KFB Engineers
Civil & Structural
ABN 28 351 246 509
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NV & JS PTY LTD

19 LOT RESIDENTIAL DEVELOPMENT – LOT 12 on SP252360
12 CRAWFORD STREET, MOSSMAN

APPLICATION FOR OPERATIONAL WORKS PERMIT

DATE: **March 2019**

DOUGLAS SHIRE COUNCIL
Received
File Name.....
Document No.....
11 MAR 2019
Attention
Information
14.209.3043.1 RN337834

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CONTENTS

4.0 Design Report (including commentary on 4.7 and 4.8)

4.1 Report – Assessment of Water Reticulation Capacity

4.2 Report – Sewerage Design

4.3 Report – Local Drainage Study

4.4 Report –Summary - Flood Assessment

4.5 Report – Stormwater Drainage from Mossman High School

- Consent from adjoining owners for discharge of Stormwater from Mossman High School

4.6 Report- ETS Geotechnical Investigation – Factual Report Borrow Area, Lot 1 on SP204449, Mossman Mt Molloy Road, Mossman KFB Engineers Dwg K-2578 BA1 issue A

4.7 Decision Notice – Douglas Shire Council – ROL 617/2015 18 December 2015

4.8 Pre-lodgement Meeting (21-02-17) - Notes

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APPLICATION FOR OPERATIONAL WORKS PERMIT

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CONTENTS 1.0

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P: 07 40320492 | F: 07 40320092 | E: email@kfbeng.com.au

Our Ref: K-2578-LTR-001
Your Ref: 617/2015
Date: 08/03/2019

The Chief Executive Officer
Douglas Shire Council
PO Box 723
MOSSMAN QLD 4873
By email
Attention: Town Planning

Dear Sir
Re: NV & JS Pty Ltd
19 Lot Residential Development
Lot 12 on SP252360 - 12 Crawford St, Mossman
Application for Operational Works Permit

We are forwarding on behalf of NV & JS Pty Ltd an Application for Operational Works Permit for the above described 19 lot residential development.

The Application fee is assessed as:

Base Fee	$3,820
Plus 19 lots x $510	9,690
	$13,510

Yours faithfully

Euan Bruce RPEQ No. 0491

Operational Works Receipting Checklist

(To be completed by Consulting engineer making the application)

Name of Council: DOUGLAS SHIRE COUNCIL

Development Name and Location: NV & JS PTY LTD (ROL (1 Lot into 19 Lots)
12 Crawford St, Mossman
Lot 12 on SP 252360

Planning Permit No/Council File No: ROL / 617 / 2015

DESIGN SUBMISSION	CHECK	COMMENT
1. Completed 'Statement of Compliance' form. (FNQROC - AP1 – Appendix A)	✓	
2. ~~IDAS Forms A, E & IDAS Assessment~~ Checklist (Available from www.ipa.qld.gov.au)	✓	DA FORM 1
3. Payment of Engineering Application Fees (Copy of receipt to be attached)		Fee assessed as $13,510 To be paid by client
4. Copy of Decision Notice for Development Application Conditions, inc. explanation of how each condition is to be addressed (Statement of Compliance)	✓	
5. Engineering Design drawings - Complete sets (1 x A1 set, 2 x A3 sets and 1 x electronic copy on compact disc in 'PDF' format)	✓	
6. One copy of Design and Standard Specifications (Unbound Copy Preferable)	✓	
7. Written consent from adjoining property owners authorising any works on their property	✓	Letters from: 1. DETE 2. Owners of Lot 11 on RP851485 3. Douglas Shire Council
8. Water reticulation network in electronic format (Engineer to confirm system requirements and compatibility with Cairns Water)	✓	
9. Landscape drawings - Complete set (1 x A1 set, 2 x A3 sets and 1 x electronic copy on compact disc in 'PDF' format). These must be accompanied by elements of the stormwater & street ltg. layout design, to avoid conflicts.		Landscaping: Tree planting in accordance with DSC policy

Operational Works Receipting Checklist

(To be completed by Consulting engineer making the application)

DESIGN SUBMISSION	CHECK	COMMENT
10. Overall network drawings (for staged development) for:		
• Water		development to be single stage
• Stormwater		
• Sewer		
• Pathways and roads		
• Street Lighting		
• Electrical		
• Gas		
• Public Transport		
• Park Reserves		
• Drainage Reserves		
11. Pavement design criteria	✓	Refer Dwg K-2578 C01 E
12. Geotechnical reports for proposed earthworks	✓	Refer Dwg K-2578 C02 D and 4.0 Design Report
13. Structural and geotechnical certificates for retaining walls etc.	N.A.	
14. ~~Water supply~~/sewerage pump station design parameters	✓	Refer Dwg K-2578 C12 E & Specification
15. Stormwater drainage calculations	✓	Refer Dwg K-2578 C11 C
16. Erosion and Sediment Control Strategy (ESCS)	✓	Refer Dwg K-2578 C15 C
17. Declared Pest Management Plan (if applicable)	NA	
18. The approval of any other Authorities & concurrence agencies likely to be affected by the works.	✓	DETE

19. Contact details of the Consulting Engineer who is submitting the Application:

Name of Engineer	EUAN FRASER BRUCE	
Name of Company	KFB ENGINEERS	
Telephone Number (s)	Office: 07 4032 0492	Mobile: 0408 772 105
Email address	euan@kfbeng.com.au	
RPEQ No.	00491	

20. Date of submission of application 01/03/2019

(For further information on all of the above refer to the FNQROC Development Manual Section AP1)

DA Form 1 – Development application details

Approved form (version 1.1 effective 22 JUNE 2018) 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 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.

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

PART 1 – APPLICANT DETAILS

1) Applicant details	
Applicant name(s) *(individual or company full name)*	**NV & JS Pty Ltd**
Contact name *(only applicable for companies)*	**Euan Bruce**
Postal address *(P.O. Box or street address)*	**PO Box 927**
Suburb	**Cairns**
State	**Queensland**
Postcode	**4870**
Country	**Australia**
Contact number	**07 4032 0492**
Email address *(non-mandatory)*	**euan@kbeng.com.au**
Mobile number *(non-mandatory)*	**0408 772 105**
Fax number *(non-mandatory)*	**07 4032 0092**
Applicant's reference number(s) *(if applicable)*	**K-2578**

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 **X**No – proceed to 3)

Queensland Government

PART 2 – LOCATION DETAILS

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

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

3.1) Street address and lot on plan

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

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

a)	Unit No.	Street No.	Street Name and Type	Suburb
		12	**Crawford Street**	**Mossman**
	Postcode	Lot No.	Plan Type and Number *(e.g. RP, SP)*	Local Government Area(s)
		12	**SP252360**	**Douglas Shire Council**
b)	Unit No.	Street No.	Street Name and Type	Suburb
	Postcode	Lot No.	Plan Type and Number *(e.g. RP, SP)*	Local Government Area(s)

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

Note: *Place each set of coordinates in a separate row. Only one set of coordinates is required for this part.*

☐ Coordinates of premises by longitude and latitude

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

☐ Coordinates of premises by easting and northing

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

3.3) Additional premises

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

XNot required

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

X In or adjacent to a water body or watercourse or in or above an aquifer	
Name of water body, watercourse or aquifer:	**Parker Creek**
☐ On strategic port land under the *Transport Infrastructure Act 1994*	
Lot on plan description of strategic port land:	
Name of port authority for the lot:	
☐ In a tidal area	
Name of local government for the tidal area *(if applicable)*:	
Name of port authority for tidal area *(if applicable)*:	
☐ On airport land under the *Airport Assets (Restructuring and Disposal) Act 2008*	
Name of airport:	

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

5) Are there any existing easements over the premises?

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

☐ 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 **X** Operational work ☐ Building work

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

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

c) What is the level of assessment?

X 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)*:

Operational works associated with the reconfiguration of 1 lot into 19 lots; open space; park areas; new roads

e) Relevant plans

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

XRelevant plans of the proposed development are attached to the development application

6.2) Provide details about the second development aspect

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

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

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

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

c) What is the level of assessment?

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

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

e) Relevant plans

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

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

6.3) Additional aspects of development
☐ Additional aspects of development are relevant to this development application and the details for these aspects that would be required under Part 3 Section 1 of this form have been attached to this development application **X** 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	**X**Yes – complete division 2
Operational work	**X** Yes – complete division 3
Building work	☐ Yes – complete *DA Form 2 – Building work details*

Division 1 – Material change of use

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

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

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

Division 2 – Reconfiguring a lot

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

9.1) What is the total number of existing lots making up the premises?	
One (1)	
9.2) What is the nature of the lot reconfiguration? *(tick all applicable boxes)*	
XSubdivision *(complete 10))*	☐ Dividing land into parts by agreement *(complete 11))*
☐ Boundary realignment *(complete 12))*	☐ Creating or changing an easement giving access to a lot from a construction road *(complete 13))*

10) Subdivision 10.1) For this development, how many lots are being created and what is the intended use of those lots:				
Intended use of lots created	Residential	Commercial	Industrial	Other, please specify:
Number of lots created	**19**			

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

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

12) Boundary realignment 12.1) What are the current and proposed areas for each lot comprising the premises?			
Current lot		Proposed lot	
Lot on plan description	Area (m^2)	Lot on plan description	Area (m^2)

12.2) What is the reason for the boundary realignment?

13) What are the dimensions and nature of any existing easements being changed and/or any proposed easement? *(attach schedule if there are more than two easements)*				
Existing or proposed?	Width (m)	Length (m)	Purpose of the easement? *(e.g. pedestrian access)*	Identify the land/lot(s) benefitted by the easement
proposed	**4**	**54**	**drainage**	**Douglas Shire Council**

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

14.2) Is the operational work necessary to facilitate the creation of new lots? *(e.g. subdivision)*	
X Yes – specify number of new lots:**19**	
☐ No	

14.3) What is the monetary value of the proposed operational work? *(include GST, materials and labour)*
$1,400,000

PART 4 – ASSESSMENT MANAGER DETAILS

15) Identify the assessment manager(s) who will be assessing this development application
Douglas Shire Council
16) Has the local government agreed to apply a superseded planning scheme for this development application?
☐ Yes – a copy of the decision notice is attached to this development application ☐ Local government is taken to have agreed to the superseded planning scheme request – relevant documents attached **X**No

PART 5 – REFERRAL DETAILS

17) Do any aspects of the proposed development require referral for any referral requirements?
***Note**: A development application will require referral if prescribed by the* Planning Regulation 2017.

X 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 Regulation 2017:**

- ☐ Clearing native vegetation
- ☐ Contaminated land *(unexploded ordnance)*
- ☐ Environmentally relevant activities (ERA) *(only if the ERA have not been devolved to a local government)*
- ☐ Fisheries – aquaculture
- ☐ Fisheries – declared fish habitat area
- ☐ Fisheries – marine plants
- ☐ Fisheries – waterway barrier works
- ☐ Hazardous chemical facilities
- ☐ Queensland heritage place *(on or near a Queensland heritage place)*
- ☐ Infrastructure – designated premises
- ☐ Infrastructure – state transport infrastructure
- ☐ Infrastructure – state transport corridors and future state transport corridors
- ☐ Infrastructure – state-controlled transport tunnels and future state-controlled transport tunnels
- ☐ Infrastructure – near a state-controlled road intersection
- ☐ On Brisbane core port land near a State transport corridor or future State transport corridor
- ☐ On Brisbane core port land – ERA
- ☐ On Brisbane core port land – tidal works or work in a coastal management district
- ☐ On Brisbane core port land – hazardous chemical facility
- ☐ On Brisbane core port land – taking or interfering with water
- ☐ On Brisbane core port land – referable dams
- ☐ On Brisbane core port land - fisheries
- ☐ Land within Port of Brisbane's port limits
- ☐ 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 – construction of new levees or modification of existing 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 have been devolved to local government)*
- ☐ Local heritage places

Matters requiring referral to the **chief executive of the distribution entity or transmission entity:** ☐ 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 ☐ Oil and gas infrastructure
Matters requiring referral to **the Brisbane City Council:** ☐ Brisbane core port land
Matters requiring referral to the **Minister under the *Transport Infrastructure Act 1994*:** ☐ Brisbane core port land (inconsistent with Brisbane port LUP for transport reasons) ☐ Strategic port land
Matters requiring referral to the **relevant port operator:** ☐ Land within Port of Brisbane's port limits (below high-water mark)
Matters requiring referral to the **Chief Executive of the relevant port authority:** ☐ 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 marina *(more than six vessel berths)*

18) Has any referral agency provided a referral response for this development application?		
☐ Yes – referral response(s) received and listed below are attached to this development application ☐ No		
Referral requirement	Referral agency	Date of referral response
Identify and describe any changes made to the proposed development application that was the subject of the referral response and the development application the subject of this form, 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
XI agree to receive an information request if determined necessary for this development application ☐ I do not agree to accept an information request for this development application ***Note**: By not agreeing to accept an information request I, the applicant, acknowledge:* • *that this development application will be assessed and decided based on the information provided when making this development application and the assessment manager and any referral agencies relevant to the development application are not obligated under the DA Rules to accept any additional information provided by the applicant for the development application unless agreed to by the relevant parties* • *Part 3 of the DA Rules will still apply if the application is an application listed under section 11.3 of the DA Rules.* *Further advice about information requests is contained in the DA Forms Guide.*

PART 7 – FURTHER DETAILS

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

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

List of approval/development application references	Reference number	Date	Assessment manager
☐ Approval ☐ Development application	**ROL 617/2015 SEDA (7635340)**	**16 December 2015**	**Douglas 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
XNot applicable *(e.g. building and construction work is less than $150,000 excluding GST)*

Amount paid	Date paid (dd/mm/yy)	QLeave levy number
$		

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
X No

23) Further legislative requirements

Environmentally relevant activities

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

☐ Yes – the required attachment (form ESR/2015/1791) for an application for an environmental authority accompanies this development application, and details are provided in the table below
X No
***Note**: Application for an environmental authority can be found by searching "ESR/2015/1791" as a search term at www.qld.gov.au. An ERA requires an environmental authority to operate. See www.business.qld.gov.au for further information.*

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

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

Hazardous chemical facilities

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

☐ Yes – *Form 69: Notification of a facility exceeding 10% of schedule 15 threshold* is attached to this development application
X No
***Note**: See www.business.qld.gov.au for further information about hazardous chemical notifications.*

Clearing native vegetation

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

section 22A of the *Vegetation Management Act 1999*?

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

XNo

***Note**: 1. Where a development application for operational work or material change of use requires a s22A determination and this is not included, the development application is prohibited development.*
2. See https://www.qld.gov.au/environment/land/vegetation/applying for further information on how to obtain a s22A determination.

Environmental offsets

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

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

X No

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

Koala conservation

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

☐ Yes

XNo

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

Water resources

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

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

X No

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

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

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

Waterway barrier works

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

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

X No

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

Marine activities

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

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

XNo

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

Quarry materials from a watercourse or lake

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

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

XNo ***Note**: Contact the Department of Natural Resources, Mines and Energy at www.dnrme.qld.gov.au and www.business.qld.gov.au for further information.*
Quarry materials from land under tidal waters 23.10) Does this development application involve the **removal of quarry materials from land under tidal water** under the *Coastal Protection and Management Act 1995?*
☐ Yes – I acknowledge that a quarry material allocation notice must be obtained prior to commencing development **X** No ***Note**: Contact the Department of Environment and Science at www.des.qld.gov.au for further information.*
Referable dams 23.11) Does this development application involve a **referable dam** required to be failure impact assessed under section 343 of the *Water Supply (Safety and Reliability) Act 2008* (the Water Supply Act)?
☐ Yes – the 'Notice Accepting a Failure Impact Assessment' from the chief executive administering the Water Supply Act is attached to this development application **X**No ***Note**: See guidance materials at www.dnrme.qld.gov.au for further information.*
Tidal work or development within a coastal management district 23.12) Does this development application involve **tidal work or development in a coastal management district**?
☐ Yes – the following is included with this development application: ☐ Evidence the proposal meets the code for assessable development that is prescribed tidal work *(only required if application involves prescribed tidal work)* ☐ A certificate of title **X**No ***Note**: See guidance materials at www.des.qld.gov.au for further information.*
Queensland and local heritage places 23.13) Does this development application propose development on or adjoining a place entered in the **Queensland heritage register** or on a place entered in a local government's **Local Heritage Register**?
☐ Yes – details of the heritage place are provided in the table below **X** No ***Note**: See guidance materials at www.des.qld.gov.au for information requirements regarding development of Queensland heritage places.*

Name of the heritage place:		Place ID:	

Brothels 23.14) Does this development application involve a **material change of use for a brothel**?
☐ Yes – this development application demonstrates how the proposal meets the code for a development application for a brothel under Schedule 3 of the *Prostitution Regulation 2014* **X**No
Decision under section 62 of the *Transport Infrastructure Act 1994* 23.15) Does this development application involve new or changed access to a state-controlled road?
Yes - this application will be taken to be an application for a decision under section 62 of the *Transport Infrastructure Act 1994* (subject to the conditions in section 75 of the *Transport Infrastructure Act 1994* being satisfied) **X**No

PART 8 – CHECKLIST AND APPLICANT DECLARATION

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

25) Applicant declaration
XBy making this development application, I declare that all information in this development application is true and correct **X** 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 OFFICE USE ONLY

Date received: _____ Reference number(s): _____

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

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

FNQROC DEVELOPMENT MANUAL

Council Douglas Shire Council
(INSERT COUNCIL NAME)

STATEMENT OF COMPLIANCE
OPERATIONAL WORKS DESIGN

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

Name of Development 19 Lot Residential Development

Location of Development Lot 12 on SP252360; 12 Crawford St., Mossman

Applicant NV & JS Pty Ltd PO Box 1334, Mossman Qld 4873

Designer KFB Engineers, ABN 28 351 246 509

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	NA
Cycleway / Pathways	NA

Landscaping	
Water Source and Disinfection/Treatment Infrastructure (if applicable)	NA
Water Reticulation, Pump Stations and water storages	water reticulation only
Sewer Reticulation and Pump Stations	
Electrical Reticulation and Street Lighting	submitted by other consultant
Public Transport	NA
Associated Documentation/ Specification	
Priced Schedule of Quantities	
Referral Agency Conditions	
Supporting Information (AP1.08)	
Other	

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

Designer KFB Engineers ..... **RPEQ No** 0491

Name in Full Euan Fraser BRUCE

Signature ..... **Date** 8 March 2019

KFB Engineers
Civil & Structural
ABN 28 351 246 509
1/38-42 Pease St, Cairns | PO Box 927, Cairns Q 4870
P: 07 40320492 | F: 07 40320092 | E: email@kfbeng.com.au

APPLICATION FOR OPERATIONAL WORKS PERMIT

NV & JS PTY LTD
19 LOT RESIDENTIAL DEVELOPMENT – LOT 12 on SP252360
12 CRAWFORD STREET, MOSSMAN

CONTENTS 2.0

2.0 Project Drawings

2.1 K-2578 - CIVIL SIGNED 180529
1 x A1 set + 2 x A3 set

2.2 Electrical & Telecommunications
2779-E01-REV1
2779-E02-REV1
2779-T01-REVA
2779-T02-REVA
2 x A3 set

1 electronic copy on disc in pDF of all dwgs

KFB Engineers
Civil & Structural
ABN 28 351 246 509
1/38-42 Pease St, Cairns | PO Box 927, Cairns Q 4870
P: 07 40320492 | F: 07 40320092 | E: email@kfbeng.com.au

APPLICATION FOR OPERATIONAL WORKS PERMIT

NV & JS PTY LTD
19 LOT RESIDENTIAL DEVELOPMENT – LOT 12 on SP252360
12 CRAWFORD STREET, MOSSMAN

CONTENTS 3.0

SPECIFICATION

NV & JS PTY LTD

LOT 12 ON SP252360, (12 CRAWFORD ST, MOSSMAN)
RECONFIGURING 1 LOT INTO 19 LOTS

OPERATIONAL WORKS

CONSULTING ENGINEERS:
KFB ENGINEERS
1/38-42 PEASE STREET, CAIRNS

CONTENTS

DETAILS

DRAWING INDEX

Job No K-2578

ASSOCIATED DRAWINGS

SPA-Consulting Engineers

1. Electrical Drawings - 2779-E01- REV1 and 2779-E02-REV1
2. Telecommunications Drawings 2779– T01-REVA and 2779-T02-REVA

1. PRELIMINARIES

1.1 APPLICATION

1.1.1 This Specification has been developed in accordance with the requirements of the FNQROC Development Manual, Issue 7 (2017).

1.1.2 The Contractor should familiarise himself with the requirements of the FNQROC Development Manual, Issue 7 (2017) including that section that details the specific requirements of the Douglas Shire Council. Where this specification differs with the requirements of the FNQROC Development Manual that manual will take precedence.

1.1.3 After amendment for use in other jurisdictions, some references to certain Standard Drawings and/or Standard Specifications may remain. If the Contractor does not have access to this material, it may be obtained from the Superintendent on request.

1.2 QUALITY ASSURANCE FOR CONTRACTORS

1.2.1 The required Standard to be applied to the whole of the Contract is AS/NZS ISO 9001:2016 Quality Management Systems .

1.2.2 Specific requirements for quality assurance are outlined in Schedule B to this Specification.

1.3 EXTENT OF WORK

1.3.1 The work to be executed under this Contract includes the supply of all labour and materials and the performance of all operations of whatever kind necessary for the complete and proper construction of the Works described in the tender documents. Work shall be performed to the complete satisfaction of the Superintendent.

1.4 NATURE OF CONTRACT

1.4.1 This is a Lump Sum Contract not subject to adjustment for Rise and Fall.

1.4.2 The Schedule of Quantities and Prices, contained in Schedule A to this Specification, and to be completed by Tenderers in calculating their tender, shall not form part of the Contract. It may, however, be used for the assessment of Progress Payments.

1.5 SCHEDULE OF DRAWINGS

1.5.1 The following drawings shall accompany this Specification:

refer to Drawing Index, on Contents page.

1.5.2 Any further drawings that may be required will, when supplied by the Superintendent, have the same standing as those supplied with this Contract.

1.6 PROVISIONAL SUMS

1.6.1 There are no Provisional Sums

1.7 TIME OF COMPLETION

1.7.1 The time of completion for the Works shall be as stated in the attached Annexure to General Conditions of Contract (AS 4000-1997) - Part A.

1.7.2 Further to Clause 34.6 of the General Conditions of Contract AS 4000-1997, the Superintendent will issue the Contractor with a Certificate of Practical Completion when:

a) construction work is completed to the satisfaction of the Superintendent;

b) the Local Authority have formally agreed to accept the Works onto maintenance; and

c) as-constructed drawings for stormwater drainage, sewage reticulation and water reticulation are submitted to the Superintendent.

1.8 INSURANCE

1.8.1 General

1.8.1.1 The Contractor's insurance requirements are as described in Clauses 16 to 19 (inclusive) in the General Conditions of Contract AS 4000-1997 as supplemented by the attached Annexure to General Conditions of Contract (AS 4000-1997) - Part A.

1.8.2 Works

1.8.2.1 The Contractor shall insure the Works in accordance with Clause 16 of the General Conditions of Contract AS 4000-1997 as supplemented by the attached Annexure to General Conditions of Contract (AS 4000-1997) - Part A and to the satisfaction of the Principal. Such insurance shall include the risk of loss and damage by fire, theft, explosion, lightning, storm, tempest and flood.

1.8.3 Construction Plant

1.8.3.1 The Contractor shall insure against fire, theft, explosion, lightning, storm, tempest and flood all plant brought onto the Site for the purpose of works by itself or by subcontractors.

1.8.4 Public Liability Insurance

1.8.4.1 Requirements for public liability insurance are specified in Clause 17 of the General Conditions of Contract AS 4000-1997 as supplemented by the attached Annexure to General Conditions of Contract (AS 4000-1997) - Part A.

1.9 DISPUTE RESOLUTION

1.9.1 Dispute resolution shall proceed in the manner described in Clause 42 of the General Conditions of Contract AS 4000-1997, as supplemented by the attached Annexure to General Conditions of Contract (AS 4000-1997) - Part A.

1.10 CONSTRUCTION SECURITY BOND

1.10.1 Refer to clause 10.0 of the attached "Information to Tenderers and Conditions of Tendering".

1.11 RETENTION MONEYS

1.11.1 Retention moneys shall be dealt with in the manner described in Clause 5 of the General Conditions of Contract AS 4000-1997, as supplemented by the attached Annexure to the General Conditions of Contract (AS 4000-1997) - Part A.

1.12 LIQUIDATED DAMAGES

1.12.1 Further to Clause 34.7 of the General Conditions of Contract AS 4000-1997, liquidated damages shall be struck at the rates specified in the attached Annexure to General Conditions of Contract (AS 4000-1997) - Part A.

1.13 DEFECTS LIABILITY PERIOD

1.13.1 A defects liability period shall operate in the manner described in Clause 35 of the General Conditions of Contract AS 4000-1997, as supplemented by the attached Annexure to General Conditions of Contract (AS 4000-1997) - Part A.

1.13.2 The Works will only be released from the defects liability period after they have been accepted off-maintenance by the Local Authority.

1.13.3 During the defects liability period, the Contractor shall:

a) make no less than four (4) visits to inspect the works and carry out necessary maintenance works as authorised by the Superintendent; and

b) repair, at no cost to the Principal, all defects, imperfections, shrinkages and other faults or damage due to any source or cause.

1.13.4 At the conclusion of the defects liability period, the Contractor shall ensure that all works are completed in accordance with the Local Authority's off-maintenance inspection checklist.

1.14 ALTERNATIVE MATERIALS

1.14.1 The Contractor may offer alternative materials to those specified or nominated on the drawings. The Contractor shall nominate any alternative materials at the time of tendering.

1.15 DOCUMENTS AND SITE SHED

1.15.1 The Contractor shall maintain on site a copy of this Specification and two sets of Contract drawings together with a copy of all written instructions issued by the Superintendent.

1.16 SITE INFORMATION AND INSPECTION OF SITE

1.16.1 The Contractor is notified that Clause 25 of the General Conditions of Contract AS 4000-1997 is amended as indicated in the attached Annexure to General Conditions of Contract (AS 4000-1997) - Part B.

1.16.2 The Contractor will be held to have included in their tender every item necessary for the full and proper completion of their work. Therefore, the Contractor shall be deemed to have taken into account in their tender the presence of water and mineral substances, and the geological structure of the soil and rock, and the existence of surface and underground services.

1.16.3 Any failure to do so will be at their own risk.

1.16.4 No extra will be allowed on the plea of want of information.

1.17 WEATHER CONDITIONS

1.17.1 The Contractor shall have made due allowance for the average weather pattern prevailing during the course of the project in compiling their tender.

1.17.2 Extensions for wet weather shall be based on the following:

a) at least 10mm must fall on a day before a one day extension will be considered (the Contractor shall supply and maintain a rain gauge on site);

b) boggy conditions shall be determined on site each day by the Superintendent;

c) extensions shall be calculated on the basis of a five day working week.

1.18 GOODS AND SERVICES TAX (GST)

1.18.1 Goods and Services Tax is applicable.

1.19 PAYROLL TAX

1.19.1 The Contractor shall have allowed for Payroll Tax on all wages in submitting its tender.

1.20 BY-LAWS, FEES AND NOTICES

1.20.1 The Contractor shall comply with all by-laws and regulations of the Local Authority and other statutory authorities having jurisdiction over the Works, and be responsible for the payment of fees and customary charges and the giving and receiving of all necessary notices.

1.21 MATERIALS AND WORKMANSHIP

1.21.1 Unless otherwise specified, materials, manufactured articles, and workmanship shall be new, the best of their respective kinds, conform to best trade practices and comply with relevant standards, codes and regulations.

1.22 INTERPRETATION OF TERMS

1.22.1 Unless otherwise specified, all references to the need for direction or approval in this Specification shall mean that the direction or approval of the Superintendent is required.

1.23 NOTICE BOARD AND PUBLIC NOTICE

As negotiated with Principal.

1.24 WATER

1.24.1 The Contractor shall make his own arrangements for water and pay all charges.

1.25 LIGHT AND POWER

1.25.1 The Contractor shall make his own arrangements for temporary light and power and pay all charges.

1.26 DAMAGE TO SERVICES

1.26.1 The Contractor shall check with the Superintendent and all relevant authorities regarding the position of existing services such as Telecom cables, electrical power cables, water, gas, sewerage and stormwater pipes and shall be responsible for all damage. The Contractor shall notify the Superintendent and the relevant authority immediately such damage occurs.

1.27 REMOVAL OF RUBBISH AND FINAL CLEAN-UP

1.27.1 The Contractor shall remove all rubbish and debris from the site from time to time.

1.27.2 On completion, the Contractor shall ensure that the site is cleaned of surplus materials, debris, etc. The whole of the site is to be left in a state to the satisfaction of the Superintendent and fit for immediate occupation and/or use.

1.28 SAMPLES, TESTING AND INSPECTIONS

1.28.1 Test samples required by the Superintendent shall be supplied at the times and in the manner set out elsewhere in this Specification.

1.28.2 All testing associated with this Contract shall be carried out in accordance with the standard test procedures prescribed by the controlling Local Authority.

Details of these test procedures may be obtained on application to the Superintendent.

1.28.3 The requirements identified in Section CP 1.16 the FNQROC Manual, shall be adhered to where applicable.

1.29 TREE CONSERVATION

1.29.1 Trees that are to be conserved will be marked on site. Every effort should be made to avoid damage to tree roots, trunks and foliage.

1.29.2 Where excavation for roadworks, stormwater drainage and other services are located in the vicinity of trees marked for conservation excavation should be carried out by means that does not damage the root system.

1.30 ORDER OF CONSTRUCTION AND CO-OPERATION

1.30.1 The Principal has arranged for works on site to be carried out by others under the following Contracts:

Contract No	Description	Contractor	Contact
	Telecommunications	To be advised	
	Electrical cable laying	To be advised	

1.30.2 The Contractor shall co-operate with any other Contractor or Subcontractors on the Site in order to minimise inconvenience and disruption.

1.30.3 The Principal shall not be responsible for any extras claimed where Contractors or Subcontractors have not co-operated and co-ordinated construction.

1.30.4 Damage caused in the course of the Works shall be made good by the appropriate trades and surfaces finished to match adjacent surfaces.

1.31 NOTICES

1.31.1 The Contractor shall give all notices and pay all fees required by statutory authorities.

1.31.2 The Contractor shall give 48 hours clear notice in writing to the owners and tenants of the land of its intention to enter private property and shall obtain written permission from the owners/tenants before entering.

1.32 PROVISION OF TRAFFIC

1.32.1 The Contractor shall provide and maintain all necessary temporary bridges, footpaths, drains, supports over or around open excavations, side tracks, roads, footpaths, cables and pipes so as to ensure continuity and safety of all services and vehicular and pedestrian traffic.

1.32.2 The Contractor shall provide and maintain all necessary temporary barriers and night lights necessary to thoroughly protect the general public and to provide for safe passage of all traffic.

1.32.3 All signs, lights, barriers and barricades shall be provided, erected and maintained in accordance with Section A.5 of the Manual of Uniform Traffic Control Devices.

1.32.4 Where sewers or culverts are being constructed on private property, the Contractor shall provide at its own cost all things necessary to give the owner of the property, safe and unobstructed access to buildings, driveways, etc, within the property.

1.33 DEMOLITION

1.33.1 No requirement.

1.34 SETTING OUT

1.34.1 The Contractor shall be responsible for all setting out of the Works in accordance with the Contract drawings and/or in accordance with instructions from the Superintendent.

1.34.2 In order to facilitate setting out by the Contractor, the authorised surveyors responsible for the cadastral survey shall provide such boundary pegs necessary, in the opinion of the Superintendent, for the Contractor to establish the position of sewer manholes, stormwater manholes, kerb and channel alignments, water service alignments and connections, etc.

1.34.3 The Contractor shall be responsible for the pegging of kerb and channel alignments, which shall be carried out by the authorised surveyor.

1.34.4 All pegs and/or marks established by the surveyor or Superintendent shall be carefully preserved.

1.34.5 Where construction necessitates the removal of pegs/marks, off-set pegs/marks shall be provided and their positions recorded on a set of contract drawings such that the original pegs/marks can be accurately re-established if required.

1.34.6 The Contractor shall be liable to pay an amount for full restoration of pegs/marks established by the surveyor or Superintendent that are displaced, removed, knocked out or covered by the Contractor.

1.35 CLEARING AND GRUBBING

1.35.1 Clearing and grubbing shall be carried out by others.

1.35.2 Trees that are to be preserved will be marked by the Superintendent.

1.35.3 All grub holes shall be filled with selected materials, compacted in layers and finished 75mm above adjacent ground.

1.35.4 The Contractor shall not fell any tree/s on allotments without the authority of the Superintendent.

1.36 EARTHWORKS

1.36.1 The Contractor shall cut to fill as described in the Contract drawings or as otherwise directed by the Superintendent. The Standard Specification for Earthworks (S1) contained in the FNQROC Development Manual shall be read in conjunction with this section.

1.36.2 Earthworks shall conform to AS 3798-1990 "Guidelines on earthworks for commercial and residential developments".

1.36.3 All earthwork quantities are solid measure. The Contractor is to make its own allowance for bulking and compaction of material even though this has been taken into consideration in the design process.

1.36.4 Imported fill shall be excavated from Lot 1 on SP204449, Mossman Mt Molloy Rd, as instructed by the Supervisor.

1.37 COMPACTION

1.37.1 Unless noted otherwise, the following standards of compaction shall apply:

Element	Compaction (Min. Dry Density Ratio per AS 1289) (Cohesive Soils)	Compaction (Min. Density Index per AS 1289) (Cohesionless Soils)
Pavement Bed (Subgrade)	98%	80
Pavement Base Course	100%	
Pavement Sub-Base Course	100%	
Filling beneath pavement (fill to be placed and compacted in 150mm layers)	98%	
Footpaths Subgrade	95%	65
Allotment Fill	95%	65

1.37.2 Compaction tests shall be in accordance with AS 1289 "Testing soils for engineering purposes".

1.37.3 Unless noted otherwise, the conduct of compaction tests shall be in accordance with "Level 2" as defined in AS 3798-1990 "Guidelines on earthworks for commercial and residential developments".

1.38 ALLOTMENT AND FOOTPATH GRADING

1.38.1 Allotments shall be constructed to achieve the overall detail indicated on drawing C02/D.

1.38.2 Footpaths shall be neatly finished to the grades shown in typical cross-section drawing C01/E.

1.39 EXCAVATED MATERIALS

1.39.1 All excavated material, including spoil cut from roads, allotments and trenches, remains the property of the Principal and shall be spread, compacted and graded on site where directed by the Superintendent.

1.40 USE OF EXPLOSIVES

1.40.1 Blasting will only be permitted with the approval of the Superintendent and Local Authority.

1.40.2 All explosives must be properly stored and handled in compliance with regulations.

1.40.3 Due care for the protection of persons and property must be exercised during blasting operations.

1.40.4 The Contractor shall make good, at its own expense and immediately, all damage incurred by any persons or property as a result of blasting or associated operations.

1.41 INTERSECTION OF SERVICES

1.41.1 Where stormwater sewers and water mains intersect at the same level, the water main shall be lowered to pass under the stormwater sewer.

1.41.2 The Contractor shall carry out the work at no extra cost.

1.42 EROSION AND SEDIMENT CONTROL

1.42.1 The cost of temporary erosion and sediment control measures required by construction shall be borne by the Contractor.

1.42.2 These measures shall be as detailed in the Erosion and Sediment Control Plan provided as part of the design drawings.

1.42.3 If no such plan is provided then any measures adopted by the Contractor must be:

a) consistent with the methods detailed in the FNQROC Development Manual, and

b) approved by the Superintendent.

1.43 AS-CONSTRUCTED DETAILS

1.43.1 The Contractor is to employ licensed surveyors to prepare as-constructed drawings in hardcopy and digital format in accordance with the FNQROC Development Manual.

1.43.2 These drawings shall be submitted to the Superintendent.

1.44 ACTS AND REGULATIONS

1.44.1 The Contractor shall comply with the requirements of:

a) the Workplace Health and Safety Act No. 63 of 1989; and

b) the requirements of any other acts, regulations, codes, etc, of authorities having jurisdiction over the Works.

2. ROADWORKS

2.1 APPLICATION

2.1.1 The Standard Specification for Earthworks (S1) ,Road Pavements (S2) and Segmental Paving (S3) contained in the FNQROC Development Manual shall be read in conjunction with this Section.

2.1.2 The Contractor shall also comply with all relevant Australian Standards.

2.2 INSTALLATIONS UNDER ROAD PAVEMENTS

2.2.1 General

2.2.1.1 All pipe and conduit installations under road pavements, shoulders and kerb and channel shall be constructed before any pavement construction is commenced.

2.2.1.2 The Contractor shall install underground power and telephone cable conduits under road pavements and footpaths in locations and to dimensions specified in approved Drawings issued by SPA Consulting and Telstra .

2.2.1.3 After approval by the Superintendent or the relevant Authority, trenches shall be backfilled to subgrade level with sand, crusher dust or other granular material approved by the Superintendent. The backfill shall be compacted to min. 95% of the standard maximum dry density.

2.2.2 Electricity Conduits

2.2.2.1 Conduits shall be uPVC Class 6, orange in colour complying with AS 2053-1984. Draw wire shall be nylon, not less than 1.5mm in diameter.

2.2.2.2 The Contractor shall supply and install the conduits in locations and to depths as detailed on approved SPA Consulting Drawings . Joints shall be properly glued and the ends of the conduits closed with styrene plugs. A draw wire shall be installed in each conduit and caution tape placed above the conduits.

2.2.2.3 Prior to backfilling the conduit trenches, the Contractor shall arrange for a approved SPA Consulting inspector to inspect and certify that the conduits are correctly installed and that their locations are marked in the approved manner .

2.2.2.4 Permanent markers shall be installed as required by the approved drawings ..

2.2.3 Telephone Conduits

2.2.3.1 The Contractor shall install telephone cable conduits in the locations and at the depths shown in the approved Telstra drawings. The conduits, which are supplied by Telstra, shall be uPVC pressure pipe Class 9 to AS 1477 with solvent welded joints and coloured white.

2.2.3.2 The joints shall be properly made and the ends of the conduits shall be sealed with polythene sheeting adequately secured to prevent the ingress of sand or soil.

2.2.3.3 Prior to backfilling the conduit trenches, the Contractor shall arrange for a Telstra officer to inspect and certify that the conduits are correctly installed and that their locations are marked in the approved manner for subsequent installation of permanent marker plates.

2.2.3.4 Permanent markers can be obtained from Telstra and shall be installed as required by Telstra.

2.2.3.5 In addition to the conduits shown on the Contract drawings, certain other conduits may also be required to be installed by Telstra.

2.2.3.6 It shall be the Contractor's responsibility to notify Telstra of the programme of works before commencing work and to liaise with Telstra to ensure that it installs its conduits without any interruption to the Contractors activities and prior to the placing of pavement material.

2.2.4 Segmental Paving

2.2.4.1 No requirement

2.3 ROAD SIGNS AND STREET NAME SIGNS

2.3.1 Road signs generally shall comply with Qld Department of Transport Standard Specification MRS11.14 "Road Furniture".

2.3.2 Street name signs shall comply with the FNQROC Manual.

3. STORMWATER DRAINAGE

3.1 APPLICATION

3.1.1 The Standard Specification for Stormwater Drainage (S4) contained in the FNQROC Development Manual shall be read in conjunction with this Section.

3.1.2 The Contractor shall also comply with all relevant Australian Standards.

3.1.3 If and to the extent that any inconsistency is observed between this Specification generally and the materials specified in this Clause, that inconsistency shall be brought to the attention of the Superintendent who shall make a direction.

3.1.4 All underground stormwater pipe drainage (between 375mm and 2000mm) shall be inspected using CCTV camera in accordance with FNQROC Specification S4.

4. WATER RETICULATION

4.1 APPLICATION

4.1.1 The Standard Specification and Drawings for Water Reticulation (S5) contained in the FNQROC Development Manual shall be read in conjunction with this Section.

4.1.2 The Contractor shall also comply with all relevant Australian Standards and all other Codes, Regulations, Standard Specifications, etc, applicable in the jurisdiction.

4.1.3 If and to the extent that any inconsistency is observed between this Specification generally and the materials specified in this Clause, that inconsistency shall be brought to the attention of the Superintendent who shall make a direction.

4.2 LOCAL AUTHORITY INSPECTOR

4.2.1 The Contractor shall allow the Local Authority's Inspector access to the Works at all times and shall provide him with any facilities he may require for inspecting the work. All necessary instructions will be issued by the Superintendent or his representative.

5. SEWERAGE RETICULATION

5.1 APPLICATION

5.1.1 The Standard Specification and Drawings for Sewerage (S6) contained in the FNQROC Development Manual shall be read in conjunction with this Section.

5.1.2 The Contractor shall also comply with all relevant Australian Standards and all other Codes, Regulations, Standard Specifications, etc., applicable in this jurisdiction.

5.1.3 If and to the extent that any inconsistency is observed between this Specification generally and the materials specified in this clause, that inconsistency shall be brought to the attention of the Superintendent who shall make a direction.

5.2 LOCAL AUTHORITY INSPECTOR

5.2.1 The Contractor shall allow the Local Authority's Inspector access to the works at all times and shall provide him with any facilities he may require for inspecting the work. All necessary instructions will be issued by the Superintendent or his representative.

5.3 CCTV INSPECTION

5.3.1 All constructed sewers shall be inspected by CCTV camera in accordance with FNQROC Specification S6.

5.4 STANDARD SEWERAGE PUMP STATION

5.4.1 The Standard Sewerage Pump Station shall be constructed in accordance with :

- FNQROC Standard Drawings S3020D or S3025C
- Number of pumps : 2 (automatic alternating duty pumps)
- FNQROC Design Manual D7.16; D7.17; D7.18; and S6.23 and
- as detailed on Drawing K-2578 Sheet C12E and including sealed access driveway

The selection of pumps, electrical requirements, switch boards telemetry and lighting, should be submitted to the supervisor for approval by Council prior to commencement of work.

Council has nominated Welcon Technologies as their current supplier of pump station switch boards and scada telemetry.

5.4.2 The Pump Station Overflow, which links to Manhole 1/1, is to be constructed in accordance with FNQROC Standard Drawing S3035A

5.4.3 Standard Sewerage Pump Station and Pump Station Overflow Levels (Refer FNQROC Standard Drawings S3020D or S3025C and S3035A) are as (RL AHD):

FSL = 8.600 (at pump well)

A = 8.800 (top of pump well)

B = 3.593 (bottom of pump well)

C = 1.993

D = 5.436 (gravity inlet)

E = 7.900 (discharge to rising main)

F = 6.000

G = 6.050

5.4.4 Pump Design Details

Duty Points in accordance with FNQROC

- Duty Point 1 (single pump operation)

  Design Flow = 1.56 litres/second vs Static Head + Friction Head

- Duty Point 2 (duty pump operating in parallel with standby pump)

  Design Flow = 1.00 litres/second vs Static Head + Friction Head

Pumps shall be selected in accordance with Section 11 of FNQROC, Table 7.14

During the construction phase the successful contractor will confirm the appropriate pump configuration with their preferred pump supplier. The pump details will be provided to the Superintendent prior to ordering who will issue the details to the Douglas Shire Council for approval.

Sewer Rising Main Details

- Length of rising main 333.2 m
- Diam of rising main PE63 PN10 HDPE pressure sewer main
- Rising main outlet RL 7.65 (AHD)

5.4.5 Drawings

Prior to commencing manufacture the following drawings are to be submitted to the Supervisor:

- Switchboard details, including mounting details, materials of construction and finishes;
- Power and control detail;
- Telemetry system

5.4.6 Operating and Maintenance Manual

Following commissioning of all equipment Contractor to supply three (3) sets of an operating and maintenance manual for the switchboards.

The manual shall list equipment installed and provide a list f recommended spare parts.

5.4.7 Electrical Supply and Installation

The electrical equipment, wiring and connections shall comply with relevant standards and and meet supply authority and Council requirements.

Power supply cables shall be run from the nominated Ergon pillar box into the switchboard. Supply and install surge protection on incoming mains.

5.4.8 kWH Metering in Switchboard

kWH metering to be installed in a separate compartment forming part of the switchboard and e to the approval of the metering authority. The door to the kWH meters shall not allow access to the remainder of the switchboard.

5.4.9 Control Panel

The control panel shall be constructed from 3.0mm "Marine" grade aluminium, be of continuously welded construction to meet the protection requirements of AS 1939 and :

- comprise three (3) compartments; one for Supply Authority kWH meters; one for Telemetry Equipment; and one for motor switch gear, controls and alarms; the compartments of adequate size to accommodate the equipment in logical order and clearly labelled;
- ventilation louvres, protected by stainless steel gauze, shall be fitted to the side panels of the compartments at high and low levels;
- be mounted on a concrete plinth;
- be provided with hinged weather proof blank doors fitted with brass tumbler type lock (L and F numbered to suit Council's key system – two keys supplied);
- be arranged for bottom entry of cables.

On completion of fabrication the outer surface of the control panel shall be polyester powder coated to Council's requirement.

5.4.10 Control Panel Equipment

An isolating main switch of the moulded case type. Install and mount so that it is operated from the front of the control panel once the weather proof door is opened.

Circuit breaker to protect the pump motors and act as motor isolator. Tripping current shall be matched to motor size.

All final sub-circuits shall be protected by circuit breakers.

All circuit breakers shall be of the moulded type having thermal and instantaneous magnetic trips.

Install a flush mounted 15-amp combination GPO and switch.

5.4.11 Motor Controls

All motor controls shall be arranged such that in the case of a power failure all units shall automatically restart once power has been restored.

Contactors shall be for utilisation category AC-3 intermittent duty class 0.1, shall be of the moulded block type construction and shall be rated to suit the full load current of the motor.

Each motor shall be provided with a suitably rated, flush mounted, circuit breaker isolating switch of the moulded case construction type. A three (3) position selector switch for each motor will be labelled AUTO – OFF – MANUAL.

- on AUTO the motor shall operate by automatic and remote controls as described below
- on OFF the entire control circuit shall become inoperative.
- on MANUAL the motor shall run.

5.4.12 Level Control

Pumps shall be controlled by a level sensing electrode or floats mounted in the sewage well. Supply and install relays and cabling for the functioning of the controls at:

- Lowest — both pumps stop
- Next Level — start duty pump
- Next Level — start the standby pump
- Next Level — Bring on the local alarm
- Highest Level — Initiate the remote alarm

5.4.13 Standby Emergency Generator

Provide for connection of a standby generator by Installation of a Clipsal Inlet socket in the switchboard of adequate rating to suit the pump motors.

The source of supply shall be by a change-over switch accessible from the front of the board when the weatherproof door is open. The switch shall be labelled – **Mains-Off-Generator.**

5.4.14 Motor Protection – Over Temperature

Over temperature protection to be fitted to all pump motors.

The control unit shall be suitable for direct connection to supply. Manual resetting of this protectiondevice shall be provided from the front of the control panel.

5.4.15 Motor Protection – Visual indicators and Instruments

Each pump motor starter shall be fitted with the following:

a) Hour run cyclometer type meter – reading five (5) digits plus tenths to register cumulative running hours.

b) Indicating lights:
   - One (1) WHITE - Motor available
   - One (1) GREEN - Motor operating
   - One (1) AMBER - One for each protection device

Indicating lights for each motor shall be grouped together and located adjacent to the respective motor controls.

Indicating lights shall:

- be suitable for 24 Volts a.c. with min MTBF of 30,000 hrs
- be such that lamps can be replaced from front of the board

- be clearly visable under normal lighting conditions
- be capable of being tested by a single push button at front of the board

5.4.16 Cables – Wiring – Conduit

All power cables in the switch/control board shall be 660Volt Grade V75, PVC Insulated.

All control and protected wiring between motors and control panel shall be 250 Volt V75 PVC insulated and sheathed cables

Control, protection and indication wiring within the boards shall be minimum 32/0.2

Wiring within the board shall be rigid and easily traceable.

Earthing shall be installed at the control panel in accordance with appropriate standards.

5.4.17 Telemetry

Telemetry hardware, in accordance with Douglas Shire Council requirements, shall be supplied and installed within the compartment provided in the Control Panel.

The Pump station control panel shall incorporate SCADA equipment for transmission of monitoring data and controls to Councils existing master system.

The Telemetry system shall be fully operational at the works acceptance stage.

6. LANDSCAPING

6.1 GENERAL REQUIREMENTS

6.1.1 The Standard Specification for Landscaping (S8) contained in the FNQROC Development Manual shall be read in conjunction with this Section and applied where applicable.

6.1.2 Tree species shall have regard to the Douglas Shire Council Superceded Planning Scheme Policy No 7 *Landscaping Policy*

6.1.3 The landscape work, is as detailed/scheduled in items 6.1, 6.2, 6.3, and 6.4 in the Bill of Quantities.

7. CONCRETE WORKS

7.1 APPLICATION

7.1.1 The Standard Specification for Concrete Works (S7) contained in the FNQROC Development Manual shall be read in conjunction with this Section

8. EROSION AND SEDIMENT CONTROL

8.1 GENERAL

8.1.1 Drawing K-2578, Sheet C15/C, Erosion and Sediment Control Plan, details the scope of the erosion and sediment control work.

It is intended that Drawing K-2578, Sheet C15/C is used as a guide and that variations may apply as the Contractor implements a sediment and erosion control process.

8.2 SEQUENCE OF WORKS

8.2.1 The construction work is to be arranged in such a way that erosion and sediment control is maintained throughout and during all phases of the works. The scale of the works opened up at any one time must be such that when the site is vacated at the end of each day it is secure from the aspect of erosion and sediment control.

8.3 PROGRAMME OF WORK

8.3.1 The contractor shall prepare a Programme of Works and submit it to the Superintendent for approval prior to the commencement of works.

8.3.2 The Programme of Works shall incorporate erosion and sediment controls for pre-construction, during construction and post construction.

8.4 PRE CONSTRUCTION

8.4.1 The following are required to be included in the pre construction process

1. Construct sediment control as shown in drawing K-2578, sheet C15/C.
2. Identify any natural gullys or water courses that require diversion drains or other appropriate works.

8.5 DURING CONSTRUCTION

8.5.1 In addition to the general works shown on drawing K-2578, sheet C15/C,

maintain regular maintenance of all erosion and sediment control structures during the construction period.

8.6 POST CONSTRUCTION

8.6.1 Upon practical completion the works will be inspected and accepted by Council onto maintenance for a period of 12-months. It will be the Contractors responsibility to maintain any revegetation works and as well maintain all erosion and sediment control measures.

NV JS Pty Ltd Crawford Street Subdivision
K-2578
Schedule of Quantities and Prices

Item	Description	Quantity	Unit	Rate	Amount
1-0	**Preliminaries and Earthworks**				
1.1	Establishment of site including (but not limited to) site office, workman facilities, mandatory permits, insurances etc...	1.0	Item		$ 18,000.00
1.2	Set-out.	1.0	Item		$ 6,800.00
1.3	Establish and maintain traffic management plan.	1.0	Item		$ 1,000.00
1.4	Erosion and Sediment Control measures				
	a) Clearing and Stripping Strategy	1.0	Item		$ 9,700.00
	b) Earthworks Strategy	1.0	Item		$ 1,500.00
	c) Completion of Construction Strategy	1.0	Item		$ 4,000.00
1.5	Earthworks (solid cut measure) Cut to fill including stockpiling and re-spreading of topsoil, excavation of pavement box , trimming and compaction as scheduled				
1.5.1	Strip topsoil (nominal 150mm thickness) and stockpile on site.	4,940.0	m^3	$6.00	$ 56,040.00
1.5.2	a) Cut to fill on site include, place, compact, grade , trimm	1,047.0	m^3	$12.00	$ 12,564.00
	b) Cut to fill shortfall (made up with topsoil respreading) (includes earthworks in school grounds)	4,940.0	m^3	$10.00	$ 49,400.00
	c) Import fill, include cart, place , compact, grade, trimm	7,870.0	m3	$30.00	$ 236,100.00
1.7	Compliance testing in accordance with FNQROC requirements.	1.0	Item		$ 1,200.00
1.8	As-constructed Drawings in accordance with FNQROC requirement	1.0	No		$ 8,700.00
1.9	Provision for Traffic	1.0	No		$ 1,000.00
TOTAL 1.0					**$ 406,004.00**

NV JS Pty Ltd Crawford Street Subdivision
K-2578
Schedule of Quantities and Prices

Item	Description	Quantity	Unit	Rate	Amount
2-0	ROAD WORKS				
2.1	Trimming and compaction of pavement subgrades (excludes any works in Crawford Street external to site)	3,778.0	m^2	$1.00	$ 3,778.00
2.2	Supply, load, cart, spread and compact 125mm depth sub-base course material (CBR 45) including island base.	472.3	m^3	$110.00	$ 51,953.00
2.3	Supply, load, cart, spread and compact 125mm depth base course material (CBR 60)	409.1	m^3	$110.00	$ 45,003.75
2.4	Final trim prepare for seal	3,273.0	m^2	$1.00	$ 3,273.00
2.5	Pavement Surfacing				
	a) 30mm Asphaltic concrete including prime	2,162.9	m^2	$23.00	$ 49,746.70
	b) 50mm Asphaltic concrete including prime to intersections	1,110.1	m^2	$36.00	$ 39,963.60
2.6	Concrete Kerbing				
	a) Layback Kerb & Channel	841.0	m	$50.00	$ 42,050.00
2.7	Road Furniture				
	a) Street name signs	2	No	$305.00	$ 610.00
2.8	a) Trench Electrical & Comms only - in verge Excavate trench 900 - 1200mm deep, 600 wide (Refer to Electrical Trench Section), sand, install conduit, sand fill, then backfill with tape and hard clover where required.	381.0	m	40.00	$ 15,240.00
	b) Trench Electrical & Comms only - road crossing. Excavate trench 1000 - 1500mm deep,600 wide (Refer to Electrical Trench Section), sand, install conduit, sand fill, then backfill with hard cover full length, tape and kerb markers.	133.0	m	45.00	$ 5,985.00
	c) Trench Comms only - in verge Excavate trench 700mm deep, 300mm wide, sand, install conduit, sand fill, then backfill with tape as per relevant specifications	40.0	m	45.00	$ 1,800.00
2.9	Supply Electrical conduits as detailed on approved SPA Consulting drawings , including all bends, fittings, E markers and conduit cover material.				
	a) C40H	75.0	m	10.00	$ 750.00
	b) C80L	481.0	m	11.00	$ 5,291.00
2.10	Supply Comms conduits as detailed on approved drawings, including draw rope, tape and fittings				
	a) P100	172.0	m	11.00	$ 1,892.00
	b) P50	292.0	m	10.00	$ 2,920.00
2.11	Construct Street Light Footings complete	9.0	No	800.00	$ 7,200.00
2.12	Locate conduit and prepare bases for Electrical pillars	19.0	No	400.00	$ 7,600.00
2.13	Supply and install Cu Earth	430.0	m	10.00	$ 4,300.00
TOTAL 2-0					$ 289,356.05

NV JS Pty Ltd Crawford Street Subdivision
K-2578
Schedule of Quantities and Prices

Item	Description	Quantity	Unit	Rate	Amount
3-0	STORMWATER DRAINAGE				
3.1	Supply and lay stormwater drainage pipes including excavation, jointing, bedding and backfill				
	a) 375 dia RCP Class 2	48.1	m	$200.00	$ 9,620.00
	b) 450 dia RCP Class 2	93.5	m	$240.00	$ 22,440.00
	c) 600 dia RCP Class 2	21.0	m	$350.00	$ 7,350.00
	d) 675 dia RCP Class 3	28.1	m	$400.00	$ 11,240.00
	e) 750 dia RCP Class 2	46.6	m	$410.00	$ 19,106.00
	f) 1500 x 600 RCBC	21.2	m	$1,000.00	$ 21,200.00
3.2	Stormwater drainage structures.				
	a) Kerb Inlet Pit, (small - sag)	6	No	$4,000.00	$ 24,000.00
	b) Kerb Inlet Pit, (small - grade)	7	No	$4,000.00	$ 28,000.00
	c) 750 dia Headwall, wingwalls & apron	1	No	$2,000.00	$ 2,000.00
	d) 1500 x 600 RCBC Headwall, wingwalls & apron	2	No	$3,600.00	$ 7,200.00
	e) Gross Pollutant Trap (GPT)	1	No	$40,000.00	$ 40,000.00
3.3	Subsoil drainage under all K&C (including flush points and outlets to stormwater pits)	841.0	m	$40.00	$ 33,640.00
3.4	Regrade open drain from Crawford Street to Parker Creek adjacent to Lot 1	110.0	m	$12.00	$ 1,320.00
3.5	Construct open drain in Mossman High School including grouted rock outlet to Parker Creek.	item		$4,000.00	$ 4,000.00
TOTAL 3-0					$ 231,116.00

4-0	WATER RETICULATION				
4.1	Supply and lay water main including pressure testing and sterilization, bends, tees, valves, crosses, concrete anchors, associated works and Council Charges				
	a) 100 dia uPVC Class 16 RRJ or 100 dia PN16 HDPE	535.4	m	$60.00	$ 32,124.00
	b) 50 dia uPVC Class 16 or 63 dia PN16 HDPE	113.6	m	$40.00	$ 4,544.00
4.2	Supply and installation of hydrants complete, incl. supply and fixing of hydrant tee, surface box, margin sets and construction of chamber to suit water mains of diameters as specified:	5.0	No	$800.00	$ 4,000.00
4.3	Supply and installation of 100ø sluice valve complete, including supply and fixing of valves, surface box, margin sets and construction of chamber to suit water mains of diameters as specified:	1.0	No	$760.00	$ 760.00
4.4	Connection to existing main (to be arranged with Council)	1.0	No		$ 2,500.00
TOTAL 4-0					$ 43,928.00

NV JS Pty Ltd Crawford Street Subdivision
K-2578
Schedule of Quantities and Prices

Item	Description	Quantity	Unit	Rate	Amount
5	SEWER RETICULATION				
5.1	Supply, lay, joint and test sewer pipes including jointing rings				
	a) 150ø uPVC Class SEH (SN8)	461.6	m	$131.00	$ 60,469.60
	b) Sewer Rising Main PE63 PN10 HDPE pressure sewer main	333.2	m	$60.00	$ 19,992.00
5.2	Supply of all materials and construction of sewer manholes and access chambers	9	No	$4,000.00	$ 12,000.00
5.3	Supply of all materials and construction of stubs in manholes and access chambers		No		
5.4	Supply of all material and construction of house connection branches including vertical riser, concrete surround and star picket	21	No	$720.00	$ 15,120.00
5.5	Connect to existing manhole	1	No	$2,800.00	$ 2,800.00
5.6	Construct Sewerage Pump Station and Pump Station Overflow complete in accordance with Specification item 5.4	1	No		$ 170,000.00
TOTAL 5-0					-$ 280,381.60

6-0	MISCELLANEOUS				
6.1	Drill seeding to lots and verges	28,534.0	m^2	$1.20	$ 34,240.80
6.2	Hydromulch to Batters :				
	a) Lot 1 Open Drain	180.0	m^2	$3.00	$ 540.00
	b) Batters steeper than 1 on 4	100.0	m^2	$3.00	$ 300.00
6.3	Supply & install turf strips behind K&C and 1m return per block	400.0	m^2	$10.00	$ 4,000.00
6.4	Street tree planting (allow 1 tree per 20m)	40.0	No	$500.00	$ 20,000.00
TOTAL 6-0					$ 59,080.80
SUB TOTAL (Items 1-0, 2-0, 3-0, 4-0, 5-0, 6.0)					$ 1,309,866.45
GST					$ 130,986.65
TOTAL					$ 1,440,853.10

KFB Engineers
Civil & Structural
ABN 28 351 246 509
1/38-42 Pease St, Cairns | PO Box 927, Cairns Q 4870
P: 07 40320492 | F: 07 40320092 | E: email@kfbeng.com.au

APPLICATION FOR OPERATIONAL WORKS PERMIT

NV & JS PTY LTD
19 LOT RESIDENTIAL DEVELOPMENT – LOT 12 on SP252360
12 CRAWFORD STREET, MOSSMAN

CONTENTS 4.0

KFB Engineers
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P: 07 40320492 | F: 07 40320092 | E: email@kfbeng.com.au

NV & JS Pty Ltd
19 Lot Residential Development
Lot 12 on SP252360 - 12 Crawford Street, Mossman **Date: 30 May 2018**

DESIGN REPORT

GENERAL

Site Description : Lot 12 on SP252360; area 3.638 ha.
Current Use – unimproved with regrowth sugar cane over site
Parker Creek borders eastern boundary and Mossman State High School borders western boundary.

Current Approval: Douglas Shire Council (DSC) Approval Reference ROL 617/2015 dated 16 December 2015.
Preliminary Approval to override the planning scheme and reconfiguring a Lot (1 Lot into 19 Lots) – subject to conditions.

COMMENTARY ON DECISION NOTICE CONDITIONS

The comments are numbered, and titled, in accordance with the Decision Notice conditions. Engineering drawings referred to are KFB Engineers Job No K-2578 Sheets C00 to C15 incl.

ASSESSMENT MANAGER CONDITIONS

1. Agreed

2. **Timing of Effect**
   Agreed

3. **Street Layout and Design**
   Street layout and design is in accordance with RPS Dwg No PR124232-Issue D dated 14 July 2015.
   - Street naming agreed to
   - Road reserve widths agreed to. Refer Sheet C01.
   - 3m wide concrete driveway detailed for sewage Pump Station. Sheet C03.
   - Stormwater Drainage calculations shown on Sheet C11.

4. **Water Supply and Sewer**
   The water supply component of Condition 4. is detailed in the attached report:
   4.1 *Assessment of Water Reticulation Capacity*
   The sewerage component of Condition 4. is detailed in the attached report:
   4.2 *Sewerage Design*
   All the requirements of Condition 4. have been met.

5. **Water Supply & Sewerage Works Internal**
   The requirements of Condition 5. have been met.
   Refer to Sheet C14 for Water Supply Layout
   Refer to Sheets C12 and C13 for sewerage details.

6. **Earthworks & Sewer Control Plan**
   a. Refer attached Report 4.4: *Summary - Flood Assessment.*
      From a flood Assessment carried out by AECOM a design Q100 level was adopted.
      Sheet C02 details the earthworks as require by Condition 6.a.
   b. Sheet C02 details the extent and location of filling on Lots 1, 6, 7, 9, 11 & 12
   c. Agreed
   d. Refer Sheet C12. A sewer *'lot control calculation'* is detailed for each lot and in all instances sufficient area is available for location of a residence.
   e. The sewer has been detailed at the front of lots 1, 2 and 3. Refer Sheet C12.

7. **Building Envelope Plan**
   Reference to Sheet C12 details that all lots have extensive coverage as regards sewerage connection(s).

8. **Sewage Pump Station**
   a. 3.4kL ; 4 hours
   b. The overflow chamber discharges to stormwater headwall 1/1 (outlet to Parker Creek). Refer Sheets C12 and C10
   c. The invert level of the overflow outlet is RL 6.200 and minimum lot level is RL 8.6.
   d. The engineering design has been given RPEQ certification.
      DSCl requirements for pump station design, pump selection, and switchboard configuration are agreed to.
      A commissioning plan for the sewage pump station will be provided at the Operational Works Acceptance stage.

9. **Local Drainage Study**
   The requirements of Condition 9. Are detailed in the attached report:
   4.3 *Local Drainage Study.*

10. **Plan of Drainage Works**
    a. Drainage infrastructure generally follows Option 2 on RPS Drawing No PR124232-4 Issue D. Lots 10 to 19 incl. grade west to east; there is no easement required at the west end of lots 10 to 19 incl.; stormwater from the Mossman High School is drained north to drain through Lot 1 and south to an outlet into Parker Creek.
       Full details of drainage works are shown in Sheets C03, C08, C09, C10, & C11.
    b. A Gross Pollutant Trap; meeting the requirements of condition 10.b.i to iv, is detailed on sheets C03 and C10. Detailed in Specification as *"Rocla Cleansall 600 or equivalent"*.

c. Flood Study determined minimum allotment level of RL 8.6 to provide immunity from flooding with an ARI 100 year rainfall event.
d. Allotments 1, 2, 3, 10 - 19 drain to road frontage and discharge via a Gross Pollutant Trap.
Allotments 4 – 9 drain to Parker Creek frontage.
Drainage from the Mossman High School discharges:
- North into an open drain at Lot 1, and thence into Parker Creek, and
- South into Parker Creek.

e. All three (3) outlets to Parker Creek have erosion and scour protection measures.

11. **Existing Creek and Drainage Systems**
Agreed

12. **Lawful Point of Discharge**
Agreed

13. **Landscape Plan**
Agreed.
Landscape Plan to be submitted as required.

14. **Open Space & Drainage Reserve**
Agreed

15. **Damage to Infrastructure**
Agreed

16. **Electricity Supply**
The following plans prepared by SPA Consulting Engineers & approved by Ergon Energy, detail the underground electrical reticulation and pole mounted transformer.
2779-E01-Rev 1
2779-E02-Rev 1

17. **Electricity & Telecommunications**
The following plans have been prepared by SPA Consulting Engineers & approved by Ergon Energy and Telstra respectively.
Electrical Reticulation – 2779-E01-Rev 1 & 2779-E02-Rev 1
Telecommunications - 2779-T01-Rev A & 2779-T02-Rev A

18. **Stockpiling & Transportation of Fill Materials**
The general requirements of this condition are agreed to.

Imported Fill
Approximately 8000cu m (solid measure) of imported fill is required for the earthworks. It is proposed to obtain this fill from Lot 1 on SP204449, a property on the Mossman Mt Molloy Road owned by connections of the Developer.
The area excavated will be kidney shaped and form a farm dam.

Suitability of Fill Material
ETS Geotechnical carried out a geotechnical investigation for the proposed borrow area, the scope of which included:

- The provision of test pit logs
- A survey of the sub surface materials
- Engineering properties of the material(s)

The investigation concluded:
In accordance with AS 3798-2007, Guidelines for Commercial & Residential Developments, following the removal of topsoil, the above materials would be considered suitable for use as fill for the proposed development.

Refer to attached Report 4.6:
ETS Geotechnical Investigation – Factual Report
Borrow Area, Lot 1 on SP204449, Mossman Mt Molloy Road, Mossman
KFB Engineers Dwg K-2578 BA1 Issue A

19. **Dust Emissions or Other Air Pollutants**
Agreed

20. **Storage of Machinery & Plant**
Agreed

21. **Construction Access**
Agreed

ADVICE
Agreed

Infrastructure Charges Notice
Agreed

COMMENTARY ON NOTES FROM PRE-LODGEMENT MEETING OF 21 FEB 2017

Comments numbered in accordance with the notes

1. **Flood Level**
No action required

2. **Detention Basin**
Detention basin not required.

3. **Flood Model**
Refer to attached Report 4.4:
    - SUMMARY: Flood Assessment, and

- FLOOD ASSESSMENT Comment on Sensitivity

4. **Road Levels**
   The road levels have been designed such that the maximum flow depth at kerb for the major storm ((Q100) is no greater than 250mm (refer QUDM 2013 7-22)

5. **Freeboard**
   The Crawford Street Flooding Assessment prepared by Aecom specifically for the 19 lot development advised that *the 100 year ARI flood level at the development may increase to approximately 8.6 m AHD.*
   On that basis the minimum surface level of 8.6 AHD is adopted for the development.

   The Flood Assessment further recommended that *the design free board for finished floor levels within the development should be in accordance with Council guidelines, however in the absence of other guidance, a minimum of 0.3 m is recommended.*
   On that basis 0.30m is adopted for design free board for finished floor levels within the development.

6. **School Drainage**
   Refer to attachéd Report 4.5:
   A *Report – Stormwater Drainage from Lot 11 on SP252360 Mossman dated 3 September 2017* prepared by KFB Engineers was submitted to the DSC.

   The Report examined in detail the two drainage options advanced in RPS plan PR124232-4 D, and further specified in the DSC Decision Notice – ROL 617/2015, for drainage of the Mossman High School (MHS) stormwater.

The Report recommended acceptance of Option 1 which discharged MHS stormwater:
- to the north via an open drain into Parker Creek
- to the south, across DSC land, into Parkers Creek

Option 1 is detailed in Sheets C03 and C09

Written approval to Option 1 has been given by:
- the Department of Education (DETE);
- the owners of adjoining lot 1 on RP851435; and
- preliminary approval has been emailed by the owner of Lot 29 on RP851435 (DSC).

Retaining Walls
The retaining walls have been deleted from the drawings.

Commentary on the summary points

Dot Point 1.
Refer to 6. School Drainage above
DSC have advised Preliminary approval for Option 1 (Refer Sheets C03 and C09).

Dot Point 2
Retaining walls have been removed and fill appropriately detailed instead (Refer Sheet C02).

Dot Point 3
Sewage Pump Station layout in accordance with DSC specific requirements.

Dot Point 4
Agreed

Commentary - Para 1 and 2
These matters are dealt with in 6. School Drainage.

Commentary – Para 3
The drainage method adopted (Sheets C03 and C09) does not provide a pedestrian link and there is no overflow path between lots 11 and 12.

Commentary – Para 4
Agreed

- -

CivilWalker
Engineering | Project Management

Ref: 125-002-002L2

10 May 2018

KFB Engineers
20 Scott Street
Cairns Qld 4870

via email: euan@kfbeng.com.au

Attention: Mr Euan Bruce

Dear Euan

12 Crawford Street, Mossman
Lot 12 on SP252360
Proposed Residential Development
Assessment of Water Reticulation Capacity

NV & JS Pty Ltd submitted a Development Application to Douglas Shire Council for a residential development at 12 Crawford Street (also known as 46 – 62 Front Street), Mossman. The development involves reconfiguration of the existing lot into 19 urban residential lots. Council approved the development, with conditions, on 16 December 2015 (Council reference: ROL617/2015).

Condition 4 "Water Supply & Sewer" requires provision of:

> *An updated water supply and sewerage infrastructure plan and supporting information, including hydraulic network analysis, must be submitted demonstrating how the development will be serviced by Council's infrastructure. In particular, the plan must:*
>
> a. *Identify external catchments that will be connected to the internal sewer or water networks;*
> b. *Identify any trunk infrastructure external to the subdivision that may require upgrading to accommodate the development; and*
> c. *The applicant is to provide a network model for the water supply system operation demonstrating acceptable minimum and maximum pressures are achieved under the conditions nominated by the FNQROC Development Manual.*

The purpose of this report is to satisfy the water supply component of Condition 4. The sewer component will be addressed under separate correspondence.

Existing System

Details of the existing water reticulation network in the area of the development was obtained from Council officers during a meeting on 4 February 2016. An extract from Council's spatial software was provided in hard copy, which is attached as **Attachment 1**.

Water Supply Demand

Section D6.07 within the FNQROC Development Manual (FNQROC) provides design flow parameters. In accordance with this section, the following parameters have been adopted:

- Average Daily Consumption (AD) — 500 litres/person/day
- Mean Day Maximum Month (MDMM) — 750 litres/person/day (1.50 x AD)
- Peak Day (PD) — 1,125 litres/person/day (2.25 x AD)
- Peak Hour (PH) — 0.013 litres/second/EP (1/12 x PD)

Table 6.1 within FNQROC provides details for equivalent demands on residential developments in terms of allotment size. The equivalent demand and actual demands are detailed in Table 1 below.

Lot	Area (m^2)	Equivalent Demand (EP/Connection)	Demand (litres/second)
1	1,355	3.4	0.044
2	1,558	3.7	0.048
3	1,235	3.4	0.044
4	1,192	3.4	0.044
5	1,435	3.4	0.044
6	1,359	3.4	0.044
7	1,322	3.4	0.044
8	1,569	3.7	0.048
9	1,322	3.4	0.044
10	1,000	3.1	0.040
11	1,000	3.1	0.040
12	1,000	3.1	0.040
13	1,000	3.1	0.040
14	1,000	3.1	0.040
15	1,000	3.1	0.040
16	1,000	3.1	0.040
17	1,000	3.1	0.040
18	1,022	3.1	0.040
19	1,017	3.1	0.040
Total			0.800

Table 1 – Water Supply Demand

Boundary Conditions

Boundary conditions for the development were obtained by undertaking hydrant flow testing at the following locations:

- opposite number 14 Williams Street;
- adjacent to number 31 Crawford Street; and
- adjacent to number 5 Crawford Street.

This work was undertaken by Gilboy Hydraulics on 22 April 2016. The results of the testing is contained within **Attachment 2**.

The hydrant testing identified that the static pressure at all three mains tested was 82.5m. This is consistent with advice provided by Council Officers in the meeting of 4 February 2016.

From the water supply demand figures noted above, the total load from the development in peak hour conditions will be 0.80 litres/second. The hydrant testing determined that at a flow of 5.0 litres/second, the available pressure within the existing system dropped from 82.5m to:

- 80.0m at 14 Williams Street;
- 80.0m at 31 Crawford Street; and
- 78.0m at 5 Crawford Street.

These pressures have been adopted in the peak hour water analysis and are considered conservative due to the development demand water flow being less than the tested flow (5.0 litres/second compared to 0.80 litres/second).

Hydrant testing determined that at a flow of 15 litres/second, the available pressure within the existing system dropped from 82.5m to:

- 52.5m at 14 Williams Street;
- 62.5m at 31 Crawford Street; and
- 55.0m at 5 Crawford Street.

These pressures have been adopted for the fire fighting analysis.

Given the high pressures available within the existing system, a single boundary condition has been utilised from 5 Crawford Street, which is immediately adjacent to the proposed development. This is considered reasonable because it represents the lowest pressure at the locations tested.

Survey shows that existing levels on the footpath at 5 Crawford Street are approximately 8.6m. The total head available at the hydrant is therefore 86.6m in peak hour analysis (78.0 + 8.6) and 63.6m in fire fighting analysis (55.0 + 8.6).

Water Supply Design Criteria

Clauses 2 and 3 within Section D6.07 of FNQROC detail the requirements for operating pressures as follows:

- Minimum Operating Pressure — 22m
- Maximum Operating Pressure — 80m
- Fire Fighting Requirements
  - Minimum Pressure — 12m
  - Flow — 15 litres/second

Clause 6 within FNQROC details the design pipeline parameters as follows:

- Friction Equation — Hazen Williams
- Pipe Capacity — Peak Hour and Fire Flow with 2/3 Peak Hour
- Maximum Velocity — 2.5m/s

Clause 7 within FNQROC details the friction coefficients for head loss calculations as follows:

- Pipe Diameter <= 150mm C = 100
- Pipe Diameter 150mm to 300mm C = 110
- Pipe Diameter 300mm to 600mm C = 120
- Pipe Diameter > 600mm C = 125

Proposed Water Reticulation Layout

The proposed water reticulation layout for the development is detailed on drawing K-2578-C14.

A single connection is proposed to Council's existing water network via the existing 100mm diameter main within Crawford Street.

Water Supply Modelling

Water supply modelling was undertaken using EPANet 2. In accordance with FNQROC analysis is required for the following scenarios:

- Peak Hour;
- Fire Fighting with 2/3 Peak Hour background demand to meet pressure requirements; and
- Fire Fighting with Peak Hour background demand confirming that positive pressure is maintained within the system.

Results of the EPA modelling are provided in **Attachment 3**. A summary of each scenario is provided below. Drawing 125-002-SK02 shows the node and pipe link details for the modelling undertaken.

Peak Hour Analysis

The peak hour analysis involved providing the demand at each allotment as specified in **Table 1** above.of 0.081 litres/second.

The proposed connection point at Crawford Street was modelled as a reservoir with available pressure of 78m and total head of 86.6m as discussed in the boundary conditions section of this report.

Results of the analysis determined that the required pressure within the proposed system meets the requirements of a minimum of 22m head and maximum of 80m head, with the minimum pressure reported being 77.74m pressure (at nodes 31 and 32 adjacent to proposed lot 4) and the maximum being 78.49m pressure (at node 6 opposite proposed lot 1).

The analysis also determined that the maximum velocity within the system was 0.07m/s which is below the required maximum of 2.5m/s.

In summary, the analysis has determined that peak hour criteria can be met with the proposed water reticulation layout as shown on drawing 125-001-SK02 and parameters as modelled in EPANet.

Fire Fighting Analysis

FNQROC requires fire fighting analysis to involve applying an additional demand of 15 litres/second to a background demand of 2/3 peak hour. Resulting pressures in the system must be a minimum of 12m. An additional requirement is to run the additional 15 litres/second demand with a background demand of an entire peak hour. Resulting pressures must remain positive within the system.

Given the high available pressure within Council's existing system, it is expected that the fire fighting analysis with an entire peak hour background demand will still meet the minimum 12m pressure requirement and if so, this will satisfy all criteria. This scenario has therefore been modelled.

The additional demand was undertaken independently at two separate locations as follows:

- Node 12 (adjacent to Lot 16) – this was selected due to it having the lowest pressure available within the 100mm diameter main in the peak hour analysis.
- Node 20 (end of cul-de-sac) – this was selected due to it being the farthest location from the Council system connection point.

The connection point at Crawford Street was modelled as a reservoir with an available pressure of 52.5m. This results in an available head of 63.6m.

A background demand of an entire peak hour was applied.

Node 12

Results of the analysis determined that the minimum pressure within the proposed subdivision during fire fighting at Node 12 meets the requirement of 12m, with the minimum pressure reported being 44.09m. The maximum velocity reported is 2.01m/s, which is below the maximum allowable of 2.5m/s.

Node 20

Results of the analysis determined that the minimum pressure within the proposed subdivision during fire fighting at Node 20 meets the requirement of 12m, with the minimum pressure reported being 36.16m. The maximum velocity reported is also 2.01m/s, which is below the maximum allowable of 2.5m/s.

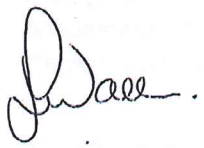
In summary, the analysis has determined that fire fighting flows can be accommodated whilst maintaining more than minimum required pressures under a background demand of peak hour with reticulation layout as shown on the project drawings. No further analysis for fire fighting is therefore required.

Conclusion

It is concluded (based on the parameters adopted during the water network analysis) that the existing water infrastructure can adequately support the development and that the proposed water reticulation layout can service the development as required by the FNQROC Development Manual.

CivilWalker
Engineering | Project Management

Yours faithfully
CivilWalker



Daryl Walker
Director / Principal Engineer

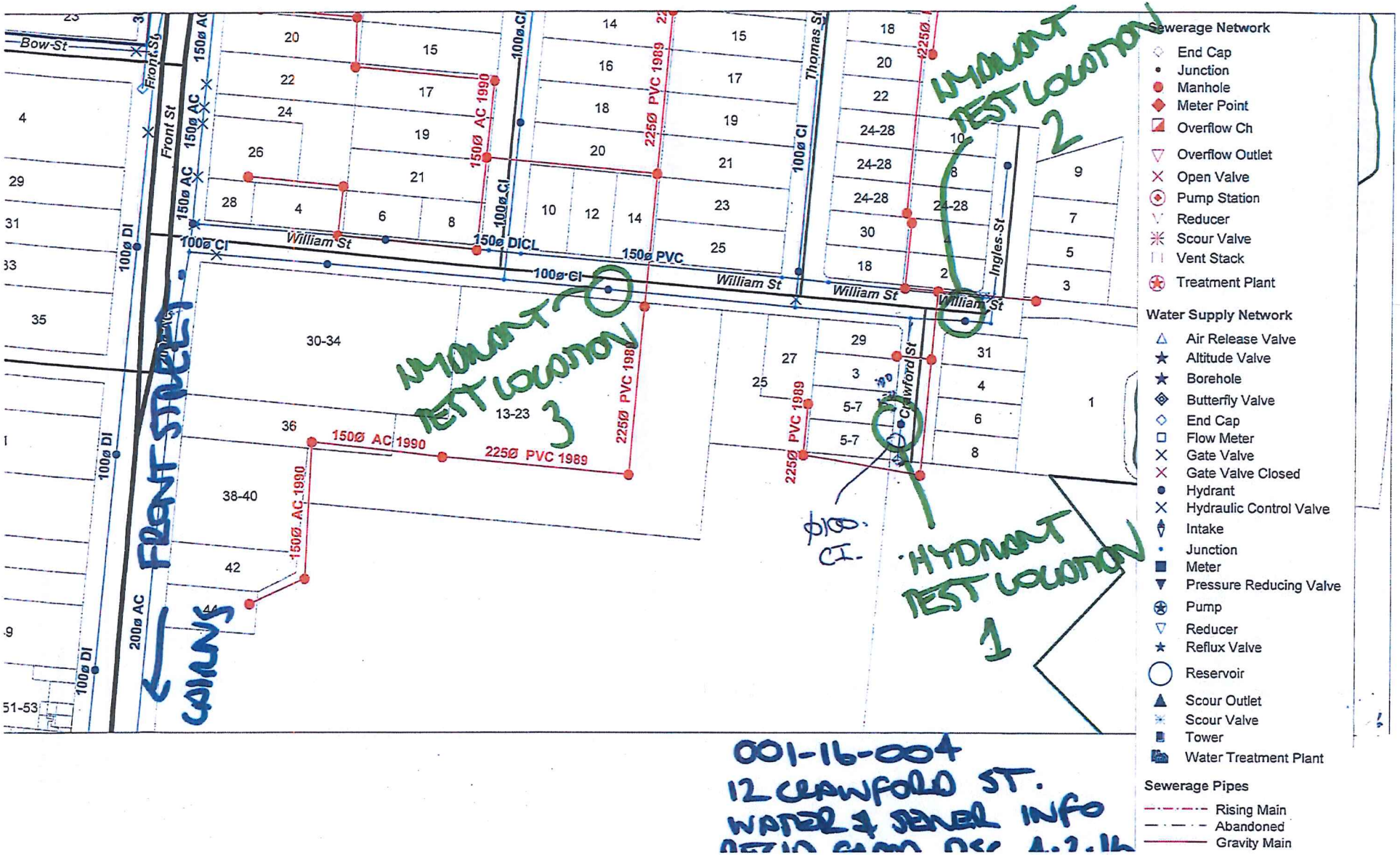
GLF Developments Pty Ltd
trading as CivilWalker
PO Box 509, Palm Cove Qld 4879

CivilWalker
Engineering | Project Management

Attachment 1

Extract from Douglas Shire Council Spatial System

GLF Developments Pty Ltd
trading as CivilWalker
PO Box 509, Palm Cove Qld 4879



001-16-004
12 CRAWFORD ST.
WATER & SEWER INFO

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Attachment 2
Hydrant Test Results

GLF Developments Pty Ltd
trading as CivilWalker
PO Box 509, Palm Cove Qld 4879

Daryl Walker

From: Greg Gilboy <Greg@gilboy.com.au>
Sent: Friday, 22 April 2016 12:43 PM
To: Daryl Walker
Cc: euan@kfbeng.com.au; Wayne Knight
Subject: RE: Request for Fee Proposal - Hydrant Tests Mossman
Attachments: Hydrant Test Locations.pdf

Hi Daryl

Thanks for commissioning us to undertake this work on your behalf.
In accordance with our discussions and your programme we undertook the fire hydrant flow tests on the mains in Mossman today at the locations nominated by yourself.

The results of these flows are listed below for your use and for further analysis.
Please let me know if you need any further information or clarification.

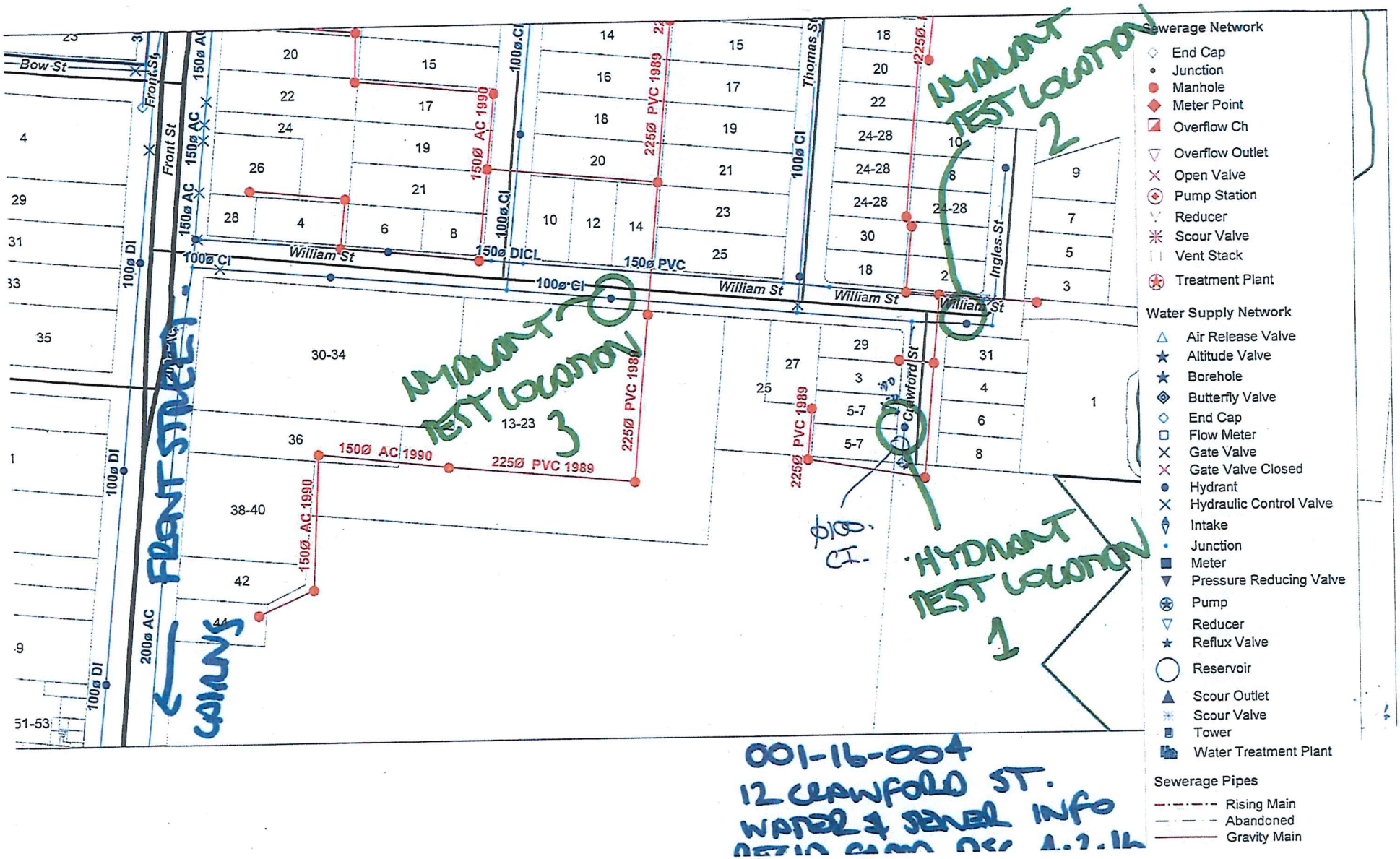
Please advise who we are to make the invoice out to and where it should be sent?
Otherwise here are the results from our tests today which are numbered to match your location map given to us initially.

Fire **Hydrant #1** tested at 8.30am
Full Flow = 26 Litres per Second at 25kPa
25L/s @ 150 kPa
20L/s @ 375 kPa
15L/s @ 550 kPa
10L/s @ 700 kPa
5L/s @ 780 kPa
Static Pressure in the main = 825kPa

Fire **Hydrant #2** tested at 8.45am
Full Flow = 31 Litres per Second at 100kPa
30L/s @ 150 kPa
25L/s @ 325 kPa
20L/s @ 500 kPa
15L/s @ 625 kPa
10L/s @ 750 kPa
5L/s @ 800 kPa
Static Pressure in the main = 825kPa

Fire **Hydrant #3** tested at 9.05am
Full Flow = 30 Litres per Second at 25kPa
25L/s @ 200 kPa
20L/s @ 475 kPa
15L/s @ 525 kPa
10L/s @ 700 kPa
5L/s @ 800 kPa
Static Pressure in the main = 825kPa

Regards Greg
Managing Director



001-16-004
12 CRAWFORD ST.
WATER & SEWER INFO

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Attachment 3

EPANet Modelling Results

GLF Developments Pty Ltd
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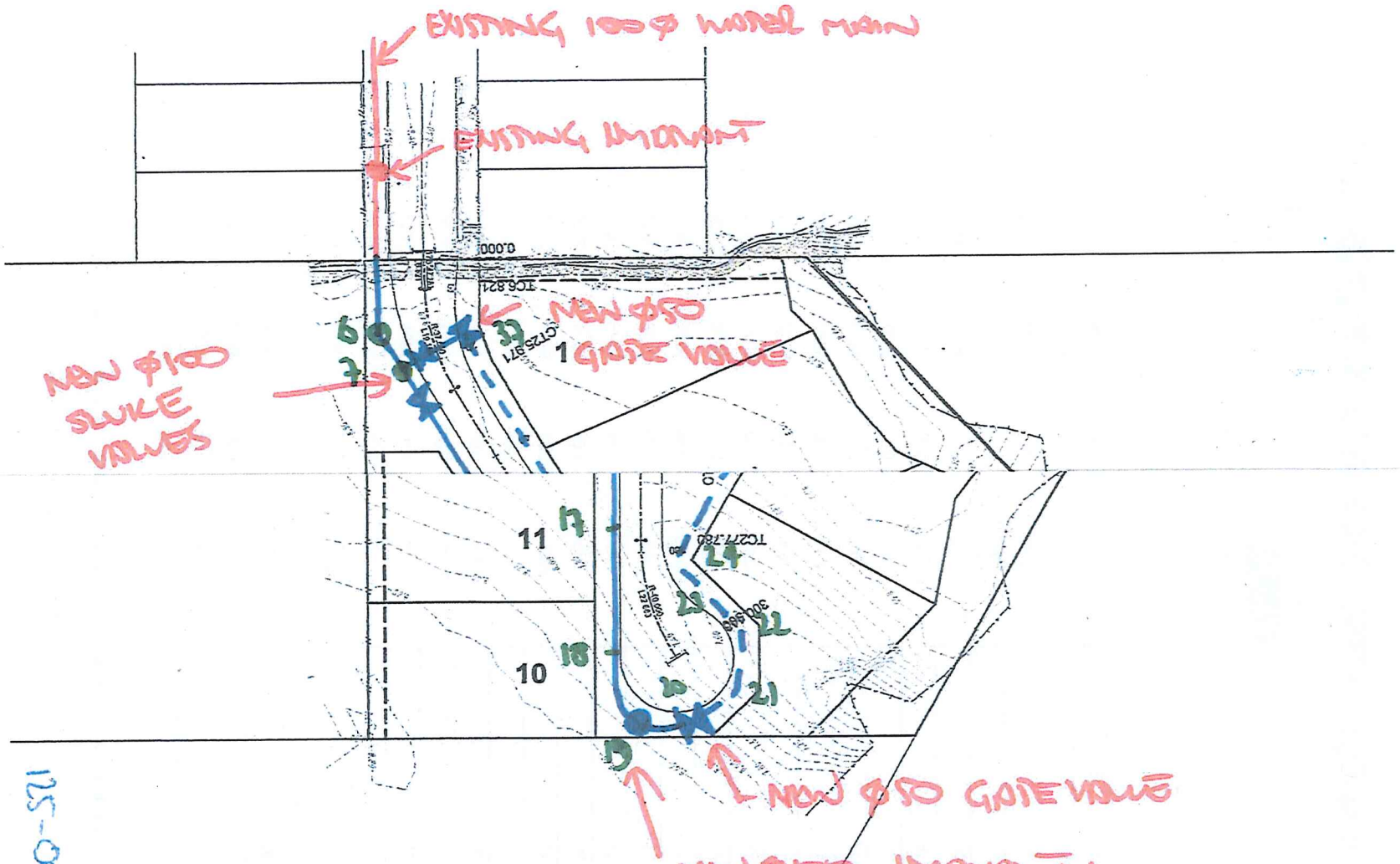
PO Box 509, Palm Cove Qld 4879


EXISTING 100Ø WATER MAIN
EXISTING HYDRANT
NEW Ø150 GATE VALVE
NEW Ø100 SLUICE VALVES
NEW Ø150 GATE VALVE
NEW Ø100 HYDRANT.
(PUT AT LOW POINT IN CUL-DE-SAC)
11
10
1
TC6.821
TC27.780
125-002-SK02.
SCALE. 1:1000
125-002
29-04-16.

Network Table - Nodes

Node ID	Elevation m	Demand LPS	Head m	Pressure m
Junc 6	8.3	0.00	86.79	78.49
Junc 7	8.6	0.00	86.79	78.19
Junc 8	8.737	0.04	86.78	78.05
Junc 9	8.774	0.00	86.78	78.01
Junc 10	8.803	0.04	86.78	77.98
Junc 11	8.884	0.04	86.78	77.89
Junc 12	9.022	0.04	86.78	77.75
Junc 13	8.95	0.04	86.77	77.82
Junc 14	8.9	0.04	86.77	77.87
Junc 15	8.8	0.04	86.77	77.97
Junc 16	8.7	0.04	86.77	78.07
Junc 17	8.6	0.04	86.77	78.17
Junc 18	8.5	0.04	86.77	78.27
Junc 19	8.45	0.00	86.77	78.32
Junc 20	8.4	0.00	86.77	78.37
Junc 21	8.45	0.00	86.77	78.32
Junc 22	8.5	0.00	86.76	78.26
Junc 23	8.55	0.00	86.76	78.21
Junc 24	8.6	0.00	86.76	78.16
Junc 25	8.7	0.04	86.75	78.05
Junc 26	8.75	0.05	86.74	77.99
Junc 27	8.825	0.04	86.74	77.92
Junc 28	8.85	0.00	86.74	77.89
Junc 29	8.875	0.04	86.74	77.87
Junc 30	8.95	0.00	86.74	77.79
Junc 31	9	0.00	86.74	77.74
Junc 32	9	0.04	86.74	77.74
Junc 33	8.78	0.00	86.75	77.97
Junc 34	8.78	0.04	86.75	77.97
Junc 35	8.78	0.00	86.76	77.98
Junc 36	8.737	0.05	86.77	78.03
Junc 37	8.6	0.04	86.79	78.19
Resvr 1	86.8	-0.76	86.80	0.00

Table 3-1 - Peak Hour Analysis Results

Network Table - Nodes

Node ID	Elevation m	Demand LPS	Head m	Pressure m
Junc 6	8.3	0.00	61.44	53.14
Junc 7	8.6	0.00	60.72	52.12
Junc 8	8.737	0.04	58.63	49.89
Junc 9	8.774	0.00	56.84	48.07
Junc 10	8.803	0.04	56.07	47.26
Junc 11	8.884	0.04	54.59	45.70
Junc 12	9.022	15.04	53.11	44.09
Junc 13	8.95	0.04	53.12	44.17
Junc 14	8.9	0.04	53.13	44.23
Junc 15	8.8	0.04	53.14	44.34
Junc 16	8.7	0.04	53.15	44.45
Junc 17	8.6	0.04	53.16	44.56
Junc 18	8.5	0.04	53.18	44.68
Junc 19	8.45	0.00	53.18	44.73
Junc 20	8.4	0.00	53.19	44.79
Junc 21	8.45	0.00	53.38	44.93
Junc 22	8.5	0.00	53.57	45.07
Junc 23	8.55	0.00	53.76	45.21
Junc 24	8.6	0.00	53.95	45.35
Junc 25	8.7	0.04	54.46	45.76
Junc 26	8.75	0.05	55.06	46.31
Junc 27	8.825	0.04	55.58	46.75
Junc 28	8.85	0.00	55.81	46.96
Junc 29	8.875	0.04	56.05	47.17
Junc 30	8.95	0.00	56.95	48.00
Junc 31	9	0.00	57.20	48.20
Junc 32	9	0.04	57.45	48.45
Junc 33	8.78	0.00	58.56	49.78
Junc 34	8.78	0.04	58.83	50.05
Junc 35	8.78	0.00	59.11	50.33
Junc 36	8.737	0.05	59.70	50.97
Junc 37	8.6	0.04	60.71	52.11
Resvr 1	63.6	-15.76	63.60	0.00

Table 3-2 – Fire Fighting Node 12 Analysis Results

Network Table - Nodes

Node ID	Elevation m	Demand LPS	Head m	Pressure m
Junc 6	8.3	0.00	61.44	53.14
Junc 7	8.6	0.00	60.72	52.12
Junc 8	8.737	0.04	58.80	50.07
Junc 9	8.774	0.00	57.16	48.39
Junc 10	8.803	0.04	56.46	47.65
Junc 11	8.884	0.04	55.10	46.21
Junc 12	9.022	0.04	53.75	44.73
Junc 13	8.95	0.04	52.41	43.46
Junc 14	8.9	0.04	51.07	42.17
Junc 15	8.8	0.04	49.74	40.94
Junc 16	8.7	0.04	48.42	39.72
Junc 17	8.6	0.04	47.11	38.51
Junc 18	8.5	0.04	45.81	37.31
Junc 19	8.45	0.00	45.18	36.73
Junc 20	8.4	15.00	44.56	36.16
Junc 21	8.45	0.00	45.01	36.56
Junc 22	8.5	0.00	45.45	36.95
Junc 23	8.55	0.00	45.90	37.35
Junc 24	8.6	0.00	46.34	37.74
Junc 25	8.7	0.04	47.53	38.83
Junc 26	8.75	0.05	48.89	40.14
Junc 27	8.825	0.04	50.04	41.21
Junc 28	8.85	0.00	50.55	41.70
Junc 29	8.875	0.04	51.06	42.18
Junc 30	8.95	0.00	52.97	44.02
Junc 31	9	0.00	53.50	44.50
Junc 32	9	0.04	54.04	45.04
Junc 33	8.78	0.00	56.35	47.57
Junc 34	8.78	0.04	56.91	48.13
Junc 35	8.78	0.00	57.48	48.70
Junc 36	8.737	0.05	58.69	49.95
Junc 37	8.6	0.04	60.70	52.10
Resvr 1	63.6	-15.76	63.60	0.00

Table 3-3 – Fire Fighting Node 20 Analysis Results

CivilWalker
Engineering | Project Management

Ref: 125-002-003L2

10 May 2018

KFB Engineers
20 Scott Street
Cairns Qld 4870

via email: euan@kfbeng.com.au

Attention: Mr Euan Bruce

Dear Euan

12 Crawford Street, Mossman
Lot 12 on SP252360
Proposed Residential Development
Sewerage Design

NV & JS Pty Ltd submitted a Development Application to Douglas Shire Council for a residential development at 12 Crawford Street (also known as 46 – 62 Front Street), Mossman. The development involves reconfiguration of the existing lot into 19 urban residential lots. Council approved the development, with conditions, on 16 December 2015 (Council reference: ROL617/2015).

Condition 4 "Water Supply & Sewer" requires provision of:

> *An updated water supply and sewerage infrastructure plan and supporting information, including hydraulic network analysis, must be submitted demonstrating how the development will be serviced by Council's infrastructure. In particular, the plan must:*
>
> a. *Identify external catchments that will be connected to the internal sewer or water networks;*
> b. *Identify any trunk infrastructure external to the subdivision that may require upgrading to accommodate the development; and*
> c. *The applicant is to provide a network model for the water supply system operation demonstrating acceptable minimum and maximum pressures are achieved under the conditions nominated by the FNQROC Development Manual.*

The purpose of this report is to satisfy the sewerage component of Condition 4. The water supply component is addressed under separate correspondence.

Existing System

Details of the existing sewerage network in the area of the development was obtained from Council officers during a meeting on 4 February 2016. An extract from Council's spatial software was provided in hard copy, which is attached as **Attachment 1**.

External Catchments

Based on the details of the existing sewerage network, no external catchments will be connected and conveyed via the internal sewer.

The proposed development will connect to the existing Council network in Crawford Street, which is a 225mm diameter PVC pipe. The invert levels of this pipe are unknown, however at the minimum grade specified within FNQROC for this pipe diameter, FNQROC nominates a capacity of 549 equivalent domestic connections.

Existing System Upgrade

The extent of the external catchments contributing to the sewer that the proposed development will connect to is not known, however given that the new development represents only 11% of the minimum capacity of the existing sewer (assuming it has been laid no flatter than the minimum allowable grade), it is not expected that any upgrade to existing infrastructure is required. This can be confirmed by liaison with Council during the application assessment phase.

Sewerage Demand

Section D7.08 within the FNQROC Development Manual provides criteria for sewer design. Table 7.2 within FNQROC provides details for sewerage loading within a development based on allotment size. The equivalent persons per connection for the proposed development are detailed in Table 1 below.

Lot	Area (m^2)	Equivalent Demand (EP/Connection)
1	1,355	3.4
2	1,558	3.7
3	1,235	3.4
4	1,192	3.4
5	1,435	3.4
6	1,359	3.4
7	1,322	3.4
8	1,569	3.7
9	1,322	3.4
10	1,000	3.1
11	1,000	3.1
12	1,000	3.1
13	1,000	3.1
14	1,000	3.1
15	1,000	3.1
16	1,000	3.1
17	1,000	3.1
18	1,022	3.1
19	1,017	3.1
	Total	62.2

Table 1 – Sewer Loading

Sewer Design Criteria

FNQROC provides the following requirements:

- Minimum Grade 150mm – Head of Pipe 1 in 100
- Minimum Grade 150mm – Second MH Length 1 in 150
- Minimum Grade 150mm – Remaining MH Lengths 1 in 150 (or 1 in 180)
- Sewers shall not be greater than 3m deep unless approved by Council
- Sewer alignment on side and rear boundaries 0.8m
- Sewer alignment on front boundaries 1.5m
- Manholes shall be placed on gravity sewers at the following locations:
  - At changes of pipe diameter
  - At ends of lines where ends are more than 30m from the previous manhole
  - At ends of lines where the line depth is greater than 1.5m
  - At ends of lines servicing more than two property connections
  - At maximum spacing of 100m
- Maximum change of angle through a manhole shall be 90 degrees (ie no more acute)

Proposed Sewer Layout

The proposed sewer layout for the development is detailed on drawing K-2578-C12, with associated sewer longitudinal sections detailed on drawing K-2578-C13. Both drawings are contained within **Attachment 2**.

The layout and design of the gravity network complies with the requirements of the FNQROC development manual.

Connection into Council's existing network is proposed at the existing sewer manhole (labelled EX/4) located at the eastern end of Crawford Street just within the proposed development site.

Sewer Pump Station

Due to the grade of the site and the invert levels of the existing sewer system, it is impracticable to grade sewer for the majority of allotments to the existing sewer system. Lots 1, 2 and 3 has been graded directly to the existing sewer manhole (EX/4), however the remainder of the proposed development's sewer has been graded south to a proposed sewer pump station. From this location a sewer rising main connects to the existing system at EX/4.

An FNQROC standard sewerage pump station is proposed which will be constructed in accordance with FNQROC standard drawings S3020 and S3030. Two pumps will be provided, which will both alternate between duty and standby pumps.

The sewer pump station overflow outlets into the proposed new stormwater system at structure 2/1 and will be constructed in accordance with FNQROC standard drawing S3035.

Referencing FNQROC standard drawing S3020 for a cast in-situ pump station, the following levels have been specified (m AHD):

- Finished surface level 8.600
- A = top of pump well 8.800
- B = bottom of pump well 3.593
- C 1.993
- D = gravity inlet 5.436

- E = discharge to rising main 7.900
- F 6.000
- G 6.050

The following duty points have calculated in accordance with FNQROC:

- Duty Point 1 (single pump operation)
  Design Flow = 1.43 litres/second vs Static Head + Friction Head
- Duty Point 2 (duty pump operating in parallel with stand-by pump)
  Design Flow = 0.91 litres/second vs Static Head + Friction Head

During the construction phase the successful contractor will confirm the appropriate pump configuration with their preferred pump supplier. The drawings require that these details be provided to the engineer prior to ordering. These details will be issued to Council for approval.

We trust that the above satisfies your requirements, however should you have any queries, please do not hesitate to contact me.

Yours faithfully
CivilWalker

Daryl Walker
Director / Principal Engineer

GLF Developments Pty Ltd
trading as CivilWalker
PO Box 509, Palm Cove Qld 4879

CivilWalker
Engineering | Project Management

Attachment 1

Extract from Douglas Shire Council Spatial System

GLF Developments Pty Ltd
trading as CivilWalker
PO Box 509, Palm Cove Qld 4879

001-16-004
12 CRAWFORD ST.
WATER & SEWER INFO

CivilWalker
Engineering | Project Management

Attachment 2

Sewer Reticulation Layout Drawing K-2578-C12
Sewer Longitudinal Sections Drawing K-2578-C13

GLF Developments Pty Ltd
trading as CivilWalker
PO Box 509, Palm Cove Qld 4879

LEGEND

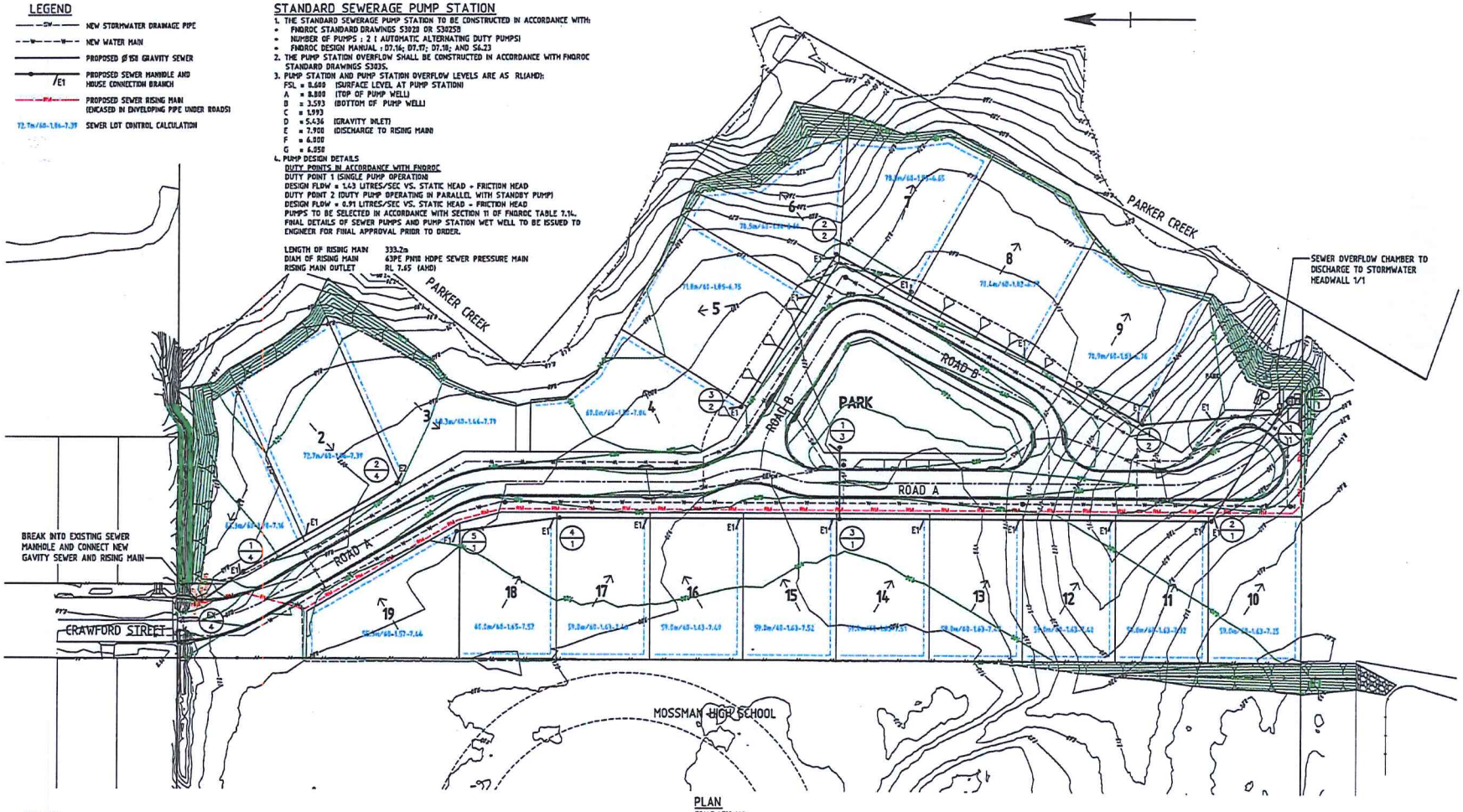
- NEW STORMWATER DRAINAGE PIPE
- NEW WATER MAIN
- PROPOSED Ø150 GRAVITY SEWER
- PROPOSED SEWER MANHOLE AND HOUSE CONNECTION BRANCH
- PROPOSED SEWER RISING MAIN (ENCASED IN ENVELOPING PIPE UNDER ROADS)
- SEWER LOT CONTROL CALCULATION

STANDARD SEWERAGE PUMP STATION

1. THE STANDARD SEWERAGE PUMP STATION TO BE CONSTRUCTED IN ACCORDANCE WITH:
   - FNQROC STANDARD DRAWINGS S3020 OR S3025B
   - NUMBER OF PUMPS : 2 I AUTOMATIC ALTERNATING DUTY PUMPS)
   - FNQROC DESIGN MANUAL : D7.16; D7.17; D7.18; AND S6.23
2. THE PUMP STATION OVERFLOW SHALL BE CONSTRUCTED IN ACCORDANCE WITH FNQROC STANDARD DRAWINGS S3035.
3. PUMP STATION AND PUMP STATION OVERFLOW LEVELS ARE AS RL(AHD):
   - FSL = 8.600 (SURFACE LEVEL AT PUMP STATION)
   - A = 8.000 (TOP OF PUMP WELL)
   - B = 3.593 (BOTTOM OF PUMP WELL)
   - C = 1.993
   - D = 5.436 (GRAVITY INLET)
   - E = 7.900 (DISCHARGE TO RISING MAIN)
   - F = 6.000
   - G = 6.050
4. PUMP DESIGN DETAILS

   DUTY POINTS IN ACCORDANCE WITH FNQROC
   DUTY POINT 1 (SINGLE PUMP OPERATION)
   DESIGN FLOW = 1.43 LITRES/SEC VS. STATIC HEAD + FRICTION HEAD
   DUTY POINT 2 (DUTY PUMP OPERATING IN PARALLEL WITH STANDBY PUMP)
   DESIGN FLOW = 0.91 LITRES/SEC VS. STATIC HEAD + FRICTION HEAD
   PUMPS TO BE SELECTED IN ACCORDANCE WITH SECTION 11 OF FNQROC TABLE 7.14.
   FINAL DETAILS OF SEWER PUMPS AND PUMP STATION WET WELL TO BE ISSUED TO ENGINEER FOR FINAL APPROVAL PRIOR TO ORDER.

   LENGTH OF RISING MAIN 333.2m
   DIAM OF RISING MAIN 63PE PN16 HDPE SEWER PRESSURE MAIN
   RISING MAIN OUTLET RL 7.65 (AHD)



PLAN
SCALE 1:500 (A1)

NOTES

1. ALL GRAVITY SEWER PIPES SHALL BE 150 DIA PVC, CLASS SN8, RRJ, UNLESS NOTED OTHERWISE.
2. REFER TO THE SEWERAGE LONGITUDINAL SECTION FOR SEWER PIPE GRADES, INVERT LEVELS, STORMWATER CLASHES, ETC.
3. CONSTRUCTION OF THE GRAVITY SEWERAGE RETICULATION SHALL BE IN ACCORDANCE WITH THE PROCEDURES, SPECIFICATIONS AND DRAWINGS INCLUDING REQUIREMENTS FOR "AS CONSTRUCTED" DRAWINGS AS CONTAINED IN THE CURRENT ISSUE OF THE "REGIONAL DEVELOPMENT MANUAL" AS ISSUED BY FNQROC, AND SHALL BE TO THE REQUIREMENTS OF THE COUNCIL.
4. INSTALL PIPE ANCHOR BLOCKS TO ALL 100 AND 150 DIA SEWERS AT GRADES GREATER THAN 1 ON 6 IN ACCORDANCE WITH FNQROC DWG No. S3015 AND WSA.
5. THE CONTRACTOR SHALL MAKE ALL APPLICATIONS AND PAY ALL FEES TO COUNCIL FOR THE SEWERAGE WORKS AND SHALL ARRANGE AND MANAGE COUNCIL'S INSPECTIONS AND TESTING OF THE WORKS. A COPY OF COUNCIL'S INSPECTION CERTIFICATE SHALL BE PROVIDED BY THE CONTRACTOR TO THE OWNER PRIOR TO PRACTICAL COMPLETION.

1:500 10 5 0 10 20 A1
1:1000 A3

No.	DATE	ISSUE / REVISIONS	DRN	CHKD
E	30/04/18	REDESIGN FOR NEW DESIGN LEVELS		
D	21/02/17	SEWER MANHOLES 1/3 AND 1/4 AND NOTES REVISED		
C	11/12/16	STORMWATER DRAINAGE, SITE LEVELS REVISED AND PUMP STATION DETAILS ADDED	EWK	EFB

DRAWING FILE: XREF FILE: N/A

N.V. & J.S. Pty Ltd
PROPOSED SUBDIVISION
AT CRAWFORD STREET, MOSSMAN

Sewer Reticulation Layout

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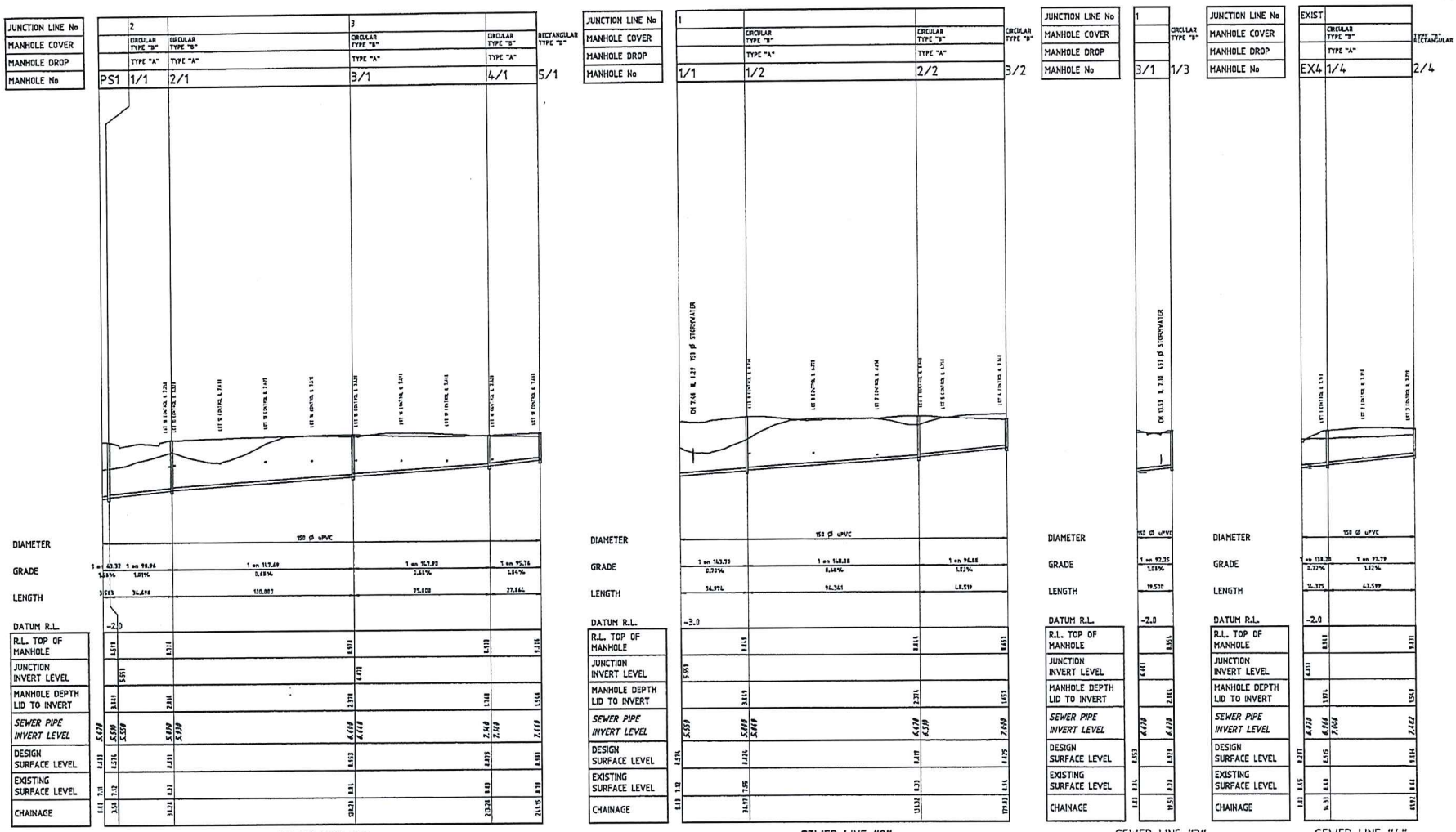
JOB No: K-2578
SHEET: C12 E
SCALE: 1:500 (@ A1)



1:1000 10 0 10 20 30 40 50 A1
1:2000 A3
HORIZONTAL

1:100 2 1 0 2 4 A1
1:200 A3
VERTICAL

No.	DATE	ISSUE / REVISIONS	DRN	CHKD
C	30/04/18	REDESIGN FOR NEW DESIGN LEVELS	EWK	EFD
B	29/11/16	REVISION FOR NEW Q100 FLOOD LEVEL - TENDER ISSUE		
A	19/07/16	ORIGINAL ISSUE		

DRAWING FILE: XREF FILE: N/A

N.V. & J.S. Pty Ltd
PROPOSED SUBDIVISION
AT CRAWFORD STREET, MOSSMAN

Sewer Longitudinal Sections

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JOB No: K-2578
SHEET: C13 C
SCALE: 1:1000H 1:100V (@ A1)

CivilWalker
Engineering | Project Management

Ref: 125-002-004L2

10 May 2018

KFB Engineers
20 Scott Street
Cairns Qld 4870

via email: euan@kfbeng.com.au

Attention: Mr Euan Bruce

Dear Euan

12 Crawford Street, Mossman
Lot 12 on SP252360
Proposed Residential Development
Local Drainage Study

NV & JS Pty Ltd submitted a Development Application to Douglas Shire Council for a residential development at 12 Crawford Street (also known as 46 – 62 Front Street), Mossman. The development involves reconfiguration of the existing lot into 19 urban residential lots. Council approved the development, with conditions, on 16 December 2015 (Council reference: ROL617/2015).

Condition 9 "Local Drainage Study" requires the applicant to:

> *Undertake a local drainage study of the site to determine the drainage impacts on upstream and downstream properties and the mitigation measures required to minimise such impacts. In particular, the study must address the following:*
>
> a. *The contributing boundaries;*
> b. *The extent of the 100 year ARI flood event in relation to the site both pre- and post-development;*
> c. *Primary and secondary flow paths for the 5, 10 and 100 year ARI rainfall events;*
> d. *Identify any requirement for drainage easements;*
> e. *Identify the need and tenure for flood detention areas to ensure a no worsening impact on downstream properties for the development;*
> f. *Information of the proposed works and any impacts proposed at the drainage outlet from the proposed development. Specific information on the pipe outlet and erosion protection in addition to the overland flow path outlet and its erosion measures is to be provided;*
> g. *Supporting calculations must include specific advice on the western catchment run-off and how this is conveyed through the site to the creek. The calculations must show how the minor rainfall event is conveyed underground and must include calculations on the overland flow for the major event. Information on the pit entry capacity, blockage factors, pit losses are to be included for the*

minor event. A severe impact assessment is required to demonstrate safe conveyance of flows in the event of complete inlet blockage;

h. *Advice on storm water drainage and flooding is to be provided for lots 6, 7, 9, 11 and 12. Where lots are proposed to be filled to achieve he required immunity, an earthworks plan is to be provided demonstrating fill levels, batter slops and the interface to exiting surface levels;*
i. *Lawful point of discharge.*

The study must be to the satisfaction of the Chief Executive Officer prior to issue of a Development Permit for Operational Works.

As required, a local drainage study has been undertaken and responses to each of the items (a through i, inclusive) above are provided below.

Item A

The proposed development site is exposed to external drainage catchments from the west. These have been identified through the use of available contour information and are shown (along with the internal developed catchments) on drawings K-2578-C08 and K-2578-C09. These drawings are attached as **Attachment 1**.

Item B

The development application engineering report (prepared by others) nominates an existing (ie pre-development) 100 year ARI flood event level of 7.3mAHD. However, the report notes that this is the recorded flood level DNRM gauge 109001A in the Mossman River, which is several kilometres from the site. It is therefore not considered to be representative of the correct pre-development flood level for the development in adjacent Parker Creek (a tributary of the Mossman River).

KFB Engineers therefore organised for a flood study to be undertaken for the site to determine an appropriate 100 year flood level for the site. Reference is made to the download link issued to Council by KFB Engineers on 20 February 2017, which contains the study. It calculated a 100 year ARI flood level in Parker Creek adjacent to the site of 8.35m AHD. This is 1.05m higher than the development application engineering report recommended level. The level of 8.35m AHD has been adopted.

In the pre-lodgement meeting of 21 February 2017, Council officers noted that they did not require a detention facility and therefore no facility is proposed for the development.

Item C

The primary flow path for the 5, 10 and 100 year ARI rainfall events will be the proposed pit and pipe network that will be constructed within the development to the extent that the pit and pipe network capacity will allow. The secondary flow path for these events will be overland flow along the proposed road towards the cul-de-sac, with outlet via the existing park to Parker Creek.

Item D

The proposed drainage network is detailed on plan and longitudinal sections (refer drawings K-2578-C08 and K-2578-C10). Hydrological and hydraulic calculations are provided on drawing K-2578-C11. These drawings are contained with **Attachment 2**. All proposed drainage infrastructure is documented on typical "standard" alignments within the road reserve and there is no requirement for drainage easements.

Item E

As identified within the response to Item B, there is no requirement for flood detention areas and therefore there is no associated land tenure issue.

Item F

The stormwater pipe system outlet structure has been designed to outlet to Parker Creek at an existing significant swale/invert where concentrated water currently flows. Erosion protection is to be provided in the form of a standard headwall and concrete apron structure. The design outlet velocity is low (1.14m/s) and therefore any additional rock/scour protection is not considered necessary.

Item G

The western catchment (school site) is made up of two catchments as identified on the previously referenced external stormwater catchment plan drawing K-2578-C09. These are labelled "Catchment A" and "Catchment B".

Catchment A is currently diverted northward along the development site boundary via an existing drainage swale that is clearly identified by the existing contours. It then crosses Crawford Street via a stormwater culvert. No change is proposed for the management of stormwater for this catchment, other than an upgrade of the pipe culvert to 2 x 600mm diameter reinforced concrete pipes. Hydrological and hydraulic calculations are provided on drawings K-2578-C09, K-2578-C10 and K-2578-C11.

Catchment B is proposed to be diverted along the boundary interface with the proposed development to outlet directly into Parker Creek without the need for conveyance via any underground drainage infrastructure through the site. Permission from Mossman High School has been granted for this work. Calculations associated with this catchment are contained on drawing K-2578-C09. A severe impact assessment associated with blockage of drainage infrastructure conveying this catchment is not relevant because of the open drainage swale philosophy.

Item H

Storm water run-off from allotments 6, 7 and 9 is proposed to be conveyed to the rear of the lots by overland sheet flow, with outlet directly to Parker Creek. Stormwater run-off from this existing area currently outlets this way and there is no obvious sign of erosion at the creek bank adjacent to these locations.

Run-off from allotments 11 and 12 will be directed toward the proposed new road and captured/conveyed to the proposed outlet at structure 1/1 via a series of pits and pipes.

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Areas of proposed fill that are required to achieve the required 100 year ARI flood event immunity are documented on earthworks drawing K-2578-C02 (refer **Attachment 3**) which provides details on fill levels, batter slopes and interface with existing levels.

Item I

The lawful point of discharge for the site has been determined to be the creek adjacent to the site, which is where stormwater run-off from the site currently discharges.

We trust that the above satisfies your requirements, however should you have any queries, please do not hesitate to contact me.

Yours faithfully
CivilWalker

Daryl Walker
Director / Principal Engineer

GLF Developments Pty Ltd
trading as CivilWalker
PO Box 509, Palm Cove Qld 4879

CivilWalker
Engineering | Project Management

Attachment 1

Internal Stormwater Drainage Catchment Plan K-2578-C08
External Stormwater Drainage Catchment Plan K-2578-C09

GLF Developments Pty Ltd
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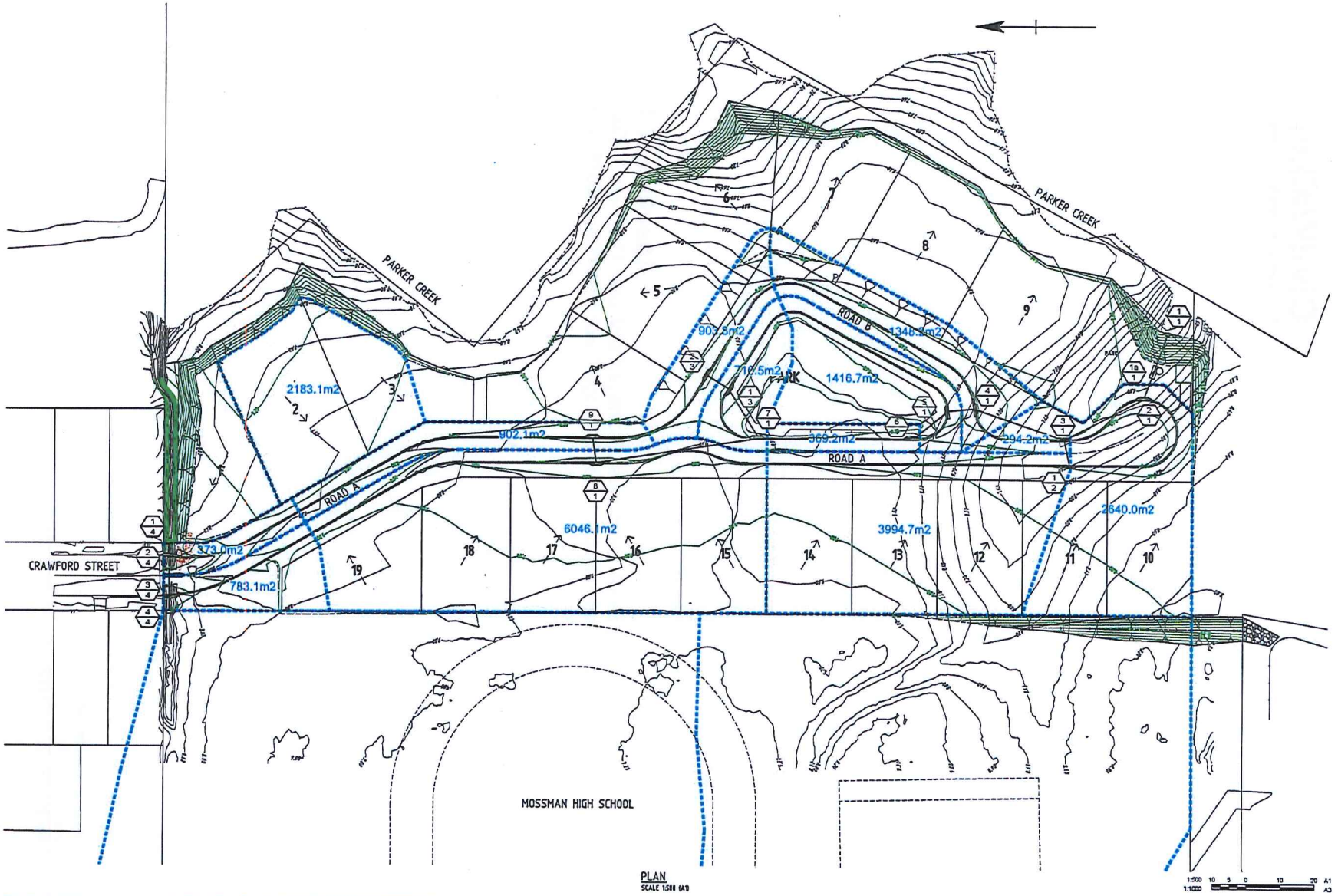
PO Box 509, Palm Cove Qld 4879



PLAN
SCALE 1:500 (A1)

1:500 10 5 0 10 20 A1
1:1000 A3

No.	DATE	ISSUE / REVISIONS	DRN	CHKD
D	30/04/18	REDESIGN FOR NEW DESIGN LEVELS		
C	11/12/16	STORMWATER DRAINAGE AND SITE LEVELS REVISED		
B	29/11/16	REVISION FOR NEW Q100 FLOOD LEVEL - TENDER ISSUE		
A	19/07/16	ORIGINAL ISSUE	BAK	SFB

DRAWING FILE: XREF FILE: N/A

N.V. & J.S. Pty Ltd
PROPOSED SUBDIVISION
AT CRAWFORD STREET, MOSSMAN

Internal Stormwater
Drainage Catchment Plan

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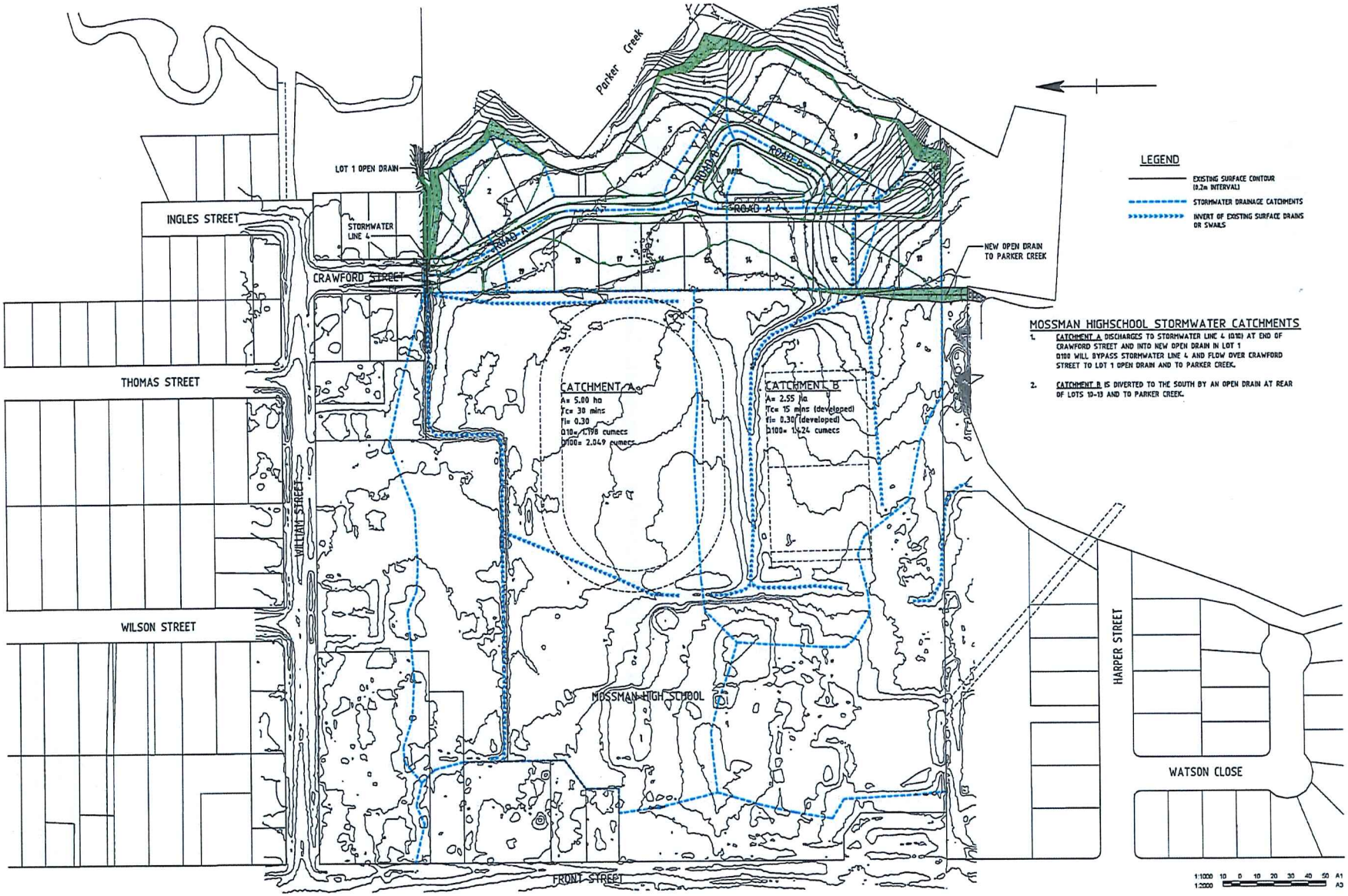
JOB No: K-2578
SHEET: C08 D
SCALE: 1:500 (@ A1)



No.	DATE	ISSUE / REVISIONS	DRN	CHKD
C	30/04/18	REDESIGN FOR NEW DESIGN LEVELS		
B	29/11/16	REVISION FOR NEW Q100 FLOOD LEVEL - TENDER ISSUE		
A	18/07/16	ORIGINAL ISSUE	SWK	SRB

DRAWING FILE: XREF FILE: N/A

N.V. & J.S. Pty Ltd
PROPOSED SUBDIVISION
AT CRAWFORD STREET, MOSSMAN

External Stormwater Drainage Catchment Plan

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JOB No: K-2578
SHEET: C09 C
SCALE: 1:1000 (@ A1)

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Engineering | Project Management

Attachment 2

Storm Water Layout Plan, Longitudinal Sections and Calculations

GLF Developments Pty Ltd
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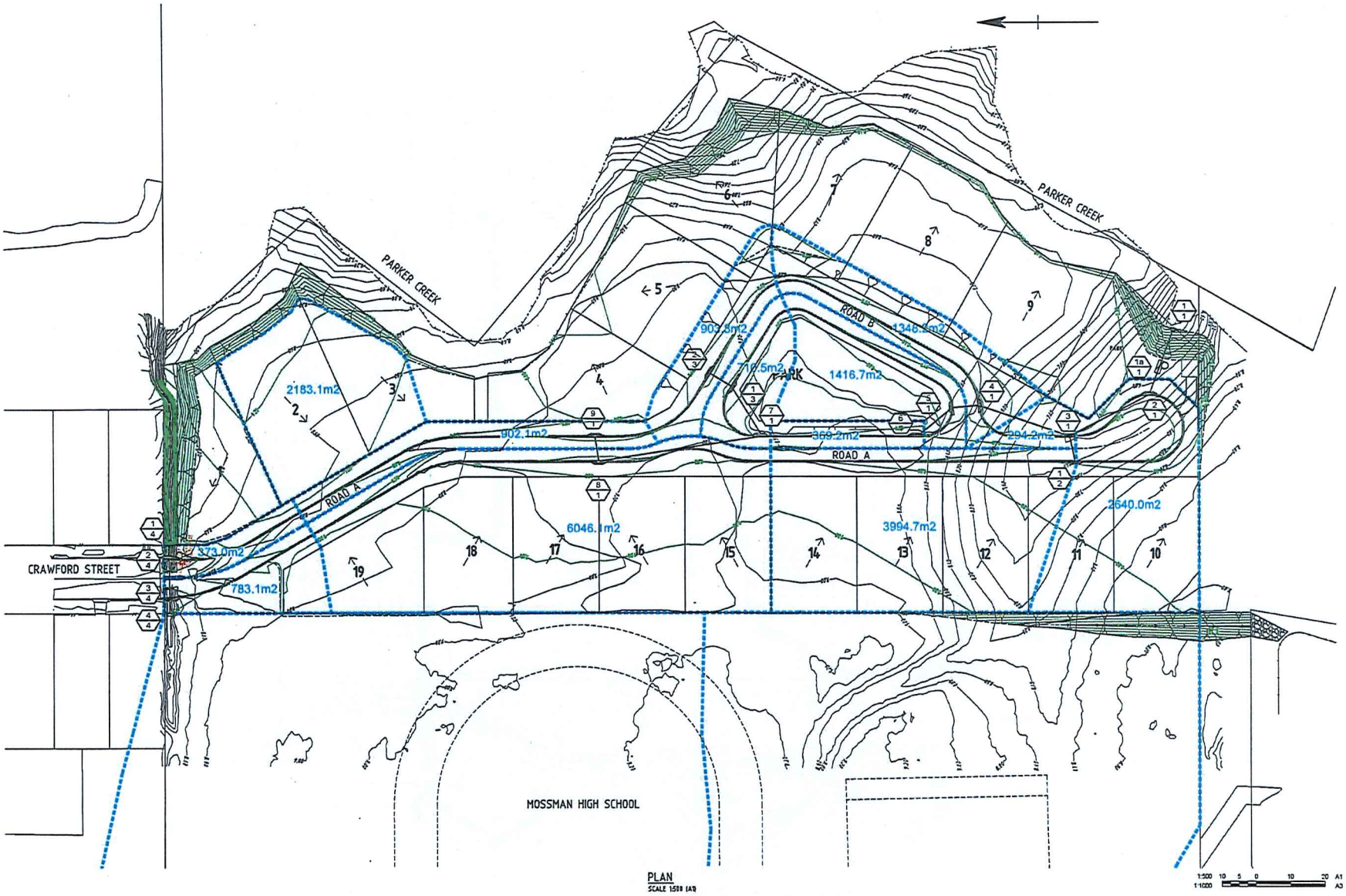

PLAN
SCALE 1:500 (A1)

NO.	DATE	ISSUE / REVISIONS	DRN	CHKD
D	30/04/18	REDESIGN FOR NEW DESIGN LEVELS		
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A	19/07/16	ORIGINAL ISSUE	BVK	EFB

DRAWING FILE XREF FILE: N/A

N.V. & J.S. Pty Ltd
PROPOSED SUBDIVISION
AT CRAWFORD STREET, MOSSMAN

Internal Stormwater
Drainage Catchment Plan

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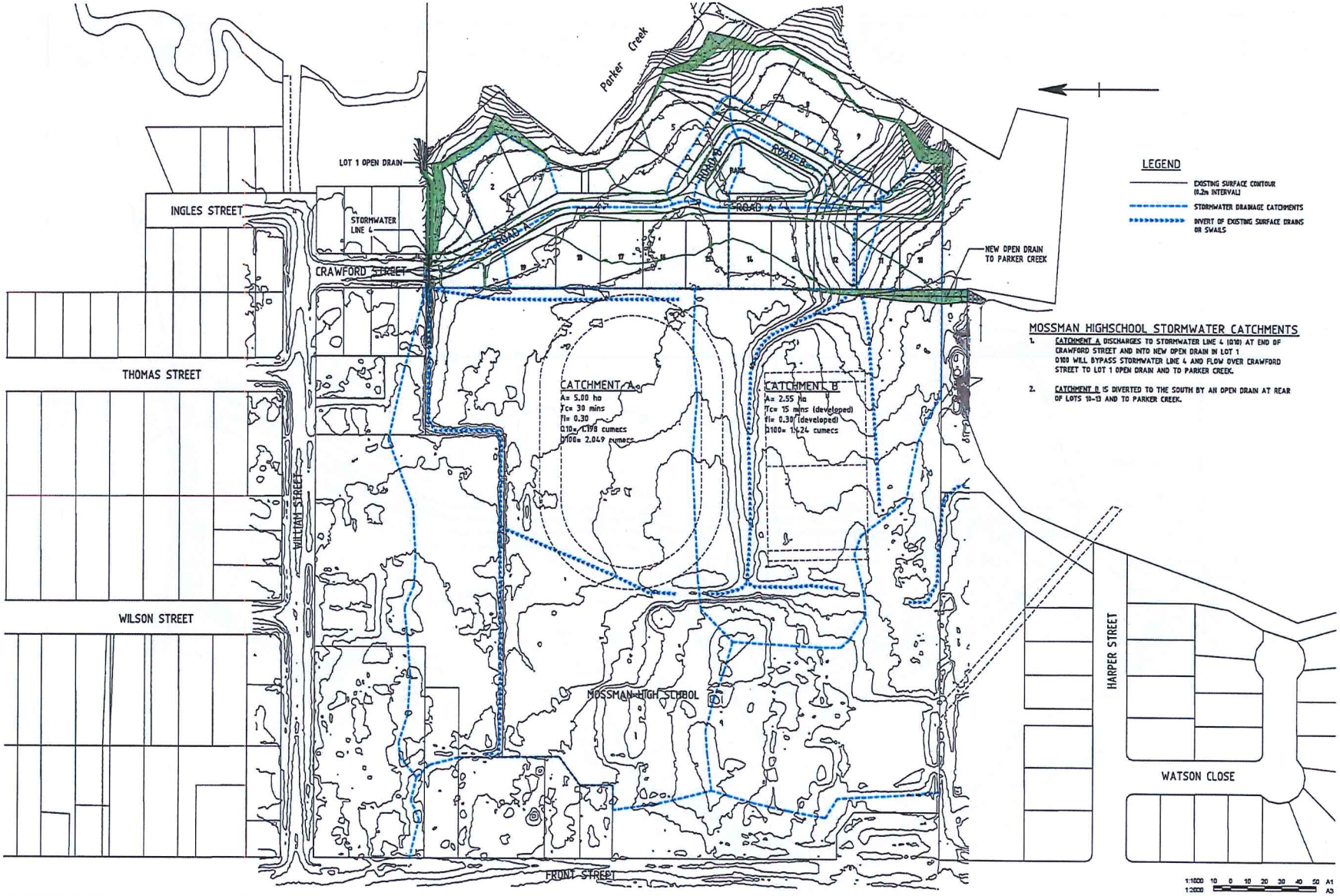
JOB No: K-2578
SHEET: C08 D
SCALE: 1:500 (@ A1)



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B	29/11/16	REVISION FOR NEW Q100 FLOOD LEVEL - TENDER ISSUE		
A	18/07/16	ORIGINAL ISSUE	EWK	EFB
No.	DATE	ISSUE / REVISIONS	DRN	CHKD

DRAWING FILE: XREF FILE: N/A

N.V. & J.S. Pty Ltd
PROPOSED SUBDIVISION
AT CRAWFORD STREET, MOSSMAN

External Stormwater Drainage Catchment Plan

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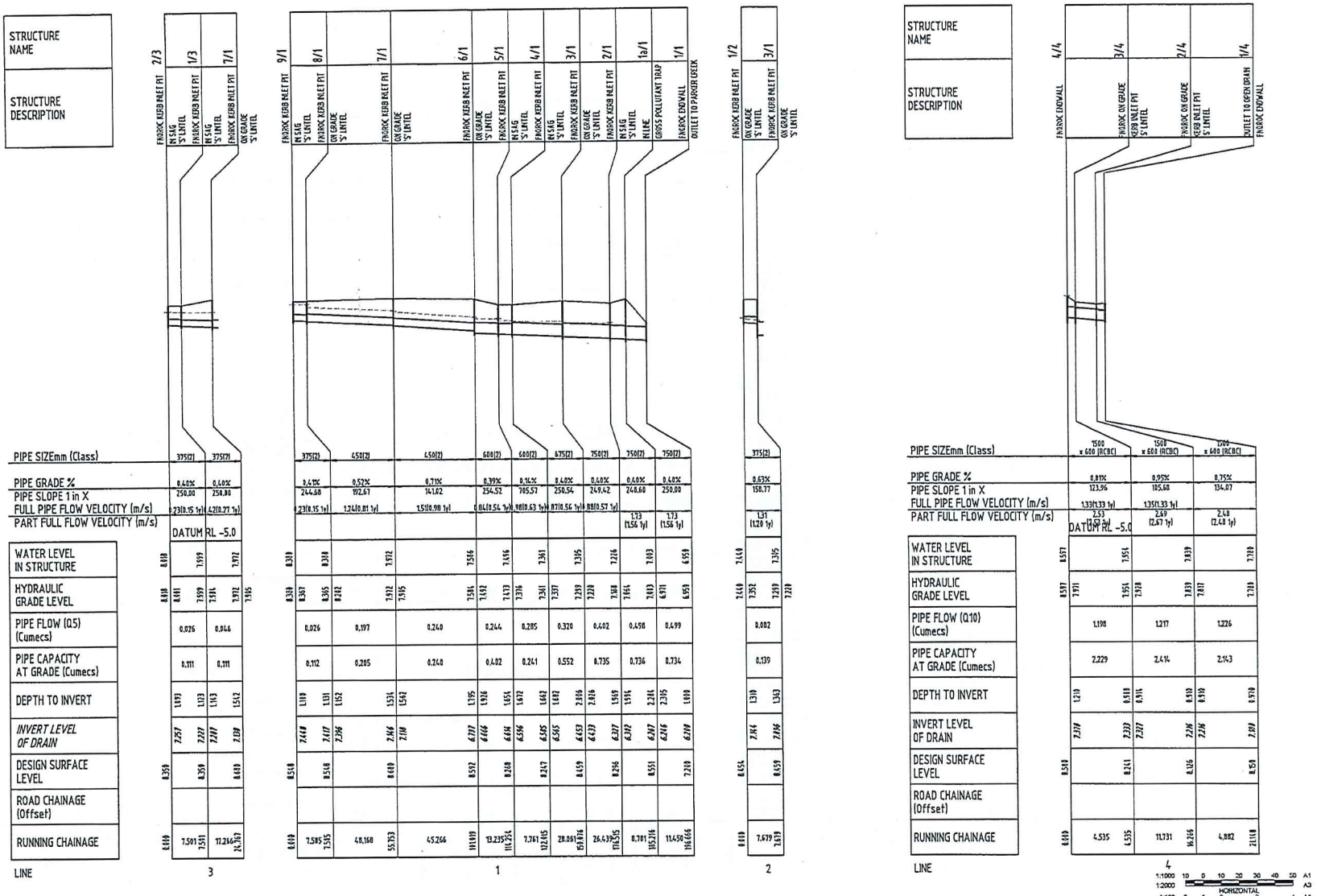
JOB No: K-2578
SHEET: C09 C
SCALE: 1:1000 (@ A1)



D	30/04/18	REDESIGN FOR NEW DESIGN LEVELS	
C	11/12/18	STORMWATER DRAINAGE AND SITE LEVELS REVISED	
B	29/11/18	REVISION FOR NEW Q100 FLOOD LEVEL - TENDER ISSUE	
A	18/07/16	ORIGINAL ISSUE	EVAK / EFB
No.	DATE	ISSUE / REVISIONS	DRN / CHKD

DRAWING FILE: XREF FILE: N/A

N.V. & J.S. Pty Ltd
PROPOSED SUBDIVISION
AT CRAWFORD STREET, MOSSMAN

Stormwater Drainage
Longitudinal Sections

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JOB No: K-2578
SHEET: C10 D
SCALE: 1:1000H 1:100V (@ A1)

LOCATION / TIME / SUB-CATCHMENT RUNOFF / INLET DESIGN

DESIGN ARI (yrs)	STRUCTURE No.	DRAIN SECTION	SUB-CATCHMENTS CONTRIBUTING	SUB-CATCHMENT TIME OF CONC. tc (min)	RAINFALL INTENSITY I (mm/h)	1yr RUNOFF CO-EFFICIENT C10	CO-EFFICIENT OF RUNOFF C	SUB-CATCHMENT AREA A (ha)	EQUIVALENT AREA CxA (ha)	SUM OF (C x A) ΣCA (ha)	SUB-CATCHMENT DISCHARGE Q (l/s)	FLOW IN K&C (INC. BYPASS) (l/s)	ROAD GRADE AT INLET (%)	MINOR FLOW ROAD CAPACITY (l/s)	INLET TYPE	FLOW INTO INLET Qg (l/s)	BYPASS FLOW Qb (l/s)	BYPASS STRUCTURE No.
5 100	2/3	2/3 to 1/3	2/3	15.00 15.00	139 221		0.74 0.96	0.090 0.090	0.067 0.085	0.067 0.085	26 52 FLOW WIDTH/DEPTH 0.015D m	26	0.00	1754	101SL0	26 (UNLOCKED)	0	
5 100	1/3	1/3 to 2/1	2/3,1/3	15.00 15.00	139 221		0.74 0.96	0.071 0.071	0.053 0.067	0.053 0.067	21 41 FLOW WIDTH/DEPTH 0.090D m	21	0.00	1754	101SL0	20 (UNLOCKED)	0	
5 100	9/1	9/1 to 8/1	9/1	15.00 15.00	139 221		0.74 0.96	0.090 0.090	0.067 0.085	0.067 0.085	26 52 FLOW WIDTH/DEPTH 0.015D m	26	0.00	1754	101SL0	25 (UNLOCKED)	0	
5 100	8/1	8/1 to 7/1	9/1,8/1	15.00 15.00	139 221		0.74 0.96	0.603 0.603	0.447 0.568	0.447 0.568	173 349 FLOW WIDTH/DEPTH 0.136D m	173	0.00	1754	101SL0	173 (UNLOCKED)	0	
5 100	7/1	7/1 to 6/1	2/3,1/3,9/1,8/1,7/1	15.00 15.00	139 221		0.74 0.96	0.001 0.001	0.001 0.001	0.001 0.001	0 1	0	0.30	102	1	0 (UNLOCKED)	0	6/1
5 100	6/1	6/1 to 5/1	2/3,1/3,9/1,8/1,7/1, 6/1	15.00 15.00	139 221		0.74 0.96	0.033 0.033	0.027 0.035	0.027 0.035	11 21 FLOW WIDTH 1.01 m DOWNSTREAM 0.309m	11	0.30	102	1	8 (UNLOCKED)	2	5/1
5 100	5/1	5/1 to 4/1	2/3,1/3,9/1,8/1,7/1, 6/1,5/1	15.00 15.00	139 221		0.74 0.96	0.142 0.142	0.105 0.133	0.105 0.133	41 82 FLOW WIDTH/DEPTH 0.034D m	43	0.00	1754	101SL0	43 (UNLOCKED)	0	
5 100	4/1	4/1 to 3/1	2/3,1/3,9/1,8/1,7/1, 6/1,5/1,4/1	15.00 15.00	139 221		0.74 0.96	0.135 0.135	0.100 0.127	0.100 0.127	39 78 FLOW WIDTH/DEPTH 0.021D m	39	0.00	1754	101SL0	39 (UNLOCKED)	0	3/1
5 100	1/2	1/2 to 3/1	1/2	15.00 15.00	139 221		0.74 0.96	0.400 0.400	0.296 0.376	0.296 0.376	114 231 FLOW WIDTH 3.147 m DOWNSTREAM 2.790m	114	0.30	102	1	82 (UNLOCKED)	32	2/1
5 100	3/1	3/1 to 2/1	2/3,1/3,9/1,8/1,7/1, 6/1,5/1,4/1,1/2,3/1	15.00 15.00	139 221		0.74 0.96	0.029 0.029	0.022 0.028	0.022 0.028	8 11 FLOW WIDTH 0.094 m DOWNSTREAM 0.230m	8	0.30	102	1	7 (UNLOCKED)	2	2/1
5 100	2/1	2/1 to 1a/1	2/3,1/3,9/1,8/1,7/1, 6/1,5/1,4/1,1/2,3/1, 2/1	15.00 15.00	139 221		0.74 0.96	0.264 0.264	0.195 0.248	0.195 0.248	75 152 FLOW WIDTH/DEPTH 0.191D m	109	0.00	1754	101SL0	109 (UNLOCKED)	0	
5 100	1a/1	1a/1 to 1/1	2/3,1/3,9/1,8/1,7/1, 6/1,5/1,4/1,1/2,3/1, 2/1,1a/1	15.00 15.00	139 221		0.74 0.96	0.001 0.001	0.001 0.001	0.001 0.001	0 1 FLOW WIDTH/DEPTH -0.056D m	0	0.00	1754	101SL0	0 (UNLOCKED)	0	
10 100	4/4	4/4 to 3/4	4/4	30.00 30.00	113 162		0.76 0.91	5.000 5.000	3.800 4.550	3.800 4.550	1193 2048 FLOW WIDTH/DEPTH 1.001D m	1193	0.00	2391	11152.0	1193 (UNLOCKED)	0	3/4
10 100	3/4	3/4 to 2/4	4/4,3/4	15.00 15.00	153 221		0.78 0.94	0.078 0.078	0.061 0.074	0.061 0.074	26 45 FLOW WIDTH/DEPTH 0.015D m	26	0.00	1191	101SL0	26 (UNLOCKED)	0	2/4
10 100	2/4	2/4 to 1/4	4/4,3/4,2/4	15.00 15.00	153 221		0.78 0.94	0.037 0.037	0.029 0.035	0.029 0.035	12 22 FLOW WIDTH/DEPTH -0.001D m	12	0.00	1191	111S10	12 (UNLOCKED)	0	

DRAIN DESIGN

STRUCTURE No.	CRITICAL TIME OF CONC. tc (min)	RAINFALL INTENSITY I (mm/h)	TOTAL (C x A) ΣCA (ha)	MAJOR TOTAL FLOW Qt (l/s)	MAJOR SURFACE FLOW CAPACITY Qm (l/s)	MAJOR SURFACE FLOW Qs (l/s)	PIPE FLOW Qp (l/s)	REACH LENGTH L (m)	PIPE GRADE S (%)	PIPE / BOX DIMENSIONS (CLASS) (mm)	FLOW VELOCITY FULL (PIPE GRADE VELOCITY) V (m/s)	TIME OF FLOW IN REACH T (min)	STRUCTURE CHART No.
2/3	15.00 15.00	139 221	0.067 0.085	52			26 (Pipe flow= Grate flow)	7.502	1.63	375(2)	0.23(0.15 ty) (2.03)	0.13	
1/3	15.13 15.13	138 220	0.120 0.152	93			46 (Pipe flow= Sum upstr + Item flow)	12.246	0.40	375(2)	0.42(0.27 ty) (1.10)	0.29	
9/1	15.00 15.00	139 221	0.067 0.085	52			26 (Pipe flow= Grate flow)	7.585	0.71	375(2)	0.23(0.15 ty) (1.34)	0.13	
8/1	15.13 15.13	138 220	0.514 0.653	399			197 (Pipe flow= Sum upstr + Item flow)	40.168	0.40	450(2)	1.24(0.83 ty) (1.24)	0.45	
7/1	15.78 15.78	136 216	0.635 0.806	484			248 (Pipe flow= Sum upstr + Item flow)	45.246	0.71	450(2)	1.58(0.96 ty) (1.51)	0.50	
6/1	16.28 16.28	134 213	0.662 0.841	498	487	253	244 (Pipe flow= Sum upstr + Item flow)	13.235	0.39	600(2)	0.84(0.54 ty) (1.38)	0.22	
5/1	16.50 16.50	134 212	0.767 0.974	574			285 (Pipe flow= Sum upstr + Item flow)	2.761	0.74	600(2)	0.98(0.63 ty) (1.83)	0.13	
4/1	16.63 16.63	133 211	0.867 1.101	645			328 (Pipe flow= Sum upstr + Item flow)	28.461	0.40	675(2)	0.87(0.56 ty) (1.50)	0.47	
1/2	15.00 15.00	139 221	0.296 0.376	231	487	149	82 (Pipe flow= Grate flow)	7.619	0.63	375(2)	0.74(0.51 ty) (1.26)	0.13	
3/1	17.28 17.28	132 209	1.185 1.505	874			462 (Pipe flow= Sum upstr + Item flow)	26.439	0.40	750(2)	0.80(0.57 ty) (1.63)	0.44	
2/1	17.54 17.54	130 206	1.380 1.753	1003			498 (Pipe flow= Sum upstr + Item flow)	8.781	0.40	750(2)	0.95(0.78 ty) (1.63)	0.13	
1a/1	17.67 17.67	130 206	1.381 1.754	1004			499 (Pipe flow= Sum upstr + Item flow)	11.450	0.40	750(2)	1.09(0.78 ty) (1.60)	0.28	
4/4	30.00 30.00	113 162	3.800 4.550	2048			1198 (Pipe flow val by user)	4.535	0.81	1500 x 600 (RCBC)	1.33(1.33 ty) (2.47)	0.06	
3/4	30.06 30.06	113 162	3.861 4.624	2081			1217 (Pipe flow= Sum upstr + Item flow)	11.331	0.95	1500 x 600 (RCBC)	1.35(1.33 ty) (2.68)	0.14	
2/4	30.20 30.20	113 161	3.890 4.659	2086			1226 (Pipe flow= Sum upstr + Item flow)	4.882	0.75	1500 x 600 (RCBC)	1.34(1.35 ty) (2.38)	0.06	

STRUCTURE RATIOS FOR 'K' VALUE CALCULATIONS

STRUCTURE No.	CALCULATIONS	LATERAL / PART FULL NOTES
2/3	Dg 0.026 Do 0.026 Do 375 CHART 32: Vo2/2gDo 0.01 H/Do 1.03 Kg side flow 6.41 end flow 4.63	
1/3	Dg 0.020 Do 0.046 Do 375 CHART 34 Angle 27 Case3 S/Do 2.5 Du/Do 1.00 Dg/Do 0.44 K 1.53 S/Do 2.40 cor 0.13 Ku 1.56 Kw 1.56	
9/1	Dg 0.026 Do 0.026 Do 375 CHART 32: Vo2/2gDo 0.01 H/Do 1.72 Kg side flow 4.23 end flow 3.36	
8/1	Dg 0.171 Do 0.197 Do 450 Angle 90 Chart 47 S/Do 2.5 charting Du/Do 0.83 K0 2.07 K0.5 2.30 Du/Do 0.13 Cg 1.01 K 2.31 S/Do 0.0 K0 0.00 K0.5 0.00 K 0.00 S/Do 0.0 K0 0.00 K0.5 0.00 K 0.00	Interp val for S/Do 2.49 Kw 0.00 CHART 46 S/Do 2.5 K0 1.67 K0.5 2.01 K 2.1 S/Do 2.0 K0 1.97 K0.5 2.02 K 2.14 Interp val for S/Do 2.49 Ku 2.11
7/1	Dg 0.009 Do 0.248 Do 450 Routine 2.2 CHART 40 Du/Do 1.00 Du/Do 0.01 K 0.75 d/Do 2.0 chrt Dg/Do 0.18 Kg 0.00 d/Do 1.5 chrt Dg/Do 0.30 Kg 0.00 d/Do 1.99 Interp value Kg 0.00 Ku=Kw= 0.76 Combined pipes in line case Join Pipes:	1/3 and 8/1 Vel1 1.22 Vel2 0.42 Eq Dia 53 Angle 90 Flow 0.24 CHART 37 Angle 0 S/Do 2.5 Du/Do 1.1 Dg/Do 0.1 K 0.23 S/Do 2.1 cor 0.00 Ku 0.23 Kw 0.23 Interpolated Ku= 0.58 Kw= 0.58
6/1	Dg 0.010 Do 0.244 Do 600 Angle 41 Chart 39 S/Do 2.5 charting Du/Do 0.75 K0 2.04 K0.5 1.74 Du/Do 0.97 Cg 0.09 K 2.01 S/Do 2.0 K0 2.26 K0.5 1.83 K 2.22 S/Do 1.5 K0 2.67 K0.5 2.11 K 2.62	Interp val for S/Do 1.51 Ku 2.61 CHART 38 S/Do 2.0 K0 2.17 K0.5 1.82 K 2.1 S/Do 1.5 K0 2.59 K0.5 2.03 K 2.5 Interp val for S/Do 1.51 Ku 2.54
5/1	Dg 0.041 Do 0.285 Do 600 Angle 35 Chart 39 S/Do 2.5 charting Du/Do 1.00 K0 1.00 K0.5 1.91 Du/Do 0.36 Cg 0.36 K 1.84 S/Do 2.0 K0 1.98 K0.5 2.10 K 2.02 S/Do 1.5 K0 2.39 K0.5 2.52 K 2.43	Interp val for S/Do 1.48 Kw 2.45 CHART 38 S/Do 2.0 K0 1.34 K0.5 1.75 K 1.80 S/Do 1.5 K0 2.35 K0.5 1.86 K 1.97 Interp val for S/Do 1.48 Ku 1.95
4/1	Dg 0.037 Do 0.328 Do 675 CHART 34 Angle 24 Case3 S/Do 2.5 Du/Do 0.89 Dg/Do 0.12 K 0.46 S/Do 1.96 cor 0.18 Ku 0.64 Kw 0.64	
1/2	Dg 0.082 Do 0.082 Do 375 CHRT 32: Vo2/2gDo 0.37 H/Do 0.38 Kg side flow 0.53 end flow 6.61 Part full downstream pipe	Upstream HGL 7.440 below outlet pipe obv 7.519 Set Kp to 1
3/1	Dg 0.016 Do 0.462 Do 750 Flow 1/2 made eqv grate flow Angle 47 Chart 39 S/Do 2.5 charting Du/Do 0.90 K0 1.84 K0.5 1.84 Du/Do 0.71 Cg 0.50 K 1.84 S/Do 2.0 K0 2.04 K0.5 1.97 K 2.01 S/Do 1.5 K0 2.44 K0.5 2.31 K 2.37 Interp val for S/Do 1.17 Kw 2.62 CHART 38 S/Do 2.0 K0 2.00 K0.5 1.82 K 1.91 S/Do 1.5 K0 2.32 K0.5 2.02 K 2.17 Interp val for S/Do 1.17 Ku 2.34 K vals above for stepped pipes as grate flow grate flow decreased by 0.078 from 1/2 Routine 2.% Equiv defin 37 CHART 41 High val lat 4/1 Dhv 675 Dhr 0.3% Dhr/Dlr 1.0 Dhr/Do 0.90	Dlw/Do 0.79 H 3.06 Low val Istrl 1/2 Dlv 375 Dlr 0.178 Dly/Do 0.58 Dls/Do 0.19 L 0.65 H-L 2.39 Ku=Kw= 2.39 Combined pipes in line case Join Pipes: 4/1 and 1/2 Vel1 0.88 Vel2 0.74 Eq Dia 744 Angle 28 Flow 0.39 CHART 37 Angle 0 S/Do 2.5 Du/Do 1.02 Dg/Do 0.02 K 0.28 S/Do 1.89 cor 0.03 Ku 0.31 Kw 0.31 Interpolated Ku= 1.53 Kw= 1.53 K vals stp pipes as pipe flow Ku 1.53 Kw 1.53 Averaged Ku 2.01 Kw 2.16
2/1	Dg 0.382 Do 0.498 Do 750 Angle 42 Chart 39 S/Do 2.5 charting Du/Do 1.00 K0 1.88 K0.5 1.91 Du/Do 0.81 Cg 1.43 K 1.85 S/Do 2.0 K0 1.98 K0.5 2.10 K 2.04 S/Do 1.5 K0 2.39 K0.5 2.52 K 2.45	Interp val for S/Do 1.21 Kw 2.61 CHART 38 S/Do 2.0 K0 1.84 K0.5 1.75 K 1.79 S/Do 1.5 K0 2.35 K0.5 1.86 K 1.96 Interp val for S/Do 1.21 Ku 2.04
1a/1	Dg 0.016 Do 0.499 Do 750 CHART 33 Angle 0 S/Do 2.5 Du/Do 1.00 Dg/Do 0.01 K 0.29 S/Do 1.02 cor 0.09 Ku 0.50 Kw 0.29	Part full downstream pipe Upstream HGL 7.003 below outlet pipe obv 7.003 Set Kp to .5
4/4	Dg 1.193 Do 1.198 Do 858 CHRT 32: Vo2/2gDo 0.15 H/Do 0.89 Kg side flow 6.95 end flow 5.47	
3/4	Dg 0.019 Do 1.217 Do 858 CHART 33 Angle 1 S/Do 2.5 Du/Do 1.00 Dg/Do 0.02 K 0.25 S/Do 1.84 cor 0.03 Ku 0.28 Kw 0.28	
2/4	Dg 0.009 Do 1.226 Do 858 CHART 33 Angle 7 S/Do 2.5 Du/Do 1.00 Dg/Do 0.01 K 0.22 S/Do 1.84 cor 0.01 Ku 0.23 Kw 0.23	

HEADLOSSES / PART FULL / DESIGN LEVELS

STRUCTURE No.	VELOCITY HEAD V2/2g (m)	U/S HEADLOSS COEFFICIENT Ku	U/S PIPE STRUCT. HEADLOSS hu (m)	LAT. HEADLOSS CO-EFFICIENT Kl	LAT. PIPE STRUCT. HEADLOSS hl (m)	W.S.E. CO-EFFICIENT Kw	CHANGE IN W.S.E. hw (m)	PIPE FRICTION SLOPE Sf (%)	PIPE FRICTION HEADLOSS (L x Sf) hf (m)	DEPTH (m)	VELOCITY Vp (m/s)	OBVERT LEVELS (m)	DRAIN SECTION H.G.L. (m)	UPSTREAM H.G.L. (m)	LAT. H.G.L. (m)	W.S.E. (m)	SURFACE OR KIC INVERT LEVEL (m)	STRUCTURE No.
2/3	0.003	6.41	0.017			6.41	0.017	0.02	0.002			7.614 7.492	8.000 7.998	8.017		8.017	8.350	2/3
1/3	0.009	1.56	0.014			1.56	0.014	0.07	0.012			7.472 7.483	7.984 7.972	7.998		7.998	8.358	1/3
9/1	0.003	4.23	0.011			4.23	0.011	0.02	0.002			7.723 7.669	8.370 8.368	8.381		8.381	8.548	9/1
8/1	0.078	2.11	0.166			2.11	0.166	0.48	0.230			7.796 7.486	8.202 7.972	8.368		8.368	8.514	8/1
7/1	0.126	0.58	0.067			0.58	0.067	0.31	0.321			7.458 7.137	7.915 7.586	7.972		7.972	8.600	7/1
6/1	0.036	2.54	0.092			2.61	0.094	0.15	0.019			7.216 7.224	7.492 7.473	7.586		7.586	8.572	6/1
5/1	0.049	1.95	0.097			2.45	0.120	0.29	0.015			7.296 7.195	7.376 7.361	7.473		7.496	8.256	5/1
4/1	0.039	0.64	0.024			0.64	0.024	0.13	0.038			7.250 7.138	7.337 7.299	7.361		7.361	8.247	4/1
1/2	0.028	1.00	0.028			1.00	0.066	0.22	0.017	0.288 (0.167 ty)	1.31 (1.20 ty)	7.519 7.471	7.352 7.304	7.440		7.440	8.454	1/2
3/1	0.039	2.18	0.079			2.16	0.085	0.32	0.032			7.195 7.089	7.220 7.188	7.299		7.345	8.459	3/1
2/1	0.061	2.04	0.124			2.61	0.162	0.30	0.036	0.448 (0.353 ty)	1.73 (1.56 ty)	7.064 7.029	7.164 7.103	7.188		7.226	8.296	2/1
1a/1	0.061	0.50	0.032			0.51	0.032	0.30	0.021	0.461 (0.353 ty)	1.73 (1.56 ty)	7.003 6.962	6.971 6.950	7.003		7.003	8.551	1a/1
4/4	0.090	6.95	0.626			6.95	0.626	1.23	0.311	0.315 (0.315 ty)	2.53 (2.53 ty)	7.971 7.936	7.971 7.954	8.597		8.597	8.550	4/4
3/4	0.093	0.28	0.026			0.28	0.026	1.26	0.028	0.302 (0.299 ty)	2.59 (2.67 ty)	7.928 7.811	7.928 7.839	7.954		7.954	8.241	3/4
2/4	0.096	0.23	0.022			0.23	0.022	1.26	0.012	0.327 (0.323 ty)	2.68 (2.68 ty)	7.811 7.781	7.817 7.788	7.839		7.839	8.326	2/4

AS SHOWN

No.	DATE	ISSUE / REVISIONS	DRN	CHKD
C	30/04/18	REDESIGN FOR NEW DESIGN LEVELS		
B	29/11/16	REVISION FOR NEW Q100 FLOOD LEVEL - TENDER ISSUE		
A	18/07/16	ORIGINAL ISSUE	EWK	EFB

DRAWING FILE: XREF FILE: N/A

N.V. & J.S. Pty Ltd
PROPOSED SUBDIVISION
AT CRAWFORD STREET, MOSSMAN

Stormwater Drainage Calculations

KFB ENGINEERS
ABN 28 351 246 508
Civil & Structural
20 Scott St, Cairns | PO Box 927, Cairns Q 4870
P: 07 40521700 | F: 07 40521634
E: email@kfbeng.com.au

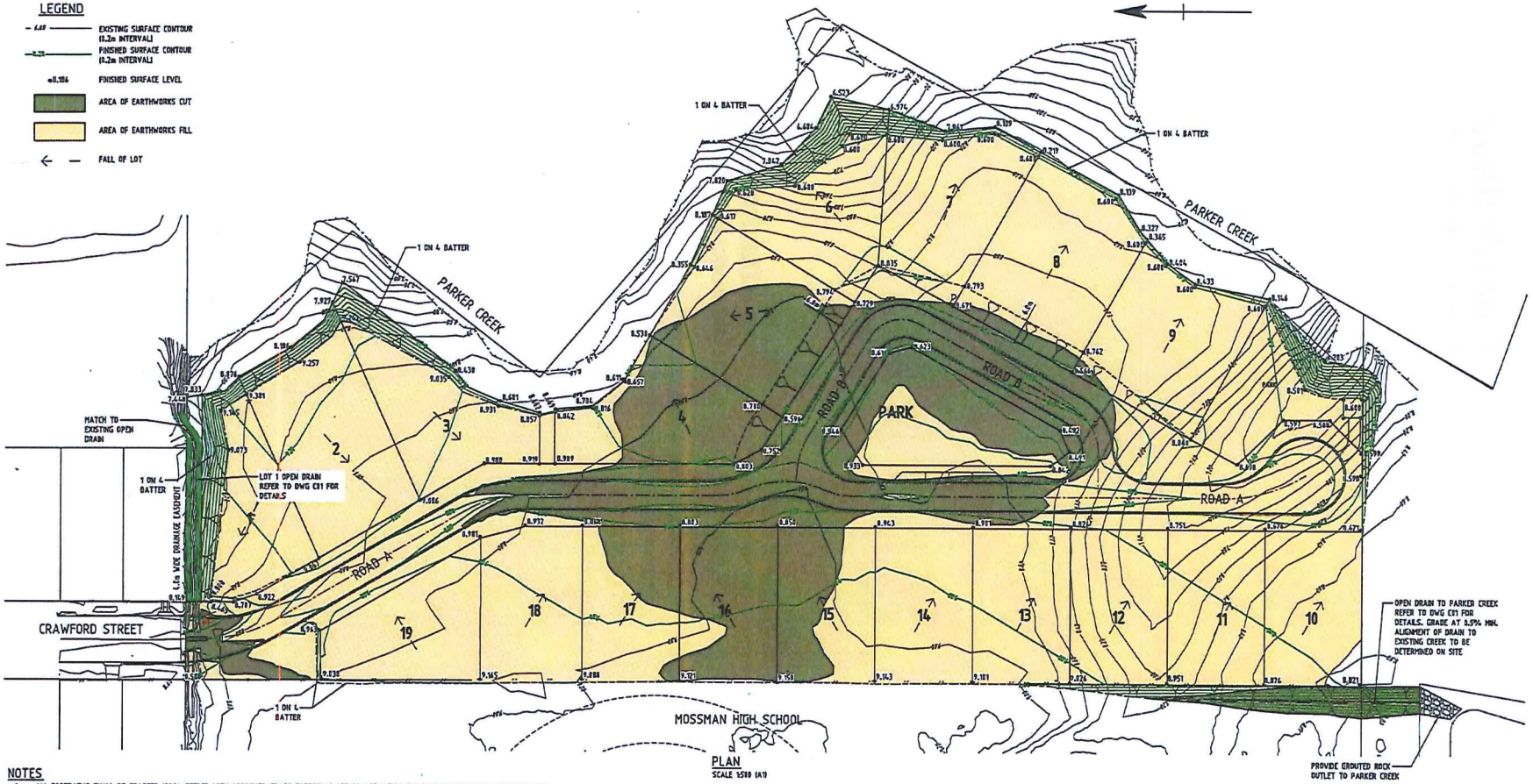
JOB No: K-2578
SHEET: C11 C
SCALE: N.T.S (@ A1)

CivilWalker
Engineering | Project Management

Attachment 3

Earthworks K-2578-C02

GLF Developments Pty Ltd
trading as CivilWalker
PO Box 509, Palm Cove Qld 4879



PLAN
SCALE 1:500 (A1)

NOTES

1. ALL FOOTPATHS SHALL BE GRASSED (DRILL SEEDED WITH APPROVED GRASS SPECIES) IN ACCORDANCE WITH LANDSCAPE SPECIFICATIONS, FERTILIZED AND MAINTAINED FOR THE REQUIRED MAINTENANCE PERIOD.
2. ALL BARE EARTHWORKS AREAS (LOTS, DRAINS, PARKS, VERGES, ETC.) SHALL BE GRASSED (DRILL SEEDED WITH APPROVED GRASS SPECIES) FOR SLOPES UP TO AND INCLUDING 1 ON 4, OR HYDROMULCHED FOR SLOPES GREATER THAN 1 ON 4. USE APPROVED SEED MIX AND MAINTAIN, WATER AND FERTILISE FOR MAINTENANCE PERIOD.
3. 150mm TOPSOIL TO BE STRIPPED FROM SITE AND SUITABLY TREATED AND STOCKPILED FOR LATER USE AS SITE FILL
4. ALL GULLIES AND DEPRESSIONS REQUIRING FILLING SHALL BE CLEARED, GRUBBED AND CLEANED OUT OF SILT, BOULDERS, DEBRIS ETC TO PROVIDE A CLEAN, FIRM BASE PRIOR TO PLACING ANY FILL OR FILTER MATERIALS. COMPACT ALL NATURAL SUBGRADES WITH 6 TO 8 PASSES OF A 10 TONNE VIBRATING ROLLER PRIOR TO PLACING ANY FILL MATERIALS. PLACE SUBSOIL DRAINS/MATS TO ENGINEERS APPROVALS AT THE BASE OF ALL SUCH FILLS AND OUTLET TO THE STORMWATER DRAINAGE SYSTEM. NOTIFY THE SUPERINTENDENT FOR AN INSPECTION PRIOR TO PLACING ANY FILL MATERIALS.
5. WHERE FILL IS PLACED ON SLOPING EXISTING SURFACE, THE EXISTING SURFACE SHALL BE BENCHED AND THE BENCH COMPACTED TO 98% SRDD PRIOR TO PLACING THE FILL MATERIAL.
6. REMOVE SURFACE ROCKS FROM THE LOTS, FOOTPATHS, VERGES AND PARKLAND AREAS. REUSE IN SCOUR PROTECTION, REMOVE EXCESS FROM SITE OR STOCKPILE AS DIRECTED. ALL COSTS TO BE INCLUDED IN CONTRACT LUMP SUM.
7. THE CONTRACTOR SHALL ENSURE NO PONDING AREAS RESULT FROM THE EARTHWORKS OPERATION. ANY SUCH AREAS WHICH DEVELOP SHALL BE RECTIFIED AS DIRECTED BY THE SUPERINTENDENT. THE CONTRACTOR SHALL NOTIFY THE SUPERINTENDENT OF THE DEVELOPMENT OR EXISTENCE OF ANY SUCH PONDING AREAS.
8. THE CONTRACTOR SHALL LIAISE WITH THE SUPERINTENDENT TO ENSURE BATTERS IN EXCESS OF 1.5m HIGH SHALL BE ASSESSED AND REPORTED FOR STABILITY (DURING CONSTRUCTION) BY A GEOTECHNICAL ENGINEER. COPIES OF REPORTS SHALL BE FORWARDED TO THE SUPERINTENDENT AND TO COUNCIL.
9. ALL BOUNDARIES WITH EXISTING CREEKS AND VEGETATION MUST BE TEMPORARILY DELINEATED AND FENCED OFF/SEGREGATED TO RESTRICT BUILDING ACCESS FOR THE DURATION OF THE CONSTRUCTION ACTIVITY.
10. ALL EARTHWORKS SHALL BE IN ACCORDANCE WITH AS3798 "GUIDELINES ON EARTHWORKS FOR COMMERCIAL AND RESIDENTIAL DEVELOPMENTS" AND THE FNQROC DEVELOPMENT MANUAL.

IMPORTED NON-PLASTIC FILL

AS METRIC SIEVE	% PASSING BY WEIGHT
75mm	100
2.36mm	25 - 70
75um	0 - 30

1. MINATURE ABRASION LOSS PASSING 2.36mm 8 - 15
2. LINEAR SHRINKAGE PASSING 4.25um 0 - 8
3. MATERIAL RETAINED ON 2.36mm SIEVE SHALL CONSIST OF SOUND STONE
4. SOAKED CBR 15 AT 98% SRDD COMPACTION

1:500 10 5 0 10 20 A1
1:1000 A3

No.	DATE	ISSUE / REVISIONS	DRN	CHKD
D	30/04/18	REDESIGN FOR NEW DESIGN LEVELS		
C	11/12/16	STORMWATER DRAINAGE AND SITE LEVELS REVISED		
B	25/11/16	REVISION FOR NEW Q100 FLOOD LEVEL - TENDER ISSUE		
A	18/07/16	ORIGINAL ISSUE	EWK	EPB

DRAWING FILE: XREF FILE: N/A

N.V. & J.S. Pty Ltd
PROPOSED SUBDIVISION
AT CRAWFORD STREET, MOSSMAN

Earthworks

KFB ENGINEERS
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20 Scott St, Cairns | PO Box 927, Cairns Q 4870
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JOB No: K-2578
SHEET: C02 D
SCALE: 1:500 (@ A1)

SUMMARY: FLOOD ASSESSMENT

Reference: AECOM

Crawford Street Flooding Assessment

NV & JS Pty Ltd

12 Dec 2016

Doc No. 60517511

Maps of maximum flood level and depth for the 100 year ARI event over the development site are shown in Figure 13 and Figure 14. Flood level and depth maps for the 5 and 10 year ARI events are included in Appendix c. The design flood levels for the development derived through the process detailed in this report are included in Table 14. Flood Level reporting locations are shown in Figure 13.

Table 14 Development Site Flood Levels

Event (ARI)	Location	Flood Level (m AHD)
5 year	1	6.90
	2	6.63
	3	6.41
	4	6.34
	5	6.34
10 year	1	7.19
	2	6.93
	3	6.84
	4	6.84
	5	6.84
100 year	1	8.35
	2	8.35
	3	8.35
	4	8.35
	5	8.35

Q100

AECOM
www.aecom.com

N

DATUM GDA 1994, PROJECTION MGA ZONE 55
0 25 50 100
Meters
1:2,500 (when printed at A3)

LEGEND

- Development Site
- Property Boundaries

100yr ARI Flood Level (m AHD)

- < 6.3
- 6.31 - 6.5
- 6.5 - 6.7
- 6.7 - 6.9
- 6.9 - 7.1
- 7.1 - 7.3
- 7.3- 7.5
- 7.5 - 7.7
- 7.7 - 7.9
- 7.9 - 8.1
- 8.1 - 8.3
- 8.3 - 8.5
- 8.5 - 8.7
- 8.7 - 8.9

Data sources:
Imagery - QLD Gov 2015
Project Area, Vegetation, Developable Area, PF - AECOM 2016
Protected Area, Roads, Watercourse, Wetland Suburb, Boundary - QLD Gov 2016
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Crawford Street Mossman

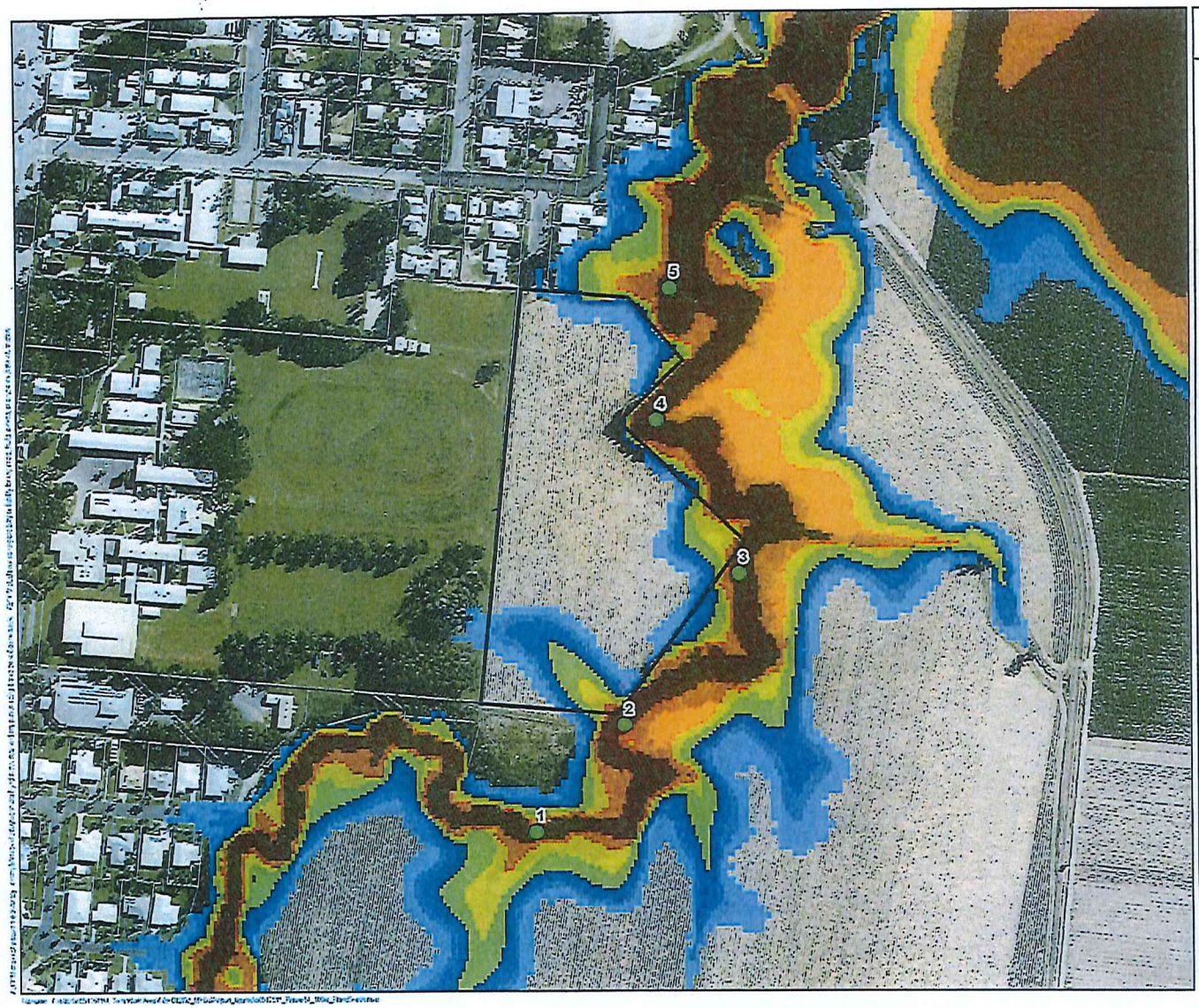
Flood Study

100 year ARI Flood Level

PROJECT ID	60457437
CREATED BY	acampbell
LAST MODIFIED	14-Oct-2016
VERSION	v2

Figure 13

A3 size



AECOM
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N

DATUM GDA 1994, PROJECTION MGA ZONE 55
0 25 50 100
Meters
1:2,500 (when printed at A3)

LEGEND

- Development Site
- Property Boundaries

100 year ARI Flood Depth (m)

- 0 - 0.3
- 0.3 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 3
- > 3

Data sources:
Imagery – QLD GDA/2015
Project Area, Topography, Developable Area, RE – 4 ECDM/2016
Protected Areas, Roads, Watercourses, Electrical Network, Wetlands – QLD Gov/2016
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Crawford Street Mossman

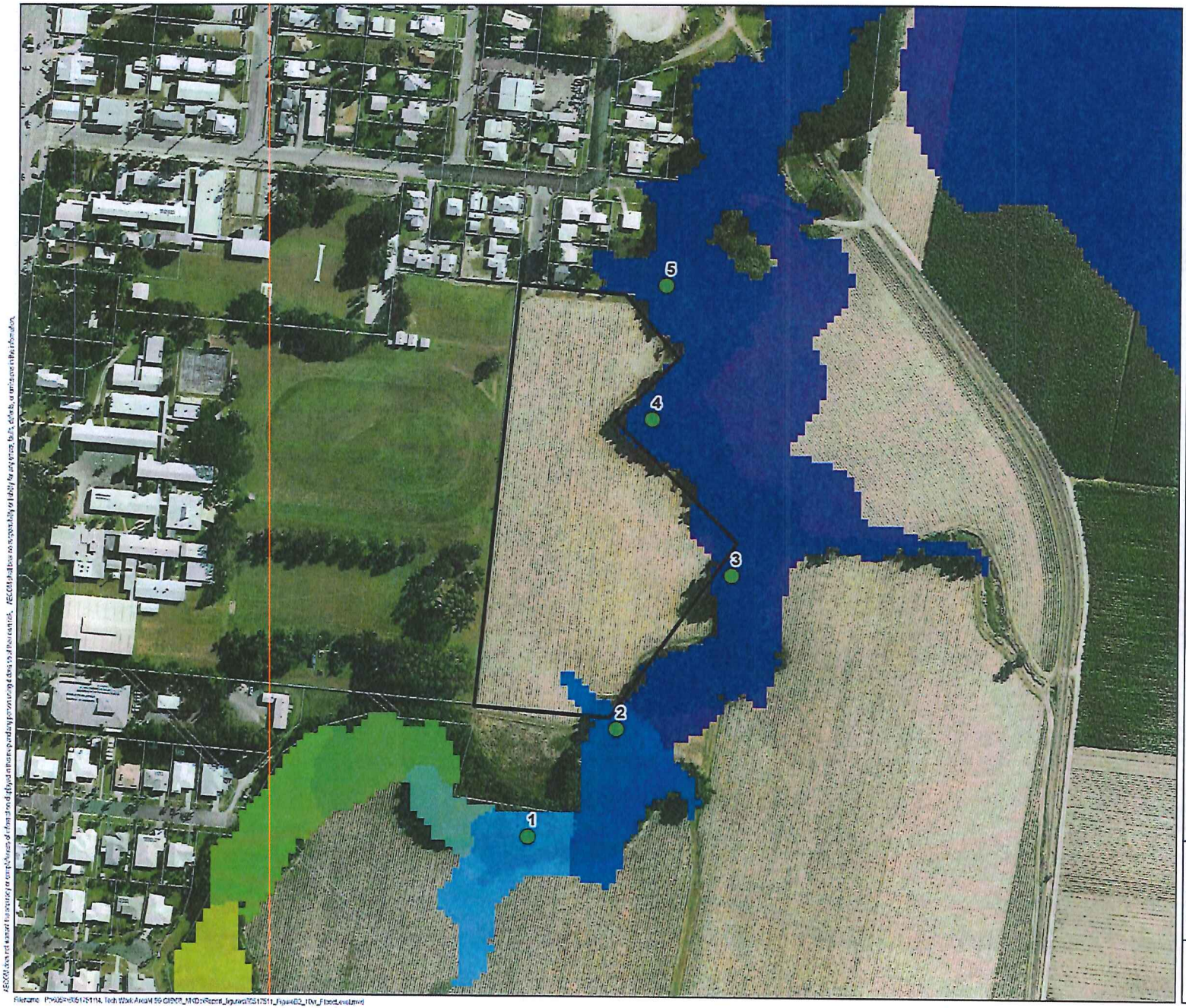
Flood Study

100 yera ARI Flood Depth

PROJECT ID	60457437
CREATED BY	[illegible]
LAST MODIFIED	14-Oct-2016
VERSION	v2

Figure 14

A3 size



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N

DATUM GDA 1994, PROJECTION MGA ZONE 56

0 25 50 100

Meters

1:2,500 (when printed at A3)

LEGEND

- Development Site
- Property Boundaries

10 year ARI Flood Level (m AHD)

- < 6.3
- 6.31 - 6.5
- 6.5 - 6.7
- 6.7 - 6.9
- 6.9 - 7.1
- 7.1 - 7.3
- 7.3- 7.5
- 7.5 - 7.7
- 7.7 - 7.9
- 7.9 - 8.1
- 8.1 - 8.3
- 8.3 - 8.5
- 8.5 - 8.7
- 8.7 - 8.9

Data sources:
Imagery - QLD GOv 2015
Project Area, Vegetation, Developable Area , RE - AECOM 2016
Protected Areas, Roads, Watercourse, Electrical Network, Wetlands - QLD Gov 2016
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Crawford Street Mossman

Flood Study

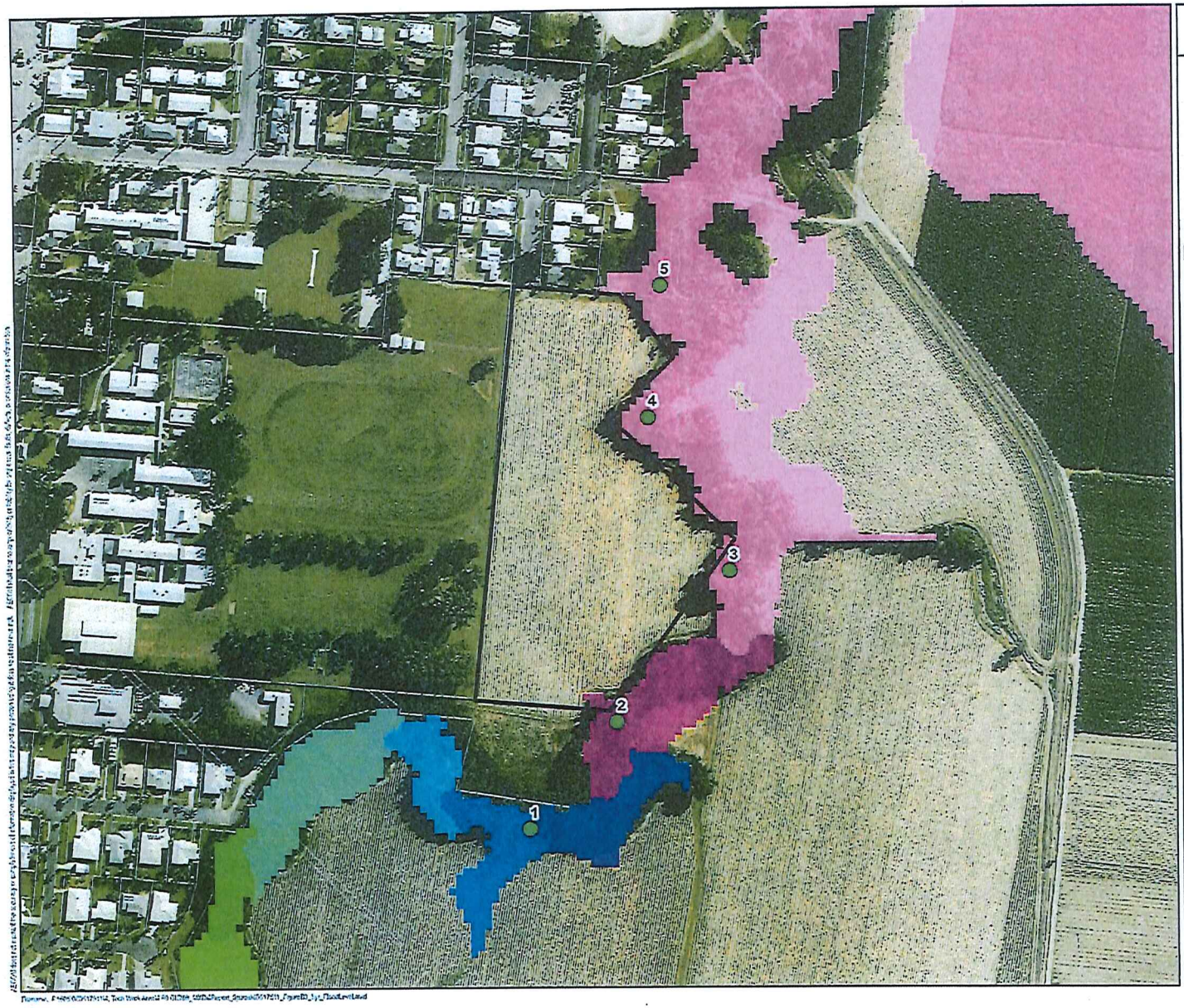
10 year ARI Flood Level

PROJECT ID	60487437
CREATED BY	adorquiza
LAST MODIFIED	12-Oct-2016
VERSION	v2

Figure B1

A3 size

Filename: P:\605\60487437\4. Tech Work Area\4.50 GIS\GIS_MXD\Report_figures\60487511_Figure02_10yr_FloodLevel.mxd



AECOM
www.aecom.com

N

DATUM GDA 1994, PROJECTION MGA ZONE 56
0 25 50 100
Meters
1:2,500 (when printed at A3)

LEGEND

- Development Site
- Property Boundaries

5 year ARI Flood Level (m AHD)

- < 6.3
- 6.31 - 6.5
- 6.5 - 6.7
- 6.7 - 6.9
- 6.9 - 7.1
- 7.1 - 7.3
- 7.3- 7.5
- 7.5 - 7.7
- 7.7 - 7.9
- 7.9 - 8.1
- 8.1 - 8.3
- 8.3 - 8.5
- 8.5 - 8.7
- 8.7 - 8.9

Data source:
Imagery - QLD Gov 2015
Project Area, Vegetation, Development Area, RE - AECOM 2016
Protected Areas, Roads, Watercourse, Electrical Network, Wetlands - QLD Gov 2016
© State of Queensland (Department of Natural Resources and Mines) (2016)

Crawford Street Mossman

Flood Study

5 year ARI Flood Level

PROJECT ID	60487437
CREATED BY	estanojkos
LAST MODIFIED	12-Oct-2016
VERSION	v2

Figure B3

A3 size

6.5 Sensitivity Analysis

There was a lack of suitable calibration data for Parker Creek and the South Mossman River to verify both flows and flood levels. Therefore a sensitivity analysis was undertaken to determine the potential impact on the 100 year ARI design flood level, when model parameters are varied.

6.5.1 Increased Flows

The hydrologic inflows were increased by applying a 30 mm initial loss value rather than the 60 mm used for the design simulations. The results indicate the 100 year ARI flood level at the development site may increase to approximately 8.6 m AHD.

6.5.2 Increased Roughness

The Manning's roughness values chosen for the design TUFLOW runs were increased. The results indicate that if the Manning's 'n' values are increased by 20%, the 100 year ARI flood level at the development site may increase to approximately 8.5 m AHD.

9.0 Conclusion

AECOM was commissioned by NJ & JV Pty Ltd to investigate the impact of flooding and determine design flood levels for the proposed development site off Crawford Street, Mossman.

Hydrologic and hydraulic investigations were undertaken to determine the 5, 10 and 100 year ARI event flood levels across the site which are provided in Table 14.

Peak water levels indicate that flood inundation across the property is evident (refer) and portions of the site will need to be filled for any future proposed development to be free from inundation. The 100 year ARI flood level for planning purposes is 8.35 m AHD.

Should filling of the inundated areas be proposed, additional modelling will be required to determine the subsequent impact of this filling on peak water levels upstream and downstream of the site.

A suitable freeboard should be applied to the finished floor level of residential dwellings. Due to a lack of suitable calibration or verification data for the South Mossman River and Parker Creek, sensitivity analysis was undertaken which indicated varying model parameters within reasonable ranges may increase the 100 year ARI design flood levels by up to 0.25 m. The design freeboard for finished floor levels within the development should be in accordance with Council guidelines, however in the absence of other guidance, a minimum of 0.3 m is recommended.

04-Jul-17

FLOOD ASSESSMENT
Comment on Sensitivity

Query	AECOM Response
Council Officer's initial reading of the AECOM's report interpreted that AECOM's calibration of the greater model adopted the initial loss of 10 mm/hr. Council therefore seeks clarification of the 60mm/hr and 30mm/hr references for sensitivity analysis that appear higher than the advised AECOM calibration values.	The model was successfully calibrated to the March 2008 and February 2014 events using an initial loss value of 10 mm. Referring to ***Section 3.5 Design Hydrology*** of the AECOM report: • the calibrated initial loss values were lower than expected for this type of catchment land use • both calibration events produced less than a 10 year ARI flow at the Mossman River gauge • the peak flood for both historical events occurred following wet antecedent conditions • the initial loss and continuing loss values were further refined to match peak flows for extreme flood events based on a Flood Frequency Analysis of the Mossman River gauge. A final initial loss value of **60 mm** was adopted for the design event hydrology. This is consistent with the values used in the Foxton Avenue Drainage Study (AECOM, 2005) and the 2013 draft Australian Rainfall and Runoff Guidelines (ARR). Sensitivity analysis was undertaken by applying a lower initial loss (of 30 mm rather than 60 mm) for the design event hydrology.

Sally Williams
Principal Engineer
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Sally.Williams@aecom.com

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KFB Engineers
Civil & Structural
ABN 28 351 246 509
1/38-42 Pease St, Cairns | PO Box 927, Cairns Q 4870
P: 07 40320492 | F: 07 40320092 | E: email@kfbeng.com.au

3 September 2017

REPORT - STORMWATER DRAINAGE FROM LOT 11 on SP252360 (MOSSMAN HIGH SCHOOL)

0.0 Planning Report for Reconfiguration Application

Original Proposal (RPS Plan PR 124232-4) detailed a 19 lot subdivision with a drainage easement between subdivision lots 11 and 12.

The accompanying Engineering report nominated a Q100 flood level of RL 7.3. The attached Concept Design detailed an earth bund along the western boundary and within the subdivision which directed stormwater flows from the Mossman High School property to an easement between subdivision lots 11 and 12 and to an existing drain at the northern end of the subdivision.

1.0 Decision Notice ROL 617/2015 - Reconfiguration of Lot 12 on SP252360 into 19 Lots

Assessment Manager Conditions 9. 10. 11. and 12 detail the requirements for stormwater management.

:

Condition 10. required that:

the subject land must be drained to the satisfaction of the Chief Executive Officer. This includes provision of the following:

a. Drainage infrastructure generally in accordance with the concepts shown as Option 2 on RPS Drawing No PR124232-4 Issue D.....

Condition 9.g. required that:

Supporting calculations must include specific advice on the western catchment run off and how this is conveyed through the site to the creek . The calculations must show how the minor rainfall event is conveyed underground and must include calculations on the overland flow for the major event. Information on the pit entry capacity, blockage factors, pit losses are to be included for the minor event. A severe impact assessment is required to demonstrate safe conveyance of flows in the event of complete inlet blockage.

2.0 Option 2 on RPS Drawing No PR124232-4 Issue D

The RPS Drawing only shows existing surface levels.

As regards stormwater from Mossman High School (Lot 11 SP252360) the RPS drawing details a 3m wide drainage easement, containing a barrier kerb catch drain, running along the western side of the subdivision and discharging into a drainage easement between subdivision lots 11 and 12 (Drainage Option 2) and as well into an existing drain at the north end of the subdivision.

The Option 2 drain:

- is intended to capture the stormwater from part of the Mossman High School property via an easement between lots 11 and 12, and

- The easement between subdivision lots 11 and 12 is required to convey the minor flow (Q5) and the major flow (Q100) and as well (severe impact assessment) all flows in the case of pipe blockage and capacity exceedence.
  Condition 9.g. of the ROL Decision Notice (617/2015) required the minor flow (Q5) is conveyed underground and the major flow (Q100) overland.
  Because RPS PR124232-4 D has no design surface levels or hydraulic information the viability of Drainage Option 2 is not established.
  The Q100 regional flood level adopted for the ROL application was RL 7.3 AHD.

4.0 Flood Study

AECOM was commissioned by the developer to investigate the impact of flooding and determine design flood levels for the proposed development site.
The AECOM investigation has resulted in a design Q100 flood level of RL 8.6 AHD being adopted.
This is 1.3m higher than the figure (RL 7.3) that supported the ROL application
Floor levels are to be 300mm above RL 8.6.

5.0 Road Levels – Major system design criteria

Design criteria for the subdivision:

- The lot layout to be generally in accord with RPS Dwg PR124232-4 D
- the minimum lot level to be RL 8.6 except the eastern side of lots 1 to 9 inclusive shall be battered as shown on Dwg K-2578 C02. The minimum floor level to be 300mm above RL 8.6.
- The Major flood event is contained within the road reserve (QUDM 2013), and.
- QUDM 2013 recommendations for roadway flow depth are adopted for Major Storm.

6.0 Mossman High School Stormwater

The design process adopted to assess how the stormwater runoff from the Mossman High School could be managed was as follows.

- A detailed investigation of the existing drainage arrangements of the Mossman High School grounds was carried out and is detailed on Dwg K-2578 Sheet SW 4.

7.0 Existing Drainage Facility on the Southern side of Mossman High School

There are two catchment areas of the Mossman High School that drain to the south:

- Catchment C (1.68ha). Drains to Parker Creek via an existing easement (Emt B) through Lot 29 on RP851435 to Lot 1 on RP851435
- Catchment B (2.55ha) . Currently drains to Parker Creek through the proposed subdivision. There is no easement over the existing outfall. The two options proposed (RPS Dwg PR124232-4 D) to handle the Catchment B flow are:
  1. Drainage Option 1 that would divert the flow via Lots 29 & Lot 1 (both RP851435) to discharge in Parker Creek at "D" .
  2. Drainage Option 2 that would take the flow between Lots 11 & 12 and the proposed park to discharge in Parker Creek .

  These Options are shown on SW1.

8.0 Drainage Option 2

Dwgs SW2, SW3, SW4, SW5 detail two methods (Drainage Option 2A & Drainage Option 2B) of meeting the requirement (ROL conditions 9.g. and 10.a.) to take the flow from catchment B between lots 11 & 12 taking into account the design level constraints of the adopted Q100 flood level of RL 8.6.

Approximate costs of the two options are:

Drainage Option 2A	
1. 99.25m 900dia class 2 RCP	79,400
2. Field inlet pit, Stormwater MH, Concrete outlet	10,500
	$89,900

Drainage Option 2B	
1. Concrete invert	2,500
2. 56m 900dia class 2 RCP	44,800
3. Field inlet, Creek outlet	7,000
	$54,300

The pipe capacity of both option 2A and 2B is designed to convey the Q100 flow from Catchment B.

In the case of inlet blockage, or a severe storm, the flow level would rise to RL 8.6 before overflowing into Road A and ponding within the Mossman High School. Considerable filling and tree clearing will be required within the Catchment B to avoid ponding.

9.0 Drainage Option 1

Dwg SW 6 details Drainage Option 1A.

The grass lined drain proposed can be maintained by mowing. Approximate cost is:

Drainage Option 1A	
1. Earthworks, including regressing	10,000
2. Creek outlet	5,000
	$15,000

Drainage Option 1A is designed to carry minor and major flows, and facilitates flooding from a severe storm; does not have the problem of inlet blockage and avoids ponding within the Mossman High School.

Drainage Option 1A requires approval/consent from:

- Department of Education and Training (DETE) - this has been given
- The owner of Lot 1 RP851435 – this has been given
- The owner of Lot 29 RP851435 (The Douglas Shire Council) - under negotiation.

10.0 Summary - Preference for Drainage Option 1A

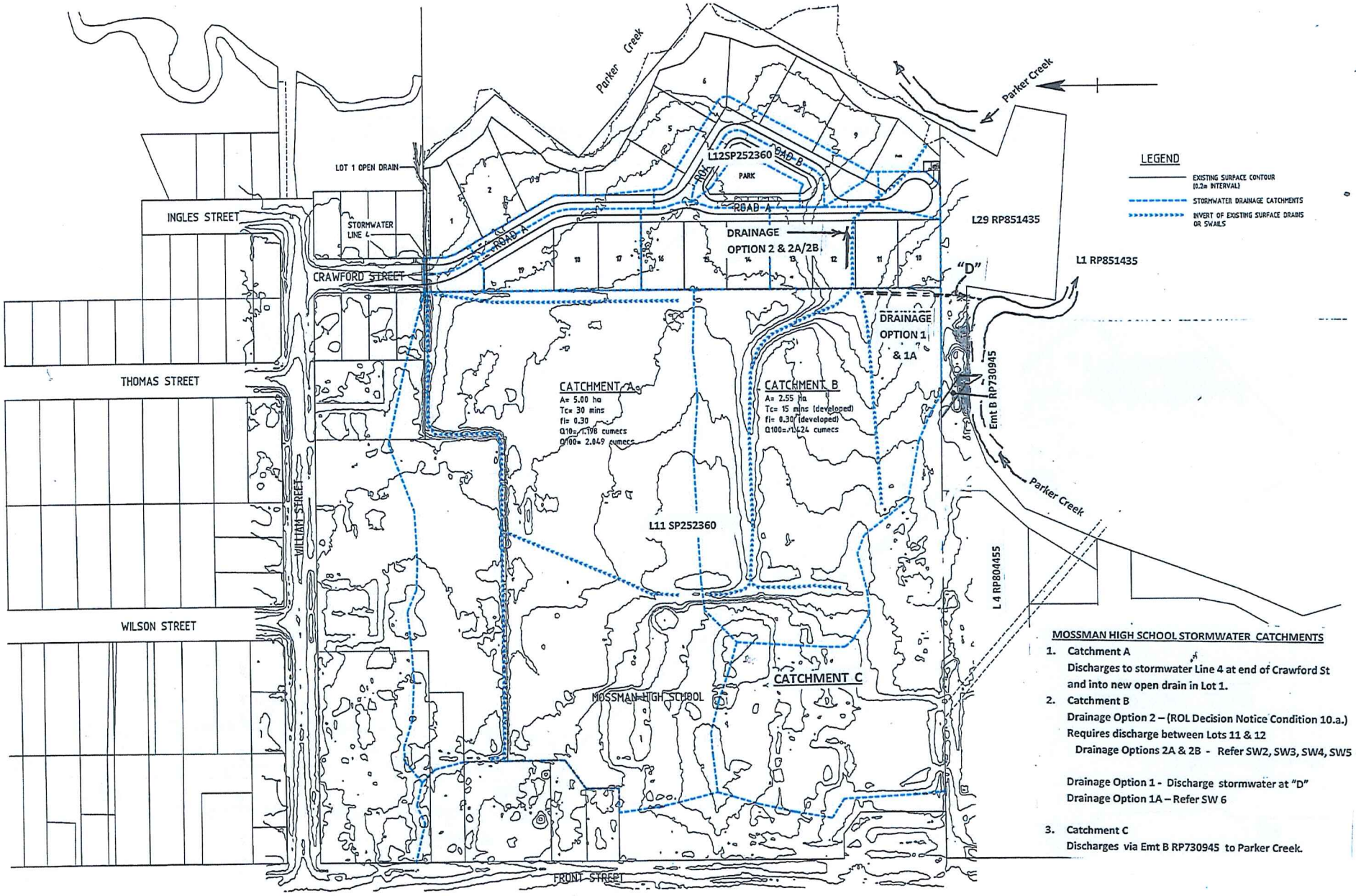
Because of level constraints related to the design Q100 flood level (RL 8.6) adopted for the layout of the proposed subdivision the drainage solution detailed as Drainage Option 1A on SW6 is considered more appropriate than the Option 2 variants (Drainage Option 2A & Drainage Option 2B) because:

1. The design basis relating to the Q100 level for the drainage solution(s) depicted on RPS Dwg PR124232-4D have been shown to be deficient and thus the requirements of conditions 9.g. & 10.a. of ROL 617/2015 should be assessed with regard to the correct design basis of the Q100 level
2. The design Option 1A provides a lower risk to blockage or capacity exceedence as does either Drainage Option 2A or Drainage Option 2B.
3. Drainage Option 1A meets the requirement of DSC Planning Policy No 6, and also the requirements of QUDM 2013, to a greater degree than Drainage Options 2A& 2B.
4. In particular Drainage Option 1A represents the most satisfactory rout for flood waters in the case of a severe storm scenario and it therefore makes sense to use it for the primary solution.
5. Drainage Option 1A is a less costly solution than either of Drainage Option 2A or 2B

Attachments:

1. Job No K-2578
   - Sheet SW1 – External Stormwater Drainage Catchment Plan
   - Sheet SW2 - Drainage Option 2A
   - Sheet SW3 - Drainage Option 2A (Section through Stormwater Line)
   - Sheet SW4 - Drainage Option 2B
   - Sheet SW5 - Drainage Option 2B (Section through Stormwater Line)
   - Sheet SW6 - Drainage Option 1A

2. APPENDIX A
   - Sheet 1 – RPS Dwg PR124232-4 D
   - Sheet 2 - ROL 617/2015, Condition 9.g.
   - Sheet 3 - ROL 617/2015, Condition 10.a.



MOSSMAN HIGH SCHOOL STORMWATER CATCHMENTS

1. Catchment A
   Discharges to stormwater Line 4 at end of Crawford St and into new open drain in Lot 1.
2. Catchment B
   Drainage Option 2 – (ROL Decision Notice Condition 10.a.)
   Requires discharge between Lots 11 & 12
   Drainage Options 2A & 2B - Refer SW2, SW3, SW4, SW5

   Drainage Option 1 - Discharge stormwater at "D"
   Drainage Option 1A – Refer SW 6
3. Catchment C
   Discharges via Emt B RP730945 to Parker Creek.

No.	DATE	ISSUE / REVISION	EVAK	EFB
1	03/09/17		DRN	CHKD

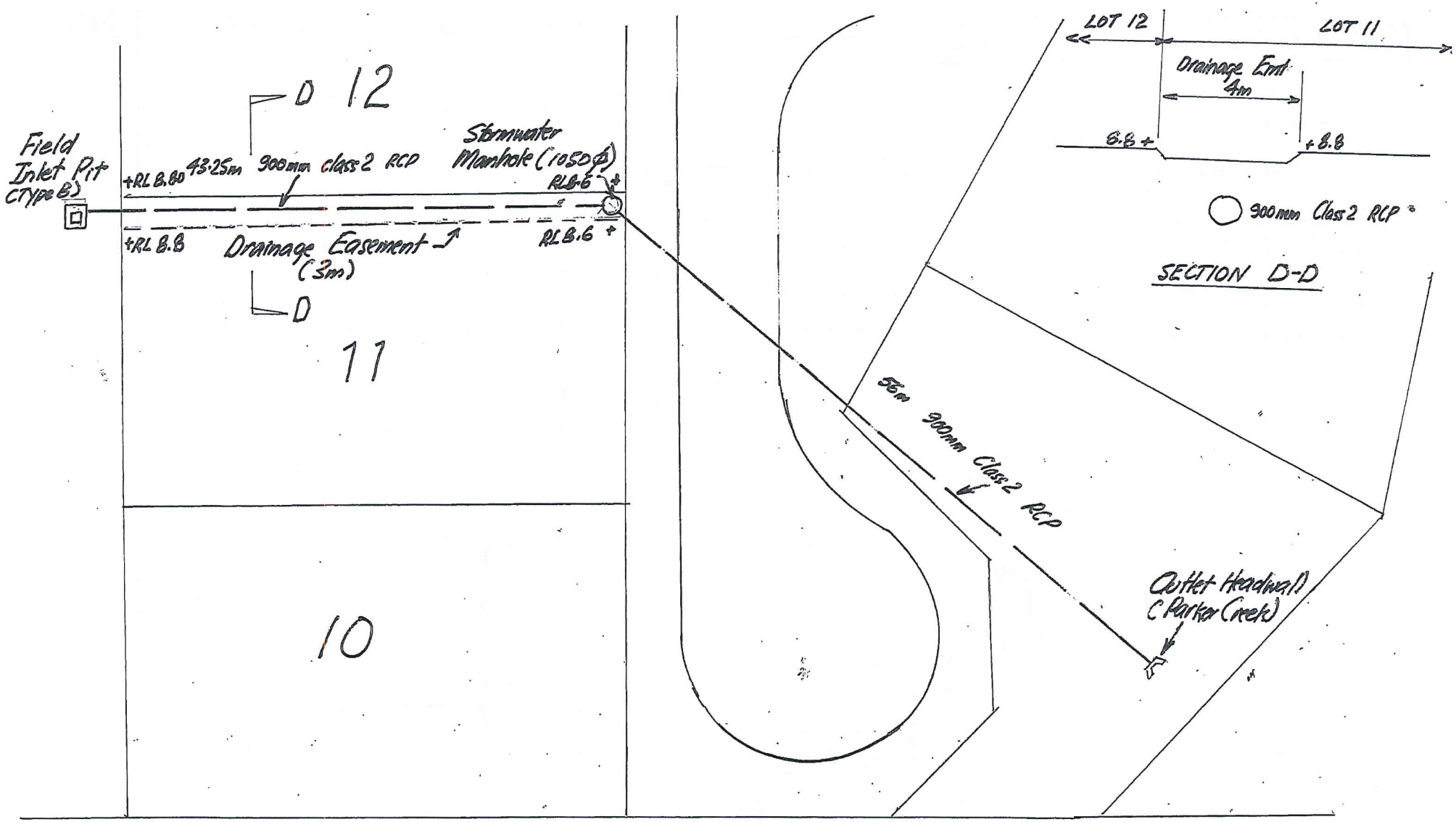
DRAWING FILE:
XREF FILE: N/A

N.V. & J.S. Pty Ltd
PROPOSED SUBDIVISION
AT CRAWFORD STREET, MOSSMAN

External Stormwater Drainage Catchment Plan

KFB ENGINEERS
ABN 28 351 246 509
Civil & Structural
20 Scott St, Cairns | PO Box 927, Cairns Q 4870
P: 07 40521700 | F: 07 40521634
E: email@kfbeng.com.au

JOB No: K-2578
SHEET: SW 1
SCALE: 1:1000 (@ A1)



DETAIL MOSSMAN HIGH SCHOOL STORMWATER (DRAINAGE OPTION 2A)

(NTS)

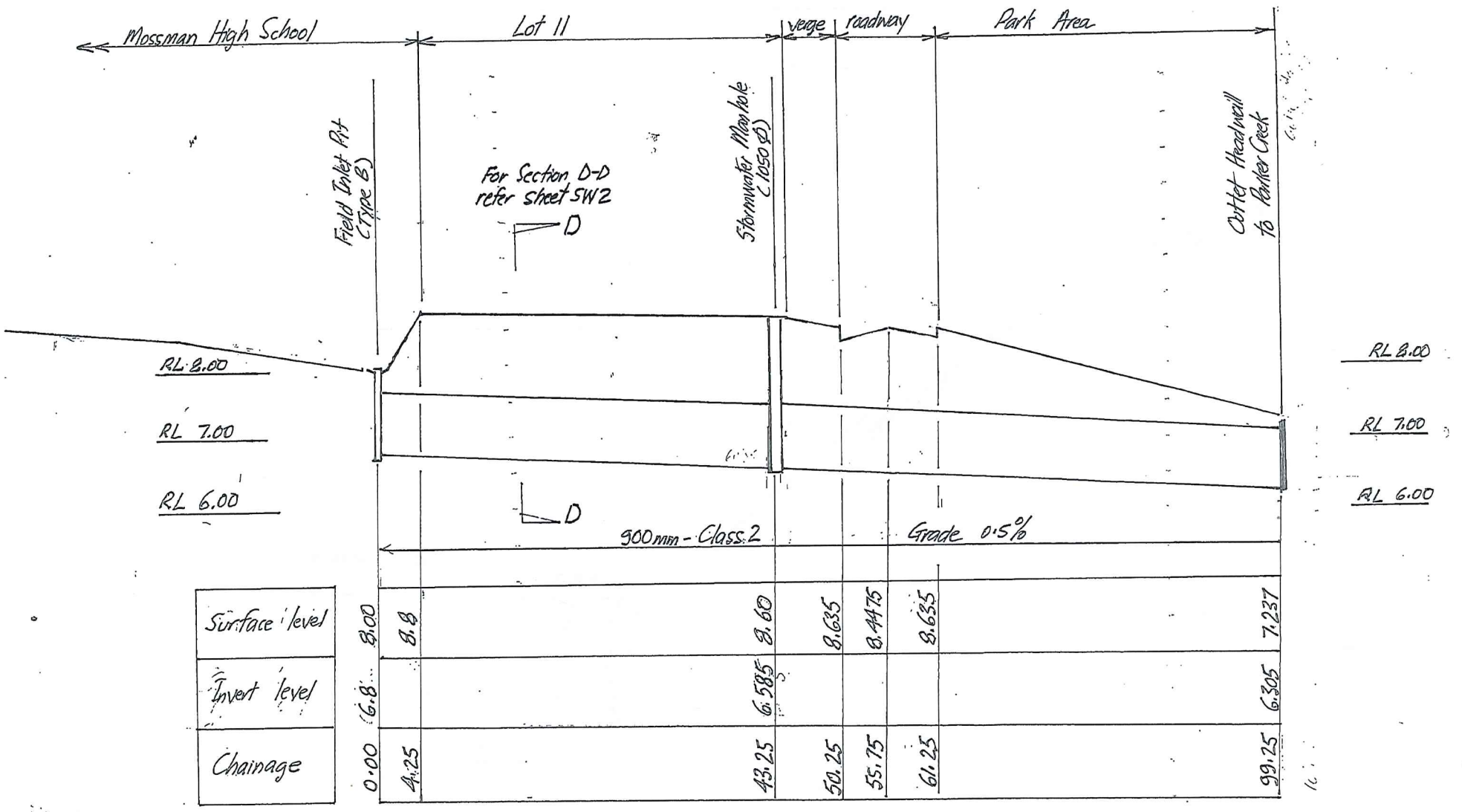
JOB NO : K-257B
SHEET : SW2
2 SEPT. 2017

JOB NO : K-2578
SHEET : SW 3
2 SEPTEMBER 2017

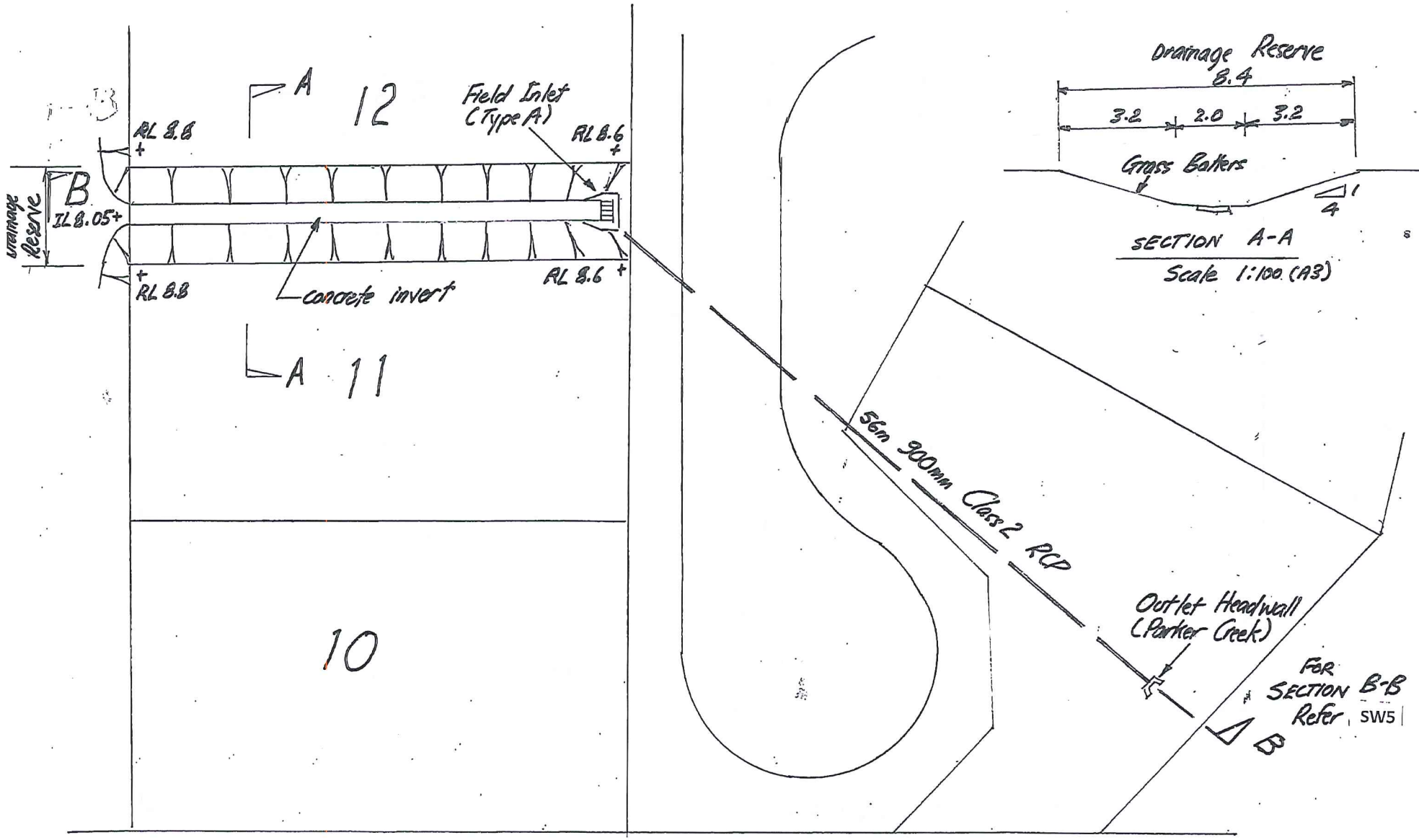
MOSSMAN HIGH SCHOOL STORMWATER (DRAINAGE OPTION 2A)

SECTION THROUGH STORMWATER LINE

0 10 20 m H 1:400 (A3)
0 1 2 V 1:50 (A3)



Surface level	8.00	8.8	8.60	8.635	8.4475	8.635	7.237
Invert level	6.8		6.585				6.305
Chainage	0.00	4.25	43.25	50.25	55.75	61.25	99.25



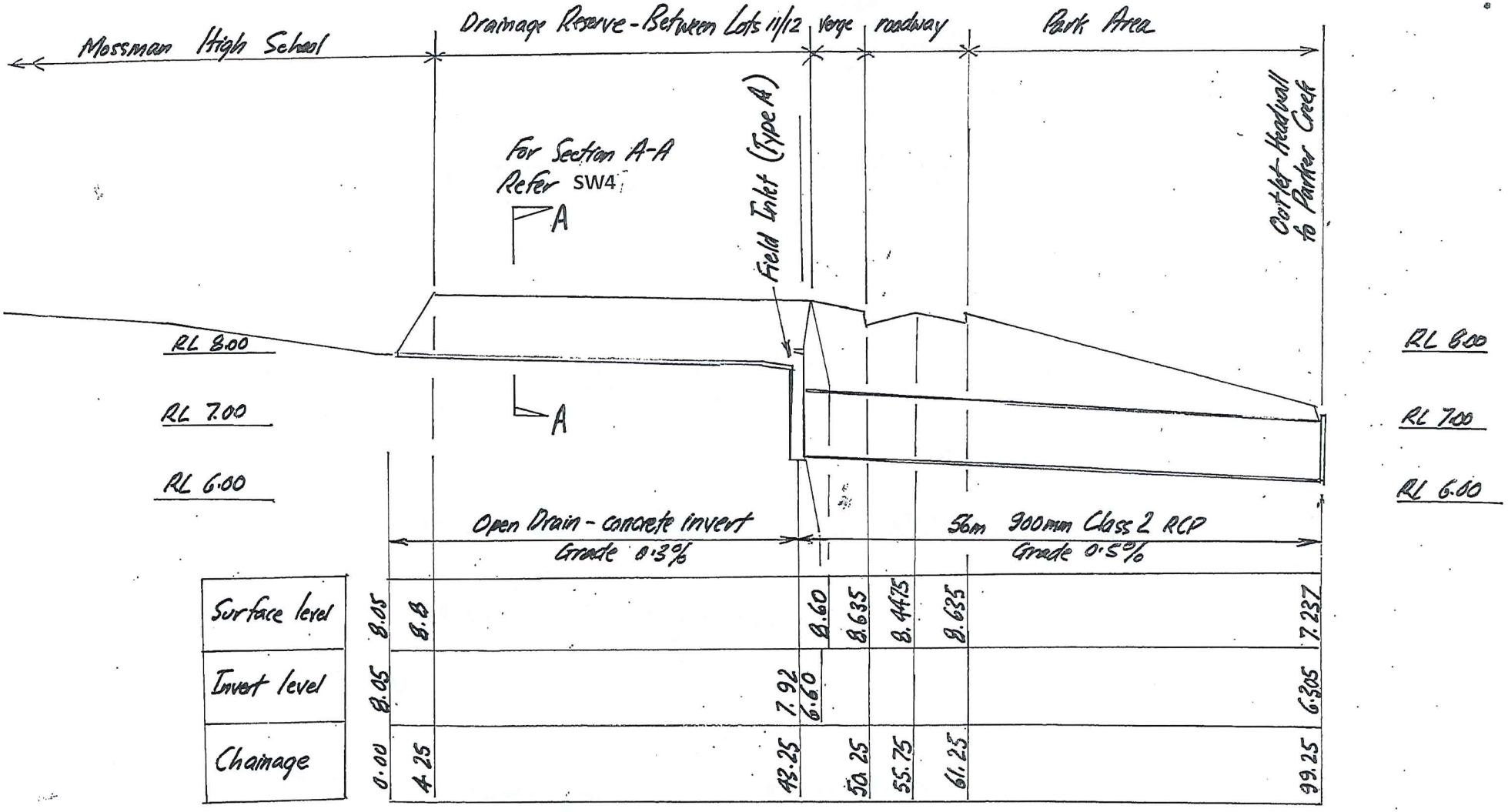
DETAIL MOSSMAN HIGH SCHOOL STORMWATER (DRAINAGE OPTION 2B)

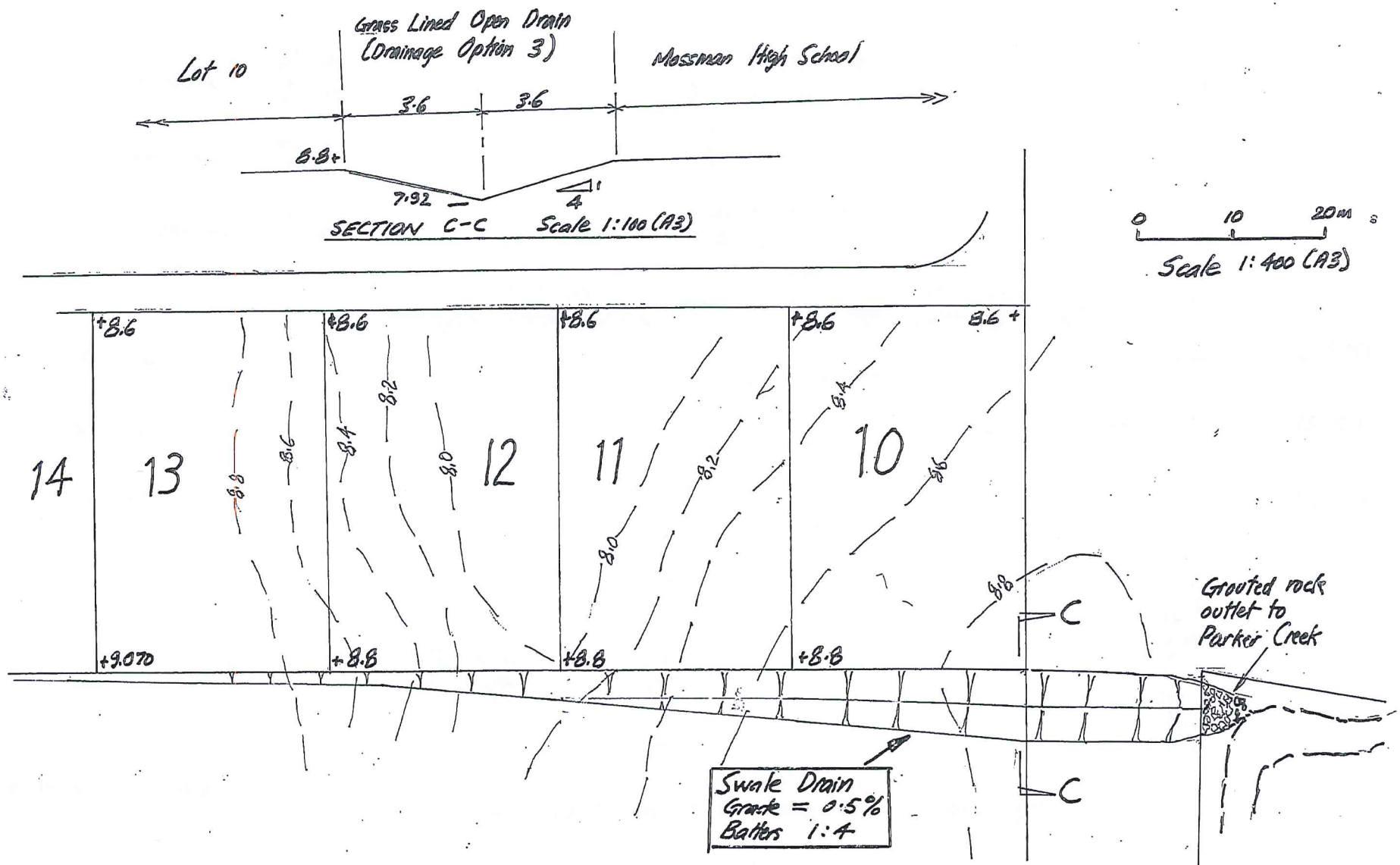
JOB No : K-2578
SHEET : SW4
2 SEPT 2017

JOB NO : K-2578
SHEET : SW5
2 SEPTEMBER 2017

MOSSMAN HIGH SCHOOL STORMWATER (DRAINAGE OPTION 2B)
SECTION B-B (THROUGH STORMWATER LINE)

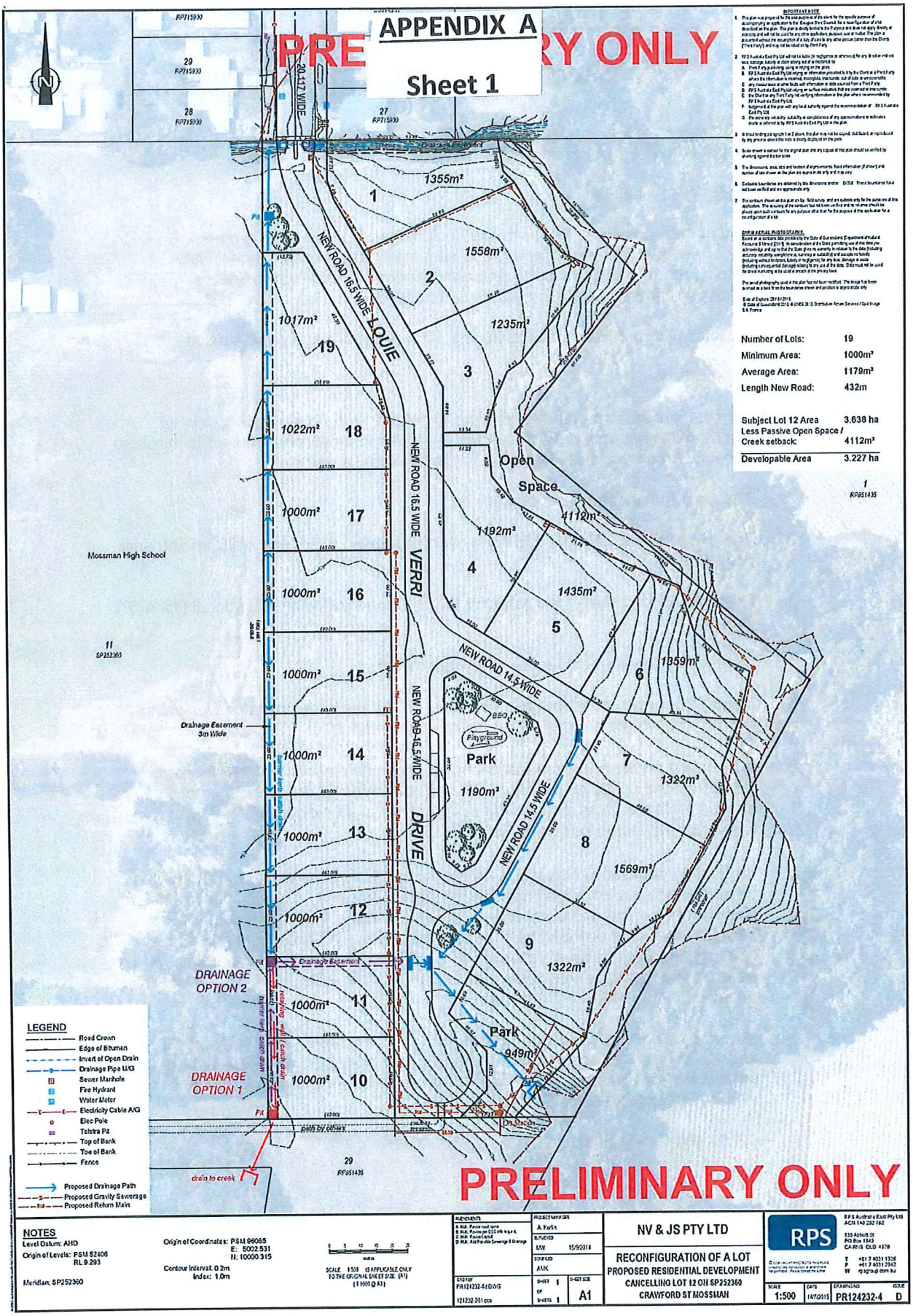
0 10 20 m H 1:400 (A3)
0 1 2 V 1:50 (A3)





DETAIL MOSSMAN HIGH SCHOOL STORMWATER (DRAINAGE OPTION 1A)

JOB NO : K-2578
SHEET : SW6
2 SEPT. 2017



NOTES

Level Datum: AHD

Origin of Levels: PSM 52406 RL 9.293

Meridian: SP252360

Origin of Coordinates: PSM 96065 E: 5002.531 N: 10000.315

Contour Interval: 0.2m Index: 1.0m

SCALE 1:500 IS APPLICABLE ONLY TO THE ORIGINAL SHEET SIZE (A1) (1:1000 @ A3)

AMENDMENTS	A Rev'n road name B Rev'n Prelim pr DCC crit reqs C Rev'n Parcel Land D Rev'n Alt Portable Sewerage Drainage
PROJECT MANAGER	A Yorke
SURVEYED	MW 15/9/2014
DESIGNED	AMK
DRAWN	PR124232-4d DWG
CHECKED	124232-201 ccx
SHEET OF SHEETS	1 1
SHEET SIZE	A1

NV & JS PTY LTD

RECONFIGURATION OF A LOT
PROPOSED RESIDENTIAL DEVELOPMENT
CANCELLING LOT 12 ON SP252360
CRAWFORD ST MOSSMAN

RPS
RPS Australia East Pty Ltd
ACN 140 292 762
135 Abbott St
PO Box 1949
CAIRNS QLD 4870
T +61 7 4031 1336
F +61 7 4031 2942
W rpsgroup.com.au

SCALE	DATE	DRAWING NO	ISSUE
1:500	14/7/2015	PR124232-4	D

c. Freeboard achieved to each lot in the event of system overflow;

d. RPEQ Certification.

The switchboard and pump station design including pump selection is to be provided to Council for approval prior to obtaining operational works approval. Council may nominate a preferred pump supplier and switchboard configuration to ensure consistency of infrastructure across Council's network.

The applicant is to provide a commissioning plan for the sewage pump station.

Local Drainage Study

9. Undertake a local drainage study of the site to determine the drainage impacts on upstream and downstream properties and the mitigation measures required to minimise such impacts. In particular, the study must address the following:

1. The contributing catchment boundaries;

2. The extent of the 100 year ARI flood event in relation to the site both pre and post development;

3. Primary and secondary flow paths for the 5, 10 and 100 year ARI rainfall (1%AEP) events;

4. Identify any requirement for drainage easements;

5. Identify the need and tenure for flood detention areas to ensure a no worsening impact on downstream properties for the development;

6. Information on the proposed works and any impacts proposed at the drainage outlet from the proposed development. Specific information on the pipe outlet and erosion protection in addition to the overland flow path outlet and its erosion protection measures is to be provided;

g. Supporting calculations must include specific advice on the western catchment run off and how this is conveyed through the site to the creek. The calculations must show how the minor rainfall event is conveyed underground and must include calculations on the overland flow for the major event. Information on the pit entry capacity, blockage factors, pit losses are to be included for the minor event. A severe impact assessment is required to demonstrate safe conveyance of flows in the event of complete inlet blockage;

h. Advice on storm water drainage and flooding is to be provided for lots 6, 7, 9, 11 and 12. Where lots are proposed to be filled to achieve the required immunity, and earthworks plan is to be provided demonstrating fill levels, batter slopes and the interface to existing surface levels;

i. Lawful point of discharge.

The study must be to the satisfaction of the Chief Executive Officer prior to issue of a Development Permit for Operational Works.

Plan of Drainage Works

10. The subject land must be drained to the satisfaction of the Chief Executive Officer. This includes provision of the following:

    a. Drainage infrastructure generally in accordance with the concepts shown as Option 2 on RPS Drawing No PR124232-4 Issue D. Calculations of the sub-catchment discharge and the flow width and depth in roadside drains and easements must be provided prior to the issue of a Development Permit for Operational Works. The calculations must demonstrate that the flows are fully contained in the drainage paths and do not enter private property except where easements exist;

    b. The drainage system from the development must incorporate a gross pollutant trap(s) or equivalent measure(s), meeting the following Council specifications for stormwater quality improvement devices (SQIDs), namely:

        i. End-of-line stormwater quality improvement devices (SQIDs) shall be of a proprietary design and construction and shall carry manufacturer's performance guarantees as to removal of foreign matter from stormwater and structural adequacy of the unit.

        ii. SQIDs shall remove at least ninety-five per cent of all foreign matter with a minimum dimension of three (3) mm and shall be configured to prevent re-injection of captured contaminants. The SQIDs treat all first flush runoff, which shall be defined as that volume of water equivalent to the runoff from the three (3) month ARI storm event. The location of SQIDs within the drainage system shall be planned to ensure that the first flush waters from all parts of the (developed) catchment are treated.

        iii. The design of the SQIDs shall not compromise the hydraulic performance of the overall drainage system.

        iv. SQIDs shall be positioned so as to provide appropriate access for maintenance equipment.

    c. All new allotments shall have immunity from flooding associated with an ARI 100 year rainfall event;

    d. Where practical, all new allotments must be drained to the road frontages, drainage easements or drainage reserves and discharged to the existing drainage system via storm water quality device(s); and

    e. Detail the outlet into Parker Creek and erosion and scour protection measures to be installed to the satisfaction of the Chief Executive Officer.

    All drainage works must be completed to the satisfaction of the Chief Executive Officer, prior to the issue of a Compliance Certificate for the Plan of Survey.

CONSENT FROM ADJOINING OWNERS FOR

DISCHARGE OF STORMWATER FROM

MOSSMAN HIGH SCHOOL

CONSENT TO ACCEPT STORMWATER

I/We, D.C. WATSON PTY LTD, HUGH CRAWFORD PTY LTD, G. MUNTZ PTY LTD, BRIE BRIE ESTATE PTY LTD,

Owners of Lot 1 on RP851435 located off Forest Glen Road, Mossman, hereby consent to the acceptance of stormwater discharge from Lot 11 on SP252360, being the site of Mossman State High School.

We understand that such discharge would occur into Parker Creek immediately south of the school in the vicinity of the existing stormwater easement.

Our consent is conditional upon flood modelling of the proposed development demonstrating no appreciable worsening of flood levels (i.e. less than or equal to 10mm in any storm event up to and including the 1% AEP storm) across any area of our property.

We request that when council has given their support and approval for the proposed storm water discharge then final flood analysis data is to be supplied as part of the final operational works application plans and confirmed as fit for operational work permit to be issued.

Signed,

.....

.....

Queensland
Government

Department of
Education and Training

23 June 2017

DOUGLAS SHIRE COUNCIL
OWNER'S CONSENT

The State of Queensland (represented by the Department of Education and Training), being the owners of a property situated at 46-62 Front Street, Mossman (otherwise described as Lot 11 on plan SP252360) and commonly known as the Mossman State High School hereby:

1. Consents to the discharge of overland flow from the proposed 19 lot subdivision at Crawford Street, Mossman (otherwise described as Lot 12 on plan SP252360). The State is able to confirm that it has been informed how the afflux resulting from the subdivision of the adjacent property and is satisfied with the proposed manner in which it will be managed.

2. The State of Queensland agrees to waive its rights to any subsequent actions or claims to which it may be entitled to make against the owner of the proposed 19 lot subdivision in respect to any loss, damage or interference with the Department's property that is caused by its agreement to accept the overland flow upon its site.

Should you wish to discuss this matter further, I invite you to contact Mr Tony Crompton, Senior Facilities Services Officer, Real Estate Management, by email at anthony.crompton@det.qld.gov.au or on telephone 3034 6022.

I trust that this information is of assistance.

Maree Bauer
Director
Portfolio Establishment
Infrastructure services Branch

Ref: 17/324345

AM60
42-60 Albert Street Brisbane 4000
PO Box 15033 City East
Queensland 4002 Australia
Telephone 07 3034 6022
Website www.dete.qld.gov.au
ABN 76 337 613 647

------ Forwarded Message ------
From: "Neil Beck" <Neil.Beck@douglas.qld.gov.au>
To: "Euan Bruce" <euan@kfbeng.com.au>
Sent: 24-Jan-18 9:53:06 AM
Subject: FW: Doc 833606 Reconfiguration of 12 Crawford St - DSC Ref : ROL 617/2015 - Parker Creek Tail Water Level

Hi Euan,

Further to your enquiry, please see comment from Manager Infrastructure regarding drainage options for the subdivision. I am not sure if you have been advised of this position as I got back from leave yesterday.

I will liaise with the property department as a Council resolution will be required in order to utilise Council's land for this purpose. I will be in touch once I have discussed with Property.

Apologies for the delay.

Regards

Neil Beck | Town Planner

Sent: Wednesday, 3 January 2018 10:19 AM
To: Neil Beck
Subject: FW: Doc 833606 Reconfiguration of 12 Crawford St - DSC Ref : ROL 617/2015 - Parker Creek Tail Water Level
Importance: High

Hi Neil,

I've reviewed the drainage report and the detailed options and support option 1 – grass swale along the back of the school discharging across the Council land to Parker Creek.

Regards

Michael Kriedemann
Manager Infrastructure
Douglas Shire Council
P: 07 4099 9435
E: Michael.kriedemann@douglas.qld.gov.au | **W:** douglas.qld.gov.au
Mail: PO Box 723, Mossman Q 4873 | **Office:** 64-66 Front St, Mossman Q 4873

From: Neil Beck
Sent: Wednesday, 20 December 2017 8:16 AM
To: Michael Kriedemann
Subject: FW: Doc 833606 Reconfiguration of 12 Crawford St - DSC Ref : ROL 617/2015 - Parker Creek Tail Water Level
Importance: High

Hi Michael – this is still outstanding. Can you please provide whether you support the use of Council land for this purpose.

The matter will need to go through the property Department and get a Council resolution on the matter. I have advised the applicant of this process.

Thanks

Neil

HEAD OFFICE – CAIRNS
ETS GEO PTY LTD
ABN: 16 121 817 794
07 4047 8600
07 4047 8699
admin@etsgeo.com.au
PO Box 587
REDLYNCH QLD 4870

1/220 Scott Street
Cairns QLD 4870

18th October 2018

KFB Engineers Pty Ltd
PO Box 927
Cairns QLD 4870

Attention: Euan Bruce

Dear Euan,

RE: GEOTECHNICAL INVESTIGATION – FACTUAL REPORT
BORROW AREA, LOT 1 ON SP204449, MOSSMAN MT MOLLOY ROAD, MOSSMAN

At the request of KFB Engineers Pty Ltd (KFB), ETS Geo Pty Ltd (ETS) has carried out a geotechnical investigation for a proposed borrow area at lot 1 on SP204449, Mossman Mt Molloy road, Mossman. The scope included the provision of the test pit logs, a summary of the subsurface materials and engineering properties.

Fieldwork was conducted by ETS on the 10th September 2018 and two (2) test pits (TP) were excavated to a depth of up to 1.4m. The target depth of 2.5m was not achieved due to collapse of the sand below the groundwater table. Disturbed sampling was carried out in each material type down the soil profile. Laboratory tests comprising Atterberg Limits, Particle size distribution and CBR tests were carried out on each sample obtained. Table 1 presents a summary of the encountered subsurface materials and Table 2 presents a summary of the laboratory test results.

TABLE 1: Subsurface Material Summary

Material Description	Depth Encountered (m)	
	BH1	BH2
Sandy CLAY / CLAY (CL-CI) Firm	0 – 0.58	0 – 0.9
SAND (SW) Medium Dense to Dense	0.58 – 1.3	0.9 – 1.4

TABLE 2: Laboratory Test Result Summary

Material Property	Sandy CLAY / CLAY (CL-CI)	SAND (SW)
Clay Content (%)	45 – 86	19 – 27
Sand Content (%)	13 – 50	70 – 72
Gravel Content (%)	1 - 5	1 - 11
Liquid Limit (%) of fines component	30 - 40	28 - 32
Plastic Limit (%) of fines component	20 – 24	19 – 20
Plastic Index (%) of fines component	10 – 16	9 – 12
Linear Shrinkage (%) of fines component	5.5 – 9.5	6 – 6.5
CBR Value (%)	1.5 - 6	5 - 11

The test pit logs and laboratory test reports are attached.

In accordance with AS3798 – 2007, Guidelines for Earthworks for Commercial & Residential Developments, following the removal of topsoil, the above materials would be considered suitable for use as fill for the proposed development. However, it must be noted that the CBR value for the CLAY soil is low, and therefore any pavement constructed on this fill will require a layer of imported fill to improve the subgrade CBR value. In addition, should the CLAY materials be utilised for allotment filling purposes, the testing undertaken indicate that these materials fall into an M-Class soil category. It should be noted that the Site Classifications performed at the completion of the development may vary and are assessed on a variety of other factors that are determined by performing individual investigations on each proposed allotment.

Furthermore, the high groundwater table that was encountered may cause difficulties when excavating the soils and also during compaction. The excavated fill materials may require a drying out period prior to being compacted.

Should you require clarification on any aspect of this letter, please do not hesitate to contact Cynthia de Bok or myself for assistance.

Yours faithfully,
For and behalf of ETS Geo Pty Ltd

M. Ganza

Michael Ganza
Managing Director – RPEQ 4449

Attachments: *Test Pit Logs*
Laboratory Test Results
Understanding the Limitations of this Report

HOLE NO.:	TP1	**SHEET :**	1 OF 1
CUSTOMER:	KFB Engineers	**JOB NO :**	GT18-372
PROJECT:	Borrow Area, Mossman Mt Molloy Road	**DATE:**	10/9/18
LOGGED BY:	GD	**REVIEWED BY:**	CDB
MACHINE:	1-2t Excavator	**RL:**	-
PIT DIMENSIONS:	1.50 m LONG	**COORDINATES:**	E: 328155.840, N: 8175512.900 (55 MGA94)

DEPTH (m)	METHOD	WATER	SAMPLE OR FIELD TEST	USCS SYMBOL	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	DCP (blows per 300mm)	STRUCTURE AND ADDITIONAL OBSERVATIONS
0.0	BU	10/09/18 23:20		CL		TOPSOIL: Sandy CLAY: low plasticity, brown, fine grained, trace of fine to medium grained gravel, trace of fine roots.	M	F		
				CL		Sandy CLAY: low plasticity, brown, fine grained, trace of fine to medium grained gravel.				
			BS 0.25 - 0.35 m							CBR 6%, LL 30%, PL 20%, PI 10%, LS 5.5%
0.5				CL		Sandy CLAY: low plasticity, grey mottled orange, fine to medium grained, trace of fine to medium grained gravel.				
				SW		SAND: fine to coarse grained, grey-brown, with low plasticity clay, trace of fine to medium grained gravel.		MD to D		
			BS 0.80 - 1.00 m							CBR 11%, LL 28%, PL 19%, PI 9%, LS 6.5%
1.0				SW		SAND: fine to coarse grained, grey, trace of low plasticity clay, trace of fine to medium grained gravel.	W			
1.5						TEST TP1 TERMINATED AT 1.30 m				
2.0										

METHOD
BU bucket
AU auger

SAMPLES AND TESTING
U50 undisturbed tube dia mm
D disturbed sample
BS bulk sample
PP pocket penetrometer (UCS) kPa
HV hand vane

WATER
standing water level
inflow
partial loss
complete loss

CONSISTENCY/DENSITY
Fines
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Coarse
VL very loose
L loose
MD medium dense
D dense
VD very dense

MOISTURE CONDITION
D dry
M moist
W wet

PENETRATION
0 no resistance to
4 absolute refusal

NOTES

HOLE NO.:	TP2	**SHEET :**	1 OF 1
CUSTOMER:	KFB Engineers	**JOB NO :**	GT18-372
PROJECT:	Borrow Area, Mossman Mt Molloy Road	**DATE:**	10/9/18
LOGGED BY:	GD	**REVIEWED BY:**	CDB
MACHINE:	1-2t Excavator	**RL:**	-
PIT DIMENSIONS:	1.50 m LONG	**COORDINATES:**	E: 328049.080, N: 8175512.050 (55 MGA94)

DEPTH (m)	METHOD	WATER	SAMPLE OR FIELD TEST	USCS SYMBOL	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	DCP (blows per 300mm)	STRUCTURE AND ADDITIONAL OBSERVATIONS
0.0	BU	10/09/18 12:10	BS 0.30 - 0.50 m	CL		TOPSOIL: Sandy CLAY: low plasticity, brown, fine grained, trace of fine to medium grained gravel, trace of fine roots.	M	F		
				CI		CLAY: medium plasticity, brown, trace of fine grained sand, trace of fine grained gravel.				CBR 1.5%, LL 40%, PL 24%, PI 16%, LS 9.5%
0.5			BS 1.00 - 1.20 m	SW		SAND: fine to coarse grained, grey-brown, with low plasticity clay, trace of fine grained gravel.		MD to D		CBR 5%, LL 32%, PL 20%, PI 12%, LS 6%
1.0				SW		SAND: fine to coarse grained, grey, trace of low plasticity clay, trace of fine to medium grained gravel.	W			
1.5						TEST TP2 TERMINATED AT 1.40 m				
2.0										

METHOD
BU bucket
AU auger

SAMPLES AND TESTING
U50 undisturbed tube dia mm
D disturbed sample
BS bulk sample
PP pocket penetrometer (UCS) kPa
HV hand vane

WATER
standing water level
inflow
partial loss
complete loss

CONSISTENCY/DENSITY
Fines
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Coarse
VL very loose
L loose
MD medium dense
D dense
VD very dense

MOISTURE CONDITION
D dry
M moist
W wet

PENETRATION
0 no resistance
to
4 absolute refusal

NOTES

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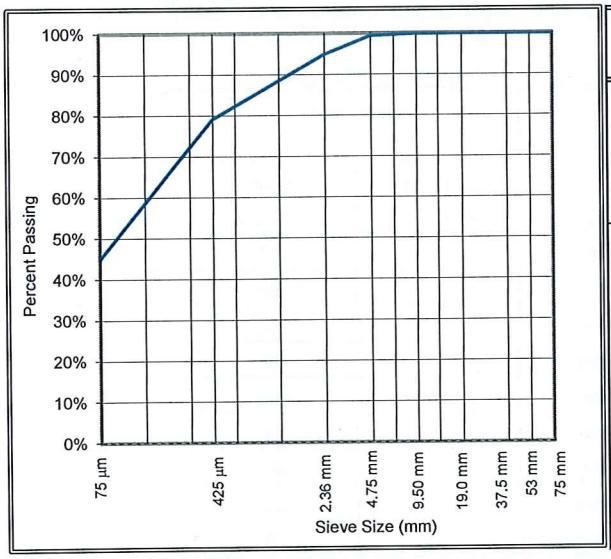
Quality of Materials Report

Client:	KFB Engineers	Report Number:	GT18-372 -27445 Q
Client Address:	PO Box 3324, Darra QLD 4076		
Job Number:	GT18-372	Report Date:	5/10/2018
Project:	Borrow Area Investigation	Test Request No:	-
Location	Ponzo Rd Mossman		
Lab No:	CS27445	Sample Location:	TP1
Date Sampled:	10/09/2018		-16.496298
Date Tested:	14/09/2018		145.390121
Sampled By:	GD		0.25-0.35m
Sample Method:	AS1289.1.2.1.6.5.4	Spec Description:	-
Material Source:	Insitu Material	Lot Number:	-
For Use As:	-	Spec Number:	-
Remarks:	-		



Particle Size Distribution

Test Method AS1289.3.6.1

A.S. Sieve Size	Specification Minimum	Result % Passing	Specification Maximum
	Specification -	Result	
75mm		100	
53mm		100	
37.5mm		100	
19.0mm		100	
9.5mm		100	
4.75mm		99	
2.36mm		95	
0.425mm		79	
0.075mm		45	

Plasticity Tests	Test Method	Specification Minimum	Result	Specification Maximum
Liquid Limit (%)	AS1289.3.1.2	-	30	-
Plastic Limit (%)	AS1289.3.2.1	-	20	-
Plasticity Index	AS1289.3.3.1	-	10	-
Linear Shrinkage (%)	AS1289.3.4.1	-	5.5	-
P.I. X % Passing 0.425mm			791	
L.S. X % Passing 0.425mm			435	
Ratio of % Passing (0.075 / 0.425)			0.57	

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APPROVED SIGNATORY

K Hodgson

Karl Hodgson - Laboratory Manager
Cairns Laboratory
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FORM NUMBER

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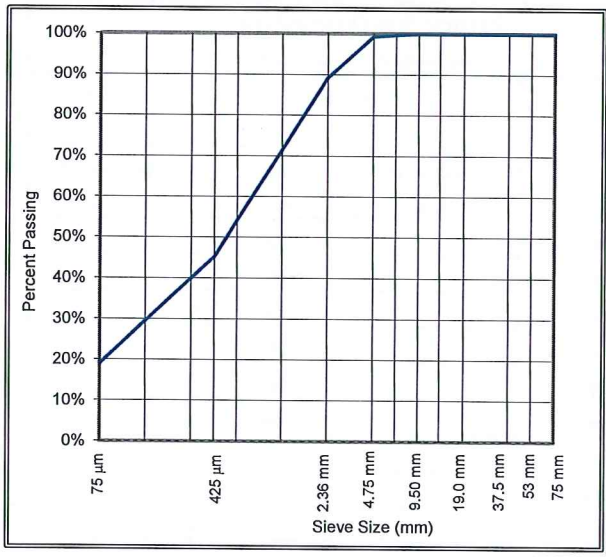
Quality of Materials Report

Client:	KFB Engineers	Report Number:	GT18-372 -27446 Q
Client Address:	PO Box 3324, Darra QLD 4076		
Job Number:	GT18-372	Report Date:	5/10/2018
Project:	Borrow Area Investigation	Test Request No:	-
Location	Ponzo Rd Mossman		
Lab No:	CS27446	Sample Location:	TP1 -16.496298 145.390121 0.8-1.0m
Date Sampled:	10/09/2018		
Date Tested:	17/09/2018		
Sampled By:	GD		
Sample Method:	AS1289.1.2.1.6.5.4		
Material Source:	Insitu Material	Spec Description:	-
For Use As:	-	Lot Number:	-
Remarks:	-	Spec Number:	-



Particle Size Distribution

Test Method AS1289.3.6.1

A.S. Sieve Size	Specification Minimum	Result % Passing	Specification Maximum
75mm		100	
53mm		100	
37.5mm		100	
19.0mm		100	
9.5mm		100	
4.75mm		99	
2.36mm		89	
0.425mm		45	
0.075mm		19	

Plasticity Tests	Test Method	Specification Minimum	Result	Specification Maximum
Liquid Limit (%)	AS1289.3.1.2	-	28	-
Plastic Limit (%)	AS1289.3.2.1	-	19	-
Plasticity Index	AS1289.3.3.1	-	9	-
Linear Shrinkage (%)	AS1289.3.4.1	-	6.5	-
P.I. X % Passing 0.425mm			407	
L.S. X % Passing 0.425mm			294	
Ratio of % Passing (0.075 / 0.425)			0.42	

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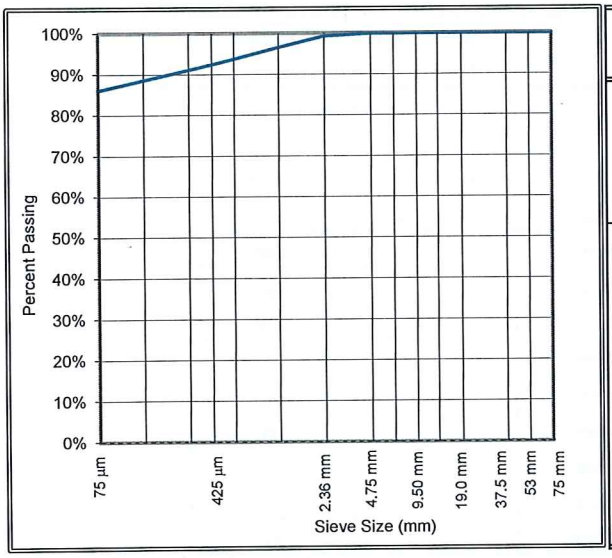
Quality of Materials Report

Client:	KFB Engineers	Report Number:	GT18-372 -27447 Q
Client Address:	PO Box 3324, Darra QLD 4076		
Job Number:	GT18-372	Report Date:	5/10/2018
Project:	Borrow Area Investigation	Test Request No:	-
Location	Ponzo Rd Mossman		
Lab No:	CS27447	Sample Location:	TP2 -16.496352 145.389224 0.3-0.5m
Date Sampled:	10/09/2018		
Date Tested:	17/09/2018		
Sampled By:	GD		
Sample Method:	AS1289.1.2.1.6.5.4		
Material Source:	Insitu Material	Spec Description:	-
For Use As:	-	Lot Number:	-
Remarks:	-	Spec Number:	-



Particle Size Distribution

Test Method AS1289.3.6.1

A.S. Sieve Size	Specification Minimum	Result % Passing	Specification Maximum
	Specification -	Result	
75mm		100	
53mm		100	
37.5mm		100	
19.0mm		100	
9.5mm		100	
4.75mm		100	
2.36mm		99	
0.425mm		92	
0.075mm		86	

Plasticity Tests	Test Method	Specification Minimum	Result	Specification Maximum
Liquid Limit (%)	AS1289.3.1.2	-	40	-
Plastic Limit (%)	AS1289.3.2.1	-	24	-
Plasticity Index	AS1289.3.3.1	-	16	-
Linear Shrinkage (%)	AS1289.3.4.1	-	9.5	-
P.I. X % Passing 0.425mm			1478	
L.S. X % Passing 0.425mm			877	
Ratio of % Passing (0.075 / 0.425)			0.93	

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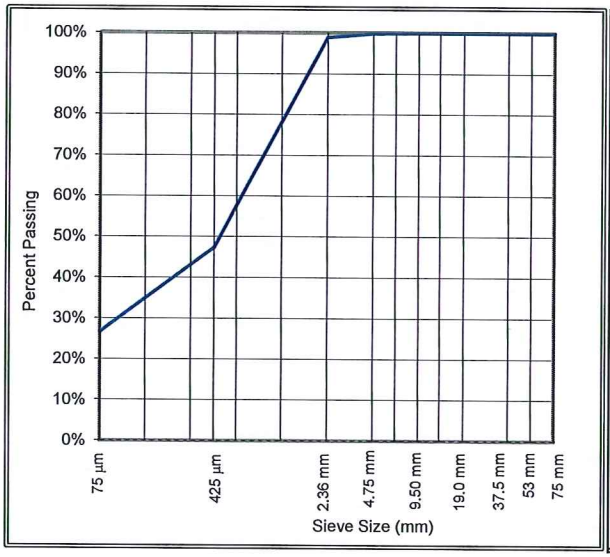
Quality of Materials Report

Client:	KFB Engineers	Report Number:	GT18-372 -27448 Q
Client Address:	PO Box 3324, Darra QLD 4076		
Job Number:	GT18-372	Report Date:	5/10/2018
Project:	Borrow Area Investigation	Test Request No:	-
Location	Ponzo Rd Mossman		
Lab No:	CS27448	Sample Location:	TP2
Date Sampled:	10/09/2018		-16.496352
Date Tested:	17/09/2018		145.389224
Sampled By:	GD		1.0-1.2m
Sample Method:	AS1289.1.2.1.6.5.4		
Material Source:	Insitu Material	Spec Description:	-
For Use As:	-	Lot Number:	-
Remarks:	-	Spec Number:	-



Particle Size Distribution

Test Method AS1289.3.6.1

A.S. Sieve Size	Specification Minimum	Result % Passing	Specification Maximum
	Specification -		Result
75mm		100	
53mm		100	
37.5mm		100	
19.0mm		100	
9.5mm		100	
4.75mm		100	
2.36mm		99	
0.425mm		47	
0.075mm		27	

Plasticity Tests	Test Method	Specification Minimum	Result	Specification Maximum
Liquid Limit (%)	AS1289.3.1.2	-	32	-
Plastic Limit (%)	AS1289.3.2.1	-	20	-
Plasticity Index	AS1289.3.3.1	-	12	-
Linear Shrinkage (%)	AS1289.3.4.1	-	6.0	-
P.I. X % Passing 0.425mm			568	
L.S. X % Passing 0.425mm			284	
Ratio of % Passing (0.075 / 0.425)			0.56	

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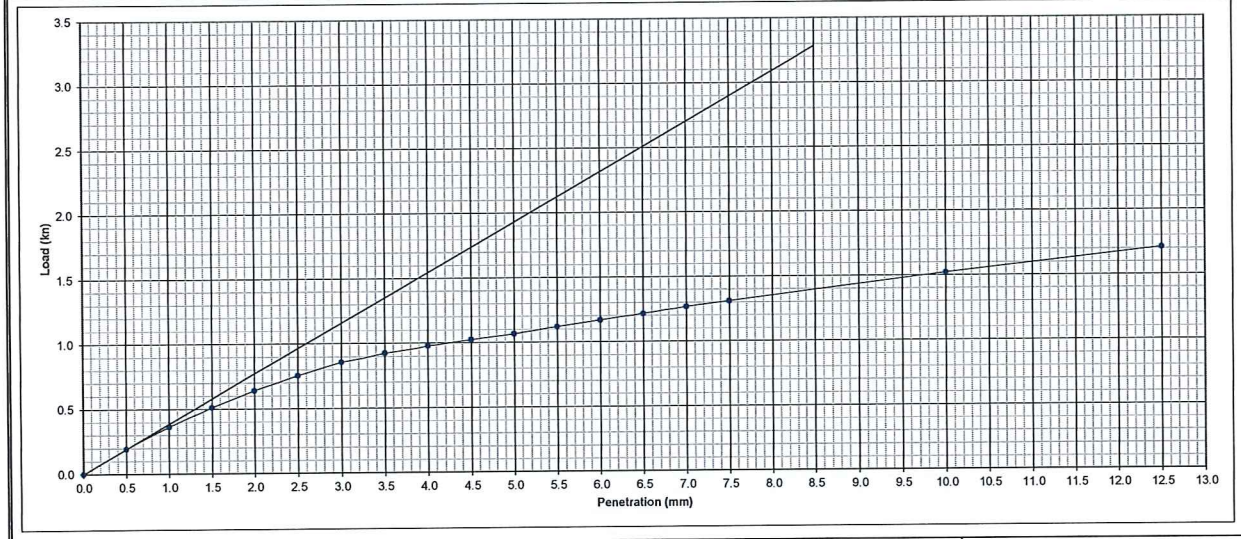
California Bearing Ratio Report (1 Point)

Client:	KFB Engineers	Report Number:	GT18-372 -CS27445 CBR
Client address:	PO Box 3324, Darra QLD 4076		
Job Number:	GT18-372	Report Date:	5/10/2018
Project:	Borrow Area Investigation	Order Number:	-
Location	Ponzo Rd Mossman		
Lab No:	CS27445	Sample Location	
Date Sampled:	10/09/2018	TP1	
Date Tested:	25/09/2018	-16.496298	
Sampled By:	GD	145.390121	
Sample Method:	AS1289.1.2.1.6.5.4	0.25-0.35m	
Material Source:	Insitu Material	Test Method :	AS 1289.6.1.1
For Use As:	-	Lot Number:	-
Remarks:	-	Item Number :	-



Maximum Dry Density - MDD (t/m³) :	1.820	Dry Density after Soak (t/m³) :	1.765
Optimum Moisture Content - OMC (%) :	12.9	Moisture Content after Soak (%) :	16.3
Compactive Effort :	Standard	Density Ratio after Soak (%) :	97
Nominated % Maximum Dry Density Compaction :	97	Field Moisture Content (%) :	10.0
Nominated % Optimum Moisture Content Compaction :	100.0	Moisture Content (Top) after Penetration (%) :	18.5
Achieved Dry Density before Soak (t/m³) :	1.767	Optional Moisture Content (Remainder) after Penetration (%) :	16.5
Achieved Percentage of Maximum Dry Density (%) :	97	CBR 2.5mm (%) :	6
Achieved Moisture Content (%) :	13.0	CBR 5.0mm (%) :	5
Achieved Percentage of Optimum Moisture Content (%) :	100	**CBR Value (%) :**	**6**
Test Condition (Soaked/Unsoaked) / Soaking Period (Days) :	Soaked / 4	Minimum Specified CBR Value (%) :	-
Swell (%) / Surcharge (kg):	0.0 / 4.5	Oversize Material (%)	
Soil Description :	Refer to Test Pit Log.		

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Approved Signatory

K Hodgson

Karl Hodgson - Lab Manager
Cairns Laboratory

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Form Number

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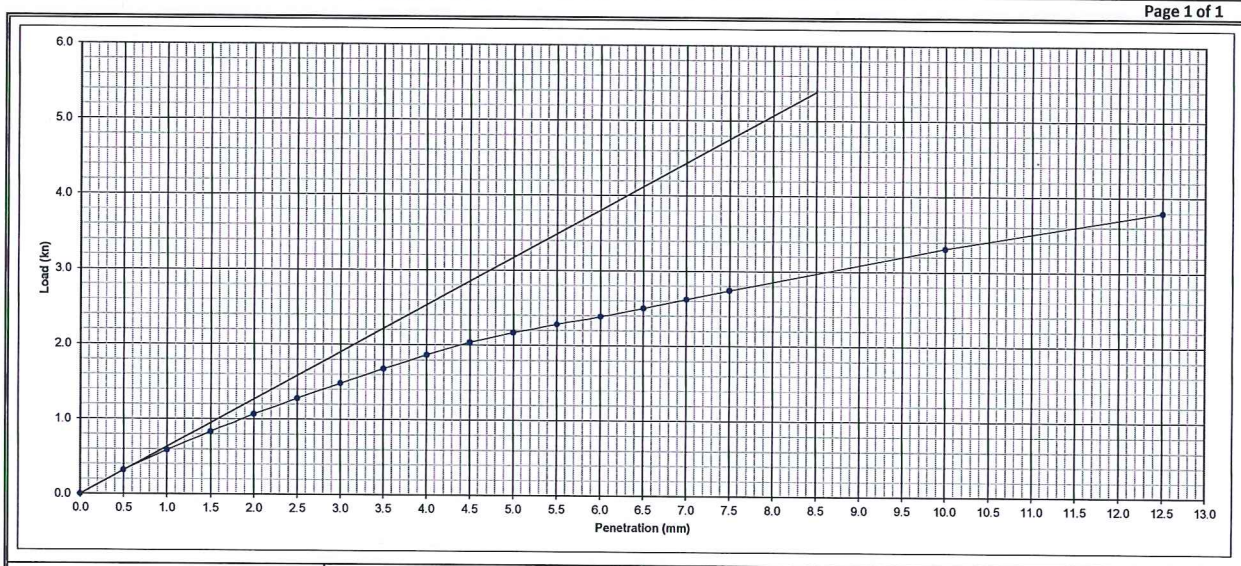
California Bearing Ratio Report (1 Point)

Client:	KFB Engineers	Report Number:	GT18-372 -CS27446 CBR
Client address:	PO Box 3324, Darra QLD 4076		
Job Number:	GT18-372	Report Date:	5/10/2018
Project:	Borrow Area Investigation	Order Number:	-
Location	Ponzo Rd Mossman		
Lab No:	CS27446	Sample Location	TP1 -16.496298 145.390121 0.8-1.0m
Date Sampled:	10/09/2018		
Date Tested:	25/09/2018		
Sampled By:	GD		
Sample Method:	AS1289.1.2.1.6.5.4		
Material Source:	Insitu Material	Test Method :	AS 1289.6.1.1
For Use As:	-	Lot Number:	-
Remarks:	-	Item Number :	-



Maximum Dry Density - MDD (t/m³) :	1.907	Dry Density after Soak (t/m³) :	1.842
Optimum Moisture Content - OMC (%) :	11.6	Moisture Content after Soak (%) :	12.8
Compactive Effort :	Standard	Density Ratio after Soak (%) :	97
Nominated % Maximum Dry Density Compaction :	97	Field Moisture Content (%) :	9.7
Nominated % Optimum Moisture Content Compaction :	100.0	Moisture Content (Top) after Penetration (%) :	14.9
Achieved Dry Density before Soak (t/m³) :	1.842	Optional Moisture Content (Remainder) after Penetration (%) :	13.6
Achieved Percentage of Maximum Dry Density (%) :	97	CBR 2.5mm (%) :	10
Achieved Moisture Content (%) :	11.8	CBR 5.0mm (%) :	11
Achieved Percentage of Optimum Moisture Content (%) :	102	CBR Value (%) :	11
Test Condition (Soaked/Unsoaked) / Soaking Period (Days) :	Soaked / 4	Minimum Specified CBR Value (%) :	-
Swell (%) / Surcharge (kg):	0.0 / 4.5	Oversize Material (%)	
Soil Description :	Refer to Test Pit Log.		

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Approved Signatory

K. Hodgson

Karl Hodgson - Lab Manager
Cairns Laboratory

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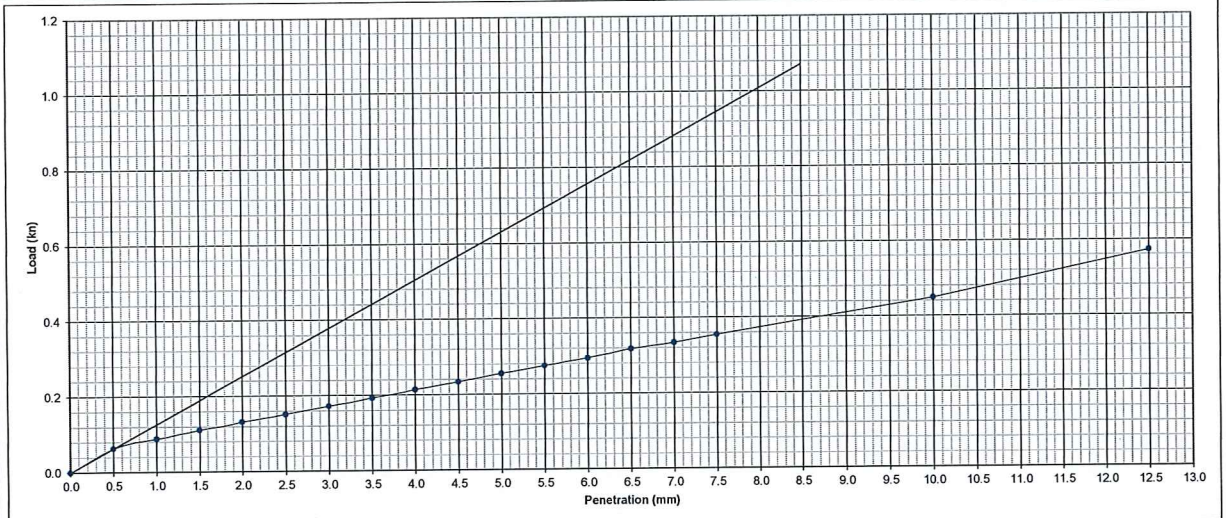
California Bearing Ratio Report (1 Point)

Client:	KFB Engineers	Report Number:	GT18-372 -CS27447 CBR
Client address:	PO Box 3324, Darra QLD 4076		
Job Number:	GT18-372	Report Date:	5/10/2018
Project:	Borrow Area Investigation	Order Number:	-
Location	Ponzo Rd Mossman		
Lab No:	CS27447	Sample Location	TP2
Date Sampled:	10/09/2018		-16.496352
Date Tested:	25/09/2018		145.389224
Sampled By:	GD		0.3-0.5m
Sample Method:	AS1289.1.2.1.6.5.4	Test Method :	AS 1289.6.1.1
Material Source:	Insitu Material	Lot Number:	-
For Use As:	-	Item Number :	-
Remarks:	-		



Maximum Dry Density - MDD (t/m³) :	1.553	Dry Density after Soak (t/m³) :	1.512
Optimum Moisture Content - OMC (%) :	21.0	Moisture Content after Soak (%) :	25.5
Compactive Effort :	Standard	Density Ratio after Soak (%) :	97
Nominated % Maximum Dry Density Compaction :	97	Field Moisture Content (%) :	11.2
Nominated % Optimum Moisture Content Compaction :	100.0	Moisture Content (Top) after Penetration (%) :	30.9
Achieved Dry Density before Soak (t/m³) :	1.513	Optional Moisture Content (Remainder) after Penetration (%) :	25.3
Achieved Percentage of Maximum Dry Density (%) :	97	CBR 2.5mm (%) :	1
Achieved Moisture Content (%) :	20.8	CBR 5.0mm (%) :	1.5
Achieved Percentage of Optimum Moisture Content (%) :	99	**CBR Value (%) :**	**1.5**
Test Condition (Soaked/Unsoaked) / Soaking Period (Days) :	Soaked / 4	Minimum Specified CBR Value (%) :	-
Swell (%) / Surcharge (kg):	0.0 / 4.5	Oversize Material (%)	
Soil Description :	Refer to Test Pit Log.		

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Approved Signatory

K Hodgson

Karl Hodgson - Lab Manager
Cairns Laboratory

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Form Number

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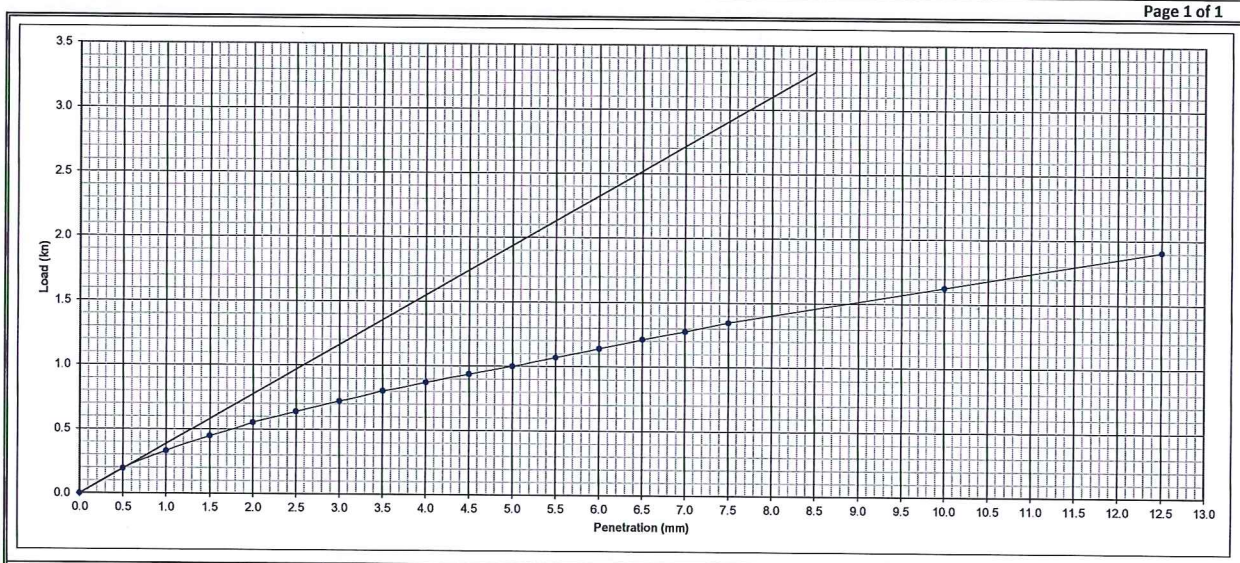
California Bearing Ratio Report (1 Point)

Client:	KFB Engineers	Report Number:	GT18-372 -CS27448 CBR
Client address:	PO Box 3324, Darra QLD 4076		
Job Number:	GT18-372	Report Date:	5/10/2018
Project:	Borrow Area Investigation	Order Number:	-
Location	Ponzo Rd Mossman		
Lab No:	CS27448	Sample Location	TP2 -16.496352 145.389224 1.0-1.2m
Date Sampled:	10/09/2018		
Date Tested:	25/09/2018		
Sampled By:	GD		
Sample Method:	AS1289.1.2.1.6.5.4		
Material Source:	Insitu Material	Test Method :	AS 1289.6.1.1
For Use As:	-	Lot Number:	-
Remarks:	-	Item Number :	-



Maximum Dry Density - MDD (t/m³) :	1.850	Dry Density after Soak (t/m³) :	1.798
Optimum Moisture Content - OMC (%) :	12.3	Moisture Content after Soak (%) :	13.6
Compactive Effort :	Standard	Density Ratio after Soak (%) :	97
Nominated % Maximum Dry Density Compaction :	97	Field Moisture Content (%) :	12.4
Nominated % Optimum Moisture Content Compaction :	100.0	Moisture Content (Top) after Penetration (%) :	16.8
Achieved Dry Density before Soak (t/m³) :	1.797	Optional Moisture Content (Remainder) after Penetration (%) :	14.7
Achieved Percentage of Maximum Dry Density (%) :	97	CBR 2.5mm (%) :	5
Achieved Moisture Content (%) :	12.2	CBR 5.0mm (%) :	5
Achieved Percentage of Optimum Moisture Content (%) :	99	CBR Value (%) :	5
Test Condition (Soaked/Unsoaked) / Soaking Period (Days) :	Soaked / 4	Minimum Specified CBR Value (%) :	-
Swell (%) / Surcharge (kg):	0.0 / 4.5	Oversize Material (%)	
Soil Description :	Refer to Test Pit Log.		

NATA
ACCREDITED FOR TECHNICAL COMPETENCE

Accredited for compliance with ISO/IEC 17025 - Testing.

Approved Signatory

Karl Hodgson - Lab Manager
Cairns Laboratory

NATA Accred. No. 20026

Form Number

FM-RP-121-4

HEAD OFFICE – CAIRNS
ETS GEO PTY LTD
ABN: 16 121 817 794
07 4047 8600
07 4047 8699
admin@etsgeo.com.au
PO Box 587
REDLYNCH QLD 4870

1/220 Scott Street
Cairns QLD 4870

UNDERSTAND THE LIMITATIONS OF YOUR GEOTECHNICAL REPORT

This report has been based on project details as provided to us at the time of the commission. It therefore applies only to the site investigated and to a specific set of project requirements as understood by ETS Geo Pty Ltd.

If there are changes to the project, you need to advise us in order that the effect of the changes on the report recommendations can be adequately assessed. ETS Geo Pty Ltd cannot take responsibility for problems that may occur due to project changes if they are not consulted.

It is important to remember that the subsurface conditions described in the report represent the state of the site at the time of investigation. Natural processes and the activities of man can result in changes to site conditions. For example, ground water levels can change or fill can be placed on a site after the investigation is completed. If there is a possibility that conditions may have changed with time, ETS Geo Pty Ltd should be consulted to assess the impact on the recommendations of the report.

The site investigation only identifies the actual subsurface conditions at the location and time when the samples were taken. Geologists and engineers then extrapolate between the investigation points to provide an assumed three-dimensional picture of the site conditions. The report is based on the assumption that the site conditions as identified at the investigation locations are representative of the actual conditions throughout an area. This may not be the case and actual conditions may differ from those inferred to exist. This will not be known until construction has commenced. Your geotechnical report and the recommendations contained within it can therefore only be regarded as preliminary.

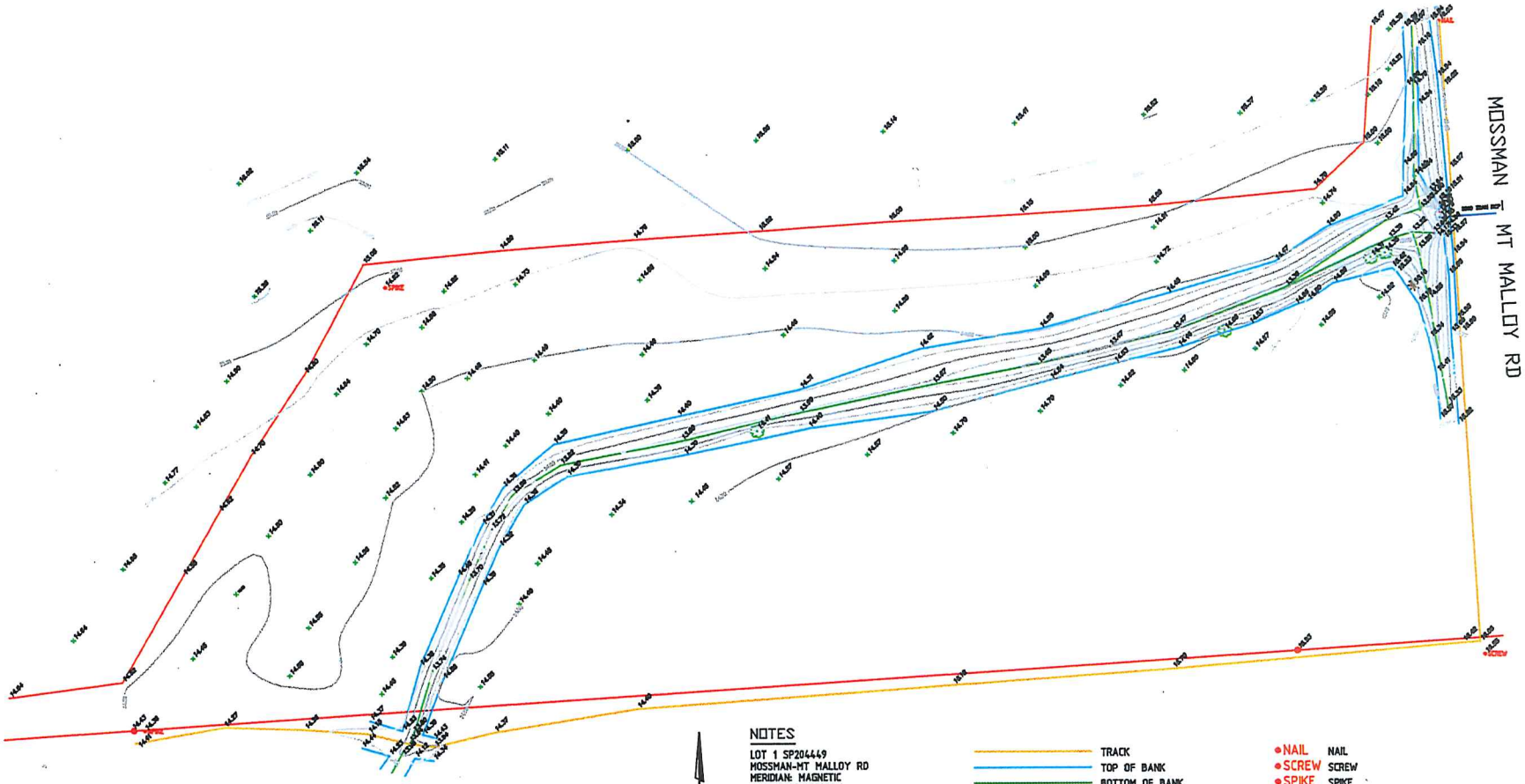
In the event that conditions encountered during construction are different to those described in the report, ETS Geo Pty Ltd should be consulted immediately. Nothing can be done to change the actual site conditions which exist but steps can be taken to reduce the impact of unexpected conditions. For this reason, the services of ETS Geo Pty Ltd should be retained through the development stage of a project.

Problems can occur when other design professionals misinterpret a report. To help avoid this, ETS Geo Pty Ltd should be retained for work with other design professionals to explain the implications of the report.

This report should be retained as a complete document and should not be copied in part, divided or altered in any way.

It is recommended that ETS Geo Pty Ltd is retained during the construction phase to confirm that conditions encountered are consistent with design assumptions. For example, this may involve assessment of bearing capacity for footings, stability of natural slopes or excavations or advice on temporary construction conditions.

This document has been produced to help all parties involve recognise their individual responsibilities.



NOTES

LOT 1 SP204449
MOSSMAN-MT MALLOY RD
MERIDIAN: MAGNETIC
PARISH OF VICTORY
COUNTY OF SOLANDER
AREA : 13.0147 HA
LEVEL DATUM : AHD
FIXED BY SPIRIT LEVELLING
FROM PSM SCR038310 CNR CAPT COOK HWY & MOSSMAN-MOUNT MALLOY RD
CONTOUR INTERVAL: 0.25 METRES
SURVEYED : 26-08-2018
LAYER SU_DTM IS A 3D LAYER
NOT ALL SERVICES & NO UNDERGROUND SERVICES HAVE BEEN LOCATED.
SURVEYED BY GREGOR WOLFF
DP SPATIAL INFORMATION SERVICES

TRACK
TOP OF BANK
BOTTOM OF BANK
TOP CONCRETE HEADWALL
BOTTOM CONCRETE HEADWALL
DRAIN PIPE U/G RCP 1800 DIAM
ELEC CABLE A/G
EDGE OF SUGAR CANE
EDGE OF BITUMIN
DTM INDEX CONTOURS
DTM CONTOURS

NAIL NAIL
SCREW SCREW
SPIKE SPIKE
SPOT LEVEL
ERGON POWER POLE
TREE
TREE - DEAD

0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

N.V. & J.S. Pty Ltd
PROPOSED SUBDIVISION
AT CRAWFORD ST, MOSSMAN

PROPOSED BORROW AREA
LOT 1 on SP204449
MOSSMAN - MT MOLLOY RD

KFB ENGINEERS
ABN 73 618 014 261
Civil & Structural
1/38-42 Pease St, Cairns | PO Box 927, Cairns Q 4870
P: 07 40320492 | F: 07 40320092
E: email@kfbeng.com.au

JOB No: K-2578
SHEET: BA1 A
SCALE: 1:500 (@ A1)

DOUGLAS
SHIRE COUNCIL

PO Box 723 Mossman Qld 4873
www.douglas.qld.gov.au
enquiries@douglas.qld.gov.au
ABN 71 241 237 800

Administration Office
64 - 66 Front St Mossman
P 07 4099 9444
F 07 4098 2902

YOUR REF: 14-20/R000112
OUR REF: ROL 617/2015 SEDA (763534)

18 December 2015

NV & JS Pty Ltd
C/- Planning Plus Pty Ltd
PO Box 8046
CAIRNS QLD 4870

Attention: Ms Claire Simmons

Dear Madam

DECISION NOTICE UNDER S 335 SUSTAINABLE PLANNING ACT 2009:
DEVELOPMENT APPLICATION FOR
46-62 FRONT STREET (12 CRAWFORD STREET), MOSSMAN

With reference to the abovementioned Development Application, which was determined by Council at the Ordinary Meeting held on 16 December 2015, please find attached the relevant Decision Notice.

The Notice includes extracts from the Act with respect to making representations about conditions, negotiated decisions, suspension of the appeal period, and lodging an Appeal.

This notice also includes an Infrastructure Charges Notice issued in accordance with section 648F of the *Sustainable Planning Act* 2009.

Should you have any enquiries in relation to this Decision Notice, please contact Neil Beck of Development and Environment on telephone number 07 4099 9451.

Yours faithfully

Paul Hoye
General Manager Operations

Att

41.2015.617
1/15

DOUGLAS
SHIRE COUNCIL

PO Box 723 Mossman Qld 4873
www.douglas.qld.gov.au
enquiries@douglas.qld.gov.au
ABN 71 241 237 800

Administration Office
64 - 66 Front St Mossman
P 07 4099 9444
F 07 4098 2902

APPLICANT DETAILS
NV & JS Pty Ltd
C/- Planning Plus Pty Ltd
PO Box 8046
CAIRNS QLD 4870

ADDRESS
46-62 Front Street (12 Crawford Street), Mossman

REAL PROPERTY DESCRIPTION
Lot 12 on SP252360

PROPOSAL
Preliminary Approval to Override the Planning Scheme and Reconfiguring a Lot (1 Lot into 19 Lots)

DECISION
Approved subject to conditions (refer to approval package below).

DECISION DATE
16 December 2015

TYPE
Preliminary Approval to Override the Planning Scheme

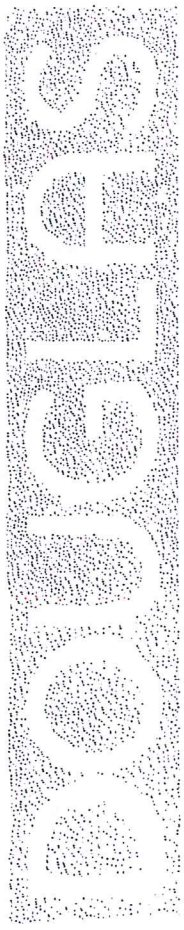
Reconfiguration of a Lot (Development Permit)

REFERRAL AGENCIES
None Applicable

SUBMISSIONS
There were no submissions for this application.

FURTHER DEVELOPMENT PERMITS REQUIRED
Development Permit for Operational Works

CODES TO COMPLY WITH FOR SELF-ASSESSABLE DEVELOPMENT
None



DOES THE ASSESSMENT MANAGER CONSIDER THE APPLICATION TO BE IN CONFLICT WITH APPLICABLE CODES, PLANNING SCHEME, STATE PLANNING POLICIES OR PRIORITY INFRASTRUCTURE PLAN (IF YES, INCLUDE STATEMENT OF REASONS)
Not in conflict

APPROVED DRAWING(S) AND/OR DOCUMENT(S)
The term 'approved drawing(s) and/or document(s)' or other similar expression means:

Drawing or Document	Reference	Date
Proposed Layout Plan	PR124232-4 Issue D	14 July 2015

ASSESSMENT MANAGER CONDITIONS

1. Carry out the approved development generally in accordance with the approved drawing(s) and/or document(s), and in accordance with:

   a. The specifications, facts and circumstances as set out in the application submitted to Council; and

   b. The following conditions of approval and the requirements of Council's Planning Scheme and the FNQROC Development Manual.

   Except where modified by these conditions of approval

Timing of Effect

2. The conditions of the Development Permit must be effected prior to the issue of a Compliance Certificate for the Plan of Survey, except where specified otherwise in these conditions of approval.

Street Layout and Design

3. The street layout and design is to be generally in accordance with RPS Drawing No PR124232-4 Issue D dated 14 July 2015 subject to any amendments to comply with the conditions and to comply with Queensland Streets and the FNQROC Development Manual, to the satisfaction of the Chief Executive Officer. In particular:

   - The street name of 'Crawford Street' will apply to the proposed new road entering the development. The Applicant may propose a name for the section of road providing access to Lot 5 through to Lot 9;
   - The road reserve widths are to be generally in accordance with RPS drawing PR124232-4 Revision D dated 14 July 2015. The road carriageway within the reserve is to be a minimum with of 7.5 m for all sections of the road. The Eastern Road verge in front of Lots 5 to 9 is to be maintained at 4.5 m minimum with a minor reduction permitted to the verge on the Park Side;
   - Suitably constructed and sealed access to the sewer pump station to allow vehicles to access the wet well for maintenance purposes;
   - Drainage calculations to demonstrate that the piped stormwater solution and overland flow paths are compliant with the Queensland Urban Drainage Manual for event flows up to and including the 100 year ARI rainfall event (1%AEP).

An amended plan incorporating the above requirements must be submitted prior to the issue of a Development Permit for Operational Works.

All works must be carried out in accordance with the approved plans, to the requirements and satisfaction of the Chief Executive Officer prior to the issue of a Compliance Certificate for the Plan of Survey.

Water Supply & Sewer

4. An updated water supply and sewerage infrastructure plan and supporting information including hydraulic network analysis must be submitted demonstrating how the development will be serviced by Council's Infrastructure. In particular the plan must:

   a. Identify external catchments that will be connected to the internal sewer or water networks;

   b. Identify any trunk infrastructure external to the subdivision that may require upgrading to accommodate the development; and

   c. The applicant is to provide a network model for the water supply system operation demonstrating acceptable minimum and maximum pressures are achieved under the conditions nominated in the FNQROC Development Manual. Council may accept alternative supporting information in lieu of a network model subject to such supporting information demonstrating acceptable system operation.

      At a minimum this must include a hydrant flow and pressure test with pressures recorded at a minimum of two adjacent hydrants to demonstrate impact on the system for flows up to and including peak hour plus fire fighting flows. Suitable documentation and evidence of such tests must be endorsed by the Registered Professional Engineer of Queensland (RPEQ) design engineer prior to achieving operational works approval.

   The water supply and sewerage infrastructure plan must be endorsed by the Chief Executive Officer prior to the issue of a Development Permit for Operational Works.

Water Supply & Sewerage Works Internal

5. Undertake the following water supply and sewerage works internal to the subject land:

   a. Provide a single internal sewer connection to each lot in accordance with the FNQROC Development Manual;

   b. Provide ability for water connection to each lot in accordance with the FNQROC Development Manual;

   All the above works must be designed and constructed in accordance with the FNQROC Development Manual.

   All works must be carried out in accordance with the approved plans, to the requirements and satisfaction of the Chief Executive Officer prior to the issue of a Compliance Certificate for the Plan of Survey.

Earthworks & Sewer Control Plan

6. Provide a plan of the proposed site earthworks and finished surface design contours which address the following requirements:

   a. Filling of the lots to achieve flood immunity. The earthworks plan is to nominate fill levels, batter slopes and the interface to existing surface levels for lots proposed to be filled;

   b. Detail the extent and location of proposed filling to take place on proposed Lots 1, 6, 7, 9, 11 & 12;

   c. Filling must be contained to each allotment with the toe of fill batters within property boundaries;

   d. The area of lots to be controlled by sewer must be clearly identified and be of sufficient area to accommodate a residence;

   e. Consideration to be given to the relocation of the sewer to the front of Lots 1 to 3 subject to sewer lot controls being satisfactory.

   The amended Plan must be submitted to Council, to the satisfaction of the Chief Executive Officer, prior to submitting a Development Application for Operational Works. All filling is to be completed in accordance with the approved plans during the Operational Works stage.

Building Envelope Plan

7. Dependent upon the sewer design and extent of fill, provide a plan nominating building envelopes for buildings on those lots to which the siting of buildings may be restricted.

   The Building Envelope Plan must be submitted to Council at the time of seeking a Development Permit for Operational Works.

   The applicant / owner must also ensure that the endorsed building envelope plans are made known to all prospective purchasers of the lots.

Sewage Pump Station

8. The applicant is to provide detailed design plans for the Pump Station. The plans are to nominate all operating levels for the pump station as per the FNQROC Development Manual.

   Supporting information for the pump station is to be provided at the time of seeking operational works approval and must include at a minimum:

   a. Emergency storage capacity and duration;

   b. Emergency overflow operation;

c. Freeboard achieved to each lot in the event of system overflow;

d. RPEQ Certification.

The switchboard and pump station design including pump selection is to be provided to Council for approval prior to obtaining operational works approval. Council may nominate a preferred pump supplier and switchboard configuration to ensure consistency of infrastructure across Council's network.

The applicant is to provide a commissioning plan for the sewage pump station.

Local Drainage Study

9. Undertake a local drainage study of the site to determine the drainage impacts on upstream and downstream properties and the mitigation measures required to minimise such impacts. In particular, the study must address the following:

1. The contributing catchment boundaries;

2. The extent of the 100 year ARI flood event in relation to the site both pre and post development;

3. Primary and secondary flow paths for the 5, 10 and 100 year ARI rainfall (1%AEP) events;

4. Identify any requirement for drainage easements;

5. Identify the need and tenure for flood detention areas to ensure a no worsening impact on downstream properties for the development;

6. Information on the proposed works and any impacts proposed at the drainage outlet from the proposed development. Specific information on the pipe outlet and erosion protection in addition to the overland flow path outlet and its erosion protection measures is to be provided;

g. Supporting calculations must include specific advice on the western catchment run off and how this is conveyed through the site to the creek. The calculations must show how the minor rainfall event is conveyed underground and must include calculations on the overland flow for the major event. Information on the pit entry capacity, blockage factors, pit losses are to be included for the minor event. A severe impact assessment is required to demonstrate safe conveyance of flows in the event of complete inlet blockage;

h. Advice on storm water drainage and flooding is to be provided for lots 6, 7, 9, 11 and 12. Where lots are proposed to be filled to achieve the required immunity, and earthworks plan is to be provided demonstrating fill levels, batter slopes and the interface to existing surface levels;

i. Lawful point of discharge.

The study must be to the satisfaction of the Chief Executive Officer prior to issue of a Development Permit for Operational Works.

Plan of Drainage Works

10. The subject land must be drained to the satisfaction of the Chief Executive Officer. This includes provision of the following:

    a. Drainage infrastructure generally in accordance with the concepts shown as Option 2 on RPS Drawing No PR124232-4 Issue D. Calculations of the sub-catchment discharge and the flow width and depth in roadside drains and easements must be provided prior to the issue of a Development Permit for Operational Works. The calculations must demonstrate that the flows are fully contained in the drainage paths and do not enter private property except where easements exist;

    b. The drainage system from the development must incorporate a gross pollutant trap(s) or equivalent measure(s), meeting the following Council specifications for stormwater quality improvement devices (SQIDs), namely:

        i. End-of-line stormwater quality improvement devices (SQIDs) shall be of a proprietary design and construction and shall carry manufacturer's performance guarantees as to removal of foreign matter from stormwater and structural adequacy of the unit.

        ii. SQIDs shall remove at least ninety-five per cent of all foreign matter with a minimum dimension of three (3) mm and shall be configured to prevent re-injection of captured contaminants. The SQIDs treat all first flush runoff, which shall be defined as that volume of water equivalent to the runoff from the three (3) month ARI storm event. The location of SQIDs within the drainage system shall be planned to ensure that the first flush waters from all parts of the (developed) catchment are treated.

        iii. The design of the SQIDs shall not compromise the hydraulic performance of the overall drainage system.

        iv. SQIDs shall be positioned so as to provide appropriate access for maintenance equipment.

    c. All new allotments shall have immunity from flooding associated with an ARI 100 year rainfall event;

    d. Where practical, all new allotments must be drained to the road frontages, drainage easements or drainage reserves and discharged to the existing drainage system via storm water quality device(s); and

    e. Detail the outlet into Parker Creek and erosion and scour protection measures to be installed to the satisfaction of the Chief Executive Officer.

    All drainage works must be completed to the satisfaction of the Chief Executive Officer, prior to the issue of a Compliance Certificate for the Plan of Survey.

Existing Creek and Drainage Systems

11. All existing creek systems and drainage areas must be left in their current state, including no channel alterations and no removal of vegetation unless consented to in writing by the Chief Executive Officer.

Lawful Point of Discharge

12. All stormwater from the property must be directed to a lawful point of discharge such that it does not adversely affect surrounding properties or properties downstream from the development.

Landscape Plan

13. Undertake landscaping of the site and street frontages of new roads in accordance with FNQROC Development Manual and in accordance with a landscape plan. The landscape plan must be endorsed by the Chief Executive Officer prior to the issue of a Development Permit for Operational Work. In particular, the plan must show:

    a. Planting of the footpath with trees using appropriate species;

    b. The provision of shade trees in the park;

    c. Species to have regard to the Planning Scheme Policy No 7 Landscaping;

    d. Inclusion of all requirements as detailed in other relevant conditions included in this Approval, with a copy of this Development Approval to be given to the applicant's Landscape Architect / Designer.

Two (2) A1 copies and one (1) A3 copy of the landscape plan must be endorsed by the Chief Executive Officer prior to the issue of a Development Permit for Operational Works. Areas to be landscaped must be established prior to approval and dating of the Plan of Survey and must be maintained for the duration of the on-maintenance period to the satisfaction of the Chief Executive Officer.

Open Space & Drainage Reserve

14. The area identified as park on RPS Drawing No PR124232-4 Issue D must be transferred to Council as freehold land tenure. The area of land adjacent the Parker Creek corridor must be transferred to the Crown for Public Use Land – Drainage Reserve. The park area central to the development must include:

    a. Water service and provision of a tap for the central park;

    b. Bollards around the perimeter to prevent vehicle access with the exception of Council access;

    c. Shelter and seating area in the central park;

d. Profiling of the park is to be demonstrated on the earthworks plan. In particular site grading, batter height and slope must meet the requirements of the Planning Scheme and FNQROC Development Manual;

e. Seeded and grassed.

The inclusion of other embellishments will be determined at the time of seeking a Development Permit for Operational Works.

This area of land must be to the requirements and satisfaction of the Chief Executive Officer. The land must be transferred at the same time as registering the Plan of Survey with the Department of Natural Resources and Mines.

Damage to Infrastructure

15. In the event that any part of Council's existing infrastructure is damaged as a result of construction activities occurring on the site, Council must be notified of the affected infrastructure and have it repaired or replaced at no cost to Council.

Electricity Supply

16. Written evidence from Ergon Energy advising if distribution substation/s are required within the development must be provided. If required, details regarding the location of these facilities must be submitted to the Chief Executive Officer accompanied by written confirmation from Ergon Energy. Details regarding underground electricity supply must be provided prior to the issue of a Development Permit for Operational Works.

Electricity & Telecommunications

17. Written evidence of negotiations with Ergon Energy and the telecommunication authority must be submitted to Council stating that both an underground electricity supply and telecommunications service will be provided to the development prior to the issue of a Compliance Certificate for the Plan of Survey.

Stockpiling & Transportation of Fill Material

18. Soil used for filling or spoil from the excavation is not to be stockpiled in locations that can be viewed from adjoining premises or a road frontage for any longer than one (1) month from the commencement of works.

    Transportation of fill or spoil to and from the site must not occur within:

    a. peak traffic times; or
    b. before 7:00 am or after 6:00 pm Monday to Friday; or
    c. before 7:00 am or after 1:00 pm Saturdays; or
    d. on Sundays or Public Holidays.

19. Dust emissions or other air pollutants must not extend beyond the boundary of the site and cause a nuisance to surrounding properties.

Storage of Machinery & Plant

20. The storage of any machinery, material and vehicles must not cause a nuisance to surrounding properties, to the satisfaction of the Chief Executive Officer.

Construction Access

21. Vehicular access to the site for construction and demolition purposes must be provided from Crawford Street only, unless authorized by the Chief Executive Officer.

ADVICE

1. This approval, granted under the provisions of the *Sustainable Planning Act* 2009, shall lapse four (4) years from the day the approval takes effect in accordance with the provisions of sections 339 and 341 of the *Sustainable Planning Act* 2009.

2. All building site managers must take all action necessary to ensure building materials and / or machinery on construction sites are secured immediately following the first cyclone watch and that relevant emergency telephone contacts are provided to Council officers, prior to commencement of works.

3. This approval does not negate the requirement for compliance with all other relevant Local Laws and other statutory requirements.

Infrastructure Charges Notice

4. A charge levied for the supply of trunk infrastructure is payable to Council towards the provision of trunk infrastructure in accordance with the Adopted Infrastructure Charges Notice, a copy of which is attached for reference purposes only. The original Adopted Infrastructure Charges Notice will be provided under cover of a separate letter.

   The amount in the Adopted Infrastructure Charges Notice has been calculated according to Council's Adopted Infrastructure Charges Resolution.

   Please note that this Decision Notice and the Adopted Infrastructure Charges Notice are stand-alone documents. The *Sustainable Planning Act* 2009 confers rights to make representations and appeals in relation to a Decision Notice and an Adopted Infrastructure Charges Notice separately.

   The amount in the Adopted Infrastructure Charges Notice is subject to index adjustments and may be different at the time of payment. Please contact Development and Environment at Council for review of the charge amount prior to payment.

   The time when payment is due is contained in the Adopted Infrastructure Charges Notice.

5. For information relating to the *Sustainable Planning Act* 2009 log on to www.dilgp.qld.gov.au . To access the FNQROC Development Manual, Local Laws and other applicable Policies log on to www.douglas.qld.gov.au .

6. That the following notation be placed on Council's future rates records in respect of the 19 residential allotments:

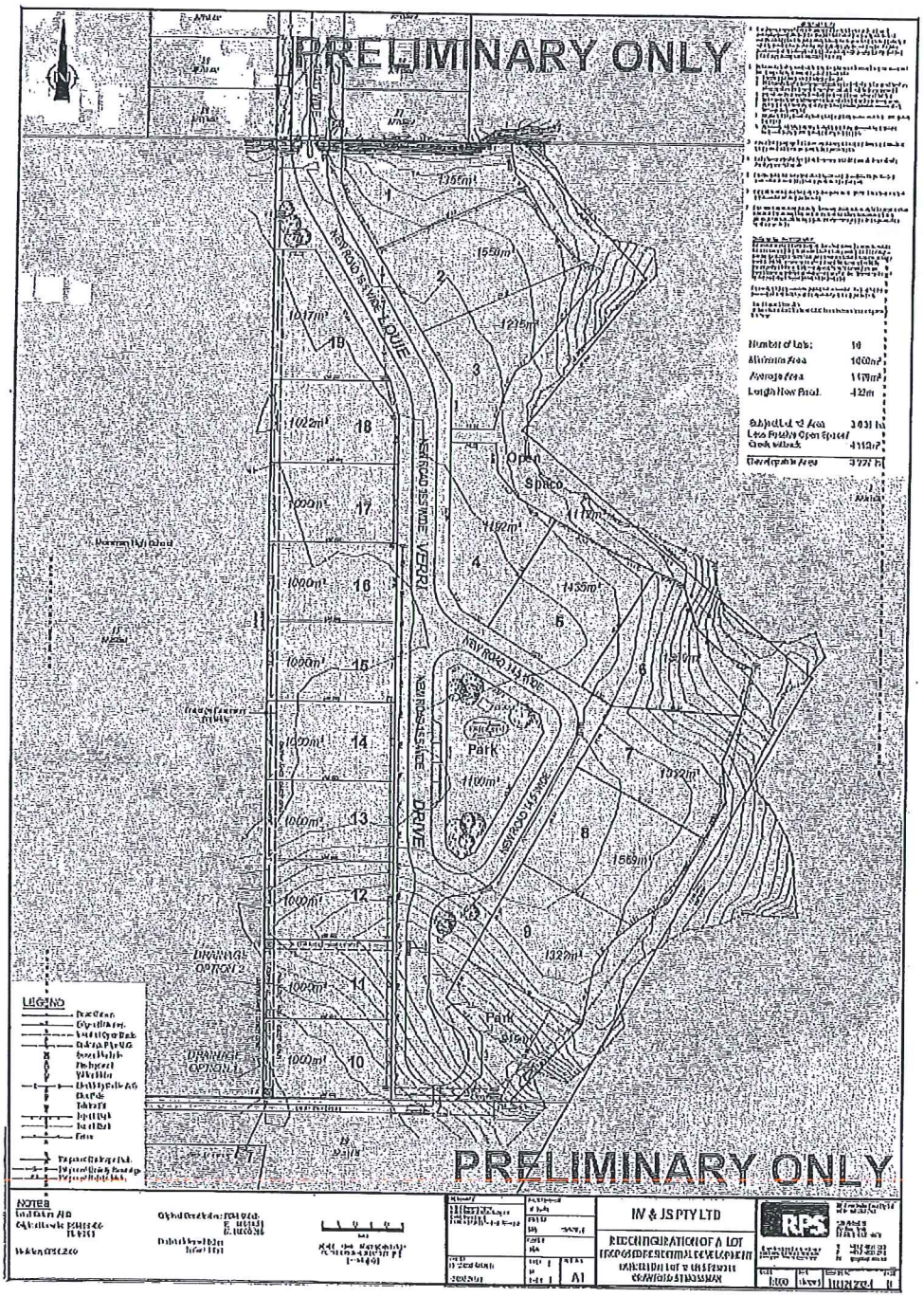
'The allotment is located in close proximity to the Mossman Sugar Mill and may from time to time be impacted by operation of the Mill with respect to odour, air-borne omissions/material and heavy vehicle movements.'

RIGHTS OF APPEAL
Attached

End of Decision Notice

DECISION NOTICE DETAILS
SUSTAINABLE PLANNING ACT 2009

APPENDIX 1: APPROVED DRAWING(S) & DOCUMENT(S)



41.2015.617
12/15

					Meeting #:	1
Meeting Purpose:	Discuss Drainage solution proposed for the development	**Meeting Time:**	2.30pm to 4.15pm		**Meeting Date:**	21 Feb 2017
Attendees:	Nathan Verri Euan Bruce Daryl Walker Michael Matthews Daniel Lamond Paul Steele	Developer Civil Engineering Consultant Civil Engineering Consultant DSC Engineer; DSC Town Planner DSC Consultant				
Circulation:	All plus Neil Beck					
Apologies:	Neil Beck DSC Senior Planner					

#	Item:	Discussion / Action:	Action By:
1	Flood Level	The applicant's consultants gave an overview of the revised 1 in 100 year ARI flood level. Euan Bruce advised that the 100 year flood level adopted for design was 8.6 m. Euan advised that in the design submitted to Council, the lots are designed to be above this level. This resolves the query between the earlier flood advice of 7.3 in the revised during levels.	
2	**Detention Basin**	Paul Steele relayed advice from Council that the detention basin shown on the drawings at the south eastern end was not supported by Council. The applicant's engineers advised the latest drawings had removed the detention basin and it was no longer part of the proposal.	Noted – no further action required
3	Flood Model	It was noted that Council had recently had a peer review done on modelling for Marr's Creek on the western side of Mossman Township. Some of the parameters highlighted from that peer review included the initial and continuing loss values. Council Officer's initial reading of the AECOM's report interpreted that AECOM's calibration of the greater model adopted an initial loss of 10mm/hr. Council therefore seeks clarification of the 60mm/hr and 30mm/hr references for sensitivity analysis that appear higher than the advised AECOM calibration values.	Developer's project team to review
4	Road Levels	Council noted that the road grading is below the 100 year flood level of 8.6m advised by the applicant, (subject to review under item 3 above). The applicant's engineers are to consider the road grading	

		in relation to the advised flood level. It was noted that the flood level has been modelled at between 8.3m and 8.6m in the advice from the flood modelling consultant, (AECOM). The applicant's civil engineers are to advise a road level and provide recommendations for resulting freeboard or on-road ponding based on the adopted levels. Further the RPEQ is to confirm how this complies with FNQROC/QUDM requirements.	Applicant to review and include supporting info in OPW submission
5	Freeboard	Council also requested that the applicant advise how free board to the final building levels will be achieved noting the requirements of the FNQROC/QUDM. Council noted that in the recent Marrs Creek flood study that project team/applicant submitted that its modelling had shown the creek system was acting as a flood plain in the 100 year flood event. The RPEQ contended that freeboard should be assessed accordingly and the engineers in that instance contended that 300 mm was sufficient. Council Notes it's up to the RPEQ to assess such matters and include its recommendation (and reasons) in its submission for operational works.	RPEQ to assess and confirm details in OPW supporting information
6	School Drainage	In relation to the drainage solution from the school the applicant's engineers provided a summary of the proposed solution. Euan advised that the School/Education Department had given approval in-principle to remove the easements in the rear of lots and locate surface drainage within the school grounds. Euan advised that the Qld Ed/School accepted the drain in its land and was accepting of the southern outlet proposed. The applicant is to get this formally from the school/education department and will submit this to Council. Council noted that Land tenure is an issue for the applicants proposed southern drainage option noting it must cross Council land and then another property to get into the creek. The AECOM maps show that the creek profile (and hence bank location) is some distance from the southern boundary. The meeting had regard to the depth contours in the flood modellers report to locate the approximate creek bank. The applicant was informed that Council's preferred option remained Option 2. The land tenure is wholly contained within the development and not reliant on third parties. It was also noted that this is the option conditioned in the current planning approval. The applicant's engineers noted concerns regarding future development of the school.	Noted Applicant to secure formal advice Actions as noted in discussion points

		Council contended that the tenure of the drainage path through the development site under option two (as conditioned) would provide the lawful point of discharge to the creek and secure the tenure for future upgrades should they be necessary in future development of the school. Council engineers also noted uncertainty with the outlet into the creek for a southern outlet solution. No survey information is currently available of the bed and banks of the creek and vegetation that may constrain this southern option. Conversely the outlet available within the land would be into an existing gully and no further in-stream works would be required. The applicant engineers expressed concern about the ability to meet the requirements of the severe Impact assessment noting that the assessment would typically assume full blockage of the pipes. Council's position is that the standard overland drainage path solution per FNQROC is a common solution and would normally accommodate the severe impact assessment. The applicant would need to assess the flows, grades, levels etc for this scenario.	
7	Retaining Walls	Discussion was then held regarding the need for retaining wall along the western Boundary. Given the battering already present in the western side of the drainage solution within the school, Council Officers asked whether a more cost effective solution might be for earth batters and a concrete invert within the school. The applicant to consider whether this is a feasible option and approach the school. Council Officers advised that the retaining wall should be wholly contained within either the school or the private lots and not spanning across boundaries. All arrangements impacting the school will need formal agreement from the school/QEd.	Consultants to consider Note

Feedback from site visit by Council Officers Friday 24th February 2017.

Summary points:-

- Preference is for drainage passing through the proposed subdivision, (Council Officer's not supportive of the southern drainage solution);
- Preference is for fill compared to retaining wall for the subdivision and Sewage Pump station;

- Minimum requirement for sewage pump station layout is to be similar to the configuration at Port Pacific Stage 4;
- Gully inlet pit is to be located to allow access via the overland flow path

Commentary

As per above, Council Officers are not supportive of the southern break into creek. The bank and adjacent land in that location is currently above the 1 in 100 year ARI event, (based on LiDAR levels), Council Officers not supportive of cutting through this zone and opening up to direct creek flows;

This contrast with the creek environment at originally nominated outlet location within the development where the Parker Creek appears to be transitioning more to a flood plain scenario breaking out to the east (see LiDAR levels). Streamflow direction is not into the site;

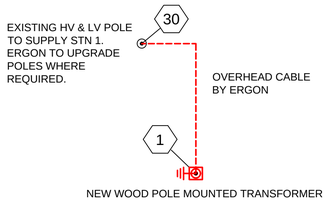
Please note Council would not be in favour of a pedestrian link into the school and would look at options to achieve the drainage solutions without encouraging pedestrians to utilise the corridor. (that is; overflow path to accommodate flows and maintenance access but not required to be a ped corridor).

Pump Station to be trafficable around PS, earthworks in lieu of retaining on southern boundary. Officers supportive of earthworks in DSC land to avoid the need for retaining walls. Council would encourage the maximisation of trafficable around pump station.

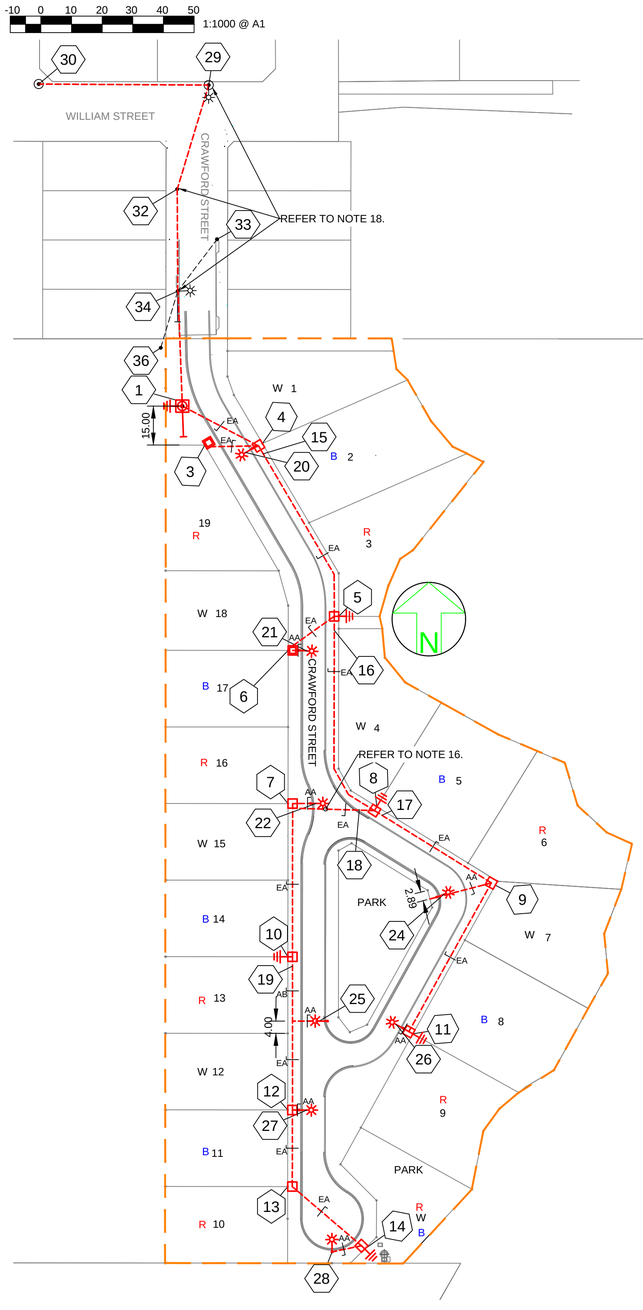
WORKPLAN NOTES

1. FOR STANDARD UNDERGROUND DUCT SECTIONS REFER TO UNDERGROUND CONSTRUCTION MANUAL DRAWING 5168.
2. STANDARD TRENCH ALIGNMENT IS 0.3 TO 1.2 METRES OFF PROPERTY ALIGNMENT SUBJECT TO LOCATION OF OTHER SERVICES. REFER TO UNDERGROUND CONSTRUCTION MANUAL DRAWING 5228.
3. STREETLIGHT POLE FOOTINGS SHALL BE LOCATED PERPENDICULAR TO THE KERB AND SQUARE FROM THE FRONT BOUNDARY PEG ENSURING NO CONFLICT WITH FUTURE DRIVEWAYS, UNLESS DETAILED OTHERWISE. WHERE DIMENSIONS ARE SHOWN, THEY TAKE PRECEDENCE OVER GRID COORDINATES.
4. ALL CONDUITS SHALL BE CONTINUOUS UNLESS DETAILED OTHERWISE.
5. REFER TO UNDERGROUND CONSTRUCTION MANUAL DRAWING 5162 FOR CONDUIT BEND DETAILS AT PILLARS.
6. FOR STANDARD UDC CONSTRUCTION PRACTICES REFER TO DRAWINGS 5022, 5085 AND 5124.
7. INSTALLATION OF WOOD POLE MOUNTED TRANSFORMER REQUIRED IN ROAD RESERVE ADJACENT LOT 19, STATION 1 BY ERGON ENERGY.
8. THERE ARE 8 x 18W LED SYLVANIA STREET SINGLE MINOR ROAD STREETLIGHTS ON RATE 2.
9. STREETLIGHT DESIGN TO AS1158 CATEGORY P4.
10. MINOR STREETLIGHTS - THE DEVELOPER SHALL SUPPLY AND INSTALL STREETLIGHT BASES. FOUNDATION DEPTH IS 1200mm FOR MINOR STREETLIGHTS. REFER TO LIGHTING CONSTRUCTION MANUAL DRAWING 1-6-4-1 & 2. FOR ALL FOOTPATHS, CENTRELINE OF STREETLIGHT SHALL BE 0.82m FROM THE INVERT OF KERB AND CHANNEL.
11. THE LIGHTING DESIGN INCLUDES AN ALLOWANCE FOR CONSTRUCTION TOLERANCE OF LIGHT POLES SUCH THAT ANY STREETLIGHT CAN BE POSITIONED UP TO A MAXIMUM OF ±350mm LONGITUDINALLY FROM THE POSITION SHOWN AND UP TO 100mm MAXIMUM FURTHER AWAY FROM KERB EDGE, INCLUDING POLES WITH GRID COORDINATES, AND STILL MAINTAIN COMPLIANCE.
12. CONFIRM ALL CONDUIT AND CABLE LENGTHS PRIOR TO INSTALLATION.
13. WHERE SHOWN, 35mm sq ANNEALED BARE Cu EARTH SHALL BE INSTALLED AT BOTTOM OF TRENCH, IN NATURAL SOIL, BELOW BEDDING SAND, LOCATED A MINIMUM OF 50mm HORIZONTALLY TOWARDS PROPERTY BOUNDARY FROM CONDUITS (HV OR LV) INSTALLED ON PROPERTY BOUNDARY SIDE OF TRENCH. COIL 2m OF CABLE AT SPECIFIED STATIONS IN THE CONDUIT DUCTING SCHEDULE AND ALL REQUIRED JOINTS FOR CONNECTION BY ELECTRICAL CONTRACTOR. THE USE OF THE EARTH ROD CONNECTOR (U-BOLT, IIN. 0719437) IS NOT ACCEPTABLE FOR CONDUCTOR / CABLE TO CONDUCTOR / CABLE CONNECTIONS. IN ADDITION PARALLEL GROOVE CLAMPS ARE NOT ACCEPTABLE FOR JOINTING OR CONNECTING EARTHS BELOW GROUND LEVEL. ACCEPTABLE METHODS SHALL BE EITHER A CRIMP LINK OR A 'C' TYPE COMPRESSION CONNECTOR. CRIMP LINKS AND 'C' TYPE COMPRESSION CONNECTORS ARE AVAILABLE FROM ERGON ENERGY STORES IIN. 0157746 AND IIN. 2406222 RESPECTIVELY.
14. IN ACCORDANCE WITH ELECTRICAL SAFETY ACT, A SAFETY OBSERVER MUST BE PRESENT AT ALL TIMES WHEN WORKING IN THE VICINITY OF ENERGIZED CABLES. CONTACT ERGON ENERGY ON 131046.
15. ELECTRONIC CABLE MARKERS (ECM'S) ARE TO BE SUPPLIED AND INSTALLED AT ENDS OF ALL SPARE CONDUITS INCLUDING (SPARE ROAD CROSSINGS, CONDUIT STUBS, FOR FUTURE STAGES, SPARE CONDUITS FOR FUTURE HV, ETC) AND AT ALL CABLE JOINTS. REFER TO ERGON STANDARD SPECIFICATIONS RSC07, RSC08, & RSM02.
16. WHERE SHOWN ON SITE PLAN, CONCRETE COVER SHALL BE INSTALLED ABOVE CONDUIT WHERE CONDUIT BURIAL DEPTH IS LESS THAN THAT SPECIFIED IN UNDERGROUND CONSTRUCTION MANUAL DRAWING 5163. FOR FOOTPATHS REFER TO UNDERGROUND CONSTRUCTION MANUAL DRAWING 5016. FOR ROAD CROSSINGS REFER TO UNDERGROUND CONSTRUCTION MANUAL DRAWING 5017.
17. ALL CONTRACTORS MUST CARRY OUT A DIAL BEFORE YOU DIG ENQUIRY BEFORE COMMENCING ANY EXCAVATION.
18. EXISTING POLES ALONG CRAWFORD ST & WILLIAM ST TO BE RELOCATED/UPGRADED BY ERGON ENERGY.

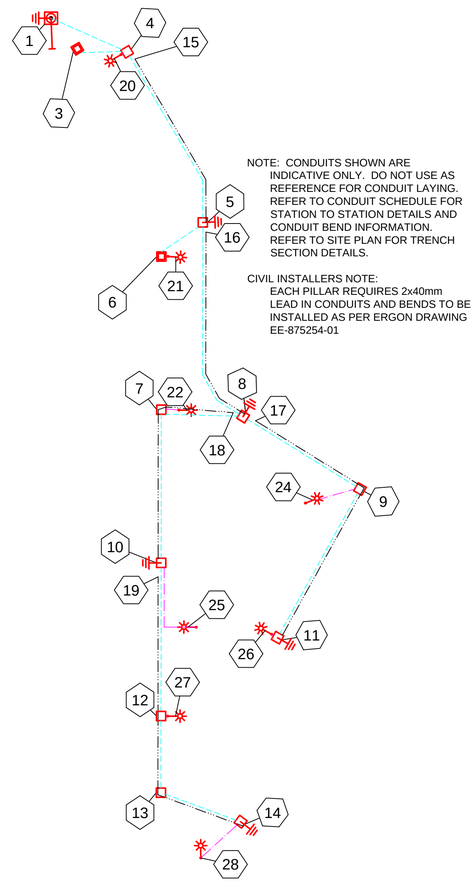
HV SCHEMATIC



SITE PLAN



CONDUIT SCHEMATIC



NOTE: CONDUITS SHOWN ARE INDICATIVE ONLY. DO NOT USE AS REFERENCE FOR CONDUIT LAYING. REFER TO CONDUIT SCHEDULE FOR STATION TO STATION DETAILS AND CONDUIT BEND INFORMATION. REFER TO SITE PLAN FOR TRENCH SECTION DETAILS.

CIVIL INSTALLERS NOTE:
EACH PILLAR REQUIRES 2x40mm LEAD IN CONDUITS AND BENDS TO BE INSTALLED AS PER ERGON DRAWING EE-875254-01

NOT FOR CONSTRUCTION

NO CONDUITS SHALL BE INSTALLED PRIOR TO AN ERGON ENERGY PRE-START MEETING, WITH THE EXCEPTION OF ROAD CROSSING CONDUITS AS PER THE CONDITIONS BELOW.

ERGON ENERGY HAVE ADVISED THAT WHERE THE CONDITIONS BELOW HAVE NOT BEEN MET AND NO PRE-START HAS OCCURRED, ERGON ENERGY WILL NOT ACCEPT THE WORKS AND REQUIRE ALL TRENCHES TO BE FULLY EXCAVATED, ALL CONDUITS TO BE REMOVED AND NEW CONDUITS INSTALLED TO ERGON ENERGY SPECIFICATIONS AFTER AN ERGON ENERGY PRE START MEETING.

CONDITIONS FOR ROAD CROSSINGS INSTALLATION PRIOR TO AN ERGON ENERGY PRE-START.
ROAD CROSSING CONDUITS ONLY MAY BE INSTALLED SUBJECT TO THE FOLLOWING CONDITIONS:

- TWO (2) WORKING DAYS NOTICE OF INTENTION TO INSTALL ROAD CROSSINGS MUST BE PROVIDED TO THE ERGON ENERGY ASSESSMENT OFFICER.
- SPA CONSULTING ENGINEERS (QLD) PTY LTD MUST BE ADVISED OF THE INTENTION TO INSTALL ROAD CROSSINGS.
- THE DEVELOPER BEARS THE RISK THAT ERGON ENERGY MAY REQUIRE CHANGES TO ROAD CROSSINGS FOR ANY DRAWINGS MARKED NOT FOR CONSTRUCTION.
- THE ROAD CROSSING CONDUITS MUST BE INSTALLED IN ACCORDANCE WITH ERGON ENERGY STANDARD SPECIFICATIONS AND STANDARD DRAWINGS.

FOR APPROVAL

ON COMPLETION, MARK UP THIS PRINT CLEARLY WITH ALL FINAL CHANGES AND RETURN TO PROJECT MANAGER

CHANGES: YES/NO

ELECTRICAL CONTRACTOR

NAME: _____

SIGNATURE: _____

DATE: _____

CIVIL CONTRACTOR

NAME: _____

SIGNATURE: _____

DATE: _____

Code	Date	Description	Revised	Code	Date	Description	Approved
1	7/11/16	FOR APPROVAL	HK				

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A business unit of SPA Consulting Engineers (QLD) Pty Ltd a.c.n. 010844416

LEGEND

- HV DUCT
- LV DUCT
- LIGHTING DUCT
- 35mm sq ANNEALED BARE COPPER EARTH
- CABLE EXISTING
- CABLE PLANNED
- CABLE RECOVER
- EQUIPMENT EXISTING
- EQUIPMENT RECOVER
- EQUIPMENT PLANNED
- SUBSTATION
- HV ISOLATING DEVICE
- LV ISOLATING DEVICE
- NORMAL PILLAR
- CROSS ROAD PILLAR
- LINKING PILLAR
- COMMERCIAL/ INDUSTRIAL PILLAR
- DISTRIBUTION CABINET
- STREETLIGHT
- EARTH
- POLE
- CABLE JOINT

Drawing Title
CRAWFORD ST, MOSSMAN
UDC UG ELECTRICAL RETICULATION
SITE PLAN & SCHEMATICS

Project Description
CRAWFORD ST
MOSSMAN, QLD 4873

Date	NOVEMBER 2016
Scale	1:1000 @ A1
Drawn	HK
Approved	JE
Sheet	1 OF 2

ERGON Project Number	SPA Drawing Number	Revision
1146276	2779-E01	1

CONDUIT DUCTING SCHEDULE

Rev Date 9-12-15

STN FROM	STN TO	ACTION	CONSTRUCTION CODE	LENGTH (m)	No. of LENGTHS / DRUM	BENDS (Degrees/ Radius(mm) x No.)	Remarks
1	4	INSTALL - CIVIL	C80L	28	4.7	45/1200x1 45/1830x1 15/1830x4	CONDUIT TO AVOID WATER SERVICES.
4	3	INSTALL - CIVIL	C80L	16	2.7	90/450x2 15/1830x4	EXTRA BENDS ADDED TO AVOID COMMS PIT.
4	5	INSTALL - CIVIL	C80L	64	10.7	45/1200x2 30/1830x1	
4	20	INSTALL - CIVIL	C40H	3	0.8	90/300x2 90/600x2	EXTRA BENDS ADDED TO AVOID THRUST BLOCKS.
5	6	INSTALL - CIVIL	C80L	20	3.3	90/450x2 15/1830x4	EXTRA BENDS ADDED TO AVOID COMMS PIT.
5	8	INSTALL - CIVIL	C80L	70	11.7	45/1200x2 30/1830x2	
6	21	INSTALL - CIVIL	C40H	3	0.8	90/300x2 90/600x2	EXTRA BENDS ADDED TO AVOID COMMS PIT.
7	10	INSTALL - CIVIL	C80L	50	8.3	45/1200x2	
7	22	INSTALL - CIVIL	C40H	7	1.8	90/300x2 90/600x2	EXTRA BENDS ADDED TO AVOID FIRE HYDRANT AND COMMS PIT.
8	7	INSTALL - CIVIL	C80L	27	4.5	45/1200x2 15/1830x6	CONDUIT TO AVOID STREET LIGHT FOOTING AND FIRE HYDRANT.
8	9	INSTALL - CIVIL	C80L	45	7.5	45/1200x2	
9	11	INSTALL - CIVIL	C80L	56	9.3	45/1200x2	
9	24	INSTALL - CIVIL	C40H	9	2.3	90/300x2 90/600x2	
10	12	INSTALL - CIVIL	C80L	50	8.3	45/1200x2	
10	25	INSTALL - CIVIL	C40H	34	8.5	90/300x2 90/600x1	
11	26	INSTALL - CIVIL	C40H	3	0.8	90/300x2 90/600x1	EXTRA BENDS ADDED TO AVOID COMMS PIT.
12	13	INSTALL - CIVIL	C80L	25	4.2	45/1200x2	
12	27	INSTALL - CIVIL	C40H	3	0.8	90/300x2	
13	14	INSTALL - CIVIL	C80L	30	5.0	45/1200x2 15/1830x4	EXTRA BENDS ADDED TO AVOID COMMS PIT.
14	28	INSTALL - CIVIL	C40H	10	2.5	90/300x2	
15	5	INSTALL - CIVIL	35mm2 ANNEALED BARE Cu EARTH	65	0.3		COIL 2M OF CABLE AT STN 5 FOR CONNECTION BY ELECTRICAL CONTRACTOR. LEAVE IN TRENCH AT STN 15.
16	8	INSTALL - CIVIL	35mm2 ANNEALED BARE Cu EARTH	70	0.3		COIL 2M OF CABLE AT STN 8 FOR CONNECTION BY ELECTRICAL CONTRACTOR. LEAVE IN TRENCH AT STN 16.
17	11	INSTALL - CIVIL	35mm2 ANNEALED BARE Cu EARTH	100	0.4		COIL 2M OF CABLE AT STN 11 FOR CONNECTION BY ELECTRICAL CONTRACTOR. LEAVE IN TRENCH AT STN 17.
18	10	INSTALL - CIVIL	35mm2 ANNEALED BARE Cu EARTH	72	0.3		COIL 2M OF CABLE AT STN 10 FOR CONNECTION BY ELECTRICAL CONTRACTOR. LEAVE IN TRENCH AT STN 18.
19	14	INSTALL - CIVIL	35mm2 ANNEALED BARE Cu EARTH	100	0.4		COIL 2M OF CABLE AT STN 14 FOR CONNECTION BY ELECTRICAL CONTRACTOR. LEAVE IN TRENCH AT STN 19.

CONSTRUCTION SCHEDULE

Rev Date 24-03-16

STN NO	SITE LABEL	POLE ALIGNMENT	POLE SETTING DEPTH	ACTION	CONSTRUCTION CLASS	CONSTRUCTION CODE	DRAWING NUMBER	POSITION ON POLE	REMARKS
1				INSTALL - ERGON	EARTH				
1				INSTALL - ERGON	HV CABLE TERMINATION	11 CT P/185T/P	5101		FINAL TERMINATION FOR STN 1 BY ERGON ENERGY.
1				INSTALL - ERGON	LV CABLE TERMINATION	LV CT P/240/P/AL	5056		FINAL TERMINATION FOR STN 4 TO STN 1.
1				INSTALL - ERGON	POLE MOUNTED TRANSFORMER				LOCATION TO BE PEGGED BY ERGON ENERGY MINIMUM OF 15M NORTH OF LOT 19 BOUNDARY AS SHOWN.
3				INSTALL	PILLAR	LV PX/6/16CU/N	5041		
4				INSTALL	PILLAR	LV PN2/6S/240/N	5026		
5				INSTALL	EARTH	E MEN/PIL	5085		
5				INSTALL	PILLAR	LV PN2/6/240/N	5026		
6				INSTALL	PILLAR	LV PX/6S/16CU/N	5041		
7				INSTALL	PILLAR	LV PN2/6S/240/N	5026		
8				INSTALL	EARTH	E MEN/PIL	5085		
8				INSTALL	PILLAR	LV PN3/6/240/N	5027		
9				INSTALL	PILLAR	LV PN2/6S/240/N	5026		
10				INSTALL	EARTH	E MEN/PIL	5085		
10				INSTALL	PILLAR	LV PN2/6S/240/N	5026		
11				INSTALL	EARTH	E MEN/PIL	5085		
11				INSTALL	PILLAR	LV PN1/6S/240/N	5025		
12				INSTALL	PILLAR	LV PN2/6S/240/N	5026		
13				INSTALL	PILLAR	LV PN2/6/240/N	5026		
14				INSTALL	EARTH	E MEN/PIL	5085		
14				INSTALL	PILLAR	LV PN1/6S/240/N	5025		LOCATE PILLAR WHERE APPROPRIATE CLEAR OF ALL SERVICES. PILLAR TO SUPPLY SEWAGE PUMP STATION.
20				INSTALL	POLE	SL BPM/75/1 15 CI	1-6-4-1 & 2		
21				INSTALL	POLE	SL BPM/75/1 15 CI	1-6-4-1 & 2		
22				INSTALL	POLE	SL BPM/75/1 15 CI	1-6-4-1 & 2		
24				INSTALL	POLE	SL BPM/75/1 15 CI	1-6-4-1 & 2		LOCATE STREETLIGHT 2.89M FROM PROPERTY BOUNDARY AS SHOWN.
25				INSTALL	POLE	SL BPM/75/1 15 CI	1-6-4-1 & 2		LOCATE STREETLIGHT 4M FROM PROPERTY BOUNDARY AS SHOWN.
26				INSTALL	POLE	SL BPM/75/1 15 CI	1-6-4-1 & 2		
27				INSTALL	POLE	SL BPM/75/1 15 CI	1-6-4-1 & 2		
28				INSTALL	POLE	SL BPM/75/1 15 CI	1-6-4-1 & 2		
29				EXISTING	POLE				ERGON TO UPGRADE POLES WHERE REQUIRED.
29				EXISTING	WOOD POLE BRACKET				
30				EXISTING	POLE				
32				EXISTING	POLE				ERGON TO UPGRADE POLES WHERE REQUIRED.
33				EXISTING	POLE				
34				EXISTING	POLE				ERGON TO UPGRADE POLES WHERE REQUIRED.
34				EXISTING	WOOD POLE BRACKET				
36				EXISTING	POLE				

UNDERGROUND CABLE SCHEDULE

Rev Date 1-2-16

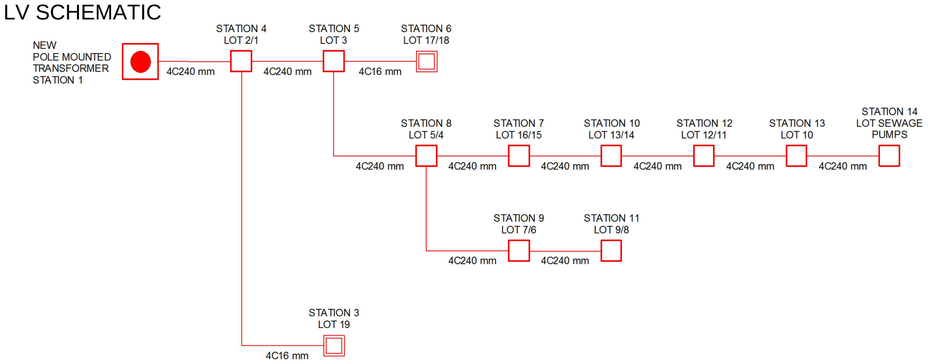
STN FROM	STN TO	ACTION	VOLTAGE	CONSTRUCTION CODE	ROUTE LENGTH	CABLE LENGTH	REMARKS
1	4	INSTALL	415V	LV-240C4/673	30	44	COIL 15M OF CABLE AT BASE OF POLE FOR FINAL TERMINATION BY ERGON ENERGY.
4	3	INSTALL	415V	LV-16CUC4/614	16	20	
4	5	INSTALL	415V	LV-240C4/673	64	68	
4	20	INSTALL	240V	LVI-4CU2NS/1671	3	8	
5	6	INSTALL	415V	LV-16CUC4/614	20	24	
5	8	INSTALL	415V	LV-240C4/673	70	74	
6	21	INSTALL	240V	LVI-4CU2NS/1671	3	8	
7	10	INSTALL	415V	LV-240C4/673	50	54	
7	22	INSTALL	240V	LVI-4CU2NS/1671	7	12	
8	7	INSTALL	415V	LV-240C4/673	27	31	
8	9	INSTALL	415V	LV-240C4/673	45	49	
9	11	INSTALL	415V	LV-240C4/673	56	60	
9	24	INSTALL	240V	LVI-4CU2NS/1671	9	14	
10	12	INSTALL	415V	LV-240C4/673	50	54	
10	25	INSTALL	240V	LVI-4CU2NS/1671	34	39	
11	26	INSTALL	240V	LVI-4CU2NS/1671	3	8	
12	13	INSTALL	415V	LV-240C4/673	25	29	
12	27	INSTALL	240V	LVI-4CU2NS/1671	3	8	
13	14	INSTALL	415V	LV-240C4/673	30	34	
14	28	INSTALL	240V	LVI-4CU2NS/1671	10	15	

PUBLIC LIGHTING SCHEDULE

Rev Date 10-08-15

STN NO	SITE LABEL	ACTION	CONSTRUCTION CODE	RATE	TARIFF OWNER	MOUNTING HEIGHT (m)	REMARKS
20		INSTALL	SL LED 0034	RATE 2	DOUGLAS SHIRE COUNCIL	7.5	
21		INSTALL	SL LED 0034	RATE 2	DOUGLAS SHIRE COUNCIL	7.5	
22		INSTALL	SL LED 0034	RATE 2	DOUGLAS SHIRE COUNCIL	7.5	
24		INSTALL	SL LED 0034	RATE 2	DOUGLAS SHIRE COUNCIL	7.5	
25		INSTALL	SL LED 0034	RATE 2	DOUGLAS SHIRE COUNCIL	7.5	
26		INSTALL	SL LED 0034	RATE 2	DOUGLAS SHIRE COUNCIL	7.5	
27		INSTALL	SL LED 0034	RATE 2	DOUGLAS SHIRE COUNCIL	7.5	
28		INSTALL	SL LED 0034	RATE 2	DOUGLAS SHIRE COUNCIL	7.5	
29		EXISTING					
34		EXISTING					

LV SCHEMATIC



NOT FOR CONSTRUCTION

NO CONDUITS SHALL BE INSTALLED PRIOR TO AN ERGON ENERGY PRE-START MEETING, WITH THE EXCEPTION OF ROAD CROSSING CONDUITS AS PER THE CONDITIONS BELOW.

ERGON ENERGY HAVE ADVISED THAT WHERE THE CONDITIONS BELOW HAVE NOT BEEN MET AND NO PRE-START HAS OCCURRED, ERGON ENERGY WILL NOT ACCEPT THE WORKS AND REQUIRE ALL TRENCHES TO BE FULLY EXCAVATED, ALL CONDUITS TO BE REMOVED AND NEW CONDUITS INSTALLED TO ERGON ENERGY SPECIFICATIONS AFTER AN ERGON ENERGY PRE START MEETING.

CONDITIONS FOR ROAD CROSSINGS INSTALLATION PRIOR TO AN ERGON ENERGY PRE-START.
ROAD CROSSING CONDUITS ONLY MAY BE INSTALLED SUBJECT TO THE FOLLOWING CONDITIONS:

- TWO (2) WORKING DAYS NOTICE OF INTENTION TO INSTALL ROAD CROSSINGS MUST BE PROVIDED TO THE ERGON ENERGY ASSESSMENT OFFICER.
- SPA CONSULTING ENGINEERS (QLD) PTY LTD MUST BE ADVISED OF THE INTENTION TO INSTALL ROAD CROSSINGS.
- THE DEVELOPER BEARS THE RISK THAT ERGON ENERGY MAY REQUIRE CHANGES TO ROAD CROSSINGS FOR ANY DRAWINGS MARKED NOT FOR CONSTRUCTION.
- THE ROAD CROSSING CONDUITS MUST BE INSTALLED IN ACCORDANCE WITH ERGON ENERGY STANDARD SPECIFICATIONS AND STANDARD DRAWINGS.

FOR APPROVAL

ON COMPLETION, MARK UP THIS PRINT CLEARLY WITH ALL FINAL CHANGES AND RETURN TO PROJECT MANAGER

CHANGES: YES/NO

ELECTRICAL CONTRACTOR

NAME: _____

SIGNATURE: _____

DATE: _____

CIVIL CONTRACTOR

NAME: _____

SIGNATURE: _____

DATE: _____

Code	Date	Description	Revised	Code	Date	Description	Approved
1	7/11/16	FOR APPROVAL	HK				

CLIENT:
NV & JS PTY LTD
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CIVIL ENGINEER
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spa consulting engineers
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A business unit of SPA Consulting Engineers (QLD) Pty Ltd a.c.n. 010844441

LEGEND

- HV DUCT
- LV DUCT
- LIGHTING DUCT
- 35mm sq ANNEALED BARE COPPER EARTH
- CABLE EXISTING
- CABLE PLANNED
- CABLE RECOVER
- EQUIPMENT EXISTING
- EQUIPMENT RECOVER
- EQUIPMENT PLANNED
- SUBSTATION
- HV ISOLATING DEVICE
- LV ISOLATING DEVICE
- NORMAL PILLAR
- CROSS ROAD PILLAR
- LINKING PILLAR
- COMMERCIAL/ INDUSTRIAL PILLAR
- DISTRIBUTION CABINET
- STREETLIGHT
- EARTH
- POLE
- CABLE JOINT

Drawing Title
CRAWFORD ST, MOSSMAN
UDC UG ELECTRICAL RETICULATION
SCHEDULES & LV SCHEMATIC

Project Description
CRAWFORD ST
MOSSMAN, QLD 4873

Date	NOVEMBER 2016
Scale	NTS
Drawn	HK
Approved	JE
Sheet	2 OF 2

ERGON Project Number	SPA Drawing Number	Revision
1146276	2779-E02	1

CONDUIT CONFIGURATION

CONDUITS AND DUCTS ARE IN LAYER:
< L460 NBN Support - Underground >
AND TERMINOLOGY CATEGORISED INTO TWO GROUPS IN THE DRAWINGS AS PER BELOW:
1- DUCT USED WITH LOCAL NETWORK
2-CONDUIT USED WITH LEAD-IN DROPS
ATTRIBUTES ATTACHED TO CONDUITS ARE AS SHOWN

CONDUIT SIZE — P100
CONDUIT LENGTH — 26.5

NOTE:
- P100 HAS AN INTERNAL DIAMETER OF 104.9 mm AND A MINIMUM WALL THICKNESS OF 4.5 mm
- P50 HAS AN INTERNAL DIAMETER OF 53 mm AND A MIMIMUM WALL THICKNESS OF 3.1 mm
- P20 HAS AN INTERNAL DIAMETER OF 23.3 mm AND A MINIMUM WALL THICKNESS OF 1.4 mm

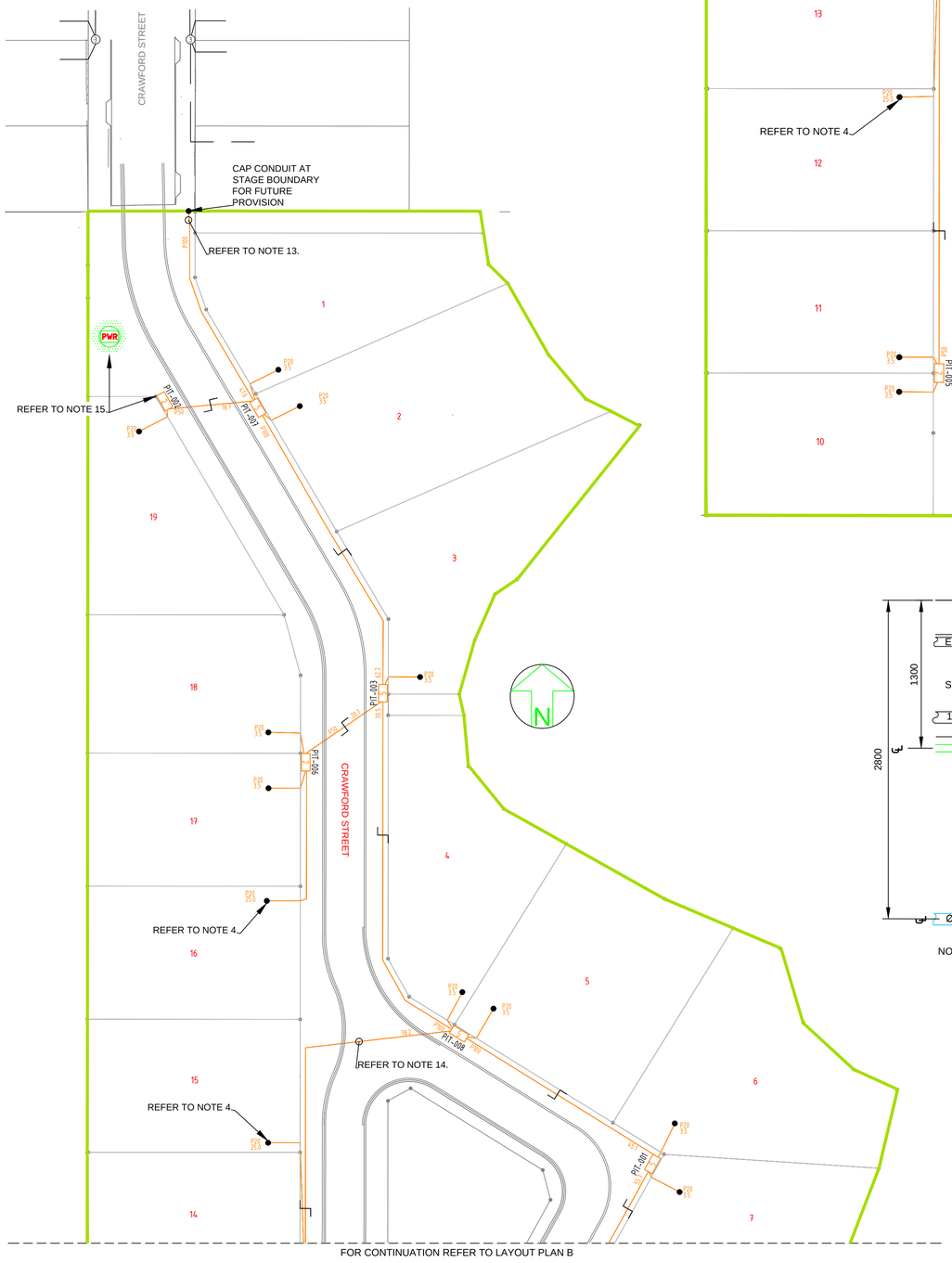
STANDARD DESIGN NOTES:

1. THERE ARE A TOTAL OF 19 SINGLE RESIDENTIAL LOTS.
2. REFER TO SPA DRAWING 2779-E01-E02 FOR COORDINATION WITH THE ELECTRICAL DESIGN.

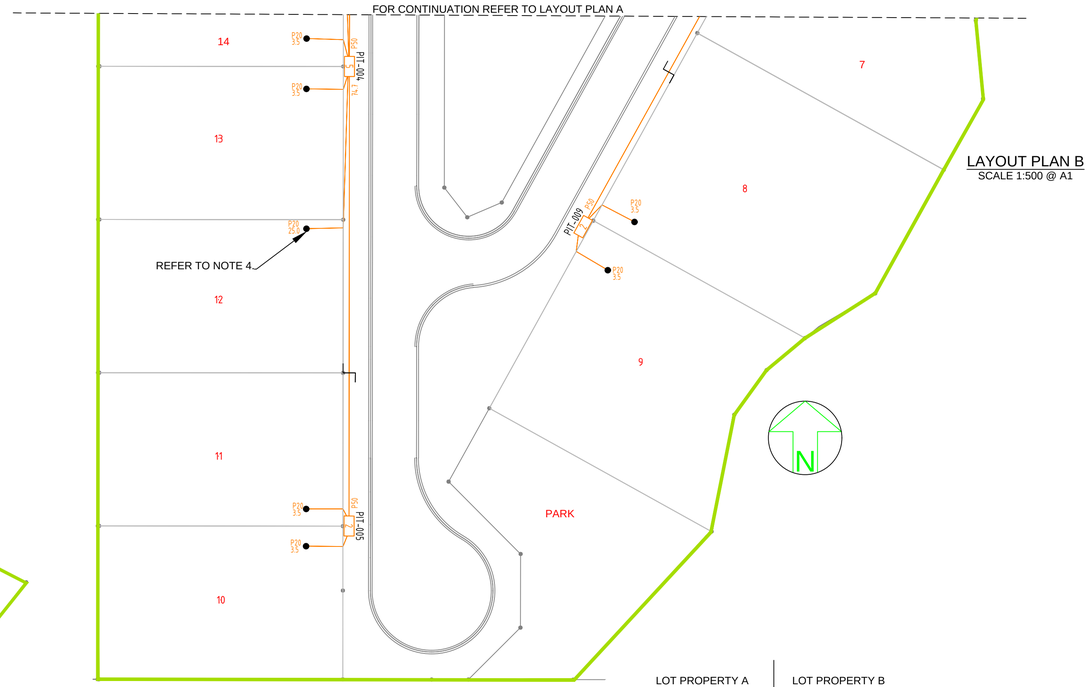
STANDARD CONSTRUCTION NOTES:

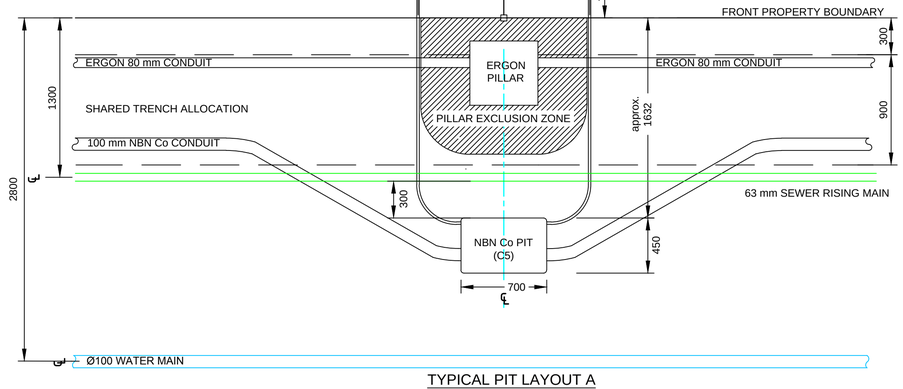
1. REFER FIBRE READY PIT AND PIPE SPECIFICATION FOR REAL ESTATE DEVELOPMENT PROJECTS - G645:2011 BY COMMUNICATIONS ALLIANCE LTD AND INDUSTRY CODE C524:2013 - EXTERNAL TELECOMMUNICATION CABLE NETWORKS FOR DETAILED SPECIFICATION.
2. MULTIPLE 15° CONDUIT BENDS TO BE USED TO SWING IN AND OUT OF THE STANDARD TRENCH ALIGNMENT AND ENTER THE NARROW ENDS OF THE PIT.
3. PITS TO INCLUDE LID GASKET TO PREVENT DIRT ENTRY AND SPREADER BARS TO PREVENT PIT BUCKLING DURING BACKFILL / GROUND COMPACTION. PIT LIDS TO BE EMBOSSED WITH "COMMUNICATIONS" AND COMPLY TO TELSTRA SPECIFICATIONS.
4. SERVICE CONDUITS TO EXTEND 1m INSIDE THE FRONT PROPERTY BOUNDARY. REFER EXTENDED SERVICE CONDUIT DETAIL FOR DISTANCES FROM DIVIDING PROPERTY BOUNDARY FOR BOUNDARIES WITHOUT PIT. CONTRACTORS TO TIE TELECOMMUNICATIONS CAUTION TAPE TO END OF SERVICE CONDUITS AND EXTEND TO ABOVE GROUND LEVEL FOR FUTURE CONDUIT LOCATION.
5. ALL CONDUITS TO ENTER AND EXIT AT NARROW ENDS OF PITS ONLY. LOCATE CONDUITS AS CENTRALLY IN PIT END WALLS AS POSSIBLE. CONDUITS SHALL NOT BE INSTALLED WITHIN 50 mm OF ANY CORNER OF THE PIT. MINIMUM SEPARATION BETWEEN CONDUITS TO BE 25 mm. INSTALL CONDUITS AND CONDUIT COLLARS (BUSHES) TO BE SQUARE AND FLUSH WITH THE PIT END WALL. REFER TO THE PIT END WALL DETAILS IN THIS DESIGN FOR ADDITIONAL REQUIREMENTS.
6. MINIMUM COVER TO BE; 300 mm FOR SERVICE DROP CONDUITS, 450 mm IN VERGE, 600 mm UNDER LOCAL ROADS, AND 800 mm UNDER MAIN ROADS.
7. CONDUITS ARE TO BE CLEANED AND PROVEN USING A MANDREL. AFTER TESTING INSTALL A SUITABLE DRAW ROPE TO ALL CONDUITS AND CAP CONDUIT ENDS. SEAL CONDUITS AT PITS TO PREVENT ENTRY OF DUST AND MOISTURE.
8. INSTALL NON CONDUCTIVE (METAL FREE) MARKER TAPE ABOVE ALL TELSTRA CONDUITS, 300 mm BELOW FINISHED GROUND LEVEL. INSTALL METALLIC KERB MARKERS AT ROAD CROSSINGS.
9. REFER TO ERGON ENERGY STANDARD DRAWINGS 5228 AND 5168 SHEETS 1 TO 3 FOR SHARED TRENCH CROSS SECTIONS.
10. GRADE TOP OF PIT TO MATCH VERGE / FOOTPATH.
11. WHERE REQUIRED, SUPPLY AND INSTALL SERVICE AND ROAD CROSSING CONDUITS SHOWN IN THE SITE PLAN.
12. SUPPLY AND INSTALL ADDITIONAL DEVIATING CONDUIT BENDS TO ACHIEVE THE INCREASED / DECREASED BURIAL DEPTH REQUIRED TO AVOID CLASH WITH OTHER SERVICES.
13. WHERE SPECIFIED ON THE SITE PLAN, TELSTRA CONDUIT TO BE INSTALLED UNDERNEATH STORM WATER.
14. WHERE SPECIFIED ON SITE PLAN, SUPPLY AND INSTALL CONCRETE COVER (FOR VERGE AND FOOTPATH) / CONCRETE ENCASEMENT (FOR ROADWAYS) ENSURE THAT MINIMUM SEPARATION TO ALL OTHER SERVICES ARE MAINTAINED.
15. CONTRACTOR TO ENSURE MINIMUM 15m CLEARANCE FROM POLE TO PIT AS PER AS/CA S0009:2016

LAYOUT PLAN A
SCALE 1:500 @ A1



LAYOUT PLAN B
SCALE 1:500 @ A1





TYPICAL PIT LAYOUT A

(SCALE 1:25 @ A1)

NOTE: - WHERE REQUIRED, MIRROR REVERSE
- LOCATE CENTRE OF PIT AS CLOSE AS POSSIBLE TO THE PROLONGATION OF PROPERTY BOUNDARY WHILST MAINTAINING A MINIMUM CLEARANCE OF 150 mm TO WATER MAIN AND 300mm TO SEWER MAIN
- WHERE REQUIRED, INSTALL SHOWN NBN Co CONDUIT

FOR CONSTRUCTION

SAFETY FIRST
SAFETY STARTS WITH YOU

****ATTENTION****
CONSTRUCTORS DO NOT change or alter job specifications unless first checking with designer.

Code	Date	Description	Revised	Code	Date	Description	Approved
A	16/11/16	FOR CONSTRUCTION	HK				

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A business unit of SPA Consulting Engineers (QLD) Pty Ltd a.c.n. 010844416

LEGEND

- PWR — TRANSFORMER / PAD MOUNT SUB-STATION / POLE MOUNT TRANSFORMER
- PIT-ID 2 — ACO CABLEMATE TYPE 2 PLASTIC PIT OR SIMILAR
- PIT-ID 5 — ACO CABLEMATE TYPE 5 PLASTIC PIT OR SIMILAR
- PIT-ID 8 — ACO CABLEMATE TYPE 8 PLASTIC PIT OR SIMILAR
- PIT-ID 9 — ACO CABLEMATE TYPE 9 PLASTIC PIT OR SIMILAR
- PIT-ID 8 OR (5) — EXISTING COMMUNICATION PIT
- LOCAL CONDUIT (P100/P50)
- EXISTING CONDUIT
- COMMUNICATION STAGE BOUNDARY
- END CAP CONDUIT WITH STATION NO.
- P20 2x3 — CAP SERVICE CONDUIT (P50/P20) P20=P23 mm COMMUNICATION SERVICE CONDUIT
- SHARED TRENCH
- ZERO LOT PROPERTY BOUNDARY

Drawing Title
CRAWFORD ST SUBDIVISION
TELSTRA PIT AND PIPE DESIGN
LAYOUT PLAN A & B

Project Description
CRAWFORD ST, MOSSMAN
QLD 4873

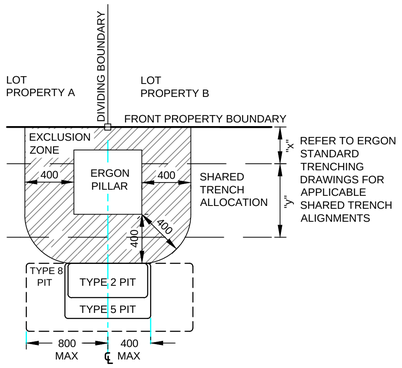
Date	NOVEMBER 2016
Scale	AS SHOWN
Region	FN
Drawn	HK
Sheet	1 OF 2

Telstra AFR Number	SPA Drawing Number	Revision
17389139	2779-T01	A

TYPICAL PIT DETAILS

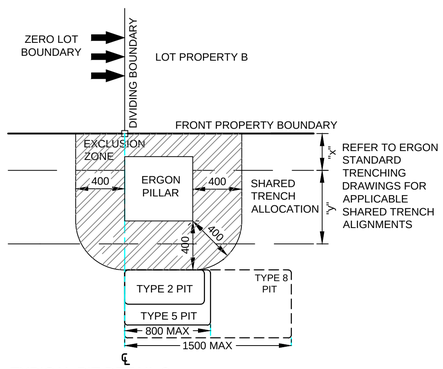
NOTES:

1. THESE DETAILS REPRESENT TYPICAL PIT CONFIGURATIONS AND THE CONTRACTOR SHALL DETERMINE THE MOST SUITABLE DETAIL FOR EACH PARTICULAR APPLICATION, IGNORING REDUNDANT DETAILS.
2. PITS SHALL BE INSTALLED CLEAR OF DRIVEWAYS AND FUTURE DRIVEWAY LOCATIONS. COORDINATE FINAL LOCATIONS WITH CIVIL DRAWINGS.
3. ENSURE PITS ARE INSTALLED IN ACCORDANCE WITH COMMUNICATIONS ALLIANCE LTD GUIDELINES AND THE FOLLOWING CLEARANCES:
   A. 100 mm FROM LV / 300 mm FROM HV ELECTRICAL CONDUITS
   B. 150 mm FROM WATER RETICULATION
   C. 150 mm FROM SEWER RETICULATION
   D. 150 mm FROM STORMWATER RETICULATION
4. MIRROR CONFIGURATION WHERE APPROPRIATE



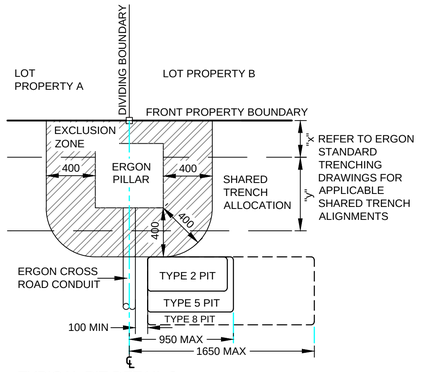
TYPICAL PIT DETAIL 1

PIT CENTRAL TO THE BOUNDARY WITH AN ERGON PILLAR.
- INSTALL CENTRE OF PIT IN LINE WITH PROLONGATION OF DIVIDING BOUNDARY.



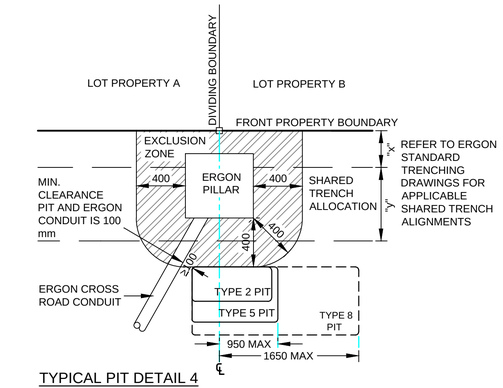
TYPICAL PIT DETAIL 2

PIT OFFSET FROM BOUNDARY WITH AN ERGON PILLAR (ZERO LOT BOUNDARY).
- ENSURE PIT TO BE CLEAR OF THE ZERO LOT BOUNDARY.



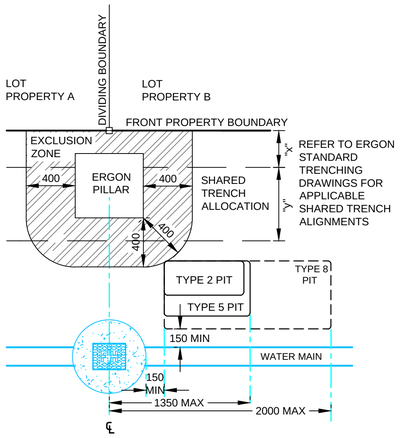
TYPICAL PIT DETAIL 3

PIT OFFSET FROM BOUNDARY WITH AN ERGON PILLAR AND 90° ERGON CONDUIT.
- ENSURE 100 mm MIN CLEARANCE TO ERGON CROSS ROAD CONDUIT.



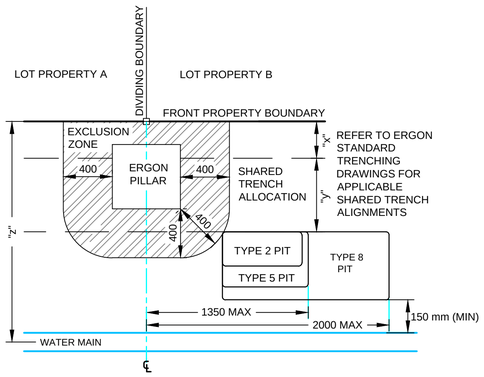
TYPICAL PIT DETAIL 4

PIT OFFSET FROM BOUNDARY WITH AN ERGON PILLAR AND ANGLED ERGON CONDUIT.
- LOCATE FAR END OF PIT AS CLOSE AS POSSIBLE TO THE PROLONGATION OF DIVIDING BOUNDARY WHILST MAINTAINING A MINIMUM OF 100 mm CLEARANCE FROM ERGON CONDUIT(S) TO MINIMISE DRIVEWAY INTRUSION.



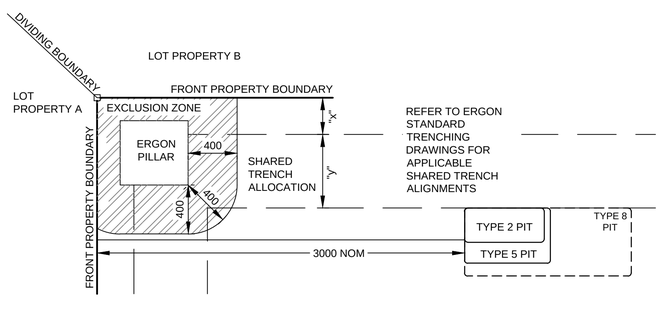
TYPICAL PIT DETAIL 5

PIT OFFSET FROM BOUNDARY WITH AN ERGON PILLAR AND FIRE HYDRANT.
- LOCATE END OF PIT AS CLOSE AS POSSIBLE TO THE PROLONGATION OF DIVIDING BOUNDARY WHILST MAINTAINING MINIMUM 150 mm CLEARANCE FROM FIRE HYDRANT AND MARGIN SETT TO MINIMISE DRIVEWAY INTRUSION.



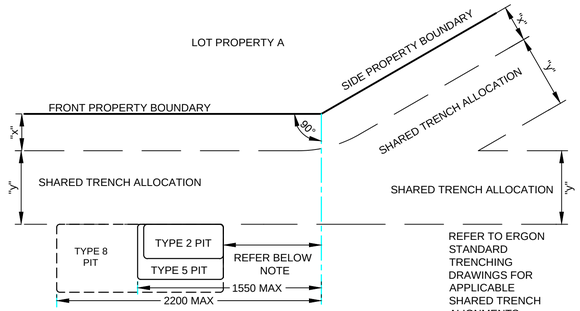
TYPICAL PIT DETAIL 6

TYPE 8 PIT OFFSET FROM BOUNDARY WITH AN ERGON PILLAR AND CLASHING WITH WATER MAIN.
- LOCATE END OF PIT AS CLOSE AS POSSIBLE TO THE PROLONGATION OF DIVIDING BOUNDARY WHILST MAINTAINING MINIMUM 150 mm CLEARANCE FROM WATER MAIN TO MINIMISE DRIVEWAY INTRUSION.



TYPICAL PIT DETAIL 7

PIT OFFSET FROM BOUNDARY WITH AN ERGON PILLAR ON STREET CORNER.
- LOCATE END OF PIT 3M FROM THE INTERSECTING PROPERTY BOUNDARIES AS PER FIGURE 5 IN THE COMMS ALLIANCE INDUSTRY GUIDLINE G645:2011.

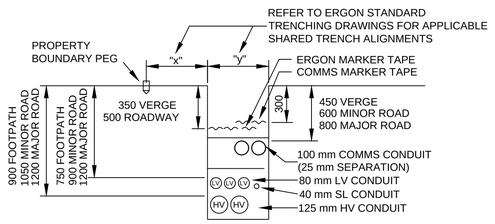


TYPICAL PIT DETAIL 8

PIT OFFSET FROM PROPERTY TRUNCATION POINT.
- LOCATE END OF PIT AS CLOSE AS PRACTICABLE TO THE TRUNCATION TO MINIMISE POTENTIAL DRIVEWAY INTRUSION.

SEPARATION FROM ERGON CONDUITS

ERGON CONDUIT TYPE	PARALLEL SEPARATION (mm)	CROSSING SEPARATION (mm)
LV/SL	100	100
HV	300	100

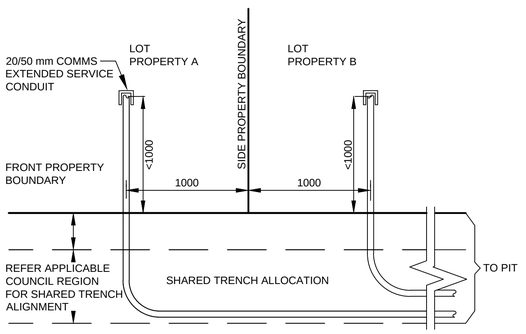


STANDARD TRENCH SECTION

SCALE 1:25 @ A1

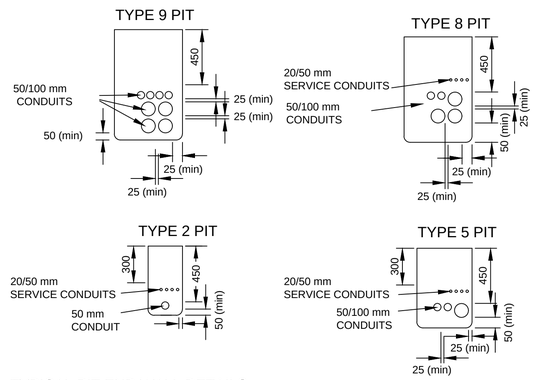
COMMUNICATION PIT SIZES

PIT TYPE	NAME	NOMINAL EXTERNAL DIMENSIONS (mm)			MINIMUM INTERNAL DIMENSIONS (mm)		
		LENGTH	WIDTH	DEPTH	LENGTH	WIDTH	DEPTH
SERVICE DROP ACCESS PIT / BOUNDARY PIT (MAXIMUM 50 mm CONDUIT ENTRY)	TYPE 2	650	280	565	490	150	500
BOUNDARY PIT / LOCAL NETWORK PIT	TYPE 5	700	450	650	510	290	540
LOCAL NETWORK CONNECTION PIT / DISTRIBUTION PIT	TYPE 8	1360	555	860	1130	390	820
FDH PIT	TYPE 9	2000	555	900	1820	370	840



EXTENDED SERVICE CONDUITS TO DISTANT PIT

SCALE 1:25 @ A1



TYPICAL PIT END WALL DETAILS

SCALE 1:25 @ A1

FOR CONSTRUCTION

Code	Date	Description	Revised	Code	Date	Description	Approved
A	16/11/16	FOR CONSTRUCTION	HK				

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A business unit of SPA Consulting Engineers (QLD) Pty Ltd a.c.n. 010844416

LEGEND

- TRANSFORMER / PAD MOUNT SUB-STATION / POLE MOUNT TRANSFORMER
- PIT-ID 2 — ACO CABLEMATE TYPE 2 PLASTIC PIT OR SIMILAR
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- EXISTING CONDUIT
- COMMUNICATION STAGE BOUNDARY
- END CAP CONDUIT WITH STATION NO.
- CAP SERVICE CONDUIT (P50/P20) P20=P23 mm COMMUNICATION SERVICE CONDUIT
- SHARED TRENCH
- ZERO LOT PROPERTY BOUNDARY

Drawing Title
CRAWFORD STREET SUBDIVISION
TELSTRA PIT AND PIPE DESIGN
TYPICAL PIT LAYOUTS & TRENCH DETAILS

Project Description
CRAWFORD ST, MOSSMAN
QLD 4873

Date	NOVEMBER 2016
Scale	AS SHOWN
Region	FN
Drawn	HK
Sheet	2 OF 2
Telstra AFR Number	17389139
SPA Drawing Number	2779-T02
Revision	A

N.V. & J.S. Pty Ltd

PROPOSED SUBDIVISION

CRAWFORD STREET, MOSSMAN

PROJECT No: K-2578

LOCALITY PLAN

N.T.S.

DRAWING LIST

DRAWING No	DRAWING TITLE
K-2578-C00	LOCALITY PLAN AND DRAWING INDEX
K-2578-C01	MISCELANEOUS SECTIONS AND DETAILS
K-2578-C02	EARTHWORKS
K-2578-C03	ROAD WORKS AND STORMWATER DRAINAGE LAYOUT
K-2578-C04	ROAD LONGITUDINAL SECTIONS
K-2578-C05	ROAD CROSS SECTIONS SHEET 1
K-2578-C06	ROAD CROSS SECTIONS SHEET 2
K-2578-C07	INTERSECTION DETAILS
K-2578-C08	INTERNAL STORMWATER DRAINAGE CATCHMENT PLAN
K-2578-C09	EXTERNAL STORMWATER DRAINAGE CATCHMENT PLAN
K-2578-C10	STORMWATER DRAINAGE LONGITUDINAL SECTIONS
K-2578-C11	STORMWATER DRAINAGE CALCULATIONS
K-2578-C12	SEWER RETICULATION LAYOUT
K-2578-C13	SEWER LONGITUDINAL SECTIONS
K-2578-C14	WATER SUPPLY LAYOUT
K-2578-C15	EROSION AND SEDIMENT CONTROL PLAN

KFB Engineers Civil & Structural

1/38-42 Pease St | PO Box 927, Cairns Q 4870

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Date: 29/5/18

Job No: K-2578

Signed: RPEQ 491

No.	DATE	ISSUE / REVISIONS	DRN	CHKD
C	30/04/18	REDESIGN FOR NEW DESIGN LEVELS		
B	29/11/16	REVISION FOR NEW Q100 FLOOD LEVEL - TENDER ISSUE		
A	18/07/16	ORIGINAL ISSUE	EWK	EFB

DRAWING FILE: XREF FILE: N/A

N.V. & J.S. Pty Ltd

PROPOSED SUBDIVISION

AT CRAWFORD STREET, MOSSMAN

Locality Plan & Drawing Index

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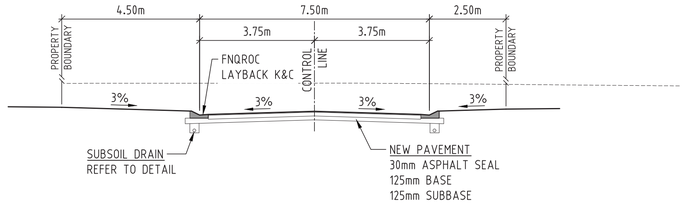
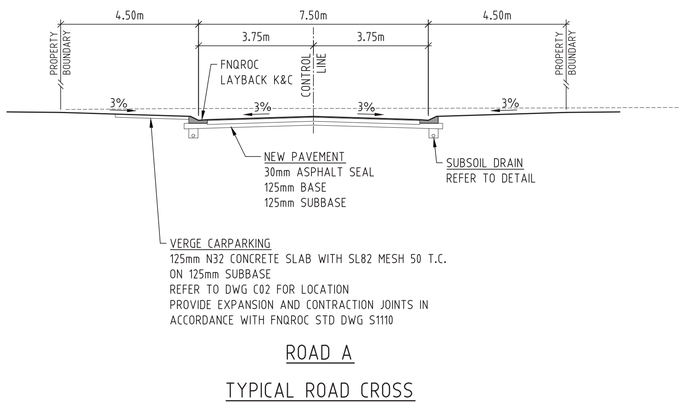
JOB No: K-2578

SHEET: C00 C

SCALE: N.T.S (@ A1)



ROAD B



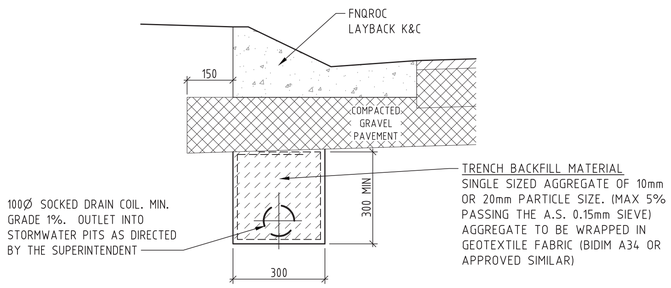
ROAD A

TYPICAL ROAD CROSS SECTIONS

SCALE 1:100 (A1)

PAVEMENT NOTES

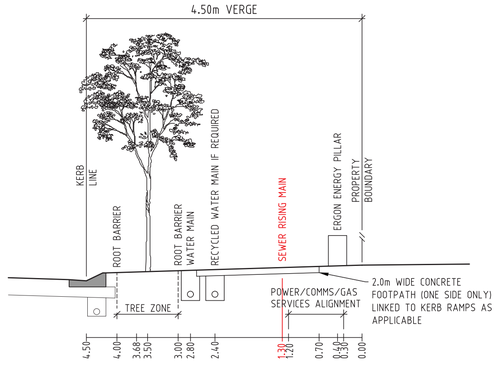
1. PAVEMENT MATERIALS SHALL COMPLY WITH THE FNQROC DESIGN MANUAL AND SPECIFICATIONS.
2. FOLLOWING COMPLETION OF SUBGRADE AND PAVEMENT COMPACTION AND TRIMMING, THE WHOLE OF THE SUBGRADE AND PAVEMENT SHALL BE INSPECTED BY PROOF ROLLING WITH A FULLY LOADED SINGLE REAR AXLE TRUCK OR EQUIVALENT. ACCEPTABLE PROOF ROLLING SHALL BE TAKEN TO BE NO VISIBLE SIGNS OF DEFORMATION OR INSTABILITY.
3. PAVEMENT MATERIAL SHALL BE SPREAD IN UNIFORM LOOSE LAYERS OF NO LESS THAN 100mm OR GREATER THAN 200mm AND SHALL BE COMPACTED TO 100% MODIFIED (UNO).
4. FOLLOWING COMPACTION OF THE EACH PAVEMENT COURSE, THE SURFACE SHALL BE WATERED AND ROLLED WITH A STEEL DRUM ROLLER TO GIVE A HARD, DENSE, TIGHTLY PACKED SURFACE FREE ON LENSES, COMPACTION PLANES AND CAKING.
5. PLACEMENT OF BASE COURSE MATERIAL ON SUB-BASE SHALL NOT COMMENCE UNTIL THE COMPACTION STANDARDS OF THE LOWER LAYERS HAVE BEEN TESTED AND ACHIEVED.
6. COMPACTION OF PAVEMENT MATERIAL SHALL BE IN ACCORDANCE WITH AS1289 "METHODS OF TESTING SOILS FOR ENGINEERING PURPOSES".
7. WHERE NEW PAVEMENT IS TO BE JOINED TO AN EXISTING PAVEMENT, SAWCUT AND REMOVE A STRIP OF THE EXISTING PAVEMENT AT LEAST 300mm WIDE TO ITS FULL DEPTH BEFORE PLACING THE NEW PAVEMENT MATERIAL.
5. PAVEMENT DESIGN IS BASED ON AN ASSUMED SUBGRADE CBR VALUE OF 5. THE CONTRACTOR SHALL CHECK THE PAVEMENT SUBGRADE CBR AND SUBMIT THE CBR TEST RESULTS TO THE SUPERINTENDENT FOR CONFIRMATION OF PAVEMENT DESIGN.
6. THE CONTRACTOR IS TO ENSURE THAT THE PAVEMENT COURSES ARE SET DOWN SUFFICIENTLY TO ALLOW FOR ASPHALT SURFACING.
7. BASE COURSE TO BE PRIMED OR TACK COAT APPLIED PRIOR TO THE PLACEMENT OF ASPHALT.
8. THE CONSTRUCTION OF ROAD SIGNS, PAVEMENT MARKING AND ASSOCIATED ROAD FURNITURE SHALL COMPLY WITH THE MAIN ROADS MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES.



NOTE: SUBSOIL DRAINS ARE TO BE INSTALLED IN LOCATIONS SHOWN ON PLAN DRAWINGS. FLUSHING POINTS TO BE IN ACCORDANCE WITH FNQROC STD DWG S1095.

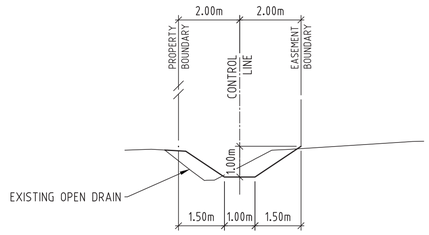
SUBSOIL DRAIN DETAIL

N.T.S.



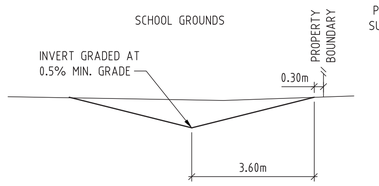
SERVICES LAYOUT FOR 4.5m VERGE

N.T.S.



LOT 1 OPEN DRAIN DETAIL

SCALE 1:100 (A1)



OPEN DRAIN TO PARKER CREEK

SCALE 1:100 (A1)

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Date: 29/5/18
Job No: K-2578
Signed: RPEQ 491

No.	DATE	ISSUE / REVISIONS	DRN	CHKD
E	30/04/18	REDESIGN FOR NEW DESIGN LEVELS		
D	21/02/17	RETAINING WALL RW2 DETAIL ADDED		
C	11/12/16	RETAINING WALL REVISED	EWK	EFB

DRAWING FILE: XREF FILE: N/A

N.V. & J.S. Pty Ltd
PROPOSED SUBDIVISION
AT CRAWFORD STREET, MOSSMAN

Miscellaneous Sections and Details

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JOB No: K-2578
SHEET: C01 E
SCALE: N.T.S (@ A1)

LEGEND

- 6.60 — EXISTING SURFACE CONTOUR (0.2m INTERVAL)
- 8.20 — FINISHED SURFACE CONTOUR (0.2m INTERVAL)
- ●8.186 FINISHED SURFACE LEVEL
- AREA OF EARTHWORKS CUT
- AREA OF EARTHWORKS FILL
- FALL OF LOT

PLAN
SCALE 1:500 (A1)

NOTES

1. ALL FOOTPATHS SHALL BE GRASSED (DRILL SEEDED WITH APPROVED GRASS SPECIES) IN ACCORDANCE WITH LANDSCAPE SPECIFICATIONS, FERTILIZED AND MAINTAINED FOR THE REQUIRED MAINTENANCE PERIOD.
2. ALL BARE EARTHWORKS AREAS (LOTS, DRAINS, PARKS, VERGES, ETC.), SHALL BE GRASSED (DRILL SEEDED WITH APPROVED GRASS SPECIES) FOR SLOPES UP TO AND INCLUDING 1 ON 4, OR HYDROMULCHED FOR SLOPES GREATER THAN 1 ON 4. USE APPROVED SEED MIX AND MAINTAIN, WATER AND FERTILISE FOR MAINTENANCE PERIOD.
3. 150mm TOPSOIL TO BE STRIPPED FROM SITE AND SUITABLY TREATED AND STOCKPILED FOR LATER USE AS SITE FILL
4. ALL GULLIES AND DEPRESSIONS REQUIRING FILLING SHALL BE CLEARED, GRUBBED AND CLEANED OUT OF SILT, BOULDERS, DEBRIS ETC TO PROVIDE A CLEAN, FIRM BASE PRIOR TO PLACING ANY FILL OR FILTER MATERIALS. COMPACT ALL NATURAL SUBGRADES WITH 6 TO 8 PASSES OF A 10 TONNE VIBRATING ROLLER PRIOR TO PLACING ANY FILL MATERIALS. PLACE SUBSOIL DRAINS/MATS TO ENGINEERS APPROVALS AT THE BASE OF ALL SUCH FILLS AND OUTLET TO THE STORMWATER DRAINAGE SYSTEM. NOTIFY THE SUPERINTENDENT FOR AN INSPECTION PRIOR TO PLACING ANY FILL MATERIALS.
5. WHERE FILL IS PLACED ON SLOPING EXISTING SURFACE, THE EXISTING SURFACE SHALL BE BENCHED AND THE BENCH COMPACTED TO 98% SRDD PRIOR TO PLACING THE FILL MATERIAL.
6. REMOVE SURFACE ROCKS FROM THE LOTS, FOOTPATHS, VERGES AND PARKLAND AREAS. REUSE IN SCOUR PROTECTION, REMOVE EXCESS FROM SITE OR STOCKPILE AS DIRECTED. ALL COSTS TO BE INCLUDED IN CONTRACT LUMP SUM.
7. THE CONTRACTOR SHALL ENSURE NO PONDING AREAS RESULT FROM THE EARTHWORKS OPERATION. ANY SUCH AREAS WHICH DEVELOP SHALL BE RECTIFIED AS DIRECTED BY THE SUPERINTENDENT. THE CONTRACTOR SHALL NOTIFY THE SUPERINTENDENT OF THE DEVELOPMENT OR EXISTENCE OF ANY SUCH PONDING AREAS.
8. THE CONTRACTOR SHALL LIAISE WITH THE SUPERINTENDENT TO ENSURE BATTERS IN EXCESS OF 1.5m HIGH SHALL BE ASSESSED AND REPORTED FOR STABILITY (DURING CONSTRUCTION) BY A GEOTECHNICAL ENGINEER. COPIES OF REPORTS SHALL BE FORWARDED TO THE SUPERINTENDENT AND TO COUNCIL.
9. ALL BOUNDARIES WITH EXISTING CREEKS AND VEGETATION MUST BE TEMPORARILY DELINEATED AND FENCED OFF/SEGREGATED TO RESTRICT BUILDING ACCESS FOR THE DURATION OF THE CONSTRUCTION ACTIVITY.
10. ALL EARTHWORKS SHALL BE IN ACCORDANCE WITH AS3798 "GUIDELINES ON EARTHWORKS FOR COMMERCIAL AND RESIDENTIAL DEVELOPMENTS" AND THE FNQROC DEVELOPMENT MANUAL.

IMPORTED NON-PLASTIC FILL

AS METRIC SIEVE	% PASSING BY WEIGHT
75mm	100
2.36mm	25 - 70
75um	0 - 30

1. MINIATURE ABRASION LOSS PASSING 2.36mm 0 - 15
2. LINEAR SHRINKAGE PASSING 4.25um 0 - 8
3. MATERIAL RETAINED ON 2.36mm SIEVE SHALL CONSIST OF SOUND STONE
4. SOAKED CBR 15 AT 98% SRDD COMPACTION

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Date: 29/5/18
Job No: K-2578
Signed: RPEQ 491

1:500 10 5 0 10 20 A1
1:1000 A3

No.	DATE	ISSUE / REVISIONS	DRN	CHKD
D	30/04/18	REDESIGN FOR NEW DESIGN LEVELS		
C	11/12/16	STORMWATER DRAINAGE AND SITE LEVELS REVISED		
B	29/11/16	REVISION FOR NEW Q100 FLOOD LEVEL - TENDER ISSUE		
A	18/07/16	ORIGINAL ISSUE	EWK	EFB

DRAWING FILE: XREF FILE: N/A

N.V. & J.S. Pty Ltd
PROPOSED SUBDIVISION
AT CRAWFORD STREET, MOSSMAN

Earthworks

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JOB No: K-2578
SHEET: C02 D
SCALE: 1:500 (@ A1)

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Date: 29/5/18
Job No: K-2578 Signed: RPEQ 491

LEGEND

- EXISTING SURFACE CONTOUR (0.2m INTERVAL)
- EXISTING SEWER
- EXISTING WATER MAIN
- EXISTING TOP OF BANK
- 8.774 FINISHED SURFACE LEVEL
- FINISHED SURFACE CONTOUR (0.2m INTERVAL)
- NEW STORMWATER DRAINAGE PIPE
- SUBSOIL DRAINAGE
- STORMWATER PIT / LINE No.
- NEW ROAD
- 50mm AC SURFACING TO INTERSECTIONS

GPT 1

DESIGN FLOW (Q5)	0.519 Cumecs
TREATMENT FLOW (3 MONTH)	0.141 Cumecs
PIPE DIAMETER	750Ø
TOP OF GPT	7.212
INLET LEVEL	5.389
OUTLET LEVEL	5.369

PLAN
SCALE 1:500 (A1)

NOTES

STORMWATER

1. ALL CULVERTS SHALL BE IN ACCORDANCE WITH FNQROC STANDARD DRAWINGS AND RELEVANT AUSTRALIAN STANDARDS.
2. PROVIDE SLOTTED DRAIN TAILS IN ACCORDANCE WITH FNQROC DWG No. S1050 AT THE DOWNSTREAM END OF STORMWATER PIPE REACHES ENTERING ALL PITS.

KERB AND CHANNEL

1. TYPES SHALL BE ACCORDANCE WITH FNQROC DWG No. S1000 FOR ALL KERB AND CHANNEL

FOOTPATHS

1. VERGE CROSS FALLS SHALL NOT EXCEED THOSE SPECIFIED.
2. ALL FOOTPATHS SHALL BE HYDROMULCHED / GRASSED (DRILL SEEDED WITH APPROVED GRASS SPECIES), FERTILISED, AND MAINTAINED FOR THE REQUIRED MAINTENANCE PERIOD.

ALL WORKS

1. CONSTRUCTION AND INSTALLATION OF ALL WORKS AS DETAILED ON THESE DRAWINGS SHALL BE IN ACCORDANCE WITH THE PROCEDURES, SPECIFICATIONS AND DRAWINGS CONTAINED IN THE CURRENT ISSUE OF THE FNQROC DEVELOPMENT MANUAL AND TO THE REQUIREMENTS OF THE CAIRNS REGIONAL COUNCIL.

COMPLIANCE WITH THE ASSESSMENT MANAGER CONDITIONS

1. THE CONTRACTOR SHALL COMPLY WITH ALL ASSESSMENT MANAGER CONDITIONS SET OUT IN THE COUNCIL DECISION NOTICE FOR OPERATIONAL WORKS.

GENERAL NOTES

1. TRAFFIC CONTROL DEVICES (ROAD EDGE GUIDE POSTS, SIGNS, ETC) SHALL BE SUPPLIED AND INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS OF THE CURRENT ISSUE OF THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES AS ISSUED BY THE DEPARTMENT OF TRANSPORT, QUEENSLAND AND FNQROC STD DWG S1041.
2. THE CONTRACTOR SHALL LIAISE WITH THE RELEVANT AUTHORITIES TO CONFIRM THE LOCATION OF ALL EXISTING SERVICES, AND SHALL ARRANGE FOR THE REMOVAL OR RELOCATION OF ANY SERVICES WHICH WILL BE AFFECTED BY THE WORKS.
3. ENSURE SERVICE CONDUITS ARE LAID BENEATH ANY EARLY WORKS FINISHES. E.g. WATER, POWER, TELECOMMUNICATIONS, ETC.
4. THE CONTRACTOR SHALL REMOVE ALL EXISTING CONSTRUCTION, TREES, SERVICES ETC AS NECESSARY TO PERMIT CONSTRUCTION OF THE NEW WORKS.
5. THE CONTRACTOR SHALL OBTAIN COUNCIL INSPECTIONS AND THEIR WITNESS TO TESTING PRIOR TO MAKING SERVICES LIVE. A COPY OF COUNCIL'S INSPECTION CERTIFICATE SHALL BE PROVIDED TO THE SUPERINTENDENT PRIOR TO PRACTICAL COMPLETION.

LANDSCAPING

1. ALL INTERNAL & EXTERNAL LANDSCAPING SHALL BE ESTABLISHED AND MAINTAINED TO THE SATISFACTION OF THE COUNCIL.

SURVEY & EXISTING SERVICES

1. LEVEL DATUM IS AHD. ORIGIN OF LEVELS PSM 52406 RL 9.293. MERIDIAN: SP252360
2. ORIGIN OF COORDINATES: PSM 96085 E: 5002.531 N: 10000.315
3. REFER RPS SURVEYORS FOR THE SURVEY STATION SETOUT DETAILS
4. THE EXISTING SERVICES SHOWN ON THESE DRAWINGS ARE DERIVED FROM SURFACE SURVEY AND COUNCIL RECORDS AND MAY NOT REPRESENT THE EXISTING SERVICES PRESENT BELOW THE SURFACE.
5. THE CONTRACTOR SHALL BE RESPONSIBLE TO LOCATE ALL EXISTING SERVICES PRIOR TO ANY EXCAVATION, PARTICULARLY ON FOOTPATHS.
6. ALL DAMAGE TO EXISTING SERVICES SHALL BE MADE GOOD TO THE SATISFACTION OF THE SUPERINTENDENT AND THE RELEVANT AUTHORITY, ALL AT THE CONTRACTORS EXPENSE. THE CONTRACTOR SHALL NOTIFY THE RELEVANT AUTHORITY IMMEDIATELY WHEN ANY DAMAGE OCCURS.
7. THE LINE AND LEVEL OF EXISTING UNDERGROUND SERVICES SHALL BE DETERMINED BY THE CONTRACTOR AND THE ENGINEER SHALL BE NOTIFIED OF ANY POTENTIAL CLASHES WITH DESIGN STRUCTURES AND SERVICES PRIOR TO COMMENCING CONSTRUCTION.
8. EXISTING OUTLET LEVELS OR CONNECTION LEVELS FOR ALL DESIGN STORMWATER AND SEWER SHALL BE CONFIRMED BY THE CONTRACTOR AND THE ENGINEER SHALL BE NOTIFIED OF ANY VARIATIONS PRIOR TO COMMENCING CONSTRUCTION.
9. EXISTING SERVICES ON THE DRAWINGS ARE PLOTTED FROM THE BEST INFORMATION AVAILABLE. NO RESPONSIBLY IS TAKEN BY THE PRINCIPAL OR SUPERINTENDENT FOR THE ACCURACY AND COMPLETENESS OF THE INFORMATION SHOWN.
10. PRIOR TO THE COMMENCEMENT OF CONSTRUCTION THE CONTRACTOR IS TO ESTABLISH ON SITE THE EXACT POSITION OF ALL UNDERGROUND SERVICES IN THE PROPOSED WORKS AREA. METHODS FOR ACHIEVING THIS WILL INCLUDE BUT NOT BE LIMITED TO:-
    - CAREFUL EXAMINATION OF THE CONTRACT DRAWINGS.
    - CONSULTATION WITH THE RELEVANT SERVICE AUTHORITIES.
    - COMPREHENSIVELY SCANNING THE AFFECTED AREAS WITH A CABLE DETECTOR AND MARKING ON THE GROUND THE POSITION OF ALL SERVICES.
    - HAND EXCAVATING TO EXPOSE ALL SUCH SERVICES WHICH MAY BE AFFECTED BY THE PROPOSED WORKS UNDER THE DIRECTION OF THE RELEVANT SERVICE AUTHORITY.

'AS CONSTRUCTED' INFORMATION

1. THE CONTRACTOR SHALL PROVIDE 'AS CONSTRUCTED' DRAWINGS INCLUDING BOTH ELECTRONIC AND HARD COPIES CERTIFIED BY A REGISTERED SURVEYOR FOR ALL UNDERGROUND SERVICES INSTALLED FOR THIS PROJECT IN ACCORDANCE WITH FNQROC AND COUNCIL REQUIREMENTS.

1:500 10 5 0 10 20 A1
1:1000 A3

No.	DATE	ISSUE / REVISIONS	DRN	CHKD
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C	11/12/16	STORMWATER DRAINAGE AND SITE LEVELS REVISED		
B	29/11/16	REVISION FOR NEW Q100 FLOOD LEVEL - TENDER ISSUE		
A	18/07/16	ORIGINAL ISSUE	EWK	EFB

DRAWING FILE: XREF FILE: N/A

N.V. & J.S. Pty Ltd
PROPOSED SUBDIVISION
AT CRAWFORD STREET, MOSSMAN

Roadworks and Stormwater Drainage Layout

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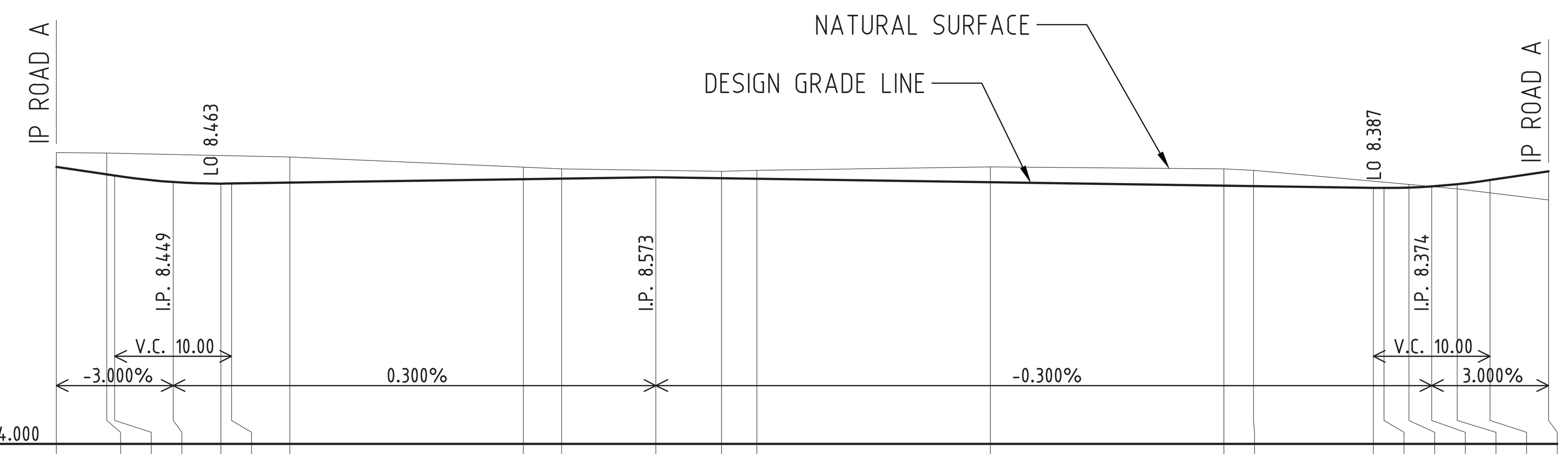
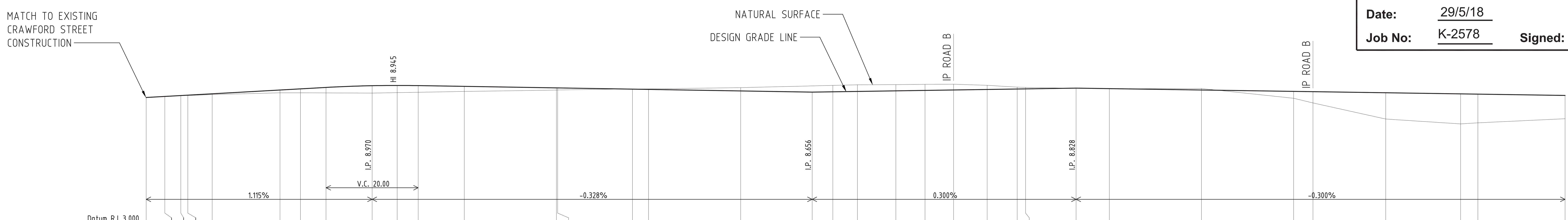
JOB No: K-2578
SHEET: C03 D
SCALE: 1:500 (@ A1)



CHAINAGE	CUT/FILL	*DESIGN GRADE LEVEL*	NATURAL SURFACE
0.000	-0.247	*8.749*	8.996
4.304	-0.367	*8.620*	8.987
5.000		*8.599*	
10.000		*8.490*	
14.091		*8.463*	
15.000		*8.464*	
20.000	-0.438	*8.479*	8.917
40.000	-0.206	*8.539*	8.745
43.272	-0.165	*8.549*	8.714
51.354		*8.573*	
56.982	-0.116	*8.556*	8.672
60.000	-0.143	*8.547*	8.691
80.000	-0.264	*8.487*	8.751
100.000	-0.287	*8.427*	8.714
102.543	-0.270	*8.419*	8.689
112.809		*8.389*	
113.718		*8.387*	
115.859	-0.055	*8.395*	8.450
117.809		*8.415*	
120.000	+0.080	*8.452*	8.373
122.809		*8.524*	
127.819	+0.490	*8.674*	8.184

LONGITUDINAL SECTION - ROAD B

SCALE: 1:500H 1:100V (A1)



CHAINAGE	CUT/FILL	*DESIGN GRADE LEVEL*	NATURAL SURFACE
-9.039	+0.000	*8.423*	8.423
-5.000	-0.002	*8.468*	8.470
-1.535	-0.003	*8.507*	8.510
0.000	+0.019	*8.524*	8.505
5.286	+0.034	*8.583*	8.549
20.000	+0.124	*8.747*	8.623
24.436	+0.173	*8.796*	8.623
30.000		*8.858*	
40.000	+0.319	*8.934*	8.615
45.452		*8.945*	
50.000		*8.937*	
60.000	+0.220	*8.904*	8.684
80.000	+0.093	*8.839*	8.745
80.261	+0.092	*8.838*	8.746
96.506	-0.012	*8.785*	8.796
100.000	-0.022	*8.773*	8.795
120.000	-0.144	*8.707*	8.851
135.500		*8.657*	
140.000	-0.277	*8.670*	8.947
145.332	-0.285	*8.686*	8.971
153.673	-0.270	*8.711*	8.981
160.000	-0.264	*8.730*	8.994
166.208	-0.247	*8.749*	8.996
173.483	-0.182	*8.770*	8.953
180.000	-0.083	*8.790*	8.873
181.824	-0.064	*8.795*	8.859
192.787		*8.828*	
200.000	+0.009	*8.807*	8.797
220.000	-0.064	*8.747*	8.811
240.000	+0.299	*8.687*	8.388
244.206	+0.490	*8.674*	8.184
260.000	+1.140	*8.627*	7.487
276.245	+1.302	*8.578*	7.276
280.000	+1.247	*8.567*	7.320
298.908	+1.010	*8.510*	7.500

LONGITUDINAL SECTION - ROAD A

SCALE: 1:500H 1:100V (A1)

KFB Engineers Civil & Structural

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Date: 29/5/18
Job No: K-2578
Signed: RPEQ 491

1:500 / 1:1000 — 10 5 0 10 20 — A1 / A3 — HORIZONTAL

1:100 / 1:200 — 2 1 0 2 4 — A1 / A3 — VERTICAL

No.	DATE	ISSUE / REVISIONS	DRN	CHKD
C	30/04/18	REDESIGN FOR NEW DESIGN LEVELS		
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DRAWING FILE: XREF FILE: N/A

N.V. & J.S. Pty Ltd
PROPOSED SUBDIVISION
AT CRAWFORD STREET, MOSSMAN

Road Longitudinal Sections

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JOB No: K-2578
SHEET: C04 C
SCALE: 1:500H 1:100V (@ A1)

KFB Engineers Civil & Structural
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P: 07 40320492 | F: 07 40320092 | E: email@kfbeng.com.au

Date: 29/5/18
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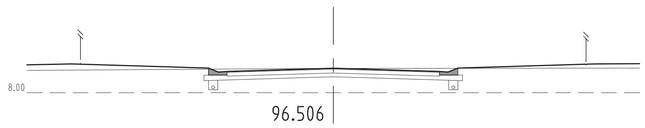

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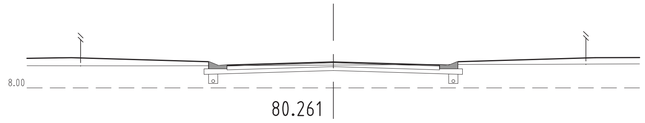

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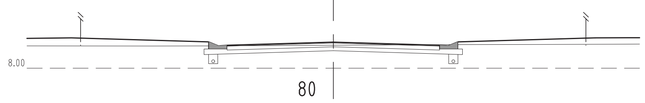

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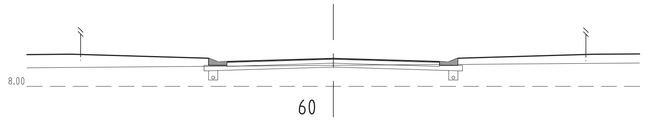

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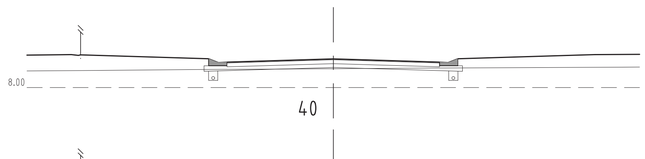

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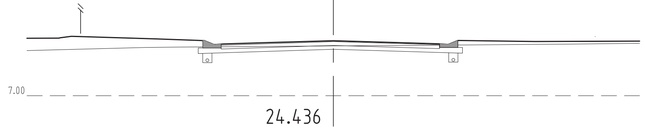

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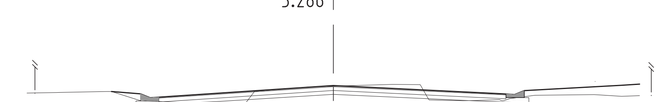

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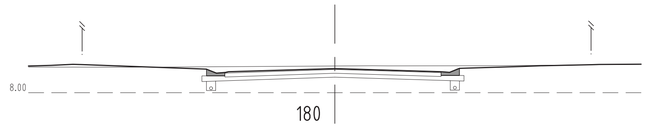

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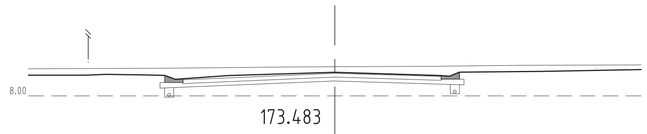

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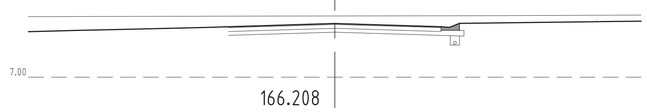

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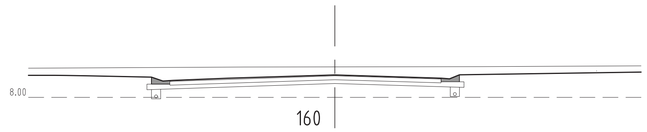

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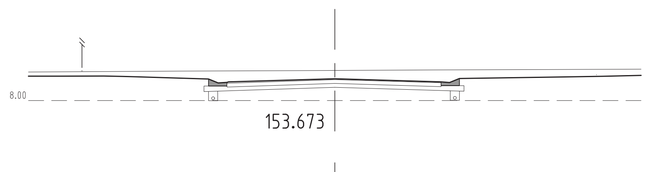

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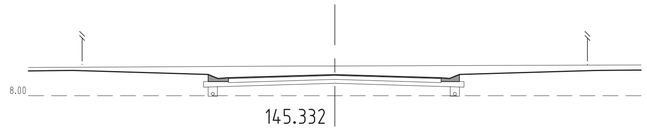

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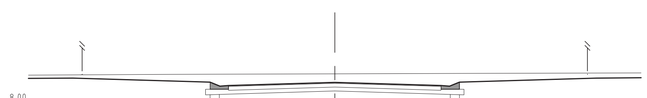

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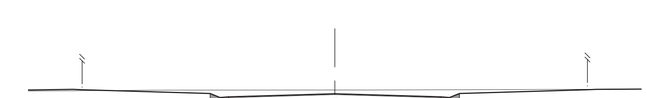

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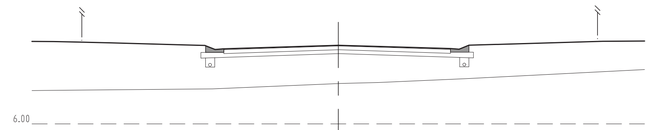

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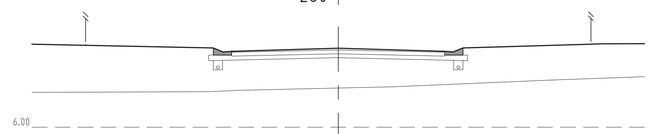

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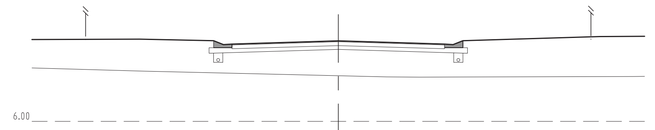

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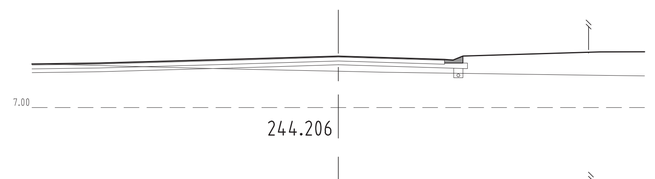
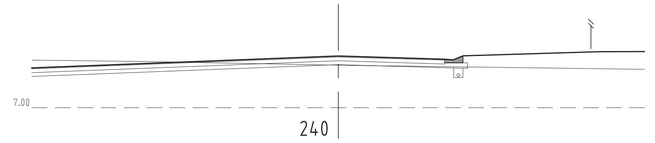


244.206



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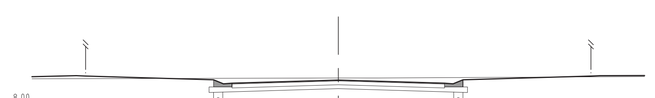


220

200

181.824

ROAD A

1:100 1 0 1 2 3 4 5 A1
1:200 A3

No.	DATE	ISSUE / REVISIONS	DRN	CHKD
C	30/04/18	REDESIGN FOR NEW DESIGN LEVELS		
B	29/11/16	REVISION FOR NEW Q100 FLOOD LEVEL - TENDER ISSUE		
A	18/07/16	ORIGINAL ISSUE	EWK	EFB

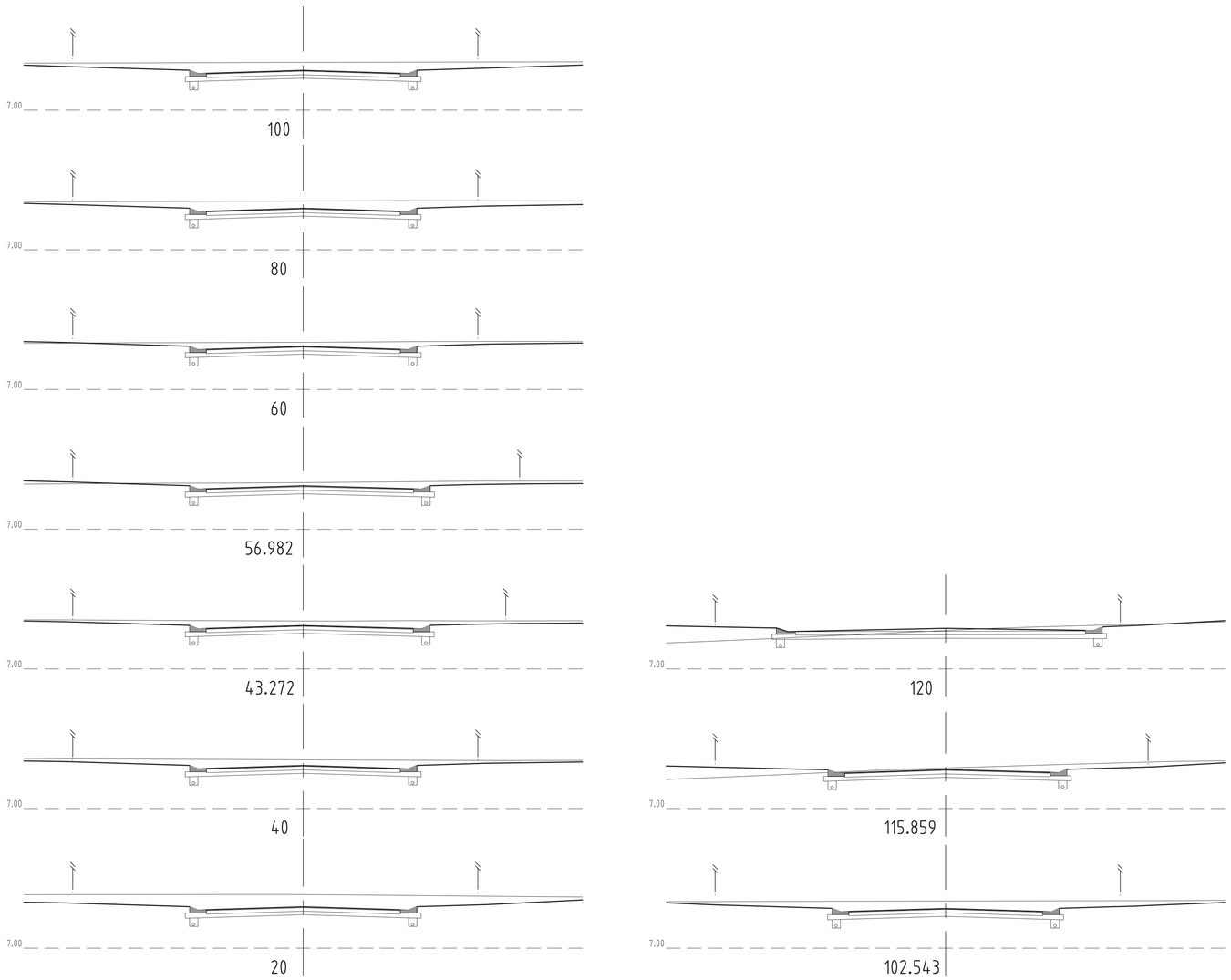
DRAWING FILE: XREF FILE: N/A

N.V. & J.S. Pty Ltd
PROPOSED SUBDIVISION
AT CRAWFORD STREET, MOSSMAN

Road Cross Sections
Sheet 1

KFB ENGINEERS Civil & Structural
ABN 28 351 246 509
20 Scott St, Cairns | PO Box 927, Cairns Q 4870
P: 07 40521700 | F: 07 40521634
E: email@kfbeng.com.au

JOB No: K-2578
SHEET: C05 C
SCALE: 1:100 (@ A1)



ROAD B

KFB Engineers Civil & Structural
1/38-42 Pease St | PO Box 927, Cairns Q 4870
P: 07 40320492 | F: 07 40320092 | E: email@kfbeng.com.au

Date: 29/5/18
Job No: K-2578
Signed: RPEQ 491

1:100 1 0 1 2 3 4 5 A1
1:200 A3

No.	DATE	ISSUE / REVISIONS	DRN	CHKD
C	30/04/18	REDESIGN FOR NEW DESIGN LEVELS		
B	29/11/16	REVISION FOR NEW Q100 FLOOD LEVEL - TENDER ISSUE		
A	18/07/16	ORIGINAL ISSUE	EWK	EFB

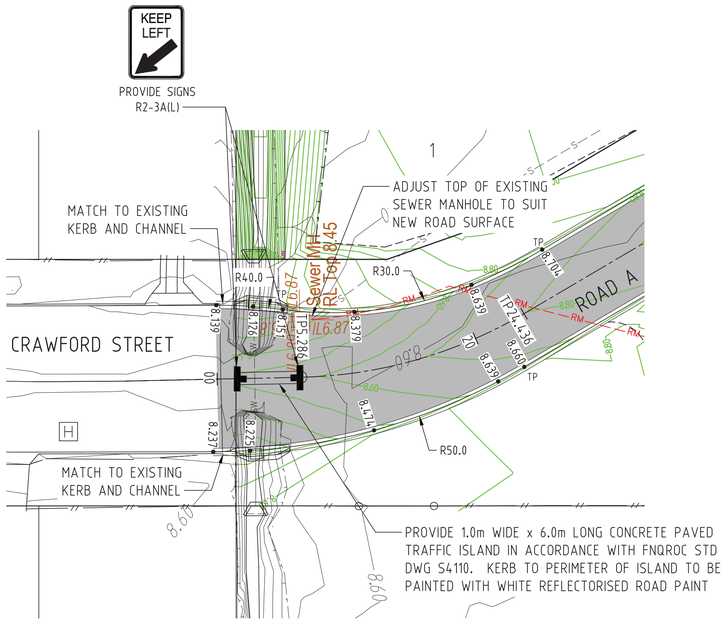
DRAWING FILE: XREF FILE: N/A

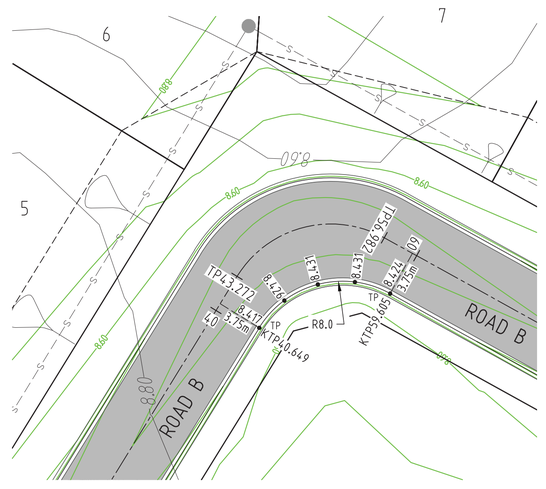
N.V. & J.S. Pty Ltd
PROPOSED SUBDIVISION
AT CRAWFORD STREET, MOSSMAN

Road Cross Sections
Sheet 2

KFB ENGINEERS
ABN 28 351 246 509
Civil & Structural
20 Scott St, Cairns | PO Box 927, Cairns Q 4870
P: 07 40521700 | F: 07 40521634
E: email@kfbeng.com.au

JOB No: K-2578
SHEET: C06 C
SCALE: 1:100 (@ A1)



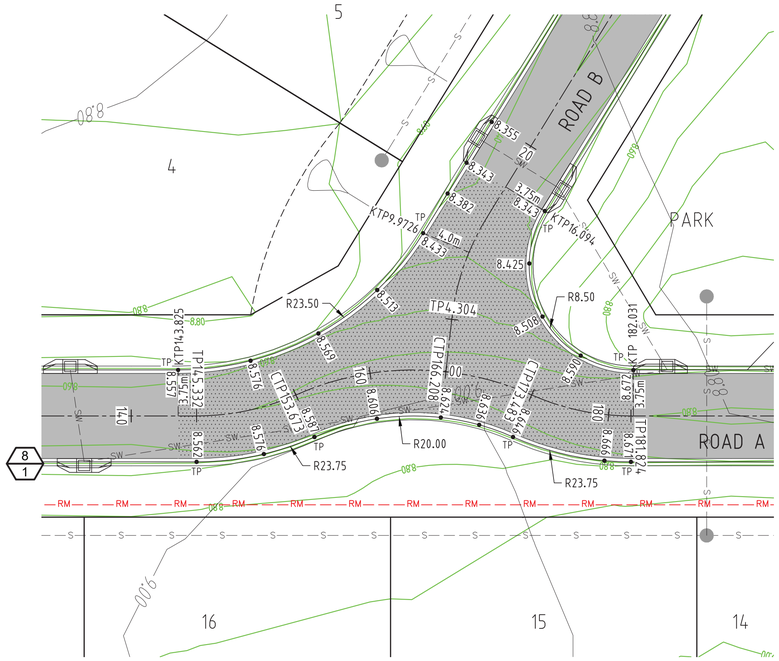


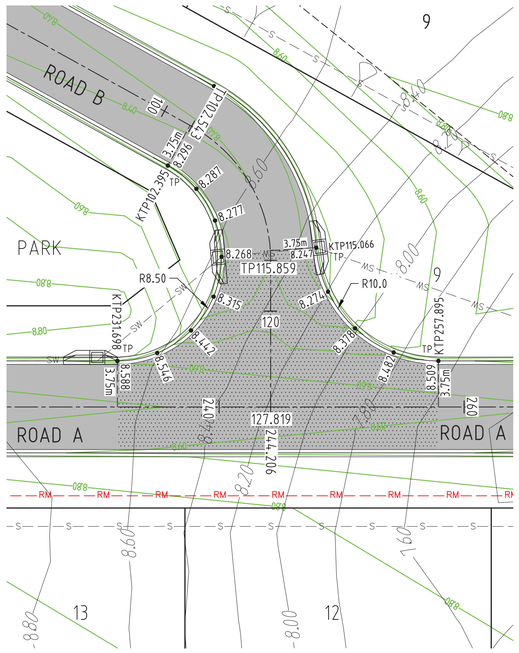
KFB Engineers Civil & Structural
1/38-42 Pease St | PO Box 927, Cairns Q 4870
P: 07 40320492 | F: 07 40320092 | E: email@kfbeng.com.au

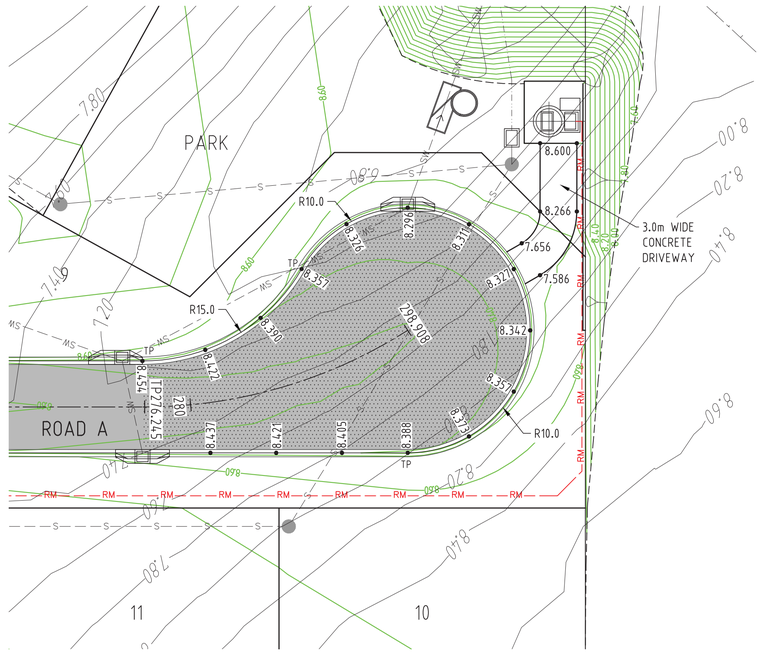
Date: 29/5/18
Job No: K-2578
Signed: RPEQ 491

LEGEND

- 7.598 DESIGN KERB INVERT LEVEL
- FINISHED SURFACE CONTOUR
- LKC FNQROC LAYBACK KERB AND CHANNEL
- 50mm AC SURFACING TO INTERSECTIONS







1:250 5 0 5 10 A1
1:500 A3

No.	DATE	ISSUE / REVISIONS	DRN	CHKD
C	30/04/18	REDESIGN FOR NEW DESIGN LEVELS		
B	29/11/16	REVISION FOR NEW Q100 FLOOD LEVEL - TENDER ISSUE		
A	18/07/16	ORIGINAL ISSUE	EWK	EFB

DRAWING FILE: XREF FILE: N/A

N.V. & J.S. Pty Ltd
PROPOSED SUBDIVISION
AT CRAWFORD STREET, MOSSMAN

Intersection Details

KFB ENGINEERS Civil & Structural
ABN 28 351 246 509
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JOB No: K-2578
SHEET: C07 C
SCALE: 1:250 (@ A1)

KFB Engineers Civil & Structural
1/38-42 Pease St | PO Box 927, Cairns Q 4870
P: 07 40320492 | F: 07 40320092 | E: email@kfbeng.com.au

Date: 29/5/18
Job No: K-2578 Signed: RPEQ 491

PARKER CREEK
PARKER CREEK
ROAD A
ROAD B
ROAD A
PARK
CRAWFORD STREET
MOSSMAN HIGH SCHOOL
2183.1m2
903.8m2
1348.2m2
710.5m2
1416.7m2
902.1m2
369.2m2
294.2m2
2640.0m2
373.0m2
783.1m2
6046.1m2
3994.7m2

PLAN
SCALE 1:500 (A1)

1:500 10 5 0 10 20 A1
1:1000 A3

No.	DATE	ISSUE / REVISIONS	DRN	CHKD
D	30/04/18	REDESIGN FOR NEW DESIGN LEVELS		
C	11/12/16	STORMWATER DRAINAGE AND SITE LEVELS REVISED		
B	29/11/16	REVISION FOR NEW Q100 FLOOD LEVEL - TENDER ISSUE		
A	18/07/16	ORIGINAL ISSUE	EWK	EFB

DRAWING FILE: XREF FILE: N/A

N.V. & J.S. Pty Ltd
PROPOSED SUBDIVISION
AT CRAWFORD STREET, MOSSMAN

Internal Stormwater
Drainage Catchment Plan

KFB ENGINEERS
ABN 28 351 246 509
Civil & Structural
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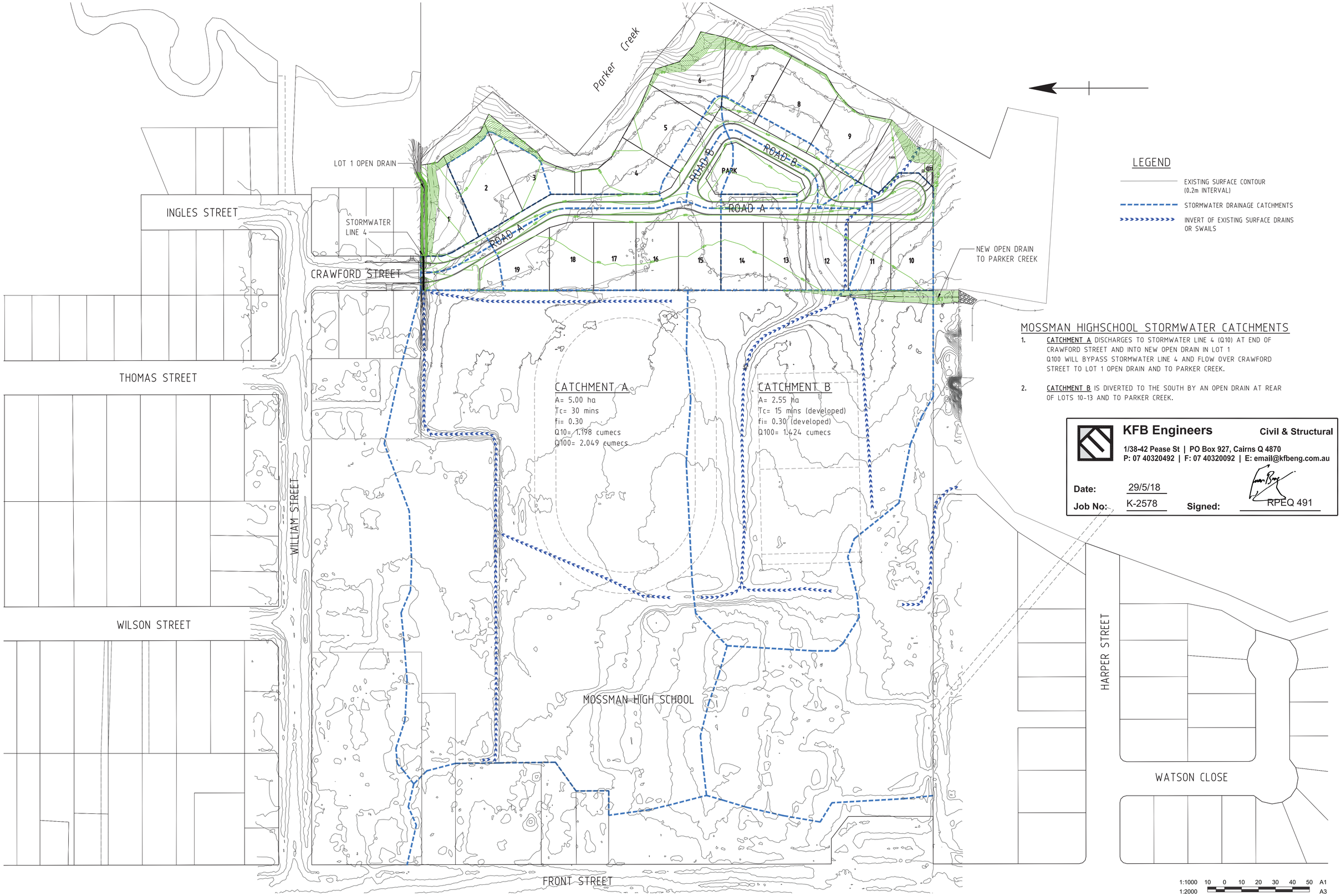
JOB No: K-2578
SHEET: C08 D
SCALE: 1:500 (@ A1)



LEGEND

- EXISTING SURFACE CONTOUR (0.2m INTERVAL)
- STORMWATER DRAINAGE CATCHMENTS
- INVERT OF EXISTING SURFACE DRAINS OR SWAILS

MOSSMAN HIGHSCHOOL STORMWATER CATCHMENTS

1. CATCHMENT A DISCHARGES TO STORMWATER LINE 4 (Q10) AT END OF CRAWFORD STREET AND INTO NEW OPEN DRAIN IN LOT 1
   Q100 WILL BYPASS STORMWATER LINE 4 AND FLOW OVER CRAWFORD STREET TO LOT 1 OPEN DRAIN AND TO PARKER CREEK.
2. CATCHMENT B IS DIVERTED TO THE SOUTH BY AN OPEN DRAIN AT REAR OF LOTS 10-13 AND TO PARKER CREEK.

KFB Engineers Civil & Structural
1/38-42 Pease St | PO Box 927, Cairns Q 4870
P: 07 40320492 | F: 07 40320092 | E: email@kfbeng.com.au

Date: 29/5/18
Job No: K-2578
Signed: RPEQ 491

No.	DATE	ISSUE / REVISIONS	DRN	CHKD
C	30/04/18	REDESIGN FOR NEW DESIGN LEVELS		
B	29/11/16	REVISION FOR NEW Q100 FLOOD LEVEL - TENDER ISSUE		
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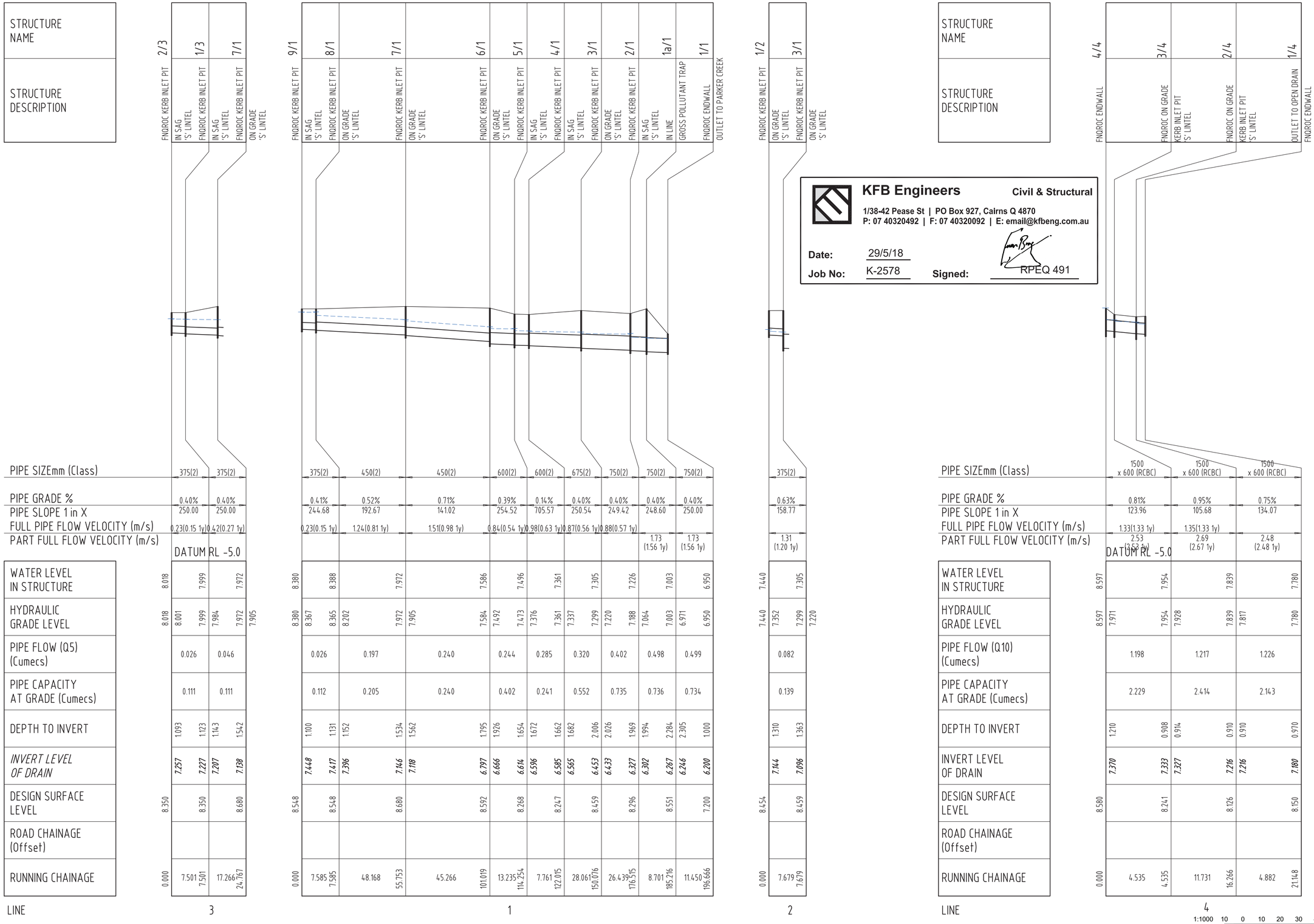
DRAWING FILE: XREF FILE: N/A

N.V. & J.S. Pty Ltd
PROPOSED SUBDIVISION
AT CRAWFORD STREET, MOSSMAN

External Stormwater Drainage Catchment Plan

KFB ENGINEERS
ABN 28 351 246 509
Civil & Structural
20 Scott St, Cairns | PO Box 927, Cairns Q 4870
P: 07 40521700 | F: 07 40521634
E: email@kfbeng.com.au

JOB No: K-2578
SHEET: C09 C
SCALE: 1:1000 (@ A1)



KFB Engineers Civil & Structural

1/38-42 Pease St | PO Box 927, Cairns Q 4870
P: 07 40320492 | F: 07 40320092 | E: email@kfbeng.com.au

Date: 29/5/18
Job No: K-2578
Signed: RPEQ 491

No.	DATE	ISSUE / REVISIONS	DRN	CHKD
D	30/04/18	REDESIGN FOR NEW DESIGN LEVELS		
C	11/12/16	STORMWATER DRAINAGE AND SITE LEVELS REVISED		
B	29/11/16	REVISION FOR NEW Q100 FLOOD LEVEL - TENDER ISSUE		
A	18/07/16	ORIGINAL ISSUE	EWK	EFB

DRAWING FILE: XREF FILE: N/A

N.V. & J.S. Pty Ltd
PROPOSED SUBDIVISION
AT CRAWFORD STREET, MOSSMAN

Stormwater Drainage
Longitudinal Sections

KFB ENGINEERS
ABN 28 351 246 509

Civil & Structural
20 Scott St, Cairns | PO Box 927, Cairns Q 4870
P: 07 40521700 | F: 07 40521634
E: email@kfbeng.com.au

JOB No: K-2578
SHEET: C10 D
SCALE: 1:1000H 1:100V (@ A1)

LOCATION				TIME		SUB-CATCHMENT RUNOFF						INLET DESIGN							DRAIN DESIGN											HEADLOSSES							PART FULL				DESIGN LEVELS							
				tc	I	C10	C	A	C×A	+CA	Q					Qg	Qb		tc	I	+CA	Qt	Qm	Qs	Qp	L	S		V	T			V2/2g	Ku	hu	Kl	hl	Kw	hw	Sf	hf		Vp							
DESIGN ARI	STRUCTURE No.	DRAIN SECTION	SUB-CATCHMENTS CONTRIBUTING	SUB-CATCHMENT TIME OF CONC.	RAINFALL INTENSITY	10yr RUNOFF CO-EFFICIENT	CO-EFFICIENT OF RUNOFF	SUB-CATCHMENT AREA	EQUIVALENT AREA	SUM OF (C × A)	SUB-CATCHMENT DISCHARGE	FLOW IN K&C (INC. BYPASS)	ROAD GRADE AT INLET	MINOR FLOW ROAD CAPACITY	INLET TYPE	FLOW INTO INLET	BYPASS FLOW	BYPASS STRUCTURE No.	CRITICAL TIME OF CONC.	RAINFALL INTENSITY	TOTAL (C × A)	MAJOR TOTAL FLOW	MAJOR SURFACE FLOW CAPACITY	MAJOR SURFACE FLOW	PIPE FLOW	REACH LENGTH	PIPE GRADE	PIPE / BOX DIMENSIONS (CLASS)	FLOW VELOCITY FULL (PIPE GRADE VELOCITY)	TIME OF FLOW IN REACH	STRUCTURE CHART No.	STRUCTURE RATIOS FOR 'K' VALUE CALCULATIONS	VELOCITY HEAD	U/S HEADLOSS COEFFICIENT	U/S PIPE STRUCT. HEADLOSS	L.A.T. HEADLOSS CO-EFFICIENT	L.A.T. PIPE STRUCT. HEADLOSS	W.S.E CO-EFFICIENT	CHANGE IN W.S.E	PIPE FRICTION SLOPE	PIPE FRICTION HEADLOSS (L × Sf)	DEPTH	VELOCITY	OBVERT LEVELS	DRAIN SECTION H.G.L	UPSTREAM H.G.L	L.A.T. H.G.L	W.S.E.	SURFACE OR K&C INVERT LEVEL	STRUCTURE No.
yrs				min	mm/h			ha	ha	ha	l/s	l/s	%	l/s		l/s	l/s		min	mm/h	ha	l/s	l/s	l/s	l/s	m	%	mm	m/s	min			m		m		m		m	%	m	m	m/s	m	m	m	m	m	m	
5 100	2/3	2/3 to 1/3	2/3	15.00 15.00	139 221		0.74 0.94	0.090 0.090	0.067 0.085	0.067 0.085	26 52 FLOW WIDTH/DEPTH 0.015Dp m	26	0.00	1754	101S1.0	26 (UNLOCKED Q)	0		15.00 15.00	139 221	0.067 0.085	52			26 (Pipe flow= Grate	7.501 flow)	1.63	375(2)1	0.23 (0.15 1y) (2.03)	0.13		Qg 0.026 Qo 0.026 Do 375 CHRT 32: Vo2/2gDo 0.01 H/Do 1.03 Kg side flow 6.41 end flow 4.63	0.003	6.41	0.017			6.41	0.017	0.02	0.002			7.614 7.492	8.000 7.998	8.017		8.017	8.350	2/3
5 100	1/3	1/3 to 7/1	2/3;1/3	15.00 15.00	139 221		0.74 0.94	0.071 0.071	0.053 0.067	0.053 0.067	20 41 FLOW WIDTH/DEPTH 0.009Dp m	20	0.00	1754	101S1.0	20 (UNLOCKED Q)	0		15.13 15.13	138 220	0.120 0.152	93			46 (Pipe flow= Sum upstr	17.266 atten flows)	0.40	375(2)1	0.42 (0.27 1y) (1.00)	0.29		Qg 0.020 Qo 0.046 Do 375 CHART 34 Angle 27 Case3 S/Do 2.5 Du/Do 1.00 Qg/Qo 0.44 K 1.53 S/Do 2.40 cor 0.03 Ku 1.56 Kw 1.56	0.009	1.56	0.014			1.56	0.014	0.07	0.012			7.472 7.403	7.984 7.972	7.998		7.998	8.350	1/3
5 100	9/1	9/1 to 8/1	9/1	15.00 15.00	139 221		0.74 0.94	0.090 0.090	0.067 0.085	0.067 0.085	26 52 FLOW WIDTH/DEPTH 0.015Dp m	26	0.00	1754	101S1.0	26 (UNLOCKED Q)	0		15.00 15.00	139 221	0.067 0.085	52			26 (Pipe flow= Grate	7.585 flow)	0.71	375(2)1	0.23 (0.15 1y) (1.34)	0.13		Qg 0.026 Qo 0.026 Do 375 CHRT 32: Vo2/2gDo 0.01 H/Do 1.72 Kg side flow 4.23 end flow 3.36	0.003	4.23	0.011			4.23	0.011	0.02	0.002			7.723 7.669	8.370 8.368	8.381		8.381	8.548	9/1
5 100	8/1	8/1 to 7/1	9/1;8/1	15.00 15.00	139 221		0.74 0.94	0.605 0.605	0.447 0.568	0.447 0.568	173 349 FLOW WIDTH/DEPTH 0.134Dp m	173	0.00	1754	101S1.0	173 (UNLOCKED Q)	0		15.13 15.13	138 220	0.514 0.653	399			197 (Pipe flow= Sum upstr	48.168 atten flows)	0.48	450(2)1	1.24 (0.81 1y) (1.24)	0.65		Qg 0.171 Qo 0.197 Do 450 Angle 90 Chart 47 S/Do 2.5 chartdeg Du/Do 0.83 K0 2.07 K0.5 2.30 Qu/Qo 0.13 Cg 1.31 K 2.37 S/Do 0.0 K0 0.00 K0.5 0.00 K 0.00 S/Do 0.0 K0 0.00 K0.5 0.00 K 0.00	0.078	2.11	0.166		Interp val for S/Do 2.49 Kw 0.00 CHART 46 S/Do 2.5 K0 1.67 K0.5 2.01 K 2.11 S/Do 2.0 K0 1.97 K0.5 2.02 K 2.04 Interp val for S/Do 2.49 Ku 2.11	2.11	0.166	0.48	0.230			7.716 7.486	8.202 7.972	8.368		8.368	8.548	8/1
5 100	7/1	7/1 to 6/1	2/3;1/3;9/1;8/1;7/1	15.00 15.00	139 221		0.74 0.94	0.001 0.001	0.001 0.001	0.001 0.001	0 1	0	0.30	102	1	0 (UNLOCKED Q)	0	6/1	15.78 15.78	136 216	0.635 0.806	484			240 (Pipe flow= Sum upstr	45.266 atten flows)	0.71	450(2)1	1.51 (0.98 1y) (1.51)	0.50		Qg 0.000 Qo 0.240 Do 450 Routine 2.2 CHART 48 Du/Do 1.00 Qu/Qo 0.81 K 0.75 d/Do 2.0 chrt Qg/Qo 0.00 Kg 0.00 d/Do 1.5 chrt Qg/Qo 0.00 Kg 0.00 d/Do 1.99 Interp value Kg 0.00 Ku=Kw= 0.76 Combined pipes in line case Join Pipes	0.116	0.58	0.067		1/3 and 8/1 Vel1 1.221 Vel2 0.410 Eq Dia 534 Angle 183 Flow 0.240 CHART 33 Angle 0 S/Do 2.5 Du/Do 1.19 Qg/Qo 0.00 K 0.23 S/Do 2.05 cor 0.00 Ku 0.23 Kw 0.23 Interpolated Ku= 0.58 Kw= 0.58	0.58	0.067	0.71	0.321			7.458 7.137	7.905 7.584	7.972		7.972	8.680	7/1
5 100	6/1	6/1 to 5/1	2/3;1/3;9/1;8/1;7/1; 6/1	15.00 15.00	139 221		0.74 0.94	0.037 0.037	0.027 0.035	0.027 0.035	10 21 FLOW WIDTH 1.010 m DOWNSTREAM 0.309m	11	0.30	102	1	8 (UNLOCKED Q)	2	5/1	16.28 16.28	134 213	0.662 0.841	498	487	253 (Pipe flow= Sum upstr	244 atten flows)	13.235	0.39	600(2)1	0.84 (0.54 1y) (1.38)	0.22		Qg 0.008 Qo 0.244 Do 600 Angle 40 Chart 39 S/Do 2.5 chartdeg Du/Do 0.75 K0 2.04 K0.5 1.174 Qu/Qo 0.97 Cg 0.09 K 2.01 S/Do 2.0 K0 2.26 K0.5 1.83 K 2.22 S/Do 1.5 K0 2.67 K0.5 2.11 K 2.62	0.036	2.54	0.092		Interp val for S/Do 1.51 Kw 2.61 CHART 38 S/Do 2.0 K0 2.17 K0.5 1.82 K 2.14 S/Do 1.5 K0 2.59 K0.5 2.13 K 2.55 Interp val for S/Do 1.51 Ku 2.54	2.61	0.094	0.15	0.019			7.276 7.224	7.492 7.473	7.584		7.586	8.592	6/1
5 100	5/1	5/1 to 4/1	2/3;1/3;9/1;8/1;7/1; 6/1;5/1	15.00 15.00	139 221		0.74 0.94	0.142 0.142	0.105 0.133	0.105 0.133	41 82 FLOW WIDTH/DEPTH 0.034Dp m	43	0.00	1754	101S1.0	43 (UNLOCKED Q)	0		16.50 16.50	134 212	0.767 0.974	574			285 (Pipe flow= Sum upstr	7.761 atten flows)	0.14	600(2)1	0.98 (0.63 1y) (0.83)	0.13		Qg 0.041 Qo 0.285 Do 600 Angle 35 Chart 39 S/Do 2.5 chartdeg Du/Do 1.00 K0 1.80 K0.5 1.91 Qu/Qo 0.86 Cg 0.36 K 1.84 S/Do 2.0 K0 1.98 K0.5 2.10 K 2.02 S/Do 1.5 K0 2.39 K0.5 2.52 K 2.43	0.049	1.98	0.097		Interp val for S/Do 1.48 Kw 2.45 CHART 38 S/Do 2.0 K0 1.84 K0.5 1.75 K 1.80 S/Do 1.5 K0 2.05 K0.5 1.84 K 1.97 Interp val for S/Do 1.48 Ku 1.98	2.45	0.120	0.20	0.015			7.206 7.195	7.376 7.361	7.473		7.496	8.268	5/1
5 100	4/1	4/1 to 3/1	2/3;1/3;9/1;8/1;7/1; 6/1;5/1;4/1	15.00 15.00	139 221		0.74 0.94	0.135 0.135	0.100 0.127	0.100 0.127	39 78 FLOW WIDTH/DEPTH 0.029Dp m	39	0.00	1754	101S1.0	39 (UNLOCKED Q)	0	3/1	16.63 16.63	133 211	0.867 1.101	645			320 (Pipe flow= Sum upstr	28.061 atten flows)	0.40	675(2)1	0.87 (0.56 1y) (1.50)	0.47		Qg 0.037 Qo 0.320 Do 675 CHART 34 Angle 24 Case3 S/Do 2.5 Du/Do 0.89 Qg/Qo 0.12 K 0.46 S/Do 1.16 cor 0.18 Ku 0.64 Kw 0.64	0.039	0.64	0.024			0.64	0.024	0.13	0.038			7.250 7.138	7.337 7.299	7.361		7.361	8.247	4/1
5 100	1/2	1/2 to 3/1	1/2	15.00 15.00	139 221		0.74 0.94	0.400 0.400	0.296 0.376	0.296 0.376	114 231 FLOW WIDTH 3.147 m DOWNSTREAM 1.790m	114	0.30	102	1	82 (UNLOCKED Q)	32	2/1	15.00 15.00	139 221	0.296 0.376	231	487	149 (Pipe flow= Grate	82 flow)	7.679	0.63	375(2)1	0.74 (0.51 1y) (1.26)	0.13		Qg 0.082 Qo 0.082 Do 375 CHRT 32: Vo2/2gDo 0.07 H/Do 0.00 Kg side flow 8.53 end flow 6.41 Part full downstream pipe	0.028	1.00	0.088		Upstream HGL 7.440 below outlet pipe obv 7.519 Set Kp to 1	1.00	0.088	0.22	0.017	0.208 (0.167 1y)	1.31 (1.20 1y)	7.519 7.471	7.352 7.304	7.440		7.440	8.454	1/2
5 100	3/1	3/1 to 2/1	2/3;1/3;9/1;8/1;7/1; 6/1;5/1;4/1;1/2;3/1	15.00 15.00	139 221		0.74 0.94	0.029 0.029	0.022 0.028	0.022 0.028	8 17 FLOW WIDTH 0.894 m DOWNSTREAM 0.238m	8	0.30	102	1	7 (UNLOCKED Q)	2	2/1	17.10 17.10	132 209	1.185 1.505	874			402 (Pipe flow= Sum upstr	26.439 atten flows)	0.40	750(2)1	0.88 (0.57 1y) (1.61)	0.44		Qg 0.006 Qo 0.402 Do 750 Flow 1/2 made eqv grate flow Angle 47 Chart 39 S/Do 2.5 chartdeg Du/Do 0.90 K0 1.84 K0.5 1.84 Qu/Qo 0.79 Cg 0.50 K 1.84 S/Do 2.0 K0 2.04 K0.5 1.97 K 2.00 S/Do 1.5 K0 2.44 K0.5 2.31 K 2.37 Interp val for S/Do 1.17 Kw 2.62 CHART 38 S/Do 2.0 K0 2.00 K0.5 1.82 K 1.91 S/Do 1.5 K0 2.32 K0.5 2.02 K 2.17 Interp val for S/Do 1.17 Ku 2.34 K vals above for stepped pipes as grate flow grate flow decreased by 0.078 from 1/2 Routine 2.14 Equiv defin 37 CHART 49 High vel lat 4/1 Dhv 675 Qhv 0.318 Dhv/Dlv 1.8 Dhv/Do 0.90	0.039	2.00	0.079		Qhv/Qo 0.79 H 3.04 Low vel lat=1 1/2 Dlv 375 Qlv 0.078 Dlv/Do 0.50 Qlv/Qo 0.19 L 0.65 H-L 2.39 Ku=Kw= 2.39 Combined pipes in line case Join Pipes 4/1 and 1/2 Vel1 0.883 Vel2 0.705 Eq Dia 768 Angle 203 Flow 0.396 CHART 33 Angle 0 S/Do 2.5 Du/Do 1.02 Qg/Qo 0.02 K 0.28 S/Do 1.05 cor 0.03 Ku 0.31 Kw 0.31 Interpolated Ku= 1.53 Kw= 1.53 K vals step pipes as pipe flow Ku 1.53 Kw 1.53 Averaged Ku 2.00 Kw 2.16	2.16	0.085	0.12	0.032			7.195 7.089	7.220 7.188	7.299		7.305	8.459	3/1
5 100	2/1	2/1 to 1a/1	2/3;1/3;9/1;8/1;7/1; 6/1;5/1;4/1;1/2;3/1; 2/1	15.00 15.00	139 221		0.74 0.94	0.264 0.264	0.195 0.248	0.195 0.248	75 152 FLOW WIDTH/DEPTH 0.098Dp m	109	0.00	1754	101S1.0	109 (UNLOCKED Q)	0		17.54 17.54	130 206	1.380 1.753	1003			498 (Pipe flow= Sum upstr	8.701 atten flows)	0.40	750(2)1	1.09 (0.70 1y) (1.61)	0.13		Qg 0.102 Qo 0.498 Do 750 Angle 42 Chart 39 S/Do 2.5 chartdeg Du/Do 1.00 K0 1.80 K0.5 1.91 Qu/Qo 0.80 Cg 0.49 K 1.85 S/Do 2.0 K0 1.98 K0.5 2.10 K 2.04 S/Do 1.5 K0 2.39 K0.5 2.52 K 2.45	0.061	2.04	0.124		Interp val for S/Do 1.21 Kw 2.68 CHART 38 S/Do 2.0 K0 1.84 K0.5 1.75 K 1.79 S/Do 1.5 K0 2.05 K0.5 1.84 K 1.95 Interp val for S/Do 1.21 Ku 2.04	2.68	0.162	0.18	0.016	0.460 (0.353 1y)	1.73 (1.56 1y)	7.064 7.029	7.064 7.003	7.188		7.226	8.296	2/1
5 100	1a/1	1a/1 to 1/1	2/3;1/3;9/1;8/1;7/1; 6/1;5/1;4/1;1/2;3/1; 2/1;1a/1	15.00 15.00	139 221		0.74 0.94	0.001 0.001	0.001 0.001	0.001 0.001	0 1 FLOW WIDTH/DEPTH -0.016Dp m	0	0.00	1754	101S1.0	0 (UNLOCKED Q)	0		17.67 17.67	130 206	1.381 1.754	1004			499 (Pipe flow= Sum upstr	11.450 atten flows)	0.40	750(2)1	1.09 (0.70 1y) (1.61)	0.18		Qg 0.000 Qo 0.499 Do 750 CHART 33 Angle 0 S/Do 2.5 Du/Do 1.00 Qg/Qo 0.00 K 0.20 S/Do 1.02 cor 0.00 Ku 0.20 Kw 0.20	0.061	0.50	0.032		Part full downstream pipe Upstream HGL 7.003 below outlet pipe obv 7.008 Set Kp to 5	0.50	0.032	0.18	0.021	0.461 (0.353 1y)	1.73 (1.56 1y)	7.008 6.962	6.971 6.950	7.003		7.003	8.551	1a/1

10 100	4/4	4/4 to 3/4	4/4	30.00 30.00	113 162		0.76 0.91	5.000 5.000	3.800 4.550	3.800 4.550	1193 2048 FLOW WIDTH/DEPTH 1.001Dp m	1193	0.00	2391	101S2.0	1193 (UNLOCKED Q)	0	3/4	30.00 30.00	113 162	3.800 4.550	2048			1198 (Pipe flow set by user)	4.535	0.81	1500 x 600 (RCBC)	1.33(1.33 1y) (2.47)	0.06		Qg 1.198 Qo 1.198 Do 858 CHRT 32: Vo2/2gDo 0.15 H/Do 0.00 Kg side flow 6.95 end flow 5.47	0.090	6.95	0.626			6.95	0.626	0.23	0.011	0.315 (0.315 1y)	2.53 (2.53 1y)	7.971 7.934	7.971 7.954	8.597		8.597	8.580	4/4
10 100	3/4	3/4 to 2/4	4/4;3/4	15.00 15.00	153 221		0.78 0.94	0.078 0.078	0.061 0.074	0.061 0.074	26 45 FLOW WIDTH/DEPTH 0.015Dp m	26	0.00	1191	101S1.0	26 (UNLOCKED Q)	0	2/4	30.06 30.06	113 162	3.861 4.624	2081			1217 (Pipe flow= Sum upstr	11.731 atten flows)	0.95	1500 x 600 (RCBC)	1.35(1.33 1y) (2.68)	0.14		Qg 0.019 Qo 1.217 Do 858 CHART 33 Angle 1 S/Do 2.5 Du/Do 1.00 Qg/Qo 0.02 K 0.25 S/Do 1.04 cor 0.03 Ku 0.28 Kw 0.28	0.093	0.28	0.026			0.28	0.026	0.24	0.028	0.302 (0.299 1y)	2.69 (2.67 1y)	7.928 7.817	7.928 7.839	7.954		7.954	8.241	3/4
10 100	2/4	2/4 to 1/4	4/4;3/4;2/4	15.00 15.00	153 221		0.78 0.94	0.037 0.037	0.029 0.035	0.029 0.035	12 22 FLOW WIDTH/DEPTH -0.001Dp m	12	0.00	1191	101S1.0	12 (UNLOCKED Q)	0		30.20 30.20	113 161	3.890 4.659	2084			1226 (Pipe flow= Sum upstr	4.882 atten flows)	0.75	1500 x 600 (RCBC)	1.36(1.35 1y) (2.38)	0.06		Qg 0.009 Qo 1.226 Do 858 CHART 33 Angle 7 S/Do 2.5 Du/Do 1.00 Qg/Qo 0.01 K 0.22 S/Do 1.04 cor 0.01 Ku 0.23 Kw 0.23	0.094	0.23	0.022			0.23	0.022	0.24	0.012	0.329 (0.327 1y)	2.48 (2.48 1y)	7.817 7.781	7.817 7.780	7.839		7.839	8.126	2/4

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Job No: K-2578
Signed: RPEQ 491

AS SHOWN

No.	DATE	ISSUE / REVISIONS	DRN	CHKD
C	30/04/18	REDESIGN FOR NEW DESIGN LEVELS		
B	29/11/16	REVISION FOR NEW Q100 FLOOD LEVEL - TENDER ISSUE		
A	18/07/16	ORIGINAL ISSUE	EWK	EFB

DRAWING FILE: XREF FILE: N/A

N.V. & J.S. Pty Ltd
PROPOSED SUBDIVISION
AT CRAWFORD STREET, MOSSMAN

Stormwater Drainage Calculations

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JOB No: K-2578
SHEET: C11 C
SCALE: N.T.S (@ A1)

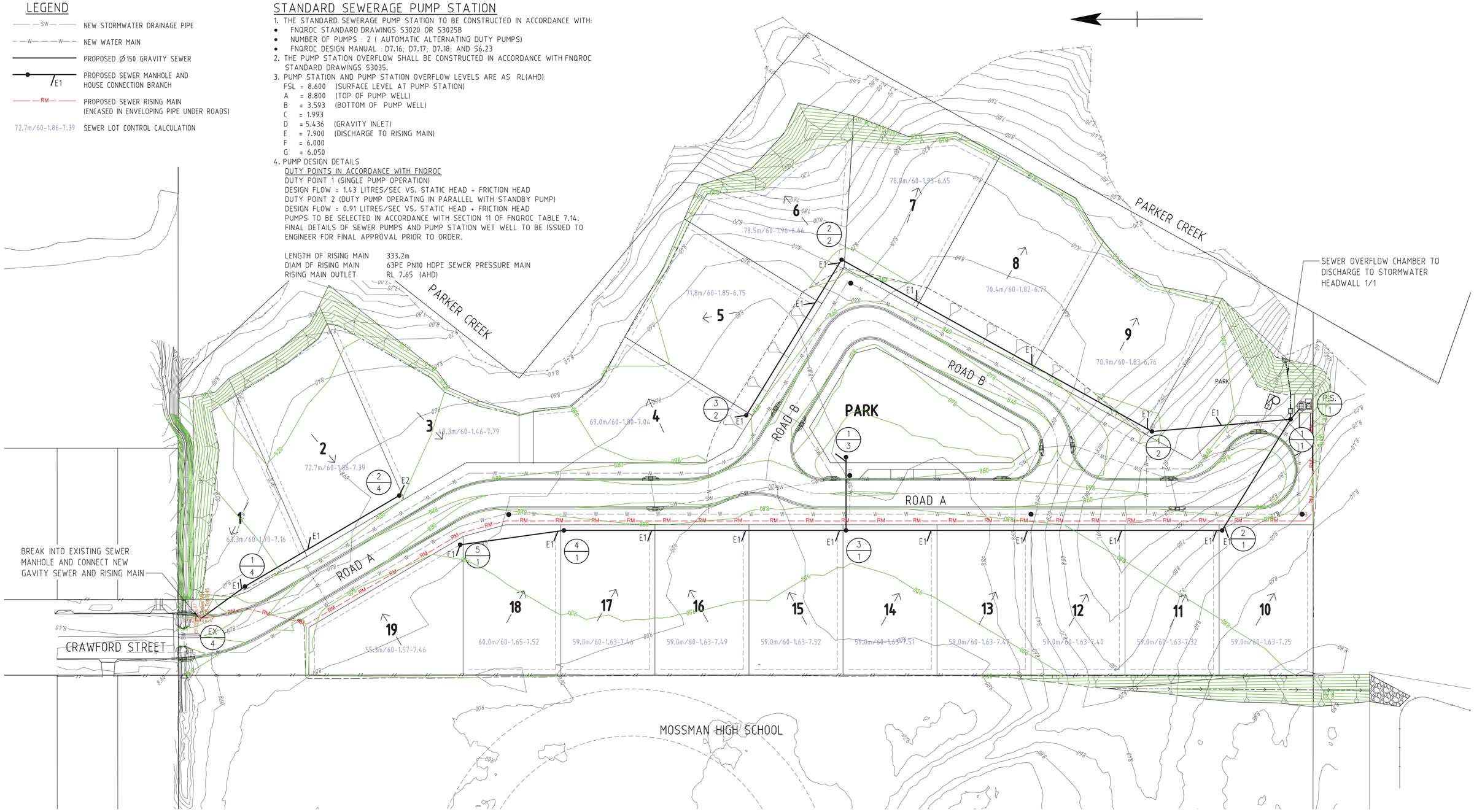
LEGEND

- NEW STORMWATER DRAINAGE PIPE
- NEW WATER MAIN
- PROPOSED Ø150 GRAVITY SEWER
- PROPOSED SEWER MANHOLE AND HOUSE CONNECTION BRANCH
- PROPOSED SEWER RISING MAIN (ENCASED IN ENVELOPING PIPE UNDER ROADS)
- 72.7m/60-1.86-7.39 SEWER LOT CONTROL CALCULATION

STANDARD SEWERAGE PUMP STATION

1. THE STANDARD SEWERAGE PUMP STATION TO BE CONSTRUCTED IN ACCORDANCE WITH:
   - FNQROC STANDARD DRAWINGS S3020 OR S3025B
   - NUMBER OF PUMPS : 2 (AUTOMATIC ALTERNATING DUTY PUMPS)
   - FNQROC DESIGN MANUAL : D7.16; D7.17; D7.18; AND S6.23
2. THE PUMP STATION OVERFLOW SHALL BE CONSTRUCTED IN ACCORDANCE WITH FNQROC STANDARD DRAWINGS S3035.
3. PUMP STATION AND PUMP STATION OVERFLOW LEVELS ARE AS RL(AHD):
   FSL = 8.600 (SURFACE LEVEL AT PUMP STATION)
   A = 8.800 (TOP OF PUMP WELL)
   B = 3.593 (BOTTOM OF PUMP WELL)
   C = 1.993
   D = 5.436 (GRAVITY INLET)
   E = 7.900 (DISCHARGE TO RISING MAIN)
   F = 6.000
   G = 6.050
4. PUMP DESIGN DETAILS
   DUTY POINTS IN ACCORDANCE WITH FNQROC
   DUTY POINT 1 (SINGLE PUMP OPERATION)
   DESIGN FLOW = 1.43 LITRES/SEC VS. STATIC HEAD + FRICTION HEAD
   DUTY POINT 2 (DUTY PUMP OPERATING IN PARALLEL WITH STANDBY PUMP)
   DESIGN FLOW = 0.91 LITRES/SEC VS. STATIC HEAD + FRICTION HEAD
   PUMPS TO BE SELECTED IN ACCORDANCE WITH SECTION 11 OF FNQROC TABLE 7.14.
   FINAL DETAILS OF SEWER PUMPS AND PUMP STATION WET WELL TO BE ISSUED TO ENGINEER FOR FINAL APPROVAL PRIOR TO ORDER.

LENGTH OF RISING MAIN	333.2m
DIAM OF RISING MAIN	63PE PN10 HDPE SEWER PRESSURE MAIN
RISING MAIN OUTLET	RL 7.65 (AHD)



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SCALE 1:500 (A1)

NOTES

1. ALL GRAVITY SEWER PIPES SHALL BE 150 DIA PVC, CLASS SN8, RRJ, UNLESS NOTED OTHERWISE.
2. REFER TO THE SEWERAGE LONGITUDINAL SECTION FOR SEWER PIPE GRADES, INVERT LEVELS, STORMWATER CLASHES, ETC.
3. CONSTRUCTION OF THE GRAVITY SEWERAGE RETICULATION SHALL BE IN ACCORDANCE WITH THE PROCEDURES, SPECIFICATIONS AND DRAWINGS INCLUDING REQUIREMENTS FOR "AS CONSTRUCTED" DRAWINGS AS CONTAINED IN THE CURRENT ISSUE OF THE 'REGIONAL DEVELOPMENT MANUAL' AS ISSUED BY FNQROC, AND SHALL BE TO THE REQUIREMENTS OF THE COUNCIL.
4. INSTALL PIPE ANCHOR BLOCKS TO ALL 100 AND 150 DIA SEWERS AT GRADES GREATER THAN 1 ON 6 IN ACCORDANCE WITH FNQROC DWG No. S3015 AND WSA.
5. THE CONTRACTOR SHALL MAKE ALL APPLICATIONS AND PAY ALL FEES TO COUNCIL FOR THE SEWERAGE WORKS AND SHALL ARRANGE AND MANAGE COUNCIL'S INSPECTIONS AND TESTING OF THE WORKS. A COPY OF COUNCIL'S INSPECTION CERTIFICATE SHALL BE PROVIDED BY THE CONTRACTOR TO THE OWNER PRIOR TO PRACTICAL COMPLETION.

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Date: 29/5/18
Job No: K-2578
Signed: RPEQ 491

1:500 10 5 0 10 20 A1
1:1000 A3

No.	DATE	ISSUE / REVISIONS	DRN	CHKD
E	30/04/18	REDESIGN FOR NEW DESIGN LEVELS		
D	21/02/17	SEWER MANHOLES 1/3 AND 1/4 AND NOTES REVISED		
C	11/12/16	STORMWATER DRAINAGE, SITE LEVELS REVISED AND PUMP STATION DETAILS ADDED	EWK	EFB

DRAWING FILE: XREF FILE: N/A

N.V. & J.S. Pty Ltd
PROPOSED SUBDIVISION
AT CRAWFORD STREET, MOSSMAN

Sewer Reticulation Layout

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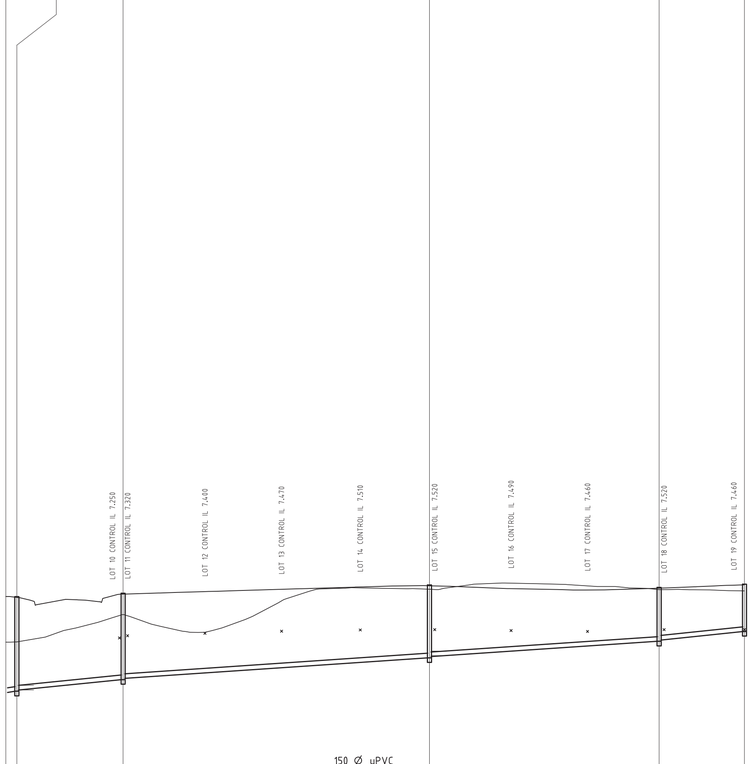
JOB No: K-2578
SHEET: C12 E
SCALE: 1:500 (@ A1)

JUNCTION LINE No		2		3		
MANHOLE COVER		CIRCULAR TYPE "B"	CIRCULAR TYPE "B"	CIRCULAR TYPE "B"	CIRCULAR TYPE "B"	RECTANGULAR TYPE "B"
MANHOLE DROP		TYPE "A"	TYPE "A"	TYPE "A"	TYPE "A"	
MANHOLE No	PS1	1/1	2/1	3/1	4/1	5/1

JUNCTION LINE No	1			
MANHOLE COVER		CIRCULAR TYPE "B"	CIRCULAR TYPE "B"	CIRCULAR TYPE "B"
MANHOLE DROP		TYPE "A"	TYPE "A"	
MANHOLE No	1/1	1/2	2/2	3/2

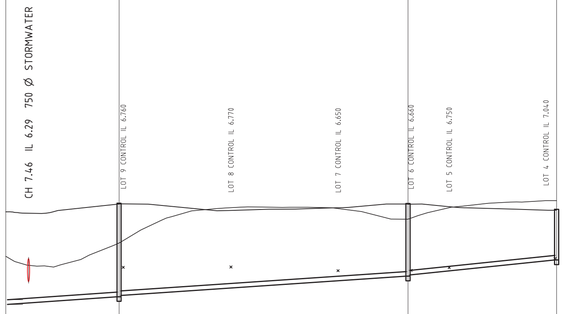
JUNCTION LINE No	1		
MANHOLE COVER		CIRCULAR TYPE "B"	CIRCULAR TYPE "B"
MANHOLE DROP			
MANHOLE No	3/1	1/3	

JUNCTION LINE No	EXIST		
MANHOLE COVER		CIRCULAR TYPE "B"	TYPE "B" RECTANGULAR
MANHOLE DROP		TYPE "A"	
MANHOLE No	EX4	1/4	2/4



DIAMETER		150 Ø uPVC							
GRADE		1 on 63.32 1.58%	1 on 98.96 1.01%	1 on 147.69 0.68%		1 on 147.90 0.68%		1 on 95.76 1.04%	
LENGTH		3.583	34.698	100.000		75.000		27.864	
DATUM R.L.		-2.0							
R.L. TOP OF MANHOLE		8.599		8.706		8.978		8.900	9.006
JUNCTION INVERT LEVEL			5.550				6.670		
MANHOLE DEPTH LID TO INVERT		3.089		2.816		2.378		1.760	1.546
SEWER PIPE INVERT LEVEL	*5.470*	*5.510*	*5.550*	*5.890*	*5.930*	*6.600*	*6.640*	*7.140*	*7.180*	*7.460*
DESIGN SURFACE LEVEL	8.600	8.574		8.681		8.953		8.875		8.981
EXISTING SURFACE LEVEL	7.11	7.12		8.02		8.84		8.83		8.79
CHAINAGE	0.00	3.58		38.28		138.28		213.28		241.15

SEWER LINE "1"

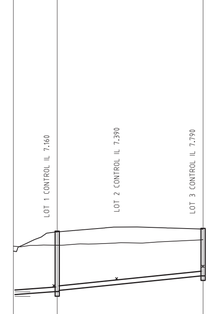


DIAMETER		150 Ø uPVC				
GRADE		1 on 143.70 0.70%		1 on 148.08 0.68%		1 on 96.88 1.03%
LENGTH		36.974		94.341		48.519
DATUM R.L.		-3.0				
R.L. TOP OF MANHOLE		8.849			8.844	8.650
JUNCTION INVERT LEVEL	5.550					
MANHOLE DEPTH LID TO INVERT		3.049			2.374	1.650
SEWER PIPE INVERT LEVEL	*5.550*	*5.800*	*5.840*		*6.470*	*6.510*	*7.000*
DESIGN SURFACE LEVEL	8.574	8.824			8.819	8.625
EXISTING SURFACE LEVEL	7.12	7.55			8.33	8.94
CHAINAGE	0.00	36.97			131.32	179.83

SEWER LINE "2"

DIAMETER		150 Ø uPVC	
GRADE		1 on 92.25 1.08%	
LENGTH		19.500	
DATUM R.L.		-2.0	
R.L. TOP OF MANHOLE			8.954
JUNCTION INVERT LEVEL		6.600	
MANHOLE DEPTH LID TO INVERT			2.084
SEWER PIPE INVERT LEVEL	*6.670*	*6.870*
DESIGN SURFACE LEVEL	8.953		8.929
EXISTING SURFACE LEVEL	8.84		8.78
CHAINAGE	0.00		19.50

SEWER LINE "3"



DIAMETER		150 Ø uPVC	
GRADE		1 on 138.28 0.72%	1 on 97.79 1.02%
LENGTH		14.325	47.599
DATUM R.L.		-2.0	
R.L. TOP OF MANHOLE		8.940		9.031
JUNCTION INVERT LEVEL	6.810		
MANHOLE DEPTH LID TO INVERT		1.974		1.549
SEWER PIPE INVERT LEVEL	*6.870*	*6.966*	*7.006*	*7.482*
DESIGN SURFACE LEVEL	8.287	8.915		9.006
EXISTING SURFACE LEVEL	8.45	8.48		8.66
CHAINAGE	0.00	14.33		61.92

SEWER LINE "4"

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Job No: K-2578
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1:1000 1:2000 — 10 0 10 20 30 40 50 — A1 A3 — HORIZONTAL

1:100 1:200 — 2 1 0 2 4 — A1 A3 — VERTICAL

No.	DATE	ISSUE / REVISIONS	DRN	CHKD
C	30/04/16	REDESIGN FOR NEW DESIGN LEVELS		
B	29/11/16	REVISION FOR NEW Q100 FLOOD LEVEL - TENDER ISSUE		
A	18/07/16	ORIGINAL ISSUE	EWK	EFB

DRAWING FILE: XREF FILE: N/A

N.V. & J.S. Pty Ltd
PROPOSED SUBDIVISION
AT CRAWFORD STREET, MOSSMAN

Sewer Longitudinal Sections

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JOB No: K-2578
SHEET: C13 C
SCALE: 1:1000H 1:100V (@ A1)

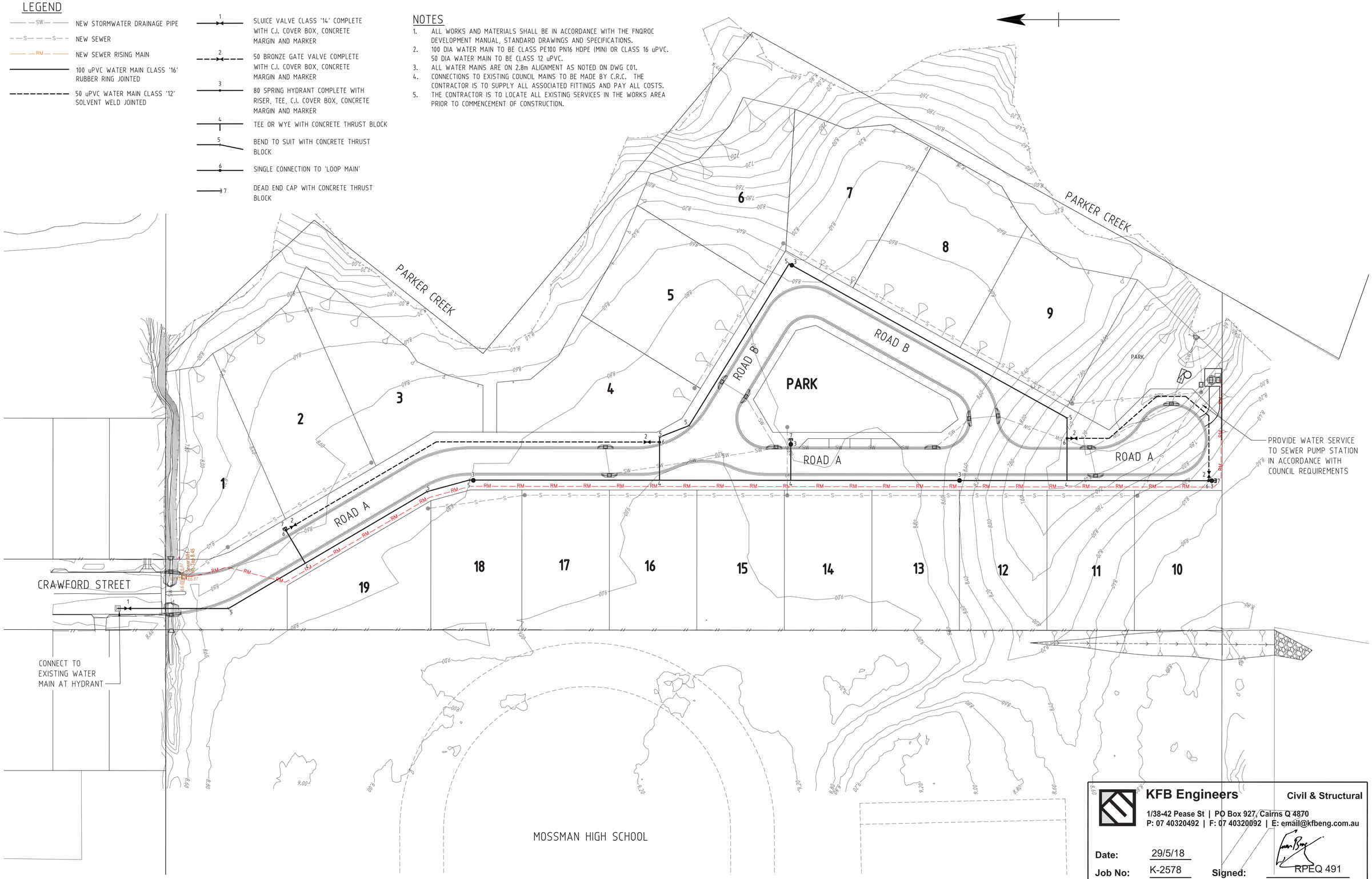
LEGEND

- NEW STORMWATER DRAINAGE PIPE
- NEW SEWER
- NEW SEWER RISING MAIN
- 100 uPVC WATER MAIN CLASS '16' RUBBER RING JOINTED
- 50 uPVC WATER MAIN CLASS '12' SOLVENT WELD JOINTED

1. SLUICE VALVE CLASS '14' COMPLETE WITH C.I. COVER BOX, CONCRETE MARGIN AND MARKER
2. 50 BRONZE GATE VALVE COMPLETE WITH C.I. COVER BOX, CONCRETE MARGIN AND MARKER
3. 80 SPRING HYDRANT COMPLETE WITH RISER, TEE, C.I. COVER BOX, CONCRETE MARGIN AND MARKER
4. TEE OR WYE WITH CONCRETE THRUST BLOCK
5. BEND TO SUIT WITH CONCRETE THRUST BLOCK
6. SINGLE CONNECTION TO 'LOOP MAIN'
7. DEAD END CAP WITH CONCRETE THRUST BLOCK

NOTES

1. ALL WORKS AND MATERIALS SHALL BE IN ACCORDANCE WITH THE FNQROC DEVELOPMENT MANUAL, STANDARD DRAWINGS AND SPECIFICATIONS.
2. 100 DIA WATER MAIN TO BE CLASS PE100 PN16 HDPE (MIN) OR CLASS 16 uPVC. 50 DIA WATER MAIN TO BE CLASS 12 uPVC.
3. ALL WATER MAINS ARE ON 2.8m ALIGNMENT AS NOTED ON DWG C01.
4. CONNECTIONS TO EXISTING COUNCIL MAINS TO BE MADE BY C.R.C. THE CONTRACTOR IS TO SUPPLY ALL ASSOCIATED FITTINGS AND PAY ALL COSTS.
5. THE CONTRACTOR IS TO LOCATE ALL EXISTING SERVICES IN THE WORKS AREA PRIOR TO COMMENCEMENT OF CONSTRUCTION.



PLAN
SCALE 1:500 (A1)

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Date: 29/5/18
Job No: K-2578
Signed: RPEQ 491

1:500 10 5 0 10 20 A1
1:1000 A3

No.	DATE	ISSUE / REVISIONS	DRN	CHKD
C	30/04/18	REDESIGN FOR NEW DESIGN LEVELS		
B	29/11/16	REVISION FOR NEW Q100 FLOOD LEVEL - TENDER ISSUE		
A	18/07/16	ORIGINAL ISSUE	EWK	EFB

DRAWING FILE: XREF FILE: N/A

N.V. & J.S. Pty Ltd
PROPOSED SUBDIVISION
AT CRAWFORD STREET, MOSSMAN

Water Supply Layout

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JOB No: K-2578
SHEET: C14 C
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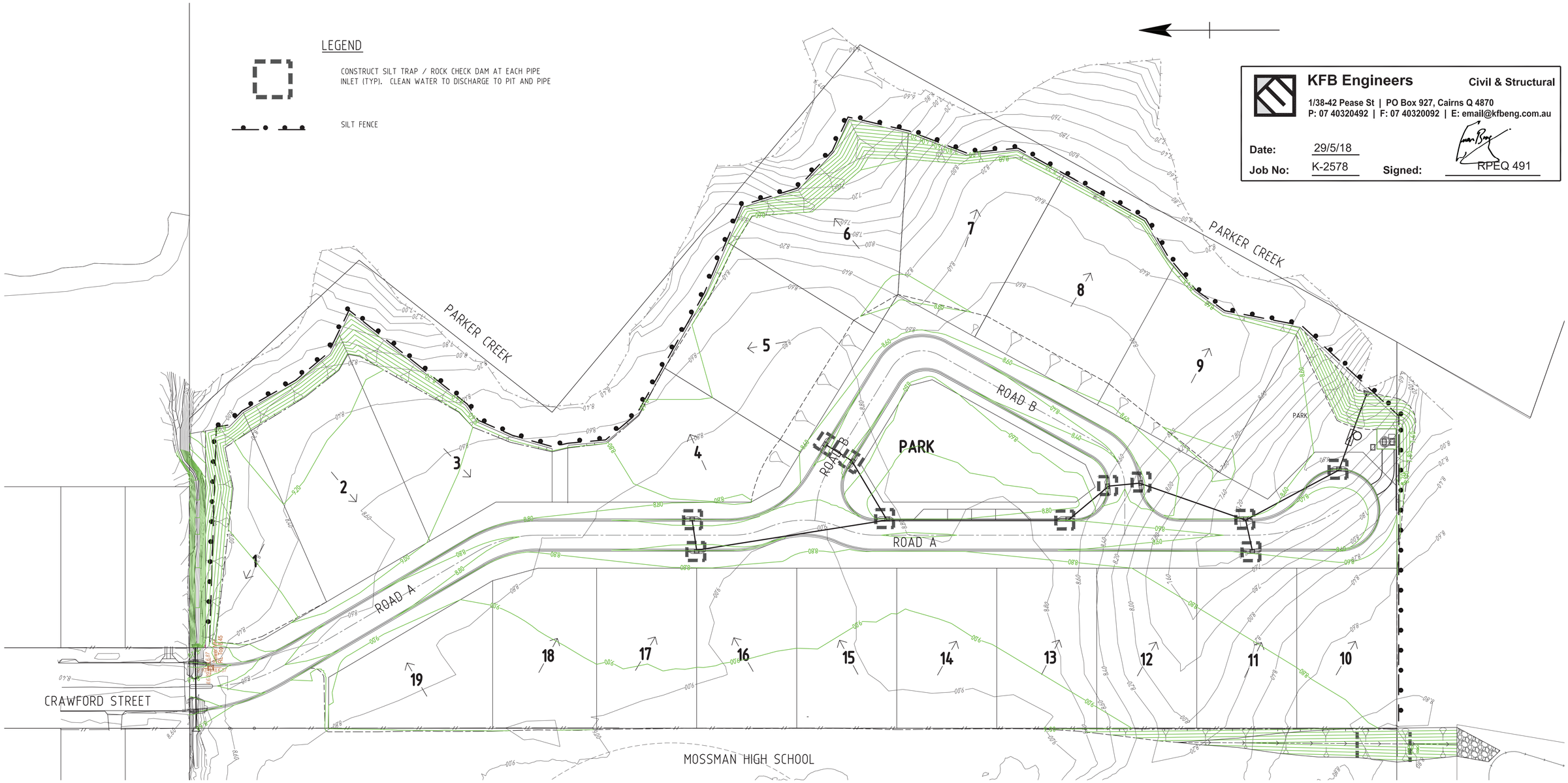

KFB Engineers Civil & Structural

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Date: 29/5/18
Job No: K-2578
Signed: RPEQ 491

EROSION SEDIMENT CONTROL STRATEGY AND ENVIRONMENTAL PROTECTION

1. THE CONTRACTOR SHALL BE RESPONSIBLE TO PROTECT AND PRESERVE THE NATURAL ENVIRONMENT AND SHALL AVOID ENVIRONMENTAL POLLUTION IN ACCORDANCE WITH THE ENVIRONMENTAL PROTECTION ACT.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE INCORPORATION OF APPROPRIATE CONTROL AND MANAGEMENT MEASURES CONFORMING TO THE REQUIREMENTS OF THE ACT AND THE RELEVANT AUTHORITIES.
3. THE EROSION AND SEDIMENT CONTROL STRATEGY, SHOWN OR NOTED ON THESE DRAWINGS, HAS BEEN PROVIDED AS A GUIDE.
4. THE CONTRACTOR SHALL PROVIDE AN EROSION SEDIMENT CONTROL PLAN (ESCP) FOR EACH PHASE OF HIS PROPOSED CONSTRUCTION PROGRAM AND WORK METHODS, AND IS WHOLLY RESPONSIBLE FOR THE IMPLEMENTATION, CONTROL AND MANAGEMENT OF SUCH PLAN.
5. THE CONTRACTOR SHALL INSTALL ALL DEVICES/MEASURES NECESSARY TO COMPLY WITH THE PROVISIONS OF THE ESCP FNQROC DEVELOPMENT MANUAL, THE ENVIRONMENTAL PROTECTION ACT, AND COUNCIL REQUIREMENTS.
6. THE ESCP SHALL INCLUDE SUCH MEASURES AS SHOWN ON THE STRATEGIC PLAN.
7. KFB ENGINEERS DOES DO NOT ACCEPT RESPONSIBILITY FOR THE CONTRACTOR'S DESIGN & IMPLEMENTATION OF HIS ESCP NOR THE CONSEQUENCES OF HIS FAILURE TO APPLY ALL REASONABLE CONTROLS.
8. ALL STORMWATER INLETS, TRENCHES, ETC, SHALL BE CONSTRUCTED IN SUCH A WAY AS TO PREVENT THE ENTRY OF SEDIMENT INTO THE STRUCTURE. IF IT IS NECESSARY TO DISCHARGE INTO SUCH INLETS THEN SUITABLE SILT TRAPS SHALL BE CONSTRUCTED UPSTREAM OF THE INLETS SUCH THAT OVERFLOW FROM TRAPS ENTERS THE DRAINS AFTER THE SEDIMENT HAS DROPPED OUT.
9. ALL SEDIMENT CONTROL MEASURES SHALL REMAIN IN PLACE UNTIL THE END OF THE MAINTENANCE PERIOD, UNLESS NOTED OTHERWISE. ALL SEDIMENT CONTROL DEVICES ARE TO BE FULLY MAINTAINED IN AN EFFECTIVE WORKING CONDITION DURING CONSTRUCTION AND THE MAINTENANCE PERIOD. THE CONTRACTOR SHALL ENSURE THAT ALL SEDIMENT CONTROL DEVICES ARE KEPT FREE OF SEDIMENT BUILD-UP.
10. SEDIMENT FENCES SHALL BE INSTALLED SUCH THAT THE BASE OF THE FENCE IS PLACED 150mm MINIMUM BELOW GROUND LEVEL, AND ANCHORED SECURELY IN SUCH POSITION.
11. ALL VEHICLE EXIT POINTS SHALL HAVE SHAKER GRIDS, WASH BAYS OR SIMILAR TO PREVENT VEHICLES FROM TRACKING SOIL AND MUD OFF SITE.
12. ALL SOIL STOCKPILES SHALL BE PROTECTED AGAINST WIND EROSION BY COVERING AND AGAINST STORMWATER RUNOFF BY SILT FENCES AT THE DOWNHILL SLOPES. STOCKPILE LOCATIONS SHALL BE DETERMINED BY THE CONTRACTOR AND EROSION/CONTROL MEASURES IMPLEMENTED & MAINTAINED FOR THE LIFE OF THE STOCKPILE.
13. THE CONTRACTOR SHALL INSTALL TURF STRIPS BEHIND ALL KERB & CHANNEL, ADJACENT CONCRETE INVERTS AND ALLOTMENT DRAINS ETC. WHERE DIRTY WATER SHEET FLOWS INTO DRAINAGE COLLECTION SYSTEMS.
14. DIVERT CLEAN WATER AROUND AREAS OF CONSTRUCTION.
15. ALL ROAD SHOULDERS, FOOTPATHS, DRAINS AND CUT BATTERS UP TO 1 on 4 SLOPE SHALL BE DRILL SEEDED WITH APPROVED GRASS SPECIES, FERTILIZED AND MAINTAINED FOR THE REQUIRED MAINTENANCE PERIOD.
16. HYDROMULCH ALL CUT AND FILL BATTERS STEEPER THAN 1 on 4, WITH APPROVED SUITABLE GRASS SPECIES AND MAINTAINED FOR THE REQUIRED MAINTENANCE PERIOD.
17. THE CONTRACTOR SHALL CONSTRUCT TEMPORARY BERMS AT THE TOP OF ALL BATTERS TO DIRECT AND CONTROL RUNOFF TO A SINGLE LOCATION. THE DISCHARGE OVER THE BATTER SHALL BE THROUGH A STABILIZED CHUTE ADDRESSED IN THE CONTRACTORS PLAN, e.g. REINFORCED TURF, GEOTEXTILE, CONCRETE OR SIMILAR.
18. ALL WORKS AND MATERIALS SHALL BE IN ACCORDANCE WITH FNQROC.

SEDIMENT CONTROL TURF DETAILS

1. PROVIDE ONE STRIP OF TURF ADJACENT TO ALL KERBS, CONCRETE SLABS, DRIVEWAYS, BATTER CHUTES ETC, WITH ONE METRE LONG RETURNS AT 10 METRE CENTRES WHERE LONGITUDINAL GRADES EXCEED 5%). PROVIDE TWO STRIPS OF TURF TO INVERT OF ALL EARTH CATCH AND DIVERSION DRAINS.

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No.	DATE	ISSUE / REVISIONS	DRN	CHKD
C	30/04/18	REDESIGN FOR NEW DESIGN LEVELS		
B	29/11/16	REVISION FOR NEW Q100 FLOOD LEVEL - TENDER ISSUE		
A	18/07/16	ORIGINAL ISSUE	EWK	EFB

DRAWING FILE: XREF FILE: N/A

N.V. & J.S. Pty Ltd
PROPOSED SUBDIVISION
AT CRAWFORD STREET, MOSSMAN

Erosion and Sediment Control Plan

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