

Jim Papas Civil Engineering Designer

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Design Excellence, Exceptional Service

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The Chief Executive Officer
Douglas Shire Council,
P.O. Box 723,
Mossman Qld 4873

July 2, 2014
1301 L01

Attn: Mr. M. Matthews

Dear Sir,

RE: OCEAN BREEZE ESTATE STAGE 5B AT BARRABAL DRIVE, COOYA

We submit the attached operational works application on behalf of Briley Consultants Pty. Ltd.

We seek your approval of these proposals and request that you issue an "Operational Works" permit to allow construction to commence.

Yours faithfully,

JIM PAPAS
CIVIL ENGINEERING
DESIGNER PTY. LTD.



JIM PAPAS

DOUGLAS SHIRE COUNCIL	
Received	
File Name	OP282/2014
Document No	
- 8 JUL 2014	
Attention	NRB
Information	4/24252

ATTACHMENTS

Design Drawings: Consisting of 3 copies (2x A1, 1 x A3) of Dwgs 1301 C01- C14 inclusive plus Cover Sheet. (Drawings are in separate folio)

Appendix A: FNQROC Statement of Compliance
FNQROC Operational Works Receipting Checklist.

Appendix B: Amended Decision Notice for Reconfiguration of a Lot

Appendix C: Water Reticulation Report

Appendix D: Sewerage Reticulation Report

Appendix E: Potential Acid Sulphate Soil Investigation

Appendix F: SPA Forms 1 and 6.

A Disc containing an electronic copy of all documents in this report is also attached.

JPCED



IDAS form 1—Application details

(Sustainable Planning Act 2009 version 3.0 effective 1 July 2013)

This form must be used for **ALL** development applications.

You **MUST** complete **ALL** questions that are stated to be a mandatory requirement unless otherwise identified on this form.

For all development applications, you must:

- complete this form (*IDAS form 1—Application details*)
- complete any other forms relevant to your application
- provide any mandatory supporting information identified on the forms as being required to accompany your application.

Attach extra pages if there is insufficient space on this form.

All terms used on this form have the meaning given in the *Sustainable Planning Act 2009* (SPA) or the Sustainable Planning Regulation 2009.

This form and any other IDAS form relevant to your application must be used for development applications relating to strategic port land and Brisbane core port land under the *Transport Infrastructure Act 1994* and airport land under the *Airport Assets (Restructuring and Disposal) Act 2008*. Whenever a planning scheme is mentioned, take it to mean land use plan for the strategic port land, Brisbane core port land or airport land.

PLEASE NOTE: This form is not required to accompany requests for compliance assessment.

This form can also be completed online using MyDAS at www.dsdip.qld.gov.au/MyDAS

Mandatory requirements

Applicant details (Note: the applicant is the person responsible for making the application and need not be the owner of the land. The applicant is responsible for ensuring the information provided on all IDAS application forms is correct. Any development permit or preliminary approval that may be issued as a consequence of this application will be issued to the applicant.)

Name/s (individual or company name in full)

For companies, contact name

Postal address

Suburb			
State		Postcode	
Country			

Contact phone number

Mobile number (non-mandatory requirement)

Fax number (non-mandatory requirement)

Email address (non-mandatory requirement)

@

Applicant's reference number (non-mandatory requirement)

1. What is the nature of the development proposed and what type of approval is being sought?

Table A—Aspect 1 of the application (If there are additional aspects to the application please list in Table B—Aspect 2.)

- a) What is the nature of the development? (Please only tick one box.)
- ☐ Material change of use ☐ Reconfiguring a lot ☐ Building work ☐ Operational work
- b) What is the approval type? (Please only tick one box.)
- ☐ Preliminary approval under s241 of SPA ☐ Preliminary approval under s241 and s242 of SPA ☐ Development permit
- c) Provide a brief description of the proposal, including use definition and number of buildings or structures where applicable (e.g. six unit apartment building defined as a *multi-unit dwelling*, 30 lot residential subdivision etc.)
- d) What is the level of assessment? (Please only tick one box.)
- ☐ Impact assessment ☐ Code assessment

Table B—Aspect 2 of the application (If there are additional aspects to the application please list in Table C—Additional aspects of the application.)

- a) What is the nature of development? (Please only tick one box.)
- ☐ Material change of use ☐ Reconfiguring a lot ☐ Building work ☐ Operational work
- b) What is the approval type? (Please only tick one box.)
- ☐ Preliminary approval under s241 of SPA ☐ Preliminary approval under s241 and s242 of SPA ☐ Development permit
- c) Provide a brief description of the proposal, including use definition and number of buildings or structures where applicable (e.g. six unit apartment building defined as a *multi-unit dwelling*, 30 lot residential subdivision etc.)
- d) What is the level of assessment?
- ☐ Impact assessment ☐ Code assessment

Table C—Additional aspects of the application (If there are additional aspects to the application please list in a separate table on an extra page and attach to this form.)

- ☐ Refer attached schedule ☐ Not required

2. Location of the premises (Complete Table D and/or Table E as applicable. Identify each lot in a separate row.)

Table D—Street address and lot on plan for the premises or street address and lot on plan for the land adjoining or adjacent to the premises (Note: this table is to be used for applications involving taking or interfering with water). (Attach a separate schedule if there is insufficient space in this table.)

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

Street address					Lot on plan description		Local government area (e.g. Logan, Cairns)
Lot	Unit no.	Street no.	Street name and official suburb/ locality name	Post-code	Lot no.	Plan type and plan no.	
i)							
ii)							
iii)							

Planning scheme details (If the premises involves multiple zones, clearly identify the relevant zone/s for each lot in a separate row in the below table. Non-mandatory)

Lot	Applicable zone / precinct	Applicable local plan / precinct	Applicable overlay/s
i)			
ii)			
iii)			

Table E—Premises coordinates (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.) (Attach a separate schedule if there is insufficient space in this table.)

Coordinates (Note: place each set of coordinates in a separate row)				Zone reference	Datum	Local government area (if applicable)
Easting	Northing	Latitude	Longitude			
					☐ GDA94 ☐ WGS84 ☐ other	

3. Total area of the premises on which the development is proposed (indicate square metres)

--

4. Current use/s of the premises (e.g. vacant land, house, apartment building, cane farm etc.)

--

5. Are there any current approvals (e.g. a preliminary approval) associated with this application? (Non-mandatory requirement)

☐ No ☐ Yes—provide details below

List of approval reference/s	Date approved (dd/mm/yy)	Date approval lapses (dd/mm/yy)

6. Is owner's consent required for this application? (Refer to notes at the end of this form for more information.)

☐ No
☐ Yes—complete either Table F, Table G or Table H as applicable

Table F

Name of owner/s of the land	
I/We, the above-mentioned owner/s of the land, consent to the making of this application.	
Signature of owner/s of the land	
Date	

Table G

Name of owner/s of the land	
☐ The owner's written consent is attached or will be provided separately to the assessment manager.	

Table H

Name of owner/s of the land	
☐ By making this application, I, the applicant, declare that the owner has given written consent to the making of the application.	

7. Identify if any of the following apply to the premises (Tick applicable box/es.)

- ☐ Adjacent to a water body, watercourse or aquifer (e.g. creek, river, lake, canal)—complete Table I
- ☐ On strategic port land under the *Transport Infrastructure Act 1994*—complete Table J
- ☐ In a tidal water area—complete Table K
- ☐ On Brisbane core port land under the *Transport Infrastructure Act 1994* (No table requires completion.)
- ☐ On airport land under the *Airport Assets (Restructuring and Disposal) Act 2008* (no table requires completion)

Table I

Name of water body, watercourse or aquifer

Table J

Lot on plan description for strategic port land	Port authority for the lot

Table K	
Name of local government for the tidal area (if applicable)	Port authority for the tidal area (if applicable)

8. Are there any existing easements on the premises? (e.g. for vehicular access, electricity, overland flow, water etc)

☐ No ☐ Yes—ensure the type, location and dimension of each easement is included in the plans submitted

9. Does the proposal include new building work or operational work on the premises? (Including any services)

☐ No ☐ Yes—ensure the nature, location and dimension of proposed works are included in plans submitted

10. Is the payment of a portable long service leave levy applicable to this application? (Refer to notes at the end of this form for more information.)

☐ No—go to question 12 ☐ Yes

11. Has the portable long service leave levy been paid? (Refer to notes at the end of this form for more information.)

☐ No
☐ Yes—complete Table L and submit with this application the yellow local government/private certifier's copy of the receipted QLeave form

Table L		
Amount paid	Date paid (dd/mm/yy)	QLeave project number (6 digit number starting with A, B, E, L or P)

12. Has the local government agreed to apply a superseded planning scheme to this application under section 96 of the *Sustainable Planning Act 2009*?

☐ No
☐ Yes—please provide details below

Name of local government	Date of written notice given by local government (dd/mm/yy)	Reference number of written notice given by local government (if applicable)

13. List below all of the forms and supporting information that accompany this application (Include all IDAS forms, checklists, mandatory supporting information etc. that will be submitted as part of this application. Note: this question does not apply for applications made online using MyDAS)

Description of attachment or title of attachment	Method of lodgement to assessment manager

14. Applicant's declaration

☐ By making this application, I declare that all information in this application is true and correct (Note: it is unlawful to provide false or misleading information)

Notes for completing this form

- Section 261 of the *Sustainable Planning Act 2009* prescribes when an application is a properly-made application. Note, the assessment manager has discretion to accept an application as properly made despite any non-compliance with the requirement to provide mandatory supporting information under section 260(1)(c) of the *Sustainable Planning Act 2009*

Applicant details

- Where the applicant is not a natural person, ensure the applicant entity is a real legal entity.

Question 1

- Schedule 3 of the Sustainable Planning Regulation 2009 identifies assessable development and the type of assessment. Where schedule 3 identifies assessable development as "various aspects of development" the applicant must identify each aspect of the development on Tables A, B and C respectively and as required.

Question 6

- Section 263 of the *Sustainable Planning Act 2009* sets out when the consent of the owner of the land is required for an application. Section 260(1)(e) of the *Sustainable Planning Act 2009* provides that if the owner's consent is required under section 263, then an application must contain, or be accompanied by, the written consent of the owner, or include a declaration by the applicant that the owner has given written consent to the making of the application. If a development application relates to a state resource, the application is not required to be supported by evidence of an allocation or entitlement to a state resource. However, where the state is the owner of the subject land, the written consent of the state, as landowner, may be required. Allocation or entitlement to the state resource is a separate process and will need to be obtained before development commences.

Question 11

- The *Building and Construction Industry (Portable Long Service Leave) Act 1991* prescribes when the portable long service leave levy is payable.
- The portable long service leave levy amount and other prescribed percentages and rates for calculating the levy are prescribed in the Building and Construction Industry (Portable Long Service Leave) Regulation 2002.

Question 12

- The portable long service leave levy need not be paid when the application is made, but the *Building and Construction Industry (Portable Long Service Leave) Act 1991* requires the levy to be paid before a development permit is issued.
- Building and construction industry notification and payment forms are available from any Queensland post office or agency, on request from QLeave, or can be completed on the QLeave website at www.qleave.qld.gov.au. For further information contact QLeave on 1800 803 481 or visit www.qleave.qld.gov.au.

Privacy—The information collected in this form will be used by the Department of State Development, Infrastructure and Planning (DSDIP), assessment manager, referral agency and/or building certifier in accordance with the processing and assessment of your application. Your personal details should not be disclosed for a purpose outside of the IDAS process or the provisions about public access to planning and development information in the *Sustainable Planning Act 2009*, except where required by legislation (including the *Right to Information Act 2009*) or as required by Parliament. This information may be stored in relevant databases. The information collected will be retained as required by the *Public Records Act 2002*.

OFFICE USE ONLY

Date received

Reference numbers

NOTIFICATION OF ENGAGEMENT OF A PRIVATE CERTIFIER

To

Council. I have been engaged as the private certifier for the building work referred to in this application

Date of engagement	Name	BSA Certification license number	Building classification/s

QLEAVE NOTIFICATION AND PAYMENT (For completion by assessment manager or private certifier 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

The *Sustainable Planning Act 2009* is administered by the Department of State Development, Infrastructure and Planning. This form and all other required application materials should be sent to your assessment manager and any referral agency.

Company owner's consent to the making of a development application
under the *Sustainable Planning Act 2009*

I, John Edwin Chivers

(insert name of self)

Director of the below mentioned company and

I, John Patrick Kelly Director

(insert name of self)

I, the undersigned, being a director or a company secretary, declare that the above name and company particulars are correct and true to the best of my knowledge and belief, and I am not aware of any circumstances that might render the above particulars misleading or likely to mislead.

Of Jonpa Pty. Ltd.

(name of company)

as owner of premises identified as follows:

Lot 901 on SP 264284 located at Barrabal Drive, Cooya Beach

(insert street address, lot or plan description or coordinates of the premises the subject of the application)

consent to the making of a development application under the *Sustainable Planning Act 2009* by

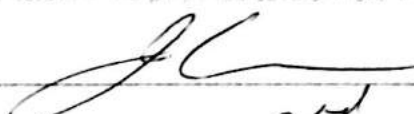
Jim Papas Civil Engineering Designer Pty. Ltd.

(insert name of applicant)

on the premises described above for the purposes of

An application for Operational Works to for Stage 5B

(insert details of the proposed development, e.g. material change of use for three storey apartment building)

 _____ (signature of Director)
signed on the 2nd day of July 20 14

 _____ (signature of Director/company secretary)
signed on the SECOND day of JULY 20 14

Company seal (if used)

IDAS form 6—Building or operational work assessable against a planning scheme

(Sustainable Planning Act 2009 version 3.0 effective 1 July 2013)

This form must be used for development applications for building work or operational work assessable against a planning scheme.

You **MUST** complete **ALL** questions that are stated to be a mandatory requirement unless otherwise identified on this form.

For all development applications, you must:

- complete *IDAS form 1—Application details*
- complete any other forms relevant to your application
- provide any mandatory supporting information identified on the forms as being required to accompany your application.

Attach extra pages if there is insufficient space on this form.

All terms used on this form have the meaning given in the *Sustainable Planning Act 2009* (SPA) or the Sustainable Planning Regulation 2009.

This form must be used for building work or operational work relating on strategic port land and Brisbane core port land under the *Transport Infrastructure Act 1994* and airport land under the *Airport Assets (Restructuring and Disposal) Act 2008* that requires assessment against the land use plan for that land. Whenever a planning scheme is mentioned, take it to mean land use plan for the strategic port land, Brisbane core port land or airport land.

This form can also be completed online using MyDAS at www.dsdip.qld.gov.au/MyDAS

Mandatory requirements

1. What is the nature of the work that requires assessment against a planning scheme? (Tick all applicable boxes.)

- ☐ Building work—complete Table A ☐ Operational work—complete Table B

Table A

a) What is the nature of the building work (e.g. building, repairing, altering, underpinning, moving or demolishing a building)?

b) Are there any current approvals associated with this application? (e.g. material change of use.)

- ☐ No ☐ Yes—provide details below

List of approval reference/s	Date approved (dd/mm/yy)	Date approval lapses (dd/mm/yy)

Table B

a) What is the nature of the operational work? (Tick all applicable boxes.)

- ☐ Road works
 ☐ Stormwater
 ☐ Water infrastructure
☐ Drainage works
 ☐ Earthworks
 ☐ Sewerage infrastructure
☐ Landscaping
 ☐ Signage
 ☐ Clearing vegetation under the planning scheme
☐ Other—provide details

b) Is the operational work necessary to facilitate the creation of new lots? (E.g. subdivision.)

- ☐ No
 ☐ Yes—specify the number of lots being created

c) Are there any current approvals associated with this application? (E.g. material change of use.)

- ☐ No
 ☐ Yes—provide details below

List of approval reference/s	Date approved (dd/mm/yy)	Date approval lapses (dd/mm/yy)

2. What is the dollar value of the proposed building work?
(Inc GST, materials and labour.)

\$

3. What is the dollar value of the proposed operational work?
(Inc GST, materials and labour.)

\$

Mandatory supporting information

4. Confirm that the following mandatory supporting information accompanies this application

Mandatory supporting information	Confirmation of lodgement	Method of lodgement
All applications involving building work or operational work		
A site plan drawn to an appropriate scale (1:100, 1:200 or 1:500 are recommended scales) which shows the following: - the location and site area of the land to which the application relates (<i>relevant land</i>) - the north point - the boundaries of the relevant land - the allotment layout showing existing lots, any proposed lots (including the dimensions of those lots), existing or proposed road reserves, building envelopes and existing or proposed open space (note: numbering is required for all lots) - any existing or proposed easements on the relevant land and their function - any access limitation strips - all existing and proposed roads and access points on the relevant land.	☐ Confirmed	

A statement about how the proposed development addresses the local government's planning schemes and any other planning documents relevant to the application.	☐ Confirmed	
A statement addressing the relevant part(s) of the State Development Assessment Provisions (SDAP).	☐ Confirmed ☐ Not applicable	
Applications for building work (including extensions and demolition that is assessable development)		
Floor plans drawn to an appropriate scale (1:50, 1:100 or 1:200 are recommended scales) which show the following: - the north point - the intended use of each area on the floor plan (for commercial, industrial or mixed use developments only) - the room layout (for residential development only) with all rooms clearly labelled - the existing and the proposed built form (for extensions only) - the gross floor area of each proposed floor area.	☐ Confirmed ☐ Not applicable	
Elevations drawn to an appropriate scale (1:100, 1:200 or 1:500 are recommended scales) which show plans of all building elevations and facades, clearly labelled to identify orientation (e.g. north elevation).	☐ Confirmed ☐ Not applicable	
Plans showing the size, location, proposed site cover, proposed maximum number of storeys, and proposed maximum height above natural ground level of the proposed new building work.	☐ Confirmed ☐ Not applicable	
Plans showing the extent of any demolition that is assessable development.	☐ Confirmed ☐ Not applicable	
Applications for operational work involving earthworks (filling and excavating)		
Drawings showing: - existing and proposed contours - areas to be cut and filled - the location and level of any permanent survey marks or reference stations used as datum for the works - the location of any proposed retaining walls on the relevant land and their height - the defined flood level (if applicable) - the fill level (if applicable).	☐ Confirmed ☐ Not applicable	
Applications for operational work involving roadworks		
Drawings showing: - existing and proposed contours - the centreline or construction line showing chainages, bearings, offsets if the construction line is not the centreline of the road and all intersection points - information for each curve including tangent point chainages and offsets, curve radii, arc length, tangent length, superelevation (if applicable) and curve widening (if applicable) - kerb lines including kerb radii (where not parallel to centreline) and tangent point changes (where not parallel to centreline) - edge of pavement where kerb is not constructed - position and extent of channelisation - location and details of all traffic signs, guideposts, guardrail and other street furniture - pavement markings including details on raised pavement markers	☐ Confirmed ☐ Not applicable	

• catchpit, manhole and pipeline locations • drainage details (if applicable) • cross road drainage culverts (if applicable) • concrete footpaths and cycle paths • location and details for access points, ramps and invert crossings • changes in surfacing material.		
Applications for operational work involving stormwater drainage		
Drawings showing: • existing and proposed contours • drainage locations, diameters and class of pipe, open drains and easements • manhole location, chainage and offset or coordinates and inlet and outlet invert levels • inlet pit locations, chainage and offset or coordinates and invert and kerb levels.	☐ Confirmed ☐ Not applicable	
Applications for operational work involving water reticulation		
Drawings showing: • kerb lines or edge of pavement where kerb is not constructed • location and levels of other utility services where affected by water reticulation works • pipe diameter, type of pipe and pipe alignment • water main alignments • water supply pump station details (if applicable) • minor reservoir details (if applicable) • conduits • location of valves and fire hydrants • location of house connections (if applicable) • location of bench marks and reference pegs.	☐ Confirmed ☐ Not applicable	
Applications for operational work involving sewerage reticulation		
Drawings showing: • location of all existing and proposed services • location of all existing and proposed sewer lines and manhole locations • location of all house connection branches • kerb lines or edge of pavement where kerb is not constructed • chainages • design sewer invert levels • design top of manhole levels • type of manhole and manhole cover • pipe diameter, type of pipe and pipe alignment • location of house connections (if applicable) • sewer pump station details (if applicable).	☐ Confirmed ☐ Not applicable	
Applications for operational work involving street lighting		
Drawings showing: • location of all light poles and service conduits • location of all other cross road conduits • type of wattage and lighting • any traffic calming devices • additional plans for roundabouts and major roads (if applicable) • details of any variations to normal alignment	☐ Confirmed ☐ Not applicable	

• details of lighting levels.		
Applications for operational work involving public utility services		
Drawings showing: • any existing light poles and power poles • any existing underground services • details of proposed services • alteration to existing services.	☐ Confirmed ☐ Not applicable	
Applications for operational work involving landscaping works		
Drawings showing: • the location of proposed plant species • a plant schedule indicating common and botanical names, pot sizes and numbers of plants • planting bed preparation details including topsoil depth, subgrade preparation, mulch type and depth, type of turf, pebble, paving and garden edge • the location and type of any existing trees to be retained • construction details of planter boxes, retaining walls and fences • the proposed maintenance period • irrigation system details.	☐ Confirmed ☐ Not applicable	

Privacy—Please refer to your assessment manager, referral agency and/or building certifier for further details on the use of information recorded in this form.

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Reference numbers

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PROJECT REPORT

GENERAL DESCRIPTION

The proposed site is located on Barrabal Drive, Cooya Beach. It is currently vacant. The proposal is to subdivide portion of the site into 19 residential lots. The area of the site is 10.22Ha.

There are no known features on the site, which are detrimental to its development.

DESIGN REQUIREMENTS

All aspects of this submission have been prepared under the direction of and endorsed by a Registered Professional Engineer Queensland. (RPEQ)

As required by the provisions of the FNQROC development Manual completed copies of the Statement of Compliance and the Operational Works Checklist are attached as Appendix A

A copy of the Negotiated Decision Notice Approval is attached as Appendix B.

ADJOINING LAND OWNERS

No work is expected to be carried out on any adjacent lot

SPA FORMS

Completed SPA Forms 1 and 6 are attached as Appendix F.

SUPPORTING INFORMATION

Design Plans: 3 copies (2xA1 and 1xA3) of the design drawings are attached. The design drawings comprise Drawings Nos 1301 C01 to C14 (incl) and a Cover Sheet.

No job specification is provided. The information that may be included in a Job Specification is shown on the drawings.

Prescribed Application Fee: A cheque in the sum of \$12,254 is attached.

PRELODGMET DISCUSSIONS

No pre-lodgment discussions were held with respect to this stage of the project.

ROADWORKS

The road network is designed in accordance with FNQROC Design Manual, including Douglas Shire Council Specific Conditions and the requirements of the Amended Decision Notice.

Barrabal Drive is constructed for a distance of about 50 metres from Cooya Beach Road. It is intended to continue with the same standard of construction and reduce the carriageway width at the corner at about Chn. 100. After this point all roads shall be 6.50 metres wide in accordance with the requirements of the FNQROC Development Manual.



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All road pavements will be designed in accordance with Austroads "Guide to Pavement Technology Part 2 Pavement Structural Design"

A design life of 20 years will be adopted for all pavements.

Prior to design California Bearing Ratio (CBR) testing has not been undertaken for the site. The CBR is to be evaluated prior to construction by in situ CBR, and 4 day soaked CBR all performed by an NATA registered materials testing authority using procedures prescribed by the Department of Main Roads and the Standards Association of Australia.

The pavement design shall be reassessed after completion of testing. For the purpose of this application the subgrade CBR is assumed to be 7.

STORMWATER DRAINAGE

3.0 STORMWATER DRAINAGE

The stormwater drainage system has been designed using the rational Method in accordance with Australian Rainfall and Runoff (ARR) and the Queensland Urban Drainage manual(QUDM)

In accordance with the QUDM recommendations, the minor system is contained within an underground system based on a 5 year return interval. The major system design is based on an average return interval of 100 years. This system uses a combination of the underground pipe system and overland flow.

Calculation of pit locations is based on flow width limitations as detailed in QUDM and a recurrence interval of 5 years.

Times of concentration are based on QUDM standard inlet times.

Runoff coefficients have been established in accordance with QUDM.

Intensity figures have been obtained from FNQROC Design Manual IFD Chart 15 Mareeba.

Pit capacities are based on FNQROC Design Manual Kerb Inlet Pit Design Charts including an appropriate blockage factor.

Road way capacities have been calculated using Manning's equation for all flows.

Pit and manhole losses have been estimated using charts in QUDM.

The stormwater design has been calculated using the latest version of PC Drain by Bandini Software Pty. Ltd.

This stage is completely contained within the development property and is not affected by any external catchments. The proposed drainage system shall discharge to the existing infrastructure.

In the event of a secure storm all stormwater flows will be safely discharged to a legal point of discharge without indicating or damage to any proposed lots.



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SEWERAGE RETICULATION

Refer to the sewerage reticulation report attached as Appendix D.

POTABLE WATER RETICULATION

All reticulation mains have been designed in accordance with the FNQROC Design Manual and the Department of Energy and Water Supply "Planning for Water Supply and Sewerage".

A copy of the approved water reticulation report is attached as Appendix C.

ELECTRICAL AND TELECOMMUNICATION RETICULATIONS

The electrical reticulation system including street lighting is to be designed and documented by Simon Perkins and Associates. Written advice in accordance with Council's Decision Notice will be provided by Simon Perkins and Associates as soon as it is available.

Simon Perkins and Associates will coordinate with Telstra. Written advice in accordance with Council's Decision Notice from Telstra will be provided as soon as it is available.



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DEVELOPMENT CONDITIONS

Assessment Manager's Conditions

Development No: CA46

Date of Issue: September 7, 2007

Plan of Reconfiguration

- 1 (a) Completed
- 1 (b) Completed
- 2 (a) Not applicable to this application

Water Supply

- 3 Completed as part of this application.

Internal

- 4 Completed
- 5 Completed as required by the FNQROC Development Manual. The conditions require provision of water meters, which we have not shown because:
 - (a) Meters not required under the provisions of the FNQROC Development Manual
 - (b) Meters are more properly provided in conjunction with the construction of a dwelling on a particular lot.
- 6 Completed as part of this application.

External

- 7 Not applicable to this application as this condition requires payment of a contribution at a later date.
- 8 (a) This work has been completed and no further action is required.
- 8 (b) This work has been completed and no further action is required.

Sewerage

Internal

- 9 Completed as part of this application.
- 10 Completed as part of this application.
- 11 Not applicable to this application
- 12 Not applicable to this application
- 13 Not applicable to this application

External

- 14 Not applicable to this application as this condition requires payment of a contribution at a later date.
- 15 (a) This work has been completed and no further action is required
- 15 (b) This work has been completed and no further action is required
- 15 (c) This work has been completed and no further action is required
- 15 (d) This work has been completed and no further action is required



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Electrical and Telephone Services

- 16 (a) The electrical reticulation system including street lighting is to be designed and documented by Simon Perkins and Associates. Written advice as required by the condition shall be provided by Simon Perkins and Associates as soon as it is available.
- 16 (b) Street lighting is to be designed and documented by Simon Perkins and Associates. Council's approval of these proposals will be sought in a separate future submission.
- 16 (c) Simon Perkins and Associates will establish the location of any additional transformers and locate them in accordance with this condition.
- 17 (a) Simon Perkins and Associates will liaise with Telstra or others as appropriate. Written advice as required by the condition shall be provided by Simon Perkins and Associates as soon as it is available.
- 17 (b) A telecommunications service will be provided to each lot in accordance with a design documented by Simon Perkins and Associates.
- 17(c) Simon Perkins and Associates will establish the location of any additional switching stations and locate them in accordance with this condition.
- 18 (a) This work has been completed and no further action is required.
- 18 (b) Not applicable to this application as this condition requires payment of a contribution at a later date or has been completed.

Earthworks

- 19 Completed as part of this application
- 20 Completed as part of this application
- 21 Completed as part of this application

Stormwater Drainage

- 22 Completed as part of this application however no easements are to be created.
- 23 (a) Completed as part of this application
- 23 (b) Completed as part of this application
- 24 Completed as part of this application
- 25 Completed as part of this application
- 26 Completed as part of this application
- 27 Not Applicable to this application

Truncations

- 28 Not Applicable to this application



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Bikeway/Pathway

- 29 (a) The proposed works are not located adjacent to any of the specified road frontages, therefore no action necessary as part of this application.
- 29 (b) No action necessary
- 30 Not Applicable to this application

Operational Works Permit

- 31 Completed as part of this application
- 32 Completed as part of this application

Street Names

- 33 Not applicable to this application
- 34 Not applicable to this application

Currency Period

- 35 No action necessary

Compliance with Conditions

- 36 Completed as part of this application

Acid Sulphate Soils

- 37 (a) Completed as part of this application
- 38 (b) Completed as part of this application

Road Works

Internal

- 38 Completed as part of this application

External

- 39 The proposed works are not located adjacent to any of the specified road frontages, therefore no action necessary as part of this application.

Landscaping, Buffering and Fencing

- 40 (a) The landscaping requirements are to be addressed by Suzan Quigg Landscape Design and will be subject to a separate submission.
- 40 (b) The proposed works are not located adjacent to any of the specified road frontages, therefore no action necessary as part of this application.
- 41 Not applicable to this application, as it requires lodgement of a bond at a later date.

Commercial Development

- 42 Not applicable to this application
- 43 Not applicable to this application
- 44 Not applicable to this application



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APPENDIX A

FNQROC FORMS

FNQROC Statement of Compliance

FNQROC Operational Works Receipting Checklist

JPCED



FNQROC DEVELOPMENT MANUAL

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

Location of Development

Applicant

Designer

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

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

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

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

Designer **RPEQ No**

Name in Full

Signature **Date**



Operational Works Receipting Checklist

(To be completed by Consulting engineer making the application)

Name of Council: Mareeba Shire Council

Development Name and Location:

Ocean Breeze Estate Stage 5B Barrabal Drive, Cooya Beach

Planning Permit No/Council File No: Unknown//

<u>DESIGN SUBMISSION</u>	<u>CHECK</u>	<u>COMMENT</u>
1. Completed 'Statement of Compliance' form. (FNQROC - AP1 – Appendix A)	Y	
2. IDAS Forms A ,E & IDAS Assessment Checklist (Available from www.ipa.qld.gov.au)	Y	
3. Payment of Engineering Application Fees (Copy of receipt to be attached)	Y	Fee calculated as \$12,254 in accordance with PSC fees and charges and confirmed by council officers
4. Copy of Decision Notice for Development Application Conditions, <u>inc. explanation of how each condition is to be addressed (Statement of Compliance)</u>	Y	
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)	Y	
6. One copy of Design and Standard Specifications (Unbound Copy Preferable)	N	Standard specification shall be FNQROC specification. information generally contained in a job specification is shown on the drawings.
7. Written consent from adjoining property owners authorising any works on their property	N.A.	
8. Water reticulation network in electronic format (Engineer to confirm system requirements and compatibility with Cairns Water)	N.A.	Council has previously approved water reticulation system. A copy of the approved report is attached as Appendix D.
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 lgt. layout design, to avoid conflicts.	N.A.	Landscape design shall be subject to a separate submission by Suzan Quigg Landscape Design



Operational Works Receipting Checklist

(To be completed by Consulting engineer making the application)

<u>DESIGN SUBMISSION</u>	<u>CHECK</u>	<u>COMMENT</u>
10. Overall network drawings (for staged development) for:	N.A.	
• Water	Y	
• Stormwater	Y	
• Sewer	Y	
• Pathways and roads	Y	
• Street Lighting	N.A.	
• Electrical	N.A.	
• Gas	N.A.	
• Public Transport	N.A.	
• Park Reserves	Y	Already dedicated
• Drainage Reserves	Y	
11. Pavement design criteria	Y	
12. Geotechnical reports for proposed earthworks	N.A.	
13. Structural and geotechnical certificates for retaining walls etc.	N.A.	
14. Water supply/sewerage pump station design parameters	N.A.	
15. Stormwater drainage calculations	Y	
16. Erosion and Sediment Control Strategy (ESCS)	Y	
17. Declared Pest Management Plan (if applicable)	N.A.	
18. The approval of any other Authorities & concurrence agencies likely to be affected by the works.	N.A.	



Operational Works Receipting Checklist

(To be completed by Consulting engineer making the application)

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

Name of Engineer	Brian Smyth	
Name of Company	Briley Consultants	
Telephone Number (s)	Office: 4054 3052	Mobile: 0400 543 052
Email address	br85287@bigpond.net.au	
RPEQ No.	9326	

20. Date of submission of application / / 200

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

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APPENDIX B
Amended Decision Notice
Reconfiguration of a Lot
(1 into 288 Lots)





ENQUIRIES:
DEPARTMENT:
EMAIL:

Mr Paul Gleeson – Manager Planning Services
Planning Services - ☎ (07) 4099 9450

OUR REF:
YOUR REF:

PTG
CA46

Salson Pty Ltd as Trustee for the Simon White Family Trust
C/- C & B Group
P O Box 1949
CAIRNS QLD 4870

7 September 2007

INTEGRATED PLANNING ACT AMENDED DECISION NOTICE DEVELOPMENT APPLICATION

Applicant's Name : Salson Pty Ltd as Trustee for the Simon White Family Trust

Owner's Name : Salson Pty Ltd

Proposal : Material Change of Use and Reconfiguring a Lot to permit 250 Residential A lots, 38 Residential B lots, 0.7 hectares to be used for commercial and community uses and 11.1 hectares to be used generally as open space

Application Number : CA46

Site Address : Cooya Beach Road, Bonnie Doon Road and Melaleuca Drive, Cooya Beach

Property Description : Lot 1 on RP 720316 and Lots 2 and 3 on SR 614

This Amended Decision Notice supersedes the Negotiated Decision Notice dated 15 June 2005. Advice note 1 has been added to reflect the specific conditions required to be addressed with each stage of the subdivision. All other conditions remain unchanged.

1. **Decision:**

Decision Date: 8 June 2005

Approved subject to Conditions

2. Type of Development Approval:

Material Change of Use
Reconfiguration a Lot

Preliminary Approval
Development Permit

3. Referral Agencies:

Concurrence Agencies:

Department of Main Roads
Environmental Protection Agency
Natural Resources & Mines

Conditions attached

4. Conditions

Assessment Manager Conditions

Plan of Reconfiguration

1. The approved reconfiguration and the carrying out of any works on the premises associated with the development must generally be in accordance with Plan of Reconfiguration No. 8021-3, Issue G, dated 18th May 2004, prepared by the C & B Group, and attached to this approval subject to:
 - (a) Modifications required by any condition of this approval and any minor alterations found necessary by Council at the time of examination of engineering plans; and
 - (b) Any development permit for operational works relating to the reconfiguration.
2. The Plan of Reconfiguration No. 8021-3 Issue G, dated 18th May 2004, must be amended as follows:
 - (a) A pathway with a minimum width of four (4) metres must be provided from the cul-de-sac in the south-eastern corner of the site to Melaleuca Drive and a 1.5 metre wide concrete footpath must be constructed within the pathway.

Water Supply

3. The reticulated water supply must be constructed with the design plans approved by Council.

Internal

4. The applicant must provide a reticulated water supply to the development.
5. This system must make provision for services to the boundaries of all lots, including main works, enveloper pipes at cross street services, valve and hydrant markers and a water meter to each lot.
6. The plans and specifications of the internal water supply must be submitted to Council at Operational Works application stage for this reconfiguration for review.

External

7. Provision of water supply headworks contributions in accordance with Council's Policy on Applicant Contributions for Water Supply and Sewerage Services and Council's Schedule of Fees and Charges which provides for contribution amounts to be varied if not paid in full within 12 months of the date of this approval. Headworks are to apply based on \$4,449.00 per E.D.C. for water supply. Payment of such contributions shall be made prior to Council Signing and Sealing of the Plan of Survey except that in relation to the Commercial/Community Purpose land (proposed Lot 900) the payment equivalent to one (1) EDC for water supply headworks shall be paid prior to Council Signing and Sealing the Plan of Survey. The balance of the water supply headworks contribution is to be paid prior to the issue of a Building Works Development Permit in respect of any development on the Commercial/Community Purposes land (proposed Lot 900). A notice will be placed on Council's rates database to this effect on Lot 900 when the title is created.
8.
 - (a) The applicant is responsible for the external works to connect the site with Council's water supply at Cooya Beach Road and to upgrade the water main to 200mm diameter for the full length of the site frontage to Cooya Beach Road.
 - (b) The applicant must design and construct a 3.5 megalitre reservoir at the existing reservoir site.

The total cost of the works to install this reservoir will be determined on the basis of the ratio of the number of lots in the proposed development to the number of existing and currently approved lots in Cooya Beach. The applicant will construct all works and the equivalent amount for Council's contribution (existing allotments) to the reservoir will be subtracted from the applicant's water supply headworks contributions for the development.

Sewerage

Internal

9. Provision of sewerage reticulation to plans approved by Council. Provision shall be made for house connection branches for each allotment.
10. The plans and specifications of the internal sewerage works must be submitted to Council at Operational Works application stage for review.
11. Pumping stations are to be located on land vested under Council's control.
12. The design information submitted for Operational Works approval shall include design flows, pipe sizes, grades, pump rates, catchments and pressure main hydraulics.
13. Pumping stations shall incorporate aluminium fabricated covers to Council's standards. Switchboards are to be aluminium or stainless steel construction. Amp meters are required for each pump motor.

External

14. Provision of sewerage headworks contributions in accordance with Council's Policy on Applicant Contributions for Water Supply and Sewerage Services and Council's Schedule of Fees and Charges which provides for contribution amounts to be varied if not paid in full within 12 months of the date of this approval. Headworks are to apply based on \$2,665.00 per E.D.C. for sewerage. Payment of such contributions shall be made prior to Council Signing and Sealing of the Plan of Survey except that in relation to the Commercial/Community Purpose land (proposed Lot 900) the payment equivalent to one (1) EDC for sewerage headworks shall be paid prior to Council Signing and Sealing the Plan of Survey. The balance of the sewerage headworks contribution is to be paid prior to the issue of a Building Works Development Permit in respect of any development on the Commercial/Community Purposes land (proposed Lot 900). A notice will be placed on Council's rates database to this effect on Lot 900 when the title is created.
15.
 - (a) The applicant must construct a pump station and rising main between the site and the Mossman Treatment Plant to provide a sewerage service to the proposed lots.
 - (b) The pump station is to be located adjacent to Cooya Beach Road at the eastern end of the park.
 - (c) The pump station and the rising main are to be sized to cater for the proposed development and for other areas of Cooya Beach which may ultimately be included in the sewerage scheme.
 - (d) The total cost of these works to install this reservoir will be determined on the basis of the ratio of the number of lots in the proposed development to the number of existing and currently approved lots in Cooya Beach. The applicant will construct all works and the equivalent amount for Council's contribution (existing allotments) to the reservoir will be subtracted from the applicant's water supply headworks contributions for the development.

Electrical & Telephone Services

16. Prior to the approval of the Plan of Survey, the Applicant must submit to Council a copy of a letter from Ergon Energy stating that satisfactory arrangements have been made for the provision of:
 - (a) an underground electrical supply to each lot; and
 - (b) street lighting in accordance with Council's adopted standards.
 - (c) locating of all above ground transformer cubicles clear of footpath and parkland areas.
17. Prior to the approval of the Plan of Survey, the Applicant must submit to Council a copy of a letter from Telstra stating that satisfactory arrangements have been made for the provision of:

- (a) an underground telephone service to each lot; and
 - (b) locating of all above ground switching station cubicles clear of footpath and parkland areas.
18. (a) The applicant must transfer the area shown as Park and Mangrove on the Proposed Plan to Council in partial satisfaction of the applicant's obligation to provide parkland to Council in accordance with Local Planning Policy No.5 – Applicant Contributions – Parks. The applicant must bear all costs of the transfer.
- (b) The applicant must contribute \$250.00 per lot in partial satisfaction of the applicant's obligation to provide parkland to Council in accordance with the Local Planning Policy. This amount is based on the usable parkland area being 75% of the total parkland required and \$250.00 being 25% of the standard Parkland Contribution under Planning Policy No. 5.

Alternatively, the amount of the contribution may be expended on works within the proposed parkland including landscaping, pathways, play equipment, shelter structures and water supply. In this case, a detailed design and costing is to be submitted for approval by Council at Operational Works stage.

Earthworks

19. All proposed lots must be drained from the rear boundary to the frontage of the lot in accordance with the Far North Queensland Regional Organisation of Councils Development Manual, except as otherwise modified by these conditions or an Operational Works Development Permit.
20. All allotment and footpath slopes must be designed in accordance with the Far North Queensland Regional Organisation of Councils Development Manual.
21. Details of the proposed filling and excavation for the reconfiguration must be included in a plan and submitted at the time of lodgement of the application for Operational Works.

Stormwater Drainage

22. The proposed drainage area must be designed in accordance with the Far North Queensland Regional Organisation of Councils Development Manual. All easements and/or reserves are to be transferred to Council as a drainage easement and/or reserve in fee simple at the applicant's cost.
23. Prior to lodgement of the Plan of Survey for Signing and Sealing / an application for Operational Works, the applicant must submit to Council a plan:
- (a) Detailing the drainage works to be undertaken on the land in connection with the reconfiguration;
 - (b) Detailing the ability of the proposed drainage works to meet with the requirements of the Far North Queensland Regional Organisation of Councils Development Manual.

24. Drainage (including underground), together with acceptable points of discharge are required in localities to be determined following submission of engineering drawings and designs at Operational Works stage.
25. The calculated design frequency for all storm water drainage shall be determined on a five (5) year recurrence interval and all relevant design data shall be submitted with the engineering drawings at Operational Works application stage.
26. Such storm water drainage work shall be designed and constructed in accordance with the requirements of the Far North Queensland Regional Organisation of Councils Development Manual and will not cause scouring, erosion, loss of vegetation, excess turbidity and landslip either within or external to the site.
27. The Applicants are required to place pollution control devices in stormwater drains in accordance with the requirements of the Far North Queensland Regional Organisation of Councils Development Manual. The design and location of these devices must be submitted at Operational Works application stage.

Truncations

28. Truncations in accordance with the provisions of Council's subdivisional Local Laws are to be provided.

Bikeway/Pathway

29.
 - (a) A bikeway/walkway shall be constructed to a minimum width of two (2) metres on the southern side of Cooya Beach Road for the full frontage of the site from the eastern extent of the site to the north-western extent of the site adjacent to the unnamed road reserve along the northern boundary of the site. This pathway is intended to be constructed of bitumen with concrete edge restraints. This part of the bikeway/walkway is to be constructed at the applicant's expense.
 - (b) A bikeway/walkway shall be constructed to a minimum width of two (2) metres from the north-western extent of the site along Cooya Beach Road to connect to the existing bikeway/walkway at the Junction Bridge. . This pathway is intended to be constructed of bitumen with concrete edge restraints. This part of the bikeway/walkway is to be constructed by Council. The total cost of these works to install this part of the bikeway/walkway will be determined on the basis of the ratio of the number of lots in the proposed development to the number of existing and currently approved lots in Cooya Beach. The applicant is to provide cost estimates for this work at Operational Works stage.
30. The bikeway/walkway shall be suitably designed in accordance with the relevant Standards Association of Australia Code. The style and construction of all footpaths and bikeways internal and external to the development is to be bitumen centre with concrete edge restraints.

Operational Works Development Permit

31. The applicant must submit as part of an application for a Development Permit for Operational Works information and plans in accordance with the Far North Queensland Regional Organisation of Councils Development Manual.
32. Full engineering drawings, prepared and/or checked by a Registered Professional Engineer, shall be submitted for all road works, stormwater drainage and allotment improvement at Operational Works Application stage. Drawings should, in general, include the following:
 - (a) locality plan;
 - (b) layout and staging plan, where applicable;
 - (c) layout plan for each new road;
 - (d) longitudinal section of each road;
 - (e) cross sections for each road, including standard cross sections;
 - (f) detailed plan of each intersection and cul-de-sac head where longitudinal grades do not exceed 1%;
 - (g) layout plan for each stormwater drainage;
 - (h) longitudinal sections for each stormwater drain line;
 - (i) details for non-standard drainage structures; and
 - (j) such other details for the proper construction of the works i.e. retaining walls etc.

Street Names

33. At the time of lodging the Survey Plan with Council for endorsement, the applicant must lodge a plan of the reconfiguration displaying the proposed street names for the reconfiguration.
34. The street name signs shall be supplied and erected by the Applicant. The signs shall be aluminium on steel posts with reflective white legend (on both sides) on a green background.

Currency Period

35. The development authorised by this Development Permit must cease at the expiration of four (4) years from the day that this Development Permit takes effect under the *Integrated Planning Act 1997* unless a detailed plan of survey has been lodged with Council for endorsement and all conditions of this approval complied with.

Compliance with Conditions

36. The Plan of Survey with associated documents shall not be endorsed by Council until all of the conditions of approval have been complied with.

Acid Sulphate Soils

37. At the time of lodgement of an application for development approval for Operational Works for the reconfiguration, the applicant must submit to Council a report identifying:
- (a) The location and extent of acid sulphate soils on the site;
 - (b) The applicant's proposed treatment of the acid sulphate soils identified.

Road Works

38. The applicant must undertake the following works:

Internal

Provision of kerb-to-kerb bitumen streets to widths required by the Far North Queensland Regional Organisation of Councils Development Manual.

Construction of a 1.5 metre wide footpath on one side of the full length of the internal loop road in the southern sector of the site and on one side of the full length of the loop road in the northern sector of the site and, in both cases, extending to Cooya Beach Road.

External

Provision is to be made for the following works external to the subject site in accordance with the Far North Queensland Regional Organisation of Councils Development Manual (FNQ ROC Development Manual).

The plans and specifications of the internal and external road works must be submitted to Council at Operational Works application stage for review.

39. Cooya Beach Road

Upgrading to the full frontage of the site in accordance with the Development Manual and generally as described in the Engineering Report submitted with the application to provide:

- a ten (10) metre wide sealed carriageway;
- kerb and channel and any associated drainage works on both sides of the carriageway;
- formed footpaths with a nominal width of 4.5 metres.

The design and construction of the works must provide for the retention of the grove of Melaleucas and other trees at the eastern end of Cooya Beach Road.

Bonnie Doon Road

Upgrading to the full frontage of the site in accordance with the FNQ ROC Development Manual. In regard to the minimum standard for the construction of Bonnie Doon Road

for the frontage of the development. Council's engineers have indicated that the carriageway will need to be upgraded to the following minimum standards in accordance with Section D1.27 part 1 of the FNQ Development Manual:

Traffic Volume/Road Class:	1000 –7999 vpd (or sub-arterial)
<u>Formation</u>	10m
Pavement Width	8m
Seal Width	8m
Shoulders	Incl. 0.5m seal on each side

Cooya Beach Road/Bonnie Doon Road Intersection

Construction of a channelised intersection in accordance with the FNQ ROC Development Manual.

Landscaping, Buffering and Fencing

40. (a) A street landscaping plan providing for street tree planting within the proposed internal roads and Cooya Beach Road and for landscaping of the proposed roundabouts must be submitted for approval at Operational Works stage.
- (b) A planted buffer must be established to the full frontages of the site to Melaleuca Drive, Bonnie Doon Road and the un-constructed Palm Road adjacent to the northern boundary of the site. This buffer is to be densely planted and is to have a minimum width of 6.0metres.

The buffer must generally be in accordance with the details provided in the advice from the C&B Group dated 22nd October 2004.

Details including design of the buffer must be submitted for approval at the Operational Works stage.

The buffer must be established to the respective road frontages of each stage of the proposed development as a particular stage is constructed.

The applicant is to install a 1.8metre high fence along the un-constructed road reserve frontage to separate the agricultural uses from the residential uses. The purpose of this fence is for safety.

41. The subdivider shall lodge with the Council cash or bank bond calculated at the rate of ten percent (10%) of the contract price for the works concerned in the subdivision as a security that the maintenance works be not completed to the satisfaction of the Director Engineering Services the Council shall make good any of the said defects and deduct the costs thereof from the cash deposit or bank bond.

Commercial Development

42. The maximum permissible gross floor area for retail uses on the land designated for commercial purposes is 450m².
43. A detailed plan of development will be required to be submitted to Council prior to any self-assessable use commencing on the area designated for commercial and community purposes.
44. The Applicant shall pay to the Council headworks contributions for water supply and sewerage in accordance with Council's Local Planning Policy: "*Determination of Contributions for Water Supply and Sewerage Headworks and External Works*" ("the Policy").

The contribution shall be calculated at the rate per Equivalent Domestic Connection ("EDC") applicable at the time of payment in accordance with the Policy.

For information purposes only:

- (a) The current rates per EDC at the time of this approval are:

Water Supply	\$ 4,449.00
Sewerage	\$ 2,665.00

- (b) The current number of EDCs for the approved use are:

Water Supply	7
Sewerage	7

The payment equivalent to one (1) EDC each for water supply and sewerage headworks shall be paid prior to Council Signing and Sealing the Plan of Survey. The balance of the water supply and sewerage headworks contribution is to be paid prior to the issue of a Building Works Development Permit in respect of any development on the Commercial/ Community Purposes land (proposed Lot 900). A notice will be placed on Council's rates database to this effect on Lot 900 when the title is created.

Advice Note 1

The following is a ready reference to the specific conditions that must be met before the Plan of Survey for each stage can be endorsed by Council. The reference to stages is specific to Plan No.8021-3. If staged layout is amended, then the conditions relevant to the lots contained within the stages as shown on Plan No.8021-3 will need to be met when those lots are submitted for endorsement. All other conditions not referenced below relate to all stages and are to be met prior to the endorsement of the Plan of Survey.

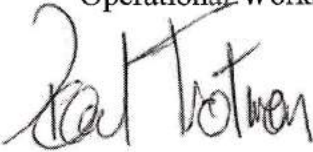
Condition	Stages as shown staged on Plan 8021-3 Issue G
2	2
part 7 (commercial)	3
8	1
part 14 (commercial)	3
15	1
18(a)	1

29(a)	1; 2; 3; 4; 5
38	1
39 (Cooya Beach Rd)	1; 2; 3; 4; 5
39 (Bonnie Doon Rd)	4;
40(b)	2; 3; 4; 5; 6
42	2
43	2
44	2

5. Further Development Approvals Required:

Operational Works

Development Permit



Paul Trotman

General Manager Development & Environment

Jim Papas Civil Engineering Designer

PTY LTD. ABN 56 010 943 905. ACN 010 943 905

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APPENDIX C Water Reticulation Report



Jim Papas Civil Engineering Designer

Please address all
correspondence to:
**P.O. Box 2347,
Mareeba QLD 4880**

PTY LTD. ABN 56 010 943 905. ACN 010 943 905

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**Mobile: 0408 770 394
Email: jim@jpced.com.au**

APPENDIX C

WATER SUPPLY RETICULATION REPORT

FOR

OCEAN BREEZE ESTATE

A

RESIDENTIAL SUBDIVISION

AT

COOYA BEACH ROAD

COOYA BEACH

Date: December 11, 2013



Jim Papas Civil Engineering Designer

PTY LTD. ABN 56 010 943 905. ACN 010 943 905

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1. INTRODUCTION

This report on the water supply reticulation for Ocean Breeze Estate, a residential subdivision at Cooya Beach, is provided to show that a satisfactory level of water supply service is available to meet the interim and ultimate development requirements.

This report provides the necessary input model assumptions and results.

This report compliments another report prepared by SKM on the Cooya Beach water supply in March 2010 and supersedes our earlier reports.

2. WATER RETICULATION NETWORK

The existing water supply network is shown on Dwgs 1187-OA Water 1 and Water 2. Based on information provided by Cairns Water and Waste we understand that the pressure at the intersection of Boonie Doon and Cooya Beach Roads is constant at 450kPa. This point is taken to be Node 101 and is on the existing 225Ø water main that provides water supply the Cooya Beach community generally including Ocean Breeze Estate.

We have modeled all the various scenarios on this basis.

The connection between Nodes 101 and 102 across Cooya Beach Road is provided to allow an alternative source of water supply to some parts of the development. This measure is good practice and enhances firefighting flows but is not necessary during stage construction.

3. ASSUMPTIONS

1. No abnormal conditions affect the water supply
2. 50 rider mains are not included in the model.
3. Cairns Water advised SKM that all property services include a pressure-reducing device to cut pressure to approximately 50m head. Therefore, separate and/or additional pressure reducing values are not required on any reticulation mains within the development.

4. WATER SUPPLY REQUIREMENTS

The level of water supply service expected of the reticulated system is in accordance with the requirements of:

1. FNQROC Development Manual 'Water Reticulation Design Guidelines'
2. Department of Natural Resources and Mines 'Planning Guidelines for Water Supply and Sewerage'

Based on information from those documents the following data is used in the model:

Average daily consumption (AD) = 500L/person

Single family dwelling on

Lots < 900m ²	2.8 persons per connection
Lots > 900m ²	3.1 persons per connection



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Peak day (PD) = 2.25 x AD
Peak hour = PD/12

Average Day demand for lot < 900m² = 0.016L/sec

Average Day demand for lot > 900m² = 0.018L/sec

Peak hour demand for lot < 900m² = 0.073L/sec 2/3 Peak Hour Demand = 0.049L/sec

Peak hour demand for lot > 900m² = 0.081L/sec 2/3 Peak Hour Demand = 0.054L/sec

From the figures shown above it can be determined that the demand at 2/3 of the Peak Hour is not less than the Average Day demand.

The peak hour flows were allocated to the nodes and a static analysis used. The residential pressure for domestic flows at peak hour is required to be in the range of 22m to 60m head.

5. FIRE FIGHTING FLOW

The 'Planning Guidelines for Water Supply and Sewerage' provides that a system with a population of less than 2000 persons have the firefighting flows imposed on 2/3 of the peak hour demand. Cooya Beach has an approximate population of about 1700 persons, which is well below the threshold noted above.

The water source for Cooya Beach is a reservoir reported by SKM to be 3.5ML capacity. The required firefighting flow is 15 L/sec for two hours and there is sufficient reservoir capacity for the firefighting flow.

The minimum permitted residential pressure during firefighting flow is 12.00m head while the maximum permitted pressure is 60.00m.

6. MAXIMUM RESIDUAL PRESSURE

The maximum residual head available, assuming no demand whatsoever, is less than 60m head.

7. RESIDENTIAL DEMANDS

Demands

This model is based on the following demands:

1. Existing Cooya Beach demands
2. Proposed subdivision demands

The existing Cooya Beach demands are based on information provided by the former DCS to SKM which is attached as Appendix C1.

The proposed subdivision demand is based on the current lot layout. These are summarised as follows:

Existing Cooya Beach demand external to the subject site: 280 lots
(Includes an undeveloped lot comprising potentially 20 lots)



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Existing demand from previous stages of the estate:	121 lots
Ocean Breeze Stage 5A demand:	10 lots
Demand in remaining stages of Ocean Breeze Estate:	157 lots

Total demand all lots at Cooya Beach: 568 lots

Surface elevations for the model nodes have been determined from the existing survey information provided by RPS. The survey data, existing and proposed lot layouts are shown on Dwgs 1187-OA Water 1 and Water 2, which are attached as Appendix C2.

It is beyond the scope of this report to model the remainder of the Cooya Beach community. Therefore we have modeled the existing Cooya Beach consumption as demands at Nodes 118 and 146. Refer the above mentioned drawings for details.

8. MODELLING PARAMETERS

The reticulation network is modelled using EPA Net Program Version 2. The model is a static analysis at peak hour or part thereof as applicable.

This program analysed the reticulation network using Hazen-Williams head loss formula. Values of roughness coefficient 'c' used are in accordance with the FNQROC Development Manual requirements, which are:

Diameter < 150	c=100
Diameter > 150 < 300	c=110

The following different scenarios are modeled:

- Scenario 12 – Existing development only at peak hour flow with a constant pressure of 450kPa at the intersection of Boonie Doon and Cooya Beach Roads.
- Scenario 13 - Full development at peak hour flow with a constant pressure of 450kPa at the intersection of Boonie Doon and Cooya Beach Roads.
- Scenario 14 - Full developed at peak hour flow with a constant pressure of 450kPa at the intersection of Boonie Doon and Cooya Beach Roads. This scenario represents the maximum pressure present in the system.
- Scenario 15 – Firefighting flows imposed on 2/3 of existing peak hour flows for existing development with a constant pressure of 450kPa at the intersection of Boonie Doon and Cooya Beach Roads.
- Scenario 16 – Firefighting flows imposed on 2/3 existing peak hour flows for full development with a constant pressure of 450kPa at the intersection of Boonie Doon and Cooya Beach Roads.
- Scenario 17 – Firefighting flow imposed on the peak hour flow for the full development with a constant pressure of 450kPa at the intersection of Boonie Doon and Cooya Beach Roads.



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9. DOMESTIC PEAK HOUR FLOWS

Model results

The modeling results for all scenarios show that all systems provide a satisfactory level of service in all cases. The results are shown in Appendix C3.

10. FIRE FIGHTING FLOWS

Model results

The modeling results for all scenarios show that all systems provide a satisfactory level of service in all cases. The results are shown in Appendix C3.

The models were examined to establish the most hydraulically disadvantaged hydrant. In the existing development the worst case is Node 131 and in the fully developed scenario Node 148 in Stage 3.



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11. CONCLUSIONS

Provided that the information provided by Cairns Water and Waste is correct then the water supply network shown in the attached drawings will service the Cooya Beach community in accordance with the requirements of both FNQROC Development Manual, 'Water Reticulation Design Guidelines' and Department of Natural Resources and Mines 'Planning Guidelines for Water Supply and Sewerage.'

We conclude as follows:

1. The proposed water supply network provides a satisfactory level of domestic water supply for all the proposed development and the wider Cooya Beach community.
2. That the reticulation network within Cooya Beach has adequate capacity to meet future demands
3. No further upgrading of existing water supply infrastructure is required as a result of the development
4. The proposed water supply network within the subdivision as shown in Appendix B conforms with the requirements of both FNQROC Development Manual 'Water Reticulation Design Guidelines' and Department of Natural Resources and Mines 'Planning Guidelines for Water Supply and Sewerage'
5. The proposed water supply network provides a satisfactory level of firefighting water supply at all pints within the proposed development.

We recommend that Council approve this report.

Attachments:

Appendix C1	Existing Cooya Beach Demands.
Appendix C2	Water Supply Reticulation Master Plans
Appendix C3	Model Results



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APPENDIX C1 EXISTING COOYA BEACH DEMANDS



facsimile transmission

SINCLAIR KNIGHT MERZ			
REC'D	14 FEB 2005	PMGR	
WHO	Noted	REMARKS	11
PROJECT No.	66 22501	OUR REF:	FILE
YOUR REF:			



TO: Wade Quinn

COMPANY: SKM

FAX NO: 4031 3967

DATE: 14 February 2005

PAGES: 4
(including this page)

FROM: Peter Cymbala

DEPT: Engineering Services

Enquiries to: Peter Cymbala
Douglas Shire Council, PO Box 357, Mossman Qld 4873
Phone: (07) 4099 9462
Fax: (07) 4098 2902
Email: douglas@dsc.qld.gov.au

This facsimile is confidential and may be the subject of legal privilege. It is intended for the named addressee. If you are not the addressee, any use of this facsimile whatsoever or the information contained in it is prohibited. Please let us know immediately if you have received this communication in error so that we can arrange for it to be returned.

MESSAGE: Cooya Beach

Wade

Find out sketch of
existing services and Reservoir Site

Regards
P. Cymbala

WATCH.

3967
4031

Douglas Shire Council

1

Total
Existing Lots
 ≈ 260 .

Cooya Beach



12
RP709171

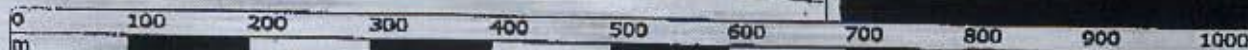
RP7330S

2
RP748487
2010ts

193 Lots

2010ts

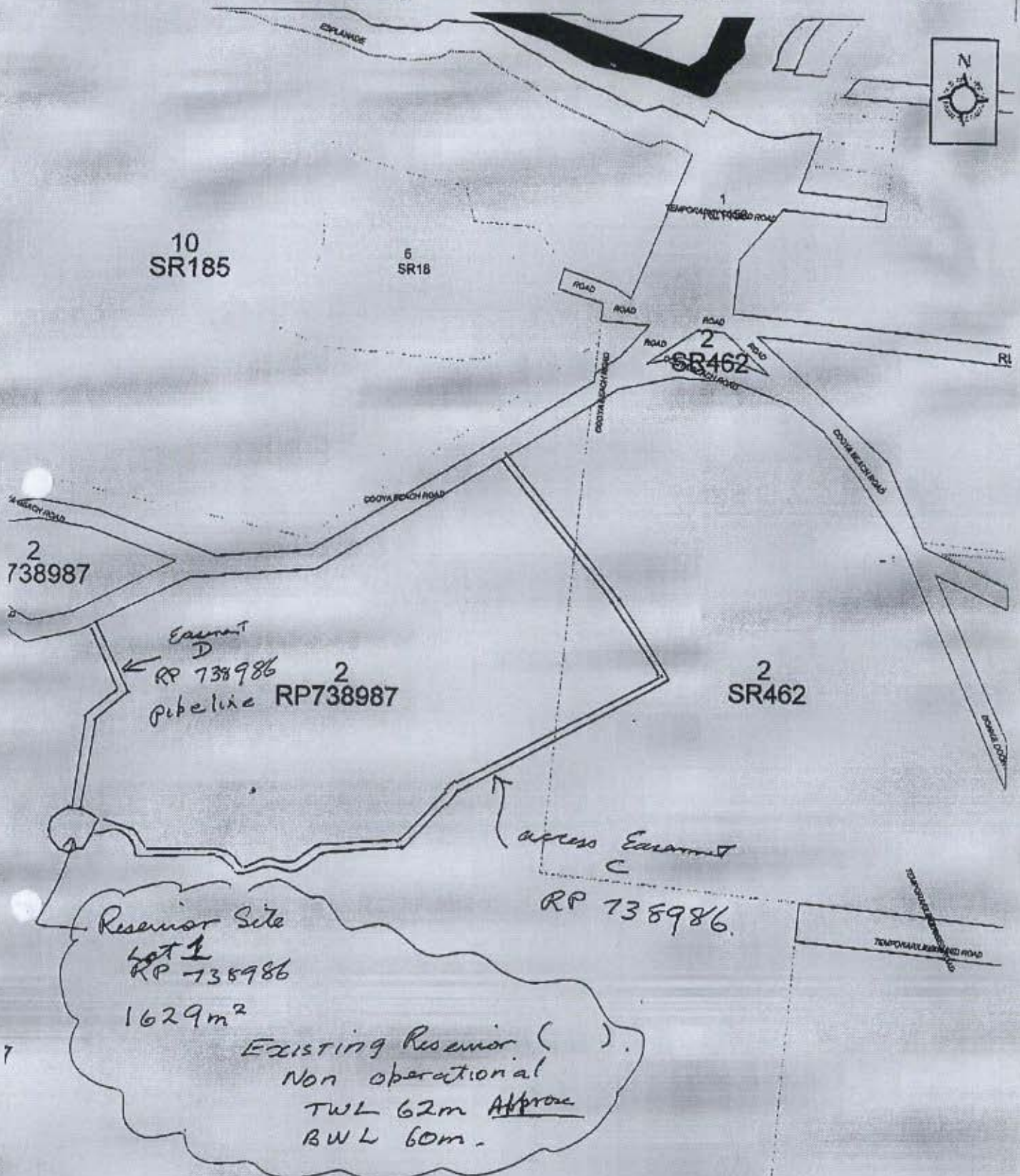
14



Scale:1:5918.507 Date: 14/2/2005

Douglas Shire Council

3



Scale:1:5140.149 Date: 14/2/2005

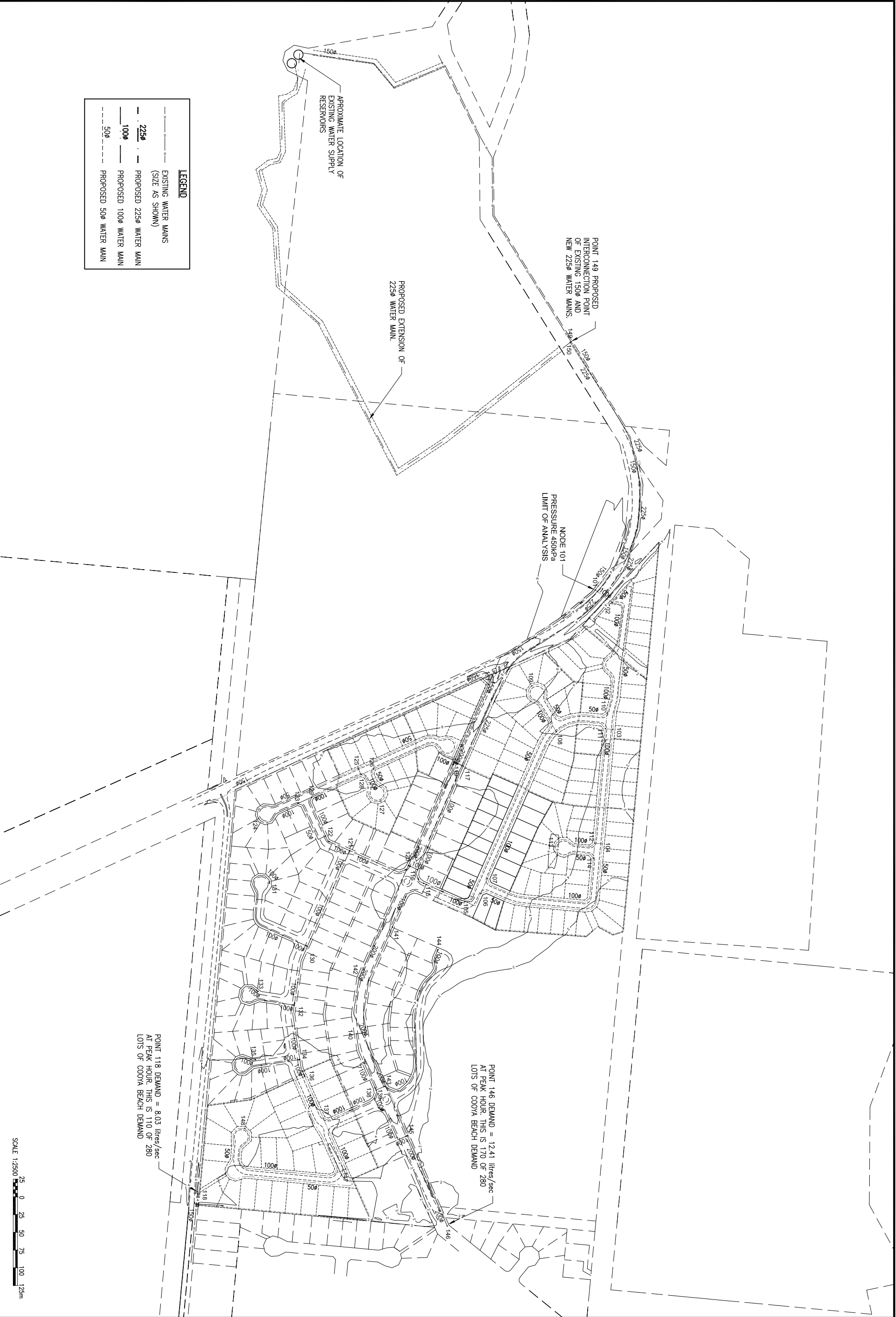
Jim Papas Civil Engineering Designer

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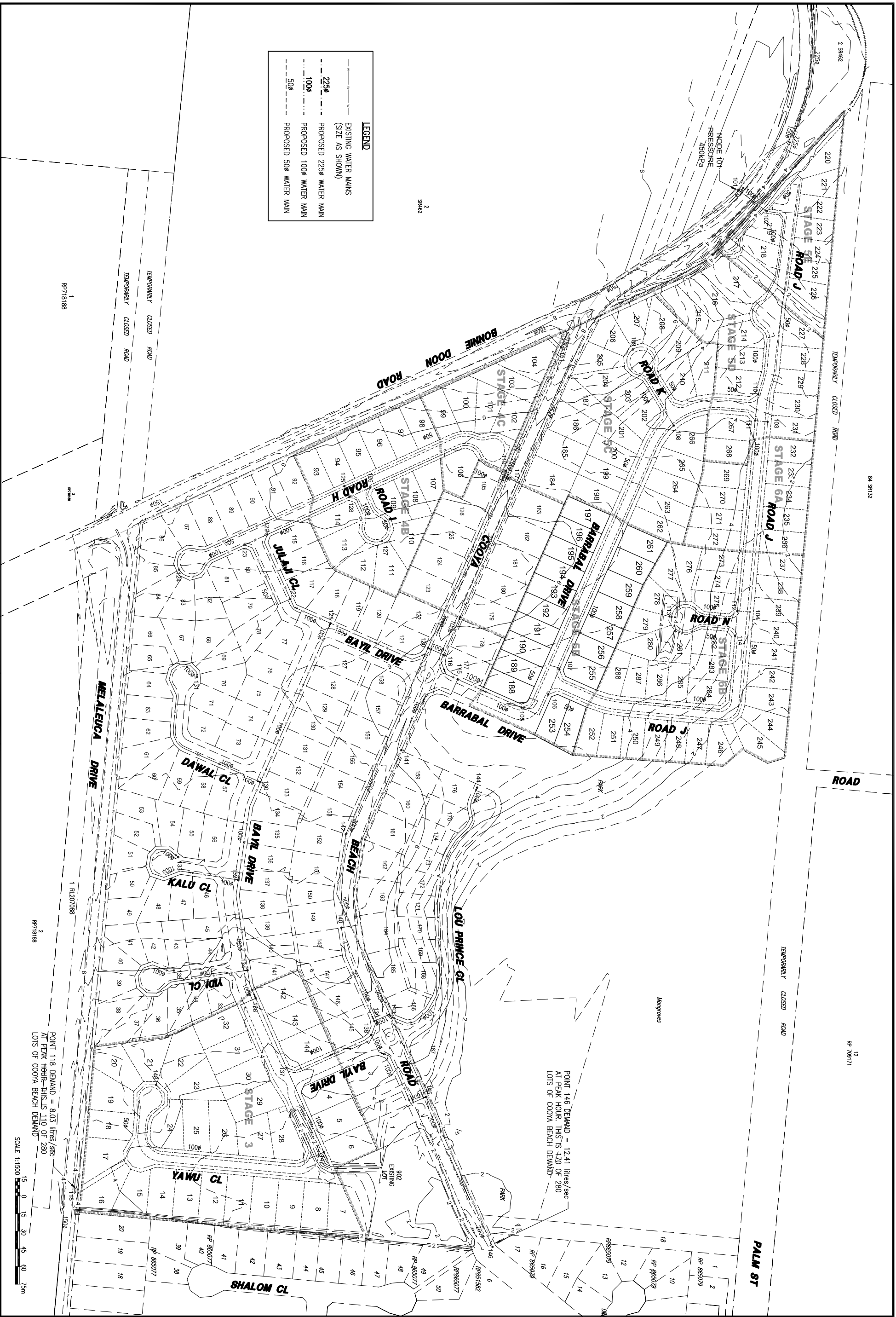
APPENDIX C2 WATER RETICULATION MASTER PLANS





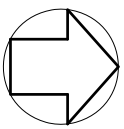
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A	ORIGINAL, ISSUE FOR OPERATIONAL WORKS APPROVAL	29.04.11	
B	GENERAL REVISION	10.04.13	
C	EXTERNAL WATER SUPPLY SHOWN, GENERAL REVISION	24.06.13	
D	CONSTANT PRESSURE APPLIED TO NODE 101 AS DETERMINED BY CRC	11.12.13	
E	STAGE 5A CONSTRUCTION SHOWN	02.06.14	

JIM PAPAS CIVIL ENGINEERING DESIGNER PTY, LTD. CIVIL ENGINEERING DESIGN AND DRAFTING P.O. Box 2347 Moreeba Q 4890 Mob. 0408 770 394 Email: admin@jpced.com.au			
DRAWING TITLE: WATER RETICULATION MASTER PLAN (SHEET 1 OF 2)			
SCALE (AT A1 SIZE)		HOR	1:2500
DATE		VER	APRIL 2011
APPROVED		DESIGNED	J.P.
		CHECKED	J.P.
		B. J. SMITH RPEQ No. 9326	
DWG NUMBER		1187 OA Water 1	AUDT E



amendments	
A ORIGINAL ISSUE FOR OPERATIONAL WORKS APPROVAL	29.04.11
B GENERAL REVISION	10.04.13
C EXTERNAL WATER SUPPLY SHOWN, GENERAL REVISION	24.06.13
D CONSTANT PRESSURE APPLIED TO NODE 101 AS DETERMINED BY CRC	11.12.13
E STAGE 5A CONSTRUCTION SHOWN	02.06.14

JIM PAPAS
CIVIL ENGINEERING
DESIGNER PTY. LTD.
CIVIL ENGINEERING DESIGN AND DRAFTING
P. O. Box 2347
Mareeba Qc 4680
Mob. 0408 770 394
Email: admin@jped.com.au



"Ocean Breeze Estate"
PROPOSED RESIDENTIAL SUBDIVISION AT
COOYA BEACH ROAD, COOYA BEACH

SCALE	HOR 1:1500	DRAWN	J.P.
(AT A1 SIZE)	VER	DESIGNED	J.P.
DATE	APRIL 2011	CHECKED	J.P.
APPROVED	B. J. SMITH REFQ No. 9326		
DWG NUMBER	1187-0A	Water 2	AMDT E

Jim Papas Civil Engineering Designer

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APPENDIX C3 MODEL RESULTS



1253-12 Scenario 12 Existing PH Flows Constant Pressure

Page 1

11-Dec-13 7:55:45 AM

 * E P A N E T *
 * Hydraulic and Water Quality *
 * Analysis for Pipe Networks *
 * Version 2.0 *

Input File: 1253-12 Scenario 12 Existing PH Flows Constant Pressure.NET

Scenario 12

Existing development at peak hour flow based on a constant pressure at intersection of Cooya Beach and Boonie Doon Roads of 450kPa in accordance with CRC letter dated December 6, 2013.

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
18	115	116	29	104.3
19	116	117	244	104.3
20	116	120	15	104.3
23	119	120	188	202.2
25	120	121	95	104.3
26	120	142	170	202.2
27	121	122	42	104.3
28	121	130	150	104.3
29	122	129	61	104.3
30	129	123	22	104.3
31	123	124	68	104.3
36	130	131	175	104.3
37	130	132	87	104.3
38	132	133	121	104.3
39	132	134	79	104.3
40	134	135	145	104.3
41	134	136	25	104.3
45	138	139	13	104.3
46	138	145	85	104.3
47	139	140	86	104.3
48	139	143	15	104.3
49	140	141	173	104.3
50	141	115	90	104.3
51	142	143	167	202.2
52	143	144	241	104.3
53	143	145	76	202.2
54	145	146	149	202.2
21	117	119	15	225
22	101	151	210	152
59	151	119	96	152
60	151	118	982	152
67	101	151	205	225
68	151	117	136	225

♀

Page 2

Scenario 12

Link - Node Table: (continued)

Link ID	Start Node	End Node	Length m	Diameter mm
1	50	101	1	450

1253-12 Scenario 12 Existing PH Flows Constant Pressure

Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality
101	0.00	48.50	45.00	0.00
115	0.07	40.66	35.76	0.00
116	0.49	40.71	35.11	0.00
117	0.57	41.23	34.63	0.00
119	0.54	41.24	35.94	0.00
120	0.39	40.71	34.91	0.00
121	0.15	39.99	33.09	0.00
122	0.15	39.97	33.07	0.00
123	0.27	39.93	33.63	0.00
124	0.73	39.92	33.22	0.00
129	0.07	39.94	33.74	0.00
130	0.51	39.34	32.29	0.00
131	0.51	39.32	32.32	0.00
132	0.37	39.13	32.13	0.00
133	0.80	39.10	32.00	0.00
134	0.22	39.06	33.76	0.00
135	0.95	39.01	33.01	0.00
136	0.49	39.06	34.46	0.00
138	0.22	40.23	35.03	0.00
139	0.16	40.24	34.94	0.00
140	0.32	40.31	33.51	0.00
141	0.41	40.51	34.61	0.00
142	0.56	40.46	33.36	0.00
143	0.31	40.24	34.84	0.00
144	0.58	40.21	35.01	0.00
145	0.69	40.16	36.76	0.00
146	12.41	39.97	36.97	0.00
151	0.00	42.74	34.74	0.00
118	8.03	40.54	36.44	0.00
50	-30.97	48.50	0.00	0.00 Reservoir

♀

Page 3

Scenario 12

Link Results:

Link ID	Flow LPS	Velocity m/s	Headloss m/km	Status
18	-2.36	0.28	1.75	Open
19	-2.65	0.31	2.16	Open
20	-0.20	0.02	0.02	Open
23	19.18	0.60	2.81	Open
25	5.22	0.61	7.57	Open
26	13.37	0.42	1.44	Open
27	1.22	0.14	0.51	Open
28	3.85	0.45	4.31	Open
29	1.07	0.13	0.40	Open
30	1.00	0.12	0.35	Open
31	0.73	0.09	0.20	Open
36	0.51	0.06	0.10	Open
37	2.83	0.33	2.44	Open
38	0.80	0.09	0.23	Open
39	1.66	0.19	0.91	Open
40	0.95	0.11	0.32	Open
41	0.49	0.06	0.09	Open
45	-1.78	0.21	1.04	Open

	1253-12	Scenario	12	Existing	PH	Flows	Constant	Pressure
46				1.56	0.18	0.81	Open	
47				-1.56	0.18	0.81	Open	
48				-0.38	0.04	0.06	Open	
49				-1.88	0.22	1.15	Open	
50				-2.29	0.27	1.65	Open	
51				12.81	0.40	1.33	Open	
52				0.58	0.07	0.13	Open	
53				11.54	0.36	1.10	Open	
54				12.41	0.39	1.25	Open	
21				-3.22	0.08	0.06	Open	
22				30.97	1.71	27.41	Open	
59				22.94	1.26	15.72	Open	
60				8.03	0.44	2.25	Open	
67				0.00	0.00	0.00	Closed	
68				0.00	0.00	0.00	Closed	
1				30.97	0.19	0.16	Open	

```

*****
*                               E P A N E T                               *
*                               Hydraulic and Water Quality                 *
*                               Analysis for Pipe Networks                   *
*                               Version 2.0                                *
*****

```

Input File: 1253-13 Scenario 13 Full Dev PH Constant Pressure.net

Scenario 13

Full development at peak hour flow with Scenario based on a constant pressure at intersection of Cooya Beach and Boonie Doon Roads of 450kPa in accordance with CRC letter dated December 6, 2013.

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
2	101	102	30	104.3
3	102	110	183	104.3
5	110	111	23	104.3
6	111	103	11	104.3
7	111	108	77	104.3
8	111	112	165	104.3
9	112	113	67	104.3
10	112	114	22	104.3
11	112	104	11	104.3
12	114	107	216	104.3
13	107	106	24	104.3
14	106	105	36	104.3
15	107	108	233	104.3
16	108	109	83	104.3
17	105	115	60	104.3
18	115	116	29	104.3
19	116	117	244	104.3
20	116	120	15	104.3
23	119	120	188	202.2
24	119	126	154	104.2
25	120	121	95	104.3
26	120	142	170	202.2
27	121	122	42	104.3
28	121	130	150	104.3
29	122	129	61	104.3
30	129	123	22	104.3
31	123	124	68	104.3
32	126	128	20	104.3
33	128	125	10	104.3
34	128	127	57	104.3
35	128	129	78	104.3
36	130	131	175	104.3
37	130	132	87	104.3

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Link - Node Table: (continued)

Link ID	Start Node	End Node	Length m	Diameter mm
38	132	133	121	104.3

1253-13 Scenario 13 Full Dev PH Constant Pressure

39	132	134	79	104.3
40	134	135	145	104.3
41	134	136	25	104.3
42	136	137	65	104.3
43	137	147	80	104.3
44	137	138	81	104.3
45	138	139	13	104.3
46	138	145	85	104.3
47	139	140	86	104.3
48	139	143	15	104.3
49	140	141	173	104.3
50	141	115	90	104.3
51	142	143	167	202.2
52	143	144	241	104.3
53	143	145	76	202.2
54	145	146	149	202.2
55	147	148	216	104.3
56	109	110	157	48.4
57	105	108	288	48.4
21	117	119	15	225
22	101	151	210	152
59	151	119	96	152
60	151	118	982	152
67	101	151	205	225
68	151	117	136	225
1	50	101	1	450

Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality
101	0.00	48.50	45.00	0.00
102	0.66	48.20	44.80	0.00
103	0.66	46.57	42.77	0.00
104	0.66	46.42	43.02	0.00
105	0.80	46.44	42.34	0.00
106	0.73	46.43	42.33	0.00
107	0.44	46.43	42.03	0.00
108	0.44	46.49	42.49	0.00
109	0.80	46.48	39.38	0.00
110	0.58	46.71	43.31	0.00
111	0.37	46.58	42.78	0.00
112	0.29	46.43	43.03	0.00
113	0.44	46.42	41.22	0.00
114	0.51	46.43	43.03	0.00

♀

Page 3

Scenario 13

Node Results: (continued)

Node ID	Demand LPS	Head m	Pressure m	Quality
115	0.07	46.47	41.57	0.00
116	0.49	46.60	41.00	0.00
117	0.57	47.20	40.60	0.00
119	0.54	47.19	41.89	0.00
120	0.39	46.61	40.81	0.00
121	0.15	46.43	39.53	0.00
122	0.15	46.44	39.54	0.00
123	0.27	46.46	40.16	0.00
124	0.73	46.45	39.75	0.00

1253-13 Scenario 13 Full Dev PH Constant Pressure

125	0.51	46.59	40.89	0.00
126	0.29	46.65	40.95	0.00
127	0.29	46.59	40.19	0.00
128	0.07	46.60	40.80	0.00
129	0.07	46.47	40.27	0.00
130	0.51	45.92	38.87	0.00
131	0.51	45.90	38.90	0.00
132	0.37	45.77	38.77	0.00
133	0.80	45.74	38.64	0.00
134	0.22	45.73	40.43	0.00
135	0.95	45.68	39.68	0.00
136	0.49	45.73	41.13	0.00
137	0.08	45.74	41.84	0.00
138	0.22	45.90	40.70	0.00
139	0.16	45.96	40.66	0.00
140	0.32	46.05	39.25	0.00
141	0.41	46.29	40.39	0.00
142	0.56	46.28	39.18	0.00
143	0.31	45.98	40.58	0.00
144	0.58	45.94	40.74	0.00
145	0.69	45.88	42.48	0.00
146	12.41	45.70	42.70	0.00
147	0.81	45.63	42.23	0.00
148	1.22	45.52	40.42	0.00
151	0.00	47.43	39.43	0.00
118	8.03	45.22	41.12	0.00
50	-41.62	48.50	0.00	0.00 Reservoir

♀

Page 4

Scenario 13

Link Results:

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status
2	6.08	0.71	10.05	Open
3	5.42	0.63	8.13	Open
5	4.56	0.53	5.89	Open
6	0.66	0.08	0.16	Open
7	1.87	0.22	1.13	Open
8	1.66	0.19	0.91	Open
9	0.44	0.05	0.08	Open
10	0.27	0.03	0.03	Open
11	0.66	0.08	0.16	Open
12	-0.24	0.03	0.03	Open
13	0.14	0.02	0.01	Open
14	-0.59	0.07	0.13	Open
15	-0.82	0.10	0.25	Open
16	0.51	0.06	0.10	Open
17	-1.30	0.15	0.57	Open
18	-3.89	0.46	4.40	Open
19	-2.86	0.33	2.48	Open
20	-1.52	0.18	0.77	Open
23	20.13	0.63	3.07	Open
24	3.41	0.40	3.46	Open
25	2.49	0.29	1.93	Open
26	15.72	0.49	1.94	Open
27	-1.03	0.12	0.38	Open
28	3.37	0.39	3.37	Open
29	-1.18	0.14	0.48	Open
30	1.00	0.12	0.35	Open
31	0.73	0.09	0.20	Open

1253-13 Scenario 13 Full Dev PH Constant Pressure

32	3.12	0.37	2.92	Open
33	0.51	0.06	0.10	Open
34	0.29	0.03	0.04	Open
35	2.25	0.26	1.59	Open
36	0.51	0.06	0.10	Open
37	2.35	0.28	1.73	Open
38	0.80	0.09	0.23	Open
39	1.18	0.14	0.48	Open
40	0.95	0.11	0.32	Open
41	0.01	0.00	0.00	Open
42	-0.48	0.06	0.09	Open
43	2.03	0.24	1.32	Open
44	-2.59	0.30	2.06	Open
45	-3.66	0.43	3.92	Open
46	0.85	0.10	0.26	Open
47	-1.80	0.21	1.05	Open
48	-2.02	0.24	1.31	Open
49	-2.12	0.25	1.42	Open
50	-2.53	0.30	1.98	Open
51	15.16	0.47	1.82	Open

♀

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Scenario 13

Link Results: (continued)

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
52	0.58	0.07	0.13	Open
53	12.25	0.38	1.22	Open
54	12.41	0.39	1.25	Open
55	1.22	0.14	0.51	Open
56	-0.29	0.16	1.47	Open
57	-0.09	0.05	0.18	Open
21	15.57	0.39	1.14	Open
22	0.00	0.00	0.00	Closed
59	8.51	0.47	2.50	Open
60	8.03	0.44	2.25	Open
67	35.54	0.89	5.23	Open
68	19.00	0.48	1.64	Open
1	41.62	0.26	0.28	Open

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*                               E P A N E T                               *
*                               Hydraulic and Water Quality                 *
*                               Analysis for Pipe Networks                   *
*                               Version 2.0                                *
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Input File: 1253-14 Scenario 14 Full Dev PH Flows Max. Pressure.NET

Scenario 14

Full development at peak hour flow with based on a constant pressure at intersection of Cooya Beach and Boonie Doon Roads of 450kPa in accordance with CRC letter dated December 6, 2013.

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
2	101	102	30	104.3
3	102	110	183	104.3
5	110	111	23	104.3
6	111	103	11	104.3
7	111	108	77	104.3
8	111	112	165	104.3
9	112	113	67	104.3
10	112	114	22	104.3
11	112	104	11	104.3
12	114	107	216	104.3
13	107	106	24	104.3
14	106	105	36	104.3
15	107	108	233	104.3
16	108	109	83	104.3
17	105	115	60	104.3
18	115	116	29	104.3
19	116	117	244	104.3
20	116	120	15	104.3
23	119	120	188	202.2
24	119	126	154	104.2
25	120	121	95	104.3
26	120	142	170	202.2
27	121	122	42	104.3
28	121	130	150	104.3
29	122	129	61	104.3
30	129	123	22	104.3
31	123	124	68	104.3
32	126	128	20	104.3
33	128	125	10	104.3
34	128	127	57	104.3
35	128	129	78	104.3
36	130	131	175	104.3
37	130	132	87	104.3
38	132	133	121	104.3

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Link - Node Table: (continued)

Link ID	Start Node	End Node	Length m	Diameter mm
39	132	134	79	104.3

1253-14 Scenario 14 Full Dev PH Flows Max. Pressure

40	134	135	145	104.3
41	134	136	25	104.3
42	136	137	65	104.3
43	137	147	80	104.3
44	137	138	81	104.3
45	138	139	13	104.3
46	138	145	85	104.3
47	139	140	86	104.3
48	139	143	15	104.3
49	140	141	173	104.3
50	141	115	90	104.3
51	142	143	167	202.2
52	143	144	241	104.3
53	143	145	76	202.2
54	145	146	149	202.2
55	147	148	216	104.3
56	109	110	157	48.4
57	105	108	288	48.4
21	117	119	15	225
22	101	151	210	152
59	151	119	96	152
60	151	118	982	152
67	101	151	205	225
68	151	117	136	225
1	50	101	1	450

Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality
101	0.00	48.50	45.00	0.00
102	0.66	48.20	44.80	0.00
103	0.66	46.57	42.77	0.00
104	0.66	46.42	43.02	0.00
105	0.80	46.44	42.34	0.00
106	0.73	46.43	42.33	0.00
107	0.44	46.43	42.03	0.00
108	0.44	46.49	42.49	0.00
109	0.80	46.48	39.38	0.00
110	0.58	46.71	43.31	0.00
111	0.37	46.58	42.78	0.00
112	0.29	46.43	43.03	0.00
113	0.44	46.42	41.22	0.00
114	0.51	46.43	43.03	0.00
115	0.07	46.47	41.57	0.00

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Scenario 14

Node Results: (continued)

Node ID	Demand LPS	Head m	Pressure m	Quality
116	0.49	46.60	41.00	0.00
117	0.57	47.20	40.60	0.00
119	0.54	47.19	41.89	0.00
120	0.39	46.61	40.81	0.00
121	0.15	46.43	39.53	0.00
122	0.15	46.44	39.54	0.00
123	0.27	46.46	40.16	0.00
124	0.73	46.45	39.75	0.00
125	0.51	46.59	40.89	0.00

1253-14 Scenario 14 Full Dev PH Flows Max. Pressure

126	0.29	46.65	40.95	0.00
127	0.29	46.59	40.19	0.00
128	0.07	46.60	40.80	0.00
129	0.07	46.47	40.27	0.00
130	0.51	45.92	38.87	0.00
131	0.51	45.90	38.90	0.00
132	0.37	45.77	38.77	0.00
133	0.80	45.74	38.64	0.00
134	0.22	45.73	40.43	0.00
135	0.95	45.68	39.68	0.00
136	0.49	45.73	41.13	0.00
137	0.08	45.74	41.84	0.00
138	0.22	45.90	40.70	0.00
139	0.16	45.96	40.66	0.00
140	0.32	46.05	39.25	0.00
141	0.41	46.29	40.39	0.00
142	0.56	46.28	39.18	0.00
143	0.31	45.98	40.58	0.00
144	0.58	45.94	40.74	0.00
145	0.69	45.88	42.48	0.00
146	12.41	45.70	42.70	0.00
147	0.81	45.63	42.23	0.00
148	1.22	45.52	40.42	0.00
151	0.00	47.43	39.43	0.00
118	8.03	45.22	41.12	0.00
50	-41.62	48.50	0.00	0.00 Reservoir

Link Results:

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
2	6.08	0.71	10.05	Open
3	5.42	0.63	8.13	Open
5	4.56	0.53	5.89	Open
6	0.66	0.08	0.16	Open
7	1.87	0.22	1.13	Open
8	1.66	0.19	0.91	Open

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Scenario 14

Link Results: (continued)

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
9	0.44	0.05	0.08	Open
10	0.27	0.03	0.03	Open
11	0.66	0.08	0.16	Open
12	-0.24	0.03	0.03	Open
13	0.14	0.02	0.01	Open
14	-0.59	0.07	0.13	Open
15	-0.82	0.10	0.25	Open
16	0.51	0.06	0.10	Open
17	-1.30	0.15	0.57	Open
18	-3.89	0.46	4.40	Open
19	-2.86	0.33	2.48	Open
20	-1.52	0.18	0.77	Open
23	20.13	0.63	3.07	Open
24	3.41	0.40	3.46	Open
25	2.49	0.29	1.93	Open
26	15.72	0.49	1.94	Open
27	-1.03	0.12	0.38	Open

1253-14 Scenario 14 Full Dev PH Flows Max. Pressure

28	3.37	0.39	3.37	Open
29	-1.18	0.14	0.48	Open
30	1.00	0.12	0.35	Open
31	0.73	0.09	0.20	Open
32	3.12	0.37	2.92	Open
33	0.51	0.06	0.10	Open
34	0.29	0.03	0.04	Open
35	2.25	0.26	1.59	Open
36	0.51	0.06	0.10	Open
37	2.35	0.28	1.73	Open
38	0.80	0.09	0.23	Open
39	1.18	0.14	0.48	Open
40	0.95	0.11	0.32	Open
41	0.01	0.00	0.00	Open
42	-0.48	0.06	0.09	Open
43	2.03	0.24	1.32	Open
44	-2.59	0.30	2.06	Open
45	-3.66	0.43	3.92	Open
46	0.85	0.10	0.26	Open
47	-1.80	0.21	1.05	Open
48	-2.02	0.24	1.31	Open
49	-2.12	0.25	1.42	Open
50	-2.53	0.30	1.98	Open
51	15.16	0.47	1.82	Open
52	0.58	0.07	0.13	Open
53	12.25	0.38	1.22	Open
54	12.41	0.39	1.25	Open
55	1.22	0.14	0.51	Open
56	-0.29	0.16	1.47	Open
57	-0.09	0.05	0.18	Open

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Scenario 14

Link Results: (continued)

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
21	15.57	0.39	1.14	Open
22	0.00	0.00	0.00	Closed
59	8.51	0.47	2.50	Open
60	8.03	0.44	2.25	Open
67	35.54	0.89	5.23	Open
68	19.00	0.48	1.64	Open
1	41.62	0.26	0.28	Open

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Input File: 1253-15 Scenario 15 FFF + 0.667 Exist PH Flows Constant Pressure.NET

Scenario 15

Firefighting flows imposed on 2/3 of existing peak hour flows based on a constant pressure at intersection of Cooya Beach and Boonie Doon Roads of 450kPa in accordance with CRC letter dated December 6, 2013.

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
18	115	116	29	104.3
19	116	117	244	104.3
20	116	120	15	104.3
23	119	120	188	202.2
25	120	121	95	104.3
26	120	142	170	202.2
27	121	122	42	104.3
28	121	130	150	104.3
29	122	129	61	104.3
30	129	123	22	104.3
31	123	124	68	104.3
36	130	131	175	104.3
37	130	132	87	104.3
38	132	133	121	104.3
39	132	134	79	104.3
40	134	135	145	104.3
41	134	136	25	104.3
45	138	139	13	104.3
46	138	145	85	104.3
47	139	140	86	104.3
48	139	143	15	104.3
49	140	141	173	104.3
50	141	115	90	104.3
51	142	143	167	202.2
52	143	144	241	104.3
53	143	145	76	202.2
54	145	146	149	202.2
21	117	119	15	225
22	101	151	210	152
59	151	119	96	152
60	151	118	982	152
67	101	151	205	225
68	151	117	136	225
1	101	50	1	450

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Scenario 15

Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality
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1253-15 Scenario 15 FFF + 0.667 Exist PH Flows Constant Pressure

101	0.00	48.50	45.00	0.00
115	0.05	37.56	32.66	0.00
116	0.33	37.59	31.99	0.00
117	0.38	38.50	31.90	0.00
119	0.36	38.50	33.20	0.00
120	0.26	37.57	31.77	0.00
121	0.10	30.10	23.20	0.00
122	0.10	30.09	23.19	0.00
123	0.18	30.07	23.77	0.00
124	0.49	30.06	23.36	0.00
129	0.05	30.07	23.87	0.00
130	0.34	19.35	12.30	0.00
131	15.34	9.59	2.59	0.00
132	0.25	19.25	12.25	0.00
133	0.53	19.24	12.14	0.00
134	0.15	19.21	13.91	0.00
135	0.63	19.19	13.19	0.00
136	0.33	19.21	14.61	0.00
138	0.15	37.35	32.15	0.00
139	0.11	37.35	32.05	0.00
140	0.21	37.39	30.59	0.00
141	0.27	37.49	31.59	0.00
142	0.37	37.46	30.36	0.00
143	0.21	37.35	31.95	0.00
144	0.39	37.34	32.14	0.00
145	0.46	37.32	33.92	0.00
146	8.28	37.23	34.23	0.00
151	0.00	41.03	33.03	0.00
118	5.36	39.98	35.88	0.00
50	-35.66	48.50	0.00	0.00 Reservoir

Link Results:

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
18	-1.61	0.19	0.86	Open
19	-3.57	0.42	3.74	Open
20	1.63	0.19	0.88	Open
23	25.99	0.81	4.93	Open
25	18.48	2.16	78.71	Open
26	8.88	0.28	0.67	Open
27	0.81	0.10	0.24	Open
28	17.57	2.06	71.65	Open
29	0.71	0.08	0.19	Open
30	0.67	0.08	0.17	Open

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Scenario 15

Link Results: (continued)

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
31	0.49	0.06	0.09	Open
36	15.34	1.80	55.74	Open
37	1.89	0.22	1.15	Open
38	0.53	0.06	0.11	Open
39	1.11	0.13	0.43	Open
40	0.63	0.07	0.15	Open
41	0.33	0.04	0.04	Open
45	-1.19	0.14	0.49	Open
46	1.04	0.12	0.38	Open

	1253-15 Scenario 15 FFF + 0.667 Exist PH Flows Constant Pressure			
47	-1.08	0.13	0.41	Open
48	-0.22	0.03	0.02	Open
49	-1.29	0.15	0.57	Open
50	-1.57	0.18	0.81	Open
51	8.51	0.26	0.62	Open
52	0.39	0.05	0.06	Open
53	7.69	0.24	0.52	Open
54	8.28	0.26	0.59	Open
21	-3.95	0.10	0.09	Open
22	35.66	1.97	35.58	Open
59	30.30	1.67	26.32	Open
60	5.36	0.30	1.06	Open
67	0.00	0.00	0.00	Closed
68	0.00	0.00	0.00	Closed
1	-35.66	0.22	0.21	Open

Input File: 1253-16 Scenario 16 FFF + 0.667 Exist PH Constant Pressure.NET

Scenario 16

Firefighting flows imposed on 2/3 existing peak hour flows based on a constant pressure at intersection of Cooya Beach and Boonie Doon Roads of 450kPa in accordance with CRC letter dated December 6, 2013.

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
18	115	116	29	104.3
19	116	117	244	104.3
20	116	120	15	104.3
23	119	120	188	202.2
25	120	121	95	104.3
26	120	142	170	202.2
27	121	122	42	104.3
28	121	130	150	104.3
29	122	129	61	104.3
30	129	123	22	104.3
31	123	124	68	104.3
36	130	131	175	104.3
37	130	132	87	104.3
38	132	133	121	104.3
39	132	134	79	104.3
40	134	135	145	104.3
41	134	136	25	104.3
45	138	139	13	104.3
46	138	145	85	104.3
47	139	140	86	104.3
48	139	143	15	104.3
49	140	141	173	104.3
50	141	115	90	104.3
51	142	143	167	202.2
52	143	144	241	104.3
53	143	145	76	202.2
54	145	146	149	202.2
21	117	119	15	225
22	101	151	210	152
59	151	119	96	152
60	151	118	982	152
67	101	151	205	225
68	151	117	136	225
1	50	101	1	450

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Scenario 16

Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality
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1253-16 Scenario 16 FFF + 0.667 Exist PH Constant Pressure

101	0.00	48.50	45.00	0.00
115	0.05	46.66	41.76	0.00
116	0.33	46.68	41.08	0.00
117	0.38	47.61	41.01	0.00
119	0.36	47.60	42.30	0.00
120	0.26	46.67	40.87	0.00
121	0.10	39.19	32.29	0.00
122	0.10	39.18	32.28	0.00
123	0.18	39.17	32.87	0.00
124	0.49	39.16	32.46	0.00
129	0.05	39.17	32.97	0.00
130	0.34	28.44	21.39	0.00
131	15.34	18.69	11.69	0.00
132	0.25	28.34	21.34	0.00
133	0.53	28.33	21.23	0.00
134	0.15	28.31	23.01	0.00
135	0.63	28.29	22.29	0.00
136	0.33	28.31	23.71	0.00
138	0.15	46.44	41.24	0.00
139	0.11	46.45	41.15	0.00
140	0.21	46.49	39.69	0.00
141	0.27	46.59	40.69	0.00
142	0.37	46.56	39.46	0.00
143	0.21	46.45	41.05	0.00
144	0.39	46.44	41.24	0.00
145	0.46	46.41	43.01	0.00
146	8.28	46.32	43.32	0.00
151	0.00	47.88	39.88	0.00
118	5.36	46.84	42.74	0.00
50	-35.66	48.50	0.00	0.00 Reservoir

Link Results:

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
18	-1.61	0.19	0.86	Open
19	-3.61	0.42	3.82	Open
20	1.67	0.19	0.91	Open
23	25.95	0.81	4.92	Open
25	18.48	2.16	78.71	Open
26	8.88	0.28	0.67	Open
27	0.81	0.10	0.24	Open
28	17.57	2.06	71.65	Open
29	0.71	0.08	0.19	Open
30	0.67	0.08	0.17	Open

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Scenario 16

Link Results: (continued)

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
31	0.49	0.06	0.09	Open
36	15.34	1.80	55.74	Open
37	1.89	0.22	1.15	Open
38	0.53	0.06	0.11	Open
39	1.11	0.13	0.43	Open
40	0.63	0.07	0.15	Open
41	0.33	0.04	0.04	Open
45	-1.19	0.14	0.49	Open
46	1.04	0.12	0.38	Open

	1253-16	Scenario	16	FFF +	0.667	Exist	PH	Constant	Pressure
47				-1.08	0.13	0.41		Open	
48				-0.22	0.03	0.02		Open	
49				-1.29	0.15	0.57		Open	
50				-1.57	0.18	0.82		Open	
51				8.50	0.26	0.62		Open	
52				0.39	0.05	0.06		Open	
53				7.69	0.24	0.52		Open	
54				8.28	0.26	0.59		Open	
21				16.95	0.43	1.33		Open	
22				9.28	0.51	2.94		Open	
59				9.36	0.52	2.99		Open	
60				5.36	0.30	1.06		Open	
67				26.38	0.66	3.01		Open	
68				20.94	0.53	1.96		Open	
1				35.66	0.22	0.21		Open	

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Input File: 1253-17 Scenario 17 FFF + Full Dev. PH Flows Min Pressure.NET

Scenario 17

Firefighting flows imposed on the full peak hour flows for the full development based on a constant pressure at intersection of Cooya Beach and Boonie Doon Roads of 450kPa in accordance with CRC letter dated December 6, 2013.

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
2	101	102	30	104.3
3	102	110	183	104.3
5	110	111	23	104.3
6	111	103	11	104.3
7	111	108	77	104.3
8	111	112	165	104.3
9	112	113	67	104.3
10	112	114	22	104.3
11	112	104	11	104.3
12	114	107	216	104.3
13	107	106	24	104.3
14	106	105	36	104.3
15	107	108	233	104.3
16	108	109	83	104.3
17	105	115	60	104.3
18	115	116	29	104.3
19	116	117	244	104.3
20	116	120	15	104.3
23	119	120	188	202.2
24	119	126	154	104.2
25	120	121	95	104.3
26	120	142	170	202.2
27	121	122	42	104.3
28	121	130	150	104.3
29	122	129	61	104.3
30	129	123	22	104.3
31	123	124	68	104.3
32	126	128	20	104.3
33	128	125	10	104.3
34	128	127	57	104.3
35	128	129	78	104.3
36	130	131	175	104.3
37	130	132	87	104.3

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Page 2 Scenario 17
Link - Node Table: (continued)

Link ID	Start Node	End Node	Length m	Diameter mm
38	132	133	121	104.3

1253-17 Scenario 17 FFF + Full Dev. PH Flows Min Pressure

39	132	134	79	104.3
40	134	135	145	104.3
41	134	136	25	104.3
42	136	137	65	104.3
43	137	147	80	104.3
44	137	138	81	104.3
45	138	139	13	104.3
46	138	145	85	104.3
47	139	140	86	104.3
48	139	143	15	104.3
49	140	141	173	104.3
50	141	115	90	104.3
51	142	143	167	202.2
52	143	144	241	104.3
53	143	145	76	202.2
54	145	146	149	202.2
55	147	148	216	104.3
56	109	110	157	48.4
57	105	108	288	48.4
21	117	119	15	225
22	101	151	210	152
59	151	119	96	152
60	151	118	982	152
67	101	151	205	225
68	151	117	136	225
1	50	101	1	450

Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality
101	0.00	48.50	45.00	0.00
102	0.66	48.00	44.60	0.00
103	0.66	45.18	41.38	0.00
104	0.66	44.85	41.45	0.00
105	0.80	44.76	40.66	0.00
106	0.73	44.77	40.67	0.00
107	0.44	44.80	40.40	0.00
108	0.44	45.01	41.01	0.00
109	0.80	45.00	37.90	0.00
110	0.58	45.43	42.03	0.00
111	0.37	45.18	41.38	0.00
112	0.29	44.85	41.45	0.00
113	0.44	44.84	39.64	0.00
114	0.51	44.84	41.44	0.00

♀

Page 3

Scenario 17

Node Results: (continued)

Node ID	Demand LPS	Head m	Pressure m	Quality
115	0.07	44.75	39.85	0.00
116	0.49	44.87	39.27	0.00
117	0.57	46.12	39.52	0.00
119	0.54	46.08	40.78	0.00
120	0.39	44.87	39.07	0.00
121	0.15	44.16	37.26	0.00
122	0.15	44.26	37.36	0.00
123	0.27	44.41	38.11	0.00
124	0.73	44.40	37.70	0.00

1253-17 Scenario 17 FFF + Full Dev. PH Flows Min Pressure

125	0.51	44.79	39.09	0.00
126	0.29	44.92	39.22	0.00
127	0.29	44.79	38.39	0.00
128	0.07	44.79	38.99	0.00
129	0.07	44.42	38.22	0.00
130	0.51	41.75	34.70	0.00
131	0.51	41.73	34.73	0.00
132	0.37	40.67	33.67	0.00
133	0.80	40.64	33.54	0.00
134	0.22	39.98	34.68	0.00
135	0.95	39.93	33.93	0.00
136	0.49	39.84	35.24	0.00
137	0.08	39.54	35.64	0.00
138	0.22	42.92	37.72	0.00
139	0.16	43.23	37.93	0.00
140	0.32	43.55	36.75	0.00
141	0.41	44.28	38.38	0.00
142	0.56	44.11	37.01	0.00
143	0.31	43.40	38.00	0.00
144	0.58	43.37	38.17	0.00
145	0.69	43.24	39.84	0.00
146	12.41	43.05	40.05	0.00
147	0.81	34.13	30.73	0.00
148	16.22	20.78	15.68	0.00
151	0.00	46.58	38.58	0.00
118	8.03	44.37	40.27	0.00
50	-56.62	48.50	0.00	0.00 Reservoir

♀

Page 4

Scenario 17

Link Results:

Link ID	Flow LPS	Velocity m/s	Headloss m/km	Status
2	7.95	0.93	16.51	Open
3	7.29	0.85	14.06	Open
5	6.31	0.74	10.77	Open
6	0.66	0.08	0.16	Open
7	2.71	0.32	2.25	Open
8	2.57	0.30	2.04	Open
9	0.44	0.05	0.08	Open
10	1.18	0.14	0.48	Open
11	0.66	0.08	0.16	Open
12	0.67	0.08	0.17	Open
13	1.88	0.22	1.15	Open
14	1.15	0.14	0.46	Open
15	-1.65	0.19	0.90	Open
16	0.40	0.05	0.07	Open
17	0.57	0.07	0.13	Open
18	-3.74	0.44	4.08	Open
19	-4.23	0.50	5.14	Open
20	0.01	0.00	0.00	Open
23	30.10	0.94	6.47	Open
24	5.19	0.61	7.53	Open
25	5.17	0.61	7.44	Open
26	24.54	0.76	4.44	Open
27	-2.81	0.33	2.41	Open
28	7.84	0.92	16.06	Open
29	-2.96	0.35	2.65	Open
30	1.00	0.12	0.35	Open
31	0.73	0.09	0.20	Open

1253-17 Scenario 17 FFF + Full Dev. PH Flows Min Pressure

32	4.90	0.57	6.74	Open
33	0.51	0.06	0.10	Open
34	0.29	0.03	0.04	Open
35	4.03	0.47	4.70	Open
36	0.51	0.06	0.10	Open
37	6.82	0.80	12.41	Open
38	0.80	0.09	0.23	Open
39	5.65	0.66	8.75	Open
40	0.95	0.11	0.32	Open
41	4.48	0.52	5.69	Open
42	3.99	0.47	4.59	Open
43	17.03	1.99	67.64	Open
44	-13.12	1.54	41.75	Open
45	-9.78	1.14	24.22	Open
46	-3.56	0.42	3.73	Open
47	-3.51	0.41	3.63	Open
48	-6.43	0.75	11.14	Open
49	-3.83	0.45	4.26	Open
50	-4.24	0.50	5.15	Open
51	23.98	0.75	4.25	Open

♀

Page 5

Scenario 17

Link Results: (continued)

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
52	0.58	0.07	0.13	Open
53	16.66	0.52	2.17	Open
54	12.41	0.39	1.25	Open
55	16.22	1.90	61.80	Open
56	-0.40	0.22	2.72	Open
57	-0.22	0.12	0.88	Open
21	23.26	0.59	2.39	Open
22	0.00	0.00	0.00	Closed
59	12.57	0.69	5.16	Open
60	8.03	0.44	2.25	Open
67	48.67	1.22	9.37	Open
68	28.06	0.71	3.38	Open
1	56.62	0.36	0.50	Open

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APPENDIX D Sewerage Reticulation Report



Jim Papas Civil Engineering Designer

Please address all
correspondence to:
**P.O. Box 2347,
Mareeba QLD 4880**

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**Mobile: 0408 770 394
Email: jim@jpced.com.au**

APPENDIX D SEWERAGE RETICULATION REPORT FOR OCEAN BREEZE ESTATE A RESIDENTIAL SUBDIVISION AT COOYA BEACH ROAD COOYA BEACH



Jim Papas Civil Engineering Designer

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INTRODUCTION

This report on the sewerage reticulation for Ocean Breeze Estate, a residential subdivision at Cooya Beach Road, Cooya Beach via Mossman, has been prepared to show that a satisfactory level of sewerage reticulation service can be provided or is available within the estate to meet the interim and ultimate development requirements.

This report provides the necessary input assumptions and results of analysis.

ASSUMPTIONS

General Assumptions

It is assumed that the following are always applicable to the sewerage reticulation network:

No abnormal conditions affect the system

All construction is in accordance with the design drawings.

The standard of construction is in accordance with the requirements of FNQROC Development manual, the expected industry standard and good quality workmanship.

RESIDENTIAL DEMANDS

This analysis is based on the demands generated by proposed subdivision and the existing residences in the vicinity.

The proposed demands are based catchment shown on the current lot layout as shown on the attached plan provided as Appendix B. These are summarised as follows:

Existing Lots in previous stages of Ocean Breeze Estate: (Includes Commercial Lot, excludes a Park Reserve)	101 lots
Proposed Residential lots in Stage 3:	32 lots
Proposed Residential lots in remaining stages:	153 lots
Future Lots in Cooya Beach external to Ocean Breeze Estate:	280 Lots

The existing Cooya Beach demands are based on information provided by the former DCS to SKM. This information is provided in Appendix D 1.

SEWAGE GENERATION RATES

Domestic Rates

The level of sewage generation expected from the development is in accordance with the requirements of:

FNQROC Development Manual 'Sewerage System Design Guidelines'

Department of Natural Resources and Mines 'Planning Guidelines for Water Supply and Sewerage'

Based on information from those documents the following data has been used in the model:



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Average daily consumption (AD) = 270L/person

Single person dwelling

Lots < 900m²

2.8 persons per connection

Peak hour = Average Day x 5

Peak hour demand per lot < 900m² = 0.044L/sec

These peak hour flows were allocated to the various sewers to determine peak discharge rates and to verify that sufficient capacity exists in the sewers.

MODEL RESULTS

Surface elevations for the sewer design have been taken from the existing survey information provided by RPS.

Dwg 1187-OA Sewer shows the existing sewers, the proposed sewerage design including the existing sewage pumping station dimensions and this drawing is provided as Appendix D2.

Gravity Sewers

We have examined the existing sewerage infrastructure at a number of critical points to ensure that there is sufficient capacity in the system to accommodate sewage discharge. The results are shown on the attached drawing and indicate that there is sufficient capacity to accommodate the sewage discharge of the entire estate.

Existing Sewage Pumping Station

Condition 15 of the Development Permit for Reconfiguration of a Lot states:

"15 (a) The applicant must construct a pump station and rising main between the site and the Mossman Treatment Plant to provide a sewerage service to the proposed lots.

15 (b) The pump station is to be located adjacent to Cooya Beach Road at the eastern end of the park.

15 (c) The pump station and the rising main are to be sized to cater for the proposed development and for other areas of Cooya Beach which may ultimately be included in the sewerage scheme."

The previous owners have fully complied with Conditions 15 (a) and 15 (b).

We have received some "As Constructed" information from Council, which we have combined with the "As Constructed" project drawings to establish the dimensions of the existing sewage pumping station. These dimensions are shown on Dwg 1187 OA Sewer attached as Appendix D 2. We then used this data to ascertain the capacity of the existing sewage pump station. We can confirm that the existing sewage pump station has sufficient capacity to accommodate the entire sewage discharge from Ocean Breeze Estate and the expected discharge from the existing lots in Cooya Beach township. The rising



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main can also accommodate the anticipated total discharges. Our calculations supporting this conclusion are attached as Appendix D 3. We therefore conclude that no upgrading works are required on any of the sewerage reticulation infrastructure.

We can offer no comment on the structural, electrical or other components of the pump station. We also note that these works were constructed by an unrelated entity and our Clients have no responsibility whatsoever for any of this infrastructure.

CONCLUSIONS

From the information provided, it can be concluded that:

The proposed sewerage reticulation network within the subdivision as shown in Appendix D2 conforms with the requirements of both FNQROC Development Manual 'Sewerage System Design Guidelines' and Department of Natural Resources and Mines 'Planning Guidelines for Water Supply and Sewerage'

The existing sewage pump station and associated rising main have sufficient capacity to provide a satisfactory sewerage effluent system for Ocean Breeze Estate.

The existing sewage pump station and associated rising main have sufficient capacity to provide a satisfactory sewerage effluent system for the future connection, by others, of the existing Cooya Beach township.

No upgrading of the existing infrastructure is required as a result of the development of Ocean Breeze Estate.

Recommend this report to Council for approval.

Attachments:

Appendix D 1	Existing Cooya Beach Demands.
Appendix D 2	Sewer Reticulation Master Plan
Appendix D 3	Sewage Pump Station Calculations



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APPENDIX D 1 COOYA BEACH DEMANDS



facsimile transmission

SINCLAIR KNIGHT MERZ			
REC'D	14 FEB 2005	PMGR	
WHO	Noted	REMARKS	11
PROJECT No.	66 22501	OUR REF:	FILE
YOUR REF:			



TO: Wade Quinn

COMPANY: SKM

FAX NO: 4031 3967

DATE: 14 February 2005

PAGES: 4
(including this page)

FROM: Peter Cymbala

DEPT: Engineering Services

Enquiries to: Peter Cymbala
Douglas Shire Council, PO Box 357, Mossman Qld 4873
Phone: (07) 4099 9462
Fax: (07) 4098 2902
Email: douglas@dsc.qld.gov.au

This facsimile is confidential and may be the subject of legal privilege. It is intended for the named addressee. If you are not the addressee, any use of this facsimile whatsoever or the information contained in it is prohibited. Please let us know immediately if you have received this communication in error so that we can arrange for it to be returned.

MESSAGE: Cooya Beach

Wade

Find out sketch of
existing services and Reservoir Site

Regards
P. Cymbala

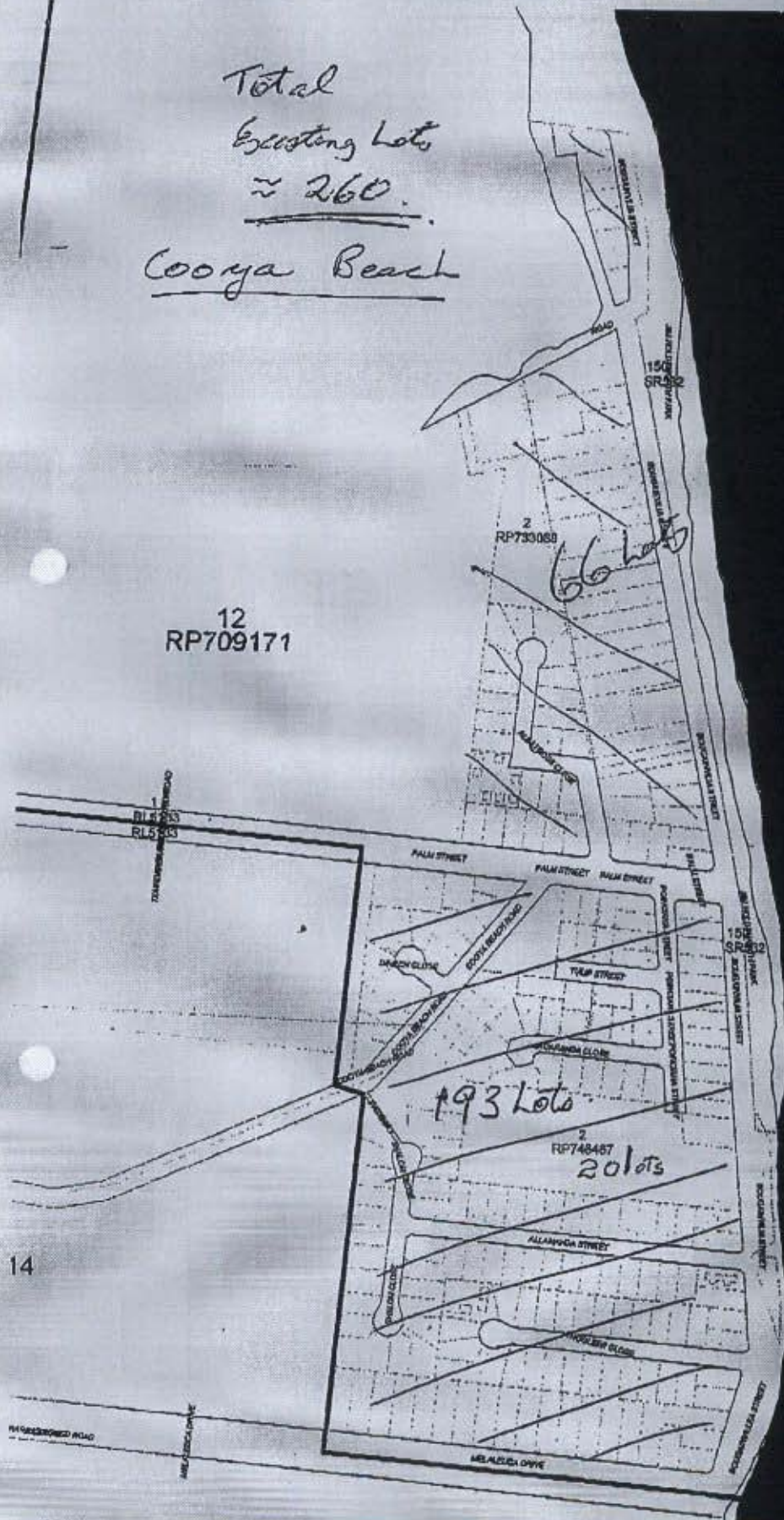
WATCH.

3967
4031

Douglas Shire Council

1

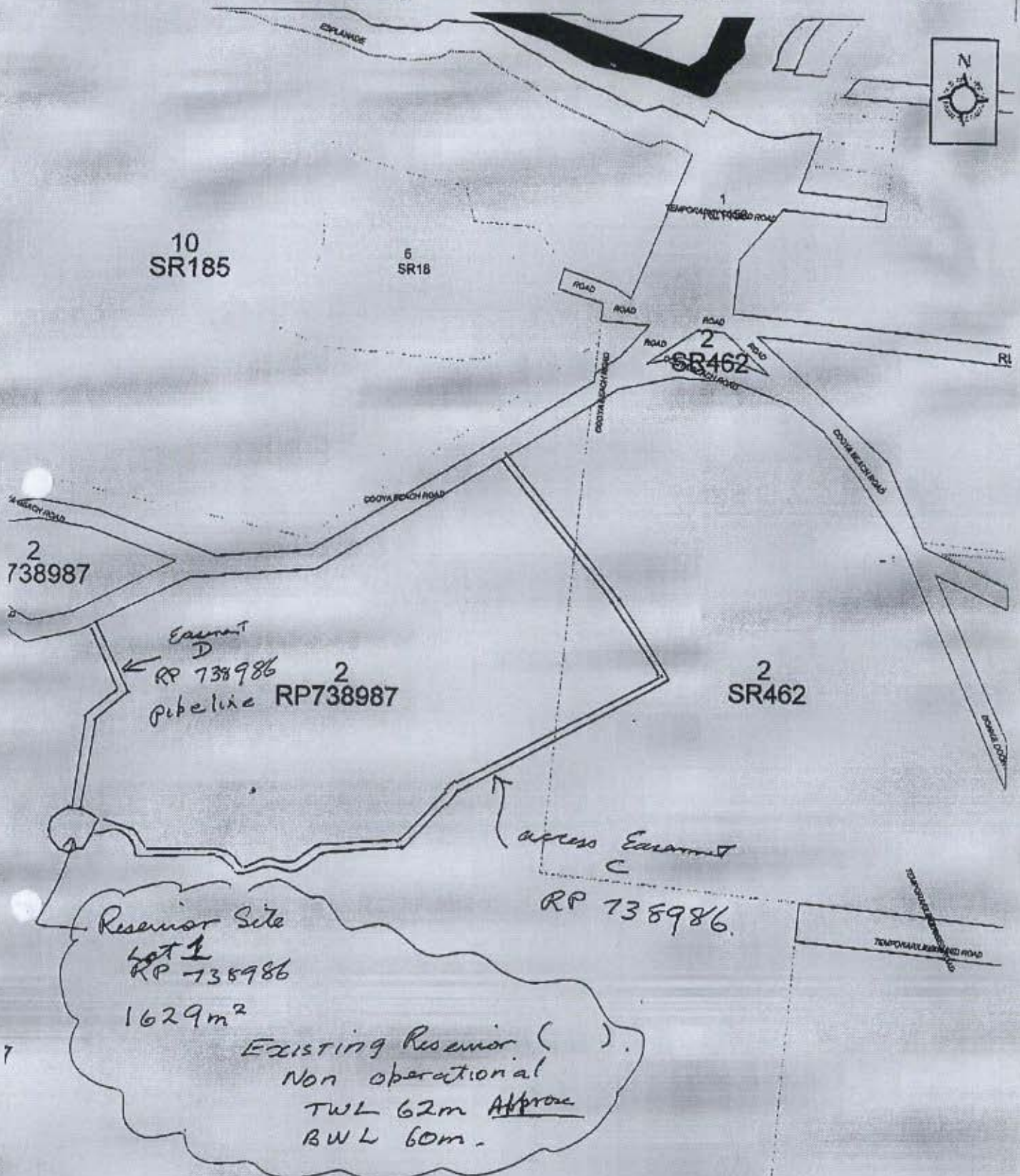
Total
Existing Lots
≈ 260.
Coonya Beach



Scale: 1:5918.507 Date: 14/2/2005

Douglas Shire Council

3



Scale:1:5140.149 Date: 14/2/2005

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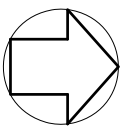
APPENDIX D 2 SEWER RETICULATION MASTER PLAN





amendments	
A ORIGINAL ISSUE FOR OPERATIONAL WORKS APPROVAL	29.04.11
B GENERAL REVISION	10.04.13
C STAGE 5A CONSTRUCTION SHOWN	02.06.14

JIM PAPAS
CIVIL ENGINEERING
DESIGNER PTY. LTD.
CIVIL ENGINEERING DESIGN AND DRAFTING
P.O. Box 2347
Mareeba Q 4880
Mob. 0408 770 394
Email: admin@jpced.com.au



"Ocean Breeze Estate"
PROPOSED RESIDENTIAL SUBDIVISION AT COOYA
BEACH ROAD, COOYA BEACH

SCALE	HOR 1:1500	DRAWN	J.P.
(AT 1/1 SIZE)	VER	DESIGNED	J.P.
DATE	APRIL 2011	CHECKED	J.P.
APPROVED	B. J. SMYTH RFEQ No. 9326		
DWG NUMBER	1187 - QA	SEWER	AMDT C

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APPENDIX D 3 SEWAGE PUMP STATION CALCULATIONS



PUMP STATION DESIGN

JOB No.1187

Date: 19.01.11

PROJECT: Cooya Beach Subdivision Stage 3

Checking capacity of existing sewage pumping station located in Cooya Beach Road

PUMP STATION CATCHMENT

No. of Lots in Proposed Development	288	Lot area varies refer note under.		
No. of Existing Lots in Cooya Beach	280	Lot area varies refer note under.		
Equivalent Population (EP)	1655			
Average Dry Weather Flow (ADWF)	270	litres/person/day (FNQROC Table 7.2)		
Total ADWF	446850	litres per day		
PEAK WET WEATHER FLOW				
PWWF(litres/sec) =	5xADWF over 24 hours			
	25.86	litres/sec.	(Duty Point 2)	
OR				
PWWF(litres/sec) =	C1xADWF over 24 hours			
where $C1=15(EP)^n$	4.63	n =	-0.159	
PWWF =	23.93	litres/sec.	(Duty Point 1)	
PEAK DRY WEATHER				
PDWF(litres/sec) =	C2xADWF over 24 hours			
where $C2=4.7(EP)^n$	2.16	n =	-0.105	
PDWF =	11.16	litres/sec		

Notes:

Number of Lots in proposed development > 900m² = 70

Number of Lots in proposed development < 900m² = 218

EP = (70*3.10) + (218*2.80) = 827.4

Given that the lot numbers are approximately equal, assume the population for the remainder of Cooya beach is the same as the proposed development, therefore the total population is 827.4 * 2 = 1655.

DESIGN INFLOW = PUMP RATE = HIGHEST VALUE = 25.86 ℓ/sec

PUMP STATION DESIGN

No. of Starts per Hour =	10		
(FNQROC Table 7.14 requires less than 10)			
Pump Rate =	= 0.9 x Pump Rate / No. of Starts per Hr m³		
25.86	2.327	m³	
OPERATING RANGE			
Operating Range	= Storage Volume x 1000 / p x r² mm		
Operating Range (in mm) =	560	where r =	1.15
EMERGENCY STORAGE			
Emergency Storage in m³ =	6x ADWF		
	= 111.71	Required	
(Half this storage, 56m³, is a result of the development)			
Depth required in m =	26.89	where r =	1.15
Overflow Level	2.210		
TWL (Pump Start)	-1.000		
Distance	3.21		
Volume in sewers with IL < 2.21	33.91		
Storage Volume Provided	47.25	(Approximately sufficient for this development)	
PUMP STATION DETAILS:			
From FNQROC Std. Dwg. S3024			
A (Top RL)	3.750	Well Dia =	2.300
B (Bottom RL)	-2.450	TWL =	-1.000
C (Subgrade RL)	-2.650	BWL =	-1.550
D (Inlet RL)	-0.790	Actual Operating Range	550
E (Outlet RL)	2.210	Operating Range	560
		(Desirable 1.0 – 2.8m)	

DESIGN OF RISING MAIN

Flow rate (Duty Point 1)	= 25.86ℓ/sec
RL bottom of Pump station (Point B)	= -2.45m
RL at High Point or Outlet of Rising Main	= 13.04m
Length of Rising Main	= 750m
Colebrook White k	= 0.01mm
Velocity	= 1.25m/sec
(Velocity Parameters: Min.= 0.75m/sec, Desirable = 1.5m/sec, Max = 2.5m/sec)	

DIAMETER OF RISING MAIN = 200mm

Rising Main Materials:- Unknown

Total Head Loss = Static head + Friction Losses
15.3+5.93m = 21.23m

PUMP SELECTION

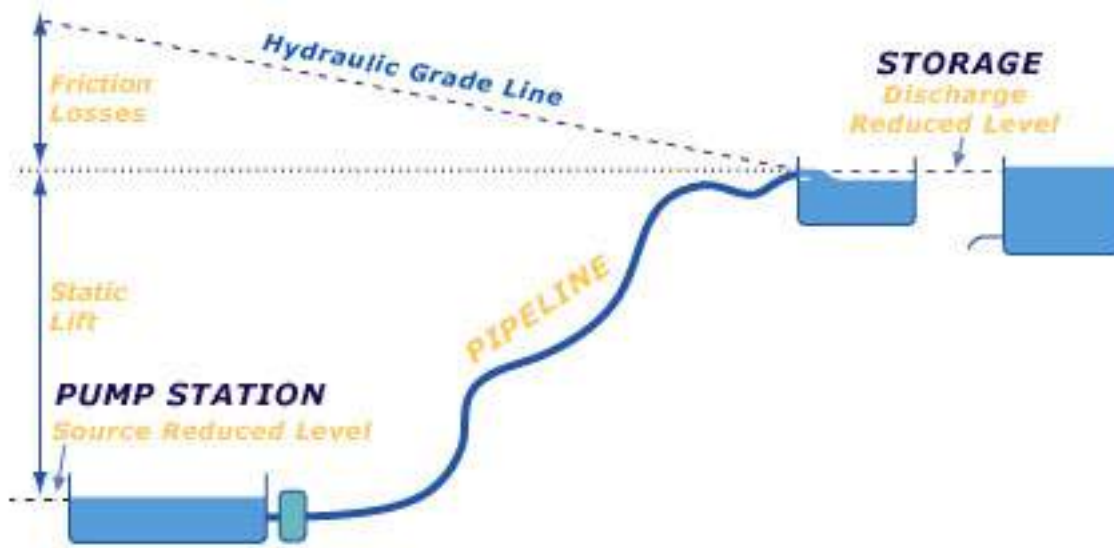
No. of Pumps = 2

PUMP DUTY = 26.00ℓ/sec against 21.20m head.

Existing Pumps:	Flygt NP 3171.181 HT
Pump Rating	22Kg
Pump weight:	Kg

NOTES

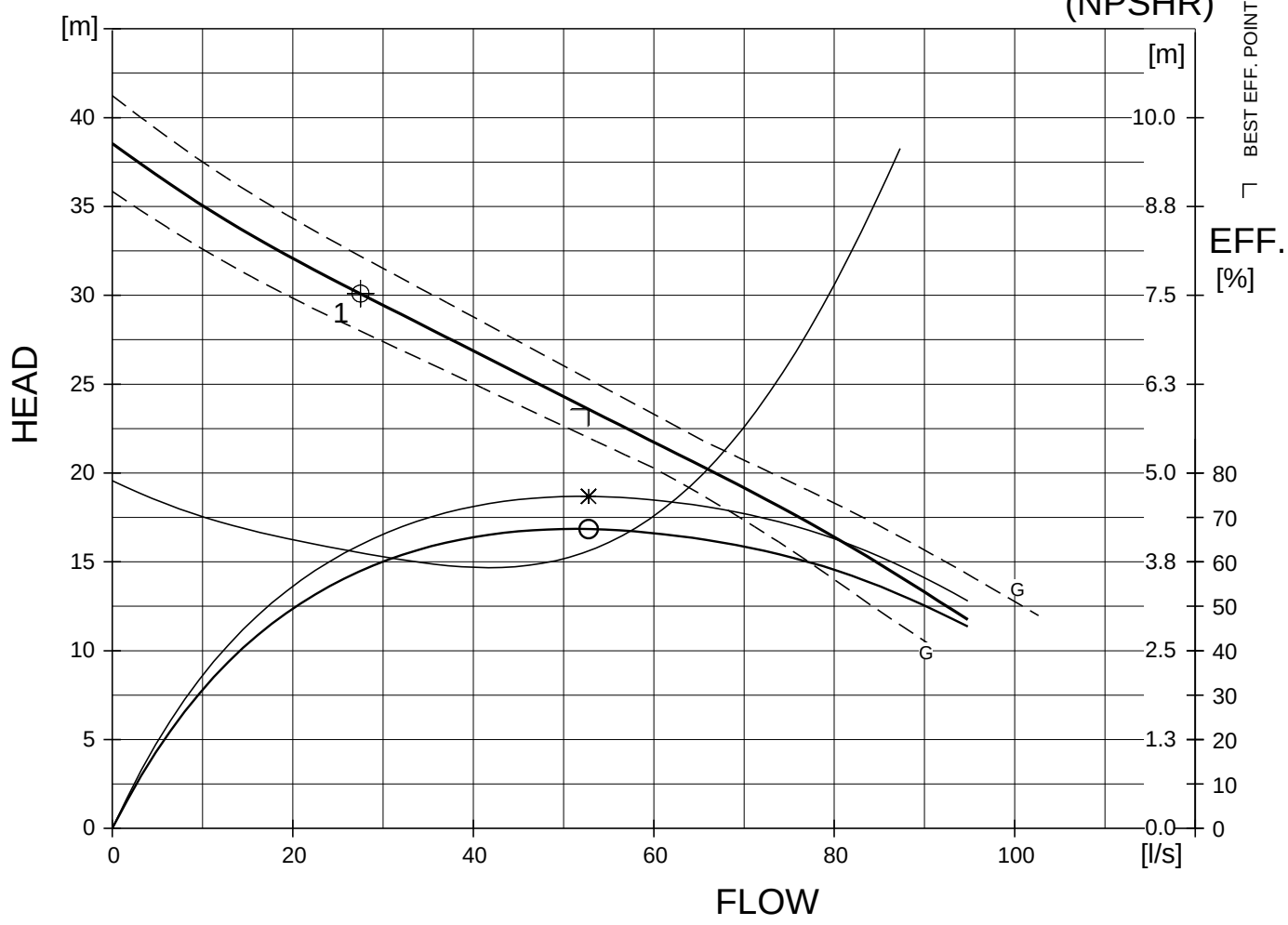
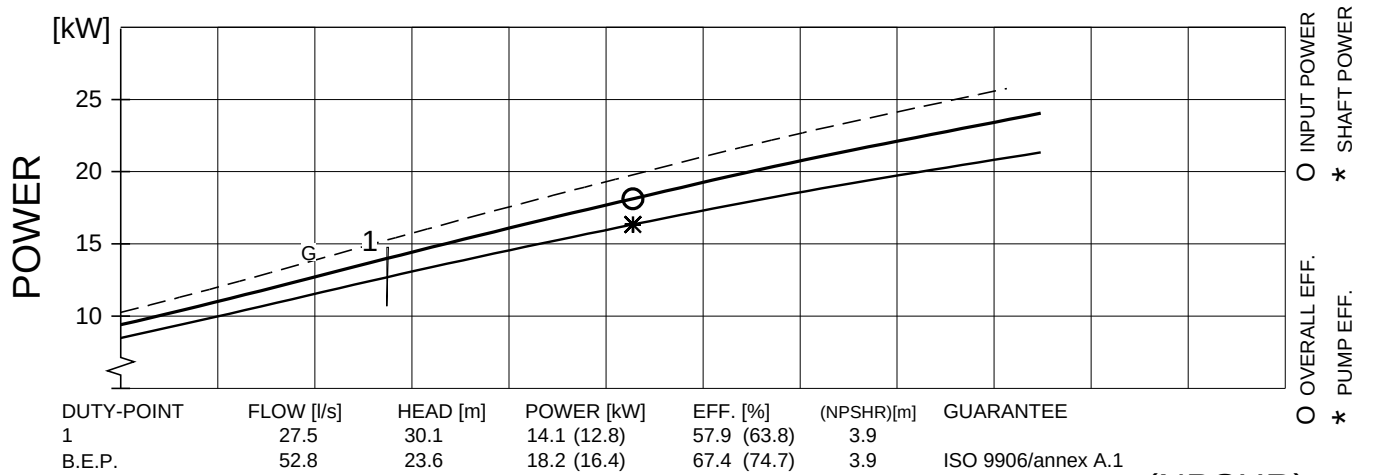
1. Peak Wet Weather Flow (PWWP) includes groundwater inflow, rainfall inflow and infiltration as noted in Table 5.5 Planning Guidelines for Water Supply and Sewerage.



Pipe Type	PE100 AS/NZS 4130 (Poliplex)
Diameter (mm)	200
Pipe Class/Stiffness	16
Length of Pipeline (m)	750
Source Reduced Level (m)	-2.45
Discharge Reduced Level (m)	13.10
Colebrook-White Roughness "k" (mm)	0.01
Kinematic Viscosity of Fluid (m ² /sec) x 10 ⁻⁶	1.01
Required Flow Rate (l/s)	26

Static Lift	15.55 (m)
Friction Losses	5.9350520575564 (m)
Total Head at Pump	21.485052057556 (m)
Flow Velocity	1.2536512440469 (m/s)

		PERFORMANCE CURVE				PRODUCT NP3171.181		TYPE HT						
DATE 2006-09-29		PROJECT Cooya Beach Revised Duty				CURVE NO 53-452-00-6050			ISSUE 1					
POWER FACTOR EFFICIENCY MOTOR DATA	1/1-LOAD 0.89 88.0 %		3/4-LOAD 0.85 89.5 %		1/2-LOAD 0.77 90.5 %		RATED POWER 22 kW STARTING CURRENT ... 232 A RATED CURRENT ... 39 A					IMPELLER DIAMETER 303 mm		
	COMMENTS		INLET/OUTLET -/100 mm		RATED SPEED 1455 rpm TOT.MOM.OF INERTIA ... 0.19 kgm2 NO. OF BLADES 2		MOTOR # 25-19-4AA		STATOR 05D		REV 10			
			IMP. THROUGHLET ---				FREQ. 50 Hz	PHASES 3	VOLTAGE 415 V		POLES 4			
						GEARTYPE ---		RATIO ---						

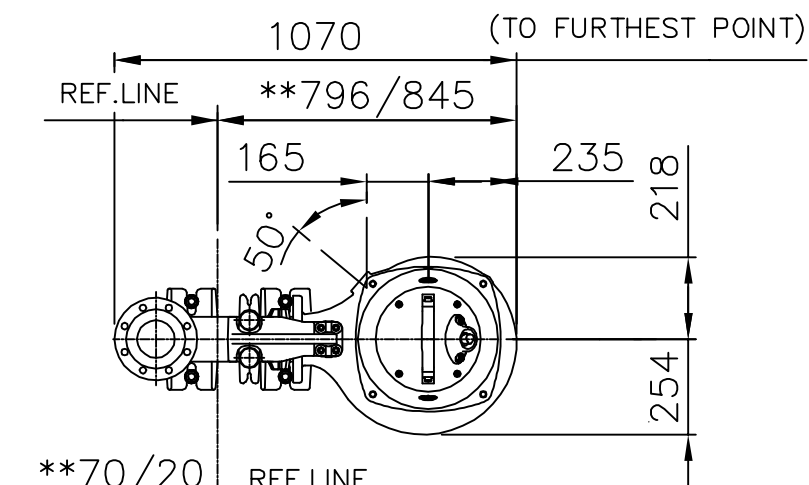
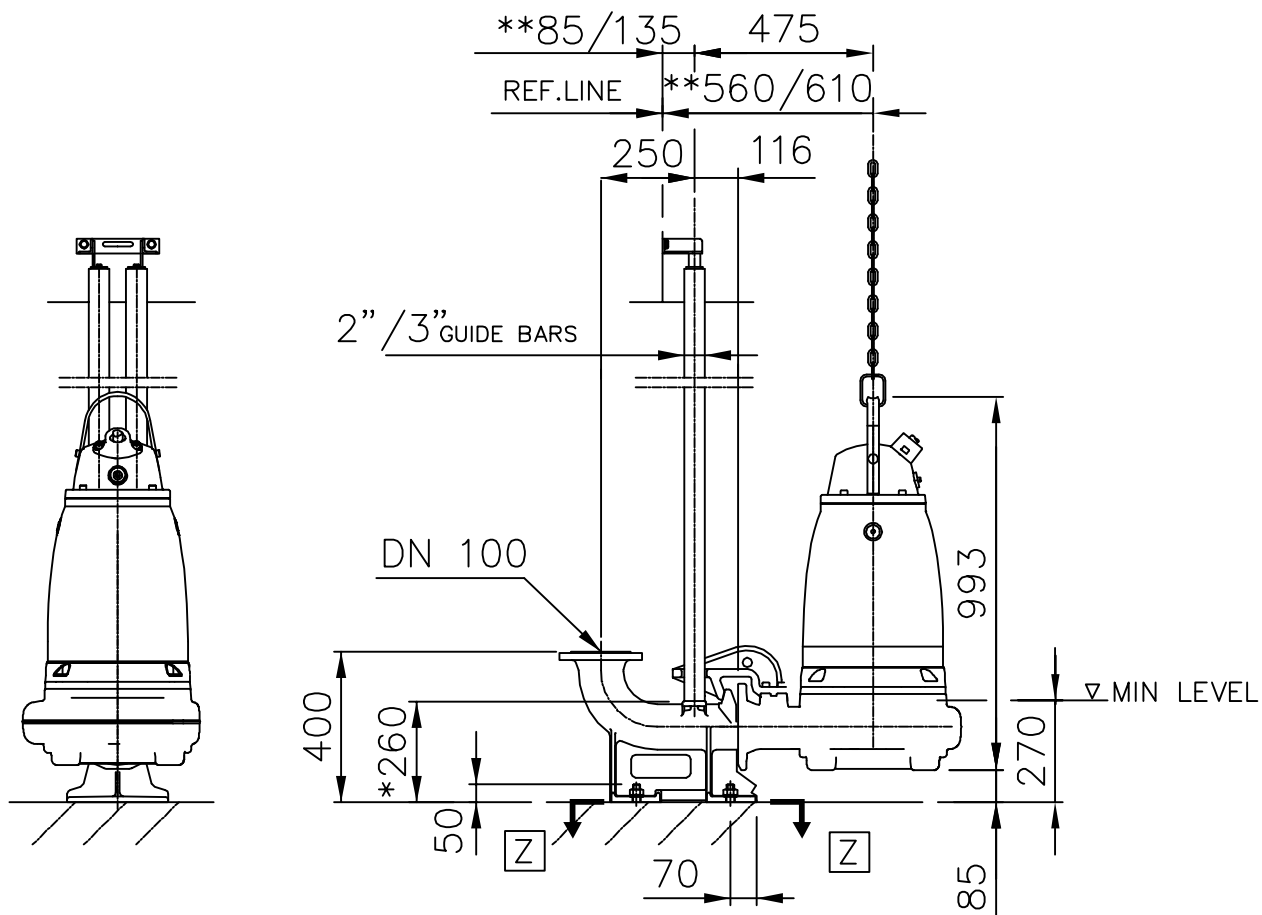


(NPSHR) = (NPSH3) + margins

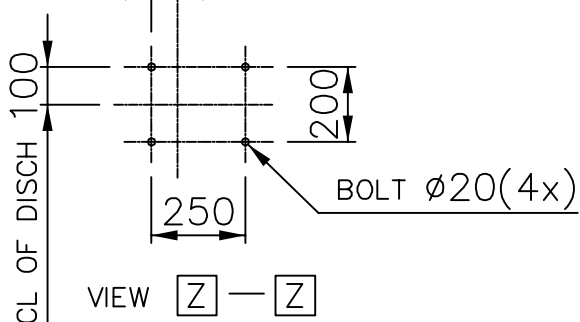
Performance with clear water and ambient temp 40 °C

GUARANTEE BETWEEN LIMITS (G) ACC. TO
ISO 9906/annex A.1

FLYPS3.1.5.5 (20060324)



2" guidebars for a new installation
 3" guidebars for retrofit
 * DIMENSION TO ENDS OF GUIDE BARS
 ** DIM. FOR 2"/3" GUIDE BARS



Weight (kg)

Pump with cooling jacket	Disch
297	42
Pump without cooling jacket	
268	

FLIGHT
 AUTOCAD
 DRAWING

Denomination
 Dimensional drwg
 NP 3171 HT
 DN 100

Drawn by KA	Checked by SB	Date 060110
Scale 1:20	Reg no 5399	
6599600		6

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APPENDIX E

Potential Acid Sulphate Soil Investigation

JPCED





C&B GROUP

- Project Management
- Planning
- Environmental Services
- Surveying

Potential Acid Sulfate Soil Investigation

Lot 1 on RP720316 & Lots 2 & 3 on SR614 Cooya Beach

Salson Pty Ltd

Date: October 2003
Ref: 8021 (R43337)

CAIRNS

1st Floor, Florence House, 26 Florence Street, Cairns Queensland 4870
PO Box 1949, Cairns Queensland 4870

Telephone: (07) 4031 1336 Facsimile: (07) 4031 2942
E-Mail Address: calrns@cbgroup.com.au



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AS/NZS ISO 9001

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FIGURES

- Figure 1** C&B Group Plan 8021-4 Location and Layout of the Proposed Residential Development including Test Pit locations
- Figure 2** C&B Group Plan 8021-5 Elevation, Drainage and areas requiring fill
- Figure 3** C&B Group Plan 8021-9 Soils on Lot 1 RP 720316 and Lots 2 & 3 on SR614

ANNEXURES

- Annexure 1** PASS/ASS Investigation Summary Results
- Annexure 2** Laboratory Report



1.0 INTRODUCTION

C&B Consulting Group was commissioned by Salson Pty Ltd. to conduct an assessment of the presence and location of Potential Acid Sulphate Soils (PASS) in the area including Lot 1 RP720316 and Lots 2 & 3 on SR614 Cooya Beach. The site has been proposed for a 270 lot residential estate. The following report provides supporting information in the form of a baseline survey and an assessment of risk from earthworks during site construction.

During field investigations, PASS was identified at approximately 0.0 metres AHD. The development constraints that PASS poses to the proposed development and management options are identified in this report.

2.0 SITE DESCRIPTION

Bonnie Doon Road in the West and Melaleuca Drive in the south bound the subject lot 1 on RP 720316 and Lots 2 & 3 on SR614 (Refer **Figure 1**). Cooya Beach Road bisects the subject lots 2 on SR614 and Lot 3 on SR614 and extends in a roughly west to east direction providing access to the community of Cooya Beach. The eastern boundaries of Lot 1 on RP720316 and Lot 2 & 3 on SR614 are located directly adjacent to residential housing.

The highest point of the subject lands (8 metres AHD) is located towards the western corners of both Lots 2 & 3 on SR614 (Refer **Figure 2**). From this point, land recedes gently towards the east and northeast, intersecting a shallow drain towards the central areas of Lot 1 on RP 720316 and Lot 2 on SR614. Elevated lands in the west (3 to 8 metres AHD) are proposed for residential housing, with areas below 3 metres in the central and eastern sections being maintained for a park and mangrove regeneration.

From the corner of Bonnie Doon Road and Melaleuca Drive in the south west of Lot 3 on SR614, land recedes gently towards the east intersecting shallow drain between existing and proposed residential housing.

Drainage relief from Lot 1 on RP 720316 and Lot 2 on SR614 is provided by a shallow easterly flowing drain in the north and east (Refer **Figure 2**). Drainage from Lot 3 on SR614 flows into a shallow northerly flowing drain along the eastern boundary. Both drains flow into the Mossman River estuary. Vegetation on all three allotments has been extensively cleared for sugar cane production. Vegetation remains in the riparian zone along the easterly flowing drain in Lot 1 on RP720316 and Lot 2 on SR614. Vegetation in this riparian zone will be retained as part of the proposed park and mangrove regeneration areas.

3.0 NATURE OF DISTURBANCE

3.1 EXCAVATION OF FILL MATERIAL

It is intended that fill for low-lying areas be sourced on-site from the high area (7 to 8 metres AHD) in the west near the existing shed (Refer **Figure 2**). All fill will be sourced from above 5 metres AHD and therefore does not trigger the SPP 2/02 Planning and Managing Development involving Acid Sulfate Soils.

Proposed fill material was sampled at three sites including waypoint 6, 8 and 15 (Refer **Figures 1 & 2**). Fill material sampled at these sites generally consists of organic sandy loams underlain by red and yellow clayey sands. PASS was not detected in these more elevated areas however the re-activity of some soils during field-testing indicated the presence of manganese.

3.2 FILLING ACTIVITIES

Disturbances associated with the proposed development include filling of selected low lying lands to 3.2 metres AHD, being the minimum site level required by Douglas Shire Council. Areas to be filled are included as the hatched areas on **Figure 2**. Areas requiring fill are also included in the Flanagan Consulting Group Report 1329/01 Engineering Issues, Material Change of Use and Reconfiguration Lot 1 on RP720316 and Lots 2 and 3 on SR614 Cooya Beach, **Figure 2**.

The three areas requiring fill include:

1. The NE corner of Lot 3 on SR614

This 1.9-Hectare area including Lots 1 through to 6 (Refer **Figure 1 & 2**) is bounded by a shallow drain in the East. Elevation of land to be filled ranges from 2 to 3.2 metres with an average fill depth of 0.8 metres (approx). Fill volume will exceed 500m³ and 0.5 metre depth thereby triggering the State Planning Policy 2/02 Planning and Managing Development involving Acid Sulfate soils, Section 3.6.

Test pits excavated in this area include waypoint 9, 10 and 13 (Refer **Figure 2**). No actionable PASS was encountered at any of these three test pits however low levels of reduced sulfur species were encountered towards the base of waypoint 10 and 13. Non-actionable material was encountered below 1 metre AHD with a gentle increase in re-activity with increasing depth.

Below 0.45 metres AHD a sulfurous odour was identifiable however this is believed to be a gradual transition into the PASS layer identified elsewhere at 0 metres AHD. Using a conservative approach, actionable PASS may occur below 0.45 metres AHD.

Fill depth along the drain will approach 1.2 metres however the risk of any de-watering or hydraulic movement of PASS material into the shallow drain is negligible due to:

- Deposition of fill will not de-water underlying coarse sands as coarse sand does not pack tightly. Loosely packed coarse sand allows almost unimpeded groundwater movement.
- Coarse Sand does not undergo subsoil displacement. Subsoil displacement is usually associated with heavy wet marine clays. Any PASS occurring below 0.4 metres AHD would have to be forced in excess of 1 metre (vertically) in order to intercept the shallow drain.

Due to the coarse texture of sands and sandy clays adjacent to the drain, it would be advisable to stabilise the western drainage embankment. Sands and sandy clays exposed in the drain batters are predominantly unconsolidated and could erode causing erosion issues on site and sedimentation problems in the culvert under Cooya Beach Road.

2. The NW corner of Lot 1 on RP720316

This 0.3-Hectare area includes Lots 237 to 243 and Lots 248 to 250 (Refer **(Figure 1 & 2)** and is bisected by a shallow NE flowing drain. Elevation of land to be filled ranges from 2.25 to 3.2 metres AHD with an average fill depth of 0.6 metres (approx). Fill volume will exceed 500 m³ and 0.5 metres depth thereby triggering the State Planning Policy 2/02 Planning and Managing Development involving Acid Sulfate Soils, Section 3.6.

The test pit at waypoint 18 is representative of soils in the NW corner of Lot 1 on RP720316. Testing of soils from WP 18 suggests that non-actionable quantities of reduced sulfide species occur below 0.5 metres AHD with actionable PASS likely to occur below 0 metres AHD. Using the most conservative approach, actionable PASS may occur below 0.5 metres AHD.

3. The Northern Central area of Lot 1 on RP720316

This 0.82-Hectare area includes Lots 226 to 228 (Refer **Figure 1 & 2**). Elevation of land to be filled ranges between 2 to 3.2 metres AHD with an average fill depth of 0.6 metres (approx). Fill volume will exceed 500 m³ and 0.5 metres depth thereby triggering the State Planning Policy 2/02 Planning and Managing Development involving Acid sulfate Soils, Section 3.6.

Test pits excavated in this area include waypoint 17 and 19. No PASS was encountered in the test pit at WP17, which reached a maximum depth of 0.75 metres AHD. Marginally actionable PASS material was encountered below 0 metres AHD at WP19 however these lands are to become part of the proposed parkland area (Refer **Figure 1**).

3.3 SEWERAGE AND WATER INFRASTRUCTURE

As the residential development will require water supply and sewerage services, excavation will be required to facilitate installation. It is anticipated that the deepest excavation would be in the order of 2.5 m below filled ground level (maximum depth 0.7 metres AHD) and be associated with the sewerage service. Excavation volume will exceed 100 m³ at or below 5 metres AHD thereby triggering the State Planning Policy 2/02 Planning and Managing Development involving Acid Sulfate Soils, Section 3.6.

4.0 SOIL DESCRIPTION

Soil mapping (Murtha, 1989), (Refer **Figure 3**), indicates that soil comprises;

Br (Brosnan) Dark Grey Sandy loam A1; yellowish red or red sandy loam to sandy clay loam massive B horizon

Mm (Mossman) Dark grey brown medium clay Ap to 30 cm; olive brown or brownish yellow, moderate to strong fine blocky structured medium clay B horizon.

Surface soils in the more elevated lands on Brosnan soil type (waypoints 6, 8, 9, and 15) typically comprised dark organic sandy loams underlain by well-drained red and yellow clayey sands respectively. In low-lying areas represented by waypoints 10, 13, 16, 17 and 19, surface soil comprised dark organic sandy loams underlain by grey coarse sands and sandy clays:

The Mossman soil type represented by waypoint 18 consisted of brown clays surface soils underlain by sandy grey clays and grey sand respectively.

5.0 FIELD INVESTIGATIONS

Field investigations, excluding sampling intensity were undertaken in accordance with the Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils (ASS) in Queensland 1998 (QASSIT Guidelines).

The investigation involved the excavation of 10 test pits over the 41.202 Hectare site. Whilst up to 84 test pits are recommended for a site up to 41 Hectares, this number was reduced due to the following;

- The majority of subject lands will not require any filling and therefore will not trigger the SPP 2/02. Over the 41.2 Hectare site, approximately 3.04 Hectares will require some filling (Refer **Figure 2**)
- Test pits were strategically located to provide good coverage across the areas proposed for the location of fill. Locating test pits in low-lying areas increased the likelihood of locating PASS (Refer **Figure 2**).
- Excavations associated with the proposed development will only be shallow (associated with the provision of drainage and sewerage infrastructure) and are considered to be of low risk.
- Soil strata appeared to be relatively uniform across the site. PASS encountered appeared to be weak and closely associated with the permanent groundwater level around RL = 0 metres AHD.

Field works involved test pitting with a backhoe and sampling of each soil horizon or every 0.25 m interval to depth of approximately 2 m below ground level.

The test pits allowed good opportunity for observation and sampling of soil horizons. Samples were immediately placed in sealable High-Density Poly-Ethylene (HDPE) plastic bags, air excluded and then sealed. Samples were placed on ice after the excavation of each test pit.

Soil colour and texture descriptions were recorded for each soil horizon and are presented in **Annexure 1**.

Field acid sulphate soil tests were then carried out on the soil samples. Field tests involve the determination of field pH (pH_f) using a pH meter and distilled water, followed by oxidation of the soil sample with pH buffered 30% hydrogen peroxide and determination of the field oxidation pH (pH_{FOX}).

The pH_F and pH_{FOX} values were recorded in addition to the strength of the observed reaction of the sample with hydrogen peroxide.

Interpreted correctly, field tests can indicate the possible presence of acid sulphate soil and can be used to assist in the selection of samples submitted for laboratory determination. It is noted that while field tests indicate the likely presence of a potential acid sulphate soil, they do not replace laboratory techniques, which confirm the presence or quantify the risk of a PASS. Refer to Section 7.1.2 for laboratory analysis. Complete soil descriptions for each test pit are presented in **Annexure 1**.

5.1 GROUND WATER QUALITY

Ground water levels were determined during the field test pitting exercise by observation of the level where ground water was observed to be flowing freely into the pit. Ground waters at waypoints 10, 13, 16, 18 and 19 were measured for pH, Electrical Conductivity and Salinity.

Location	PH	EC	Salinity
WP10	5.29	100.3 uS	46.8 ppm
WP13	5.36	141 uS	67.3 ppm
WP16 (Brackish)	5.19	227.9 uS	108 ppm
WP18	5.14	149.6 uS	71 ppm
WP19 (Saline)	5.38	15.85mS	9.30ppK

6.0 SAMPLE AND LABORATORY INTEGRITY

Soil samples were collected and recorded by a suitably qualified and experienced environmental scientist.

Samples were presented to the laboratory in a chilled state and in good condition within sample holding times.

Samples submitted for laboratory determination were analysed for Action criteria using a Combination of TAA (Total Actual Acidity) and Scr (Chromium Reducible Sulfur) method. One sample was analysed for manganese.

Laboratory determinations were carried out by NATA Registered laboratory (Australian Environmental Laboratories, Cairns).

The portable field meter used to determine soil and water pH and electrical conductivity was calibrated prior to and after use.

7.0 RESULTS

7.1 DELINEATION OF THE PASS HORIZON

7.1.1 Field Testing

Field-testing was used to determine if PASS occurs on lands defined as Lot 1 on RP720316 and Lots 2 & 3 on SR614. Field-testing suggests that PASS occurs below 0 metres (AHD) and may occur below 0.5 metres AHD (Refer **Annexure 1**). After field testing, twelve soil samples were selected for laboratory analysis. Samples were taken from the depth considered to represent the NON-PASS/PASS boundary so that a maximum cut depth for sewerage infrastructure might be determined.

7.1.2 Lab Analysis

PASS action criteria, as presented in the QASSIT Guidelines, for three broad soil texture categories are provided in Table 1. The action criteria have been prepared with consideration of the texture of coarse, medium and fine textured soils which each have variable buffering capacity against acidity.

Table 1 – ASS Action Criteria (For 3 Broad Texture Classes)

Type of Material		Action Criteria			
Texture Range	Approx. clay content (%)	1 – 1000 t disturbed		> 1000 t disturbed	
		Sulfur trail % S	Acid trail mol H ⁺ / t	Sulfur trail % S	Acid trail mol H ⁺ / t
Coarse Texture	≤5	0.03	18	0.03	18
Medium Texture Sandy loams to light clays	5 – 40	0.06	36	0.03	18
Fine Texture Medium to heavy clays	≥ 40	0.1	62	0.03	18

Sulfur Trail (% S) is determined by dividing the TAA (Total Actual Acidity) by a conversion factor of 30.59 and adding the result to the Scr (Chromium Reducible Sulfur).

$$\%S = (TAA/30.59) + Scr$$

Note that the laboratory analysis results for TAA (Total Actual Acidity) are expressed with a limit of reporting of 0.5 kg H₂SO₄/t (dry weight). When the TAA is <0.5, 0.5 is used to allow margin or a "worst case" figure. The TAA for all laboratory samples was less than 0.5 kg H₂SO₄/tonne (dry weight).

Laboratory testing confirmed that the PASS/NON-PASS boundary was successfully identified at 0.0 metres AHD with some residual low-level sulfidic material detected between 0.5 and 0 metres AHD (Refer **Annexure 1**). Residual sulfidic material above 0.0 metres AHD suggests that the water table is transitional, usually residing above 0.5 metres AHD with permanent water below 0 metres AHD.

7.2 LIMING RATE FOR THE STRONGEST PASS SOIL ENCOUNTERED

From laboratory analysis of PASS found on the site, the strongest PASS was used to formulate an interim-liming rate. In the event that PASS is exposed during excavations this liming rate can be used to treat soils until proper laboratory results for the exposed PASS become available.

$$\text{Liming Rate} = \%S * \text{Conversion to H}_2\text{SO}_4 * \text{conversion to CaCO}_3 * 1.5 \\ (\text{Safety Factor})$$

$$= 0.016634 * 30.52 * 1.02 * 1.5 \\ = \mathbf{7.768 \text{ Kg CaCO}_3/\text{tonne}}$$

$$\text{Conversion to Kg CaCO}_3/\text{m}^3 \text{ (Approximate Specific Gravity of wet sand is } 1.92 \text{ tonnes/m}^3\text{)}$$

$$= 7.768 * 1.92 \\ = \mathbf{14.914 \text{ Kg CaCO}_3/\text{m}^3}$$

7.3 ACTUAL ACID SULFATE SOILS

The pH_F field test results indicate that the soils in their natural state are acidic with pH ranging from pH 4.40 to 6.44 (Refer **Annexure 1**). Acidic soils are commonly encountered in north Queensland where soils are strongly weathered and in locations where soils have previously underlain freshwater swamps rich in organic matter.

Total Actual Acidity (TAA) values were not within detection limits indicating that while some of the soils are mildly acidic, they are not AASS (Actual Acid Sulphate Soil). Interpolation of laboratory and field assessments indicates the absence of ASS soils (Refer **Annexure 2**).

8.0 ENVIRONMENTAL MANAGEMENT PLAN

Objective/Target

To ensure that during construction/excavation, potential acid sulfate soils are not disturbed, however if they are disturbed, to undertake the necessary mitigation measures to neutralise the soil and prevent any runoff of acidic waters.

Tasks/Actions

- An acid sulfate soil investigation of the site (C&B Group, September 2003) indicates potential acid sulfate soils (PASS) may occur below 0.5 metres AHD. The investigation was confined to a maximum excavation depth of -0.4 metres AHD. Any proposed excavation works below -0.4 metres AHD shall be subject to further investigation prior to commencement of works.
- In the event that soils with PASS or ASS characteristics are disturbed and remain exposed to the atmosphere, the area shall be treated with up to 15 kg / m³ (to be confirmed through laboratory analysis) fine agricultural lime. This figure was calculated from the highest %S found in the test pit at waypoint 16 between -0.22 to -0.4 m AHD. The calculations are in accordance with the Queensland Acid Sulfate Technical Manual Soil Management Guidelines (version 3.8)
- Prevent any lowering of the permanent groundwater table height that may be caused by the proposed activity. If groundwater table height is expected to be lowered by activities such as temporary dewatering, implement groundwater monitoring. As a minimum pH, EC and the chloride and sulfate concentration should be monitored for each aquifer. This activity should be continued should the pH drop by greater than 1 pH unit, or EC increase by 10 % or more.

- Any suspected PASS material disturbed shall be stockpiled separately and tested using pH field oxidation tests and laboratory analysis to confirm if the soil is PASS. Bunding, diversion drains, and contaminated water treatment impoundments shall be used to contain run off from the storage area.
- Prior to release, impounded stormwater from the bunded area will be monitored to ensure acceptable turbidity and pH concentrations (Total suspended solids (TSS) 50mg/L and pH 6.0-8.5)
- As an alternative to liming treatment, PASS may be buried below the water table. However, AASS (Actual Acid Sulfate Soil) will require neutralisation prior to burial under the water table.
- Minimise the depth in essential drainage structures. Manage drainage to maintain the watertable surrounding drainage structures above any sulfidic layer (ie above 0.5 metres AHD) in the soil (eg. Shallow grassed drains)
- In the event that an alternative procedure to neutralisation by lime is to be undertaken, the efficiency of the techniques shall be trialed using material from the site. If the techniques are found to be suitable, the use shall be approved in writing by the EPA and DNRM prior to commencement of construction.
- Removal of any neutralised PASS material offsite shall be approved by the Douglas Shire Council, Environmental Protection Agency and or the Department of Natural Resources and Mines.
- Earthwork contractors (if required) shall be briefed in relation to the identification and potential environmental risks associated with PASS.

Performance Indicators

The pH of any off site discharge or runoff from any excavations below 0.5 metres AHD or stockpiled PASS shall be within QASSIT guidelines (6.0-8.5 pH units) or above background surface water pH.

Monitoring

Visual monitoring should be undertaken to identify signs of ASS oxidation, including:

- Rust coloured deposits on plants and on banks of drains, water bodies and watercourses indicating iron precipitates;
- Areas of green-blue water or extremely clear water indicating high concentrations of dissolved metals in solution;
- Sulfurous smells (eg. Mangrove Mud Smell);
- Formation of the mineral jarosite and other acidic salts in exposed or excavated soils;
- Black or odorous waters indicating de-oxygenation;
- Unexplained scalding, degradation or death of vegetation;
- Unexplained death or disease in aquatic organisms;
- A transition to, or establishment of, a community dominated by acid tolerant species;
- Invasion of a community or area by acid tolerant species;
- Corrosion of concrete and/or steel structures in contact with soil or water;
- Monitoring the pH of soil and runoff, to be undertaken as required.

Responsible Person/Organisation

The earthwork contractor shall be responsible for the appointment of suitably qualified personnel to undertake PASS testing of any suspicious soils and routine monitoring of site runoff and stockpiles.

Corrective Action

In the event that monitoring indicates the presence of PASS or acidic runoff, application of agricultural or hydrated lime (water) at rates appropriate to neutralise acidic soils or runoff shall be immediately undertaken.

Reporting/Review

A review of the PASS management plan to be undertaken following any exceedance of performance criteria.

9.0 CONCLUSION

9.1 FILLING ACTIVITIES

From the analysis of field and laboratory results, filling activities described in Section 3.2 and **Figure 2** are not considered to pose any foreseeable risk in relation to the exposure and/or disturbance of potential acid sulfate soils.

Due to the porous nature and low compaction of sandy Brosnan Soils, compaction related de-watering is highly unlikely. Filling on Mossman soils will be light (around 0.6 metres depth) and it is unlikely that the deep PASS layer could hydraulically penetrate the shallow drain. Actual Acid Sulfate Soils were not encountered during laboratory analysis and therefore any acidity released from soils being moved beneath the water table is considered to be negligible.

9.2 CUTTING ACTIVITIES

The design plan for sewerage system installation is available in the Flanagan Consulting Group Report 1329/01 Engineering Issues, Material Change of Use and Reconfiguration Lot 1 on RP720316 and Lots 2 and 3 on SR614 Cooya Beach, **Figure 6**.

Depth of sewerage system infrastructure generally ranges from 1 to 2.5 metres below ground surface level. From the required minimum ground surface level of 3.2 metres AHD, sewerage pipes would lie between 2.2 and 0.7 metres AHD. Therefore trenches cut for the emplacement of sewerage infrastructure will be above the weak marginally actionable layer at 0.5 metres AHD and are highly unlikely to disturb PASS below 0 metres AHD.

To avoid PASS disturbance, it would be considered prudent that any disturbances or excavations below 0.5 metres AHD should be subject to further on-site testing and performance criteria set out in the Environmental Management Plan (Refer Section 8.0).

10.0 REFERENCES

State Planning Policy Guideline, 2/02, Planning and Managing Development involving Acid Sulfate Soils V2, Queensland Government.

Queensland Acid Sulphate Soils Investigation Team (1998) Guidelines for Sampling and Analysis of Lowland Acid Sulphate Soils (ASS) in Queensland 1998 (October 1998, Revision 4.0), Department of Natural Resources, Brisbane.

Instructions for the Treatment and management of Acid Sulfate Soils (2001) (version 1.0) Produced by the Environmental Protection Agency in consultation with the Department of Natural Resources and Mines and the Department of Primary Industries.

Dear SE, Moore NG, Dobos SK, Watling KM, Ahern CR (2002) Queensland Acid Sulfate Soil Technical Manual, Soil Management Guidelines (version 3.8) Department of Natural Resources and Mines, Brisbane.

Murtha, G. G. (1989) Soils of the Mossman Cape Tribulation Area, North Queensland. CSIRO.

Figure 1

C&B Group Plan 8021-4 Location and Layout
of the Proposed Residential Development including Test Pit
locations

Note : Borehole Locations were taken with a hand held GPS unit and may be subject to errors up to 5 metres



Figure 2

C&B Group Plan 8021-5 Elevation, Drainage
and areas requiring fill

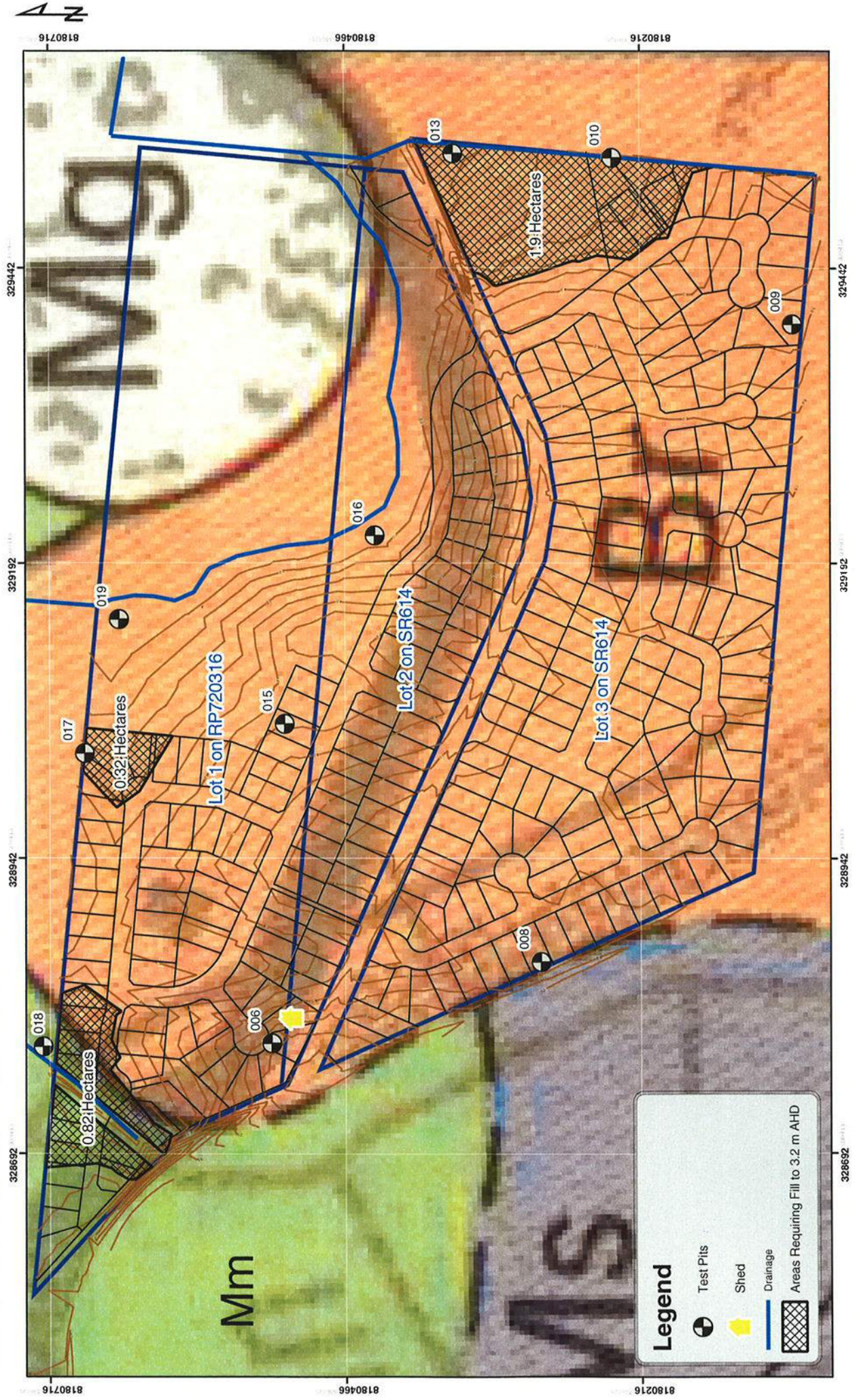
Elevation (AHD) over Lot 1 on RP720316 and Lots 2 & 3 on SR614



Figure 3

C&B Group Plan 8021-9 Soils on Lot 1 RP
720316 and Lots 2 & 3 on SR614

Soils on Lot 1 on RP720316 and Lots 2 & 3 on SR614



Annexure 1

PASS/ASS Investigation Summary Results

Annexure 1													
Test Site	Depth Below G.S. (m)	SL (ASOS) (m)	Description	SLF	SLF ₁₀₀	SLF ₂₀₀	SLF ₃₀₀	Manganese (mg/kg)	SLF (ppm) (m.wt)	SLF (m.wt)	FAA (mg/kg) (m.wt)	FAA (m.wt)	FAA (m.wt)
009	Ground Surface	0	7.25	Grey Brown Organic Sandy Loam	5.73	5.52	0.71	L					
		0.3	5.86	Reddy Brown Clayey Fine Sand	5.77	4.7	1.07	VL					Organic Reaction
		0.61	5.74	Reddy Brown Clayey Fine Sand	5.59	5.05	0.51	-					Organic Reaction
		1	5.25	Reddy Brown Clayey Fine Sand	5.75	4.45	1.29	-					
		1.6	5.75	Reddy Brown Clayey Fine Sand	5.55	4.75	0.8	-					
		2	5.25	Yellow Fine Med Sand (light orange mottles)	5.15	4.35	0.77	-					
PI Base													
009	Ground Surface	0	5.25	Light Brown Pebbly Clay (shaly important)	5.64	5.47	1.25	L					
		0.22	5.52	Chocolate Brown Organic Sandy Loam	4.25	4.25	0.49	M					
		0.4	5.85	Brown Loamy Sand	5.21	4.25	0.99	L					
		0.62	5.73	Brown Red Clayey Pebbly Sand	4.29	4.45	0.84	M					
		0.8	5.45	Brown Red Clayey Pebbly Sand	4.4	4.75	0.33	M					
		1.2	5.55	Brown Red Clayey Pebbly Sand (poorly sorted)	5.25	5.45	0.23	M					
		1.6	4.75	Reddy Yellow Clayey Sand (poorly sorted)	4.87	5.52	0.85	M					
		2	4.25	Yellow Clayey Sand (dark mineral aggregate ~20% manganese?)	5.41	5.35	0.35	H					Reaction with Manganese
		2.3	5.35										
	PI Base												
009	Ground Surface	0	4.75	Dark Organic Sandy Loam	4.75	4.57	0.22	-					
		0.49	4.25	Light Grey Loamy Sand (poorly sorted)	4.54	4.51	0.03	-					
		0.7	4.05	White Grey Loamy Sand (poorly sorted)	4.59	4.45	0.14	-					
		0.89	3.85	Yellow Orange Clayey Sand (poorly sorted)	4.59	4.51	0.28	-					
		1.2	3.45	Yellow Orange Clayey Sand (poorly sorted)	4.81	4.57	0.44	-					
		1.6	3.15	Yellow Clayey Sand (minor orange mottles)	5.04	5.57	0.53	H	59	<0.05	<0.5	0.01040211	Manganese Nodules Found
		2	2.75	Light Grey Coarse Sand (heavy red mottles)									
	PI Base												
009	Ground Surface	0	2	Dark Grey Black Silty Sand	4.52	3.73	1.09	-					
		0.35	1.85	Grey Brown Clayey Sand (poorly sorted)	5.05	4.44	0.54	-					
		0.6	1.4	Dark Brown Grey Coarse Sand	5.15	4.7	0.45	-					
		0.8	1.2	Dark Brown Grey Coarse Sand	5.27	4.37	1	-					
		1	1	Dark Grey Clayey Coarse Sand	4.22	4.37	0.45	-	0.04	<0.5	<0.5	0.01040211	
		1.2	0.7	Dark Grey Clayey Coarse Sand	5.13	3.2	1.93	VL	0.025	<0.5	<0.5	0.01040211	
		0.45		Wet Light Grey Coarse Sand (outfurnish sand)	5.32	2.93	2.39	L					
		0.3											
	PI Base												
009	Ground Surface	0	2	Dark Organic Sandy Silty	5.42	3.44	1.96	L					
		0.32	1.65	Yellow Grey Coarse Sandy Clay	5.35	4.32	1.14	-					
		0.49	1.31	Moist Grey Brown Clayey Sand	5.32	4.51	0.71	-					
		0.69	1.31	Yellow Grey Coarse Sandy Clay (heavy orange mottles)	5.55	4.37	1.19	-					
		1	1	Dark Yellowish Grey Coarse Sand	5.49	4.24	1.25	-	0.025	<0.5	<0.5	0.01040211	
		1.2	0.8	Coarse Grey Sand (yellow mottles, no shell)	5.79	2.99	2.8	L	0.027	<0.5	<0.5	0.01040211	
		1.6	0.5	Medium Grey Coarse Clayey Sand (minor yellow mottles)	5.77	3.83	1.94	L					
		0.37		Wet Medium Grey Coarse Sand	5.37	3.35	1.79	L					
		0											
	PI Base												
009	Ground Surface	0	4.5	Dark Organic Sandy Loam	4.75	3.55	1.12	L					
		0.32	4.15	Brown Sandy Clay	4.77	3.35	0.51	L					Organic Reaction
		0.65	3.84	Yellowish Red Sandy Clay	4.72	3.82	0.9	L					Organic Reaction
		1	3.5	Reddy Yellow Sandy Clay	4.84	4.57	0.27	L					
		1.22	3.25	Yellowish Grey Sandy Clay	4.42	4.1	0.32	L					
		1.5	3	Yellowish Grey Sandy Clay	4.55	4.05	0.49	-					
		1.75	2.75	Light Grey Sandy Clay (minor sandy yellow mottles)	4.85	3.81	1.04	L	0.02	<0.5	<0.5	0.01040211	Likely Reaction with Manganese
		2	2.8	Light Grey Sandy Clay (minor mottles)	0.39	4.44	1.25	-					
	PI Base												
009	Ground Surface	0	1.6	Dark Organic Sandy Silty	5.21	4.25	1.45	-					
		0.4	1.1	Dark Brownish Grey Sandy Clay	5.59	4.24	0.49	-					
		0.6	0.9	Dark Grey Clayey Sand	5.75	5.15	0.62	-					
		0.8	0.7	Dark Grey Clayey Sand	5.57	5.25	0.32	-					
		1	0.5	Light Grey Sandy Clay (no shell)	5.34	4.87	0.47	-					
		1.2	0.3	Medium Grey Clay	5.66	4.71	0.94	-					
		1.5	0	Wet Grey Sand (no shell)	5.83	4.55	1.45	-	0.02	<0.5	<0.5	0.01040211	Weak PASS
		0.125		Light to Medium Grey Clayey Sand (dark brown mottles)	5.79	4.49	1.19	M	0.15	<0.5	<0.5	0.01040211	Weak PASS
		0.4											
	PI Base												
009	Ground Surface	0	2.75	Dark Organic Coarse Sandy Loam	4.57	3.55	1.11	L					
		0.5	2.35	Yellow Grey Sandy Clay	5.35	4.2	0.89	-					
		1	1.75	Grey Sandy Clay (heavy orange mottles)	5.19	4.9	0.29	-					
		1.3	1.45	Grey Coarse Sand (heavy orange mottles)	5.1	4.51	0.59	-					
		1.6	1.85	Coarse Grey Sand	5.23	4.15	1.07	-					
	PI Base												
009	Ground Surface	0	2	Brown Medium Clay	5.05	3.85	1.22	H					
		0.32	1.65	Dark Brown Medium Clay	5.17	3.45	1.53	M					
		0.4	1.4	Dark Brownish Grey Clay	5.35	3.35	1.45	L					
		0.6	1.2	Dark Grey Medium Clay	5.21	4.29	1.12	L					
		0.8	0.8	Dark Grey Medium Clay	5.05	4.45	0.6	M					
		1.2	0.5	Heavy Grey Clay	4.43	3.85	1.58	VL	0.029	<0.5	<0.5	0.01040211	
		0.125		Dark Grey Coarse Sand (dark brown mottles)	5.29	3.85	2.11	VL	0.021	<0.5	<0.5	0.01040211	Weak PASS
		0											
	PI Base												
009	Ground Surface	0	1.5	Brownish Grey Organic Clay	4.85	3.91	0.97	VL					
		0.3	1.2	Medium Grey Clay	5.15	4	1.15	-					
		0.6	0.9	Light Grey Sandy Clay	5.21	4.29	1.42	-					
		0.8	0.6	Moist Light Grey Sandy Clay	5.5	4.25	1.52	-					
		1.1	0.4	Light Grey Sandy Clay	5.55	4.15	1.45	-					
		1.3	0.2	Light Grey Medium Clay	5.21	4.35	0.93	-	0.022	<0.5	<0.5	0.01040211	Weak PASS
		1.5	0	Medium Grey Clay (outfurnish sand)	5.9	1.72	4.08	L	0.08	<0.5	<0.5	0.01040211	Weak PASS
		0.3											
	PI Base												

Key (Groundwater)

Weak PASS
Weak PASS

Key (Airborne Criteria)

Weak PASS	Below Action Criteria
Weak PASS	Above Action Criteria

Annexure 2

Laboratory Report

**CERTIFICATE OF ANALYSIS**

25 September, 2003

Mr David Morrison
C & B Group
PO Box 1949
CAIRNS QLD 4870

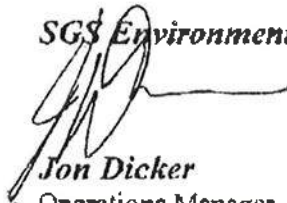
Your Order No: -
Laboratory Report No: 45871

Date Received: 8 September 2003

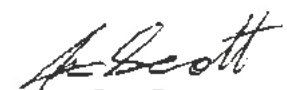
Dear Sir:

Twelve soil samples labelled according to the following tables were received and analysed for the parameters as listed. Please find the results in the attached report.

Yours faithfully,

SGS Environmental Services

Jon Dicker
Operations Manager
CAIRNS



Jon Scott
Inorganic Chemist
CAIRNS



NATA Accredited Laboratory No: 2552
NATA Endorsed Test Report
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Page 1 of 5



Laboratory Report No: 45871

RESULTS I

SGS Reference	Your Reference	Moisture % H ₂ O	pH KCl	TAA (pH 5.5) kg H ₂ SO ₄ /tonne
Blank		-	5.8	-
45871-02	WP10: 1.0-1.3	14	4.8	<0.5
45871-03	WP10: 1.3-1.5	16	4.9	<0.5
45871-04	WP13: 1.0-1.2	15	4.8	<0.5
45871-05	WP13: 1.2-1.5	14	4.8	<0.5
45871-06	WP15: 1.75-2.0	10	5.3	<0.5
45871-07	WP16: 1.5-1.72	11	5.5	<0.5
45871-08	WP16: 1.72-2.0	9	5.0	<0.5
45871-09	WP18: 1.5-1.64	23	4.4	<0.5
45871-10	WP18: 1.64-2.0	16	4.8	<0.5
45871-11	WP19: 1.3-1.5	16	5.1	<0.5
45871-12	WP19: 1.5-1.8	17	5.0	<0.5
Limit of Reporting		1	0.1	0.5
ASSMAC Method		2B1	21A	21F

Results determined on a dry basis.

* NATA accreditation does not cover the performance of this analysis.



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Page 2 of 5

SGS

Laboratory Report No: 45871

RESULTS II

SGS Reference	Your Reference	Chromium Reducible Sulphur [*] (S _{Cr}) % w/w
45871-02	WP10: 1.0-1.3	0.010
45871-03	WP10: 1.3-1.5	0.005
45871-04	WP13: 1.0-1.2	<0.005
45871-05	WP13: 1.2-1.5	0.007
45871-06	WP15: 1.75-2.0	<0.005
45871-07	WP16: 1.5-1.72	0.020
45871-08	WP16: 1.72-2.0	0.15
45871-09	WP18: 1.5-1.64	0.009
45871-10	WP18: 1.64-2.0	0.021
45871-11	WP19: 1.3-1.5	0.072
45871-12	WP19: 1.5-1.8	0.080
Limit of Reporting		0.005
ASSMAC [†] Method		22B

Results determined on a dry basis.[†] Acid Sulfate Soils Management Advisory Committee.

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SGS

Laboratory Report No: 45871

RESULTS III

SGS Reference	Your Reference	Manganese (Mn) mg/kg
45871-01	WP09: 1.6-2.0	59
Limit of Reporting		0.05
SGS Method		CEI-200

Results determined on a dry basis.

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Page 4 of 5

Laboratory Report No: 45871

SGS**RESULTS IV**

Our Reference	Your Reference	Moisture [‡] % H ₂ O	pH _{KCl}	TAA (pH 5.5) kg H ₂ SO ₄ /tonne	pH _{0x}	TPA (pH 5.5) kg H ₂ SO ₄ /tonne	TSA (pH 5.5) kg H ₂ SO ₄ /tonne
Blank		-	5.8	-	5.9	-	-
45871-1	WP9: 1.6-2.0	20	5.0	<0.5	4.7	<0.5	<0.5
R45871-1	Repeat WP9: 1.6-2.0	-	5.0	<0.5	4.8	<0.5	<0.5
	Limit of Reporting	1	0.1	0.5	0.1	0.5	0.5
	ASSMAC [§] method	2B1	21A	21F	21B	21G	21H

Our Reference	Your Reference	S _{KCl} [†] % w/w	S _P [†] % w/w	S _{POS} [†] % w/w	Ca _{KCl} [†] % w/w	Ca _P [†] % w/w	Ca _A [†] % w/w	Mg _{KCl} [†] % w/w	Mg _P [†] % w/w	Mg _A [†] % w/w	Na _{KCl} [†] % w/w	Na _P [†] % w/w	Na _A [†] % w/w
Blank		-	-	-	-	-	-	-	-	-	-	-	-
45871-1	WP9: 1.6-2.0	<0.005	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
R45871-1	Repeat WP9: 1.6-2.0	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
	Limit of Reporting	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
	ASSMAC Method	21Ce	21De	21Ee	21Vh	21Wh	21Xh	21Sm	21Tm	21Um	21Ms	21Ns	21Ps

Results determined on a dry basis.

‡ NATA accreditation does not cover the performance of this analysis.

§ ASSMAC - Acid Sulfate Soils Management Advisory Committee - Acid Sulfate Soil Manual, August 1998

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Jim Papas Civil Engineering Designer

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APPENDIX F SPA FORMS 1 and 6



OCEAN BREEZE ESTATE

STAGE 5B

RESIDENTIAL SUBDIVISION

AT

GOOYA BEACH ROAD

GOOYA BEACH

PROJECT DRAWINGS
PROJECT No. 1301

- C 01 – EXISTING SITE PLAN.
 - C 02 – TYPICAL CROSS SECTION, PAVEMENT DATA, SET OUT AND DETAILS.
 - C 03 – BULK EARTHWORKS PLAN.
 - C 04 – EARTHWORKS, ROADWORKS AND STORMWATER DRAINAGE PLAN.
 - C 05 – SOIL AND WATER MANAGEMENT PLAN.
 - C 06 – SEWERAGE RETICULATION PLAN.
 - C 07 – WATER RETICULATION PLAN.
 - C 08 – BARRABAL DRIVE – LONGITUDINAL SECTION.
 - C 09 – BARRABAL DRIVE – CROSS SECTIONS.
 - C 10 – ROAD J- LONGITUDINAL AND CROSS SECTIONS.
 - C 11 – STORMWATER DRAINAGE– LONGITUDINAL SECTION, SET OUT DATA, PT. SCHEDULE AND NOTES
 - C 12 – SEWERAGE RETICULATION– LONGITUDINAL SECTIONS, SET OUT DATA AND NOTES
 - C 13 – STORMWATER DRAINAGE CATCHMENT PLAN
 - C 14 – STORMWATER DRAINAGE CALCULATION SHEET.
- (Note: Dwgs C13 and 14 are not part of the Contract Drawings)

BRILEY
CONSULTANTS
CONSULTING ENGINEERS

Ph. (07) 4054 3052 Mob 0400 543 052
Email: br55287@bigpond.net.au



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DESIGNER PTY. LTD.
CIVIL ENGINEERING DESIGN AND DRAFTING

P.O. Box 2347
Mareeba Q 4880
Ph. 0408 770 354
Email: admin@jpedu.com.au

NOTES:

SURVEY CONTROL

ORIGIN OF LEVELS:
PSM 76389 RL 3.363 AHD der.

ORIGIN OF COORDINATES:
PSM 76389 9853.42E, 80445.36N

MERIDIAN: MGA ZONE 55

CONTOUR INTERVAL EXISTING SURFACE:
0.20m INDEXED AT 1.0m INTERVALS.

NOTES:

THE CONTRACTOR TO CONFIRM SURVEY DATUM WITH SURVEYOR PRIOR TO COMMENCEMENT OF WORK.

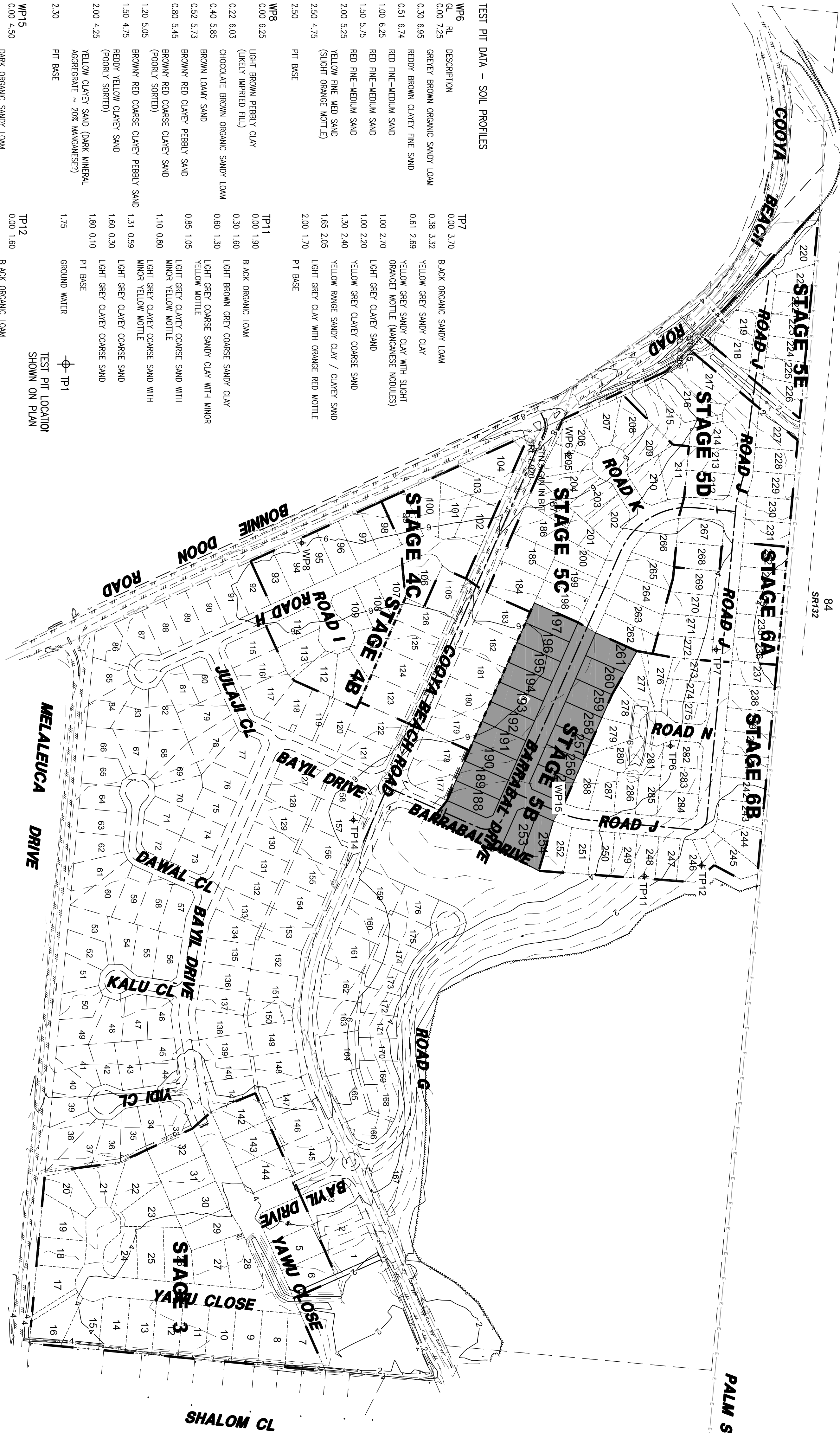
THE PRINCIPAL'S SURVEYOR SHALL PROVIDE INITIAL SURVEY DATA AND FINAL CADASTRAL SURVEY INFORMATION ONLY. THE CONTRACTOR IS RESPONSIBLE FOR ALL OTHER SURVEY DATA NECESSARY TO CONSTRUCT THE WORKS INCLUDING 'AS CONSTRUCTED' INFORMATION. THE COST OF PROVIDING THIS SURVEY SHALL FORM PART OF THE CONTRACT SUM.

RP DESCRIPTION
LOT 901 ON SP 264 284
PARISH OF VICTORY
COUNTY OF SOLANDER
LOCAL AUTHORITY
DOUGLAS SHIRE COUNCIL

EXISTING SERVICES

- EXISTING SERVICES ARE PLOTTED FROM THE BEST INFORMATION AVAILABLE. NO RESPONSIBILITY IS TAKEN BY THE SUPERINTENDENT FOR THE ACCURACY AND COMPLETENESS OF THE INFORMATION SHOWN.
- PRIOR TO THE COMMENCEMENT OF CONSTRUCTION THE CONTRACTOR IS TO ESTABLISH ON SITE THE EXACT LOCATION OF ALL UNDERGROUND SERVICES IN THE PROPOSED WORKS AREA. METHODS TO ACHIEVE 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 SERVICES WHICH MAY BE AFFECTED BY THE PROPOSED WORKS UNDER THE DIRECTION OF THE RELEVANT SERVICE AUTHORITY.
- THE CONTRACTOR SHALL BRING TO THE SUPERINTENDENT'S ATTENTION ANY DISCREPANCIES BETWEEN THE EXISTING SERVICES THUS IDENTIFIED AND THE DOCUMENTED SERVICES WHICH MIGHT AFFECT THE PROPOSED WORKS. APPROPRIATE MEASURES TO RESOLVE ANY CONFLICTS WILL BE DOCUMENTED BY THE SUPERINTENDENT.

LEGEND
EXISTING TOP OF BANK
EXISTING TOE OF BANK
EXISTING CHANGE OF GRADE
EXISTING EDGE OF BITUMEN
EXISTING KERB & CHANNEL
EXISTING UNDERGROUND DRAINAGE
EXISTING WATER MAINS
EXISTING SEWERS
EXISTING ELECTRICITY
EXISTING TELSTRA CABLES
EXISTING OPEN DRAINS
PROPOSED STAGE BOUNDARIES
EXISTING CONTOURS
EXISTING CONTOURS (At 0.5m, INDEXED AT 2.0m)



WP15	0.00 4.50	TP12	0.00 1.60
0.32 4.18	DARK ORGANIC SANDY LOAM	0.25 1.35	BLACK ORGANIC LOAM
0.66 3.84	BROWN SANDY CLAY	0.50 1.10	LIGHT BROWN GREY COARSE SANDY CLAY
1.00 3.50	YELLOW RED SANDY CLAY	0.71 0.89	LIGHT TO MEDIUM GREY CLAY
1.22 3.28	REDDY YELLOW SANDY CLAY	1.00 0.60	LIGHT GREY SANDY CLAY
1.50 3.00	YELLOW GREY SANDY CLAY	1.20 0.40	LIGHT TO MEDIUM GREY CLAYEY SAND
1.75 2.75	YELLOW GREY SANDY CLAY	1.60 0.00	MEDIUM GREY CLAYEY SAND
2.00 2.50	LIGHT GREY SANDY CLAY (MINOR REDDY YELLOW MOTTLE)	1.45	PIT BASE GROUND WATER
2.00 2.30	PIT BASE	TP14	
0.00 5.70	BLACK SANDY ORGANIC LOAM	0.29 5.41	BROWN / RED CLAYEY SAND
0.00 3.20	BLACK ORGANIC SANDY LOAM	0.66 5.04	RED CLAYEY SAND
0.29 2.91	YELLOW ORANGE SANDY CLAY	1.13 4.57	YELLOW / RED CLAYEY SAND
0.51 2.69	YELLOW CLAYEY SAND	1.62 4.08	YELLOW CLAYEY SAND
0.79 2.41	YELLOW ORANGE SANDY CLAY	1.90 3.80	YELLOW CLAYEY SAND
1.00 2.20	YELLOW GREY CLAYEY COARSE SAND	2.40 3.30	PIT BASE
1.32 1.88	YELLOW GREY CLAYEY COARSE SAND		
1.65 1.55	YELLOW GREY CLAYEY COARSE SAND		
2.00 1.20	LIGHT GREY CLAYEY COARSE SAND		

Point #	Existing	Northing	Level	Description
1	9552.307	80419.077	2.776	Sh 9063 NIK
2	9554.645	80410.780	0.000	Sh 9126 NIC
3	9551.771	80409.594	0.000	Sh 9127 NIC
4	9451.670	80379.190	2.649	Sh 9062 Spike
5	9376.825	80363.112	4.290	Sh 9066 Star Picket
6	9370.404	80354.323	4.742	Sh 9144 NIK
7	9355.917	80341.131	5.225	Sh 9143 NIK
8	9371.029	80322.165	4.840	Sh 9142 NIK
9	9381.996	80326.354	4.761	Sh 9141 NIK
10	9394.163	80294.934	4.318	Sh 9008 NIK
11	9351.871	80216.688	4.767	Sh 9109 NIK
12	9337.258	80209.513	0.000	Sh 9000 OPM
13	9315.966	80200.058	5.036	Sh 9111 NIK
14	9305.432	80198.481	6.148	Sh 9110 NIK
15	9517.457	80064.644	0.000	Sh 9013 NIC
16	9521.816	80068.904	0.000	Sh 9107 OIP

PRE-START MEETING

- THE CONTRACTOR SHALL PRODUCE THE FOLLOWING DOCUMENTS AT THE PRE-START MEETING:
- EVIDENCE OF PAYMENT OF Q LEAVE LEVY.
 - TRAFFIC MANAGEMENT PLAN.
 - PRICED BILL OF QUANTITIES.
 - CONTRACTOR'S EROSION AND SEDIMENT CONTROL PLAN.
 - THE PLAN SHALL DEMONSTRATE A SUITABLE ESC STRATEGY FOR EACH PHASE OF THE WORKS AND SHALL INCLUDE STANDARD DRAWINGS AND SPECIFICATIONS FOR ALL ESC MEASURES.
 - EVIDENCES OF INSURANCES:
 - PUBLIC LIABILITY
 - LOSS OR DAMAGE TO THE WORKS
 - WORKERS COMPENSATION
 - NOTICE OF APPOINTMENT OF PRINCIPAL CONTRACTOR AS REQUIRED BY WORKPLACE, HEALTH AND SAFETY ACT.
 - PROGRAMME OF WORKS
 - SOURCE OF FILL

SCALE 1:2000



amendments

A	ORIGINAL ISSUE FOR OPERATIONAL WORKS APPROVAL	01.07.14

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STAGE 5B OF PROPOSED RESIDENTIAL SUBDIVISION

AT BARABAL DRIVE, COOYA BEACH

DRAWING TITLE: EXISTING SITE PLAN.

DWG NUMBER 1301 – C01

AUDT A

SCALE (AT A1 SIZE)

HOR 1:2000

VER

DATE JULY 2013

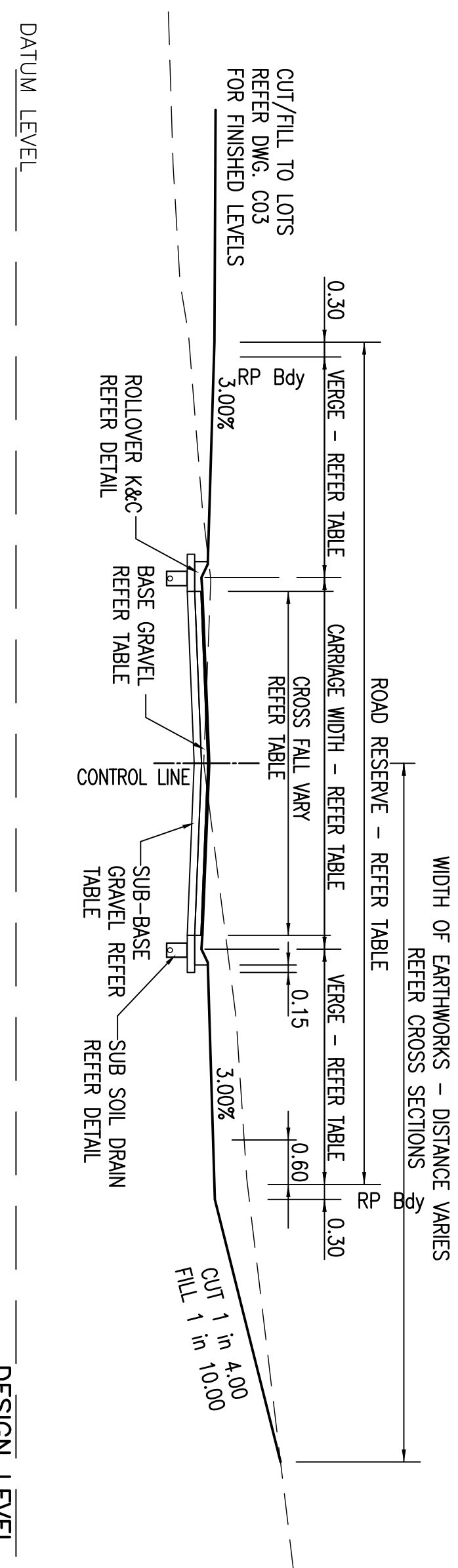
APPROVED

DRAWN J.P.

DESIGNED J.P.

CHECKED J.P.

B. J. SMITH RPEO No. 9326



TYPICAL CROSS SECTION
BARRABAL DRIVE & ROAD J

SCALE: 1:100

PAVEMENT NOTES

PROPOSAL. PAYMENT DESIGN STATED HEREIN IS BASED ON A MINIMUM GCR UNDER SERVICE CONDITIONS OF 7. PAYMENT DESIGN IS SUBJECT TO REVISION ON BASIS OF CONFIRMATORY GCR TESTS TAKEN AT THE TIME OF CONSTRUCTION, BASED ON THE INSTIT GCR TEST RESULTS. THE FINAL PAYMENT DESIGN SHALL BE APPROVED BY COUNCIL PRIOR TO CONSTRUCTION. THE COMPLETED PAYMENT DESIGN SHALL GENERALLY COMPLY WITH AUSTRALROADS OR OTHER PAYMENT DESIGN MANUAL AS APPLICABLE.

SUBGRADE - COMPACT TO 100% SRDD

SHOULD ANY SOFT OR UNSUITABLE MATERIAL BE IDENTIFIED SEEK ADVICE OF THE SUPERINTENDENT.

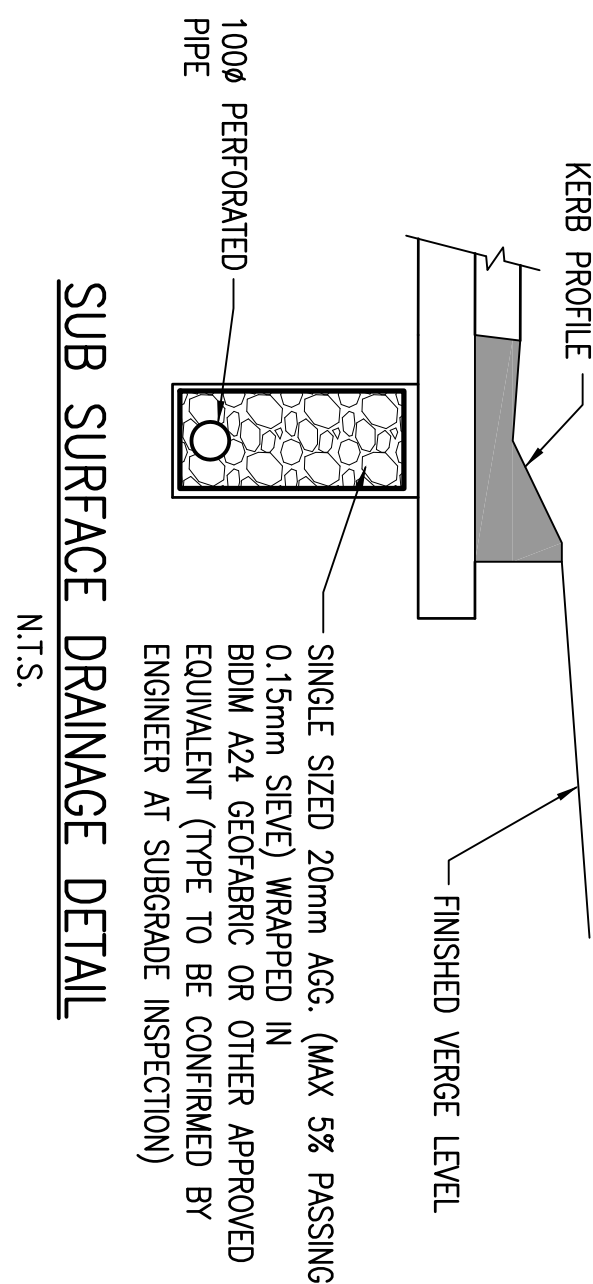
SUBBASE SHALL CONSIST OF TYPE 2 SUBTYPE 2.3 PAVEMENT MATERIAL (B' OR 'C' GRADED AND COMPACTED TO 100% SRDD IN ACCORDANCE WITH SPECIFICATION).
DEPTH OF PAVEMENT AS NOTED IN TABLE.

BASE SHALL CONSIST OF TYPE 2 SUBTYPE 2.2 PAVEMENT MATERIAL ('B' OR 'C' GRADED) COMPACTED TO 100% SRDD IN ACCORDANCE WITH SPECIFICATION.
DEPTH OF PAVEMENT AS NOTED IN TABLE.

AS FOLLOWS:

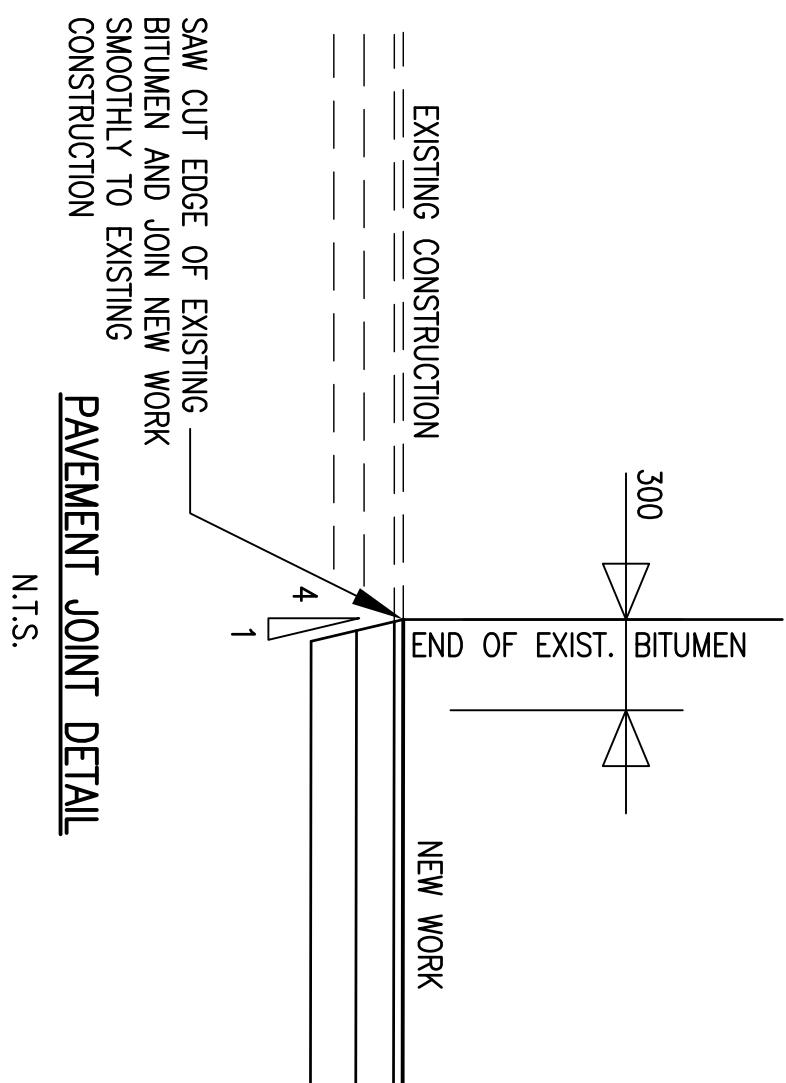
30mm THICK DENSE GRADED ASPHALT (AC10)
APPLY A LIGHT PRIME TO PAVEMENT PRIOR TO PLACEMENT OF ASPHALT.

ROAD NAME AND CHAINAGE	ROAD RESERVE WIDTH (m)	LHS VERGE WIDTH (m)	CARRIAGEWAY WIDTH (m)	RHS VERGE WIDTH (m)	SUBBASE (MIN. DEPTH mm)	BASE (MIN. DEPTH mm)
BARRABAL DRIVE CHN 49.825 TO 107.097	20,000	6,00	8,00 (3-4%)	6,00	125	100
BARRABAL DRIVE CHN 107.097 – END	17,000	5,250	6,50 (4%)	5,250	100	100
ROAD J	17,000	5,250	6,50 (4%)	5,250	100	100



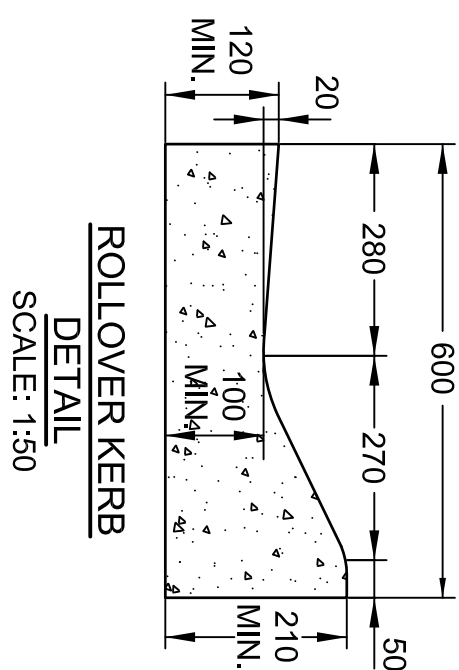
SUB SURFACE DRAINAGE DETAIL

N.T.S.



PAVEMENT JOINT DETAIL

N.T.S.



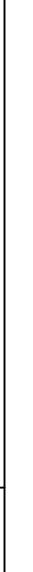
ROLLOVER KERB

SCALE: 1:50

BARBARAL DRIVE					
	CHAINAGE	EASTING	NORTHING	RADII	BEARING
I#25	0.000	9057.863	80368.854		23°50'04" STRAIGHT
	49.825	9077.998	80414.429		23°50'04" STRAIGHT
I#26	49.825	9077.998	80414.429		23°50'04" STRAIGHT
	60.000	9082.109	80423.737		23°50'04" STRAIGHT
I#27	60.000	9082.109	80423.737		23°50'04" STRAIGHT
	83.535	9091.620	80445.264		23°50'04" STRAIGHT
C# 13	83.535	9091.620	80445.264	15.000	23°50'04" ARC
	107.097	9083.861	80463.046	15.000	23°50'06" ARC
I#28	107.097	9083.861	80465.046		23°50'06" STRAIGHT
	350.895	8860.955	80563.566		29°35'00" STRAIGHT
C# 14	350.895	8860.955	80563.566	61.500	29°35'06" ARC
	427.621	8824.572	80625.519		51°8'58" STRAIGHT
I#29	427.621	8824.572	80625.519		51°8'58" STRAIGHT
	461.739	8827.733	80659.480		51°8'58" STRAIGHT

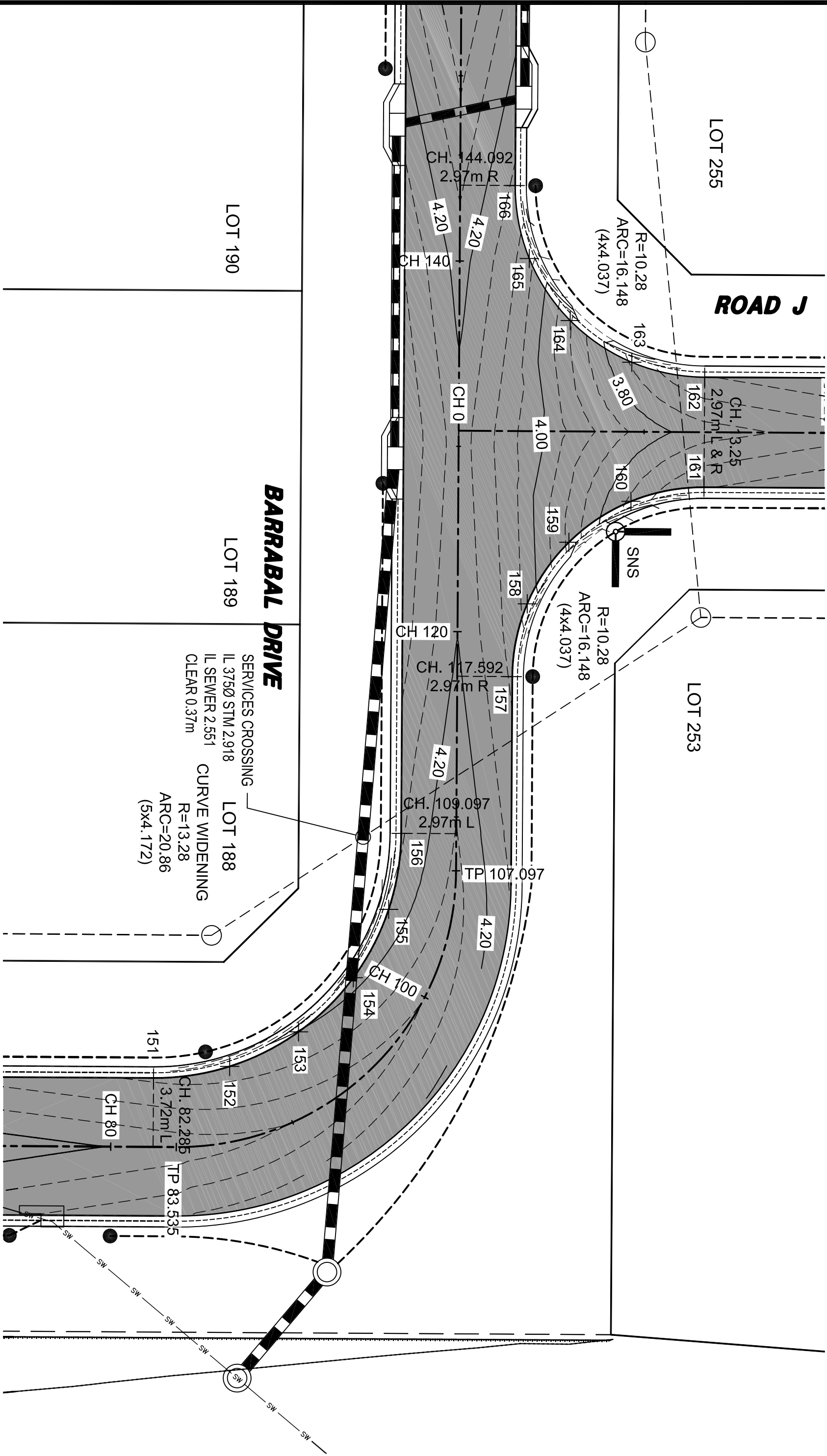
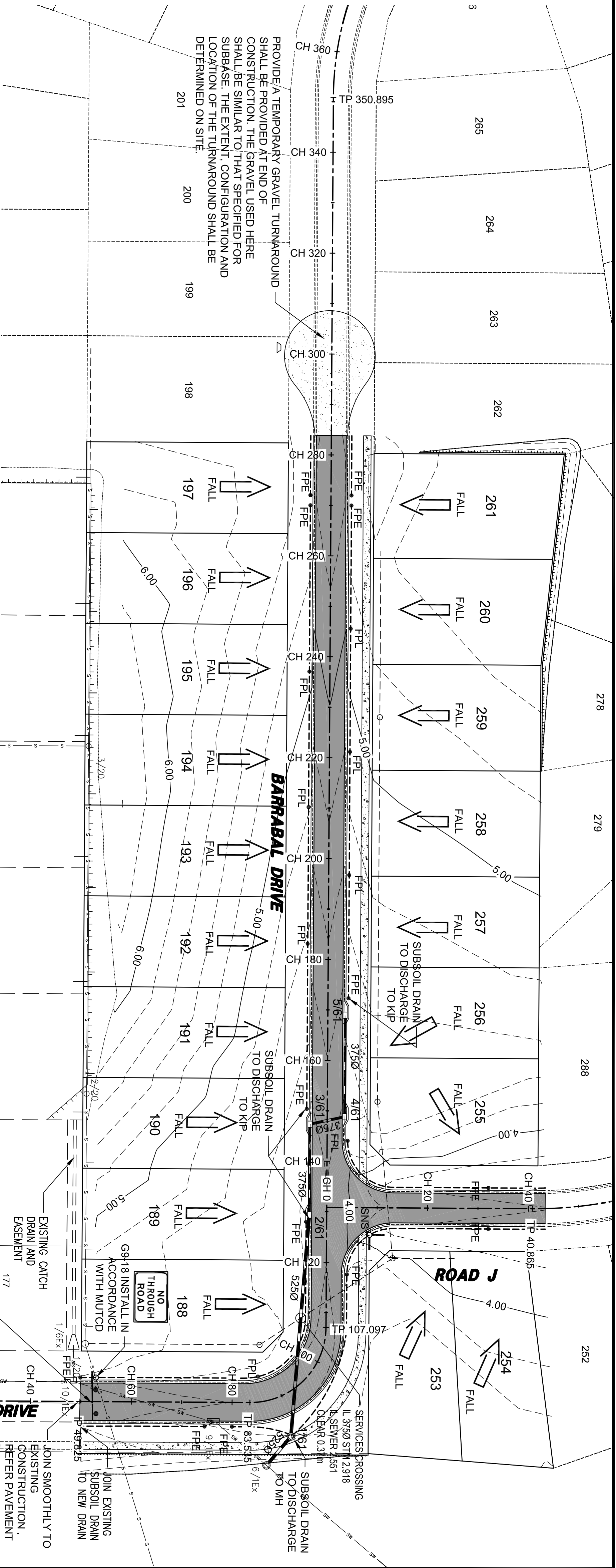
ROAD J				
	CHAINAGE	EASTING	NORTHING	BEARING
L#30	0.000 40.865	9062.240 9078.754	80474.642 80512.022	2350°06" STRAIGHT 2350°06" STRAIGHT
C# 15	40.865 66.722	9078.754 9068.233	80512.022 80536.938	2350°06" ARC 51°18'56" ARC
L#31	66.722 154.890	9068.233 9093.402	80536.938 80624.726	51°18'56" STRAIGHT 51°18'36" STRAIGHT
C# 16	154.890 170.598	9093.402 9084.371	80624.726 80623.610	51°18'56" ARC 275°18'56" ARC
L#32	170.598 434.990	9084.371 8821.116	80623.610 80660.106	275°18'56" STRAIGHT 275°18'56" STRAIGHT
C# 17	434.990 440.502	8821.116 8615.705	80660.106 80661.117	275°18'56" ARC 285°50'39" ARC
L#33	440.502 456.867	8815.705 8799.963	80661.117 80665.584	285°50'39" STRAIGHT 285°50'39" STRAIGHT
C# 18	456.867 462.379	8799.963 8794.551	80665.584 80666.595	285°50'39" ARC 275°18'56" ARC
L#34	462.379 477.888	8794.551 8779.109	80666.595 80668.032	275°18'56" STRAIGHT 275°18'56" STRAIGHT
C# 19	477.888 479.061	8779.109 8777.944	80668.032 80668.164	275°18'56" ARC 277°53'21" ARC
L#35	479.061 623.140	8777.944 8635.116	80668.164 80687.108	277°53'21" STRAIGHT 277°53'21" STRAIGHT



amendments ORIGINAL ISSUE FOR OPERATIONAL WORKS APPROVAL 01.07.14		JIM PAPAS CIVIL ENGINEERING DESIGNER PTY. LTD. CIVIL ENGINEERING DESIGN AND DRAFTING P. O. Box 2347 Mob. 0408 770 394 Email: jdpapas@pced.com.au Mareeba Q 4880	
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"Ocean Breeze Estate" STAGE 5B OF PROPOSED RESIDENTIAL SUBDIVISION AT BARRABAL DRIVE, COOYA BEACH		DRAWING TITLE: TYPICAL CROSS SECTION, PAVEMENT DATA, SET OUT AND DETAILS	
SCALE	HOR 1:100	DRAWN	J.P.
(AT A1 SIZE)	VER	DESIGNED	J.P.
DATE	JULY 2014	CHECKED	J.P.
APPROVED	B. J. SMYTH RPEQ No. 9326		
DWG NUMBER	1301 - C02	AMDT	A

INTERSECTION SETOUT POINTS			
Point #	Easting	Northing	Level
151	9087.712	80445.624	0.000
152	9088.776	80449.640	4.222
153	9088.546	80453.789	4.202
154	9087.046	80457.664	4.182
155	9084.422	80460.885	4.163
156	9080.931	80463.138	4.143
157	9075.560	80472.004	4.091
158	9072.278	80474.310	4.031
159	9071.128	80477.696	3.889
160	9069.437	80481.647	3.739
161	9070.311	80485.562	3.654
162	9064.878	80487.962	3.654
163	9062.572	80484.680	3.743
164	9059.186	80482.530	3.905
165	9055.235	80481.839	4.063
166	9051.321	80482.713	4.139

NOTE: EC = EDGE OF CHANNEL = EDGE OF BITUMEN

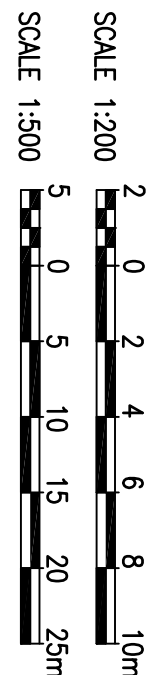


INTERSECTION DETAIL

SCALE 1:200

LEGEND

- ASPHALT SEAL 30mm THICK REFER DWG. 2 FOR PAVEMENT DETAILS
- CONCRETE FOOTPATH AS REQUIRED BY DSC 1.50m WIDE
- PROPOSED ROUTE OF SEWER
- SUB SOIL DRAINS IN ACCORDANCE WITH FNROC STD. DWG. S1095
- FPS = FLUSHING POINT AT START
- FPL = FLUSHING POINT IN LINE
- FPE = FLUSHING POINT AT KIP
- DESIGN CONTOURS (AT 0.2m, INDEXED AT 1.0m)
- EXISTING CONTOURS (AT 0.5m, INDEXED AT 1.0m)



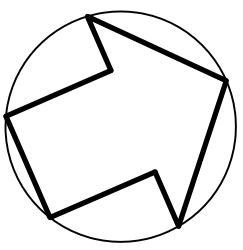
amendments

A	ORIGINAL ISSUE FOR OPERATIONAL WORKS APPROVAL	01.07.14

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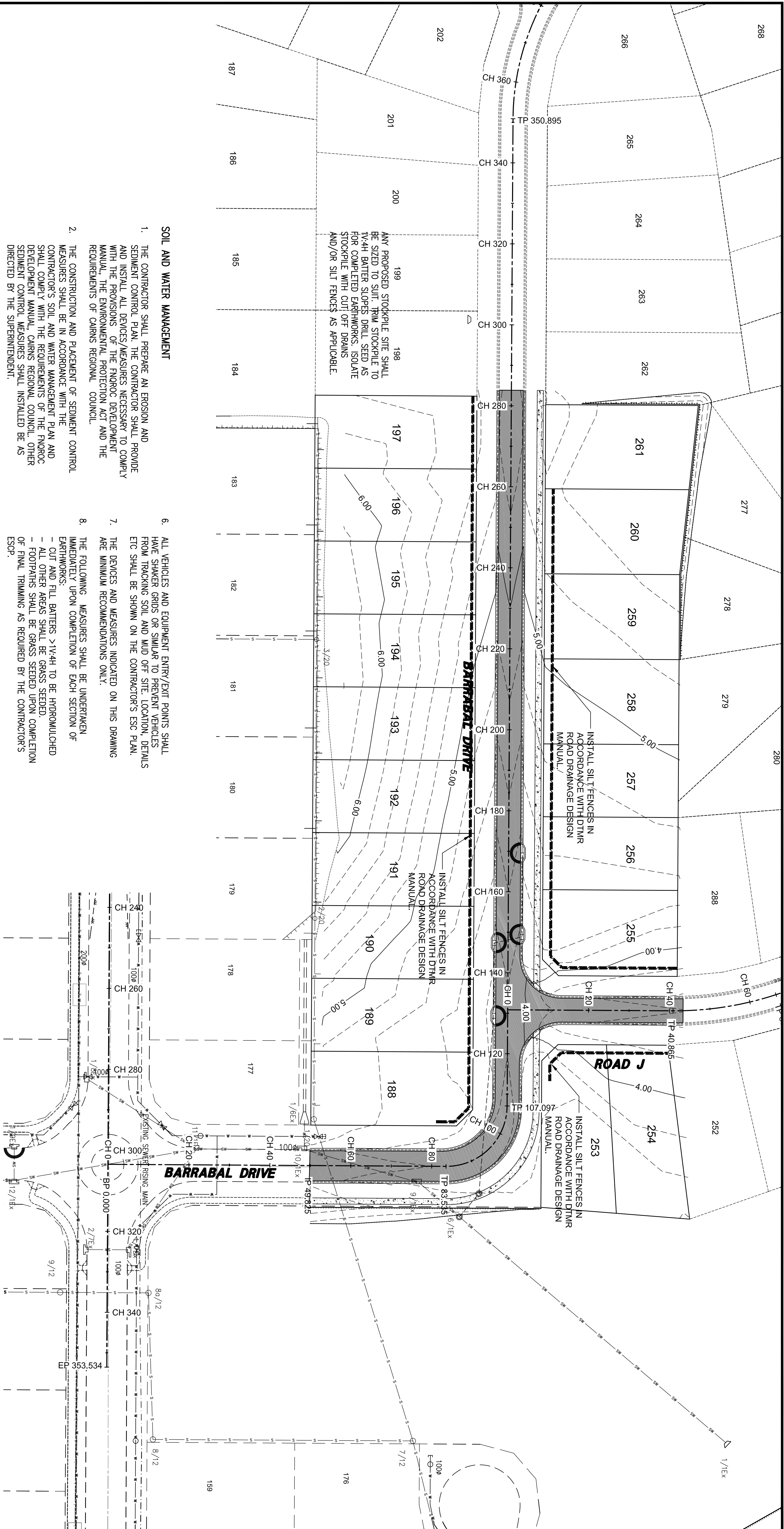
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"Ocean Breeze Estate"
STAGE 5B OF PROPOSED RESIDENTIAL SUBDIVISION
AT BARABAB DRIVE, COOYA BEACH

DRAWING TITLE: EARTHWORKS, ROADWORKS AND STORMWATER DRAINAGE PLAN

SCALE	HOR 1:500/200	VER (AT 1:500)	DRAWN	J.P.
DATE	JULY 2014	DESIGNED	J.P.	
APPROVED	B. J. SMITH RPEQ No. 9326	CHECKED	J.P.	
DWG NUMBER	1301 - C04	AUDT	A	



SOIL AND WATER MANAGEMENT

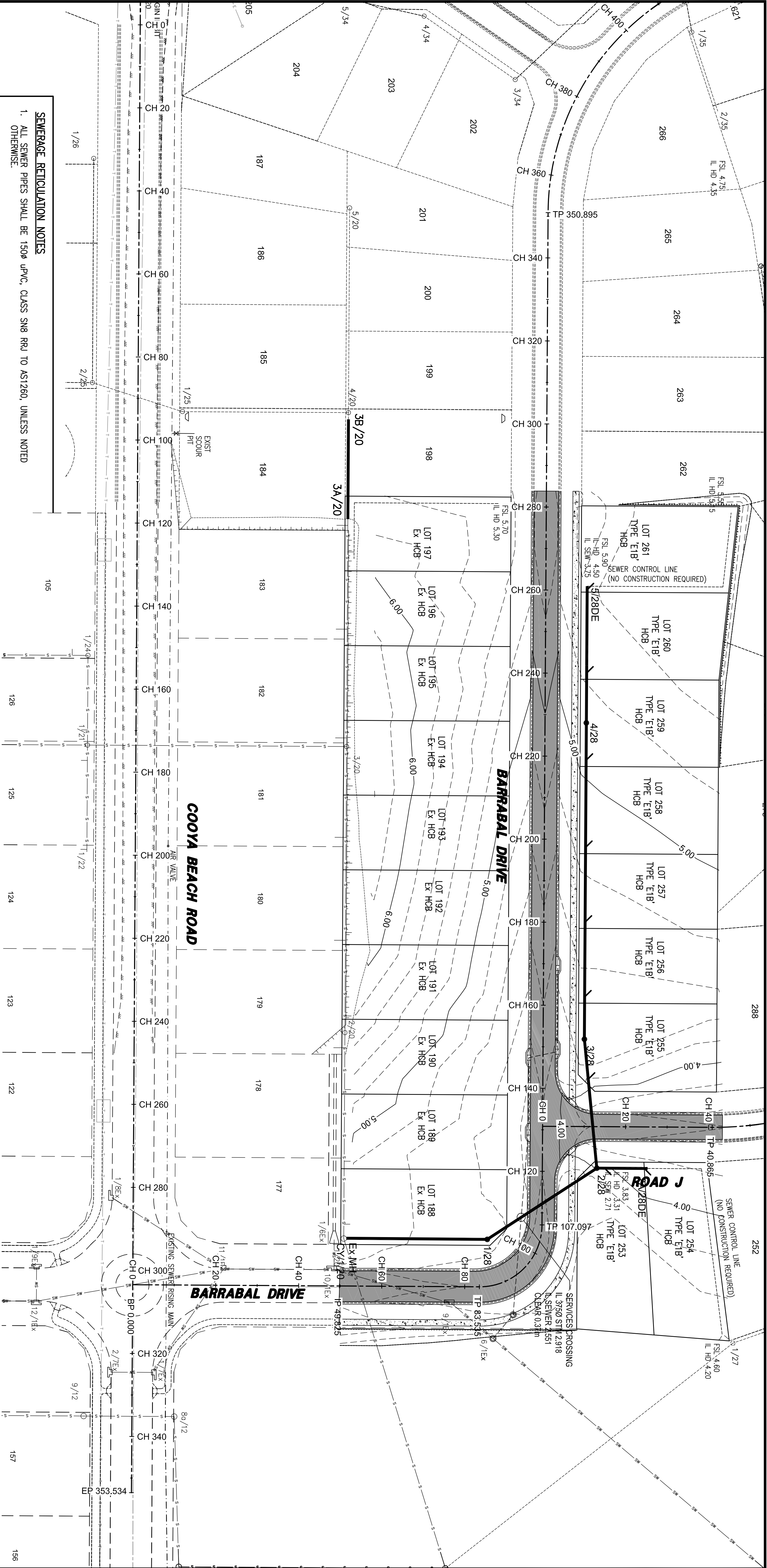
1. THE CONTRACTOR SHALL PREPARE AN EROSION AND SEDIMENT CONTROL PLAN. THE CONTRACTOR SHALL PROVIDE AND INSTALL ALL DEVICES/MESURES NECESSARY TO COMPLY WITH THE PROVISIONS OF THE FNRDC DEVELOPMENT MANUAL, THE ENVIRONMENTAL PROTECTION ACT AND THE REQUIREMENTS OF CARNS REGIONAL COUNCIL.
2. THE CONSTRUCTION AND PLACEMENT OF SEDIMENT CONTROL MEASURES SHALL BE IN ACCORDANCE WITH THE CONTRACTORS SOIL AND WATER MANAGEMENT PLAN AND SHALL COMPLY WITH THE REQUIREMENTS OF THE FNRDC DEVELOPMENT MANUAL, CARNS REGIONAL COUNCIL. OTHER SEDIMENT CONTROL MEASURES SHALL INSTALLED BE AS DIRECTED BY THE SUPERINTENDENT.
3. ALL SEDIMENT CONTROL MEASURES ARE TO 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 DURING THE MAINTENANCE PERIOD. THE CONTRACTOR IS TO ENSURE THAT ALL SEDIMENT CONTROL DEVICES ARE KEPT FREE OF SEDIMENT BUILD-UP.
4. SEDIMENT FENCES ARE TO BE INSTALLED SUCH THAT THE BASE OF THE FENCE IS PLACED 200mm MINIMUM BELOW GROUND LEVEL, AND ANCHORED SECURELY IN SUCH POSITION.
5. STOCKPILE SITES SHALL BE LOCATED ON SITE AS DIRECTED BY THE SUPERINTENDENT AFTER CONSULTATION AND AGREEMENT WITH COUNCIL. ENCLOSE ALL STOCKPILES WITH SILT FENCES AND COVER WITH VISQUEER OR SIMILAR IN TIMES OF HIGH WIND FOR DUST CONTROL.
6. THE CONTRACTOR SHALL OBTAIN A TRACKING LOG FROM TRACKING SOIL AND MUD OFF SITE. LOCATION, DETAILS ETC SHALL BE SHOWN ON THE CONTRACTOR'S ESC PLAN.
7. THE DEVICES AND MEASURES INDICATED ON THIS DRAWING ARE MINIMUM RECOMMENDATIONS ONLY.
8. THE FOLLOWING MEASURES SHALL BE UNDERTAKEN IMMEDIATELY UPON COMPLETION OF EACH SECTION OF EARTHWORKS:
- CUT AND FILL BATTERS >1V:4H TO BE HYDROMULCHED
 - ALL OTHER AREAS SHALL BE GRASS SEEDD.
 - FOOTPATHS SHALL BE GRASS SEEDD UPON COMPLETION OF FINAL TRIMMING AS REQUIRED BY THE CONTRACTOR'S ESCP.
9. WHERE SHOWN, EXISTING KERB INLETS SHALL HAVE SEDIMENT TRAPS IN ACCORDANCE WITH CONTRACTORS' ESCP PLAN.
10. TURF STRIPS (400 WIDE) ARE TO BE PROVIDED ALONG THE BACK OF THE KERB AND CHANNEL.
11. REVEGETATION SHALL BE WATERED AND MAINTAINED UNTIL GROWTH IS ESTABLISHED.
12. PEAT PLANT MANAGEMENT
NO EXCESS SOIL SHALL BE REMOVED FROM THE SITE.
A TRUCK SHAKE DOWN AND WASH DOWN AREA IS TO BE LOCATED ON SITE AFTER CONSULTATION WITH COUNCIL. IT SHALL BE PROPERLY MAINTAINED BY THE CONTRACTOR THROUGHOUT THE CONSTRUCTION PHASE OF THE PROJECT. THE CONTRACTOR IS RESPONSIBLE FOR CONTROL OF WEEDS UNTIL THE END OF THE MAINTENANCE PERIOD OR THE SALE OF THE LOTS WHICHEVER OCCURS FIRST.
- LEGEND
- PROPOSED SILT FENCE
CONSTRUCTED IN ACCORDANCE WITH
DNRM ROAD DRAINAGE DESIGN
MANUAL.
EXTENT AS SHOWN ON PLAN
- KERB INLET WITH SILT TRAP
-
- The technical drawing illustrates the proposed silt fence construction. The main plan view shows a road cross-section with three channels labeled CH 240, CH 260, and CH 280. A dashed line indicates the proposed silt fence location. A detailed inset shows the kerb inlet with a silt trap, labeled 'KERB INLET WITH SILT TRAP'. The drawing also shows existing features like 'EXISTING' and 'C'.

LEGEND

PROPOSED SILT FENCE
CONSTRUCTED IN ACCORDANCE WITH
DTMR ROAD DRAINAGE DESIGN
STANDARD

KERB INLET WITH SILT TRAP

amendments A ORIGINAL ISSUE FOR OPERATIONAL WORKS APPROVAL 01.07.14		JIM PAPAS CIVIL ENGINEERING DESIGNER PTY. LTD. CIVIL ENGINEERING DESIGN AND DRAFTING P. O. Box 2347 Mob: 0408 770 394 Email: admin@pced.com.au Mareeba Q 4880	
 DIAL BEFORE YOU DIG www.1100.com.au			
"Ocean Breeze Estate" STAGE 5B OF PROPOSED RESIDENTIAL SUBDIVISION AT BARBARAL DRIVE, COOYA BEACH		DRAWING TITLE: SOL AND WATER MANAGEMENT PLAN.	
SCALE (AT A1 SIZE) HOR 1:500 DRAWN J.P. VER DESIGNED J.P. DATE JULY 2014 CHECKED J.P.		APPROVED B. J. SMITH REC NO. 9326	
DWG NUMBER 1301 - C05 AADT A			



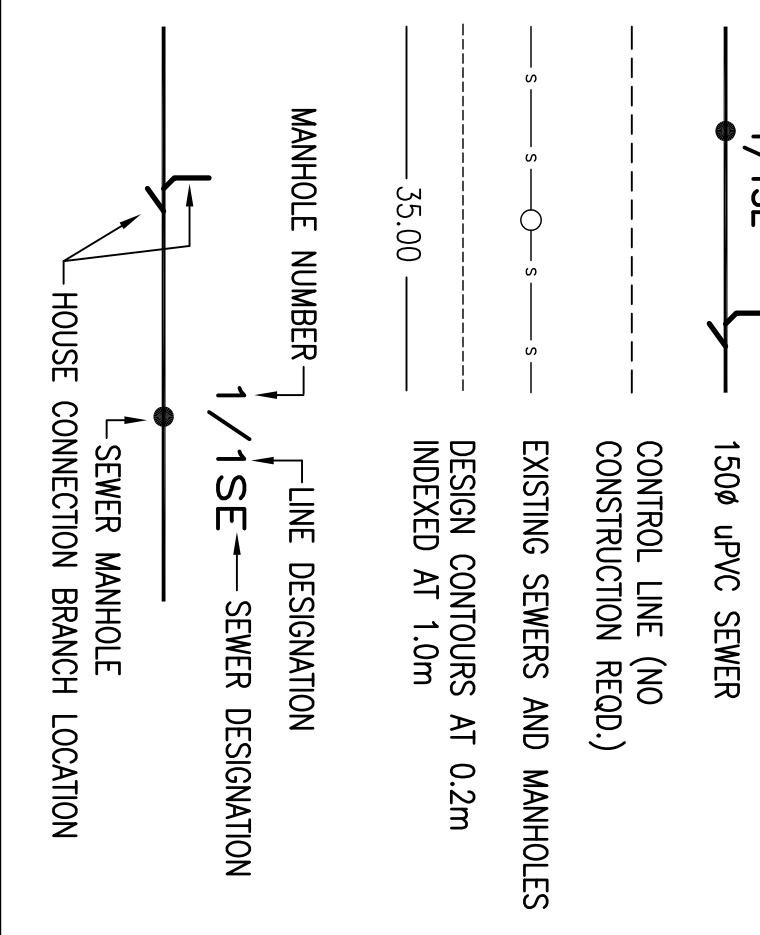
SEWERAGE RETICULATION NOTES

1. ALL SEWER PIPES SHALL BE 150Ø UPVC, CLASS SN8 R9 TO AS1280, UNLESS NOTED OTHERWISE.
2. UNO ALL HOB'S WILL BE TYPE E1A, E1B OR E2 IN ACCORDANCE WITH FNQROC DWG No S3005.
3. END CAPS ARE TO BE PROVIDED AT ALL LINE ENDS WHERE MANHOLES ARE NOT TO BE CONSTRUCTED.
4. WHERE MANHOLES OCCUR AT THE ENDS OF SEWER LINES, THE HOUSE CONNECTION BRANCH (HCB) FOR THE END ALLOTMENT SERVICED BY THE SEWER LINE SHALL CONNECT INTO THE MANHOLE (NOT THE SEWER LINE) IN ORDER TO AVOID DRY MANHOLE SITUATIONS. REFER TO PLAN FOR HCB LOCATIONS.
5. REFER TO THE SEWERAGE LONGITUDINAL SECTIONS FOR SEWER PIPE GRADES, INVERT LEVELS, STORMWATER CROSSINGS, ETC.
6. CONSTRUCTION OF THE SEWERAGE RETICULATION IS TO BE IN ACCORDANCE WITH THE PROCEDURES, SPECIFICATIONS AND DRAWINGS CONTAINED IN FNQROC DEVELOPMENT MANUAL INCLUDING LOCAL AUTHORITY SPECIFIC CLAUSES.
7. ALL SEWERS TO BE CLEANED, TESTED AND PASSED BEFORE CONNECTION TO EXISTING COUNCIL SEWERS.
8. MANHOLES SHALL BE CONSTRUCTED TO RL's SHOWN ON THE DRAWINGS (NOMINALLY 50mm ABOVE FINISHED SURFACE LEVELS)
9. PRIOR TO THE COMMENCEMENT OF CONSTRUCTION THE CONTRACTOR SHALL VERIFY EXISTING INVERT LEVELS AT CONNECTION MANHOLE AND ADVISE THE SUPERINTENDENT OF ANY DISCREPANCIES.
10. THE CONTRACTOR SHALL ALLOW TO VIDEO CHECK (AND RECTIFY, IF NECESSARY) ALL NEW SEWER WORK.

NOTES:

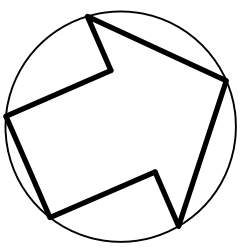
1. REFER DWG. C12 FOR SET OUT DETAILS.
2. REFER DWG. C12 FOR NOTES.

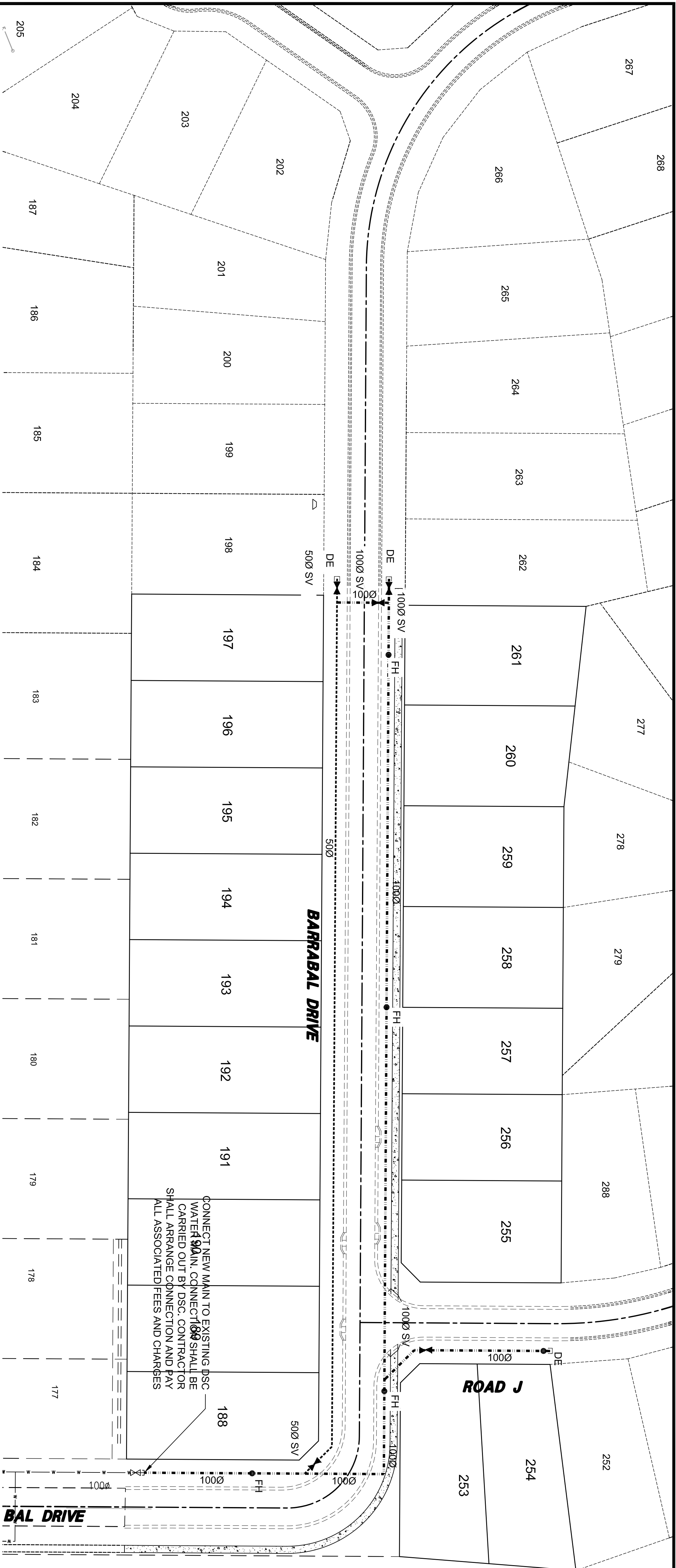
LEGEND



SCALE 1:500



amendments			
A	ORIGINAL ISSUE FOR OPERATIONAL WORKS APPROVAL	01.07.14	
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"Ocean Breeze Estate" STAGE 5B OF PROPOSED RESIDENTIAL SUBDIVISION AT BARRABAL DRIVE, COOYA BEACH			
DRAWING TITLE: SEWERAGE RETICULATION PLAN		DWG NUMBER 1301 – C06 AUDT A	
SCALE (AT A1 SIZE)		HOR 1:500	DRAWN J.P.
DATE	JULY 2014	DESIGNED J.P.	
APPROVED		CHECKED J.P.	
		B. J. SMITH RFD No. 9326	



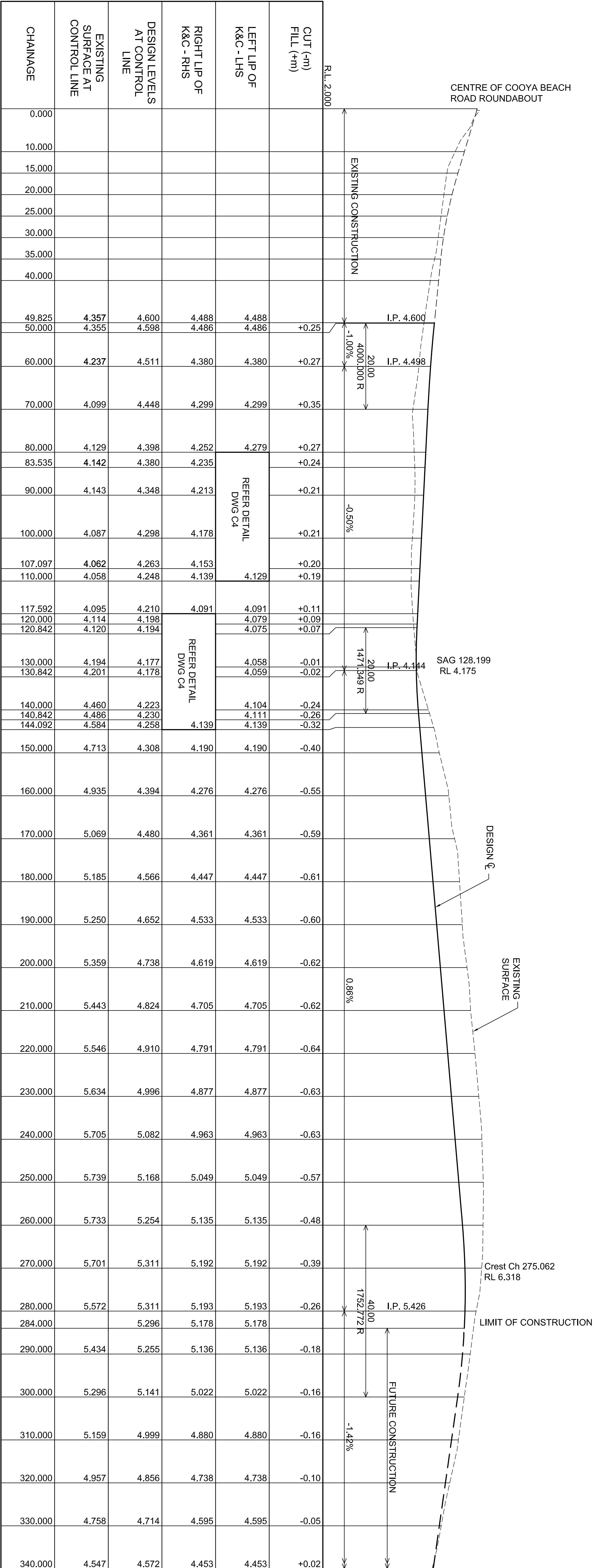
WATER RETICULATION NOTES

1. MAINPENS
1000 – UP/C PN 16 SERIES 2 RUJ TO AS 1477
2. VALVES AND HYDRANTS MUST BE LOCATED OPPOSITE BOUNDARY
JUNCTIONS AND TRIBUTIONS AS APPROPRIATE.
3. ALIGNMENT OF WATER RETICULATION MAINS WITHIN ROAD RESERVES TO
BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE LOCAL AUTHORITY
(280m IN CAIRNS REGIONAL COUNCIL JURISDICTION)
4. INSTALLATION OF VALVES AND FIRE HYDRANTS TO BE IN ACCORDANCE
WITH THE REQUIREMENTS OF THE LOCAL AUTHORITY.
5. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH PLURROC
DEVELOPMENT MANUAL, INCLUDING STANDARD DRAINAGES.
6. MINIMUM TEST PRESSURE FOR ALL WATER MAINS SHALL BE 1200KPa.
THE CONTRACTOR SHALL GIVE THE WATER OFFICER TWENTY FOUR (24)
HOURS NOTICE PRIOR TO TESTING

LEGEND

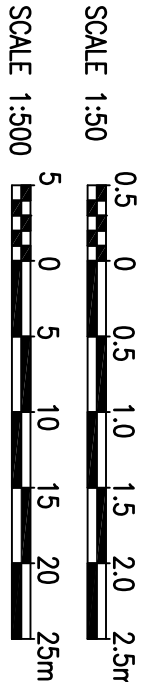
- | | |
|---------------------------------|---|
| 100# | 100# UPVC WATER MAN |
| 100# SV | SLUCE VALVE TO AS 2638 COATED WITH A THERMOSETTING EPOXY POWDER, ME CLASS 16 COMPLETE WITH C.I. COVER, BOX, ANCHOR, MARGIN & MARKER OR 63# DR BRASS VALVE COMPLETE WITH C.I. COVER, BOX, ANCHOR, MARGIN AND MARKER. (SIZE) AS NOTED |
| 80 # | 80 # SPRING HYDRANT (MAXI FLO TYPE) COMPLETE WITH C.I. TEE (ME), RISER, C.I. COVER, BOX, MARGIN & MARKER. ORIENTATE HYDRANT SUCH THAT BOLTS ARE PARALLEL TO WATER MAN. |
| DE | 150 Ø OR 100 Ø C.I. DEAD END CAP M.E., OR 63# DEAD END CAP WITH CONCRETE THRUST BLOCK. |
| EXISTING WATER MAN AND FIXTURES | — SIZES AND TYPES AS NOTED |

amendments					
A	ORIGINAL ISSUE FOR OPERATIONAL WORKS APPROVAL				01.07.14
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(B)					
					
"Ocean Breeze Estate"					
STAGE 5B OF PROPOSED RESIDENTIAL SUBDIVISION AT BARRABAL DRIVE, COOYA BEACH					
DRAWING TITLE:		WATER RETICULATION PLAN			
DWG NUMBER		1301 - C07 AMDT A			
SCALE	HOR 1:500	DRAWN	J.P.		
(AT 1/ SITE)	VER	DESIGNED	J.P.		
DATE	JULY 2014	CHECKED	J.P.		
APPROVED	B. J. SMITH RPEQ No. 9326				



LONGITUDINAL SECTION BARRABUL DRIVE

SCALES: HOR: 1:500
VER: 1:50



amendments

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STAGE 5B OF PROPOSED RESIDENTIAL SUBDIVISION

AT BARRABUL DRIVE, COOYA BEACH

DRAWING TITLE: BARRABUL DRIVE – LONGITUDINAL SECTION

DWG NUMBER 1301 – C08

AMDT A

SCALE (AT A1 SIZE)

HOR 1:500

VER 1:50

DATE JULY 2014

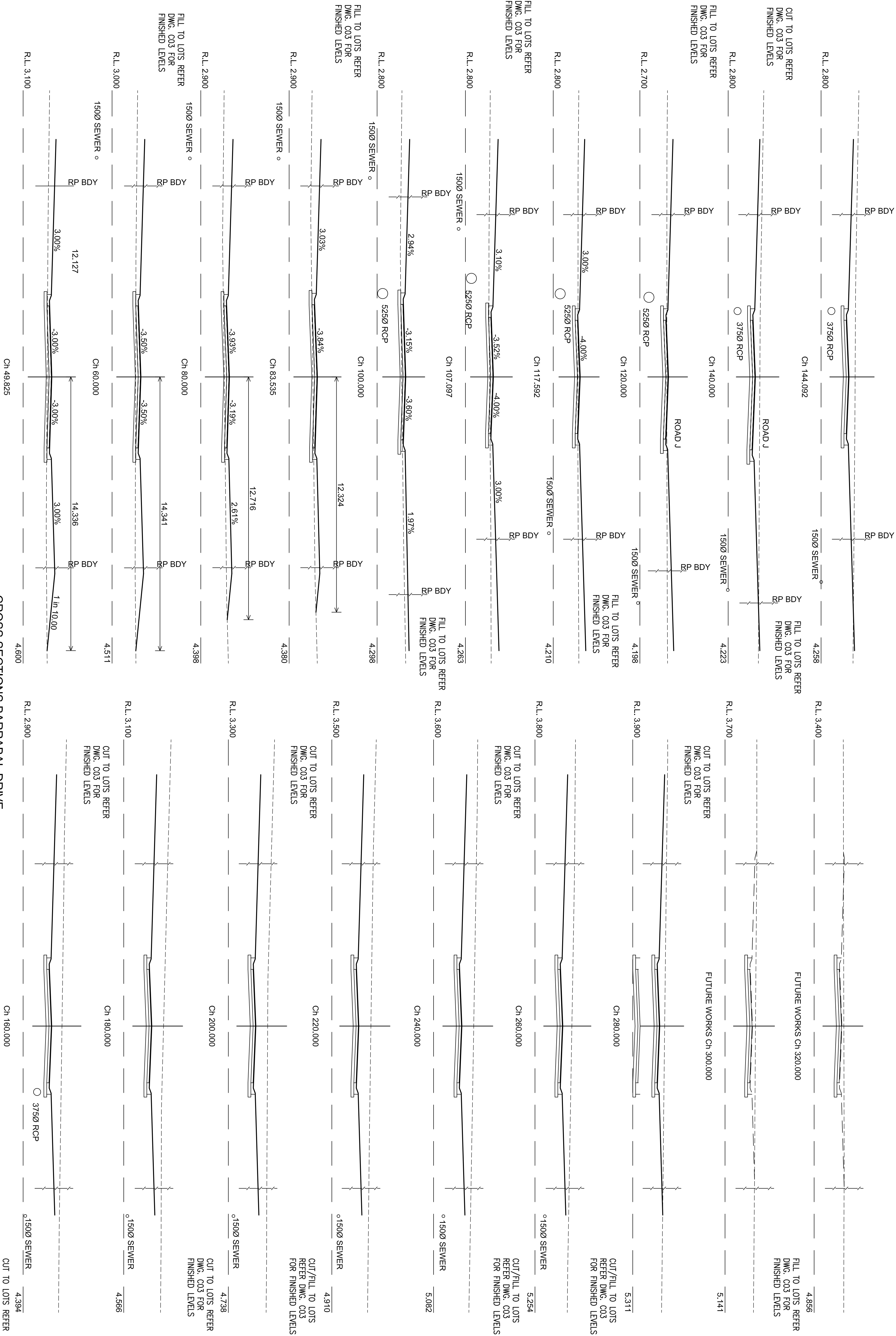
APPROVED

DRAWN J.P.

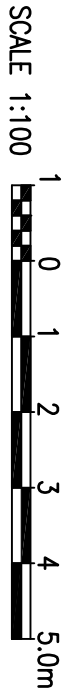
DESIGNED J.P.

CHECKED J.P.

B. J. SMITH RPEQ No. 9326



CROSS SECTIONS BARRABUL DRIVE
 SCALES: HOR: 1:100
 VER: 1:100



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STAGE 5B OF PROPOSED RESIDENTIAL SUBDIVISION

AT BARRABUL DRIVE, COOYA BEACH

DRAWING TITLE: BARRABUL DRIVE – CROSS SECTIONS.

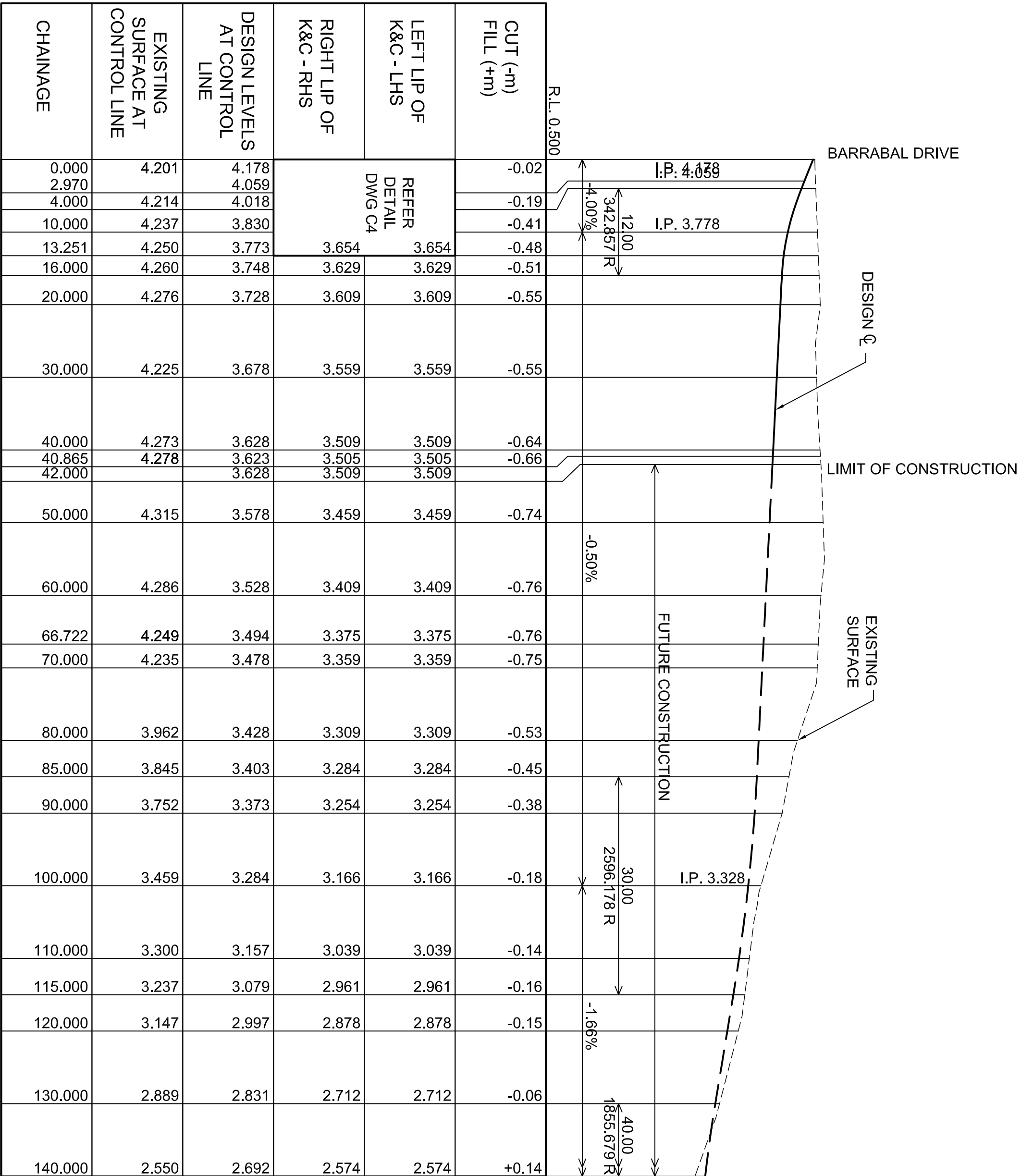
SCALE (AT A1 SIZE)	HOR	1:100	DRAWN	J.P.
DATE	JULY 2014	DESIGNED	J.P.	
APPROVED		CHECKED	J.P.	

DWG NUMBER

1301 – C09

AMDT

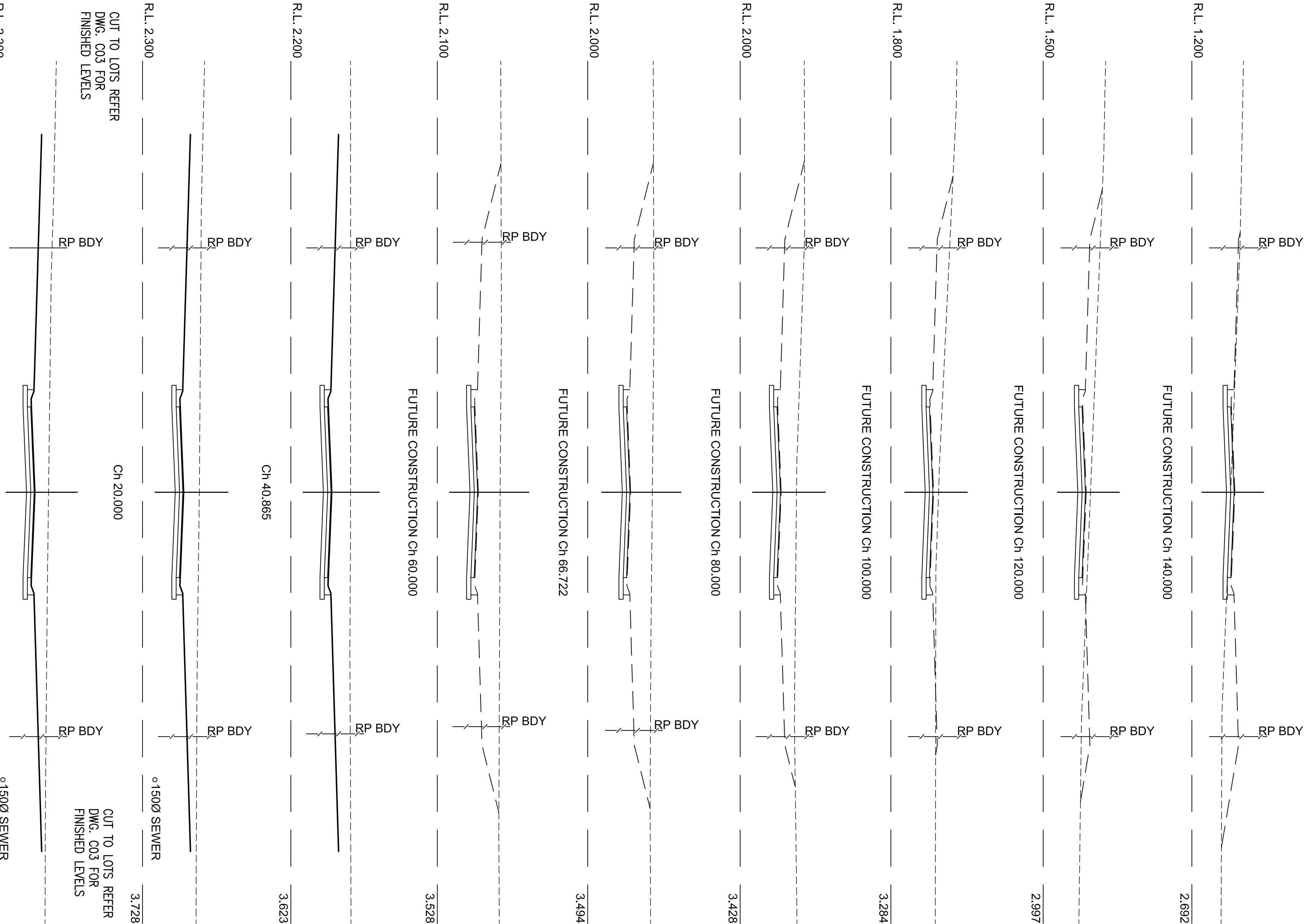
A



CUT (-m) FILL (+m)	LEFT LIP OF K&C - LHS	RIGHT LIP OF K&C - RHS	DESIGN LEVELS AT CONTROL LINE	EXISTING SURFACE AT CONTROL LINE	CHAINAGE
-0.02	REFER DETAIL DWG C4	3.654	4.178	4.201	0.000
-0.19			4.059	4.214	2.970
-0.41			4.018	4.237	4.000
-0.48	3.654	3.629	3.830	4.250	10.000
-0.51	3.629	3.609	3.773	4.260	13.251
-0.55	3.609	3.559	3.748	4.276	16.000
			3.728		20.000
-0.55	3.559	3.509	3.678	4.225	30.000
-0.64	3.509	3.509	3.628	4.273	40.000
-0.66	3.505	3.509	3.623	4.278	40.865
	3.509		3.628		42.000
-0.74	3.459	3.459	3.578	4.315	50.000
-0.76	3.409	3.409	3.528	4.286	60.000
-0.76	3.375	3.375	3.494	4.249	66.722
-0.75	3.359	3.359	3.478	4.235	70.000
-0.53	3.309	3.309	3.428	3.962	80.000
-0.45	3.284	3.284	3.403	3.845	85.000
-0.38	3.254	3.254	3.373	3.752	90.000
-0.18	3.166	3.166	3.284	3.459	100.000
-0.14	3.039	3.039	3.157	3.300	110.000
-0.16	2.961	2.961	3.079	3.237	115.000
-0.15	2.878	2.878	2.997	3.147	120.000
-0.06	2.712	2.712	2.831	2.889	130.000
+0.14	2.574	2.574	2.692	2.550	140.000

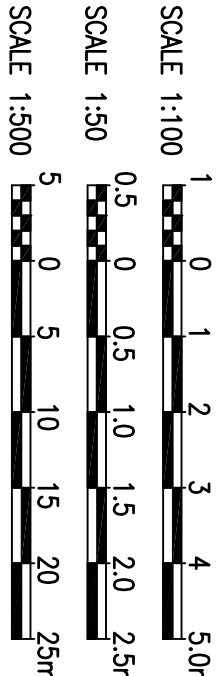
LONGITUDINAL SECTION ROAD J

SCALES: HOR: 1:500
VER: 1:50



CROSS SECTIONS ROAD J

SCALES: HOR: 1:100
VER: 1:100



amendments

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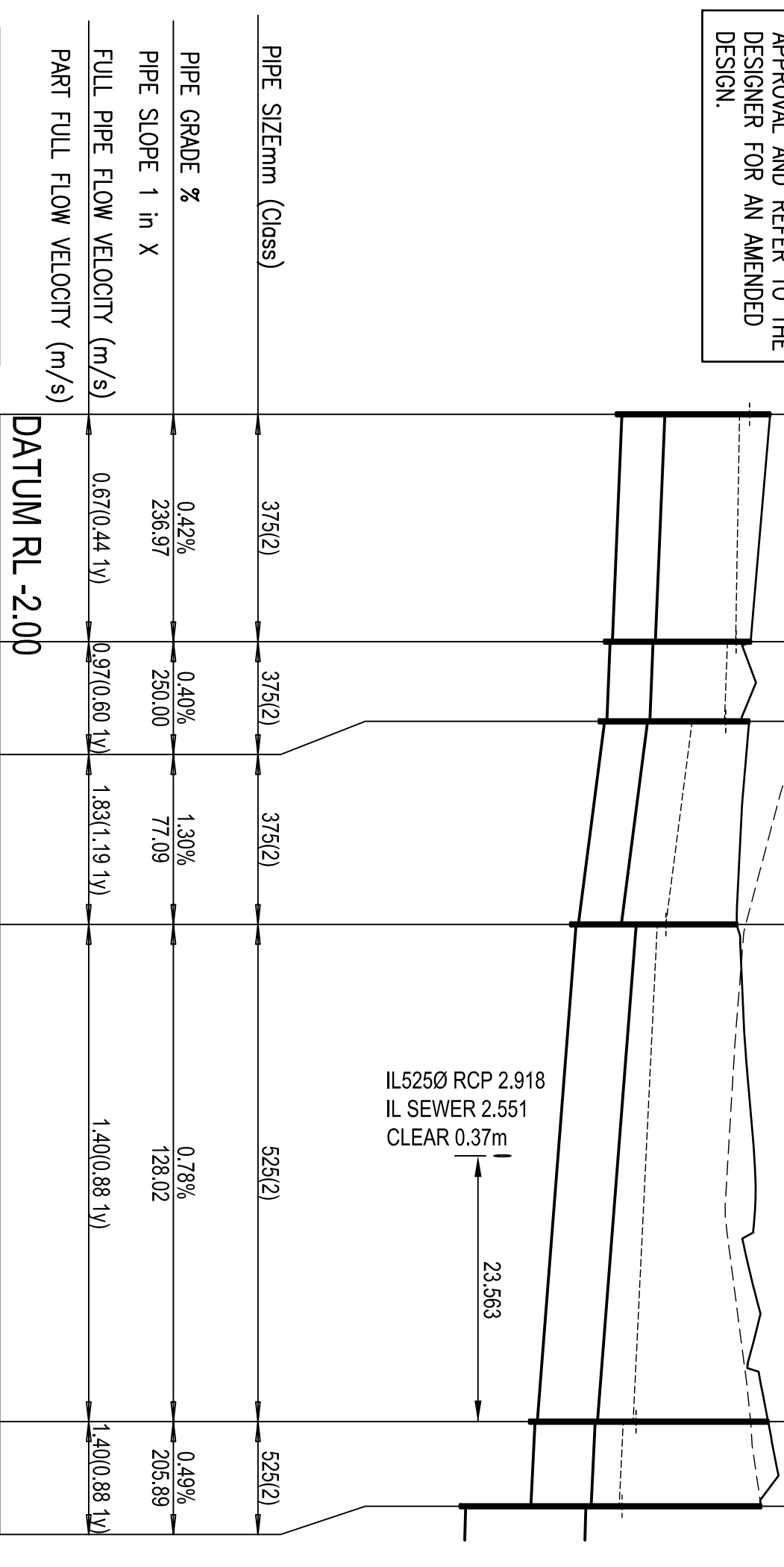
STAGE 5B OF PROPOSED RESIDENTIAL SUBDIVISION
AT BARRABAL DRIVE, COOYA BEACH

DRAWING TITLE: ROAD J – LONGITUDINAL AND CROSS SECTIONS

SCALE (AT A1 SIZE)	HOR 1:500/100	VER 1:50/100	DESIGNED	J.P.
DATE	JULY 2014	CHECKED	J.P.	
APPROVED	B. J. SMITH RPEQ No. 9326			
DWG NUMBER	1301 – C10	AUDT	A	

STRUCTURE NAME	STRUCTURE DESCRIPTION
4/61	KERB PIT ON GRADE SMALL LINTEL (10% Blockage)
4/61	KERB PIT ON GRADE SMALL LINTEL (10% Blockage)
3/61	KERB PIT ON GRADE SMALL LINTEL (10% Blockage)
2/61	KERB INLET IN SAG SMALL LINTEL
1/61	1050Ø MANHOLE TO FNQROC STD DWG S1065
6/1EX	EXISTING MANHOLE

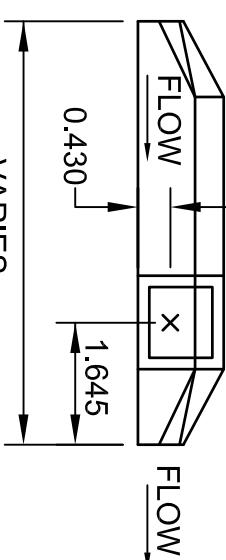
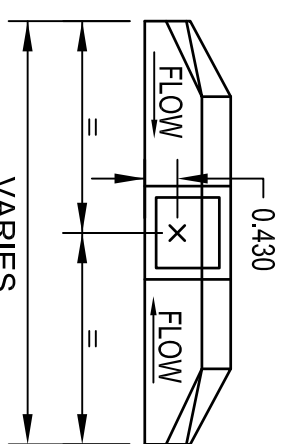
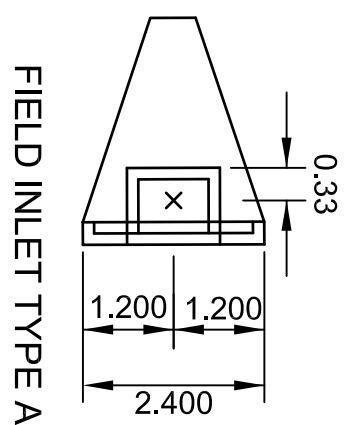
NOTE: IF "BRO PIT'S" ARE TO BE USED, THEN THE CONTRACTOR SHALL OBTAIN COUNCIL'S APPROVAL AND REFER TO THE DESIGNER FOR AN AMENDED DESIGN.



WATER LEVEL IN STRUCTURE						4.657	4.657
HYDRAULIC GRADE LEVEL						4.569	
PIPE FLOW (Cumecs)						0.076	
PIPE CAPACITY AT GRADE (Cumecs)						0.119	
DEPTH TO INVERT						0.116	
INVERT LEVEL OF DRAIN						0.208	
DESIGN SURFACE LEVEL						0.208	
ROAD CHAINAGE (OFFSET)						0.313	
RUNNING CHAINAGE						0.313	
0.000	168.982	4.839				4.657	4.657
20.150	(2.970R)		3.526	1.313		4.569	
20.150	148.836	4.754	3.441	1.313		4.534	4.537
7.060	(2.970R)		3.421	1.333		4.461	
27.210	147.336	4.748	3.393	1.355		4.435	4.445
18.000	(2.970L)		3.373	1.375		4.148	
45.210	129.337	4.672	3.139	1.533		3.915	3.915
44.070	(2.970L)		3.119	1.553		3.839	
89.280		4.250	2.775	1.475		3.625	3.651
7.500			2.755	1.495		3.537	
96.780		4.330	2.719	1.611		3.501	3.527
3.286							

LINE 61

STORMWATER SETOUT POINTS				
Point #	Existing	Northing	Level	Description
201	9104.362	80443.304	4.250	6/1/c
202	9101.046	80450.831	4.250	7/61
203	9062.223	80470.878	4.672	2/61
204	9045.758	80478.151	4.748	3/61
205	9041.177	80465.071	4.754	4/61
206	9022.748	80443.710	4.839	5/61



NOTES:

SET OUT POINT IS CENTRE OF GRATE

WIDTH IS DIMENSION PERPENDICULAR TO PRECAST BACKSTONE (i.e. TYPICALLY PERPENDICULAR TO THE LINE OF THE KERB AND CHANNEL)

LENGTH IS DIMENSION PARALLEL TO THE LINE OF THE KERB AND CHANNEL.

INSTALL 2.0m SUB SOIL DRAIN AS REQUIRED BY F90RQC DWGS.

PIPE LENGTHS SHOWN ARE MEASURED FROM CENTRE OF GRATE TO CENTRE OF GRATE

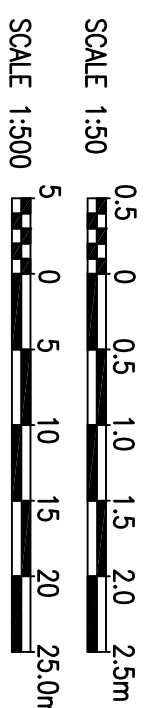
ALL STORMWATER DRAIN PIPES SHALL BE R.C. PIPES CLASS 2 11 TO AS 4085

FSL NOTED IS THE EDGE OF THE KERB AND CHANNEL PERPENDICULAR TO THE SETOUT POINT.

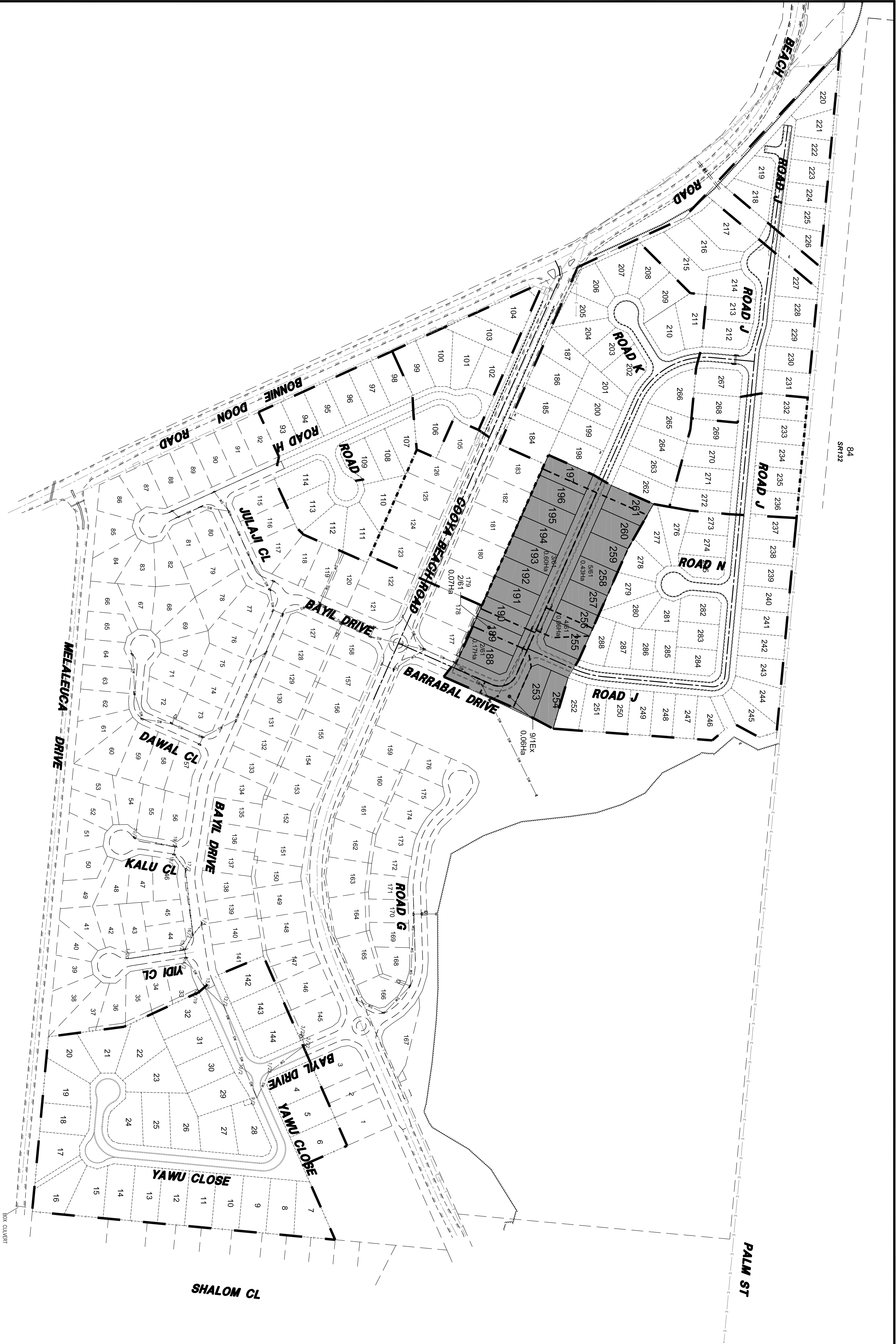
INTEL LENGTHS NOTED INCLUDE TRANSMISSION LENGTHS.

STORMWATER DRAINAGE SET OUT DETAILS

PIT SCHEDULE									
PIT No.	TYPE	INTERNAL		INLET		OUTLET		F.S.L.	PIT DEPTH
		WIDTH	LEN.	DIA.(C)	INV R.L.	DIA.(C)	INV R.L.		
5/61	KERB INLET ON GRADE SMALL LINTEL 10% BLOCKAGE	835	930			375(2)	3.526	4.839	1.31
4/61	KERB INLET ON GRADE SMALL LINTEL 10% BLOCKAGE	835	930	375(2)	3.441	375(2)	3.421	4.754	1.33
3/61	KERB INLET ON GRADE SMALL LINTEL 10% BLOCKAGE	835	930	375(2)	3.393	375(2)	3.373	4.748	1.38
2/61	KERB INLET IN SAG SMALL LINTEL	835	930	375(2)	3.139	525(2)	3.119	4.672	1.55
1/61	105600 MANHOLE TO FNRORC STD DWG S.1005	105000		525(2)	2.775	525(2)	2.755	4.250	1.49



JIM PAPAS					
CIVIL ENGINEERING DESIGNER PTY. LTD.					
CIVIL ENGINEERING DESIGN AND DRAFTING					
P.O. Box 2347 Mareeba Q 4880 Email: jdpap@jpced.com.au Mob: 0408 770 394					
 DIAL BEFORE YOU DIG www.1100.com.au					
"Ocean Breeze Estate"					
STAGE 5B OF PROPOSED RESIDENTIAL SUBDIVISION AT BARRABAL DRIVE, COOYA BEACH					
DRAWING TITLE: STORMWATER DRAINAGE- LONGITUDINAL SECTION, SET OUT DATA, PTT SCHEDULE AND NOTES					
SCALE	HOR	1:500	DRAWN	J.P.	
(AT A1 SIZE)	VER	1:50	DESIGNED	J.P.	
DATE		JULY 2014	CHECKED	J.P.	
APPROVED	B. J. SMYTH RPEQ No. 9326				
DWG NUMBER	1301 - C11		AMDT	A	



[illegible]

EXTENT OF STAGE 5B STORMWATER DRAINAGE WORKS

amendments ORIGINAL ISSUE FOR OPERATIONAL WORKS APPROVAL 01.07.14		JIM PAPAS CIVIL ENGINEERING DESIGNER PTY. LTD. CIVIL ENGINEERING DESIGN AND DRAFTING P. O. Box 2347 Mob. 0408 770 394 Email: admin@jpced.com.au Waverley Q 4880	
 DIAL BEFORE YOU DIG www.1100.com.au			
"Ocean Breeze Estate" STAGE 5B OF PROPOSED RESIDENTIAL SUBDIVISION AT BARRABAL DRIVE, COOYA BEACH		DRAWING TITLE: STORMWATER DRAINAGE CALCULATION SHEET	
SCALE	HOR. N.T.S.	DRAWN	J.P.
(AT 1:1 SIZE)	VER	DESIGNED	J.P.
DATE	JULY 2014	CHECKED	J.P.
APPROVED	B. J. SMYTH P.ENG No. 9326		
DWG NUMBER	1301 - C14		AMDT A