Please address all correspondence to: P.O. Box 2347, Mareeba QLD 4880 PTY LTD. ABN 56 010 943 905. ACN 010 943 905 Design Excellence, Exceptional Service

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

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 PAP

DOUGLAS SHIRE COUNCIL Received File Name O.P.282/2014 Document No. - 8 JUL 2014 Attention N.R.B Information 8/0 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.

JPCE

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

 Postal address

 Suburb

 Suburb

 State
 Postcode

 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 pr	proposed and what type of approval is being sought?			
Tab	IE A—Aspect 1 of the application (If there are	e additional aspects to the application please list in Table B—Aspect 2.)			
a)	What is the nature of the development? (Plea	ease only tick one box.)			
	Material change of use Reconfigu	guring a lot Duilding work Operational work			
b)	What is the approval type? (Please only tick	k one box.)			
	Preliminary approval Preliminar under s241 of SPA under s24 of SPA	ary approval Development permit 241 and s242			
c)	Provide a brief description of the proposal, in applicable (e.g. six unit apartment building de	including use definition and number of buildings or structures where defined as a <i>multi-unit dwelling</i> , 30 lot residential subdivision etc.)			
d)	What is the level of assessment? (Please only	nly tick one box.)			
	Impact assessment Code asse	sessment			
Tab Add	IE B —Aspect 2 of the application (If there are litional aspects of the application.)	e additional aspects to the application please list in Table C—			
a)	What is the nature of development? (Please	e only tick one box.)			
	Material change of use Reconfigu	guring a lot Duilding work Operational work			
b)	What is the approval type? (Please only tick	k one box.)			
	Preliminary approval under s241 of SPA of SPA	ary approval Development 241 and s242 permit			
c)	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 <i>multi-unit dwelling</i> , 30 lot residential subdivision etc.)				
d)	What is the level of assessment?				
	Impact assessment Code assessment				
Tab sep	Ie C—Additional aspects of the application (If arate table on an extra page and attach to this	If there are additional aspects to the application please list in a is form.)			
	Refer attached schedule Not requir	ired			

2.	Locatio	n of the pr	emises (Complete	e Table D	and/or Ta	able E as a	pplicable	e. Identif	fy each lot in a separate row.)
Table adjace (Attach	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.)								
	Stree	et address a	and lot on plan (Al	l lots mus	t be listed	.)			
	Stree deve	et address a lopment in	and lot on plan for water but adjoining	the land a g or adjac	adjoining o ent to lan	or adjacent d, e.g. jetty	to the p , pontoo	remises n. All lot	(Appropriate for s must be listed.)
Street	addres	S			Lot on plan description			Local government area (e.g. Logan, Cairns)	
Lot	Unit no.	Street no.	Street name and o suburb/ locality na	official Ime	Post- code	Lot no.	Lot no. Plan type and plan no.		
i)									
ii)									
iii)									
Plann i separa	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	t Applicable zone / precinct			Applicable local plan / precinct Appli			Applica	able 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	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 ap	oplication? (Refer to notes at the en	nd 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 applie	ation.			
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 as	sessment manager.			
Table H					
Name of owner/s of the land					
By making this application, I, the applicant, decl	are that the owner has given written co	nsent 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, cana	I)—complete Table I			
On strategic port land under the <i>Transport</i>	rt Infrastructure Act 1994—complete	Table J			
In a tidal water area—complete Table K					
On Brisbane core port land under the Tra	nsport Infrastructure Act 1994 (No ta	able 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			

Tab	Table K					
Nam	ne of local government for the tidal area (if applicable)	Port author	prity for the tidal area (if applicable)		
8.	Are there any existing easements or water etc)	n the premises?	(e.g. for vehic	cular access, electricity, overland flow,		
	No Yes—ensure the type, loca	tion and dimensi	on of each ea	sement is included in the plans submitted		
9.	Does the proposal include new build services)	ding work or op	erational wor	k on the premises? (Including any		
	No Yes—ensure the nature, lo	cation and dimer	nsion of propos	sed works are included in plans submitted		
10.	Is the payment of a portable long se end of this form for more information.)	rvice leave levy	applicable to	this application? (Refer to notes at the		
	No—go to question 12 Yes					
11.	Has the portable long service leave information.)	levy been paid?	(Refer to note	es at the end of this form for more		
	No					
	Yes—complete Table L and submit with receipted QLeave form	this application	the yellow loca	al government/private certifier's copy of the		
Tab	le L					
Amo	ount paid		Date paid (dd/mm/yy)	QLeave project number (6 digit number starting with A, B, E, L or P)		
12.	12. Has the local government agreed to apply a superseded planning scheme to this application under section 96 of the <i>Sustainable Planning Act 2009</i> ?					
	 │ No					
	Yes—please provide details below					
Nam	Name of local government Date of writte by local gover (dd/mm/yy)		notice given ment	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 noncompliance 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

То	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

Director of the below mentioned company and

I. John Patrick Kelly Director

ment encore o fa

Content simplify in the uncondition date for the energy proceeding. Detert the above notice and company particle first as manphels on for a propertary sumpany that has a rich director who is near the conditional precisitive only that date that date to incompate the content scheduly.

Of Jonpa Pty. Ltd.

nome of amongs?

Locard

as owner of premises identified as follows:

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

"insert infreet address, lot on 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.

[ment name of applicant]

on the premises described above for the purposes of

An application for Operational Works to for Stage 5B

interf datails of the programs developed	ient lo gi material chango ol	fuch for these storey apartment	bu ising!
1/			
10-	, . .		(signature of Director)
	/		

signed on the	2	day of	July	20 14
	flally		legnalure of l	Frecha compose secretar
signed on the	Secono	day of	JULY	20 ('

Company seal if used;

The Sustainable Planning Act 2009 is administered by the Department of Infrastructure and Planning, Queensland Government

Scanned by CamScanner

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—c	omplete Table B
Tab	ole A		
a)	What is the nature of the building work (e.g building)?	. building, repairing, altering, ur	derpinning, moving or demolishing a
b)	Are there any current approvals associated	with this application? (e.g. mat	erial change of use.)
	No Yes— provide details	below	
l	ist 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 by	oxes)			
Road works Stormwater Wat	ter infrastructure			
Drainage works Earthworks Sew	verage infrastructure			
Landscaping Signage Clea	aring 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.)			
List of approval reference/s Date approved (dd/r	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	on accompanies this application			
Mandatory supporting informationConfirmation of lodgementMethod 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:	Confirmed			
• the location and site area of the land to which the application relate (<i>relevant land</i>)	es			
the north point				
 the boundaries of the relevant land the allotment layout showing existing lots, any proposed lots (include) 	ding the			
dimensions of those lots), existing or proposed road reserves, build envelopes and existing or proposed open space (note: numbering required for all lots)	ding is			
 any existing or proposed easements on the relevant land and their function 				
any access limitation atring				

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	
Applications for building work (including extensions and demolition that	is assessable develo	opment)
 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) 	Confirmed	
 the gross floor area of each proposed floor area. 		
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	
Plans showing the size, location, proposed site cover, proposed maximum number of storeys, and proposed maximum height above natural ground leve of the proposed new building work.	Confirmed	
Plans showing the extent of any demolition that is assessable development.	Confirmed	
Applications for operational work involving earthworks (filling and excave	vating)	
Drawings showing:	Confirmed	
 existing and proposed contours 		
 areas to be cut and filled 		
 areas to be cut and lined 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) 		
Applications for operational work involving roadworks		
Drawings showing:		
 existing and proposed contours 	Not applicable	
 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 	i i	
street furniture		

 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 shore a point of the second second		
Changes in surfacing material.		
Applications for operational work involving stormwater drainage	Γ	
Drawings showing:	Confirmed	
 existing and proposed contours 	Not applicable	
 drainage locations, diameters and class of pipe, open drains and 		
easements		
 manhole location, chainage and offset or coordinates and inlet and outlet invert levels 		
invent levels		
levels.		
Applications for operational work involving water reticulation		
 kerb lines or edge of pavement where kerb is not constructed leastion and levels of other utility services where affected by water. 		
 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. 		
Applications for operational work involving sewerage reticulation		
Drawings showing:	Confirmed	
 location of all existing and proposed services 	Not applicable	
 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 mannole and mannole cover ning diameter, type of ning and ning alignment 		
 pipe diameter, type of pipe and pipe alignment leastion of bound connections (if applicable) 		
focation of nouse connections (if applicable) sower nume station details (if applicable)		
Applications for operational work involving street lighting		
Drawings showing:		
 location of all light poles and service conduits 	Not applicable	
location of all other cross road conduits		
• type of wattage and lighting		
 any trainic calming devices additional plana for round-bauta and major roads (if annliable) 		
 automotial plans for roundabouts and major roads (II applicable) details of any variations to normal alignment 		

		1	
٠	details of lighting levels.		
Ар	plications for operational work involving public utility services		
Dra	awings showing:	Confirmed	
•	any existing light poles and power poles	Not applicable	
٠	any existing underground services		
٠	details of proposed services		
•	alteration to existing services.		
Ар	plications for operational work involving landscaping works		
Dra	awings showing:	Confirmed	
•	the location of proposed plant species	Not applicable	
•	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.		

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.

OFFICE USE ONLY

Date received

Reference numbers

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.

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PROJECT REPORT

GENERAL DESCRIPTION

The proposed site is located ain 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.

PRELODGMENT 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 **r**oad 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



FNQROC DEVELOPMENT MANUAL

(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



Name of Council: Mareeba Shire Council

Development Name and Location:

Ocean Breeze Estate Stage 5B Barrabal Drive, Cooya Beach

DESIGN SUBMISSION	<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 <u>www.ipa.qld.gov.au</u>)	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</u> <u>each condition</u> is to be addressed (Statement <u>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 ltg. layout design, to avoid conflicts. 	N.A.	Landscape design shall be subject to a separate submission by Suzan Quigg Landscape Design



DESIGN SUBMISSION	<u>CHECK</u>	COMMENT
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.	



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)





ENOURIES: DEPARTMENT: EMAIL:

OUR REF: YOUR REF:

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

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

ALL COMMUNICATIONS TO BE PHONE (07) 4099 9444 FACSIMILE (07) 4098 2902 ADMINISTRATION CENTRE ADDRESSED TO: INTERNET www.dsc.qld.gov.au (ALL DEPARTMENTS) THE CHIEF EXECUTIVE OFFICER 64-66 FRONT STREET, MOSSMAN P.O. BOX 357 PHONE (07) 4099 9496 FACSIMILE (07) 4098 3298 MOSSMAN, QLD 4873 LIBRARY 14 MILL ST., MOSSMAN

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 culde-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 within12 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.
 - (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.

8.

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 12months 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

- (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
 - (i) 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)
Formation	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 22^{nd} 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

MON

Paul Trotman General Manager Development & Environment

PTY LTD. ABN 56 010 943 905. ACN 010 943 905 Design Excellence, Exceptional Service

> APPENDIX C Water Reticulation Report



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

PTY LTD. ABN 56 010 943 905. ACN 010 943 905 Design Excellence, Exceptional Service

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

APPENDIX C

WATER SUPPLY RETICULATION REPORT

FOR

OCEAN BREEZE ESTATE

Α

RESIDENTIAL SUBDIVISION

AT

COOYA BEACH ROAD

COOYA BEACH

Date: December 11, 2013



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

Design Excellence, Exceptional Service

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 < 900m² Lots > 900m² 2.8 persons per connection

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 < $900m^2 = 0.016L/sec$ Average Day demand for lot > $900m^2 = 0.018L/sec$ Peak hour demand for lot < $900m^2 = 0.073L/sec$ 2/3 Peak Hour Demand = 0.049L/sec

Peak hour demand for lot > $900m^2 = 0.081L/sec 2/3$ Peak Hour Demand = 0.054L/secFrom the figures shown above it can 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 $\frac{2}{3}$ 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 3.5MLcapacity. 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



14-02-05;15:29 ;Doublas Shire Council : +61 SINCLAIR KNIGHT MERZ facsimile REC'D 14 FEB 2005 PMGB VVHC 动动动 transmission Noted 村 11 - HOJECT No. OUR REF: TO: Wade Quin FILE YOUR REF: SKM COMPANY: DATE: 14 February 2005 4031 3967 FAX NO: PAGES: (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.gld.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 Coaya Beach MESSAGE: Wade Jud attack shetches of Site exceptions and Receive Site Regula WATCH





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APPENDIX C2 WATER RETICULATION MASTER PLANS







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> APPENDIX C3 MODEL RESULTS



1253-	12 Scenario 12 Existing PH Flows Co	nstant Pressure
Page 1	ŭ 11-	Dec-13 7:55:45 AM
******	* * * * * * * * * * * * * * * * * * * *	* * * * * * * * * * * * * * * * * *
*	EPANET	*
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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:

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Li nk I D	Start Node	End Node		Length m	Diameter mm
$ \begin{array}{c} 18\\ 19\\ 20\\ 23\\ 25\\ 26\\ 27\\ 28\\ 29\\ 30\\ 31\\ 36\\ 37\\ 38\\ 39\\ 40\\ 41\\ 45\\ 46\\ 47\\ 48\\ 49\\ 50\\ 51\\ 52\\ 53\\ 54\\ 21\\ 22\\ 59\\ 60\\ 67\\ 68\\ \end{array} $	$\begin{array}{c} 115\\ 116\\ 116\\ 119\\ 120\\ 120\\ 121\\ 121\\ 122\\ 129\\ 123\\ 130\\ 130\\ 132\\ 132\\ 132\\ 134\\ 134\\ 138\\ 138\\ 138\\ 139\\ 139\\ 140\\ 141\\ 142\\ 143\\ 143\\ 145\\ 117\\ 101\\ 151\\ 151\\ 101\\ 151\\ 151\end{array}$	$\begin{array}{c} 116\\ 117\\ 120\\ 120\\ 121\\ 142\\ 122\\ 130\\ 129\\ 123\\ 124\\ 131\\ 132\\ 133\\ 134\\ 135\\ 136\\ 139\\ 145\\ 140\\ 143\\ 141\\ 115\\ 143\\ 144\\ 145\\ 146\\ 119\\ 151\\ 119\\ 118\\ 151\\ 117\\ \end{array}$		$\begin{array}{c} 29\\ 244\\ 15\\ 188\\ 95\\ 170\\ 42\\ 150\\ 61\\ 22\\ 68\\ 175\\ 87\\ 121\\ 79\\ 145\\ 25\\ 13\\ 85\\ 86\\ 15\\ 173\\ 90\\ 167\\ 241\\ 76\\ 149\\ 15\\ 210\\ 96\\ 982\\ 205\\ 136\end{array}$	$\begin{array}{c} 104.\ 3\\ 104.\ 3\\ 104.\ 3\\ 202.\ 2\\ 104.\ 3\\ 202.\ 2\\ 104.\ 3\\ 202.\ 2\\ 104.\ 3\\ 105.\ 225.\$
Page 2 Link - Node T	able: (continue	d)			Scenario 12
Li nk I D	Start Node	End Node	_	Length	Diameter mm
1	50	101	Page 1	1	450

1253-12 Scenario 12 Existing PH Flo	ows Constant Pressure
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Node Results:

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Node I D	Demand LPS	Head m	Pressure m	Quality	
$ \begin{array}{c} 101\\ 115\\ 116\\ 117\\ 119\\ 120\\ 121\\ 122\\ 123\\ 124\\ 129\\ 130\\ 131\\ 132\\ 133\\ 134\\ 135\\ 136\\ 138\\ 139\\ 140\\ 141\\ 142\\ 143\\ 144\\ 145\\ 146\\ 151\\ 118\\ 50\\ \end{array} $	$\begin{array}{c} 0. \ 00\\ 0. \ 07\\ 0. \ 49\\ 0. \ 57\\ 0. \ 54\\ 0. \ 39\\ 0. \ 15\\ 0. \ 15\\ 0. \ 27\\ 0. \ 73\\ 0. \ $	$\begin{array}{c} 48.50\\ 40.66\\ 40.71\\ 41.23\\ 41.24\\ 40.71\\ 39.99\\ 39.97\\ 39.93\\ 39.92\\ 39.92\\ 39.94\\ 39.34\\ 39.32\\ 39.10\\ 39.06\\ 39.01\\ 39.06\\ 40.23\\ 40.24\\ 40.21\\ 40.51\\ 40.46\\ 40.24\\ 40.21\\ 40.51\\ 40.46\\ 40.24\\ 40.51\\ 40.51\\ 40.51\\ 40.51\\ 40.51\\ 40.51\\ 40.51\\ 40.51\\ 40.54\\ 48.50\\ \end{array}$	$\begin{array}{c} 45.\ 00\\ 35.\ 76\\ 35.\ 11\\ 34.\ 63\\ 35.\ 94\\ 34.\ 91\\ 33.\ 09\\ 33.\ 07\\ 33.\ 63\\ 33.\ 22\\ 33.\ 74\\ 32.\ 29\\ 32.\ 32\\ 32.\ 13\\ 32.\ 00\\ 33.\ 76\\ 33.\ 76\\ 33.\ 01\\ 34.\ 46\\ 35.\ 03\\ 34.\ 94\\ 33.\ 51\\ 34.\ 61\\ 33.\ 36\\ 34.\ 94\\ 33.\ 51\\ 34.\ 61\\ 33.\ 36\\ 34.\ 84\\ 35.\ 01\\ 36.\ 76\\ 36.\ 97\\ 34.\ 74\\ 36.\ 44\\ 0.\ 00\\ \end{array}$	0.00 0.00	Reservoi r
Page 3 Link Results:					Scenario 12
Li nk I D	FI ow LPS	VelocityUr m/s	nit Headloss m/km	s Statu	JS
18 19 20 23 25 26 27 28 29 30 31 36 37 38 39 40 41 45	-2. 36 -2. 65 -0. 20 19. 18 5. 22 13. 37 1. 22 3. 85 1. 07 1. 00 0. 73 0. 51 2. 83 0. 80 1. 66 0. 95 0. 49 -1. 78	0. 28 0. 31 0. 02 0. 60 0. 61 0. 42 0. 14 0. 45 0. 13 0. 12 0. 09 0. 06 0. 33 0. 09 0. 19 0. 11 0. 06 0. 21	1. 75 2. 16 0. 02 2. 81 7. 57 1. 44 0. 51 4. 31 0. 40 0. 35 0. 20 0. 10 2. 44 0. 23 0. 91 0. 32 0. 09 1. 04 Page 2	Open Open Open Open Open Open Open Open	

46	1253-12	Scenari o	12 Existing	PH Flows	Constant	Pressure
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	0pen	
51		12.81	0.40	1.33	0pen	
52		0. 58	0.07	0. 13	0pen	
53		11.54	0.36	1. 10	0pen	
54		12.41	0.39	1. 25	0pen	
21		-3.22	0.08	0.06	0pen	
22		30. 97	1. 71	27.41	0pen	
59		22.94	1.26	15.72	0pen	
60		8.03	0.44	2.25	0pen	
67		0.00	0.00	0.00	CI osed	
68		0.00	0.00	0.00	CI osed	
1		30. 97	0. 19	0. 16	0pen	

1253-1	13 Scenario 13 Full Dev PH Consta	nt Pressure
Page 1	11-[Dec-13 7:56:17 AM
******	* * * * * * * * * * * * * * * * * * * *	*****
*	ΕΡΑΝΕΤ	*
*	Hydraulic and Water Quality	*
*	Analysis for Pipe Networks	*
*	Version 2.0	*
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Input File: 1253-13 Scenario 13 Full Dev PH Constant Pressure.net

Scenario 13

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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.

Li nk I D	Start Node	End Node	Length m	Diameter mm
2 3 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37	$\begin{array}{c} 101 \\ 102 \\ 110 \\ 111 \\ 111 \\ 111 \\ 112 \\ 112 \\ 112 \\ 112 \\ 112 \\ 114 \\ 107 \\ 106 \\ 107 \\ 108 \\ 105 \\ 115 \\ 116 \\ 116 \\ 119 \\ 120 \\ 120 \\ 121 \\ 121 \\ 122 \\ 129 \\ 123 \\ 126 \\ 128 \\ 128 \\ 128 \\ 128 \\ 130 \\ 130 \end{array}$	$102 \\ 110 \\ 111 \\ 103 \\ 108 \\ 112 \\ 113 \\ 114 \\ 104 \\ 107 \\ 106 \\ 105 \\ 108 \\ 109 \\ 115 \\ 108 \\ 109 \\ 115 \\ 116 \\ 117 \\ 120 \\ 120 \\ 120 \\ 120 \\ 120 \\ 120 \\ 120 \\ 120 \\ 120 \\ 120 \\ 121 \\ 142 \\ 122 \\ 130 \\ 129 \\ 123 \\ 124 \\ 128 \\ 125 \\ 127 \\ 129 \\ 131 \\ 132 \\ 132 \\ 132 \\ 131 \\ 132 \\ 101 $	$\begin{array}{c} 30\\ 183\\ 23\\ 11\\ 77\\ 165\\ 67\\ 22\\ 11\\ 216\\ 24\\ 36\\ 233\\ 83\\ 60\\ 29\\ 244\\ 15\\ 188\\ 154\\ 95\\ 170\\ 42\\ 150\\ 61\\ 22\\ 68\\ 20\\ 10\\ 57\\ 78\\ 175\\ 87\end{array}$	$104. 3 \\ 104. 3 \\ 104. 3 \\ 104. 3 \\ 104. 3 \\ 104. 3 \\ 104. 3 \\ 104. 3 \\ 104. 3 \\ 104. 3 \\ 104. 3 \\ 104. 3 \\ 104. 3 \\ 104. 3 \\ 104. 3 \\ 104. 3 \\ 104. 3 \\ 104. 3 \\ 202. 2 \\ 104. 3 \\ 202. 2 \\ 104. 3 \\ 1$
Link - Node	Table: (cont	i nued)		Scenario 13
Li nk I D	Start Node	End Node	Length m	Diameter mm
38	132	133 Page 2	121	104. 3

39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 21 22 59 60 67 68 1 Node Results:	1253-13 Sce 132 134 134 136 137 137 138 138 139 140 141 142 143 145 147 109 105 117 101 151 151 151 50	nari o 13 Fu 134 135 136 137 147 138 139 145 140 143 141 115 143 144 145 146 148 110 108 119 151 119 151 119 151 119 151 117 101	ull Dev PH	Constant 79 145 25 65 80 81 13 85 86 15 173 90 167 241 76 149 216 157 288 15 210 96 982 205 136 1	Pressure 104. 3 104. 3 202. 2 104. 3 202. 2 202. 2 104. 3 202. 2 202. 2 104. 3 48. 4 48. 4 48. 4 225 152 152 152 225 225 225 450
Node I D	Demand LPS	Head m	Pressure m	Quality	
101 102 103 104 105 106 107 108 109 110 111 112 113 114	$\begin{array}{c} 0.\ 00\\ 0.\ 66\\ 0.\ 66\\ 0.\ 80\\ 0.\ 73\\ 0.\ 44\\ 0.\ 44\\ 0.\ 80\\ 0.\ 58\\ 0.\ 37\\ 0.\ 29\\ 0.\ 44\\ 0.\ 51\\ \end{array}$	$\begin{array}{r} 48.50\\ 48.20\\ 46.57\\ 46.42\\ 46.44\\ 46.43\\ 46.43\\ 46.43\\ 46.49\\ 46.48\\ 46.71\\ 46.58\\ 46.43\\ 46.43\\ 46.42\\ 46.43\end{array}$	45.00 44.80 42.77 43.02 42.34 42.33 42.03 42.49 39.38 43.31 42.78 43.03 41.22 43.03	$\begin{array}{c} 0.\ 00\\ 0.\ 0.\ 00\\ 0.\ 0.\ 00\\ 0.\ 0.\ 0.\ 0.\ 0.\ 0.\ 0.\ 0.\ 0.\ 0.\$	
Page 3 Node Results:	(continued)				Scenario 13
Node I D	Demand LPS	Head m	Pressure m	Quality	
115 116 117 119 120 121 122 123 124	0. 07 0. 49 0. 57 0. 54 0. 39 0. 15 0. 15 0. 27 0. 73	$\begin{array}{c} 46.\ 47\\ 46.\ 60\\ 47.\ 20\\ 47.\ 19\\ 46.\ 61\\ 46.\ 43\\ 46.\ 44\\ 46.\ 46\\ 46.\ 45\\ \end{array}$	41.57 41.00 40.60 41.89 40.81 39.53 39.54 40.16 39.75 Page 2	$\begin{array}{c} 0. \ 00\\ 0. \ 0. \$	

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1253-13 Scenar	io 13 Full	Dev PH	Constant Pressure
0. 51	46.59	40.89	0.00
0. 29	46.65	40.95	0.00
0. 29	46.59	40.19	0.00
0. 07	46.60	40.80	0.00
0. 07	46.47	40.27	0.00
0. 51	45.92	38.87	0.00
0. 51	45.90	38.90	0.00
0.37	45.77	38.77	0.00
0.80	45.74	38.64	0.00
0. 22	45.73	40.43	0.00
0.95	45.68	39.68	0.00
0.49	45.73	41.13	0.00
0. 08	45.74	41.84	0.00
0. 22	45.90	40.70	0.00
0. 16	45.96	40.66	0.00
0. 32	46.05	39.25	0.00
0.41	46.29	40.39	0.00
0.56	46.28	39. 18	0.00
0. 31	45.98	40. 58	0.00
0. 58	45.94	40.74	0.00
0.69	45.88	42.48	0.00
12.41	45.70	42.70	0.00
0. 81	45.63	42.23	0.00
1. 22	45.52	40.42	0.00
0.00	47.43	39.43	0.00
8.03	45.22	41.12	0.00
-41.62	48.50	0.00	0.00 Reservoir
	1253-13 Scenar 0. 51 0. 29 0. 29 0. 07 0. 07 0. 51 0. 51 0. 37 0. 80 0. 22 0. 95 0. 49 0. 08 0. 22 0. 95 0. 49 0. 08 0. 22 0. 16 0. 32 0. 41 0. 56 0. 31 0. 58 0. 69 12. 41 0. 81 1. 22 0. 00 8. 03 -41. 62	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$

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Page 4 Scenario 13 Link Results: -----Flow VelocityUnit Headloss Li nk Status ١D LPS m/s m/km ----_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _____ _ _ _ _ _ _ _ 0. 71 2 6.08 10.05 0pen 3 0.63 8. 13 5. 89 5.42 0pen 5 4.56 0.53 0pen Open Open 0.66 0.08 0.16 6 7 0.22 1.13 1.87 0.19 0.91 8 1.66 0pen 9 0.44 0.05 0.08 0pen 0.27 0.03 10 0.03 0pen 0.66 0.08 0.16 11 0pen 12 -0.24 0.03 0.03 0pen 13 0.14 0.02 0.01 0pen -0. 59 -0. 82 14 0.07 0.13 0pen 15 0.25 0.10 0pen 0.51 0.06 0.10 0pen 16 -1.30 0pen 17 0.15 0.57 -3.89 18 0.46 4.40 0pen 19 0.33 -2.86 2.48 0pen 20 -1.52 0.18 0.77 0pen 23 20.13 0.63 3.07 0pen 3. 41 2. 49 15. 72 24 0.40 3.46 0pen 25 0.29 1.93 0pen 0.49 1.94 26 0pen 27 -1.03 0.12 0.38 0pen 3.37 28 3.37 0.39 0pen 29 -1.18 0.14 0.48 0pen 30 1.00 0.12 0.35 0pen 0.09 0.73 0.20 31 0pen Page 3

	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	0pen
47	-1.80	0. 21	1.05	Open
48	-2.02	0. 24	1.31	0pen
49	-2.12	0. 25	1.42	Open
50	-2.53	0.30	1. 98	Open
51	15. 16	0.47	1.82	0pen

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Page 5 Link Results: (continued)

Scenario 13

$\begin{array}{c c c c c c c c c c c c c c c c c c c $	•	,			
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Li nk I D	FI ow LPS	VelocityUnit m/s	Headloss m/km	Status
	52 53 54 55 56 57 21 22 59 60 67 68 1	0.58 12.25 12.41 1.22 -0.29 -0.09 15.57 0.00 8.51 8.03 35.54 19.00 41.62	0. 07 0. 38 0. 39 0. 14 0. 16 0. 05 0. 39 0. 00 0. 47 0. 44 0. 89 0. 48 0. 26	0. 13 1. 22 1. 25 0. 51 1. 47 0. 18 1. 14 0. 00 2. 50 2. 25 5. 23 1. 64 0. 28	Open Open Open Open Open Open CI osed Open Open Open Open Open Open Open

1253-1	4 Scenario 14 Full Dev PH Flows Max.	Pressure
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*	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

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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.

Li nk I D	Start Node	End Node	Length m	Diameter mm
$\begin{array}{c} 2\\ 3\\ 5\\ 6\\ 7\\ 8\\ 9\\ 10\\ 11\\ 12\\ 13\\ 14\\ 15\\ 16\\ 17\\ 18\\ 19\\ 20\\ 23\\ 24\\ 25\\ 26\\ 27\\ 28\\ 29\\ 30\\ 31\\ 32\\ 33\\ 34\\ 35\\ 36\\ 37\\ 38\\ \end{array}$	$\begin{array}{c} 101 \\ 102 \\ 110 \\ 111 \\ 111 \\ 111 \\ 111 \\ 112 \\ 112 \\ 112 \\ 112 \\ 112 \\ 112 \\ 114 \\ 107 \\ 106 \\ 107 \\ 108 \\ 105 \\ 115 \\ 116 \\ 107 \\ 108 \\ 105 \\ 115 \\ 116 \\ 119 \\ 120 \\ 120 \\ 120 \\ 120 \\ 120 \\ 121 \\ 122 \\ 129 \\ 123 \\ 126 \\ 128 \\ 128 \\ 128 \\ 128 \\ 128 \\ 130 \\ 130 \\ 130 \\ 132 \end{array}$	$\begin{array}{c} 102 \\ 110 \\ 111 \\ 103 \\ 108 \\ 112 \\ 113 \\ 114 \\ 104 \\ 107 \\ 106 \\ 105 \\ 108 \\ 109 \\ 115 \\ 116 \\ 107 \\ 106 \\ 105 \\ 108 \\ 109 \\ 115 \\ 116 \\ 117 \\ 120 \\$	$\begin{array}{c} 30\\ 183\\ 23\\ 11\\ 77\\ 165\\ 67\\ 22\\ 11\\ 216\\ 24\\ 36\\ 233\\ 83\\ 60\\ 29\\ 244\\ 15\\ 188\\ 154\\ 95\\ 170\\ 42\\ 150\\ 61\\ 22\\ 68\\ 20\\ 10\\ 57\\ 78\\ 175\\ 87\\ 121\\ \end{array}$	$\begin{array}{c} 104.\ 3\\ 104.\ 3\\ 104.\ 3\\ 104.\ 3\\ 104.\ 3\\ 104.\ 3\\ 104.\ 3\\ 104.\ 3\\ 104.\ 3\\ 104.\ 3\\ 104.\ 3\\ 104.\ 3\\ 104.\ 3\\ 104.\ 3\\ 104.\ 3\\ 104.\ 3\\ 104.\ 3\\ 104.\ 3\\ 202.\ 2\\ 104.\ 3\\ 202.\ 2\\ 104.\ 3\\ 202.\ 2\\ 104.\ 3\\ 104.\$
Page 2 Link - Node	Table: (cont	i nued)		Scenario 14
Li nk I D	Start Node	End Node	Length	Diameter mm
39	132	134 Page 1	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	Demand	Head	Pressure	Quality
I D	LPS	m	m	
101 102 103 104 105 106 107 108 109 110 111 112	0. 00 0. 66 0. 66 0. 80 0. 73 0. 44 0. 44 0. 44 0. 80 0. 58 0. 37 0. 29	48.50 48.20 46.57 46.42 46.44 46.43 46.43 46.43 46.43 46.49 46.48 46.71 46.58 46.43	45.00 44.80 42.77 43.02 42.34 42.33 42.03 42.03 42.49 39.38 43.31 42.78 43.03	0.00 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

f

Page 3 Node Results: (continued)

Scenario 14

(
Node I D	Demand LPS	Head m	Pressure m	Quality	
116 117 119 120 121 122 123 124 125	0. 49 0. 57 0. 54 0. 39 0. 15 0. 15 0. 27 0. 73 0. 51	46.60 47.20 47.19 46.61 46.43 46.43 46.44 46.46 46.45 46.59	41.00 40.60 41.89 40.81 39.53 39.54 40.16 39.75 40.89 Page 2	$\begin{array}{c} 0.\ 00\\ 0.\ 00\\ 0.\ 00\\ 0.\ 00\\ 0.\ 00\\ 0.\ 00\\ 0.\ 00\\ 0.\ 00\\ 0.\ 00\\ 0.\ 00\\ 0.\ 00\\ 0.\ 00\\ 0.\ 00\\ \end{array}$	
			. ~g~ ~		

$126 \\ 127 \\ 128 \\ 129 \\ 130 \\ 131 \\ 132 \\ 133 \\ 134 \\ 135 \\ 136 \\ 137 \\ 138 \\ 139 \\ 140 \\ 141 \\ 142 \\ 143 \\ 144 \\ 145 \\ 146 \\ 147 \\ 148 \\ 151 \\ 118 \\ 50 $	1253-14 Scena 0. 29 0. 29 0. 07 0. 07 0. 51 0. 51 0. 37 0. 80 0. 22 0. 95 0. 49 0. 08 0. 22 0. 16 0. 32 0. 41 0. 56 0. 31 0. 58 0. 69 12. 41 0. 81 1. 22 0. 00 8. 03 -41. 62	ario 14 Full 46. 65 46. 59 46. 60 46. 47 45. 92 45. 90 45. 77 45. 74 45. 73 45. 68 45. 73 45. 68 45. 73 45. 68 45. 73 45. 90 45. 96 46. 29 46. 29 46. 29 46. 29 46. 29 46. 29 45. 98 45. 98 45. 98 45. 98 45. 70 45. 63 45. 52 47. 43 45. 22 48. 50	Dev PH FI ov 40. 95 40. 19 40. 80 40. 27 38. 87 38. 90 38. 77 38. 64 40. 43 39. 68 41. 13 41. 84 40. 70 40. 66 39. 25 40. 39 39. 18 40. 58 40. 74 42. 48 42. 70 42. 23 40. 42 39. 43 41. 12 0. 00	Max. 0.00	Pressure Reservoi r
Link Results:					
Li nk I D	FI ow LPS	VelocityUni m/s	t Headloss m/km	Stati	us
2 3 5 6 7 8	6.08 5.42 4.56 0.66 1.87 1.66	0.71 0.63 0.53 0.08 0.22 0.19	10.05 8.13 5.89 0.16 1.13 0.91	Open Open Open Open Open Open	
Page 4 Link Results:	(continued)				Scenario 14
Li nk I D	FI ow LPS	VelocityUni m/s	t Headloss m/km	Stati	us
9 10 11 12 13 14 15 16 17 18 19 20 23 24 25 26 27	$\begin{array}{c} 0.\ 44\\ 0.\ 27\\ 0.\ 66\\ -0.\ 24\\ 0.\ 14\\ -0.\ 59\\ -0.\ 82\\ 0.\ 51\\ -1.\ 30\\ -3.\ 89\\ -2.\ 86\\ -1.\ 52\\ 20.\ 13\\ 3.\ 41\\ 2.\ 49\\ 15.\ 72\\ -1.\ 03\\ \end{array}$	0. 05 0. 03 0. 08 0. 03 0. 02 0. 07 0. 10 0. 06 0. 15 0. 46 0. 33 0. 18 0. 63 0. 40 0. 29 0. 49 0. 12 Pa	0. 08 0. 03 0. 16 0. 03 0. 01 0. 13 0. 25 0. 10 0. 57 4. 40 2. 48 0. 77 3. 07 3. 46 1. 93 1. 94 0. 38 ge 3	Open Open Open Open Open Open Open Open	

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	1253-14 Scenario	14 Full	Dev PH Flow	vs Max.	Pressure
28	3. 37	0.39	3.37	0pen	
29	-1. 18	0.14	0.48	0pen	
30	1.00	0. 12	0.35	0pen	
31	0. 73	0.09	0.20	0pen	
32	3. 12	0.37	2.92	0pen	
33	0. 51	0.06	0. 10	0pen	
34	0. 29	0.03	0.04	0pen	
35	2. 25	0.26	1. 59	0pen	
36	0. 51	0.06	0. 10	0pen	
37	2.35	0. 28	1.73	0pen	
38	0.80	0.09	0.23	0pen	
39	1. 18	0.14	0.48	0pen	
40	0. 95	0. 11	0.32	0pen	
41	0. 01	0.00	0.00	0pen	
42	-0.48	0.06	0.09	0pen	
43	2.03	0.24	1.32	0pen	
44	-2.59	0.30	2.06	0pen	
45	-3.66	0.43	3. 92	0pen	
46	0.85	0. 10	0.26	0pen	
47	-1.80	0. 21	1.05	0pen	
48	-2.02	0.24	1. 31	0pen	
49	-2.12	0. 25	1.42	0pen	
50	-2.53	0.30	1. 98	0pen	
51	15.16	0.47	1.82	0pen	
52	0. 58	0.07	0.13	0pen	
53	12.25	0.38	1.22	0pen	
54	12.41	0.39	1.25	0pen	
55	1. 22	0.14	0.51	0pen	
56	-0. 29	0.16	1.4/	Open	
57	-0.09	0.05	0. 18	0pen	
Page 5					Scenari
					Julia

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Link Results: (continued)

o 14

Li nk I D	FI ow LPS	VelocityUnit m/s	Headloss m/km	Status
21 22 59 60 67 68	15.57 0.00 8.51 8.03 35.54 19.00	0. 39 0. 00 0. 47 0. 44 0. 89 0. 48	1. 14 0. 00 2. 50 2. 25 5. 23 1. 64	Open CI osed Open Open Open Open Open
1	41.62	0.26	0.28	Open

	1253-15 Scenario 15 FFF + 0.667 Exist PH Flows Constant Press	ure
Page 1	11-Dec-13 7:57:05 A	M
* * * * * * * *	***************************************	*
*	ΕΡΑΝΕΤ	*
*	Hydraulic and Water Quality	*
*	Analysis for Pipe Networks	*
*	Version 2.0	*
* * * * * * * *	***************************************	*

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

Scenario 15

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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.

Li nk I D	Star Node	t	End Node		Length m	Diameter mm
18 19 20 23 25 26 27 28 29 30 31 36 37 38 39 40 41 45 46 47 48 49 50 51 52 53 54 21 22 59 60 67 68 1 Page 2	$\begin{array}{c} 115\\ 116\\ 116\\ 120\\ 120\\ 121\\ 122\\ 129\\ 123\\ 130\\ 132\\ 132\\ 132\\ 134\\ 138\\ 139\\ 139\\ 140\\ 141\\ 142\\ 143\\ 145\\ 141\\ 142\\ 143\\ 145\\ 117\\ 101\\ 151\\ 101\\ 151\\ 101\\ 151\\ 101\\ 151\\ 101\\ 151\\ 101\\ 151\\ 101\\ 151\\ 101\\ 151\\ 101\\ 151\\ 101\\ 151\\ 101\\ 151\\ 101\\ 151\\ 101\\ 151\\ 101\\ 151\\ 101\\ 151\\ 101\\ 151\\ 101\\ 151\\ 101\\ 151\\ 101\\ 151\\ 101\\ 10$		116 117 120 121 142 122 130 129 123 124 131 132 133 134 135 136 139 145 140 143 145 140 143 141 115 143 144 145 146 119 151 119 151 119 151 117 50		$\begin{array}{c} 29\\ 244\\ 15\\ 188\\ 95\\ 170\\ 42\\ 150\\ 61\\ 22\\ 68\\ 175\\ 87\\ 121\\ 79\\ 145\\ 25\\ 13\\ 85\\ 86\\ 15\\ 173\\ 90\\ 167\\ 241\\ 76\\ 149\\ 15\\ 210\\ 96\\ 982\\ 205\\ 136\\ 1\end{array}$	104. 3 104. 3 104. 3 202. 2 104. 3 202. 2 104. 3 104. 3 105. 2 202. 2 20
Node Results:						
Node I D		Demand LPS	Head m	Pressure m	Quality	

$\begin{array}{c} 1253 - 1\\ 101\\ 115\\ 116\\ 117\\ 119\\ 120\\ 121\\ 122\\ 123\\ 124\\ 129\\ 130\\ 131\\ 132\\ 133\\ 134\\ 135\\ 136\\ 138\\ 139\\ 140\\ 141\\ 142\\ 143\\ 144\\ 145\\ 146\\ 151\\ 118\\ 50\\ \end{array}$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{r} FFF + 0.\ 667 \\ 48.\ 50 \\ 37.\ 56 \\ 37.\ 59 \\ 38.\ 50 \\ 38.\ 50 \\ 38.\ 50 \\ 37.\ 57 \\ 30.\ 10 \\ 30.\ 09 \\ 30.\ 07 \\ 30.\ 06 \\ 30.\ 07 \\ 19.\ 35 \\ 9.\ 59 \\ 19.\ 25 \\ 19.\ 24 \\ 19.\ 21 \\ 19.\ 21 \\ 19.\ 19 \\ 19.\ 21 \\ 37.\ 35 \\ 37.\ 35 \\ 37.\ 35 \\ 37.\ 35 \\ 37.\ 35 \\ 37.\ 39 \\ 37.\ 49 \\ 37.\ 46 \\ 37.\ 35 \\ 37.\ 34 \\ 37.\ 32 \\ 37.\ 23 \\ 41.\ 03 \\ 39.\ 98 \\ 48.\ 50 \end{array}$	Exist PH 45.00 32.66 31.99 31.90 33.20 31.77 23.20 23.19 23.77 23.36 23.87 12.30 2.59 12.25 12.14 13.91 13.19 14.61 32.15 32.05 30.59 31.59 30.36 31.95 32.14 33.92 34.23 35.88 0.00	Flows Constant Pressure 0.00
Link Results:				
Link ID	FI ow LPS	VelocityUnit m/s	t Headloss m/km	s Status
18 19 20 23 25 26 27 28 29 30	-1.61 -3.57 1.63 25.99 18.48 8.88 0.81 17.57 0.71 0.67	0. 19 0. 42 0. 19 0. 81 2. 16 0. 28 0. 10 2. 06 0. 08 0. 08	0.86 3.74 0.88 4.93 78.71 0.67 0.24 71.65 0.19 0.17	Open Open Open Open Open Open Open Open
Page 3 Link Results:	(continued)			Scenario 15
Li nk I D	FI ow LPS	VelocityUni m/s	t Headloss m/km	s Status
31 36 37 38 39 40 41 45 46	0. 49 15. 34 1. 89 0. 53 1. 11 0. 63 0. 33 -1. 19 1. 04	0. 06 1. 80 0. 22 0. 06 0. 13 0. 07 0. 04 0. 14 0. 12 Pag	0. 09 55. 74 1. 15 0. 11 0. 43 0. 15 0. 04 0. 49 0. 38 ge 2	Open Open Open Open Open Open Open Open

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	1253-15	Scenario 15	FFF + 0.667	Exist PH	Flows Constar	nt Pressure
47		-1.08	0. 13	0.41	0pen	
48		-0. 22	0. 03	0.02	0pen	
49		-1.29	0. 15	0.57	0pen	
50		-1.57	0. 18	0.81	0pen	
51		8. 51	0.26	0.62	0pen	
52		0.39	0.05	0.06	0pen	
53		7.69	0.24	0.52	0pen	
54		8. 28	0.26	0.59	0pen	
21		-3.95	0. 10	0.09	0pen	
22		35.66	1.97	35.58	0pen	
59		30.30	1.67	26.32	0pen	
60		5.36	0.30	1.06	0pen	
67		0.00	0.00	0.00	Closed	
68		0.00	0.00	0.00	Closed	
1		-35.66	0. 22	0. 21	0pen	
					-	

1	253-16 Scenario 16 FFF + 0.667 Exist PH Constar	nt Pressure
Page 1	11-Dec-13	3 7:57:30 AM
*********	*****	* * * * * * * * * * * *
*	EPANET	*
*	Hydraulic and Water Quality	*
*	Analysis for Pipe Networks	*
*	Version 2.0	*
* * * * * * * * * * * *	*****	* * * * * * * * * * * *

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

Scenario 16

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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.

Li nk I D	Star Node	t	End Node		Length m	Diameter mm
18 19 20 23 25 26 27 28 29 30 31 36 37 38 39 40 41 45 46 47 48 49 50 51 52 53 54 21 22 59 60 67 68 1	$\begin{array}{c} 115\\ 116\\ 116\\ 120\\ 120\\ 121\\ 122\\ 129\\ 123\\ 130\\ 132\\ 132\\ 134\\ 138\\ 139\\ 140\\ 141\\ 142\\ 143\\ 145\\ 117\\ 101\\ 151\\ 151\\ 151\\ 151\\ 151\\ 151\\ 151$		$\begin{array}{c} 116\\ 117\\ 120\\ 121\\ 142\\ 122\\ 130\\ 129\\ 123\\ 124\\ 131\\ 132\\ 133\\ 134\\ 135\\ 136\\ 139\\ 145\\ 140\\ 143\\ 141\\ 115\\ 143\\ 144\\ 145\\ 146\\ 119\\ 151\\ 119\\ 151\\ 119\\ 151\\ 117\\ 101 \end{array}$		$\begin{array}{c} 29\\ 244\\ 15\\ 188\\ 95\\ 170\\ 42\\ 150\\ 61\\ 22\\ 68\\ 175\\ 87\\ 121\\ 79\\ 145\\ 25\\ 13\\ 85\\ 86\\ 15\\ 173\\ 90\\ 167\\ 241\\ 76\\ 149\\ 15\\ 210\\ 96\\ 982\\ 205\\ 136\\ 1\end{array}$	$\begin{array}{c} 104.\ 3\\ 104.\ 3\\ 104.\ 3\\ 202.\ 2\\ 104.\ 3\\ 202.\ 2\\ 104.\ 3\\ 202.\ 2\ 2\ 2\ 2\ 2\ 2\ 2\ 2\ 2\ 2\ 2\ 2\ 2\$
Page 2						Scenario 16
Nodo		Domand		Drossuro	Ouality	
		LPS	m	m		

$\begin{array}{c} 125\\ 101\\ 115\\ 116\\ 117\\ 119\\ 120\\ 121\\ 122\\ 123\\ 124\\ 129\\ 130\\ 131\\ 132\\ 133\\ 134\\ 135\\ 136\\ 138\\ 139\\ 140\\ 141\\ 142\\ 143\\ 144\\ 145\\ 146\\ 151\\ 118\\ 50\\ \end{array}$	53-16 Scenario 0.00 0.05 0.33 0.38 0.36 0.26 0.10 0.10 0.10 0.10 0.18 0.49 0.05 0.34 15.34 0.25 0.53 0.15 0.63 0.15 0.63 0.15 0.63 0.15 0.63 0.37 0.21 0.27 0.37 0.21 0.39 0.46 8.28 0.00 5.36 -35.66	$\begin{array}{c} 16 & FFF + 0 \\ & 48.50 \\ & 46.66 \\ & 46.68 \\ & 47.61 \\ & 47.60 \\ & 46.67 \\ & 39.19 \\ & 39.19 \\ & 39.17 \\ & 39.16 \\ & 39.17 \\ & 28.34 \\ & 28.33 \\ & 28.31 \\ & 28.33 \\ & 28.31 \\ & 28.33 \\ & 28.31 \\ & 28.33 \\ & 28.31 \\ & 28.33 \\ & 28.31 \\ & 28.59 \\ & 28.31 \\ & 46.44 \\ & 46.45 \\ & 46.45 \\ & 46.45 \\ & 46.45 \\ & 46.44 \\ & 46.59 \\ & 46.56 \\ & 46.44 \\ & 46.41 \\ & 46.32 \\ & 47.88 \\ & 46.84 \\ & 48.50 \end{array}$	D. 667 Exist 45.00 41.76 41.08 41.01 42.30 40.87 32.29 32.28 32.87 32.46 32.97 21.39 11.69 21.34 21.23 23.01 22.29 23.71 41.23 23.01 22.29 23.71 41.24 41.15 39.69 40.69 39.46 41.05 41.24 43.01 43.32 39.88 42.74 0.00	PH Constant 0.00	Pressure ervoi r
Link ID	FI ow LPS	VelocityUr m/s	nit Headloss m/km	Status	
18 19 20 23 25 26 27 28 29 30	-1. 61 -3. 61 1. 67 25. 95 18. 48 8. 88 0. 81 17. 57 0. 71 0. 67	0. 19 0. 42 0. 19 0. 81 2. 16 0. 28 0. 10 2. 06 0. 08 0. 08	0. 86 3. 82 0. 91 4. 92 78. 71 0. 67 0. 24 71. 65 0. 19 0. 17	Open Open Open Open Open Open Open Open	
Page 3 Link Results:	(continued)			S	cenario 16
Li nk I D	FI ow LPS	VelocityUr m/s	nit Headloss m/km	Status	
31 36 37 38 39 40 41 45 46	0. 49 15. 34 1. 89 0. 53 1. 11 0. 63 0. 33 -1. 19 1. 04	0.06 1.80 0.22 0.06 0.13 0.07 0.04 0.14 0.12	0.09 55.74 1.15 0.11 0.43 0.15 0.04 0.49 0.38 Page 2	Open Open Open Open Open Open Open Open	

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Scenario 1	6 FFF +	0.667 Exist	PH Constant	Pressure
-1.08	0.13	0.41	0pen	
-0. 22	0.03	0. 02	0pen	
-1.29	0. 15	0.57	0pen	
-1.57	0. 18	0.82	0pen	
8.50	0.26	0.62	0pen	
0.39	0.05	0.06	0pen	
7.69	0.24	0. 52	0pen	
8.28	0.26	0.59	0pen	
16. 95	0.43	1.33	0pen	
9.28	0. 51	2.94	0pen	
9.36	0. 52	2.99	0pen	
5.36	0.30	1.06	0pen	
26.38	0.66	3. 01	0pen	
20.94	0. 53	1.96	0pen	
35.66	0. 22	0. 21	0pen	
	Scenario 1 -1.08 -0.22 -1.29 -1.57 8.50 0.39 7.69 8.28 16.95 9.28 9.36 5.36 26.38 20.94 35.66	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$

1253-1	7 Scenario 17 FFF + Full Dev. PH Flows	Min Pressure
Page 1	11-Dec	-13 7:57:55 AM
*****	*****	******
*	ΕΡΑΝΕΤ	*
*	Hydraulic and Water Quality	*
*	Analysis for Pipe Networks	*
*	Version 2.0	*
* * * * * * * * * * * * * * * * * * *	*****	* * * * * * * * * * * * * * *

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

Scenario 17

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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.

Li nk I D	Start Node	End Node	Length m	Diameter mm
2 3 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37	$\begin{array}{c} 101 \\ 102 \\ 110 \\ 111 \\ 111 \\ 111 \\ 112 \\ 112 \\ 112 \\ 112 \\ 114 \\ 107 \\ 106 \\ 107 \\ 108 \\ 105 \\ 115 \\ 116 \\ 105 \\ 115 \\ 116 \\ 119 \\ 120 \\ 120 \\ 120 \\ 121 \\ 122 \\ 129 \\ 123 \\ 126 \\ 128 \\ 128 \\ 128 \\ 128 \\ 130 \\ 130 \end{array}$	102 110 111 103 108 112 113 114 104 107 106 105 108 109 115 116 117 120 120 126 121 142 122 130 129 123 124 128 125 127 129 131 132	$\begin{array}{c} 30\\ 183\\ 23\\ 11\\ 77\\ 165\\ 67\\ 22\\ 11\\ 216\\ 24\\ 36\\ 233\\ 83\\ 60\\ 29\\ 244\\ 15\\ 188\\ 154\\ 95\\ 170\\ 42\\ 150\\ 61\\ 22\\ 68\\ 20\\ 10\\ 57\\ 78\\ 175\\ 87\end{array}$	$104. 3 \\ 202. 2 \\ 104. 3 \\ 1$
Page 2 Link - Node	Table: (cont	i nued)		Scenario 17
Li nk I D	Start Node	End Node	Length m	Diameter mm
38	132	133 Page 1	121 I	104. 3

	39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 21 22 59 60 67 68 1	1253-17 132 134 134 136 137 137 138 139 140 141 142 143 145 147 109 105 117 101 151 151 50	Scenario	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	Full Dev.	PH Flows P 79 145 25 65 80 81 13 85 86 15 173 90 167 241 76 149 216 157 288 15 210 96 982 205 136 1	Win Pressure 104.3 104.3 104.3 104.3 104.3 104.3 104.3 104.3 104.3 104.3 104.3 104.3 104.3 104.3 202.2 104.3 202.2 104.3 202.2 104.3 202.2 104.3 202.2 104.3 202.2 104.3 202.2 104.3 48.4 48.4 48.4 225 152 152 225 225 225 450	
	Node I D		Demand LPS	Head m	Pressure m	Quality		
	101 102 103 104 105 106 107 108 109 110 111 112 113 114		$\begin{array}{c} 0. \ 00\\ 0. \ 66\\ 0. \ 66\\ 0. \ 80\\ 0. \ 73\\ 0. \ 44\\ 0. \ 44\\ 0. \ 80\\ 0. \ 58\\ 0. \ 37\\ 0. \ 29\\ 0. \ 44\\ 0. \ 51\\ \end{array}$	$\begin{array}{c} 48.50\\ 48.00\\ 45.18\\ 44.85\\ 44.76\\ 44.77\\ 44.80\\ 45.01\\ 45.01\\ 45.00\\ 45.43\\ 45.18\\ 44.85\\ 44.84\\ 44.84\end{array}$	45.00 44.60 41.38 41.45 40.66 40.67 40.40 41.01 37.90 42.03 41.38 41.45 39.64 41.44	$\begin{array}{c} 0. \ 00\\ 0. \ 0. \$		
Ŷ	Page 3 Node Results	s: (cont	i nued)				Scenario 17	
	Node I D		Demand LPS	Head m	Pressure m	Quality		
	115 116 117 119 120 121 122 123 124		0. 07 0. 49 0. 57 0. 54 0. 39 0. 15 0. 15 0. 27 0. 73	44. 75 44. 87 46. 12 46. 08 44. 87 44. 16 44. 26 44. 41 44. 40	39. 85 39. 27 39. 52 40. 78 39. 07 37. 26 37. 36 38. 11 37. 70 Page 2	$\begin{array}{c} 0.\ 00\\ 0.\ 00\\ 0.\ 00\\ 0.\ 00\\ 0.\ 00\\ 0.\ 00\\ 0.\ 00\\ 0.\ 00\\ 0.\ 00\\ 0.\ 00\\ 0.\ 00\\ 0.\ 00\\ \end{array}$		
	1253-17	Scenari o	17 FFF +	Full Dev.	PH Flows Min	Pressure		
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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 Res	ervoi r		

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Page 4 Scenario 17 Link Results: _____ Flow VelocityUnit Headloss Status Li nk ١D LPS m/s m/km - -_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _____ _ _ _ _ _ _ _ 7.95 7.29 6.31 2 0. 93 0pen 16.51 3 5 0.85 14.06 0pen 0.74 10.77 0pen Open Open 0.08 0.16 6 0.66 7 2.71 0.32 2.25 2.57 0.30 2.04 8 0pen 9 0.44 0.05 0.08 0pen 0.14 10 1.18 0.48 0pen 0.08 0.66 0.16 0pen 11 0.08 12 0.67 0.17 0pen 13 1.88 0.22 0pen 1.15 1.15 -1.65 0. 14 0. 19 0. 46 0. 90 14 0pen 15 0pen 0.40 0.05 0.07 0pen 16 0.57 0pen 17 0.07 0.13 18 -3.74 0.44 4.08 0pen 19 -4.23 0.50 5.14 0pen 0.00 20 0.01 0.00 0pen 0.94 23 30.10 6.47 0pen 5. 19 5. 17 24. 54 24 0.61 7.53 0pen 25 7.44 0.61 0pen 26 0.76 4.44 0pen 27 -2.81 0.33 2.41 0pen 7.84 0.92 16.06 28 0pen 0.35 0.12 29 -2.96 2.65 0pen 1.00 30 0.35 0pen 0.73 0.09 0.20 31 0pen Page 3

	1253-17	Scenari o	17 FFF +	Full Dev.	PH Flows Min	Pressure
32		4.90	0.57	6.74	0pen	
33		0.51	0.06	0. 10	0pen	
34		0.29	0.03	0.04	0pen	
35		4.03	0.47	4.70	0pen	
36		0.51	0.06	0. 10	0pen	
37		6.82	0.80	12.41	0pen	
38		0.80	0.09	0. 23	0pen	
39		5.65	0.66	8.75	0pen	
40		0.95	0. 11	0.32	0pen	
41		4.48	0. 52	5. 69	0pen	
42		3.99	0.47	4.59	0pen	
43		17.03	1.99	67.64	0pen	
44		-13.12	1.54	41.75	0pen	
45		-9.78	1.14	24.22	0pen	
46		-3.56	0.42	3.73	0pen	
47		-3.51	0.41	3.63	0pen	
48		-6.43	0.75	11. 14	0pen	
49		-3.83	0.45	4.26	0pen	
50		-4.24	0.50	5.15	0pen	
51		23.98	0.75	4.25	0pen	

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Page 5 Link Results: (continued)

Scenario 17

Li nk I D	FI ow LPS	VelocityUnit m/s	Headloss m/km	Status
52 53 54 55 56 57 21 22 59 60 67 68 1	$\begin{array}{c} 0.58\\ 16.66\\ 12.41\\ 16.22\\ -0.40\\ -0.22\\ 23.26\\ 0.00\\ 12.57\\ 8.03\\ 48.67\\ 28.06\\ 56.62 \end{array}$	0.07 0.52 0.39 1.90 0.22 0.12 0.59 0.00 0.69 0.44 1.22 0.71 0.36	0. 13 2. 17 1. 25 61. 80 2. 72 0. 88 2. 39 0. 00 5. 16 2. 25 9. 37 3. 38 0. 50	Open Open Open Open Open Open CI osed Open Open Open Open Open Open Open

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> APPENDIX D Sewerage Reticulation Report



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



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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:	101 lots
(Includes Commercial Lot, excludes a Park Reserve)	
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 $< 900m^2 = 0.044L/sec$

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



14-02-05;15:29 ;Doublas Shire Council : +61 SINCLAIR KNIGHT MERZ facsimile REC'D 14 FEB 2005 PMGB VVHC 动动动 transmission Noted 村 11 - HOJECT No. OUR REF: TO: Wade Quin FILE YOUR REF: SKM COMPANY: DATE: 14 February 2005 4031 3967 FAX NO: PAGES: (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.gld.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 Coaya Beach MESSAGE: Wade Jud attack shetches of Site exceptions and Receive Site Regula WATCH





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> APPENDIX D 2 SEWER RETICULATION MASTER PLAN





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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 no	ote under.
No. of Existing Lots in Cooya			
Beach	280	Lot area varies refer no	ote 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	er 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	er 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 > $900m^2 = 70$ Number of Lots in proposed development < $900m^2 = 218$ 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 $827.4 \times 2 = 1655$.

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 Pu	۳ mp Rate / No. of Starts per Hr m³	
25.86	2.327	m³	
OPERATING RANGE			
Operating Range	= Storage	e Volume x 1000 / p x r² mm	
Operating Range (in mm) =	560	where r =	1.15
EMERGENCY STORAGE			
Emergency Storage in m ³ =	6x ADWF		
=	111.71	Required	
(Half this storage, 56m ³ , is a result o	f the develo	pment)	
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		
		(Approximately sufficient for this	
Storage Volume Provided	47.25	development)	
PUMP STATION DETAILS:			
From FNQROC Std. Dwg. S3024			
A (Top RL)	3.750	Well Dia =	2.300
B (Bottom RL)	-2.450	TVVL =	-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/secRL bottom of Pump station (Point B)= -2.45mRL at High Point or Outlet of Rising Main= 13.04mLength of Rising Main= 750mColebrook White k= 0.01mmVelocity= 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.



Pumped Pipeline Flow Calculator: 20th January 2011 06:42:37



Ріре Туре	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 (m2/sec) x 10^-6	1.01
Required Flow Rate (I/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)

This program calculates only pipe friction based on formulas presented in AS2200-2006. The user will need to separately determine fitting, entrance and exit losses. The user will need to ensure that additional static head or pressure is available to cover these losses. A lower flow than that calculated will result if this extra static head or pressure is not available. The information above is from the computer program "Pumped Pipeline Flow Calculator". The results shown depend on the reliability of input data provided. Iplex Pipelines (Aust) Pty Ltd is not liable for any loss or damage of any kind claimed to arise either directly or indirectly as a result of reliance on these calculations.



FLYPS3.1.5.5 (20060324)



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APPENDIX E Potential Acid Sulphate Soil Investigation





- 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

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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, <u>PASS was identified at approximately 0.0 metres</u> <u>AHD.</u> The development constraints that PASS poses to the proposed development and management options are identified in this report.



Potential Acid Sulfate Soll Investigation Salson Pty Ltd October 2003 R43337 (8021)

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.



Potential Acid Sulfate Soil Investigation Salson Pty Ltd October 2003 R43337 (6021)

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 day Ap to 30 cm; olive brown or brownish yellow, moderate to strong fine blocky structured medium day 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 welldrained 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 Guldelines 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 soll 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.



Potential Acid Sulfate Soll Investigation Salson Pty Ltd October 2003 R43337 (8021)

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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 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 categorles 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.

Type of Material		Action Criteria			
		1 – 1000 t disturbed		> 1000 t disturbed	
Texture Range	Approx. clay content (%)	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	≥ 40	0.1	62	0.03	18

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



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 H_2SO_4/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 H_2SO_4/t onne (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.

Liming Rate = %S * Conversion to $H_2SO_4^-$ * conversion to $CaCO_3^-$ * 1.5 (Safey Factor)

= 0.016634 * 30.52 * 1.02 * 1.5 = **7.768 Kg CaCO₃-/tonne**

Conversion to Kg $CaCO_3^{-}$ /m³ (Approximate Specific Gravity of wet sand is 1.92 tonnes/m³)

= 7.768 * 1.92 = **14.914 Kg CaCO₃⁻/m³**

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.



Potential Acid Sulfate Soil Investigation Salson Pty Ltd October 2003 R43337 (8021) 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.



Potential Acid Sulfate Soil Investigation Salson Pty Ltd October 2003 R43337 (8021)

- 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 Soll) 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.



Potential Acid Sulfate Soil Investigation Salson Pty Ltd October 2003 R43337 (8021)
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 Solls (ASS) in Queensland 1998 (October 1998, Revision 4.0), Department of Natural Resources, Brisbane.

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

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Figure 1

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



Borehole Locations on Lot 1 RP720316 and Lots 2 & 3 on SR614

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



Annexure 1

PASS/ASS Investigation Summary Results

Test Site	Dapith Ballow Cill.	AHOS	(Centry See	DIN S	Affine 1	Cellurence	Residen	Wangsnood	3.5 Pocas)	Ser TAA		TAA (85 %5)	Action Criteria Convent
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	63	8.95	Babb Bone Cause Fire Sard	5.77	47	1.07							Occurit: Resolution
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		6.25											
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	0.22	5.00	Light Drown Public City (Bady Imported fill)	8.44	*u	12							
	0.4	5.85	Chocoles Brown Organic Sandy Loam	4.6	4.00	1.00							
	6.52	5.73	Brown Lowing Send	621	4.5	1.00	LD						
			Drywry Ros Cloyey Pebly Sand	4.82	4.48	6.05							
			Browny Red Course Clayey Sand (poorly sared)	4.4	4.75	0.09	M						
			Browny Red Course Clayery Publy Sand	5.25	1.41	-0.23	88						
		***	Redity Yellow Clayry Sand (poorly sorted)	4.87	5.52	4.85							
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			White Grey Lowny Send (poorly socied)	4.50	4.45	0.14	14						
			Yelowy Orange Caryey Sand (prosty sarted)	4,09	4.61	0.05	1.6						
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12.2.2.5 second WP17 Ground Burlows 2748 274	14 15 6 05 1 13 14 2 0 652 65 65 65 65 13 14 13 14 13 14 13 14 13 14 13 14 13 14	45 5 225 235 235 235 235 235 235 235 235	Data. Step Gang, Sand Upta Gang, Sand Upta Gang, Sand Upta Gang, Sand Upta Gang, Sand Data. Digentil Course Sandy Leane Value Course Sandy Leane Sandy Course Sandy Leane Sandy Leane Sandy Leane Sandy Leane Sandy Leane Sandy Course Sandy Leane Sandy Course Sandy Leane Sandy Sandy Course Sandy C	447 534 646 639 639 639 639 639 639 639 639 639 63	445 447 471 46 47 47 47 47 47 47 46 38 47 46 48 40 40 40 40 40 40 40 40 40 40 40 40 40	645 647 645 413 535 645 949 147 122 155 646 1,42 754 646 2,13 754 646	· · · · · · · · · · · · · · · · · · ·			0.62 0.15 0.009 0.925	-45 -55 	4.01534311 841534311 9.01534311 9.01534311	Image: State in the state i
WP17 Croud Surface Pt Base AP18 Cound Surface Double Surface	14 15 6 05 1 1 3 13 13 13 13 13 14 6 2 6 2 6 2 6 2 6 2 6 2 6 2 6 13 1 13 1	46 5 3 235 235 235 235 135 135 135 135 135 135 136 44 0 0 15 13 13 2 0 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Data. Step Galay, Bala Upta Data Step Galay Units Salaharang Cary Upta Cary Man Jon sumit, Upta Salaharan Stardy Lean Nata. Cary Earchy: Sarat Salaharan Stardy Cary Earchy Carlor Sarat Salay Cary Earchy Carlor Salay Escan Yalaharang Earchy Cary Cary Earchy Carlor Salay Escan Sarat Salay Salaharan Earchy Salahara Cary Earchy Salay Cary Earchy Salahara Cary Earchy Salahara Cary Earchy Salay Cary Earchy Salahara Cary Earchy Salahara Cary Earchy Salay Cary Earchy Cary Cary Earchy Cary Cary Earchy Salahara Cary Earchy Salahara Cary Earchy Salahara Cary Earchy Salahara Cary Earchy Cary Cary Earchy Cary Cary Earchy Cary Cary Earchy Cary Earchy Cary Cary Earchy Cary Earchy Cary Cary Earchy Cary Ea	447 134 464 457 457 457 457 457 457 457 457 457 45	445 447 47 47 47 47 47 47 47 47 47 47 47 46 385 385 385 385 385 385 385 385 385 385	445 647 647 643 644 643 649 649 649 649 649 644 644 644 644 644				822 0.15 0.09 0.925	-05 -05 -05	4.91534311 8.415343311 9.415343311 0.41634311	Image: State in the state i
WP37 Grand Burless Nr Bees Graft Dourd Surface Dourd Surface	14 15 6 05 1 13 15 15 15 15 15 15 15 15 15 15 15 15 15	46 67 8 44 275 235 175 145 175 145 175 145 146 14 14 147 68 68 68 68 68 63 65 65 65 65 65	Data. Step Galay, Barl Upta Data. Step Galay Galay Upta Data. Step Galay Upta Data. Step Galay Upta Data. Step Galay Data. Digenet Course Galay Kann Vales: Course Galay Kann Vales: Course Galay Kann Vales: Course Galay Kann Vales: Course Galay Kann Galay Galay Course Galay Data Bornet Machine Course Bornet Machine Course Data Bornet Machine Course Band Bornet Machine Course Ba	149 534 546 549 549 549 549 549 549 549 549 549 549	445 447 449 449 449 449 449 449 449 449 449	410 647 647 643 643 643 643 649 649 649 649 649 649 649 649 649 649				963 0.15 0.00 0.009 0.009	-65 -63 -61 -61	4.91534311 8.415343(1 9.415343(1 9.41534511 9.41534511	In the PAS In the
WP17 Crowd Surface Ni Base AP18 Sourd Surface GP19 Cound Surface	14 15 6 03 1 33 16 2 2 0 6 22 6 5 6 5 6 5 6 5 6 6 7 6 7 6 7 6 7 6 7 6	45 5 32k 44 235 145 145 145 145 146 14 147 166 15 15 15 15 15 15 15 15 15 15 15 15 15	Data. Step Gales, Bale Upta Carlos (Dary Under) Galactions (Dary Control (Dary Contr	149 154 153 153 153 153 153 155 153 155 153 155 153 155 153 155 153 155 153 155 155		All A	- - - - - - - - - - - - - - - - - - -			842 0.15 0.09 0.024	43 43	4.01534211 8.41534211 9.01534211 9.01534211	Image: State of the sector
12 Base Pri Bas	14 15 6 03 1 33 12 2 0 63 63 63 64 13 13 64 9 63 64 83 13 13	45 5 32k 44 235 135 135 135 135 135 135 135 135 135 1	Data. Step Gange, Sand Upta Gang, Sand Upta Gang, Sand Upta Gang, Sang Data. Step Gang, Sand Sand, Signer, Sand Jahane Sand Data. Signer, Sand Jahan Sand, Signer, Sand Jahan Sand, Signer, Sand Sand, Signer, Sand Sand, Signer, Sand Sand, Sand Sand, Sand Sand, Sand Sand, Sand Sand Sand, Sand	147 134 149 149 149 149 149 149 149 149 149 14	445 447 448 49 40 40 40 40 40 40 40 40 40 40 40 40 40	ALL SFP CL L14 L14 L14 L14 L14 L14 L14 L14 L14 L1				822 813 8509 8301	45 45 45	4.91534211 8.816342[1] 0.815342[1] 0.815342[1]	Image: State PAD
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Key (Groundwater)

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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,

G.Y Environmental Services

Jon Dicker Operations Manager CAIRNS

pleatt

Jon Scott Inorganic Chemist CAIRNS



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Page 1 of 5

Environmental Services Unit 2, 58 Comport Street, Portsmith 4870 QLD Australia www.sgs.com 2 +81 (0)7 4036 5111 1 + 51 (0)7 4035 5122

26/09 '03 FRI 10:45 [TX/RX NO 7859] 2001

SGS ENVIRONMENTAL

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Laboratory Report No: 45871

SGS Reference	Your Reference	Moisture % H2O	рН ксі	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: 1.9-1.2	15	4.8	<0.5
45871-05	WP13: 1.2-1.5	[4	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]	0.1	0.5
	ASSMAC Method	2B1	21A	21F

RESULTS I

Results determined on a dry basis.

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Laboratory Report No: 45871

SGS Reference	Your Reference	Chromium Reducible Sulphur (S c _c) % 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 II

Results determined on a dry basis.

* Acid Sulfate Soils Management Advisory Committee. NATA Accredited Laboratory No: 2562 NATA Endorsed Test Report This Document shall not be reproduced, except in full

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26/09 '03 FRI 10:45 [TX/RX NO 7859] 2003

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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.



NATA According Laboratory No: 2582 NATA Endorsed Test Report This Document shall not be reproduced, except in full

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Laboratory Report No: 45871

RESULTS IV

Reference	Y our Reference	Moisture" % H±O	рН кол	TAA (pH 5.5) kg H _i S0./tonte	pH _{ox}	TPA (pH 5.5) kg H ₅ S0,/logne	TSA (pH 5.5) hg H ₂ SOJ(tonne
Blank			5.8		5.9		,
45871-1	WP9: 1.6-2.0	20	5.0	<0.5	C.4	<0.5	<0.5
R45871-1	Repeat WP9: 1.6-2.0		5.0	<0.5	6 . 4	<0.5	<0.5
	Limit of Reporting	1	0.1	0.5	0,1	0.5	0.5
	ASSMAC ⁴ method	2B1	21A	21F	218	210	21H

•													
Cur Reference	Your Reference	S KCI % W/W	S p ¹	S POS	Cako [*] % w/w	Ca .*	Ca, Ca, W/W	MB KCI	Mg. ⁵	Ng A ⁷ % w/w	Na KCI % w/w	A EN	Na A
Blank							T						
		,	•	1			•		•				Γ
45871-1	WP0- 1 6.7 0	10.005	A AAC	10.000			-						
	The a a sub-	CONTRA	00077		CU-0.0>	<0.005	<0.005	<0.005	<0.005	<0.005	SMOS	200.002	10.000
R45871-1	Panant 12/200- 1 6 1 0	200 07	10 000							10000	norm.	- CONTRA	1 CODIN
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	SUBJORAN IN MIRCH	CORTO	0000	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0 AAC	0.000	0.000
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VESTINS OFF	immed on a dry bas	115.						J,					

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

³ ASSMAC - Acid Sulfate Soils Management Advisory Committee - Acid Sulfate Soil Manual, August 1998 NATA Accretion Laboratory No: 2562 NATA Endoreout Test Report



Page 5 of 5

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26/09 '03 FRI 10:45 [TX/RX NO 7859] 2005

Jim Papas Civil Engineering Designer

PTY LTD. ABN 56 010 943 905. ACN 010 943 905 Design Excellence, Exceptional Service

> APPENDIX F SPA FORMS 1 and 6





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1	C 14	C 13	C 12	C 11	C 10	C 09	C 08	C 07	C 06	C 05	C 04	C 03	C 02	C 01		
2. 	4 - STO	3 - STO	2 - SEW	1 - STO) – ROA) – BAR	3 – BAR	7 – WAT	6 – SEM	5 - SOII	4 - EAR	3 – BUL	2 – TYP	I – EXIS	OJEC-	
2	RMW	RMW	/ERA	RMW	ں ح	RAB	RAB	뜄	/ERA	' ₽	THW	Т Т	ICAL	STIN	 	

T DRAWINGS
 T No. 1301
 (ISTING SITE PLAN. PICAL CROSS SECTION, PAVEMENT DATA, SET OUT AND DETALLS. UK EARTHWORKS PLAN. INTHWORKS, ROADWORKS AND STORMWATER DRAINAGE PLAN.
 ILK EARTHWORKS, ROADWORKS AND STORMWATER DRAINAGE MEAN.
 ILK EARTHWORKS, ROADWORKS AND STORMWATER DRAINAGEMENT PLAN.
 IMERAGE RETICULATION PLAN.
 ARRABAL DRIVE - LONGITUDINAL SECTION.
 ARRABAL DRIVE - CROSS SECTIONS.
 DAD J- LONGITUDINAL AND CROSS SECTIONS.
 ADD J- LONGITUDINAL AND CROSS SECTIONS.
 IORMWATER DRAINAGE - LONGITUDINAL SECTIONS, SET OUT DATA, PIT SCHEDULE AND NOTES
 INGRMATER DRAINAGE CATCHMENT PLAN
 IORMWATER DRAINAGE CATCHMENT PLAN
 IORMWATER DRAINAGE CATCHMENT PLAN
 INGRMATER DRAINAGE CALCULATION SHEET.
 S C13 and 14 are not part of the Contract Drawings)





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		2.00 1.20 PIT BASE	
PIT BASE	2.40	YELLOW GREY CLAYEY COARSE SAND 1.65 1.55 LIGHT GREY CLAYEY COARSE SAND	EXISTING CONTOURS
	2.40 3.30	1.32 1.88 YELLOW GREY CLAYEY COARSE SAND	PROPOSED STAGE BOUNDARIES
YELLOW CLAYEY SAND	1.90 3.80	0.79 2.41 1.00 2.20	D EXISTING OPEN DRAINS
YELLOW / RED CLAYEY SAND	1.62 4.08	0.51 2.69 YELLOW CLAYEY SAND	EXISTING_TELSTRA_CABLES
RED CLAYEY SAND	0.66 5.04 1.13 4.57	0.29 2.91 YFLLOW ORANGE SANDY CLAY	E E EXISTING ELECTRICITY
BROWN / RED CLAYEY SAND	0.29 5.41	TP6 0.00 3.20	
BLACK SANDY ORGANIC LOAM	0.00 5.70	Z.UU Z.JU FII BAJE	
	TP14	(MINOR MOTTLE)	
GROUND WATER	1.45	2.00 2.50 LIGHT GREY SANDY CLAY	======== EXISTING KERB & CHANNEL
PIT BASE		1.73 2.73 LIGHT GREY SANDY CLAY (MINOR REDDY YELLOW MOTTLE)	TTT EXISTING EDGE OF BITUMEN
MEDIUM GREY CLAYEY SAND	1.20 0.40	1.50 3.00 YELLOWY GREY SANDY CLAY	A EXISTING CHANGE OF GRADE
LIGHT TO MEDIUM GREY CLAYEY SAND	1.00 0.60	1.22 3.28 YELLOWY GREY SANDY CLAY	EXISTING TOE OF BANK
LIGHT OREY SANDY CLAY	0.71 0.89	1.00 3.50 REDDY YELLOW SANDY CLAY	EXISTING TOP OF BANK
LIGHT BROWN GLEY COARSE SANDY CLAY	0.50 1.10	0.66 3.84 VELOWA DEC CAMPA CLAY	LEGEND
BLACK ORGANIC LOAM	0.00 1.60 0.25 1.35	0.00 4.50 DARK ORGANIC SANDY LOAM 0.32 4.18	
SHOWN ON F	TP12	WP15	SUPERINTENDENT.
TEST PIT LOC	1./0	2.30 PIT BASE	PROPOSED WORKS. APPROPRIATE MEASURES TO RESOLVE ANY CONFLICTS WILL BE DOCUMENTED BY THE
CENTIND WATER	1 75	YELLOW CLAYEY SAND (DARK MINERAL AGGREGRATE ~ 20% MANGANESE?)	BETWEEN THE EXISTING SERVICES THUS IDENTIFIED AND THE DOCUMENTED SERVICES WHICH MIGHT AFFECT THE
LIGHT GREY CLAYEY COARSE SAND	1.80 0.10	(POORLY SORTED)	3. THE CONTRACTOR SHALL BRING TO THE SUPERINTENDENTS ATTENTION ANY DISCREPANCIES
LIGHT GREY CLAYEY COARSE SAND	1.60 0.30	1.50 4.75 REDDY YELLOW CLAYEY SAND	AUTHORITY.
LIGHT GREY CLAYEY COARSE SAND WITH MINOR YELLOW MOTTLE		1.20 5.05 BROWNY RED COARSE CLAYEY PEBBLY SANI	MAY BE AFFECTED BY THE PROPOSED WORKS UNDER THE DIRECTION OF THE RELEVANT SERVICE
MINOR YELLOW MOTTLE	1.10 0.80	0.80 5.45 BROWNY RED COARSE CLAYEY SAND	 GROUND THE POSITION OF ALL SERVICES HAND EXCAVATING TO EXPOSE ALL SERVICES WHICH
YELLOW MOTTLE	0.85 1.05	0.52 5.73 BROWNY RED CLAYEY PEBBLY SAND	 COMPREHENSIVELY SCANNING THE AFFECTED AREAS WITH A CABLE DETECTOR AND MARKING ON THE
LIGHT GREY COARSE SANDY CLAY WITH MI	0.60 1.30	0.40 5.85 CHOCOLATE BROWN ORGANIC SANDY LOAM	 CONSULTATION WITH THE RELEVANT SERVICE AUTHORITIES
BLACK ORGANIC LOAM	0.30 1.60	(LIKELY IMPRTED FILL)	CAREFUL EXAMINATION OF THE CONTRACT DRAWINGS
	TP11 0.00 1.90	WP8 0.00 6.25 IIGHT BROWN PERRIY CLAY	LUCATION OF ALL UNDERGROUND SERVICES IN THE PROPOSED WORKS AREA. METHODS TO ACHIEVE THIS WILL INCLUDE BUT NOT BE LIMITED TO:-
PIT BASE	2.00 1.70	2.50 PIT BASE	2. PRIOR TO THE COMMENCEMENT OF CONSTRUCTION, THE CONTRACTOR IS TO ESTABLISH ON SITE THE EXACT
LIGHT GREY CLAY WITH ORANGE RED MOT	1.65 2.05	(SLIGHT ORANGE MOTTLE) 2.50 4.75	COMPLETENESS OF THE INFORMATION SHOWN.
YELLOW RANGE SANDY CLAY / CLAYEY SA	1.30 2.40	2.00 5.25 YELLOW FINE-MED SAND	INFORMATION AVAILABLE. NO RESPONSIBILITY IS TAKEN BY THE SUPERINTENDENT FOR THE ACCURACY AND
LIGHT GREY CLAYEY SAND YELLOW GREY CLAYEY COARSE SAND	1.00 2.20	1.50 5.75 BED FINE-MEDIUM SAND	1. EXISTING SERVICES ARE PLOTTED FROM THE BEST
ORANGET MOTTLE (MANGANESE NODULES)	1.00 2.70	1.00 6.25	EXISTING SERVICES
YELLOW GREY SANDY CLAY WITH SLIGHT	0.61 2.69	0.51 6.74 REDDY BROWN CLAYEY FINE SAND	
YELLOW GREY SANDY CLAY	0.38 3.32	0.00 7.25 GREYEY BROWN ORGANIC SANDY LOAM 0.30 6.95	DUUGLAS SHIRE CUUNCIL
BLACK ORCANIC SANDY LOAM	TP7 0.00 3.70	WP6 GL RL DESCRIPTION	LOCAL AUTHORITY
		test pit data - soil profiles	RP DESCRIPTION LOT 901 ON SP 264 284 PARISH OF VICTORY
TT TT L			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.
			THE PRINCIPAL'S SURVEYOR SHALL PROVIDE INITIAL
THE ALL CONTRACTOR			THE CONTRACTOR TO CONFIRM SURVEY DATUM WITH SURVEYOR PRIOR TO COMMENCEMENT OF WORK.
ONC			NOTES:
			CONTOUR INTERVAL EXISTING SURFACE: 0.20m INDEXED AT 1.0m INTERVALS.
			MERIDAN: MGA ZONE 55
219 218			ORIGIN OF COORDINATES: PSM 76389 9853.42E, 80445.36N
			PSM 76389 RL 3.363 AHD der.
20 22 STAGE 5E	2	A A A A A A A A A A A A A A A A A A A	
			NUILS:

DY CLAY WITH MINOR

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TEST PIT LOCATION SHOWN ON PLAN

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"Ocean B STAGE 5B OF AT BARRABAL

Breeze Estate" of proposed residential l drive, cooya beach

SUBDIVISION

DRAWING TITLE:

EXISTING

SITE PLAN.

DIAL														
BEI	16	15	14	13	12	11	10	9	8	7	6	თ	4	3
=OR(9521.816	9517.457	9305.432	9315.966	9337.258	9331.871	9394.163	9381.996	9371.029	9355.917	9370.404	9376.825	9451.670	9551.771
®	80068.904	80064.644	80198.481	80200.058	80209.513	80216.688	80294.934	80326.354	80322.165	80341.131	80354.323	80363.112	80379.190	80409.594
	0.000	0.000	6.148	5.036	0.000	4.767	4.318	4.761	4.840	5.225	4.742	4.290	2.649	0.000
	Stn 9107	Stn 9013	Stn 9110	Stn 9111	Stn 9000	Stn 9109	Stn 9008	Stn 9141	Stn 9142	Stn 9143	Stn 9144	Stn 9066	Stn 9062	Stn 9127
$\left.\right\rangle$	OIP	NIC	NIK	NIK	OPM	NIK	NIK	NIK	NIK	NIK	NIK	Star Pick	Spike	NIC

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SOURCE OF

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F PRINCIPAL CONTRACTOR AS HEALTH AND SAFETY ACT.

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APPOINTMENT OF PRINCIPAL

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PRE-START MEETING

THE CONTRACTOR SHALL PRODUCE THE FOLLOWING DOCUMENTS AT THE PRE-START MEETING:

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9554.645

80410.780

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Stn 9126 NIC

9552.307

80419.077

2.776

Stn 9063 NIK

Point

#

Easting

Northing

Level

Description

SURVEY MARKS

- <u>-</u> ... 4 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:

SHALOM CL	
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	nin@jpced.com.au	Email: adr	4880	Mareeba Q				
Ę	Y. LTD. AND DRAFTING 3 770 394	Mob. 0408	GINEERING L	P. O. Box 2				
	AS ERING	PAP, GINE	JIL EN	CIV	01.07.14	PERATIONAL WORKS APPROVAL	ORIGINAL ISSUE FOR 0	> 0
100	100	5.250	6.50 (4%)	5.250	17.000	ROAD J		
100	100	5.250	6.50 (4%)	5.250	17.000	BARRABAL DRIVE CHN 107.097 – END		
100	125	6.00	.00 (3-4%)	6.00 8	20.000	BARRABAL DRIVE CHN 49.825 TO 107.097		
ASE WIN. DEPTH 1m)	SUBBASE B. (MIN. DEPTH (N mm) m	RHS VERGE WIDTH (m)	ARRIAGEWAY WIDTH (m) CROSSFALL (%)	VERGE WIDTH (m)	RESERVE WIDTH (m)	ROAD NAME AND CHAINAGE		
		SPHALT.	EMENT OF AS	0) TO PLACE	SPHALT (AC1 MENT PRIOR	30mm THICK DENSE GRADED AS APPLY A LIGHT PRIME TO PAVEN		
CONDITIONS	L CRC SPECIFIC	MANUA	QROC DESIGN	ed in FN	AS SPECIFI	SEAL PAVEMENT AREAS ASPHALT AS FOLLOWS:		
COMPACTED	OR 'C' GRADED)	AL ('B' (MENT MATERI	2.2 Pavei Ification.	2 SUBTYPE 2 WITH SPEC 1N TABLE.	BASE SHALL CONSIST OF TYPE TO 100% SRDD IN ACCORDANCE DEPTH OF PAVEMENT AS NOTED		
ADED)	'B' OR 'C' GRA	terial ('	AVEMENT MA PECIFICATION.	PE 2.3 P WITH SF	ACCORDANCE IN TABLE.	SUBBASE SHALL CONSIST OF TY COMPACTED TO 100% SRDD IN DEPTH OF PAVEMENT AS NOTED		
NTENDENT.	of the superi	ADVICE	vtified seek	BE IDEN	% SRDD. BLE MATERIAI	SUBGRADE – COMPACT TO 1003 SHOULD ANY SOFT OR UNSUITAI		
RVICE ORY CBR , THE FINAL ? PAVEMENT	CBR UNDER SEF OF CONFIRMAT ? TEST RESULTS, 4. ROADS OR DTMR	AINIMUM V BASIS SITU CBR TRUCTION TH AUSTF	NSED ON A N REVISION ON OR TO CONS COMPLY WI	'EIN IS BA BJECT TO IN. BASED JNCIL PRIJ ENERALLY	Stated Her Esign IS Su Constructio Yed By Cou Yen Shall G	PAVEMENT NOTES PROVISIONAL PAVEMENT DESIGN CONDITIONS OF 7. PAVEMENT DI TESTS TAKEN AT THE TIME OF (PAVEMENT DESIGN SHALL APPRC THE COMPLETED PAVEMENT DES DESIGN MANUAL AS APPLICABLE.		
	: ROAD J	<u>VE &</u> 1:100	<u>DAL CRC</u> BAL DRI SCALE:	<u>TYPI(</u> <u>3ARRA</u>				
		C				DATU <u>M LE</u> VEL		
ER SUB SOIL DR	SUB-BASE GRAVEL REFE	ontrol Line	AAVEL	BASE GF REFER 1	/ER K&C	Rollov Refer		
<u>0.15</u> <u>0.15</u> <u>0.15</u> <u>0.15</u> <u>0.15</u>		- REFER	ARRIAGE WIDTH CROSS FA REFER TAI		- REFER TABL	O.30 VERGE - CUT/FILL TO LOTS REFER DWG. CO3 FOR FINISHED LEVELS 3.00%		
RTHWORKS - DISTAN ER CROSS SECTIONS	WIDTH OF EAI REF - REFER TABLE	SERVE -	ROAD RE					

STAGE 5B OF PROPOSED RESIDENTIAL STAGE 5B OF PROPOSED RESIDENTIAL STATE BARRABAL DRIVE, COOYA BEACH	"Ocoan Broozo	MIN. ROLLOVER KERB DETAIL SCALE: 1:50				N.I.J.	EXISTING PAVEMENT JO	JOIN NEW WORK				300				SUB SURF		<u> <u> </u></u>		ofile					
SUBD				50			INT DETAIL			END NEW WORK	OF EXIST		EN			ACE DRAINAGE DETAIL	0.15mm SIEVE) WRAPPED IN BIDIM A24 GEOFABRIC OR OTHER APPROVED FOLIIVALENT (TYPE TO RE CONFIRMED RY	SINGLE SIZED 20mm AGG. (MAX 5% PASSING	FINISHED VERGE LEVEL						
IVISION ID DETAILS			L#35	C# 19	L#34	C# 18	L#33	C# 17	L#32	C# 16	L#31	C# 15	L#30			L#29	C# 14	L#28	C# 13	L#27	L#26	L#25			
			479.061 623.140	477.888 479.061	462.379 477.888	456.867 462.379	440.502 456.867	434.990 440.502	170.598 434.990	154.890 170.598	66.722 154.890	40.865 66.722	0.000 40.865	CHAINAGE		427.621 461.739	350.895 427.621	107.097 350.895	83.535 107.097	60.000 83.535	49.825 60.000	0.000 49.825	CHAINAGE		
			8777.944 8635.116	8779.100 8777.944	8794.55 8779.100	8799.963 8794.55	8815.705 8799.963	8821.116 8815.705	9084.37 8821.116	9093.402 9084.37	9085.233 9093.402	9078.754 9085.233	9062.240 9078.754	EASTING		8824.572 8827.733	8860.955 8824.572	9083.96 8860.955	9091.620 9083.96	9082.109 9091.620	9077.998 9082.109	9057.863 9077.998	EASTING	BAR	
	SCALE		80668.164 80687.108	80668.032 80668.164	1 80666.595 80668.032	80665.584 80666.595	80661.117 80665.584	80660.106 80661.117	80635.610 80660.106	80624.726 80635.610	80536.938 80624.726	80512.022 80536.938	80474.642 80512.022	NORTHING	ROAD J	80625.519 80659.490	80563.566 80625.519	80465.046 80563.566	80445.264 80465.046	80423.737 80445.264	80414.429 80423.737	80368.854 80414.429	NORTHING	RABAI DR	
APPROVED DWG NUN	1:100 1.0			30.000		30.000		30.000		10.000		80.000		RADII			61.500 61.500		15.000 15.000				RADII	VF	
-/ VER DESI JULY 2014 CHEC B. J. SMY IBER 1301 - C0	0 1.0 2.0 3.0 HOR 1:100 DRA		277°33'21" STRAIGHT 277°33'21" STRAIGHT	275°18'58" ARC 277°33'21" ARC	275°18'58" STRAIGHT 275°18'58" STRAIGHT	285°50'39" ARC 275°18'58" ARC	285°50'39" STRAIGHT 285°50'39" STRAIGHT	275°18'58" ARC 285°50'39" ARC	275°18'58" STRAIGHT 275°18'58" STRAIGHT	5°18'58" ARC 275°18'58" ARC	5°18'58" STRAIGHT 5°18'58" STRAIGHT	23°50'06" ARC 5°18'58" ARC	23°50'06" STRAIGHT 23°50'06" STRAIGHT	BEARING		5°18'58" STRAIGHT 5°18'58" STRAIGHT	293°50'06" ARC 5°18'58" ARC	293°50'06" STRAIGHT 293°50'06" STRAIGHT	23°50'04" ARC 293°50'06" ARC	23°50'04" STRAIGHT 23°50'04" STRAIGHT	23°50'04" STRAIGHT 23°50'04" STRAIGHT	23°50'04" STRAIGHT 23°50'04" STRAIGHT	BEARING		

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Mob. 0408 770 394	CIVIL ENGINEERING D P. O. Box 2347 M						
GINEERING R PTY, LTD,	CIVIL ENG	01.07.14	IPPROVAL	WORKS A	OPERATIONAL	AL ISSUE FOR	A ORIGIN
DADAS				LEVEL	FINISHED	EFINITION OF	
N OF THE EARTHWORKS AND _ IF ANY.	AFTER COMPLETION MENT OF TOP SOIL	to be achieved Prior to placei)TES FOR	ORKS NO	FINISHED LE	OTE: FL =	πz
HE DRAWINGS ARE THE LEVELS	VELS NOTED ON TH	THE FINISHED LE	Ex Ex	4.610 4.539	80495.286 80479.239	9127.568 9119.033	14/
ND FILL AREAS TO A DEPTH OF 75mm. 40mm) THE FINISHED EARTHWORKS N AS PRACTICARI F AFTER COMPLETION	RS AND FOOTPATHS	ALLOIMENIS, BATTEL (WITH AN ABSOLUTE) ARFAS SHATT RF D	: = ;	3.749	80507.463	9086.033	146
DIL SHALL BE RE-SPREAD TO	THE WORKS, TOP SO	ON COMPLETION OF	ם ב	3.916 3.825	80482.641 80493.576	9075.067	144
AND MAINTAINED FOR THE REQUIRED	ABLE GRASS SPECIES, D.	AN APPROVED SUIT	P	4.313	80477.366	9077.109	143
M EROSION, BY HYDROMULCHING WITH	BE PROTECTED FROM	ALL BATTERS SHALL	E×L r	4.465	80462.725	9110.250	142
W PLASTICITY GRANULAR MATERIAL WITH	NOT MORE THAN 15%	ANY IMPORTED FILL A PLASTICITY INDEX		4.539	80525.196 80516.619	9052.078 9071.49.3	140
		ETC.	ExL	4.840	80532.470	9035.613	139
. DISTRESS (BY WAY OF INDUCED NT-SENSITIVE FEATURES STRUCTURES	ADJACENT MOVEMEN	SETTLEMENT) TO AN	ExL	5.043	80539.744	9019.149	138
ANY VIBRATORY ROLLING OR	KEN TO ENSURE THAT	CARE SHALL BE TAK	E P	5.510 5.267	80556.710 80548.230	8980.745 8999.940	136
1 FOR COHESIONLESS (SAND) COMPACTION, IF APPROPRIATE).	5.31, 5.4.1 AND 5.5.1 RNATIVELY, STANDARD	METHODS AS 1289 MATERIALS OR ALTE	22	5.550	80567.192	8962.440	135
RATED DENSITY ESTABLISHED BY TEST	THE MAXIMUM DRY DE	AS A PERCENTAGE	<u>ה</u>	5.320	80542.951	8928.654	133
SS, UNDER LEVEL 2 SUPERVISION (AS	DOmm FINAL THICKNES	NOT MORE THAN 20	고 고	5.369 5.372	80534.433 80542.830	8947.934 8928.928	131 132
VIEDDNI V DOMBACTED IN LAVEDS DE		WHICH MAT EXIST.	Ē	5.189	80525.949	8967.138	130
ANY LOCALISED COMPRESSIBLE ZONES	AND RECTIFICATION OF	ALLOW DETECTION A	~ ;	5.008	80517.463	8986.347	129
AS 1289 TESTS 5.3.1 AND 5.5.1).	D VIBRATED DENSITY (A	MAXIMUM SATURATE	ם ב	4.673 4.828	80501.703 80508.977	9022.021	127
ORMLY COMPACTED TO ACHIEVE A DRY	GRADE SHALL BE UNIFO	THE EXPOSED SUBO	Ē	4.518	80494.429	9038.486	126
OTECTED BT DIVERSION DRAINS AND	PROPRIATE.	SILT FENCES AS AP	~ -	4.355	80487.468	9054.241	125
R CONSULTATION AND AGREEMENT WITH	E SUPERINTENDENT AFTER	DIRECTED BY THE S	ם ב	4.447	80451.592 80489 511	9083.483 0050 517	123
TOP SOILS MAY BE STOCKPILED FOR	TINAL DESIGN LEVELS.	MATERIAL TO SUIT F	문	4.397	80456.867	9081.440	122
VSIST OF CLEARANCE OF VEGETATION	SHALL GENERALLY CON	SITE EARTHWORKS	귀고	4.334 4.316	80469.896 80462.622	9051.950 9068.415	120 121
HE CONTRACTOR SHALL OBTAIN	TO REMOVE ANY TREE	PRIOR TO COMMENC	2	4.482	80477.169	9035.485	119
		BULK EARTHWORKS	ج ج	4.791 4.637	80484.443	9019.020	118
		/	<u>1</u>	4.946	80498.991	8986.091	116
			2	5.101	80506.265	8969.626	115
			ם ב	5.398	80520.813 80513 539	8936.696	113
			FL	5.417	80528.087	8920.231	112
			Ex L	5.973 5.612	80491.104 80498.377	8923.571 8907.106	111
		/ 		6.243	80483.830	8940.036	109
	199	200	ExL	6.353	80476.556	8956.501	108
				6.403	80469.282	8972.966	107
				6.085 6.277	80454.734 80462 008	9005.895 8080 431	105
			ExL	5.783	80443.344	9020.542	104
CH 3	CH 3	CH 3	Ext F	4./60 5.263	80428./9/ 80436.070	9053.472 9037.007	102
		340 +		4.750	80421.426	9070.156	101
			Description	Level	Northing	Easting	Point #
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262	· 263	30			Ì	\ \ \ X	
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				00	26		

DRAWING TITLE: BULK EARTHWORKS PLAN.













X	DE		100¢ SV	100ø	
EXISTING WATER MAIN AND FIXTURES -	150 Ø OR 100 Ø C.I. DEAD END CAP M BLOCK.	80 Ø SPRING HYDRANT (MAXI FLO TYPE) BOX, MARGIN & MARKER. ORIENTATE HYI MAIN.	SLUICE VALVE TO AS 2638 COATED WITH COMPLETE WITH C.I. COVER, BOX, ANCHO COMPLETE WITH C.I. COVER, BOX, ANCHO	100ø uPVC WATER MAIN	LEGEND

					SCALE
DWG NUMB	APPROVED	DATE	(AT A1 SIZE)	SCALE	1:500 ⁵
ER 1301 -	B. J	JULY 2014	VER	HOR 1:500	+0 5 10
- C07 /	I. SMYTH RPE	CHECKED	DESIGNED	DRAWN	15 <u>20</u>
AMDT A	⁻ Q No. 9326	J.P.	J.P.	J.P.	1 25m

H A THERMOSETTING EPOXY POWDER, ME CLASS 16 OR, MARGIN & MARKER OR 63¢ DR BRASS VALVE OR, MARGIN AND MARKER. SIZES AS NOTED.) COMPLETE WITH C.I. TEE (ME), RISER, C.I. COVER, DRANT SUCH THAT BOLTS ARE PARALLEL TO WATER OR 63Ø DEAD END CAP WITH CONCRETE THRUST

								1	
RIGINAL I		우 	COV SU m	DES	K & R	Σ Ω Π	ΞC		
nts SSUE FC			RFAC		GHT L		JT (-m _L (+m		
OR OPER		G E	LINE	LEVEL	S P PF	P OF	3.0	<u> . L. 2.0</u>	CENTRE OF COOYA BEACH
ATIONAL		0.000		<u>م'</u>				00	
WORKS		10.000							
APPROVA		15.000							
F .		20.000							
		25.000							
		35.000							
01.0		40.000							
07.14		49.825	4.357	4.600	4.488	4.488			I.P. 4.600
CIVIL E P. O. Boy Mareeba		50.000	4.355	4.598	4.486	4.486	+0.25		
J VIL NGINEI Q 4880		60.000	4.237	4.511	4.380	4.380	+0.27		× 00 20 I.P. 4.498
		70.000	4.099	4.448	4.299	4.299	+0.35		
PAF GIN DESIGN Mob. 04 Email: a									
PAS EEF TY. 1 AND E 08 770 3 dmin@jj		80.000	4.129	4.398	4.252	4.279	+0.27		
RINA LTC BRAFTII 394 Sced.com		90,000	4 143	4 348	4 213	RE	+0.21		
						ER DE	0121		
		100.000	4.087	4.298	4.178		+0.21	-	
		107.097	4.062 4.058	4.263	4.153	4.129	+0.20		
		117 500	4.005	4.210	4 001	4 001	10.11		
		120.000 120.842	4.093	4.210 4.198 4.194	4.091	4.091 4.079 4.075	+0.09 +0.07		
		130.000	4.194	4.177	REFEF	4.058	-0.01		1471 N LP 4 144 SAG 128.199
		130.842	4.201	4.178	C DETA	4.059	-0.02		+ 100 HT HI 4.175 + 200 - スロー
		140.000 140.842	4.460	4.223 4.230		4.104	-0.24 -0.26		
		144.092	4.584	4.258	4.139	4.139	-0.32		
 ල	<u>-ONG</u>								
		160.000	4.935	4.394	4.276	4.276	-0.55		
\square	SCA SCA	170.000	5.069	4.480	4.361	4.361	-0.59		
	LES: T								
	VER. 1: 1: 1: 1: 1: 1: 1: 1: 1: 1: 1: 1: 1:	180.000	5.185	4.566	4.447	4.447	-0.61		
STAC AT D	500 500	190.000	5.250	4.652	4.533	4.533	-0.60		
CCC SE 5 BARF 5 TITLE	BAL								
	DRIVE	200.000	5.359	4.738	4.619	4.619	-0.62		
- F PF DR RRABAL	10 · 1	210.000	5.443	4.824	4.705	4.705	-0.62		
ROPO IVE, DRIVE									
- LON		220.000	5.546	4.910	4.791	4.791	-0.64		
Sta RES YA E		230.000	5.634	4.996	4.877	4.877	-0.63		
AL SEC									
		240.000	5.705	5.082	4.963	4.963	-0.63		
SUE		250.000	5.739	5.168	5.049	5.049	-0.57		
NON NO		260.000	5.733	5.254	5.135	5.135	-0.48		



		Z			SC/	SCA
DWG NUMB	APPROVED	DATE	(AT A1 SIZE)	SCALE	E 1:500 5	E 1:50
ER 1301 -	B.	JULY 2014	VER 1:50	HOR 1:500	0 5 10	
- C08	J. SMYTH RPE	CHECKED	DESIGNED	DRAWN	15 20	
amdt A	⁻ Q No. 9326	J.P.	J.P.	J.P.	⊒ 25m	

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							Î			
270.000	5.701	5.311	5.192	5.192	-0.39					Crest Ch 275.062
							_			RL 6.318
280.000	5.572	5.311	5.193	5.193	-0.26		40	I.P. 5.426		
284.000		5.296	5.178	5.178			00			LIMIT OF CONSTRUCTION
290.000	5.434	5.255	5.136	5.136	-0.18			Î	1	
									i ;	
300.000	5.296	5.141	5.022	5.022	-0.16			FU		
								URE] 	
310.000	5.159	4.999	4.880	4.880	-0.16	-1.42		CON	 	
						2%		STRL	1 ; 1 /	
320.000	4.957	4.856	4.738	4.738	-0.10				/	
								ž	 /	
330.000	4.758	4.714	4.595	4.595	-0.05				/'	
									ĺ	
340.000	4.547	4.572	4.453	4.453	+0.02	¥		¥	Í	

DRAWING TITLE: BARRABAL DRIVE - CROSS SECTIONS.	www.iiuu.com.au	Mareeba Q 4880 Email: admin@jpced.com.au	
AT BARRABAL DRIVE, COOYA BEACH	NOU DIG	CIVIL ENGINEERING DESIGN AND DRAFTING	
"Ocean Breeze Estate"	DIAL BEFORE	OT.07.14 CIVIL ENGINEERING	amendments A ORIGINAL ISSUE FOR OPERATIONAL WORKS APPROVAL
BARRABAL DRIVE Ch 160.000 IOR. 1:100 R: 1:100	4.600 CROSS SECTIONS SCALES: H VEF	Ch 49.825	
R.L. 2.900	3.00% <u>1 in 10.00</u>	3.00% -3.00% -3.00%	R.L. 3.100
CUT TO LOTS REFER Ch 180.000 DWG. CO3 FOR FINISHED LEVELS	14.336 ₽ BDY4.511	Ch 60.000	150Ø SEWER 。 <u>R</u> P BDY
		-3.50% -3.50%	R.L. 3.000
	14.341 	Ch 80.000	FILL TO LOTS REFER DWG. CO3 FOR FINISHED LEVELS P
Ch 200.000	4.398		R.L. 2.900
	12.716 PE	-3.93% -3.19%	, <u>R</u> P E
	3DY	Ch 83.535	R.L. 2.900 150Ø SEWER o
CUT TO LOTS REFER DWG. CO3 FOR		3.03% -3.84%	
	12.324 	Ch 100.000	FILL TO LOTS REFER DWG. CO3 FOR FINISHED LEVELS RJ.
	4.298	525Ø RCP	R.L. 2.800 150Ø SEWER o
Ch 240.000		2.94% -3.15% -3.60%	
R.L. 3.600	DY FILL TO LOTS REFER R DWG. CO3 FOR R	Ch 107.097	<u>R</u> P BDY
	 4.263		R.L. 2.800 150Ø SEV
CUT TO LOTS REFER Ch 260.000 DWG. CO3 FOR FINISHED LEVELS	3.00% RP B		FINISHED LEVELS
R.L. 3.800		Ch 117.592	EIII TO LOTE BEEEB
Ch 280.000	BDY FILL TO LOTS REFER DWG. CO3 FOR FINISHED LEVELS	Ch 120.000	
R.L. 3.900		525Ø RCP	R.L. 2.700
CUT TO LOTS REFER FUTURE WORKS Ch 300.000		Сh 140.000 R0	FILL TO LOTS REFER DWG. CO3 FOR FINISHED LEVELS
R.L. 3.700		O 375Ø RCP	R.L. 2.800
FUTURE WORKS Ch 320.00	AD J		CUT TO LOTS REFER DWG. CO3 FOR FINISHED LEVELS
			R.L. 2.800
	<u></u> РВ		
	DY		





. WORKS APPROVAL 01.07.14 CIVIL ENGINEERING DESIGNER PTY, LTD, DESIGNER PTY, LTD, CIVIL ENGINEERING DESIGN AND DRAFTING P. O. Box 2347 Mareeba Q 480 Email: admin@jpced.com.au	ORIGINAL ISSUE FOR OPERATIONAL WORKS APPROVAL	
	nendments	٥

		CHAINAGE	EXISTING SURFACE AT CONTROL LINE	DESIGN LEVELS AT CONTROL LINE	RIGHT LIP OF K&C - RHS	LEFT LIP OF K&C - LHS	CUT (-m) FILL (+m)	R.L. 0.500				BARRABAI DRIVF
		0.000	4.201	4.178			-0.02		↑.		:P: 4 :039	
		4.000	4.214	4.059			-0.19	ť/		\		
		10.000	4.237	3.830		24₽	-0.41		12.8 0%	12	.P. 3.778	
		13.251	4.250	3.773	3.654	3.654	-0.48		× 57 F	8		
		16.000	4.260	3.748	3.629	3.629	-0.51			/		
		20.000	4.276	3.728	3.609	3.609	-0.55					
		30.000	4.225	3.678	3.559	3.559	-0.55					GN F
		40.000 40.865 42.000	4.273 4.278	3.628 3.623 3.628	3.509 3.505 3.509	3.509 3.505 3.509	-0.64 -0.66	-7				LIMIT OF CONSTRUCTION
		50.000	4.315	3.578	3.459	3.459	-0.74					
SCA	IGITUDIN	60.000	4.286	3.528	3.409	3.409	-0.76		-0.50%			
LES:	AL	66 700	4 240	2 404	2 275	2 275	0.76				FU.	SU EX
< Ŧ	S	70.000	4.249	3.494	3 350	3 350	-0.76					 RF/
OR. 1:500	-CTION	80.000	3.962	3.428	3.309	3.309	-0.53				CONSTR	ACE
	RO	05 000	2.045	2 400	2 00 4	2 004	0.45					
	B	85.000	3.845	3.403	3.284	3.284	-0.45			`		
	احـــ	90.000	3.752	3.373	3.254	3.254	-0.38				۷	
		100.000	3,459	3.284	3.166	3,166	-0.18		2596.	30	I.P. 3.328	

DRAWING TITLE: ROAD J - LONGTITUDINAL AND CROSS SECTIONS

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





 100.000	0.100	0.201	0.100	01100	0110		1.1 . 0.020
						.00 178 R	
110.000	3.300	3.157	3.039	3.039	-0.14		
115.000	3.237	3.079	2.961	2.961	-0.16		
120.000	3.147	2.997	2.878	2.878	-0.15	-1.6	
						6%	I_{l}
130.000	2.889	2.831	2.712	2.712	-0.06		\underline{I}'
						40.00	
140.000	2.550	2.692	2.574	2.574	+0.14	↓ _୵ v	¥ /



	3.251 1:100	5.000).865	UCTION Ch 60.000	UCTION Ch 66.722	UCTION Ch 80.000	JCTION Ch 100.000	JCTION Ch 140.000	
SCALE (AT A1 SIZE) DATE APPROVED DWG NUMB	SCALE 1:500	<u>R</u> P BDY	<u>, R</u> P BDY	, <u>R</u> P BDY −, -, <u>R</u> P B	DY RP BDY	, <u>, </u> Р ВDY	<u>R</u> P BDY		<u>R</u> P BDY
HOR 1:500/100 DRAWN J.P VER 1:50/100 DESIGNED J.P JULY 2014 CHECKED J.P B. J. SMYTH RPEQ No. 93 ER 1301 - C10 AMDT 4	 • 150Ø SEWER 3.773 0 0 0 0 0 0 0 1.0 1.5 2.0 2.5m 	∘ 150Ø SEWER 3.728 CUT TO LOTS REFER DWG. CO3 FOR FINISHED LEVELS	3.623	3.528	3.494	3.428	3.284	2.692	

	DESIGNER PTY. LTD.		
	JIM PAPAS	01.07.14	r operational works approval
	LINE 61		
	0.150 20.150 7.060 27.210 18.000 45.210	0.000	RUNNING CHAINAGE
	148.836 (2.970R) 147.336 (2.970L) 129.337 (2.970L)	168.982 (2.970R)	ROAD CHAINAGE (OFFSET)
	4.754 4.748 4.672	4.839	DESIGN SURFACE
	3.441 3.421 3.393 3.373 3.139 3.119	3.526	INVERT LEVEL OF DRAIN
1	1.313 1.333 1.355 1.375 1.553	1.313	DEPTH TO INVERT
	0.119 0.116 0.208		PIPE CAPACITY AT GRADE (Cumecs)
	0.111 0.208		PIPE FLOW (Cumecs)
	4.534 4.461 4.435 4.148 3.915 3.839	4.657 4.569	HYDRAULIC GRADE LEVEL
	4.537 4.445 3.915	4.657	WATER LEVEL IN STRUCTURE
	/I RL -2.00		PART FULL FLOW VELOCITY (m,
	.42% 0.40% 1.30% 36.97 250.00 77.09 (0.44 1y) 0.97(0.60 1y) 1.83(1.19 1y)	/s) 0.67	PIPE GRADE % PIPE SLOPE 1 in X FULL PIPE FLOW VELOCITY (m/
	75(2) 375(2) 375(2)		PIPE SIZEmm (Class)
		Π	
1			NOTE: IF "BRO PITS" ARE TO BE USED, THEN THE CONTRACTOR SHALL OBTAIN COUNCIL'S APPROVAL AND REFER TO THE DESIGNER FOR AN AMENDED DESIGN.
I	KERB PIT ON GRADE SMALL LINTEL (10% Blockage) KERB PIT ON GRADE SMALL LINTEL (10% Blockage) KERB INLET IN SAG SMALL LINTEL	SMALL LINTEL (10% Blockage)	STRUCTURE DESCRIPTION
•	4/61 3/61 2/61	₿/61	STRUCTURE

DRAWING TITLE: STORMWATER DRAINAGE- LONGITUDINAL SECTION, SET OUT DATA, PIT SCHEDULE AND NOTES	AI BARRABAL DRIVE, COUTA BEACH	STAGE SE OF PROPOSED RESIDENTIAL SUBDIVISION		"Onone Dronen Entato"	SCALE
DWG NUMBE	APPROVED	DATE	(AT A1 SIZE)	SCALE	5 1:500 5
IR 1301		JULY 2014	VER 1:50	HOR 1:500	о
- C11	B. J. SMYTH RF	CHECKED	DESIGNED	DRAWN	10 15 20
≥	ĔQ				

SCALE 1:50

0.5 0

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-1 0

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2.0 2.5m



				PIT SC	HEDULE				
ЫL		INTER	VAL	INLE	Т	OUT	LET		PIT
No.	TYPE	WIDTH	LEN.	DIA.(CL)	INV R.L.	DIA.(CL)	INV R.L.	F.S.L.	DEPTH
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	1050Ø MANHOLE TO FNQROC STD DWG S1065	105(Ø	525(2)	2.775	525(2)	2.755	4.250	1.49

STORMWATER DR

VARIES LARGE LINTEL - 6.800 MEDIUM LINTEL - 5.600 SMALL LINTEL - 4.400 KERB INLET PIT ON GRADE

0.430	FLOW
1.64	



FIELD INLET TYPE A 0.430

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



NOTES:

SET OUT POINT IS CENTRE OF GRATE

ST	ORMWAT	ER SETO	UT PC	DINTS
Point #	Easting	Northing	Level	Description
201	9104.362	80443.304	4.250	6/1Ex
202	9101.046	80450.031	4.250	1/61
203	9062.223	80470.878	4.672	2/61
204	9045.758	80478.151	4.748	3/61
205	9047.177	80485.071	4.754	4/61
206	9028.748	80493.210	4.839	5/61

\geq	
₹	
⋗	
G	

E SET OUT DETAILS

	DULE	
OUTLET		

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

FLOW G

LENGTH IS DIMENSION PARALLEL TO THE LINE OF THE KERB AND CHANNEL. INSTALL 2.0m SUB SOIL DRAIN AS REQUIRED BY FNQROC. 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 1J TO AS 4058

LINTEL LENGTHS NOTED INCLUDE TRANSITION LENGTHS.

E	FERING Y. LTD. ND DRAFTING 770 394 nin@jpced.com.au	CIVIL ENGINE DESIGNER PT CIVIL ENGINEERING DESIGN A P. O. Box 2347 Mareeba Q 4880 Email: adm	01.07.14	ROVAL	ORIGINAL ISSUE FOR OPERATIONAL WORKS APP	> C
S: HOR. 1:50 VER: 1:50	SCALE					
TUDINA NE 28		SEW	-			
96	31.1	31.476 65.385	ت 33.909	0.000	CHAINAGE	
		4.148	4.053	4.425	EXISTING SURFACE	
		4.148	4.053	4.425	FINISHED SURFACE	
	2.576	2.536	2.286	2.060	INVERT LEVEL	
	1.572	1.612	1.767	2.365	DEPTH TO INVERT	
50 50	150Ø	150Ø PVC 1:150		150Ø P 1:150	PIPE DETAILS SLOPE/GRADE DATUM RL 0.00	
		BR	BR	вк	PIT TYPE PIT COVER (CLASS)	
	LINE 2a/28 DE ENTERS 150Ø IL 2.586	UL525Ø RCP 2.918 IL SEWER 2.551 CLEAR 0.37m 2/28	1/28		NOTE: PIT TYPE R = ROUND RE = RECTANGULAR PIT COVER TYPE B IN ACCORDANCE WITH THE REQUIREMENTS OF FNQROC DESIGN MANUAL 1/20 F	
)				Fxist	
	STING EW SEWER	CONTRACTOR SHALL VERIFY EXIS THE SUPERINTENDENT OF ANY RECTIFY, IF NECESSARY) ALL NI	onstruction the ole and advise . Ideo check (and	SHALL ALLOW TO V	9. PRIOR TO THE CC INVERT LEVELS AT DISCREPANCIES. 10. THE CONTRACTOR WORK.	
	COUNCIL	FORE CONNECTION TO EXISTING IN THE DRAWINGS (NOMINALLY 50) and passed be to rl's shown o	BE CLEANED, TESTED	7. ALL SEWERS TO E SEWERS. 8. MANHOLES SHALL	
	NUAL	D IN FNOROC DEVELOPMENT MAN	TICULATION IS TO RAWINGS CONTAINE CLAUSES.	SSINGS, ETC. THE SEWERAGE RE ECIFICATIONS AND DF AUTHORITY SPECIFIC	6. CONSTRUCTION OF PROCEDURES, SPE INCLUDING LOCAL	
	R TO PLAN	IES, THE HOUSE CONNECTION BE VER LINE SHALL CONNECT INTO . DRY MANHOLE SITUATIONS. REFEI	IDS OF SEWER LIN VICED BY THE SEV ORDER TO AVOID	OCCUR AT THE EN IND ALLOTMENT SERV HE SEWER LINE) IN INS.	4. WHERE MANHOLES (HCB) FOR THE E MANHOLE (NOT TH FOR HCB LOCATIO	
	lo S3005.	CORDANCE WITH FNQROC DWG N	e1b or e2 in Ac	vill be type e1a, e d be provided at ,	2. UNO ALL HCB'S W 3. END CAPS ARE TO CONSTRUCTED.	
		RJ TO AS1260, UNLESS NOTED	⊃VC, CLASS SN8 F	LATION NOTES SHALL BE 150ø uf	SEWERAGE RETICU 1. ALL SEWER PIPES OTHERWISE.	

DRAWING TITLE: SEWERAGE RETICULATION - LONGITUDINAL SECTIONS, SET OUT DAT

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





	SEWER	SETOUT	POIN	S
Point #	Easting	Northing	Level	Description
301	9067.869	80419.956	4.800	Ex MH
302	9081.901	80451.561	4.519	1/28
303	9076.690	80482.603	4.061	2/28
304	9047.018	80492.236	4.503	3/28
305	8977.331	80523.037	5.166	4/28
306	8947.221	80536.345	5.440	5/28DE
307	9081.633	80493.792	3.904	2A/28DE

ATA AND NOTES	2	NAL					
		SEWER	0.000	5.750 5.750	3.820 -3.820 R 1.80 J	—— 3A/20	
DWG NU	(AT A1 SI DATE	LINE 28A LES: HOR. 1:50 VER: 1:50 SCALE 1:50 SCALE 1:50	24.000	5.214 5.214	3.980 -3.980	—— 3B/20	
JMBER 1301	ZE) HOR 1:500 VER 1:50 JULY 2014) B.	OINAL 5 0 0.5 1.0 0 5 10					
- C12 AM	DRAWN DESIGNED CHECKED	0 1.5 2.0 2 20 2					
DT A	J.P. J.P. J.P. J.P.	55 m 5.0 m					



Email: admin@jpced.com.au	Mareeba Q 4880			
Mob. 0408 770 394	P. O. Box 2347			
NG DESIGN AND DRAFTING	CIVIL ENGINEER.			
IER PTY. LTD.	DESIGN			
	CIVILE	01.07.14	ORIGINAL ISSUE FOR OPERATIONAL WORKS APPROVAL	₽
M PAPAS	J		nendments	٥

EXTENT OF STAGE 5B STORMWATER DRAINAGE WORKS

	100	100	100	5 100	5 100	5 100	5 100	5 100	5 100	5 100	5 100	100 100	91 100	DESIGN ARI		
	6/1EX	9/1EX	10/1EX	1/6EX	11/1EX	1/8EX	1/61	2/61	3/61	4/61	5/61	1/7EX	2/7EX	STRUCTURE No.		
	6/1EX to 1/1EX	9/1EX to 6/1EX	10/1EX to 9/1EX	1/6EX to 10/1EX	11/1EX to 10/1EX	1/8EX to 11/1EX	1/61 to 6/1EX	2/61 to 1/61	3/61 to 2/61	4/61 to 3/61	5/61 to 4/61	1/7EX to 11/1EX	2/7EX to 1/7EX	DRAIN SECTION		LOCATION
]	5/61;4/61;1/6 1/61;7/12SW to 1/ EX;1/8EX;11/1EX; 6EX;10/1EX;9/1E) 6/1EX	7/12SW to 1/7EX; 8EX;11/1EX;1/6E; 10/1EX;9/1EX	7/12SW to 1/7EX; 8EX;11/1EX;1/6E 10/1EX	1/6EX	7/12SW to 1/7EX; 8EX;11/1EX	1/8EX	5/61;4/61;4/61;1/6 1/61	5/61;4/61;4/61;1/6	5/61;4/61	5/61;4/61	5/61	2/7EX;1/7EX	2/7EX	SUB-CATCHMENTS CONTRIBUTING		
	22; 15.00 77 15.00 X; X;	X; 5.00	X; 5.00	15.00 15.00	1/ 10.00 10.00	15.00 15.00	2; 15.00 15.00	52 15.00 15.00	15.00 15.00	15.00 15.00	15.00 15.00	10.00 10.00	10.00 10.00	SUB-CATCHMENT TIME OF CONC.	tc	TIME
	114 188	171 291	171 291	114 188	134 224	114 188	114 188	114 188	114 188	114 188	114 188	134 224	134 224	RAINFALL INTENSITY	_	SC
	0.76 0.96	0.76 0.76 0.96 0.96	0.76 0.96	0.76 0.96	0.76 0.96	0.76 0.96	0.76 0.96	0.76 0.76 0.96 0.96	0.76 0.96	0.76 0.96	0.76 0.96	0.76 0.96	0.76 0.96	CO-EFFICIENT OF RUNOFF	C	JB-CATC
	0.001 0.001	0.091 0.081 0.081 0.081	0.028 0.028	0.267 0.267	0.093 0.093	0.298 0.298	0.001 0.001	0.077 0.176 0.077 0.176	0.605 0.605	0.066 0.066	0.434 0.434	0.149 0.149	na 0.158 0.158	SUB-CATCHMENT AREA	A	HMENT
	0.001 0.001	0.069 0.062 0.087 0.078	0.021 0.027	0.203 0.256	0.071 0.089	0.226 0.286	0.001 0.001	0.059 0.134 0.074 0.169	0.460 0.581	0.050 0.063	0.330 0.417	0.113 0.143	na 0.120 0.152	- EQUIVALENT AREA	C*A	RUNOFF
	0.001 0.001	0.131 0.165	0.021 0.027	0.203 0.256	0.071 0.089	0.226 0.286	0.001 0.001	0.192 0.243	0.460 0.581	0.050 0.063	0.330 0.417	0.113 0.143	na 0.120 0.152	SUM OF (C * A)	+CA	
	0	62 133 FLOW	10 FLOW	64 134 FLOW	26 56 FLOW D	72 149 FLOW	1 0	61 127 FLOW	146 303 FLOW D0	16 33 FLOW	105 218 FLOW	89 89	1/S 45 94	SUB-CATCHMENT DISCHARGE	Q	
	0	72 WIDTH/DE	15 WIDTH/DE OWNSTRE	64 WIDTH/DE	26 WIDTH/DE OWNSTRE	72 WIDTH/DE OWNSTRE	0	109 WIDTH/DE	146 WIDTH/DE OWNSTRE	45 WIDTH/DE OWNSTRE	105 WIDTH/DE OWNSTRE	51	45	FLOW IN K&C (INC. BYPASS)		
	0.00	0.50 EPTH 1.200	1.10 EPTH 0.86 EAM 0.223	0.00 EPTH 0.17	1.00 EPTH 1.200 EAM 0.406	1.50 EPTH 1.79 EAM 0.846	0.00	0.42 EPTH 1.67	0.42 EPTH 2.633 EAM 1.604	0.42 EPTH 1.556 EAM 0.669	0.42 EPTH 2.283 EAM 1.261	0.00	0.00	ROAD GRADE AT INLET		
	0	133 0Wd m	11Wd m m	533 1Wd m	314 m m	701 4Wd m		133 5Wd m	197 3Wd m m	197 6Wd m m	197 3Wd m m	0	0 S	MINOR FLOW ROAD CAPACITY		
	4	101S0.	4	101S0.	4	4	4	101S0.	4	4	4	4	4	INLET TYPE		ET DES
		7 80		6	2	ъ		08 10		<u>س</u>	7	4	ي ي		Q	IGN
		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		4				99	4	6 Over	6 2		0 SI		Q	-
				10	10	7 1		)		) land flow d	9	0			ð	-
			'60EX	0/1EX	0/1EX	/9EX			2/61	(Sum Imp / liverted = 0	4/61	V1EX	/7EX	STRUCTURE No.		
	21.33 21.33	21.19 21.19	20.88	15.00 15.00	20.58 20.58	15.00 15.00	16.93 16.93	16.39 16.39	16.22 16.22	15.77 15.77 Area Maj D ).270; Equ	15.00 15.00	10.17 10.17	10.00	. CRITICAL TIME OF CONC.	tc	
	98 159	98 160	161 99	114 188	99 162	114 188	108 178	110 181	110 182	112 184 .528 Sum   iv Area = [	114 188	133 223	134 224	RAINFALL INTENSITY	_	_
	6.349 7.401	5.314 6.623	5.183 6.458	0.203 0.256	4.959 6.175	0.226 0.286	1.034 0.777	1.033 0.776	0.840 0.533	0.380 0.000 Flow Maj 0 Diverted Fl	0.330 0.417	0.233 0.295	na 0.120 0.152	TOTAL (C * A)	+CA	
	3269	2944	2888	134	2779	149	384	390	269	0 .270 Over ow x 360/1	218	183	95	MAJOR TOTAL FLOW	Q	
			1925					560 (	1768 (	(I and Flow N 84mm/h =	1768		l/s	MAJOR SURFACE FLOW CAPACITY	Qm	DRAII
ALCI	⁵ ipe flow=	^p ipe flow=	1491 Pipe flow=	(Pipe t	^p ipe flow=	(Pipe t	^o ipe flow=	82 ^{&gt;i} pe flow=	67 ^{&gt;i} pe flow=	^э ipe flow <del>=</del> //aj 0.160) 0.528 to cu	142 (Pipe†	Pipe flow=	(Pipet	MAJOR SURFACE FLOW	Qs	
JLAT	1703 Sum upstr	1424 Sum upstr	1397 Sum upstr	64 flow= Grate	1334 Sum upstr	55 low= Grate	308 Sum upstr	308 Sum upstr	203 Sum upstr	110 Sum upstr utside netw	76 Iow= Grate	76 Sum upstr	I/S 36 1ow= Grate	PIPE FLOW	Qp	
SNO	86.25 atten flows	13.06 atten flows	29.49 atten flows	7.20 € flow)	26.63 atten flows	31.87 ∋ flow)	7.50 atten flows	44.07 atten flows	18.00 atten flows	27.12 atten flows /ork)	45.99 ∋ flow)	30.15 atten flows	m 10.00 ∍ flow)	REACH LENGTH		
TAB	0.267 s)	0.153 3)	0.780 \$)	6.250	0.939 s)	1.788	0.468 s)	0.468 \$)	1.229 s)	0.400 \$)	0.400	0.962 \$)	2.900	PIPE GRADE	S	
Ē	1050(2);	1050(2)	1050(2)	375(20).	1050(2)	375(20).	525(2).	525(2);	375(2).	375(2)	375(20)	375(20)	mm 375(2);	PIPE / BOX DIMENSIONS (CLASS)		
•	91(1.19 1y (1.64)	60(1.02 1 <b>y</b> (1.25)	(2.81) (2.81)	56(0.35 1y (4.01)	49(0.93 1 <del>y</del> (3.09)	48(0.31 1y (2.14)	37(0.85 1y (1.37)	37(0.85 1y (1.37)	78(1.17 1y (1.78)	97(0.61 1y (1.01)	67(0.44 1y (1.01)	67(0.42 1y (1.57)	m/s 32(0.20 1y (2.73)	FLOW VELOCITY FULL (PIPE GRADE VELOCITY)	<	
	) 0.75	0.14	0.31	0.12	0.30	) 0.53	) 0.09	) 0.54	0.17	0.45	) 0.77	0.50	min ) 0.17	TIME OF FLOW IN REACH		
	Qo 1.703 Do 1050 Join Pipes: 1/61 and 9/1EX Vel1 1.290 Vel2 1.644 Eq Dia 1169 Angle 194 Flow 1.703	Qg 0.041 Qo 1.424 Do 1050 CHART 34 Angle 24 Case 3 S/Do 2.5 Du/Do 1.00 Qg/Qo 0.03 K 0.37 S/Do 1.33 cor 0.04 Ku 0.41 Kw 0.41	Qg 0.007 Qo 1.397 Do 1050 Join Pipes: 1/6EX and 11/1EX Vel1 0.503 Vel2 1.541 Eq Dia 1086 Angle 167 Flow 1.390	Qg 0.064 Qo 0.064 Do 375 CHRT 32: Vo2/2gDo 0.04 H/Do 0.00 Kg side flow 9.58 end flow 6.90 Part full downstream pipe	Qg 0.016 Qo 1.334 Do 1050 Flow 1/7EX made eqv grate flow Flow 1/8EX made eqv grate flow CHART 33 Angle 10 S/Do 2.5	Qg 0.055 Qo 0.055 Do 375 CHRT 32: Vo2/2gDo 0.03 H/Do 0.00 Kg side flow 9.93 end flow 7.08 Part full downstream pipe	Co 0.308 Do 525 CHART 50 Du/Do1.00 alpha 36 K'w 0.24 Vu 1.42 WSE 0.11 Ku 0.88 Kw 1.14	Qg 0.105 Qo 0.308 Do 525 CHART 33 Angle 4 S/Do 2.5 Du/Do 0.71 Qg/Qo 0.34 K 0.38 S/Do 1.75 cor 0.25 Ku 0.63 Kw 0.63	Cg 0.095 Qo 0.203 Do 375 Angle 117 Chart 47 S/Do 2.5 chartdeg Du/Do 1.00 K0 1.92 K0.5 2.12 Qu/Qo 0.53 Cg 0.95 K 2.11 S/Do 4.0 K0 1.91 K0.5 1.66 K 1.67 S/Do 3.0 K0 2.00 K0.5 1.89 K 1.90	Cg 0.035 Qo 0.110 Do 375 Angle 159 Chart 47 S/Do 2.5 chartdeg Du/Do 1.00 K0 1.92 K0.5 2.12 Qu/Qo 0.68 Cg 0.72 K 2.07 S/Do 4.0 K0 1.91 K0.5 1.66 K 1.73 S/Do 3.0 K0 2.00 K0.5 1.89 K 1.92	Qg 0.076 Qo 0.076 Do 375 CHRT 32: Vo2/2gDo 0.06 H/Do 1.83 Kg side flow 3.71 end flow 3.12	Qg 0.041 Qo 0.076 Do 375 Angle 56 Chart 39 S/Do 2.5 chartdeg Du/Do 1.00 K0 1.80 K0.5 1.91 Qu/Qo 0.47 Cg 1.04 K 1.91 S/Do 2.0 K0 1.98 K0.5 2.10 K 2.11 S/Do 1.5 K0 2.39 K0.5 2.52 K 2.52 Interp val for S/Do 1.17 Kw 2.79 CHART 38	Qg 0.036 Qo 0.036 Do 375 CHRT 32: Vo2/2gDo 0.01 H/Do 0.00 Kg side flow 10.46 end flow 7.36 Part full downstream pipe	STRUCTURE RATIOS FOR 'K' VALUE CALCULATIONS		
	0.186	0.130 0	0.126 0	0.016 1	0.113 0	0.012 1	0.096 0	0.096 0	0.161 1	0.048 1	0.023 3	0.023 1	0.005 1	VELOCITY HEAD	V2/2g	HEADLO
	.16 0.	.41 0.	.68	<u>.00</u> 0.	.63 0.	<u>.00</u> 0	.88 0.	.63 0.	.51 0.	.56 0.	.71 0.	.00	.00 .0	COEFFICIENT		DSSES
	215 CH Ru Ku	053	086 CH Kw Ku	039 Up: Set	.071 Du S/E K v	152 Ups Set	084	061	244 Inte CH S/D S/D Inte	075 Inte CH S/D S/D Inte	084	035 S/C Inte Par Ups Set	170 Upt Set	HEADLOSS LAT. HEADLOSS	ם ד ד	-
	ART 51 ti 1 1169 Du/D 0.20 Vu 1 1.16 Kw 1		ART 51 ti 2 1086 Du/D 0.19 Vu 1 0.68 Kw 0.	stream HG e obv 3.90 Kp to 1	Do 1.00 Q o 1.12 cor als above 1	stream HG e obv 4.30 Kp to 1			erp val for S ART 46 10 4.0 K0 1 10 3.0 K0 1 10 3.0 K0 1 10 yal for S	erp val for S ART 46 10 4.0 K0 1 10 3.0 K0 1 10 3.0 K0 1 10 7 S		kp 2.0 K0 1 to 1.5 K0 2 tr full down: stream HG e obv 4.02 Kp to 1	stream HG ∋ obv 4.33 Kp to 1	CO-EFFICIENT LAT. PIPE STRUCT.	<u>-</u>	-
	10 Do 1050 10 1 11 Kd 59 WSE 0 30	.0	0 Do 1050 1.03 Kd 86 WSE 0	1 L 3 792 be	0. 0.15 Ku 0. 0r steppec	1 1 195 be		.0	1. 5/Do 3.19 H 53 K0.5 1 74 K0.5 1 5/Do 3.19 H	1. 5/Do 3.20 H 53 K0.5 1 74 K0.5 1 5/Do 3.20 H	<u>ب</u>	1. .05 K0.5 1 5/Do 1.17 H stream pip L 3.962 be	1 L 4.208 be	HEADLOSS W.S.E	-	-
	30 0.2 theta 14 r 1.16 .24	41 0.0	36 0.1 theta 13 r 0.68	00 0.0	33 0.0 K 0.48 63 Kw 0.6; pipes as (	00 0.1	14 0.1	33 0.0	36 0.3 (w 1.86 (w 1.86 43 K 1.43 52 K 1.53 (u 1.51	38 0.0 (w 1.88 (w 1.88 52 K 1.46 52 K 1.58 (u 1.56	71 0.0	00 0.0 75 K 1.74 84 K 1.83 (u 1.89 ∋ low outlet	00 0.1			-
	7Do 0.24	0.	/Do 0.23	0.	071 0. 3 grate flow	0.	0.	061 0.			0.0	0.	170 0.		<u>&gt;</u>	-
	36 0.3	25 0.0	24 0.0	12 0.0	22 0.0	09 0.0	47 0.0	47 0.2	23 0.2	36 0.0	17 0.0	0.0	04 0.0	SLOPE PIPE FRICTION	эт р	
	310	033	071	0.0 0.0	059	029 0.	035	206	221	860	080	0.11 0.11	004 (0.00	HEADLOSS (L * Sf)		ART FUI
				096 2.1 76 1y) (2.40		123 1 98 1y) (1 53						174 54 1y) (1.3	m m/ 088 1.: 08 1.: 08 1.: 0.: 0.: 0.: 0.: 0.: 0.: 0.: 0.: 0.: 0			<del> -</del> 
	2.9	ω ω 	ωω	32 3.9 3 1y) 3.4	3.7	73 4.3 3 1y) 3.7	3.2	3.2	3 3 3 3	3.7	3.7	3 1y) 3.7	32 4.3 1y) 4.0		q 	
	206 <u>3</u> 976 <u>2</u>	236 216 3.	476 <u>3</u> 246 <u>3</u> .	901 3. 451 3.	746 3. 496 3.	301 4. 731 3.	260 3. 225 3.	486 280 3	575 4 353 3.	703 595 4.	907 4. 723 4.	731 3.3	331 341 3.4	DRAIN SECTION		
	.286	.534	.587	753 744	.803	.043 - 2	.536	.826	.108 .887	.450	.605	.927	.038 .962	H.G.L		DESIGN
	3.501	3.587	3.744	3.792	3.874	4.195	3.620	3.887	4.352	4.525	4.689	3.962	4.208	UPSTREAM H.G.L		
	3.527	3.587	3.766	3.792	3.874	4.195	3.645	3.887	4.409	4.540	4.689	3.962	4.208	W.S.E.		
	4.330	4.284	4.520	4.610	4.810	5.730	4.250	4.672	4.748	4.754	4.839	5.340	5.340	SURFACE OR K&C INVERT LEVEL		-
	6/1EX	9/1EX	10/1EX	1/6EX	11/1EX	1/8EX	1/61	2/61	3/61	4/61	5/61	1/7EX	2/7EX	STRUCTURE No.		

DRAWING TITLE: STORMWATER DRAINAGE CALCULATION SHEET

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



DWG NUMBI	APPROVED	DATE	(AT A1 SIZE)		
ER 1301 -	B. 2	JULY 2014	VER	HOR N.T.S.	
- C14 /	J. SMYTH RPE	CHECKED	DESIGNED	DRAWN	
amdt <b>A</b>	⁻ Q No. 9326	J.P.	J.P.	J.P.	