHALL INFORM THE SUPERINTENDENT IMMEDIATELY AND SEEK THE ADVICE OF THE SUPERINTENDENT OR GITA. COMPACT FILL TO 95% DRY DENSITY RATIO IN LAYERS OF THICKNESS APPROPRIATE TO THE
- COMPACTION PLANT EMPLOYED BT NOT EXCEEDING 300mm 10. ROAD VERCE SHALL BE FULLY TURFED ON COMPLETION OF TOPSOILING. ELSEWHERE, DISTURBED AREAS 1:3 OR FLATTER SHALL BE GRASS SEEDED AND AREAS STEEPER THAN 1:3
- SHALL BE HYDROMULCHED (UNLESS NOTED OTHERWISE).

CONCRETE NOTES:

1. ALL CONCRETE WORKS INCLUDING SUPPLY, PLACEMENT, COMPACTION, REINFORCEMENT AND FINISHING SHALL BE CARRIED OUT IN ACCORDANCE WITH THE CURRENT FNQROC DEVELOPMENT MANUAL SPECIFICATION - S7 CONCRETE WORKS

DRAINAGE NOTES:

- 1. ALL STORMWATER DRAINAGE WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE
- CURRENT FNQROC DEVELOPMENT MANUAL SPECIFICATION S4 'STORWWATER DRAINAGE'. ALL REINFORCED CONCRETE PIPES SHALL BE CLASS 2 UNLESS NOTED OTHERWISE. ALTERNATIVE MATERIAL TYPES SUCH AS HDPE OR FRC MAY BE USED SUBJECT TO 2.
- SUPERINTENDENTS/COUNCIL APPROVAL. ALL PVC PIPES SHALL BE CLASS SN4 MINIMUM SWJ UNLESS NOTED OTHERWISE.
- EXCAVATION, BEDDING AND BACKFILL FOR CONCRETE PIPES SHALL BE CARRIED OUT IN ACCORDANCE WITH FNQROC STANDARD DRAWING S1046. EXCAVATION, BEDDING AND BACKFILL FOR PVC PIPES TO BE IN ACCORDANCE WITH AS/NZS 5.
- 2566.2 "BURIED ELEXIBLE PIPES PART 2 INSTALLATION" ALL KERB INLET PITS TO BE CONSTRUCTED IN ACCORDANCE WITH FNQROC STD DRG'S S1050 6.
- AND \$1060 7. ALL PRECAST HEADWALLS SHALL BE PROVIDED WITH A CUT-OFF WALL IN ACCORDANCE WITH
- FNQROC STD DRG S1075

EROSION AND SEDIMENT CONTROL NOTES:

- PRIOR TO CONSTRUCTION COMMENCING, THE CONTRACTOR MUST PREPARE AN EROSION & 1. SEDIMENT CONTROL PLAN (ESCP) TO MANAGE THE SITE DURING CONSTRUCTION AND THE DEFECT LIABILITY PERIOD.
- THE ESCP MUST BE CONSISTENT WITH THE APPROVED EROSION & SEDIMENT CONTROL STRATEGY (ESCS) AND SHALL TAKE INTO CONSIDERATION THE CONTRACTOR'S PROPOSED
- STRATEGY (ESCS) AND SHALL TAKE INTO CONSIDERATION THE CONTRACTOR'S PROPOSED CONSTRUCTION METHODOLOGY AND PROGRAM. AN ESCP THAT DIFFERS TO THE APPROVED ESCS MUST BE SUBMITTED TO THE SUPERINTENDENT FOR APPROVAL PRIOR TO SUBMITTING TO COUNCIL. NO EARTHWORKS SHALL COMMENCE ON ANY PART OF THE SITE PRIOR TO APPROPRIATE 3 4
- EROSION AND SEDIMENT CONTROL MEASURES BEING INSTALLED DOWNSTREAM OF THE SITE AND IN ACCORDANCE WITH THE APPROVED ESCP.
- AT ALL TIMES THE CONTRACTOR SHALL MONITOR THE PREVAILING WEATHER CONDITIONS AND TAKE ALL NECESSARY PRECAUTIONS TO CONTROL EROSION AND DOWNSTREAM SEDIMENTATION DURING ALL STAGES OF CONSTRUCTION.
- THE IMPACT ON THE ENVIRONMENT SHALL BE MINIMISED BY OBSERVING THE FOLLOWING CONSTRUCTION PRACTICES: · AREAS DISTURBED BY CONSTRUCTION TRAFFIC AND PROCEDURES SHALL BE MINIMISED.
- MINIMISE TRAFFIC MOVEMENTS AND SPEEDS ON EXPOSED SURFACES.
- · REVEGETATION OF DISTURBED AREAS SHALL BE CARRIED OUT SOON AFTER THE COMPLETION OF TOPSOIL PLACEMENT.
- FLOW DIVERSION SHALL BE CARRIED OUT BY EARLY INSTALLATION OF DRAINS ALONG TOPS OF BATTERS WITH APPROPRIATE SILTATION CONTROL DEVICES.
- SEDIMENT INTERCEPTION BY THE PLACEMENT OF SUITABLE RETENTION SYSTEMS ACROSS DRAINAGE LINES AND AT INTERCEPTION POINTS FOR BOTH THE CONSTRUCTION AND STOCKPILE AREAS.
- ALL ACCESS TO AND FROM THE SITE SHALL BE VIA A TEMPORARY CONSTRUCTION ENTRY/EXIT THE CONTRACTOR SHALL NOMINATE A PROPOSED ACCESS LOCATION ON THE ESC PLAN FOR APPROVAL BY THE SUPERINTENDENT
- STOCKPILES SHALL ONLY BE LOCATED IN AREAS NOMINATED ON THE PROJECT DRAWINGS OR APPROVED BY THE SUPERINTENDENT. ALL STOCKPILES MUST HAVE APPROPRIATE ESC MEASURES INSTALLED TO PREVENT SEDIMENT TRANSPORT. THE MAXIMUM HEIGHT OF ALL STOCKPILES MUST BE LIMITED TO 2.0m
- ALL PERMANENT AND TEMPORARY UNLINED SWALES AND DRAINS MUST HAVE APPROPRIATE TEMPORARY EROSION PROTECTION.
- ALL PARTIALLY CONSTRUCTED DRAINAGE STRUCTURES MUST BE PROTECTED AGAINST SEDIMENT INFILTRATION DURING CONSTRUCTION.
- ALL COMPLETED DRAINAGE STRUCTURES MUST BE PROTECTED AGAINST SEDIMENT INFILTRATION UNTIL GRASSING IS ESTABLISHED.
- AT ALL TIMES FOR THE DURATION OF CONSTRUCTION. WET SUPPRESSION METHODS TO BE
- 10. ALL EROSION AND SEDIMENT CONTROL MEASURES MUST BE CHECKED FOR DAMAGE, CLEANED OUT AND FULLY REINSTATED AFTER EACH RAINFALL EVENT RESULTING IN RUNOFF 11. IF EROSION AND SEDIMENT CONTROL DEVICES HAVE BEEN FOUND TO BE DEFICIENT OR FAILED
- SERVICE, DUE TO UNFORESEEN CIRCUMSTANCES, CORRECTIVE ACTION IS TO BE UNDERTAKEN IMMEDIATELY WHICH MAY INCLUDE AMENDMENTS/ADDITIONS TO THE ORIGINAL APPROVED EROSION CONTROL PLANS.
- 12. THE INSTALLATION, REMOVAL, RELOCATION OR MODIFICATION TO EROSION AND SEDIMENT CONTROL DEVICES MAY BE MADE BY COUNCIL IF DEEMED NECESSARY AND RELEVANT. 13. EROSION AND SEDIMENT CONTROL DEVICES SHALL REMAIN IN PLACE UNTIL THE TREATMENT
- AREA IS SUITABLY STABILISED/VEGETATED. THE CONTRACTOR SHALL UNDERTAKE A FORMAL COMPLIANCE AUDIT OF THE ESC AT SIX WEEKS INTERVALS DURING THE CONSTRUCTION PERIOD OF THE PROJECT. RECORDS OF THE AUDIT SHALL BE RETAINED ON SITE. WHERE IDENTIFIED AS PART OF THE AUDIT THE ESCP SHALL BE UPDATED AND PROVIDED TO THE SUPERINTENDENT.

SEWER NOTES:

- 1. ALL SEWER WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE CURRENT FNQROC DEVELOPMENT MANUAL SPECIFICATION S6 'SEWERAGE RETICULATION'.
- ALL NEW SEWER MAINS AND MANHOLES TO BE CONSTRUCTED IN ACCORDANCE WITH FNQROC STD DRAWINGS 3000 AND S3015.
- ALL SEWER MANHOLE COVERS SHALL BE CIRCULAR UNLESS NOTED OTHERWISE. COVERS SHALL BE TYPE B INSIDE PROPERTIES AND TYPE C ELSEWHERE. ALL SEWER MANHOLE COVER LEVELS TO BE 50mm ABOVE FINISHED SURFACE LEVEL UNLESS
- NOTED OTHERWISE.
- ALL HOUSE CONNECTION BRANCHES TO NEW SEWER MAINS TO BE CONSTRUCTED IN ACCORDANCE WITH THE PROJECT DRAWINGS AND FNOROC STD DRAWING S3005. BRANCHES SHALL BE CLEARLY MARKED IN ACCORDANCE WITH THE SPECIFICATION.
- SHALL BE CLEARLY MARKED IN ACCORDANCE WITH THE SPECIFICATION. COUNCIL MUST BE CONTACTED TO PERFORM ANY DIRECT CONNECTION TO LIVE SEWER MAINS. THE CONTRACTOR SHALL LODGE WITH COUNCIL THE APPROPRIATE APPLICATION FORMS AND FEES FOR THESE WORKS TO BE COMPLETED. IT MAY BE POSSIBLE FOR SOME WORKS TO BE PERFORMED BY THE CONTRACTOR UNDER SPECIAL CIRCUMSTANCES AND SUBJECT TO APPROPRIATE CONTINUES AGREED TO WITH COUNCIL. THE CONTRACTOR SHALL CARRY OUT A CCTV INSPECTION THROUGH ALL SEWERS WITHIN THE
- DEVELOPMENT BOTH PRIOR TO COMMENCING WORKS AND ALSO ON COMPLETION OF CONSTRUCTION ACTIVITY ON THE SITE. THE FOOTAGE TO THE SUPERINTENDENT FOR ASSESSMENT. ANY SECTIONS OF SEWER CONSIDERED TO BE DAMAGED DURING CONSTRUCTION SHALL BE RECTIFIED TO THE SATISFACTION OF COUNCIL

WATER NOTES:

- AND DUCTILE IRON COMPATIBLE.
- 600mm MINIMUM ELSEWHERE.

- 6 COUNCIL MUST BE CONTACTED TO PERFORM ANY DIRECT CONNECTION OR ALTERATION TO LIVE

LANDSCAPING NOTES:

- DEVELOPMENT MANUAL SPECIFICATION S8 'LANDSCAPING
- ADVANCE TO ENSURE AVAILABILITY

- SERVICES
- GREATER THAN 7.5m FROM STREET LIGHTS c. GREATER THAN 2.0m FROM STORMWATER DRAINAGE PITS
- d. GREATER THAN 3.0m FROM DRIVEWAYS

MG

MF

DATE: 15/04/24 RPEQ: 5085

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10.	DATE	DESCRIPTION	DESIGN	APPROVED





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SCALE

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MG

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ALL WATER RETICULATION WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE CURRENT FNQROC DEVELOPMENT MANUAL SPECIFICATION - S5 'WATER RETICULATION'. ALL PVC AND PE PIPES SHALL BE CLASS PN16. PVC PIPES SHALL BE RUBBER RING JOINTED

3. FOR MAIN TRENCHING, BEDDING & ANCHORAGE DETAILS REFER FNQROC STD DRAWINGS S2015 & S2016. ENSURE COVER TO WATER MAINS IS 800mm MINIMUM UNDER ROADWAYS AND

ALL WATER MAINS SHALL BE INSTALLED ON A STANDARD 2.0m OFFSET FROM THE PROPERTY BOUNDARY UNLESS NOTED OTHERWISE ON PLANS.

WHERE NON-METALLIC PIPES ARE LAID, A CONTINUOUS STEEL WIRE, 1.6mm MIN DIAMETER, SHALL BE LAID IMMEDIATELY ABOVE THE FILL SAND TO ASSIST IN FUTURE LOCATING. THIS WIRE IS TO BE WRAPPED ONCE AROUND ALL HYDRANTS AND VALVES.

WATER MAINS. THE CONTRACTOR SHALL LODGE WITH COUNCIL THE APPROPRIATE APPLICATION FORMS AND FEES FOR THESE WORKS TO BE COMPLETED. IT MAY BE POSSIBLE FOR SOME VORKS TO BE PERFORMED BY THE CONTRACTOR UNDER SPECIAL CIRCUMSTANCES AND SUBJECT TO APPROPRIATE CONDITIONS AGREED TO WITH COUNCIL.

ALL HYDRANTS AND VALVES TO BE LOCATED OPPOSITE PROPERTY BOUNDARY TRUNCATIONS AND CORNERS, UNLESS NOTED OTHERWISE ON PLANS. FOR VALVES & HYDRANT BOXES INSTALLATION DETAILS REFER FNQROC STD DRAWINGS S2000 AND S2005.

HYDRANTS OR VALVES CONSTRUCTED IN CONCRETE ARE TO HAVE A COMPRESSIBLE LAYER (ABLEFLEX) INSTALLED ON THE SURROUND. REFER FNQROC STD DRAWING \$2000. THE MINUM TEST PRESSURE FOR ALL PIEPS SHALL BE 1250 KPG. THE GIVE COUNCILS WATER OFFICER 24 HOURS NOTICE PRIOR TO TESTING. PERIOD. THE CONTRACT SHALL

ALL LANDSCAPING WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE CURRENT FNQROC ALL PLANTS MUST BE ORDER SUPPLIED BY A REPUTABLE NURSERY, AND ORDERED WELL IN

TURF TO BE USED SHALL BE ROLLED B GRADE TURF MIX OF SPECIES 80% BUFFALO GRASS (AXONOPUS COMPRESSUS) AND 20% COUCH GRASS VARIETIES. STREET TREES SHALL BE PROVIDED WHERE INDICATED ON PLAN. FINAL LOCATION TO BE

DETERMINED ON SITE FOLLOWING INSTALLATION OF DRIVEWAYS AND CONFIRMATION OF SITE

STREET TREES FINAL LOCATION SHALL BE IN ACCORDANCE WITH THE FOLLOWING: a. GREATER THAN 4.0m FROM ELECTRICITY OR TELECOMMUNICATION POLES OR PILLARS.

e A MINIMUM OF 0.8m AND A MAXIMUM OF 1.0m FROM THE BACK OF KERB TEMPORARY IRRIGATION SHALL BE INSTALLED TO ENABLE WATERING DURING THE ESTABLISHMENT



CONMAT PTY LTD QUILL STREET LAND DEVELOPMENT

GENERAL NOTES

160-001-C101

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LEGEND

	STAGE BOUNDARY
	PROPOSED TOP OF BATTER
	PROPOSED BOTTOM OF BATTER
	EXISTING SEWER EASEMENT
——— E ———	EXISTING ELECTRICITY (A/G)
S	EXISTING SEWER MAIN
w	EXISTING WATER MAIN
— т —	EXISTING TELSTRA
_///	EXISTING FENCE
	EXISTING BUILDING
	PAD BOUNDARY
	WORKS AREA



	CONSTRUC	STION	
ÆF	CONMAT PTY LTD		
	QUILL STREET LAND DEVELOPME	NT	
REF	GENERAL LAYOUT PLAN		
10	160-001-C103	A3	A







1.0	PROPOSED MAJO (1.0m INTERVAL) PROPOSED MINC (0.1m INTERVAL)
	PAD BOUNDARY
	PROPOSED TOP
	PROPOSED BOTT
s	EXISTING SEWER
	SEWER EASEMEN
	PROPOSED FILL

OSED MAJOR CONTOURS INTERVAL) DSED MINOR CONTOURS INTERVAL) BOUNDARY OSED TOP OF BATTER OSED BOTTOM OF BATTER NG SEWER MAIN EASEMENT

, SP163448



	POINT NUMBER	EASTING	NORTHING	HEIGHT
	1	4903.079	10237.163	395.624
S	2	4907.599	10223.085	395.624
	3	4908.123	10218.001	395.639
	4	4910.710	10169.102	395.760
	5	4909.473	10165.081	395.784
	6	4893.069	10159.875	395.956
	7	4872.232	10222.442	395.964
	8	4872.321	10224.414	395.959
	9	4873.084	10225.948	395.948
	10	4874.286	10227.121	395.930
	11	4877.179	10228.286	395.910
4 SP163118	12	4897.243	10235.899	395.712
51 700440	13	4900.155	10236.678	395.652
	14	4977.753	10245.366	395.770
	15	4981.675	10233.038	395.900
	16	4946.039	10220.952	395.900
	17	4942.936	10230.709	395.780
	18	4947.128	10238.517	395.740
	19	4962.896	10243.590	395.740

ROCK LINED DRAIN - CONTROL LINE

١G	NORTHING	BEARING	RAD/SPIRAL	A.LENGTH	DEFL.ANGLE
40	10158.029	72°12'00.00"			
61	10161.375	72°12'00.00"			
06	10163.669		-10	12.876	73°46'35.22"
00	10171.171	358*25'24.78"			
90	10186.084	358*25'24.78"			
27	10188.348		20	4.510	12 ° 55'08.29"
44	10190.594	11°20'33.07"			
49	10237.807	11*20'33.07"			
88	10240.510		15	8.153	31°08'25.05"
42	10244.954	42°28'58.12"			
10	10246.073	42*28'58.12"			

BATTER TOP - CONTROL LINE

١G	NORTHING	BEARING	RAD/SPIRAL	A.LENGTH	DEFL.ANGLE
45	10157.398				
34	10221.908	342 11'59.95"	13	19.415	85*34'09"
93	10237.915	67*46'09.17"			
35	10246.884	67*46'09.17"			6°08'36"
63	10249.055	73°54'45.16"			

CATCH DRAIN - CONTROL LINE

١G	NORTHING	BEARING	RAD/SPIRAL	A.LENGTH	DEFL.ANGLE
82	10159.080			64.654	
18	10220.639	342'12'01.66"	7	10.594	86°42'55"
65	10229.310	68*54'56.20"	7	19.146	
29	10236.198	68*54'56.20"	100	10.889	6°14'21"
82	10239.555	75'09'17.28"	100	50.147	
56	10252.403	75*09'17.28"			



CONMAT PTY LTD

QUILL STREET LAND DEVELOPMENT

GRADING PLAN

160-001-C104

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LOT 1 DRIVEWAY

THING	BEARING	RAD/SPIRAL	A.LENGTH	DEFL.ANGLE
04.914	312*02'53.90"			
20.765	342*12'00.00"			
27.561		R = -12.000	12.879	61*29'32.69"
28.888	280*42'27.31"			
29.675	280*42'27.31"			
30.525		R = -18.000	8.956	28°30'27.31"
29.127	252*12'00.00"			
25.976	252*12'00.00"			

LEGEND

	STAGE BOUNDARY
1.0	PROPOSED MAJOR CONTOURS (1.0m INTERVAL)
	PROPOSED MINOR CONTOURS (0.1m INTERVAL)
_///	EXISTING FENCE
	EXISTING BUILDING
	PAD BOUNDARY
_///	NEW HANDRAIL
s	EXISTING SEWER MAIN
	NEW GRAVEL DRIVEWAY
	EXISTING CONCRETE SPANNING SLAB
\bullet	PROPOSED GUIDE POSTS



CONMAT PTY LTD QUILL STREET LAND DEVELOPMENT

DRIVEWAY PLAN

160-001-C105

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		STREET 45/VTP396.942 /IP396.706	366 289			COMPACT TO 98% SRDD CBR 5 FOR SUBGR TYPE 2.3 200mm GRAVEL DRIVEWAY, R FNQROC STD DWG S	MIN. ADE. FHICK EFER 1110. GRAVEL DRIVEWA SCALE 1:50
		CH.0.1	CH.5.373/VIP3	9997-700 DRIVEWAY CENTREL	CH 22 618 MP394.094	CH.37.28/VIP393.735 EXISTING 5 x 4 BCb 10 BEWIN	221-P6EdUV 192-6E-HO EXISTING SURFACE
IVEWAY LONG dwg	Horizontal Curve Data Vertical Geometry Grade (%) Vertical Grade Length Vertical Curve Lenath (m)	-9.008 <u>%</u> 2.759m 5.228m VC	-15.978 % 15.271m	9.176m VC	 	8.481m VC	13.219 %
01-C106 DR	Vertical Curve Radius (m) DATUM RL388.000	R = 75	>	R = 75	>	R = 50	
awings\160-0	CUT/FILL	0.15	0.048	-0.05 -0.056 -0.048	0.0058	0.373	0.469 0.496 0.911 1.096
bdivision\Dr	CENTRELINE	396.942 396.942 396.661 396.661	396.289 334.399	394.407 394.355 394.238	394.094 393.014 393.814 393.77	393.735 393.779 393.791	394.757 394.757 394.757 394.757 395.184
1 Quill St Su	NATURAL SURFACE	396.805 396.859 396.650	396.241	394.457 394.411 394.286	394.036 393.518 393.578	393.362 393.401 393.415	393.703 393.708 393.846 393.846 393.846
60 ConmattoC	CHAINAGE	0.145 0.145 2.759	5.373	18.03 18.578 20	22.618 30.111 31.28	33.152 35.23 35.52	39.761 40 44.189 47.415
00000000000000000000000000000000000000			_,,		VEWAY - LONGITUDINAL SE	ECTION	
SHOUSHARCONDUCTOOT SHOUSHARCONDUCTOOT A 03/04/24 NO. DATE	_ ISSUE DESCRIPTION DESIG	N APPROVED			SCALE SCALE 1:50 0 0.25 0.5 0.75 1.0 1 1:200 0 2 3 4 5 1 </th <th>25 1.50 A3 7 A3 7 A3 200 A3 210 A3</th> <th>DESIGNED MG PROJECT REF DESIGN MF DRAWING REF DRAWING NO DATE: 15/04/24 RPEQ: 5085</th>	25 1.50 A3 7 A3 7 A3 200 A3 210 A3	DESIGNED MG PROJECT REF DESIGN MF DRAWING REF DRAWING NO DATE: 15/04/24 RPEQ: 5085





ROCK LINED DRAIN - LONGITUDINAL SECTION



1.25 1.50 A3	DRAWN	MG	DESIGNED	MG	PROJECT R
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	CONSTRUCTION			
E CONMAT PTY I	_TD			
QUILL STREET LAND DEVELOPMENT				
ROCK LINED DF	RAIN			
ONGITUDINAL SECTION AND DI	ETAIL (SHEET 1	OF 2)		
° 160-001-C107	SIZE A3	A		

APPROVED FOR



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EF	CONMAT PTY LTD		
	QUILL STREET LAND DEVELOPME	NT	
EF	SEWER RETICULATION PLAN		
10	160-001-C109	A3	A



LEGEND

1.0	PROPOSED MAJOR CONTOURS (1.0m INTERVAL)
	PROPOSED MINOR CONTOURS (0.1m INTERVAL)
1.0	EXISTING MAJOR CONTOURS (1.0m INTERVAL)
	EXISTING MINOR CONTOURS (0.1m INTERVAL)
	EXTENT OF DISTURBANCE
	CLEAN WATER DIVERSION BUND
	TEMPORARY CONSTRUCTION ENTRY / EXIT
	TURF
\boxtimes	HYDROMULCH
	DRILL SEED/GRASS
SF	SEDIMENT FENCING
Constant of the second s	ROCK FILTER DAM
	CHECK DAM



CONMAT PTY LTD QUILL STREET LAND DEVELOPMENT

EROSION AND SEDIMENT CONTROL PLAN

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SIZE A3

3 REVISION

SEDIMENT FENCE

MATERIAL

FABRIC: POLYPROPYLENE, POLYAMIDE, NYLON, POLYESTER, OR POLYETHYLENE WOVEN OR NON-WOVEN FABRIC, AT LEAST 700mm IN WIDTH AND A MINIMUM UNIT WEIGHT OF 1400SM. ALL FABRICS TO CONTAIN ULTRAVIOLET INHIBITORS AND STABILISERS TO PROVIDE A MINIMUM OF 6 MONTHS OF USEABLE CONSTRUCTION LIFE (ULTRAVIOLET STABILITY EXCEEDING 70%)

FABRIC REINFORCEMENT: WIRE OR STEEL MESH MINIMUM 14-GAUGE WITH A MAXIMUM MESH SPACING OF 200mm.

SUPPORT POSTS/STAKES:

1500mm² (MIN) HARDWOOD, 2500mm² (MIN) SOFTWOOD, OR 1.5kg/m (MIN) STEEL STAR PICKETS SUITABLE FOR ATTACHING FABRIC

- INSTALLATION
- REFER TO APPROVED PLANS FOR LOCATION, EXTENT AND REQUIRED TYPE OF FABRIC (IF SPECIFIED). IF THERE ARE QUESTIONS OR PROBLEMS WITH THE LOCATION, EXTENT, FABRIC TYPE, OR METHOD OF INSTALLATION CONTACT THE ENGINEER OR RESPONSIBLE ON-SITE OFFICIER FOR ASSISTANCE.
 TO THE MAXIMUM DEGREE PRACTICAL, AND WHERE THE PLANS ALLOW, ENSURE THE FENCE IS LOCATED:

 TOTALLY WITHIN THE PROPERTY BOUNDARIES;
 ALONG A LINE OF CONSTANT ELEVATION WHEREVER PRACTICAL;
 TOTALLY UTHIN THE FOOD THE OF AND WHEREVER PRACTICAL;
- iii. AT LEAST 2m FROM THE TOE OF ANY FILLING OPERATIONS THAT MAY RESULT IN SHIFTING SOIL/FILL
- III. AT LEASI 2m FROM THE TOE OF ANY FILLING OPERATIONS THAT MAY RESULT IN SHIFTING SOLCFILL DAMAGING THE FEROLE.
 INSTALL RETURNS WITHIN THE FENCE AT MAXIMUM 20m INTERVALS IF THE FENCE IS INSTALLED ALONG THE CONTOUR, OR 5 TO 10m MAXIMUM SPACING (DEPENDING ON SLOPE) IF THE FENCE IS INSTALLED AT AN ANGLE TO THE CONTOUR. THE 'RETURN'S SHALL CONSIST OF EITHER:
 V-SHAPED SECTION EXTENDING AT LEAST 1.5m UP THE SLOPE; OR
- V-SHAPED SECTION EXTENDING AT LEAST 1.5m UP THE SLOPE; OR
 SANDBAG OR ROCK/AGGREGATE CHECK DAM A MINIMUM 1/3 AND MAXIMUM 1/2 FENCE HEIGHT, AND EXTENDING AT LEAST 1.5m UP THE SLOPE.
 ENSURE THE EXTREME ENDS OF THE FENCE ARE TURNED UP THE SLOPE AT LEAST 1.5m, OR AS NECESSARY, TO MINIMISE WATER BYPASSING AROUND THE FENCE.
 ENSURE THE SEDIMENT FENCE IS INSTALLED IN A MANNER THAT AVOIDS THE CONCENTRATION OF FLOW ALONG THE FENCE, AND THE UNDESTRALED DISCHARGE OF WATER AROUND THE ENDS OF THE FENCE.
 IF THE SEDIMENT FENCE IS TO BE INSTALLED ALONG THE EDGE OF EXISTING TREES, ENSURE CARE IS TAKEN TO PROTECT LET ETERSE. AND THEIR POOT SYSTEME DIPON.

- PROTECT THE TREES AND THEIR ROOT SYSTEMS DURING INSTALLATION OF THE FENCE. DO NOT ATTACH TH FABRIC TO THE TREES
- FABRIC TO THE TREES. 1. UNLESS DIRECTED BY THE SITE SUPERVISOR OR THE APPROVED PLANS, EXCAVATE A 200mm WIDE BY 200mm DEEP TRENCH ALONG THE PROPOSED FENCE LINE, PLACING THE EXCAVATED MATERIAL ON THE UP-SLOPE SIDE OF THE TRENCH. 8. ALONG THE LOWER SIDE OF THE TRENCH, APPROPRIATELY SECURE THE STAKES INTO THE GROUND SPACED NO GREATER THAN 3m IF SUPPORTED BY A TOP SUPPORT WIRE OR WEIR MESH BACKING, OTHERWISE NO GREATER THEORY.
- THAN 2m. 9. IF SPECIFIED, SECURELY ATTACH THE SUPPORT WIRE OR MESH TO THE UP-SLOPE SIDE OF THE STAKES WITH THE
- MESH EXTENDING AT LEAST 200mm INTO THE EXCAVATED TRENCH, ENSURE THE MESH AND FABRIC IS ATTACHED TO THE UP-SLOPE SIDE OF THE STAKES EVEN WHEN DIRECTING A FENCE AROUND A CORNER OR SHARP CHANGE
- TO THE UP-SLOPE SIDE OF THE STAKES EVEN WHEN DIRECTING A FENCE AROUND A CORNER OR SHARP CHANGE OF DIRECTION.
 10. WHEREVER POSSIBLE, CONSTRUCT THE SEDIMENT FENCE FROM A CONTINUOUS ROLL OF FABRIC. TO JOIN FABRIC EITHER:

 ATTACH EACH END TO TWO OVERLAPPING STAKES WITH THE FABRIC FOLDING AROUND THE ASSOCIATED STAKE ONE TURN, AND WITH THE TWO STAKES TIED TOGETHER WITH WIRE; OR
 OKETURN, AND WITH THE TWO STAKES TIED TOGETHER WITH WIRE; OR
 SECURELY ATTACH THE FABRIC TO THE SUPPORT POSTS USING 25 X 12.5mm STAPLES, OR TIE WIRE AT MAXIMUM 1500mm SPACING.
- 150mm SPACING.
- SECURELY ATTACH THE FABRIC TO THE SUPPORT WIRE/MESH (IF ANY) AT A MAXIMUM SPACING OF 1m.
 SECURELY ATTACH THE FABRIC TO THE SUPPORT WIRE/MESH (IF ANY) AT A MAXIMUM SPACING OF 1m.
 ENSURE THE COMPLETED SEDIMENT FENCE IS AT 450mm, BUT NOT MORE THAN 700mm HIGH. IF A SPILL-THOUGH WEIR IS INSTALLED, ENSURE THE CREST OF THE WEIR IS AT LEAST 300mm ABOVE GROUND LEVEL.
 BACKFILL THE TRENCH AND TAMP THE FILL TO FIRMLY ANCHOR THE BOTTOM OF THE FABRIC AND MESH TO PREVENT WATER FROM FLOWING UNDER THE FENCE.
- ADDITIONAL REQUIREMENTS FOR THE INSTALLATION OF SPILL-THROUGH WEIR
- ADDITIONAL REQUIREMENTS FOR THE INSTALLATION OF SPILL-THROUGH WEIR 15. LOCATE THE SPILL-THROUGH WEIR SUCH THAT THE WEIR CREST WILL BE LOWER THAN THE GROUND LEVEL AT EACH END OF THE FENCE. 16. ENSURE THE CREST OF THE SPILL-THROUGH WEIR IS AT LEAST 300mm THE GROUND ELEVATION. 17. SECURELY THE A HORZONTAL CROSS MEMBER (WEIR) TO THE SUPPORT POSTS/STAKES EACH SIDE OF THE WEIR. CUT THE FABRIC DOWN THE SIDE OF EACH POST AND FOLD THE FABRIC OVER THE CROSS MEMBER AND ADDPORDMETELY SECTIONE THE EADDIC APPROPRIATELY SECURE THE FABRIC.
- 18. INSTALLA SUITABLE SPLASH PAD AND/OR CHUTE IMMEDIATELY DOWN-SLOPE OF THE SPILL-THROUGH WEIR TO CONTROL SOIL EROSION AND APPROPRIATELY DISCHARGE THE CONCENTRATED FLOW PASSING OVER THE WEIR. MAINTENANCE

- MAINTENANCE 19. INSPECT THE SEDIMENT FENCE AT LEAST WEEKLY AND AFTER ANY SIGNIFICANT RAIN. MAKE NECESSARY REPAIRS IMMEDIATELY. 20. REPAIR ANY TORN SECTIONS WITH A CONTINUOUS PIECE OF FABRIC FROM POST TO POST. 21. WHEN MAKING REPAIRS, ALWAYS RESTORE THE SYSTEM TO ITS ORIGINAL CONFIGURATION UNLESS AN AMENDED LAYOUT IS REQUIRED OR SPECIFIED. MAKING REPAIRS, ALWAYS DESTORE THE SYSTEM TO ITS ORIGINAL CONFIGURATION UNLESS AN AMENDED LAYOUT IS REQUIRED OR SPECIFIED.
- 22. IF THE FERCE IS SAGING BETWEEN STAKES, INSTALL ADDITIONAL SUPPORT POSTS. 23. REMAYE ACCUMULATED SEDIMENT IF THE SEDIMENT DEPOSIT EXCEEDS A DEPTH OF 1/3 THE HEIGHT OF THE
- FENCE. 24. DISPOSE OF SEDIMENT IN A SUITABLE MANNER THAT WILL NOT CAUSE AN EROSION OR POLLUTION HAZARD. 25. REPLACE THE FABRIC IS THE SERVICE LIFE OF THE EXISTING FABRIC EXCEEDS 6 MONTHS.
- REMOVAL
- 26. WHEN DISTURBED AREAS UP-SLOPE OF THE SEDIMENT FENCE ARE SUFFICIENTLY STABILISED TO RESTRAIN
- WHEN DISTORED AREAS OF SLOPE OF THE SEDMENT FENCE ARE SUFFICIENTLY STABLESD TO RESTRAIN EROSION, THE FENCE MUST BE REMOVED.
 REMOVE MATERIALS AND COLLECTED SEDIMENT AND DISPOSE OF IN A SUITABLE MANNER THAT WILL NOT CAUSE AN EROSION OR POLLUTION HAZARD.
- 28. REHABILITATE/REVEGETATE THE DISTURBED GROUND AS NECESSARY TO MINIMISE THE EROSION HAZARD.





					CLIENT	SCALE		MG	DESIGNED	MG	PROJECT
							DRAWN	MF	DESIGN	MF	
					CONMAT	NTS	CIVIL SIGNOFF	APPROVAL	APPROVED		DRAWING
(/				FRSCON	CONSTRUCTION MATERIALS			Tak	Mart		DRAWING
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	"TUM
	50-75MM CRUSHED ROCK
	(200MM_MINIMUM), GEOTEXTILE FILTER
	MATERIAL UNDER WHEN
\swarrow	OR WHERE DIRECTED
	HIGH RUNOFF
S S S DIVERSIO	N BUND RATED INTO THE PAD
WHEN T	IE ENTRY/EXIT PAD IS
SOIL DIS	TURBANCE.
ONSTRUCTION	ENTRY / EXIT
NOT TO SCALE	
EROSION RESISTANT ROCK, NOM mm (LARGE DISTURBANCES). A	NAL DIAMETER OF 50 TO 75mm (SMALL LL REASONABLE MEASURES MUST BE TAKEN TO
512E.	
ĒĢATE.	
NON-WOVEN FILTER CLOTH ('B	DIM' A24 OR EQUIVALENT).
(-	
FOR LOCATION AND DIMENSION ON, DIMENSIONS, OR METHOD O	AL DETAILS. IF THERE ARE QUESTIONS OR F INSTALLATION, CONTACT THE ENGINEER OR
CER FOR ASSISTANCE. IE ROCK PAD, REMOVING STUMP	S, ROOTS AND OTHER VEGETATION TO PROVIDE A
VEHICLES, BUT CLEAR ONLY TH	T NECESSARY FOR THE EXIT. DO NOT CLEAR
OFT, PLASTIC OR CLAYEY, PLACE	A SUB-BASE OF CRUSHED ROCK OR A LAYER
ING A MINIMUM 200mm THICK UCTION SITE IS UP-SLOPE OF 1	LAYER OF CLEAN, OPEN-VOID ROCK. HE ROCK PAD, THUS CAUSING STORMWATER
THE ROCK PAD, THEN FORM A DIVERT SUCH RUNOFF TO A SU	MINIMUM 300mm HIGH FLOW CONTROL BERM ITABLE SEDIMENT TRAP.
PAD SHOULD BE AT LEAST 15M OR EXIT AND AT LEAST 3m. T	WHERE PRACTICABLE, AND AS WISE AS THE HE ROCK PAD SHOULD COMMENCE AT THE EDGE
CAD OR PAVEMENT. CK PAD WHERE IT MEETS THE I	AVEMENT SO THAT THE WHEELS OF TURNING
TO PEDESTRIAN MOVEMENT, THE	COVER THE COARSE ROCK WITH FINE AGGREGATE
ID EXIT POINTS PRIOR TO FORE PRODUCING RAINFALL, OR OTHEF	AST RAIN, DAILY DURING EXTENDED PERIODS OF WISE AT FORTNIGHTLY INTERVALS.
R MUD IS TRACKED OR WASHED HYSICALLY REMOVED, FIRST USIN	ONTO THE ADJACENT SEALED ROADWAY, THEN G A SQUARE-EDGED SHOVEL, AND THEN A
D THEN BY A MECHANICAL VACU REASONS, THE ROADWAY SHALL	UM UNIT, IF AVAILABLE. ONLY BE WASHED CLEAN AFTER ALL REASONABLE
THE ROCK BECOMES FILLED WIT	H MATERIAL AND THE REFECTIVENESS OF THE
DDED AND/OR THE ROCK PAD	AUST BE EXTENDED.
SIRED OPERATIONAL CONDITIONS	NOT CREATE AN EROSION OF POLITION
	. NOT OREALE AN EROSION OR FOLLOHON
REMOVED ONLY AFTER IT IS NO	I ONGER NEEDED AS A SEDIMENT TRAP.
LLECTED SEDIMENT AND DISPOSE	OF IN A SUITABLE MANNER THAT WILL NOT
HE DISTURBED GROUND AS NEC	ESSARY TO MINIMISE THE EROSION HAZARD.
RECTION OF FLOW	
0.6m	MIN 1 2
	om UNDISTURBED AREA
NOT TO SCALL	
ED WEEKLY IT SHOULD BE REMOVED T	D AVOID PONDING
J UN DAMAGE	
ATCH DRAINS DOWN EXPO	ED SLOPES SHOULD NOT
UISTANCE DEFINED BY: 48 [LOG(H)] - 25 M	ETRES
71 - 48 LOG(% SLO	AS DEFINED
OPE)= <u>100</u>	APPROVED FOR
	CONSTRUCTION
REF	
ER	
NO	
160)-001-C111 A3 A

P05-F-DD01 Document Transmittal

Project:	Quill Street Subdivision									*					
Attention:	Sam Wakeford							ONS	2					25	
Company:	Mareeba Shire Council					Γ	<u>V</u> Date	vw of Is	<mark>w.e</mark> ssue	ersco	on.o	com	.au		
		Day	16												
From:	Mark Freeman	Month	04												
r iom.		Year	24												

Dwg/Doc Number	Dwg/Doc Title				Re	visi	on				
160-001-C100	Cover Sheet, Locality Plan and Drawing List	А									
160-001-C101	General Notes	А									
160-001-C102	Clearing Plan	А									
160-001-C103	General Layout Plan	А									
160-001-C104	Grading Plan	А									
160-001-C105	Driveway Plan	А									
160-001-C106	Driveway Longitudinal Section	А									
160-001-C107	Drain Longitudinal Section (Sheet 1 of 2)	А									
160-001-C108	Drain Longitudinal Section (Sheet 2 of 2)	А									
160-001-C109	Sewer Reticulation Plan	А									
160-001-C111	Erosion and Sediment Control Plan	А									
160-001-C112	Erosion and Sediment Control Notes	А									
160-001-R001	Operational Works Application	В									
160-001-R002	Stormwater Management Plan	А									
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Company Nam	10	Attention			Nu	mber c	of Co	pies		
Mareeba Shire Co	ouncil	Sam Wakeford	1							
Mareeba Shire Co	ouncil	Carl Ewin	1							
Mareeba Shire Co	ouncil	Italo Armenti	1							
ConMat		Roy Lavis	1							
ConMat		Steven Lavis	1							
Tyrone Corp		Peter McNamee	1							
A - Approval	T - Tender Issue	R - As Requested			Re	eason f	or Is	sue		
P - Preliminary	C - Constructon Issue	FI - For Information	А							
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A - Original	С - Сору	P - PDF			F	orm	at Is	sue	d			
M - Model	D - Acad Drawing	O - Other	Ρ									
M- Mail	C - To be Collected	E - E-Mail			Me	thod	l of l	Deliv	very			
H - Hand Delivery	CO - Courier	O - Other	Е									



QUILL STREET MAREEBA

STORMWATER MANAGEMENT PLAN

FILE NO: 160-001-R002

MSC REF: OPW210006

CLIENT:





Prepared by:

ERSCON PTY. LTD. T/as ERSCON Consulting Engineers PO Box 7890 CAIRNS QLD 4870





DOCUMENT ISSUE RECORD

Revision Code	Date Revised	Revision Details	Author	Checked	Approved
A	23/02/24	Stormwater Management Plan	MF	MF	JDM

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APPENDIX C – Building Pad Height Sketch
APPENDIX D – Hydrological Analysis

APPENDIX E – Hydraulic Analysis



1 SUMMARY

1.1 APPLICATION DETAILS

This Stormwater Management Plan supports the application for the operational works approval to complete construction of the land development as approved for reconfiguration by Council. The entire works area has previously had an operational works approval (OPW 210006) dated 17th December 2021. This was originally for 4 lots, however, have now been combined into 1 lot.

Proposed development:	
Type of approva sought:	
Site address:	
Real property description:	/
Site area:	
Assessment manager:	
Owner details:	
Applicant details:	

Land development on Quill Street, Mareeba. Works include earthworks, sewer connection, overland stormwater drainage and driveway.

Stormwater Management Plan

Quill Street, Mareeba Lot 22 on SP217220

8,401 m² Mareeba Shire Council

Conmat Pty Ltd Conmat Pty Ltd C/-ERSCON PTY. LTD. PO BOX 7890 CAIRNS QLD 4870

1.2 PLANNING INSTRUMENT DETAILS

Planning scheme:
Zone:
Local plan:
Level of assessment:
Applicable codes:

Mareeba Shire Council Planning Scheme 2016 Medium Density Residential Nil Code Assessment Nil

1.3 REFERRAL AGENCIES

Referral agency and role



2 SITE DETAILS

2.1 SITE DESCRIPTION

The site is located at the northern end of Quill Street, Mareeba.

Table 1: Site description

Site characteristic	Description
Existing land use	The existing land use has been a vacant lot.
Existing structures	There is an existing driveway, sewer, water and stormwater services constructed which will be utilised for this lot. Some temporary structures also exist that will be removed.
Frontage and access	The site has frontage to Quill Street and will be connected by a gravel driveway.
Topography and views	The lot varies in level from approximately RL391m to RL399m AHD. The lot maintains visual amenity to the local area through existing vegetation.
Existing vegetation	The lot is predominantly trees with open grassed areas and other overgrown vegetation.
Existing waterways	Site stormwater discharges through the existing drainage easement that runs through the lot and to the existing stormwater system in Quill Street.





Figure 1: Aerial View of Site Identification Source: DA Mapping System



Figure 2: Satellite View of Site Identification **Source: QLD Globe**



2.2 SURROUNDING LAND USES

Table 2: Surrounding land uses

Surrounding land uses		
North	Existing residential area	
South	Existing residential area	
East	Existing residential area	
West	Existing residential area and school	



3 STORMWATER MANAGEMENT PLAN

3.1 DESIGN METHOD

The stormwater design has been carried out using the Rational Method, in accordance with the Queensland Urban Drainage Manual (QUDM).

In accordance with the QUDM recommendations, the major system design has been calculated based on a 100-year recurrence interval (1 in 100 ARI / 1% AEP), using overland flow.

Runoff has been calculated using IFD Chart 15 of the FNQROC Development Manual. Runoff Coefficients have been determined in accordance with QUDM.

3.2 CATCHMENT AREAS

Four external catchments and one internal catchment have been channelled into the open drain system which dissects the lot (see Figure 1 and refer Appendix A – Catchment Plan).

- Catchment A is the capture of surface water from the major earth pad.
- Catchment B, C and D collect surface water from the existing lots and St Thomas' Primary School which is contained within the boundaries of Constance, Hastie and Atherton Street.
- Catchment E encompasses the western side of Quill Street for its full length.

Modelling and observations indicated that the external roadworks are captured via the kerb and channel and drained away from the site.





Figure 1 - Catchment Areas for Quill Street



3.3 HYDROLOGICAL DESIGN PHILOSOPHY

The major drainage system consists of a combination of grass swale drains and a rock lined open drain. The flooded inundation of the site has been separated into two assessments.

Firstly, the overland flow combinations from the catchments and secondly the backflow from the Barron River. Both scenarios have been modelled for a Q100 event and achieve immunity from the lots being flooded.

Coefficients of Discharge have been determined in accordance with Section 4.5 of QUDM assuming an Urban Residential – Low Density (Including roads) Development Category. Rainfall intensities have been obtained from BOM IFD rainfall charts and IFD Chart 15 from FNQROC Section D4 Appendix A.

Times of Concentration have been determined in accordance with Section 4.6 of QUDM. Specifically, the recommended Overland Sheet Flow Times detailed in Table 4.6.4.

The Hydrological Analysis undertaken including the catchment area and flow widths for the rock lined and swale drain layout are shown in the calculation tables contained in Appendix D.

3.3.1 Overland Flow Contributions

The overland flow paths of a Q100 event from the catchment areas A, C, D and E, which diverge prior to the access cross over to the main pad, show the water level in the drain below the freeboard level of approximately 300mm below the lip level. Freeboard below 300mm also occurs when catchment B diverges with the drain, post the lot access (refer Appendix B – Q100 Design Sketches).

3.3.2 Barron River Flooded Backflow

The second assessment is based on the backflow from the Barron River when in flood. The level required for the lots to have flood immunity is RL 395.593m AHD as supplied by MSC. The lots are above this level by a minimum of 100mm at the front of the lots (refer Appendix B – Q100 Design Sketches). The pad levels are designed to ensure the finished floor levels (FFL) are a minimum of 300mm above the Q100 level.

3.3.3 Hydrological Analysis

Stream velocities and volumes were calculated for the 5 contributing catchments for AEP values of 83%, 39%, 18%, 10%, 5%, 2% and 1%. Accumulated values were then determined when flow paths converged as they descended through the catchment. The greatest contributing catchment was D (which includes St Stephen's School) where flows volumes were determined as 1.39m³/s and a velocity of 2.042m/s for the 5% AEP and 1.96m³/s and 2.263m/s for the 1% AEP. (Refer Appendix D - Hydrological Analysis).

The combined catchments of A, C, D and E, converge prior to the access crossing to the main pad and had flow volumes of 2.12m³/s and a velocity of 2.365m/s for a 5%AEP and 3.02m³/s and 2.614m/s for a 1% AEP.

Downstream from the $2x450\emptyset$ and access crossing to the main pad, the combined catchments produce flow volumes of $3.27m^3$ /s and a velocity of 2.633m/s for a 5% AEP and $4.61m^3$ /s and 2.722m/s for a 1% AEP.



Mareeba Shire Council have determined the lot levels are to be above RL 395.593 to ensure flood immunity for a Q100 event. (refer Appendix C – Building Pad Height Sketch).

3.3.4 Hydraulic Analysis

The site uses a combination of different sized open table drains to channel the overland flow to the legal point of discharge located at the boundary with Lot 1 on SP163448. Flow depths and velocities were determined using ERSCON's Super Drain spreadsheet. These values are calculated by inputting the drain profile, flow volume (m³/s) and relative slope along the travelled path.

Flow paths from Catchments B and C diverge at the western boundary with Lot 5 on RP 716383. The volumes for both paths are similar with Catchment B flowing north for a 1% AEP at 0.59m³/s at 1.439m/s and height of 0.310m. Catchment C flow contributes to the southern drain, along the western boundary at 0.65m³/s at 1.562m/s and a height of 0.361m for a 1% AEP.

The rear table drain is designed with a 0.5m wide base and a 1 in 2 batter to the design surface with a 1 in 6 max. grade to the rear boundary. The longitudinal fall of the drain is 1% both north and south of the catchment interface. Table 9.5.2 of QUDM nominates a maximum velocity of 2.8m/s for a grassed channel with 100% cover of a couch grass (buffalo grass). The rear table drain shape and grass lining are suitable to handle a 1% AEP flow.

The rock drain profile has both a primary and secondary flow profile. The low flow capture consists of a concrete invert drain which channels the combined minor flows from catchments C and D initially. The secondary flow profile has a 2.10m wide and 0.60m deep rock channel with a 200mm nominal diameter stone in the base and a 450mm nominal rock on the sides with grasses of Lomandra Hystrix growing throughout.

The rock channel has been designed to cater for a Q100 of 4.61m³/s with velocities of 2.722m/s. Based on 6.25Ha and a 0.06m³/s for a .001m³/s/ha contribution, low flow channels require a minimum channel size of 2.0m base width, 0.45m deep and side slopes of 1 on 1 (refer QUDM Table 9.8.1). **The rock drain for the low flow is suitable to handle a 10% AEP flow.**

The cross section profile for the 600mm deep rock drain for a 1% AEP is capable of taking a 576mm deep flow prior to the 2 x 450Ø at the property access. Below the property access, the 1% AEP has a flow height of 751mm where the rock drain is 900mm deep. **The rock drain size and material type are suitable to handle a 1% AEP flow**.

A hydraulic analysis has been calculated and located in Appendix E.

3.3.5 Time of Closure (ToC)

The Time of Closure (ToC) for the driveway is generally not a requirement for an internal access driveway. The site has a minor drainage path which is dry for most of the year. The site does not have hydrographic levels to produce an estimate for peak flow times for hourly duration for a 1 in 50 ARI (2% AEP).

The highest daily rainfall recorded in the Mareeba site was on 17 December 2023 of 261mm for a 24 hour period which was a weather system associated with ex Tropical Cyclone Jasper.

The days preceding the 17th had 24 hour recorded falls of 99, 123 and 102mm and the day after the 17th December had a fall of 193mm. In total, the amount of rain recorded by the



weather bureau site at Mareeba was over 778mm in 5 days. It has unofficially been declared a 1 in 100 year event. Evidence on site after the event, indicated an approximate width of flow of 2-3m with a 300-400mm flooded height. No scouring was observed.

Mareeba has an average of 920mm of rain per year over 56 days, with February receiving the most with an average of 250mm for the month.

The existing twin 450 RCPs which are located below the access driveway, are to remain. The pipes have the capacity to handle a 1 in 2 ARI (39% AEP) based on the TMR Road Drainage Manual - Appendix 9A Design Nomograph (see Appendix E).

Based on the A, C, D and E combined flows for a 1 in 2 year event, the existing twin 450 RCPs will be able to contain a 0.98m³/s flow. Above this, the water will back up and flow over the driveway which will make it unpassable for a minimal amount of time.

To make the driveway completely immune to a 1 in 50 year (2% AEP) event at 2.66m³/s, the pipes would need to be increased to a $2 \times 600 \times 600$ RCBC.

3.3.6 Rock Sizing of Open Drain

The rock sizing of the open drain has been determined utilising the *Rock Sizing for the Lining of Drainage Channels* guidelines from Chapter 9 of the QUDM manual.

For Rounded Rock:

$$d_{50} = \frac{K_1 \cdot V^2}{2 \cdot g \cdot K^2 (s_r - 1)}$$

Where: $K_1 = 1.36$ (for rounded rock)

V = 2.515 m/s (for a Q100 event)

 $S_r = 2.8$ (assuming granite)

K =			
	Grade 1	Grade 2	Grade 3
Slope (%)	6.0%	3.0%	1.0%
К	0.86	0.96	1.09
d_{50}	0.33	0.26	0.21



For Irregular Shaped Rock:

$$d_{50} = \frac{K_1 \cdot V^2}{2 \cdot g \cdot K^2 (s_r - 1)}$$

...

Where: $K_1 = 1.00$ (for irregular shaped rock)

V = 2.515m/s (for a Q100 event)

 $S_r = 2.8$ (assuming granite)

κ =					
	Grade 1	Grade 2	Grade 3		
Slope (%)	6.0%	3.0%	1.0%		
К	0.86	0.96	1.09		
d 50	0.24	0.19	0.15		

3.4 MINOR DRAINAGE

The minor drainage system involves overland flow to the twin 450 RCPs which are located below the access driveway. The existing pipes have the capacity to handle a 1 in 2 ARI (39% AEP) based on the TMR Road Drainage Manual - Appendix 9A Design Nomograph (see Appendix E).

3.4.1 Overland Flow

In accordance with the requirements of QUDM, the minor drainage system, which incorporates overland flow along the access driveway, has been designed for a recurrence interval of 5 years (18% AEP). The runoff will be carried by the minor drainage system in the driveway table drain and discharged into the rock lined drain.

Depth by velocity calculations for half the road flow have been undertaken and all drains produce satisfactory results regarding pedestrian safety.







LOT

<u>LEGEND</u>

1.0	PROPOSED MAJOR CONTOURS (1.0m INTERVAL)
	PROPOSED MINOR CONTOURS (0.1m INTERVAL)
	PAD BOUNDARY
	PROPOSED TOP OF BATTER
	PROPOSED BOTTOM OF BATTER
s	EXISTING SEWER MAIN
	SEWER EASEMENT
	PROPOSED FILL

CATCHMENT AREAS

CATCHMENT	AREA (m²)	FLOW LENGTH (km)
A	0.30	0.10
В	1.02	0.21
С	1.08	0.21
D	3.47	0.275
E	0.38	0.24
TOTAL	6.25	

FOR INFORMATION ONLY

REF	CONMAT PTY LTD		
	QUILL STREET SUBDIVISION		
REF	CATCHMENT PLAN		
NO	160-001-SK08	SIZE A3	revision 1







<u>LEGEND</u>

1 RP700513

-	Y	1	Y	Ţ	Y	_
			s –			

PAD BOUNDARY PROPOSED TOP OF BATTER PROPOSED BOTTOM OF BATTER EXISTING SEWER MAIN SEWER EASEMENT Q100 LEVEL

1 SP163448

4 SP163448

FOR INFORMATION ONLY

CONMAT PTY LTD		
QUILL STREET LAND DEVELOPMEN	ΝT	
Q100 PLAN		
160-001-SK05	A3	REVISION 1
· · · · · · · · · · · · · · · · · · ·		



<u>LEGEND</u>

1 RP700513

	PAD BOUNDARY
	PROPOSED TOP OF BATTER
	PROPOSED BOTTOM OF BATTER
s	EXISTING SEWER MAIN
	SEWER EASEMENT
	Q100 + 300mm FREEBOARD LEVEL

1 SP163448

4 SP163448

FOR INFORMATION ONLY

ÆF	CONMAT PTY LTD		
	QUILL STREET LAND DEVELOPME	NT	
EF	Q100 + 300mm FREEBOARD PLAN	١	
10	160-001-SK06	A3	revision 1






LEGEND

1 RP700513

1 SP163448

4 SP163448

	PAD BOUNDARY
	PROPOSED TOP OF BATTER
	PROPOSED BOTTOM OF BATTER
S	EXISTING SEWER MAIN
	SEWER EASEMENT
	HEIGHT (RL 395.593)

FOR INFORMATION ONLY

REF	CONMAT PTY LTD		
	QUILL STREET LAND DEVELOPME	NT	
REF	BUILDING PAD HEIGHT VS.		
	NOMINATED MINIMUM RL 395.593	3	
NO	160-001-SK07	A3	REVISION 1





160-001 Quill Street, Mareeeba Path A



Time of concentration Calculation

(Using Bransby-Williams' Equation)

Proportionality Factor	P=	58	(for Ha)
Length of Flow Path	L=	0.096	km
Top of Catchment (RL)	RL =	396	m
Area of Catchment	A =	0.30	Ha

Catchment Profile 396 [to utilise graph area b		a better]			
Chainage	RL	RL	Area under Grap	h (m²)	
0	392.871	-3.129			
52	393.5	-2.5	-146		
73	394.02	-1.98	-47		
79	395.8	-0.2	-7		
79	395.8	-0.2	0		
79	395.8	-0.2	0		
79	395.8	-0.2	0		
79	395.8	-0.2	0		
79	395.8	-0.2	0		
96	396	0	-2		
Total area under graph Area below outlet level Area above outlet			-202 -300 99		m² m² m²
Height for ave	rage slope			2.06	m
Average Slope			S =	2.1	%

Average Slope Calculation					
Outlet Chaina	age	0			
Catchment le	ength	96			
Outlet RL	-3				
Top RL (Av S	-1.1				
Tc =	(A ^ 0.	P x L 1) x (S ^ 0.2)			

Tc = 5.4 min

Adpoted Tc 6.0 min



Flow Calculation for Upstream Catchment

Catchment A

Fraction Impervious =	
1 hour @ 10 year ARI =	

 $f_i = 0.7$ ${}^1I_{10} = 63.5$ $C_{10} = 0.84$

Table Below (QUDM Table 4.5.3)mm/hr(IFD CHARTS)(QUDM Table 4.5.3)

AEP		63%	39%	18%	10%	5%	2%	1%		
Design ARI		1	2	5	10	20	50	100		
Frequency Factor	F _Y	0.8	0.85	0.95	1	1.05	1.15	1.2		(QUDM Table 4.5.2)
Coefficient of Discharge	C _Y	0.672	0.714	0.798	0.84	0.882	0.966	1		(QUDM Equation 4.3)
Time of Concentration	T _C	6	6	6	6	6	6	6	min	
Rainfall Intensity	^{6min} l ₁₀	95	108	145	168	189	216	236	mm/hr	(IFD CHARTS)
Area	А	0.3	0.3	0.3	0.3	0.3	0.3	0.30	На	
Path A Flow		0.05	0.06	0.10	0.12	0.14	0.17	0.20	m³/s	
Velocity		1.385	1.438	1.527	1.562	1.599	1.613	1.640	m/s	Taken from ERSCON
Height		0.089	0.096	0.113	0.100	0.131	0.138	0.149	m	Super Drain Table

160-001 Quill Street, Mareeeba Path B



Time of concentration Calculation

(Using Bransby-Williams' Equation)

Proportionality Factor	P=	58	(for Ha)
Length of Flow Path	L=	0.23	km
Top of Catchment (RL)	RL =	404.069	m
Area of Catchment	A =	1.02	На

Catchment P	rofile	405 [to utilise graph area better]			
Chainage	RL	RL	Area under Gra	ph (m²)	
0	392.722	-12.278			
28	395.246	-9.754	-308		
67	395.504	-9.496	-375		
100	400.967	-4.033	-223		
121	402.744	-2.256	-66		
170	403.592	-1.408	-90		
206	403.894	-1.106	-45		
206	403.894	-1.106	0		
206	403.894	-1.106	0		
228	404.069	-0.931	-22		
Total area uno	der graph		-1131		m ²
Area below ou	utlet level		-2799		m²
Area above ou	utlet		1669		m²
Height for ave	rage slope			14.64	m
Average Slo	ope		S =	6.4	%

Average Slope Calculation				
Outlet Chainage	0			
Catchment lengtl	h 228			
Outlet RL	-12			
Top RL (Av Slope	e) 2.4			
Tc =	PxL			
	(A ^ 0.1) x (S ^ 0.2)			
Tc =	9.1 min			

Adpoted Tc 10.0 min



Flow Calculation for Upstream Catchment

Catchment	: B
-----------	------------

Fraction Impervious =	$f_i = 0.7$	٦
1 hour @ 10 year ARI =	¹ I ₁₀ = 63.5	r
	C _{10 =} 0.84	

Table Drain	(QUDM Table 4.5.3)
mm/hr	(IFD CHARTS)
	(QUDM Table 4.5.3)

AEP		63%	39%	18%	10%	5%	2%	1%		
Design ARI		1	2	5	10	20	50	100		
Frequency Factor	F _Y	0.8	0.85	0.95	1	1.05	1.15	1.2		(QUDM Table 4.5.2)
Coefficient of Discharge	C _Y	0.672	0.714	0.798	0.84	0.882	0.966	1		(QUDM Equation 4.3)
Time of Concentration	T _c	10.0	10	10	10	10	10	10.0	min	
Rainfall Intensity	^{10min} ₁₀	84	95	128	149	168	192	209	mm/hr	(IFD CHARTS)
Area	A	1.02	1.02	1.02	1.02	1.02	1.02	1.02	Ha	
Path B Flow		0.16	0.19	0.29	0.35	0.42	0.53	0.59	m³/s	
Velocity		1.003	1.063	1.188	1.260	1.313	1.393	1.149	m/s	Taken from ERSCON
Height		0.159	0.176	0.217	0.242	0.261	0.292	0.397	m	Super Drain Table

160-001 Quill Street, Mareeeba Path C



Time of concentration Calculation

(Using Bransby-Williams' Equation)

Proportionality Factor	P=	58	(for Ha)
Length of Flow Path	L=	0.210	km
Top of Catchment (RL)	RL =	404.1	m
Area of Catchment	A =	1.08	Ha

Catchment P	chment Profile		405 [to utilise graph area bett		
Chainage	RL	RL	Area under Gra	ph (m²)	
0	392.752	-12.248			
27	395.253	-9.747	-297		
67	395.524	-9.476	-386		
74	397.428	-7.572	-60		
80	397.7	-7.3	-39		
100	401	-4	-116		
121	402.735	-2.265	-66		
206	404	-1	-139		
206	404	-1	0		
210	404	-1	-4		
Total area uno Area below ou Area above ou	der graph utlet level utlet		-1107 -2572 1465		m² m² m²
Height for ave	rage slope			13.95	m
Average Slo	ppe		S =	6.6	%

Average Slope Calculation				
Outlet Chain	age	0		
Catchment le	ength	210		
Outlet RL		-12		
Top RL (Av S	Slope)	1.7		
Tc =	Р	хL		
	(A ^ 0.1)	x (S ^ 0.2)		
Tc =	8.3	min		

Adpoted Tc 9.0 min



Flow Calculation for Upstream Catchment

Catchment C	,
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Fraction Impervious =	$f_i = 0.7$	Table Drain	(QUDM Table 4.5.3)
1 hour @ 10 year ARI =	¹ I ₁₀ = 63.5	mm/hr	(IFD CHARTS)
	C ₁₀ = 0.84		(QUDM Table 4.5.3)

AEP		63%	39%	18%	10%	5%	2%	1%		
Design ARI		1	2	5	10	20	50	100		
Frequency Factor	F _Y	0.8	0.85	0.95	1	1.05	1.15	1.2		(QUDM Table 4.5.2)
Coefficient of Discharge	C _Y	0.672	0.714	0.798	0.84	0.882	0.966	1		(QUDM Equation 4.3)
Time of Concentration	T _c	9	9	9	9	9	9	9	min	
Rainfall Intensity	$^{9min}I_{10}$	87	98	132	154	173	198	216	mm/hr	(IFD CHARTS)
Area	A	1.08	1.08	1.08	1.08	1.08	1.08	1.08	Ha	
Path C Flow		0.18	0.21	0.32	0.39	0.46	0.57	0.65	m³/s	
Velocity		1.115	1.160	1.303	1.368	1.432	1.514	1.562	m/s	Taken from ERSCON
Height		0.193	0.202	0.340	0.410	0.490	0.341	0.361	m	Super Drain Table

160-001 Quill Street, Mareeeba Path D



Time of concentration Calculation

(Using Bransby-Williams' Equation)

Proportionality Factor	P=	58	(for Ha)
Length of Flow Path	L=	0.275	km
Top of Catchment (RL)	RL =	405.532	m
Area of Catchment	A =	3.47	Ha

Catchment P	hment Profile		406 [to utilise graph area bet		r]
Chainage	RL	RL	Area under Gra	ph (m²)	
0	394.5	-11.5			
21	395.79	-10.21	-228		
50	396.198	-9.802	-290		
125	398.9	-7.1	-634		
156	401.5	-4.5	-180		
204	403	-3	-180		
215	404.4	-1.6	-25		
258	405.4	-0.6	-47		
258	405.4	-0.6	0		
275	406	-0.468	-9		
					- 2
Total area uno	der graph		-1593		m²
Area below ou	itlet level		-3163		m ²
Area above or	utlet		1569		m²
Height for ave	rage slope			11.41	m
Average Slo	ppe		S =	4.1	%

Average Slope Calculation				
Outlet Chain	age	0		
Catchment le	ength	275		
Outlet RL		-12		
Top RL (Av S	Top RL (Av Slope)			
Tc =	Р	хL		
	(A ^ 0.1)	x (S ^ 0.2)		
Tc =	10.6	min		

Adpoted Tc 11.0 min



Flow Calculation for Upstream Catchment Catchment D

Fraction Impervious =	$f_i = 0.7$	Table Dra	ain (QUDM Table 4.5.3)
1 hour @ 10 year ARI =	¹ I ₁₀ = 63.5	mm/hr	(IFD CHARTS)
	$C_{10} = 0.84$		(QUDM Table 4.5.3)

AEP		63%	39%	18%	10%	5%	2%	1%		
Design ARI		1	2	5	10	20	50	100		
Frequency Factor	F _Y	0.8	0.85	0.95	1	1.05	1.15	1.2		(QUDM Table 4.5.2)
Coefficient of Discharge	C _Y	0.672	0.714	0.798	0.84	0.882	0.966	1		(QUDM Equation 4.3)
Time of Concentration	Т _с	11.0	11	11	11	11	11	11	min	
Rainfall Intensity	11min	82	93	125	145	164	187	204	mm/hr	(IFD CHARTS)
Area	A	3.47	3.47	3.47	3.47	3.47	3.47	3	Ha	
Path D Flow		0.53	0.64	0.96	1.17	1.39	1.74	1.96	m³/s	
Velocity		1.503	1.599	1.821	1.937	2.042	2.185	2.263	m/s	Taken from ERSCON
Height		0.188	0.209	0.960	0.290	0.319	0.359	0.382	m	Super Drain Table

160-001 Quill Street, Mareeeba Path E



Time of concentration Calculation

(Using Bransby-Williams' Equation)

Proportionality Factor	P=	58	(for Ha)
Length of Flow Path	L=	0.236	km
Top of Catchment (RL)	RL =	401.105	m
Area of Catchment	A =	0.38	Ha

Catchment Profile		402	[to utilise graph	area bette	r]
Chainage	RL	RL	Area under G	raph (m²)	
0	392.286	-9.714			
24	396.8	-5.2	-177	•	
34	397.9	-4.1	-48		
67	398.8	-3.2	-118		
67	398.8	-3.2	0		
67	398.8	-3.2	0		
67	398.8	-3.2	0		
67	398.8	-3.2	0		
67	398.8	-3.2	0		
236	401	-0.895	-347		
Total area uno	der graph itlet level		-690 -229:	3	m² m²
			1600	5	m ²
Height for ave	rage slope		1002	13.58	m
Average Slo	ope		S =	5.8	%

Average Slope Calculation				
Outlet Chainage	;	0		
Catchment leng	th	236		
Outlet RL		-10		
Top RL (Av Slop	ce)	3.9		
Tc =	Р	хL		
	(A ^ 0.1)	x (S ^ 0.2)		
Tc =	10.6	min		

Adpoted Tc 11.0 min



Flow Calculation for Upstream Catchment Catchment E

English Incolor and and a				
Fraction Impervious =	$t_i = 0.7$	Table Drain	(QUDM Table 4.5.3)	Rock Lined Drain
1 hour @ 10 year ARI =	${}^{1}I_{10} = 63.5$	mm/hr	(IFD CHARTS)	
	$C_{10} = 0.84$		(QUDM Table 4.5.3)	

AEP		63%	39%	18%	10%	5%	2%	1%		
Design ARI		1	2	5	10	20	50	100		
Frequency Factor	F _Y	0.8	0.85	0.95	1	1.05	1.15	1.2		(QUDM Table 4.5.2)
Coefficient of Discharge	C _Y	0.672	0.714	0.798	0.84	0.882	0.966	1		(QUDM Equation 4.3)
Time of Concentration	T _C	11	11	11	11	11	11	11	min	
Rainfall Intensity	^{9min} I ₁₀	82	93	125	145	164	187	204	mm/hr	(IFD CHARTS)
Area	A	0.38	0.38	0.38	0.38	0.38	0.38	0.38	Ha	
Path E Flow		0.06	0.07	0.10	0.13	0.15	0.19	0.21	m³/s	
Velocity		1.110	1.177	1.348	1.488	1.570	1.714	1.779	m/s	Taken from ERSCON
Height		0.034	0.038	0.047	0.054	0.059	0.068	0.072	m	Super Drain Table

JOB NO:160-001JOB:Quill Street, MareeebaTITLE :Combined Path of A, C, D and E



Time of concentration Calculation (Using Bransby-Williams' Equation)

Proportionality Factor	P=	58	(for Ha)
Length of Flow Path	L=	0.275	km
Top of Catchment (RL)	RL =	405.532	m
Area of Catchment	A =	4.02	Ha

Catchment Profile		406	[to utilise graph area better]	_
Chainage	RL	RL	Area under Graph (m²)	Ī
0	394.5	-11.5		ľ
21	395.79	-10.21	-228	
50	396.198	-9.802	-290	
125	398.9	-7.1	-634	
156	401.5	-4.5	-180	
204	403	-3	-180	
215	404.4	-1.6	-25	
258	405.4	-0.6	-47	
258	405.4	-0.6	0	
275	406	-0.468	-9	
Total area uno	der graph		-1593	m²
Area below ou	utlet level		-3163	m²
Area above o	utlet		1569	m²
Height for ave	erage slope		11.41	m

Average Slope Calculation				
Outlet Chain	lage	0		
Catchment I	ength	275		
Outlet RL		-12		
Top RL (Av	Slope)	-0.1		
Tc =	P	хL		
	(A ^ 0.1)	x (S ^ 0.2)		
Tc =	10.4	min		

Adpoted Tc	11.0	min



Flow Calculation for Upstream Catchment Catchment A, C, D and E

Fraction Impervious =
1 hour @ 10 year ARI =

$f_i = 0.7$	Table Draii
¹ I ₁₀ = 63.5	mm/hr
C ₁₀ = 0.84	

Drain	(QUDM Table 4.5.3)	
•	(IFD CHARTS)	
	(QUDM Table 4.5.3)	

Rock Lined Drain

AEP		63%	39%	18%	10%	5%	2%	1%		
Design ARI		1	2	5	10	20	50	100		
Frequency Factor	F _Y	0.8	0.85	0.95	1	1.05	1.15	1.2		(QUDM Table 4.5.2)
Coefficient of Discharge	C _Y	0.672	0.714	0.798	0.84	0.882	0.966	1		(QUDM Equation 4.3)
Time of Concentration	T _C	11.0	11	11	11	11	11	11	min	
Rainfall Intensity	$^{11\text{min}}$ I $_{10}$	82	93	125	145	164	187	204	mm/hr	(IFD CHARTS)
Area	A	4.02	4.02	4.02	4.02	4.02	4.02	4	Ha	
Path D Flow		0.62	0.74	1.11	1.36	1.61	2.02	2.27		
Path C Flow		0.18	0.21	0.32	0.39	0.46	0.57	0.65		
Path A Flow		0.05	0.06	0.10	0.12	0.14	0.17	0.20	m³/s	Taken from ERSCON
Path E Flow		0.06	0.07	0.10	0.13	0.15	0.19	0.21		Super Drain Table
Total of A, C, D and E		0.90	1.09	1.63	1.99	2.36	2.96	3.33		
Velocity		1.787	1.882	2.123	2.252	2.365	2.525	2.614	m/s]
Height		0.311	0.337	0.408	0.449	0.486	0.543	0.576	m	

160-001 Quill Street, Mareeeba Combined Total Catchments A, B, C, D and E



Time of concentration Calculation (Using Bransby-Williams' Equation)

JOB NO:

JOB:

TITLE :

Proportionality Factor	P=	58	(for Ha)
Length of Flow Path	L=	0.275	km
Top of Catchment (RL)	RL =	405.532	m
Area of Catchment	A =	5.23	На

Catchment P	rofile	406 [to utilise graph area better]					
Chainage	RL	RL	Area under Graph (m ²				
0	394.5	-11.5					
21	395.79	-10.21	-228				
50	396.198	-9.802	-290				
125	398.9	-7.1	-634				
156	401.5	-4.5	-180				
204	403	-3	-180				
215	404.4	-1.6	-25				
258	405.4	-0.6	-47				
258	405.4	-0.6	0				
275	406	-0.468	-9				
Total area uno Area below ou Area above ou	der graph utlet level utlet		-1593 -3163 1569		m² m² m²		
Height for ave	erage slope			11.41	m		
Average Slo	ppe		S =	4.1	%		

Average Slope Calculation							
Outlet Chainage	0						
Catchment length	275						
Outlet RL	-12						
Top RL (Av Slope)	-0.1						

Tc =	PxL
	(A ^ 0.1) x (S ^ 0.2)
Tc =	10.2 min





Flow Calculation for Upstream Catchment Catchment A, B, C, D and E			
Fraction Impervious =	$f_i = 0.7$	Table Drain (QUDM Table 4.5.3)	Rock Lined Drain
1 hour @ 10 year ARI =	${}^{1}I_{10} = 63.5$	mm/hr (IFD CHARTS)	

 $C_{10} = 0.84$

(QUDM Table 4.5.3)

AEP		63%	39%	18%	10%	5%	2%	1%		
Design ARI		1	2	5	10	20	50	100		
Frequency Factor	F _Y	0.8	0.85	0.95	1	1.05	1.15	1.2		(QUDM Table 4.5.2)
Coefficient of Discharge	C _Y	0.672	0.714	0.798	0.84	0.882	0.966	1		(QUDM Equation 4.3)
Time of Concentration	T _c	11.0	11	11	11	11	11	11	min	
Rainfall Intensity	$^{11\text{min}}I_{10}$	82	93	125	145	164	187	204	mm/hr	(IFD CHARTS)
Area	A	5.23	5.23	5.23	5.23	5.23	5.23	5	Ha	
Path D Flow		0.80	0.96	1.44	1.77	2.10	2.62	2.96		
Path B Flow		0.16	0.19	0.29	0.35	0.42	0.53	0.59		
Path C Flow		0.18	0.21	0.32	0.39	0.46	0.57	0.65		
Path A Flow		0.05	0.06	0.10	0.12	0.14	0.17	0.20	m³/s	Taken from ERSCON
Path E Flow		0.06	0.07	0.10	0.13	0.15	0.19	0.21		Super Drain Table
Combined Total Catchment of A, B, C, D and E		1.25	1.50	2.25	2.76	3.27	4.09	4.61		
Velocity		1.868	1.971	2.219	2.354	2.471	2.633	2.722	m/s	
Height		0.397	0.433	0.526	0.581	0.632	0.707	0.751	m	



Note: Q is Discharge per culvert cell

9A

9A-6 Outlet Control - Head for concrete pipes flowing full (n=0.012)



Note: Q is Discharge per culvert cell

9A-5 Outlet Control - Head for concrete box culverts flowing full (n=0.012)







PROJECT DRAIN Qxxx FLOW

Q =	0.65	Slope	1 %	Depth	0.248	n 0.016	q 0.65	A 0.378	v 1.7205
Label Constraints	Horizontal (m) Vertical (m) Grade %	Surface	n				1	
	1			T T					
	1							0.9	J
	1					\backslash			
	1								
	1							0.8	
	1								
	1							0.7	
	1						\backslash		
	1						\backslash		
	1				μ			0.6	
	1			0.047	f Inve				
	3	5.5 0.88 16	Kernel Earth, uniform section - Clean, recently completed Earth, uniform section - Clean, recently completed	0.017	.eft o				,
	Invert Line	.25 0 0.0		0.017			\backslash		
	2 0	.25 0 0.0	Earth, uniform section - Clean, recently completed	0.017	vert		\backslash		
	2	1.8 0.9 50	% Earth, uniform section - Clean, recently completed	0.017	of In			0.4	
	1				Right			\backslash	
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Q =	4.61	Slope	1	%	Depth	0.735	n 0.0206	q 4.6099	A 1.645	v 2.8027
Label Constraints	Horiz 1 1 1 1 1 1 1 1 1 1 1 1 1	3 0.75 0.6 0.75 0.75 0.1 0.05 0.075 ontal (m) 0.25 0.05 0.075 0.11 0.05 0.25 0.075 0.05 0.05 0.75 0.1 0.6 0.6 1 0.25	Grade % 25.00% 100.0% 100.0% 30.0% 0.0% 13.3% 0.0% 13.3% 100.0% 5.00% 20%	Surface Average Grassed Rock Rock Concrete Concrete Concrete Rock Rock Average Grassed Average Grassed	n 0.045 0.035 0.035 0.013 0.013 0.013 0.013 0.013 0.013 0.013 0.035 0.045 0.045	Right of Invert				