

JIM PAPAS DRAFTING PTY. LTD.

ACN 010 943 905 ABN 56 010 943 905

P.O. Box 413
Earlville Q 4870

6 Neptune Court
Mt. Sheridan Q 4868

Ph. (07) 4036 1690

FAX (07) 4036 4307

Mobile 0408 770 394

Email: jimpapas@westnet.com.au

The Chief Executive
Cairns Regional Council
P.O. Box 359,
CAIRNS Qld. 4870

June 27, 2011
1208 L01

Attn. Mr. L. Rankine

Dear Sir,



**RE: REQUEST FOR FURTHER INFORMATION FOR OPERATIONAL WORKS FOR OCEAN
BREEZE ESTATE STAGE 4 AT 905L COOYA BEACH ROAD BOONIE DOON
(Your Ref. 8/10/44 (2449462))**

We refer to your Request for Further Information (RFI) dated January 18, 2010.

BACKGROUND

This development property has been sold. We act on behalf of the new owners Jonpa Pty. Ltd in conjunction with Briley Consultants Pty. Ltd. We advise Council that we have been appointed as designers of this project and all future correspondence should be directed to us. The original application for Stage 4A was lodged by the former consultant, Sinclair Knight Mertz (SKM). SKM are no longer associated with the project.

For various reasons we are unable to access the design calculations, drawings and other data on which the original application was based. Therefore our response to Council's RFI is based on such information that is available on the public record or that we have developed ourselves. We have redrawn the engineering drawings to reflect our responses contained in this letter. A full set of the revised engineering drawings is attached as Appendix A.

On this basis, we respond to Council's RFI as follows:

Item 1 *"Confirm all lots are immune to a 1 in 100 year ARI event."*

RESPONSE

Based on the stormwater drainage calculations shown on Dwg 1208 C13, we conclude that all proposed lots in Stage 4A of Ocean Breeze Estate are above the inundation level caused by a rainfall event of ARI 100 years.

Item 2 *"Extended lengths of infrastructure crossing under roadways are not supported by Council. Please amend stormwater line 3/12 to 2/12 such that the shortest possible crossing length is achieved. An additional manhole may be required."*

RESPONSE

We have redesigned the stormwater drainage layout, which has substantially reduced the length of stormwater drainage pipework under roadways. The revised layout is shown on Dwg 1208 C04.

JIM PAPAS DRAFTING

PTY. LTD.

ACN 010 943 905 ABN 56 010 943 905

Item 3 "Confirm all sub-catchments time of concentrations are 15 minutes."

RESPONSE

We refer Council to the Queensland Urban Drainage Manual (QUDM) Table 4.06.1 "Recommended standard inlet times" which notes that the standard inlet time for an urban residential catchment where the average slope of land at the top of the catchment is up to 3% is 15 minutes. Therefore this is the appropriate time of concentration for these catchments.

Item 4 "Confirm flows width in the kerb and channel (Column 15, Drawing CB22504-C-16) for a 5 year flood event are in accordance with the maximum allowable flow widths identified in the Queensland Urban Drainage Manual."

RESPONSE

The QUDM Table 7.04.1 Roadway flow widths and depth limitations (longitudinal drainage) indicates that for both Road B and H the permitted flow width is "Full pavement width with zero depth at crown". Our revised design achieves this outcome as shown on Dwg 1208 C13.

Item 5 "Undertake a drainage study of the site to determine the drainage impacts on upstream and downstream properties and the mitigation measures required to minimise such impacts. In particular, the study must address the following:

- a. The contributing internal and external catchment boundaries;
- b. The extent of the 100 year ARI flood event in relation to the site both pre and post development;
- c. Primary and secondary flow paths for the 5 and 100 year ARI flood events;
- d. Identify the need and tenure for flood detention areas to ensure a no worsening impact on downstream properties for the entire development;
- e. Information on the proposed works and any impacts proposed at the drainage outlet from the proposed development.
- f. Lawful point of discharge.

The study must be endorsed by the Chief Executive Officer prior to the issue of a development permit for operational works."

RESPONSE

We note that the Amended Decision Notice Approval dated September 7, 2007 on which this application is based does not impose any conditions with respect to ensuring a no worsening impact on downstream properties nor do they require determination of the extent of flooding for pre and post development. Therefore, we do not believe that we are obliged to provide any such information and we have not responded to Items b and d above.

We have attached our Overall Stormwater Drainage Plan Dwg 1208 OA Stm as Appendix B, which shows:

- i) a. The contributing internal and external catchment boundaries;
- ii) c. Primary and secondary flow paths for the 5 and 100 year ARI flood events;
- iii) f. The lawful points of discharge

With respect to Item e above, we believe that such information is a matter of detailed design, which we have not undertaken at this time. We will be pleased to provide such data at the appropriate time in conjunction with the application for a Development Permit for Operational Works associated with the particular drainage outlet.

Item 6 "Water

Identify on the drawing the clearances (horizontal and vertical) between the proposed water main pipes, and other services to verify compliance with WSA 03-2002, Table 4.1 at the following points:

- a. At the intersection between Road H and Road B, where:
 - The proposed \varnothing 50mm uPVC water main crosses the proposed \varnothing 450mm stormwater pipe.

JIM PAPAS DRAFTING PTY. LTD.

ACN 010 943 905 ABN 56 010 943 905

- The proposed $\phi 100\text{mm}$ uPVC water main crosses the proposed $\phi 375\text{mm}$ stormwater pipe
- b. At Road B in front of Lot 117, where the proposed $\phi 100\text{mm}$ uPVC water main crosses the proposed $\phi 600\text{mm}$ stormwater pipe."

RESPONSE

The stormwater system has been redesigned but we decline to provide this information

Item 7 "The proposed hydrant located in front of Lot 117 is to be relocated such that it is situated in line with the property boundary."

RESPONSE

We have located the fire hydrant to near the end of the existing water main so that it may be used as a flushing point. It will be close to the existing stop valve. Refer to Dwg 1208 C07

Item 8 "Amend Note 1, such that all water mains are on 2.8m alignments from R.P. Boundaries, in accordance with FNQROC Design Guideline Table 06.2."

RESPONSE

On Dwg. 1208 C07 we stipulate that the water main alignment is 2.80m from the RP Boundaries.

Item 9 "Comments on Water Analysis"

Water & Waste have reviewed the information provided in support of the above proposed development and have the following observations:

The report only considers Stage 1 and the ultimate development - it does not consider Stage 4A as an interim development. The report needs to be updated to include Stage 4A as an interim stage in addition to consideration of the ultimate development, for that reason Water & Waste was not able to complete a full review of the water reticulation analysis, but make the following comments:

- a. Modelling has adopted the Colebrook-White head loss formula. Although this is not inappropriate, Council requires the use of Hazen Williams head loss formula (per FNQROC Design Guidelines) as a more relevant approach for water reticulation analysis. The Hazen Williams "C" values stated in FNQROC shall apply.
- b. It is noted that an average daily usage of 700L/person/day has been adopted. FNQROC requirements are for an average daily consumption of 500L/person/day, which has also been adopted for Division 10. The modelling and report needs to reflect an average daily consumption of 500L/person/day.
- c. Confirm the operating water level adopted in the new Cooya Beach Reservoir for the scenarios modelled.
- d. Advise the future stage of the development requiring provision of the duplicate 0150mm main from the Cooya Beach Reservoir to connect to the new 0200mm main in Cooya Beach Road shown in Dwg. No. CF22501-F-02 (Amdt B)."

RESPONSE

We attach our Water Supply Report as Appendix C, which incorporates the following:

- i. Our analysis, which has been done using EPANet program, which in turn uses the Hazen Williams equation together with the appropriate "C" values.
- ii. An average daily consumption of 500 L/person/day has been adopted.
- iii. The new reservoir levels have been adopted. The relevant parameters are noted in our report.
- iv. Earlier information contained in SKM's planning clearly indicated that the existing water supply connection to the reservoirs is a 200 ϕ water main. We cannot explain SKM's submitted data for Stage 4A showing a duplicate 150 ϕ water main. We can only suggest that this is an error.

JIM PAPAS DRAFTING

PTY. LTD.

ACN 010 943 905 ABN 56 010 943 905

Item 10 *"The following existing drop distances have to be amended in accordance with the Standard Drawing S3000-CRC Rev (B)."*

RESPONSE

We have redesigned the sewerage reticulation system such that the sewers now comply with these requirements. Refer to Dwg 1208 C06.

Secondary Issues

Item 11 *"Amend drawings to provide a 2.0m footpath along the Northern side of Road B and Road H (ie. On the frontage to Lots 114-117)."*

RESPONSE

The amended drawings show a concrete footpath along the northern side of Juluji Close and Road H.

Item 12 *"Amend plans to show a buffer mound to the frontage of Bonnie Doon Road as required by development approval dated 7 September 2007. This may be shown on the landscaping plan to be submitted to Council."*

RESPONSE

This matter shall be addressed as part of the landscape plans.

This completes our response to your Information Request. We have addressed each item in your letter and have indicated whether or not we have supplied the requested information. We have supplied most but not all of the requested information and ask for Council to proceed with the assessment of the application.

FURTHER MATTERS

During our design process we noticed two items that in accordance with the provisions of the FNQROC Development Manual we are required to obtain Council's prior approval.

Firstly we draw Council's attention to the longitudinal grade in Road H as shown on Dwg. No. 1280 C09, which is 0.3%. This is a flatter grade than the general permissible grade of 0.5%. We have adopted this grade because we expect that using a grade 0.5% along the entire length of Road H would result in a road level at the northern end of Road H that is about a metre below the existing crown level of Cooya Beach Road. While this may have aesthetic implications it will also cause significant problems with the provision of primary and secondary drainage infrastructure at this location. Therefore, we request that a minimum longitudinal grade of 0.3% be permitted along Road H. The soil profile in the area indicates that the subgrade is predominately sand, which is relatively stable, hence we do not consider that any significant movement of the subgrade is likely, therefore the flatter grade will be satisfactory.

We seek Council's written approval of this proposal.

Secondly we examined our future sewerage options and discovered that it is necessary to install another sewage pump station probably near Lot 246. We attach Dwg 1208 OA Sewer, attached as Appendix D, which shows the future sewer layout. So that excavation may be minimised, we request that Line 27 from Manhole 7/12 to 10/27 be laid at a grade of 1:180. This is permitted by the provisions of the FNQROC Development Manual provided that the sewer is located in flat country and a minimum 20 EDC are serviced. This proposal complies with both these conditions.

We seek Council's written approval for this proposal.

JIM PAPAS DRAFTING PTY. LTD.

ACN 010 943 905 ABN 56 010 943 905

Our Client is anxious to proceed with construction in the near future. To assist our Client in this regard, we are prepared to attend any necessary meeting to discuss these or any other relevant matters to facilitate a prompt resolution and the provision of an Operational Works Permit.

We trust that this is satisfactory, however, if you require further information or if you have any queries please do not hesitate to contact the undersigned.

Yours faithfully,

JIM PAPAS
DRAFTING PTY. LTD.


JIM PAPAS

Attachments

- Appendix A: Cover Sheet plus Dwgs. 1208 C01 to C13 inclusive. (Separate folio)
- Appendix B: Dwg 1208 OA Stm.
- Appendix C: Water Supply Reticulation Report
- Appendix D: Dwg. 1208 OS Sewer

JIM PAPAS DRAFTING
PTY. LTD.

ACN 010 943 905 ABN 56 010 943 905

APPENDIX B
STORMWATER DRAINAGE MASTER PLAN
DWG. 1208 OA Stm

JIM PAPAS DRAFTING
PTY. LTD.

ACN 010 943 905 ABN 56 010 943 905

APPENDIX C
WATER SUPPLY
RETICULATION REPORT

LINE	PIPE GRADE	CATOWENT	FEET FLOW	SEWER CAPACITY		SEWER CAPACITY	SEWER CAPACITY
				Feet Flow	Feet Flow	Feet Flow	Feet Flow
1	180	200	12.58	24.52	18.11	18.11	18.11
2	180	200	8.81	18.11	18.11	18.11	18.11
3	180	200	3.71	24.52	18.11	18.11	18.11
4	180	200	1.48	18.11	18.11	18.11	18.11
5	180	200	5.30	18.11	18.11	18.11	18.11

AT PS INLET
DIL @ 1:50 = -1.087
DIL @ 1:80 = -0.760
AT PS OUTLET
DIL @ 1:50 = 3.330
DIL @ 1:80 = 3.040
MIN. PL = 3.40

NOTE:
LINE 27 FROM MANHOLE 1/27
TO 10/27 (COLOURED GREEN)
SHALL BE LAID AT A GRADE
OF 1:80 WITH CRC PERMISSION.

LEGEND

- — — — — EXISTING SEWERS
- - - - - EXISTING 200# RISING MAIN
- — — — — STAGE 3 SEWERS
- - - - - FUTURE SEWERS
- 1/2 MANHOLE NUMBER

SCALE 1:1500 15 0 15 30 45 60 75m

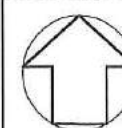
amendments

A	ORIGINAL ISSUE FOR OPERATIONAL WORKS APPROVAL	29.04.11

JIM PAPAS DRAFTING PTY. LTD.

CIVIL ENGINEERING DESIGN AND DRAFTING

6 Neptune Court Ph. (07) 4036 1690
Mt. Sheridan Q 4868 Mob. 0408 770 394
Email: jimpapas@westnet.com.au



"Ocean Breeze Estate"

PROPOSED RESIDENTIAL SUBDIVISION AT COOYA
BEACH ROAD, COOYA BEACH

DRAWING TITLE: SEWER RETICULATION MASTER PLAN

SCALE (AT A1 SIZE)	HOR 1:1500	DRAWN	J.P.
DATE	JUNE 2011	DESIGNED	J.P.
APPROVED		CHECKED	J.P.
DWG NUMBER	1208 - OA Sower	AMDT	A

JIM PAPAS DRAFTING PTY. LTD.

ACN 010 943 905 ABN 56 010 943 905

P.O. Box 413
Earlville Q 4870

6 Neptune Court
Mt. Sheridan Q 4868

Ph. (07) 4036 1690

FAX (07) 4036 4307

Mobile 0408 770 394

Email: jimpapas@westnet.com.au

**WATER SUPPLY RETICULATION REPORT
FOR
OCEAN BREEZE ESTATE
STAGE 4A
A
RESIDENTIAL SUBDIVISION
AT
COOYA BEACH ROAD
COOYA BEACH**

JIM PAPAS DRAFTING

PTY. LTD.

ACN 010 943 905 ABN 56 010 943 905

1. INTRODUCTION

This report on the water supply reticulation for Ocean Breeze Estate, a residential subdivision at Cooya Beach, has been undertaken 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.

2. MODELLING PARAMETERS

Model

The reticulation network was modelled using EPA Net Program Version 2. The model is based on a static analysis at peak hour.

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 three different scenarios were modeled. They are:

- Scenario 1 - Fully developed domestic flow at peak hour
- Scenario 2 - Fire fighting for and with appropriate peak hour demand imposed on the system
- Scenario 3 - Fire fighting flow in Stage 4A

This modeling was divided into those separate scenarios to demonstrate that the existing trunk mains and water supply infrastructure can service the proposed development.

3. ASSUMPTIONS

1. No abnormal conditions affect the water supply
2. Construction of the development occurs in order of stage numbers
3. 50 rider mains have not been modeled except between nodes 105 and 110 for compliance during stage construction

4. RESIDENTIAL DEMANDS

Demands

This model is based on the following demand:

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. This information is provided in Appendix C-1.

JIM PAPAS DRAFTING

PTY. LTD.

ACN 010 943 905 ABN 56 010 943 905

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: (Includes an undeveloped lot comprising potentially 20 lots)	280 lots
Existing demand from previous stages of the estate:	103 lots
Ocean Breeze Stage 4A demand:	18 lots
Demand in remaining stages of Ocean Breeze Estate:	167 lots
Total demand all lots at Cooya Beach:	568 lots

Surface elevations for the model nodes have been taken from the existing survey information provided by RPS. The survey data and existing lot layout is shown on Dwg 1280-OA Water. This drawing is attached as Appendix C-2.

The Cooya Beach demand has been modeled as a single point demand at Node 146. Refer the above mentioned drawing for details.

5. 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 has been used in the model:

Average daily consumption (AD) = 500L/person

Single person dwelling

Lots < 900m² 2.8 persons per connection

Lots > 900m² 3.1 persons per connection

Peak day (PD) = 2.25 x AD

Peak hour = PD/12

Peak hour demand for lot < 900m² = 0.073L/sec

Peak hour demand for lot > 900m² = 0.081L/sec

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

6. 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 fire fighting 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 3.5ML capacity. The required fire fighting flow is 15 L/sec for two hours and there is sufficient reservoir capacity for the fire fighting flow. We note that the external water reticulation works were constructed by an unrelated entity and our Clients have no responsibility whatsoever for any of this infrastructure. We offer no comment on any aspect of these works except to verify that they appear hydraulically adequate.

The minimum permitted residential pressure during fire fighting flow is 12m. The maximum pressure network condition for modeling is based on reservoir level at 66% of top water level. Cairns Water advised SKM that all property services include a pressure-reducing device to cut pressure to approximately 50m per head. Therefore, separate and additional pressure reducing values are not required or any reticulation was within the development.

7. RESIDENTIAL PRESSURE

The maximum residual pressure available, assuming no demand, is about 66m.

Model results

The results of the modeling are shown in Appendix C-3.

Peak hour demand

The minimum required residential pressure at any mode during peak hour shall be greater than 22m. The residential pressure does not fall to less than this value at any stage.

SKM report noted that the reservoir servicing the site has the following characteristics:

- | | |
|-----------|--------|
| 1. TWL | 69.61m |
| 2. BWL | 60.56m |
| 3. Volume | 3.5ML |

Therefore: 95% of TWC = RL 69.16
66% of TWL = RL 66.53

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

8. FIRE FIGHTING FLOW

The model was examined on a number of occasions to establish the most hydraulically disadvantaged hydrant. In the fully developed scenario the worst case was Node 124 in Stage 4A. The residual pressure at this node is 22.10m which is considerably greater than the required 12.0m.

At no node did the residual pressure all below 12.0m.

The model was also examined for performance during staged development and at no time did the residual pressure at any node fall below 12.0m.

9. CONCLUSIONS

For the analysis provided, it can be concluded that:

3. 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'
1. The proposed water supply network provides satisfactory fire fighting protection for the proposed development

JIM PAPAS DRAFTING

PTY. LTD.

ACN 010 943 905 ABN 56 010 943 905

2. The proposed water supply network provides a satisfactory level of domestic water supply for all the proposed development
3. That the reticulation network within Cooya Beach has adequate capacity to meet future demands
4. No upgrading of existing water supply infrastructure is required as a result of the development

Recommend this report to Council for approval.

Attachments:

Appendix C-1:	Existing Cooya Beach Demands.
Appendix C-2:	Water Supply Reticulation Master Plan
Appendix C-3:	Model Results

JIM PAPAS DRAFTING

PTY. LTD.

ACN 010 943 905 ABN 56 010 943 905

**APPENDIX C-1
EXISTING COOYA BEACH DEMANDS**

facsimile transmission

TO: Wade Quinn

COMPANY: SKM

FAX NO: 4031 3967

SINCLAIR KNIGHT MERZ			
REC'D	14 FEB 2005	PMCR	
WHO	Notes	DATE	14
PROJECT No	22501	OUR REF:	FILE
YOUR REF:			



DATE: 14 February 2005

PAGES: 4
(including this page)

FROM: Peter Cymbala

DEPT: Engineering Services

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

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

MESSAGE: Cooya Beach

Wade

Find out about sketches of
existing services and removal site

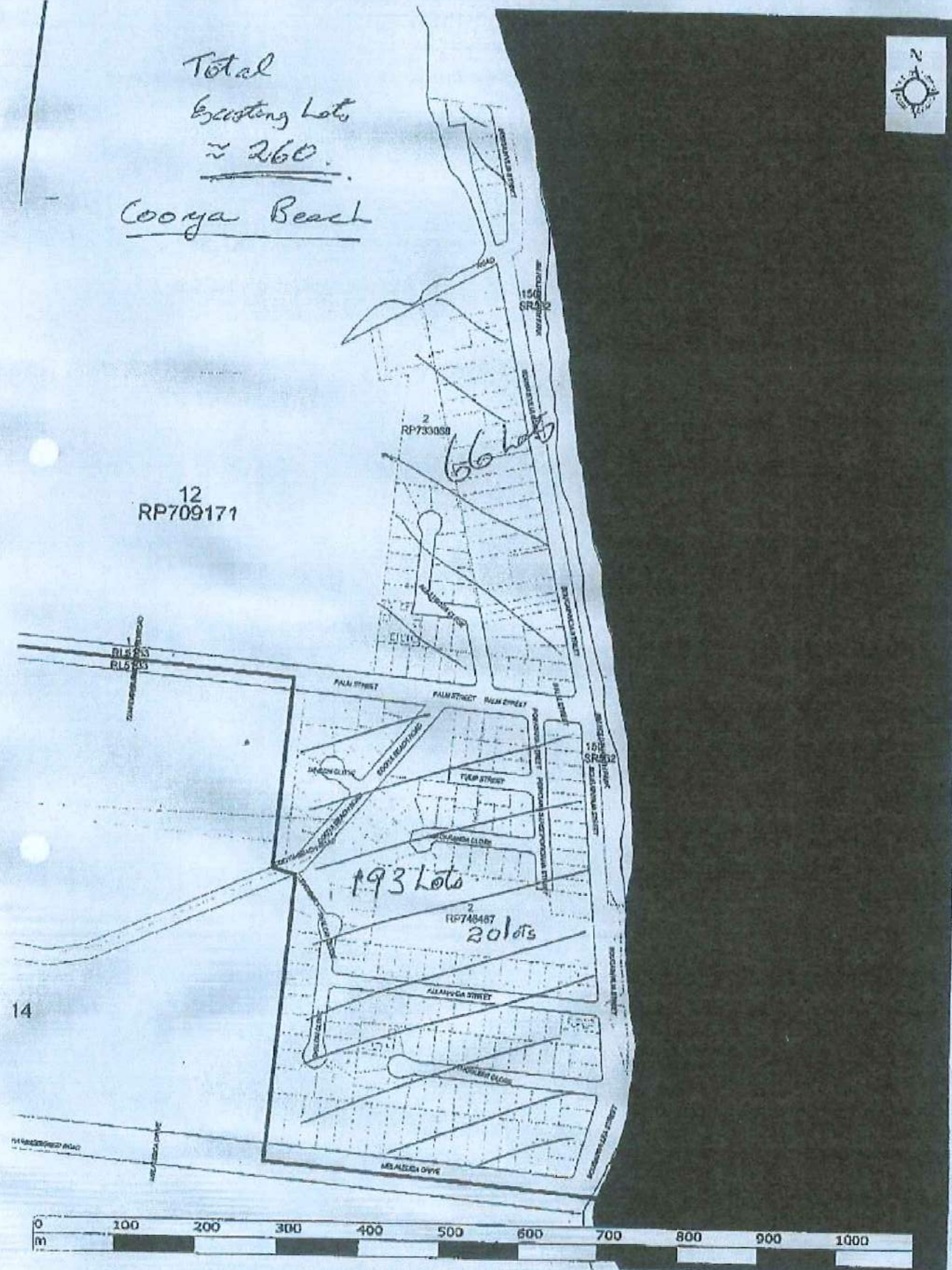
Regards
P. Cymbala

WATCH.

3967
4031 Douglas Shire Council

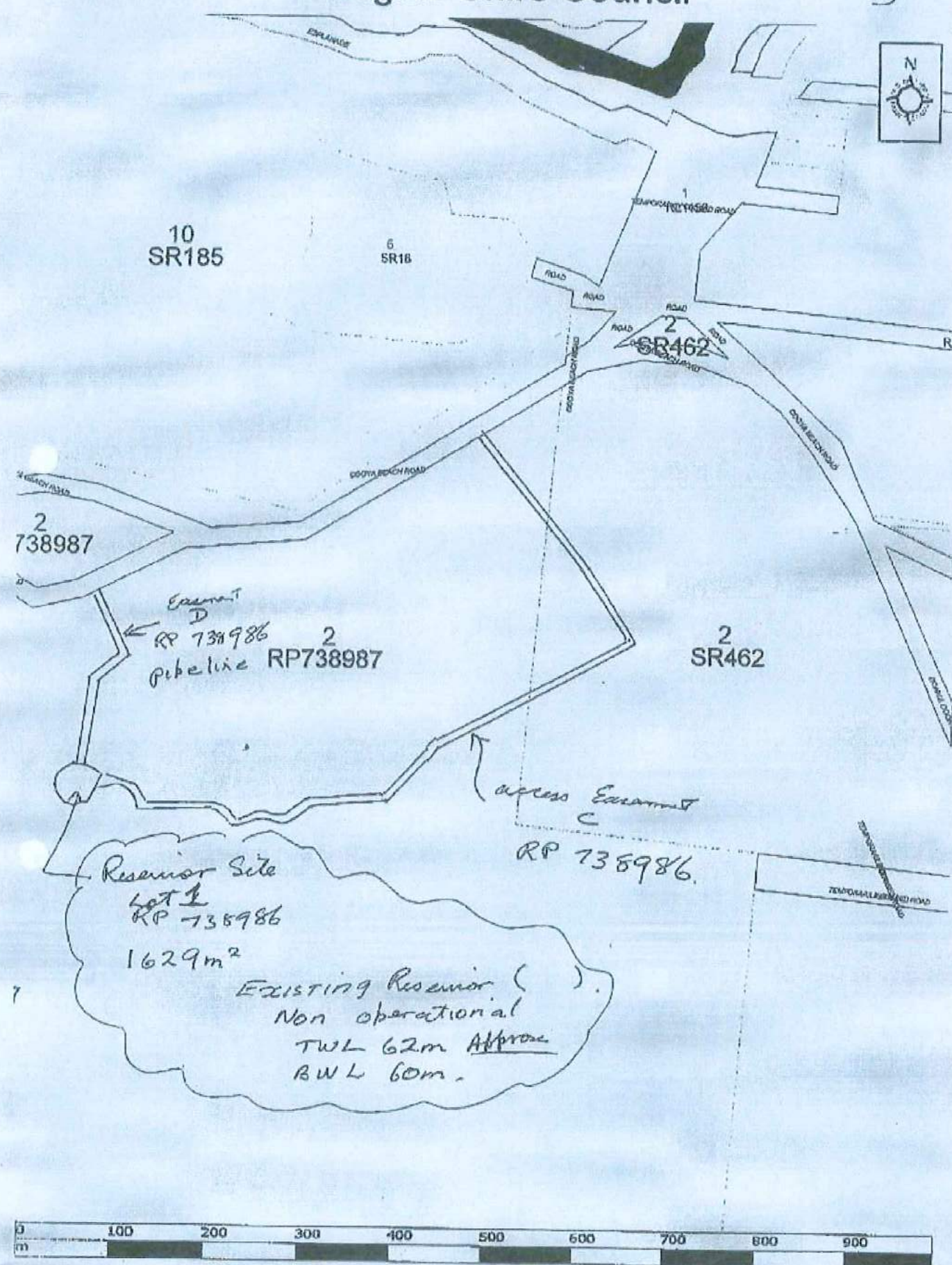
1

Total
Existing Lots
≈ 260.
Cooya Beach



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

Douglas Shire Council



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

JIM PAPAS DRAFTING

PTY. LTD.

ACN 010 943 905 ABN 56 010 943 905

**APPENDIX C-2
WATER RETICULATION MASTER PLAN**

APPENDIX C-3
MODEL RESULTS

Input File: 1208 Domestic Peak Hour Flows.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
2	101	102	30	104.3
3	102	110	183	104.3
4	101	118	248	202.2
5	110	111	23	104.3
6	111	103	11	104.3
7	111	108	77	104.3
8	111	112	165	104.3
9	112	114	67	104.3
10	112	14	22	104.3
11	112	104	11	104.3
12	14	107	216	104.3
13	107	106	24	104.3
14	106	105	36	104.3
15	107	108	233	104.3
16	108	109	83	104.3
17	105	115	60	104.3
18	115	116	29	104.3
19	116	117	244	104.3
20	116	120	15	104.3
21	117	118	15	104.3
22	118	119	56	202.2
23	119	120	188	202.2
24	119	126	154	104.3
25	120	121	95	104.3
26	120	142	170	202.2
27	121	122	42	104.3
28	121	130	150	104.3
29	122	129	61	104.3
30	129	123	22	104.3
31	123	124	68	104.3
32	126	128	20	104.3
33	128	125	10	104.3
34	128	127	57	104.3
35	128	129	78	104.3
36	130	131	175	104.3
37	130	132	87	104.3
38	132	133	121	104.3

Page 2
 Link - Node Table: (continued)

Link ID	Start Node	End Node	Length m	Diameter mm
39	132	134	79	104.3
40	134	135	145	104.3
41	134	136	25	104.3
42	136	137	65	104.3
43	137	147	80	104.3
44	137	138	81	104.3

1208 Domestic Peak Hour Flows.rpt

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	142	202.2
55	147	148	216	104.3
1	50	101	1075	202.2
56	109	110	157	48.4
57	105	108	288	48.4

Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality
101	0.00	56.48	52.98	0.00
102	0.66	48.66	45.26	0.00
103	0.66	48.70	44.90	0.00
104	0.66	48.72	45.32	0.00
105	0.80	49.74	45.64	0.00
106	0.73	49.37	45.27	0.00
107	0.44	49.18	44.78	0.00
108	0.44	48.76	44.76	0.00
109	0.80	48.73	41.63	0.00
110	0.58	48.69	45.29	0.00
111	0.37	48.70	44.90	0.00
112	0.29	48.72	45.32	0.00
114	0.44	48.72	43.52	0.00
14	0.51	48.75	45.35	0.00
115	0.07	50.60	45.70	0.00
116	0.49	51.34	45.74	0.00
117	0.41	53.40	46.80	0.00
118	0.16	53.55	46.75	0.00
119	0.54	53.06	47.76	0.00
120	0.39	51.45	45.65	0.00
121	0.15	50.53	43.63	0.00

±

Page 3

Node Results: (continued)

Node ID	Demand LPS	Head m	Pressure m	Quality
122	0.15	50.46	43.56	0.00
123	0.27	50.35	44.05	0.00
124	0.73	50.34	43.64	0.00
125	0.51	50.32	44.62	0.00
126	0.29	50.32	44.62	0.00
127	0.29	50.32	43.92	0.00
128	0.07	50.32	44.52	0.00
129	0.07	50.36	44.16	0.00
130	0.51	50.01	42.96	0.00
131	0.51	49.99	42.99	0.00
132	0.37	49.85	42.85	0.00
133	0.80	49.82	42.72	0.00
134	0.22	49.81	44.51	0.00
135	0.95	49.76	43.76	0.00
136	0.49	49.81	45.21	0.00
137	0.08	49.81	45.91	0.00
138	0.22	49.97	44.77	0.00
139	0.16	50.05	44.75	0.00
140	0.32	50.15	43.35	0.00

1208 Domestic Peak Hour Flows.rpt

141	0.41	50.41	44.51	0.00
142	0.56	50.75	43.65	0.00
143	0.31	50.09	44.69	0.00
144	0.58	50.06	44.86	0.00
145	0.69	49.87	46.47	0.00
146	20.44	49.43	46.43	0.00
147	0.81	49.71	46.31	0.00
148	1.22	49.60	44.50	0.00
50	-41.62	69.16	0.00	0.00 Reservoir

Link Results:

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
2	0.00	0.00	0.00	closed
3	-0.66	0.08	0.16	open
4	41.62	1.30	11.80	open
5	-1.12	0.13	0.44	open
6	0.66	0.08	0.16	open
7	-1.52	0.18	0.77	open
8	-0.64	0.07	0.15	open
9	0.44	0.05	0.08	open
10	-2.03	0.24	1.31	open
11	0.66	0.08	0.16	open
12	-2.54	0.30	1.99	open
13	-5.40	0.63	8.06	open
14	-6.13	0.72	10.19	open

Page 4

Link Results: (continued)

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
15	2.42	0.28	1.82	open
16	0.92	0.11	0.30	open
17	-7.38	0.86	14.37	open
18	-10.06	1.18	25.53	open
19	-5.54	0.65	8.44	open
20	-5.02	0.59	7.03	open
21	-5.95	0.70	9.64	open
22	35.51	1.11	8.79	open
23	34.97	1.09	8.55	open
24	0.00	0.00	0.00	closed
25	5.96	0.70	9.69	open
26	23.60	0.74	4.13	open
27	2.38	0.28	1.77	open
28	3.43	0.40	3.48	open
29	2.23	0.26	1.57	open
30	1.00	0.12	0.35	open
31	0.73	0.09	0.20	open
32	-0.29	0.03	0.04	open
33	0.51	0.06	0.10	open
34	0.29	0.03	0.04	open
35	-1.16	0.14	0.47	open
36	0.51	0.06	0.10	open
37	2.41	0.28	1.81	open
38	0.80	0.09	0.23	open
39	1.24	0.15	0.53	open
40	0.95	0.11	0.32	open
41	0.07	0.01	0.00	open
42	-0.42	0.05	0.07	open
43	2.03	0.24	1.32	open
44	-2.53	0.30	1.97	open
45	-4.63	0.54	6.07	open
46	1.89	0.22	1.15	open

	1208 Domestic Peak Hour Flows.rpt			
47	-1.88	0.22	1.15	Open
48	-2.91	0.34	2.56	Open
49	-2.20	0.26	1.53	Open
50	-2.61	0.31	2.10	Open
51	23.04	0.72	3.95	Open
52	0.58	0.07	0.13	Open
53	19.24	0.60	2.83	Open
54	20.44	0.64	3.16	Open
55	1.22	0.14	0.51	Open
1	41.62	1.30	11.80	Open
56	0.12	0.06	0.28	Open
57	0.45	0.25	3.42	Open

Input File: 1208 Fire Fighting Flow at Peak Hour Flows.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
2	101	102	30	104.3
3	102	110	183	104.3
4	101	118	248	202.2
5	110	111	23	104.3
6	111	103	11	104.3
7	111	108	77	104.3
8	111	112	165	104.3
9	112	114	67	104.3
10	112	14	22	104.3
11	112	104	11	104.3
12	14	107	216	104.3
13	107	106	24	104.3
14	106	105	36	104.3
15	107	108	233	104.3
16	108	109	83	104.3
17	105	115	60	104.3
18	115	116	29	104.3
19	116	117	244	104.3
20	116	120	15	104.3
21	117	118	15	104.3
22	118	119	56	202.2
23	119	120	188	202.2
24	119	126	154	104.3
25	120	121	95	104.3
26	120	142	170	202.2
27	121	122	42	104.3
28	121	130	150	104.3
29	122	129	61	104.3
30	129	123	22	104.3
31	123	124	68	104.3
32	126	128	20	104.3
33	128	125	10	104.3
34	128	127	57	104.3
35	128	129	78	104.3
36	130	131	175	104.3
37	130	132	87	104.3
38	132	133	121	104.3

Page 2
 Link - Node Table: (continued)

Link ID	Start Node	End Node	Length m	Diameter mm
39	132	134	79	104.3
40	134	135	145	104.3
41	134	136	25	104.3
42	136	137	65	104.3
43	137	147	80	104.3
44	137	138	81	104.3

1208 Fire Fighting Flow at Peak Hour Flows.rpt

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	142	202.2
55	147	148	216	104.3
1	50	101	1075	202.2
56	109	110	157	48.4
57	105	108	288	48.4

Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality
101	0.00	53.19	49.69	0.00
102	0.44	46.36	42.96	0.00
103	0.44	46.38	42.58	0.00
104	0.44	46.39	42.99	0.00
105	0.53	46.87	42.77	0.00
106	0.49	46.70	42.60	0.00
107	0.29	46.61	42.21	0.00
108	0.29	46.41	42.41	0.00
109	0.53	46.40	39.30	0.00
110	0.39	46.37	42.97	0.00
111	0.25	46.38	42.58	0.00
112	0.19	46.39	42.99	0.00
114	0.29	46.39	41.19	0.00
14	0.34	46.41	43.01	0.00
115	0.05	47.28	42.38	0.00
116	0.33	47.82	42.22	0.00
117	0.27	49.97	43.37	0.00
118	0.11	50.11	43.31	0.00
119	0.36	49.59	44.29	0.00
120	0.26	47.86	42.06	0.00
121	0.10	46.22	39.32	0.00

♀

Page 3

Node Results: (continued)

Node ID	Demand LPS	Head m	Pressure m	Quality
122	0.10	46.19	39.29	0.00
123	0.18	46.14	39.84	0.00
124	0.49	46.13	39.43	0.00
125	0.34	46.13	40.43	0.00
126	0.19	46.13	40.43	0.00
127	0.19	46.13	39.73	0.00
128	0.05	46.13	40.33	0.00
129	0.05	46.14	39.94	0.00
130	0.34	44.54	37.49	0.00
131	0.34	44.54	37.54	0.00
132	0.25	43.75	36.75	0.00
133	0.53	43.74	36.64	0.00
134	0.15	43.20	37.90	0.00
135	0.63	43.18	37.18	0.00
136	0.33	43.08	38.48	0.00
137	0.05	42.79	38.89	0.00
138	0.15	45.90	40.70	0.00
139	0.11	46.19	40.89	0.00
140	0.21	46.42	39.62	0.00

1208 Fire Fighting Flow at Peak Hour Flows.rpt

141	0.27	46.96	41.06	0.00
142	0.37	47.09	39.99	0.00
143	0.21	46.35	40.95	0.00
144	0.39	46.34	41.14	0.00
145	0.46	46.17	42.77	0.00
146	13.63	45.96	42.96	0.00
147	0.54	37.77	34.37	0.00
148	15.82	25.02	19.92	0.00
50	-42.77	66.53	0.00	0.00 Reservoir

Link Results:

Link ID	Flow LPS	velocity m/s	Unit Headloss m/km	Status
2	0.00	0.00	0.00	closed
3	-0.44	0.05	0.08	Open
4	42.77	1.33	12.41	Open
5	-0.75	0.09	0.21	Open
6	0.44	0.05	0.08	Open
7	-1.01	0.12	0.36	Open
8	-0.43	0.05	0.07	Open
9	0.29	0.03	0.04	Open
10	-1.35	0.16	0.62	Open
11	0.44	0.05	0.08	Open
12	-1.69	0.20	0.94	Open
13	-3.60	0.42	3.81	Open
14	-4.09	0.48	4.81	Open

♀

Page 4

Link Results: (continued)

Link ID	Flow LPS	velocity m/s	Unit Headloss m/km	Status
15	1.62	0.19	0.86	Open
16	0.61	0.07	0.14	Open
17	-4.92	0.58	6.79	Open
18	-8.46	0.99	18.53	Open
19	-5.67	0.66	8.81	Open
20	-3.12	0.37	2.93	Open
21	-5.94	0.70	9.62	Open
22	36.72	1.14	9.36	Open
23	36.36	1.13	9.19	Open
24	0.00	0.00	0.00	closed
25	8.14	0.95	17.23	Open
26	24.84	0.77	4.54	Open
27	1.59	0.19	0.83	Open
28	6.45	0.75	11.20	Open
29	1.49	0.17	0.74	Open
30	0.67	0.08	0.17	Open
31	0.49	0.06	0.09	Open
32	-0.19	0.02	0.02	Open
33	0.34	0.04	0.05	Open
34	0.19	0.02	0.02	Open
35	-0.77	0.09	0.22	Open
36	0.34	0.04	0.05	Open
37	5.77	0.68	9.11	Open
38	0.53	0.06	0.11	Open
39	4.99	0.58	6.96	Open
40	0.63	0.07	0.15	Open
41	4.21	0.49	5.08	Open
42	3.88	0.45	4.37	Open
43	16.36	1.91	62.80	Open
44	-12.53	1.47	38.33	Open
45	-9.35	1.09	22.30	Open
46	-3.33	0.39	3.29	Open

1208 Fire Fighting Flow at Peak Hour Flows.rpt

47	-3.01	0.35	2.73	Open
48	-6.45	0.76	11.21	Open
49	-3.22	0.38	3.10	Open
50	-3.50	0.41	3.60	Open
51	24.47	0.76	4.41	Open
52	0.39	0.05	0.06	Open
53	17.42	0.54	2.35	Open
54	13.63	0.42	1.49	Open
55	15.82	1.85	59.01	Open
1	42.77	1.33	12.41	Open
56	0.08	0.04	0.13	Open
57	0.30	0.16	1.62	Open

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

Input File: 1208 Fire Fighting Flow at Peak Hour Flows for Stage 4.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
2	101	102	30	104.3
3	102	110	183	104.3
4	101	118	248	202.2
5	110	111	23	104.3
6	111	103	11	104.3
7	111	108	77	104.3
8	111	112	165	104.3
9	112	114	67	104.3
10	112	14	22	104.3
11	112	104	11	104.3
12	14	107	216	104.3
13	107	106	24	104.3
14	106	105	36	104.3
15	107	108	233	104.3
16	108	109	83	104.3
17	105	115	60	104.3
18	115	116	29	104.3
19	116	117	244	104.3
20	116	120	15	104.3
21	117	118	15	104.3
22	118	119	56	202.2
23	119	120	188	202.2
24	119	126	154	104.3
25	120	121	95	104.3
26	120	142	170	202.2
27	121	122	42	104.3
28	121	130	150	104.3
29	122	129	61	104.3
30	129	123	22	104.3
31	123	124	68	104.3
32	126	128	20	104.3
33	128	125	10	104.3
34	128	127	57	104.3
35	128	129	78	104.3
36	130	131	175	104.3
37	130	132	87	104.3
38	132	133	121	104.3

Page 2
Link - Node Table: (continued)

Link ID	Start Node	End Node	Length m	Diameter mm
39	132	134	79	104.3
40	134	135	145	104.3
41	134	136	25	104.3
42	136	137	65	104.3
43	137	147	80	104.3
44	137	138	81	104.3

1208 Fire Fighting Flow at Peak Hour Flows for Stage 4.rpt

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	142	202.2
55	147	148	216	104.3
1	50	101	1075	202.2
56	109	110	157	48.4
57	105	108	288	48.4

Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality
101	0.00	53.19	49.69	0.00
102	0.44-2649181.00-2649184.00			0.00
103	0.44-2649181.00-2649185.00			0.00
104	0.44-2649181.00-2649185.00			0.00
105	0.53-2649181.00-2649185.00			0.00
106	0.49-2649181.00-2649185.00			0.00
107	0.29-2649181.00-2649186.00			0.00
108	0.29-2649181.00-2649185.00			0.00
109	0.53-2649181.00-2649188.00			0.00
110	0.39-2649181.00-2649184.00			0.00
111	0.25-2649181.00-2649185.00			0.00
112	0.19-2649181.00-2649185.00			0.00
114	0.29-2649181.00-2649186.00			0.00
14	0.34-2649181.00-2649185.00			0.00
115	0.05	48.27	43.37	0.00
116	0.33	48.44	42.84	0.00
117	0.27	50.31	43.71	0.00
118	0.11	50.43	43.63	0.00
119	0.36	49.96	44.66	0.00
120	0.26	48.44	42.64	0.00
121	0.10	40.12	33.22	0.00

Page 3

Node Results: (continued)

Node ID	Demand LPS	Head m	Pressure m	Quality
122	0.10	37.53	30.63	0.00
123	0.18	32.53	26.23	0.00
124	15.49	28.67	21.97	0.00
125	0.34-416368.50-416374.20			0.00
126	0.19-416368.50-416374.20			0.00
127	0.19-416368.50-416374.80			0.00
128	0.05-416368.50-416374.30			0.00
129	0.05	33.81	27.61	0.00
130	0.34	39.64	32.59	0.00
131	0.34	39.64	32.64	0.00
132	0.25	39.46	32.46	0.00
133	0.53	39.45	32.35	0.00
134	0.15	39.38	34.08	0.00
135	0.63	39.36	33.36	0.00
136	0.33	39.37	34.77	0.00
137	0.05-757392.50-757396.40			0.00
138	0.15	47.87	42.67	0.00
139	0.11	47.89	42.59	0.00
140	0.21	47.96	41.16	0.00

1208 Fire Fighting Flow at Peak Hour Flows for Stage 4.rpt

141	0.27	48.15	42.25	0.00
142	0.37	48.16	41.06	0.00
143	0.21	47.90	42.50	0.00
144	0.39	47.88	42.68	0.00
145	0.46	47.80	44.40	0.00
146	13.63	47.59	44.59	0.00
147	0.54-7573	92.60-7573	95.90	0.00
148	0.81-7573	92.60-7573	97.80	0.00
50	-42.77	66.53	0.00	0.00 Reservoir

Link Results:

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
2	0.00	0.00	0.00	closed
3	2.02	0.24	0.00	Open
4	40.31	1.26	11.12	Open
5	1.53	0.18	13.25	Open
6	0.44	0.05	0.00	Open
7	0.23	0.03	0.00	Open
8	0.61	0.07	0.00	Open
9	0.29	0.03	0.00	Open
10	-0.32	0.04	0.00	Open
11	0.44	0.05	0.00	Open
12	-0.66	0.08	0.00	Open
13	-1.33	0.16	12.70	Open
14	-1.82	0.21	0.00	Open

♀

Page 4

Link Results: (continued)

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
15	0.39	0.05	0.00	Open
16	0.43	0.05	0.00	Open
17	0.00	0.00	0.00	closed
18	-4.58	0.54	5.95	Open
19	-5.25	0.61	7.64	Open
20	0.33	0.04	0.05	Open
21	-5.52	0.65	8.40	Open
22	34.68	1.08	8.42	Open
23	33.93	1.06	8.08	Open
24	0.00	0.00	0.00	closed
25	19.58	2.29	87.58	Open
26	14.43	0.45	1.66	Open
27	16.21	1.90	61.72	Open
28	3.27	0.38	3.19	Open
29	16.11	1.89	61.01	Open
30	15.67	1.83	58.01	Open
31	15.49	1.81	56.78	Open
32	0.19	0.02	0.00	Open
33	0.34	0.04	0.00	Open
34	0.19	0.02	0.00	Open
35	0.00	0.00	0.00	closed
36	0.34	0.04	0.05	Open
37	2.59	0.30	2.07	Open
38	0.53	0.06	0.11	Open
39	1.81	0.21	1.07	Open
40	0.63	0.07	0.15	Open
41	1.03	0.12	0.38	Open
42	0.00	0.00	0.00	closed
43	1.35	0.16	0.95	Open
44	0.00	0.00	0.00	closed
45	-2.41	0.28	1.81	Open
46	1.56	0.18	0.81	Open

1208 Fire Fighting Flow at Peak Hour Flows for Stage 4.rpt

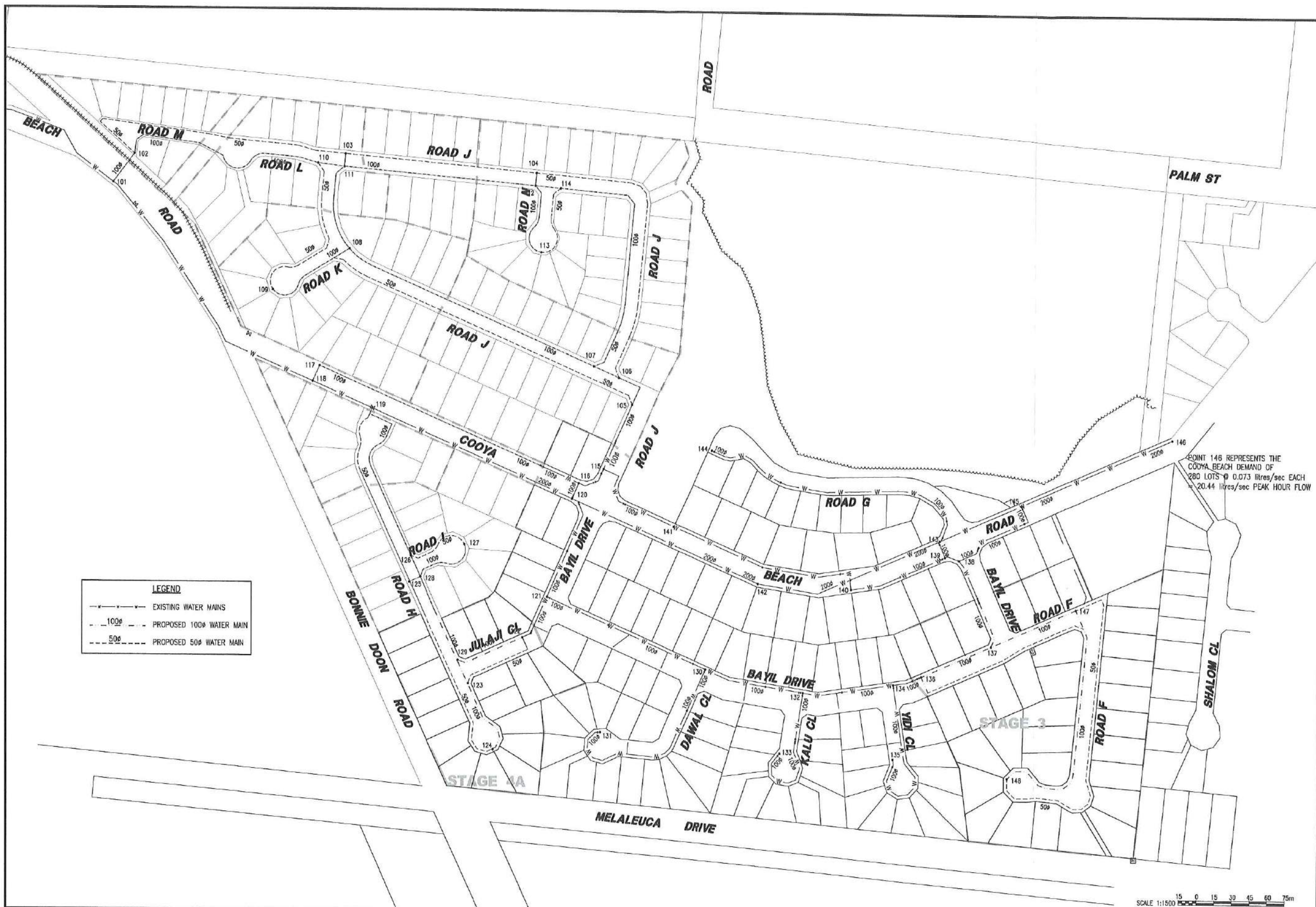
47	-1.59	0.19	0.84	Open
48	-0.93	0.11	0.31	Open
49	-1.80	0.21	1.06	Open
50	-2.08	0.24	1.37	Open
51	14.05	0.44	1.58	Open
52	0.39	0.05	0.06	Open
53	12.53	0.39	1.28	Open
54	13.63	0.42	1.49	Open
55	0.81	0.10	0.35	Open
1	42.77	1.33	12.41	Open
56	-0.10	0.06	1.94	Open
57	0.11	0.06	1.06	Open

JIM PAPAS DRAFTING

PTY. LTD.

ACN 010 943 905 ABN 56 010 943 905

**APPENDIX D
SEWERAGE RETICULATION
MASTER PLAN
DWG. 1208 OA Sewer**



LEGEND

— W — EXISTING WATER MAINS

- - - 100mm PROPOSED 100mm WATER MAIN

... 50mm PROPOSED 50mm WATER MAIN

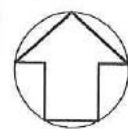
SCALE 1:1500

amendments		
A	ORIGINAL ISSUE FOR OPERATIONAL WORKS APPROVAL	29.04.11

**JIM PAPAS DRAFTING
PTY. LTD.**

CIVIL ENGINEERING DESIGN AND DRAFTING

6 Neptune Court Ph. (07) 4935 1690
Mt. Sheridan Q 4868 Mob. 0408 770 394
Email: jimpapas@westnet.com.au



"Ocean Breeze Estate"

PROPOSED RESIDENTIAL SUBDIVISION AT COOYA
BEACH ROAD, COOYA BEACH

DRAWING TITLE: WATER RETICULATION MASTER PLAN

SCALE (AT A1 SIZE)	HOR 1:1500	DRAWN	J.P.
	VER	DESIGNED	J.P.
DATE	JUNE 2011	CHECKED	J.P.
APPROVED			
DWG NUMBER	1208 - OA Water	AMDT	A

OCEAN BREEZE ESTATE STAGE 4A RESIDENTIAL SUBDIVISION AT JULAJI CLOSE COOYA BEACH

PROJECT DRAWINGS

PROJECT No. 1208

- C 01 - EXISTING SITE PLAN.
- C 02 - TYPICAL CROSS SECTION, PAVEMENT DATA, SET OUT AND INTERSECTION DETAILS.
- C 03 - BULK EARTHWORKS PLAN.
- C 04 - EARTHWORKS, ROADWORKS AND STORMWATER DRAINAGE PLAN.
- C 05 - SOIL AND WATER MANAGEMENT PLAN.
- C 06 - SEWERAGE RETICULATION PLAN.
- C 07 - WATER RETICULATION PLAN.
- C 08 - JULAJI CLOSE - LONGITUDINAL AND CROSS SECTIONS.
- C 09 - ROAD H - LONGITUDINAL AND CROSS SECTIONS.
- C 10 - STORMWATER DRAINAGE LONGITUDINAL SECTIONS, SET OUT DATA AND PIT SCHEDULE.
- C 11 - SEWERAGE RETICULATION LONGITUDINAL SECTIONS, NOTES AND SET OUT.
- C 12 - STORMWATER DRAINAGE CATCHMENT PLAN
- C 13 - STORMWATER DRAINAGE CALCULATION SHEET

BRILEY CONSULTANTS

CONSULTING ENGINEERS

Ph. (07) 4054 3052 Mob 0400 543 052
Email: br05207@bigpond.net.au



RPS Australia East Pty Ltd
ACN 140 292 762

1009 Pioneer Ct
CRAIGLIE QLD 4877
PO Box 355
MOSSMAN QLD 4873

© COPYRIGHT PROTECTS THIS PLAN
Unauthorized reproduction or translation
without the written consent of RPS is prohibited.

T +61 7 4008 1148
F +61 7 4008 1814
W rpsgroup.com.au

JIM PAPAS DRAFTING PTY. LTD.

CIVIL ENGINEERING DESIGN AND DRAFTING

6 Neptune Court Ph. (07) 4036 1690
Mt. Sheridan Q 4868 Mob. 0408 770 394
Email: jimpapas@westnet.com.au

NOTES:

SURVEY CONTROL

ORIGIN OF LEVELS:
PSM 76389 RL 3.363 AHD der.

ORIGIN OF COORDINATES:
PSM 76389 9853.42E, 80445.36N

MERIDIAN: MGA ZONE 55

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

NOTES:

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

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

RP DESCRIPTION
PART LOT 905 ON SP210324
PARISH OF VICTORY
COUNTY OF SOLANDER
LOCAL AUTHORITY
CAIRNS REGIONAL COUNCIL

EXISTING SERVICES

- EXISTING SERVICES ARE PLOTTED FROM THE BEST
INFORMATION AVAILABLE. NO RESPONSIBILITY IS TAKEN
BY THE SUPERINTENDENT FOR THE ACCURACY AND
COMPLETENESS OF THE INFORMATION SHOWN.
- PRIOR TO THE COMMENCEMENT OF CONSTRUCTION, THE
CONTRACTOR IS TO ESTABLISH ON SITE THE EXACT
LOCATION OF ALL UNDERGROUND SERVICES IN THE
PROPOSED WORKS AREA. METHODS TO ACHIEVE THIS
WILL INCLUDE BUT NOT BE LIMITED TO:-
 - CAREFUL EXAMINATION OF THE CONTRACT DRAWINGS
 - CONSULTATION WITH THE RELEVANT SERVICE
AUTHORITIES
 - COMPREHENSIVELY SCANNING THE AFFECTED AREAS
WITH A CABLE DETECTOR AND MARKING ON THE
GROUND THE POSITION OF ALL SERVICES
 - HAND EXCAVATING TO EXPOSE ALL SERVICES WHICH
MAY BE AFFECTED BY THE PROPOSED WORKS
UNDER THE DIRECTION OF THE RELEVANT SERVICE
AUTHORITY.
- THE CONTRACTOR SHALL BRING TO THE
SUPERINTENDENT'S ATTENTION ANY DISCREPANCIES
BETWEEN THE EXISTING SERVICES THUS IDENTIFIED AND
THE DOCUMENTED SERVICES WHICH MIGHT AFFECT THE
PROPOSED WORKS. APPROPRIATE MEASURES TO
RESOLVE ANY CONFLICTS WILL BE DOCUMENTED BY THE
SUPERINTENDENT.

PRE-START MEETING

THE CONTRACTOR SHALL PRODUCE THE FOLLOWING
DOCUMENTS AT THE PRESTART MEETING:

- EVIDENCE OF PAYMENT OF PORTABLE LONG SERVICE
LEAVE LEVY.
- EVIDENCE OF PAYMENT OF OCCUPATIONAL HEALTH AND
SAFETY FEES.
- TRAFFIC MANAGEMENT PLAN
- PRICED BILL OF QUANTITIES.
- CONTRACTOR'S EROSION AND SEDIMENT CONTROL PLAN.
- EVIDENCES OF INSURANCES:
 - PUBLIC LIABILITY
 - LOSS OR DAMAGE TO THE WORKS
 - WORKERS COMPENSATION
- NOTICE OF APPOINTMENT OF PRINCIPAL CONTRACTOR AS
REQUIRED BY WORKPLACE, HEALTH AND SAFETY ACT.
- PROGRAMME OF WORKS

TEST PIT DATA - SOIL PROFILES

WPB	CL	RL	DESCRIPTION
0	6.25		LIGHT BROWN PEBBLY CLAY (LIKELY IMPORTED FILL)
0.22	6.03		CHOCOLATE BROWN ORGANIC SANDY LOAM
0.4	5.85		BROWN LOAMY SAND
0.52	5.73		BROWN RED CLAYEY PEBBLY SAND
0.8	5.45		BROWN RED COARSE CLAYEY SAND (POORLY SORTED)
1.2	5.05		BROWN RED COARSE CLAYEY PEBBLY SAND
1.5	4.75		REDDY YELLOW CLAYEY SAND (POORLY SORTED)
2	4.25		YELLOW CLAYEY SAND (DARK MINERAL AGGREGATE ~20% MANGANESE?)
2.3	3.95		PIT BASE

TEST PIT LOCATION
SHOWN ON PLAN

LEGEND

—	EXISTING TOP OF BANK
—	EXISTING TOE OF BANK
—	EXISTING CHANGE OF GRADE
—	EXISTING EDGE OF BITUMEN
—	EXISTING KERB & CHANNEL
—	EXISTING UNDERGROUND DRAINAGE
—	EXISTING WATER MAINS
—	EXISTING SEWERS
—	EXISTING ELECTRICITY
—	EXISTING TELSTRA CABLES
—	EXISTING OPEN DRAINS
—	PROPOSED STAGE BOUNDARIES
—	EXISTING CONTOURS (AT 0.5m, INDEXED AT 1.0m)

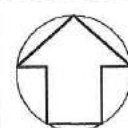
SURVEY MARKS

Point #	Easting	Northing	Level	Description
1	9552.307	80419.077	2.776	Stn 9063 NIK
2	9554.645	80410.780	0.000	Stn 9126 NIC
3	9551.771	80409.594	0.000	Stn 9127 NIC
4	9451.670	80379.190	2.649	Stn 9082 Spike
5	9376.825	80363.112	4.290	Stn 9086 Star Picket
6	9370.404	80354.323	4.742	Stn 9144 NIK
7	9355.917	80341.131	5.225	Stn 9143 NIK
8	9371.029	80322.165	4.840	Stn 9142 NIK
9	9361.996	80326.354	4.761	Stn 9141 NIK
10	9384.163	80294.934	4.318	Stn 9008 NIK
11	9331.871	80216.688	4.767	Stn 9109 NIK
12	9337.258	80209.513	0.000	Stn 9000 OPM
13	9315.966	80200.058	5.036	Stn 9111 NIK
14	9305.432	80198.481	6.148	Stn 9110 NIK
15	9517.457	80064.644	0.000	Stn 9013 NIC
16	9521.816	80068.904	0.000	Stn 9107 OIP

amendments

A	ORIGINAL ISSUE FOR OPERATIONAL WORKS APPROVAL	27.08.11

**JIM PAPAS DRAFTING
PTY. LTD.**
CIVIL ENGINEERING DESIGN AND DRAFTING
6 Neptune Court Ph. (07) 4036 1690
Mt. Sheridan Q 4868 Mob. 0408 770 394
Email: jimpapas@westnet.com.au



"Ocean Breeze Estate"

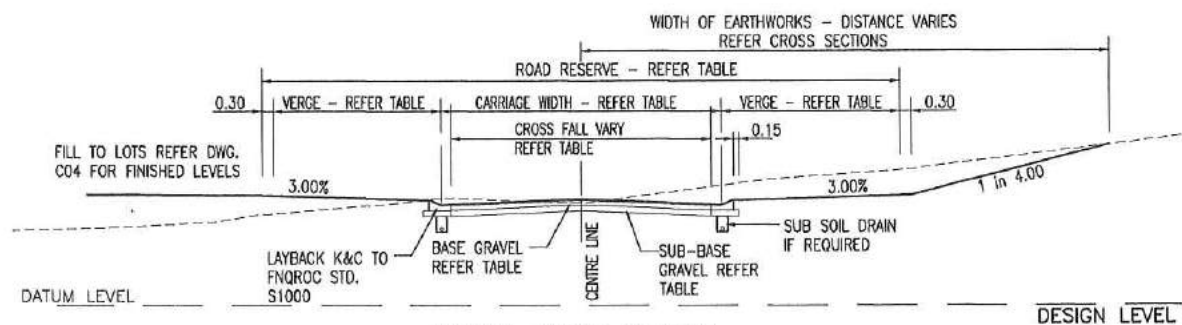
STAGE 4A OF PROPOSED RESIDENTIAL SUBDIVISION
AT JULAJI CLOSE, COOYA BEACH

DRAWING TITLE: EXISTING SITE PLAN

SCALE 1:2000

SCALE (AT A1 SIZE)	HOR 1:2000	DRAWN J.P.
	VER	DESIGNED J.P.
	DATE JUNE 2011	CHECKED J.P.

APPROVED	DWG NUMBER	1208 - C01	AMDT	A
----------	------------	------------	------	---



**TYPICAL CROSS SECTION
JULAJI CLOSE & ROAD H**
SCALE: 1:100

PAVEMENT NOTES

PROVISIONAL PAVEMENT DESIGN STATED HEREIN IS BASED ON A MINIMUM CBR UNDER SERVICE CONDITIONS OF 7. PAVEMENT DESIGN IS SUBJECT TO REVISION ON BASIS OF CONFIRMATORY CBR TESTS TAKEN AT THE TIME OF CONSTRUCTION. BASED ON THE INSITU CBR TEST RESULTS, THE FINAL PAVEMENT DESIGN SHALL APPROVED BY COUNCIL PRIOR TO CONSTRUCTION. THE COMPLETED PAVEMENT DESIGN SHALL GENERALLY COMPLY WITH AUSTRROADS OR DTMR PAVEMENT DESIGN MANUAL AS APPLICABLE.

SUBGRADE - COMPACT TO 100% SRDD.
SHOULD ANY SOFT OR UNSUITABLE MATERIAL BE IDENTIFIED SEEK ADVICE OF THE SUPERINTENDENT.

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

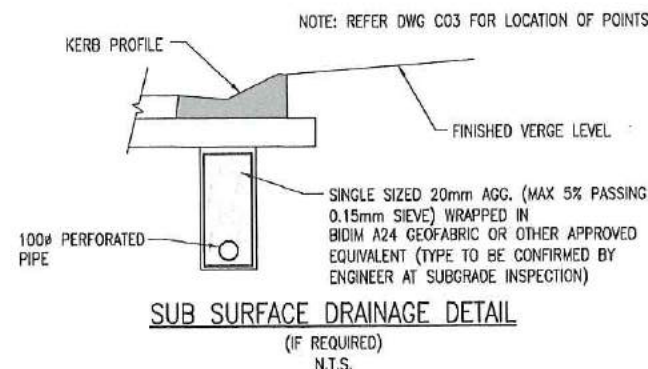
BASE SHALL CONSIST OF TYPE 2 SUBTYPE 2.2 PAVEMENT MATERIAL ('B' OR 'C' GRADED) COMPACTED
TO 100% SRDD IN ACCORDANCE WITH SPECIFICATION.
DEPTH OF PAVEMENT AS NOTED IN TABLE.

SEAL PAVEMENT AREAS WITH 300mm THICK ASPHALT "CRC10" AS DESCRIBED IN FNQROC DESIGN
MANUAL CRC SPECIFIC CONDITIONS IN ACCORDANCE WITH THE SPECIFICATION. ASPHALT THICKNESS
SHALL BE INCREASED TO 50mm WHERE SHOWN ON THE DRAWINGS.

ROAD NAME AND CHAINAGE	ROAD RESERVE WIDTH (m)	LHS VERGE WIDTH (m)	CARRIAGEWAY WIDTH (m) CROSSFALL (%)	RHS VERGE WIDTH (m)	SUBBASE (MIN. DEPTH mm)	BASE (MIN. DEPTH mm)
JULAJI CLOSE	17.00	5.00	7.00 (3%)	5.00	125	125
ROAD H	15.00	4.25	6.50 (3%)	4.25	125	125

Julaji Close					
	CHAINAGE	EASTING	NORTHING	RADII	BEARING
L#9	0.000 9.980	9024.428 9015.873	80277.156 80272.018		239°00'52" STRAIGHT 239°00'52" STRAIGHT
C# 7	9.980 17.044	9015.873 9011.272	80272.018 80266.804	11.500 11.500	239°00'52" ARC 203°49'08" ARC
L#10	17.044 26.451	9011.272 9006.666	80266.804 80256.368		203°49'08" STRAIGHT 203°49'08" STRAIGHT
C# 8	26.451 34.087	9006.666 9003.486	80256.368 80251.755	15.000 15.000	203°49'08" ARC 225°20'51" ARC
C# 9	34.087 39.355	9003.486 8999.172	80251.755 80248.780	15.000 15.000	225°20'51" ARC 245°28'05" ARC
L#11	39.355 107.765	8999.172 8936.935	80248.780 80220.376		245°28'05" STRAIGHT 245°28'05" STRAIGHT

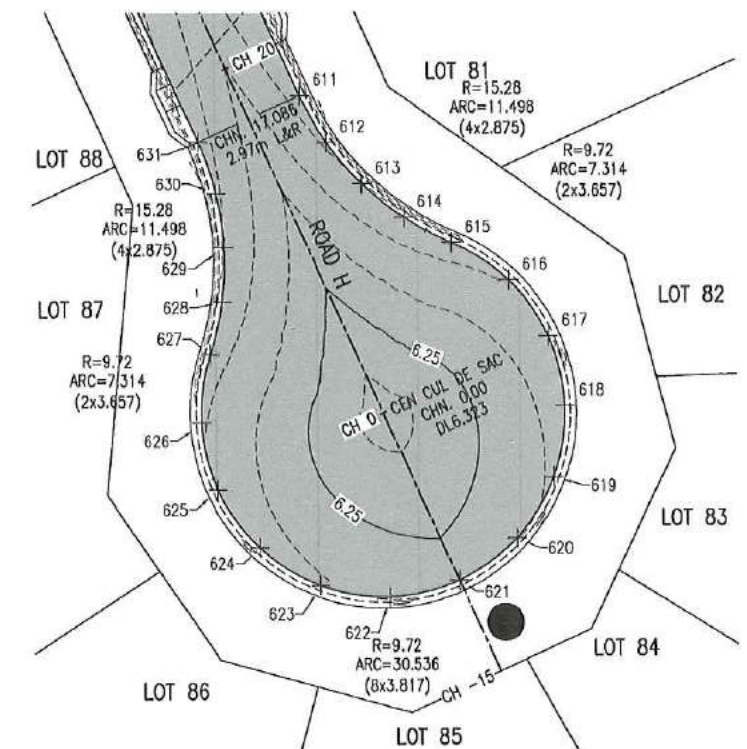
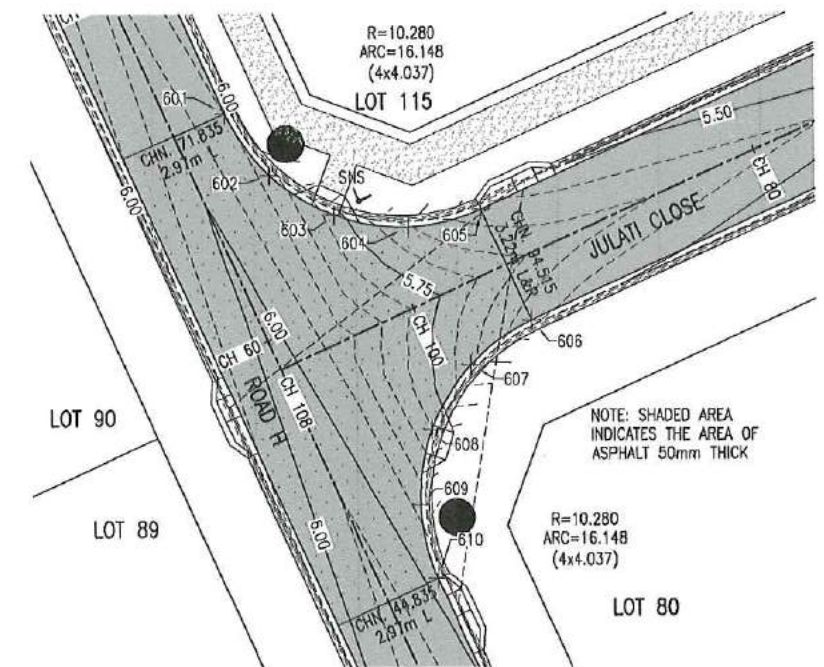
Road H					
	CHAINAGE	EASTING	NORTHING	RADII	BEARING
L#17	-15.000 0.000	8967.385 8961.157	80153.661 80167.307		335°28'05" STRAIGHT 335°28'05" STRAIGHT
L#18	0.000 117.769	8961.157 8912.259	80167.307 80274.445		335°28'05" STRAIGHT 335°28'05" STRAIGHT
L#19	117.769 250.507	8912.259 8857.147	80274.445 80395.201		335°28'05" STRAIGHT 335°28'05" STRAIGHT
C# 11	250.507 266.163	8857.147 8856.984	80395.201 80410.405	18.750 18.750	335°28'05" ARC 23°18'31" ARC
L#20	266.163 284.144	8856.984 8864.099	80410.405 80426.918		23°18'31" STRAIGHT 23°18'31" STRAIGHT
L#21	284.144 299.270	8864.099 8870.084	80426.918 80440.810		23°18'31" STRAIGHT 23°18'31" STRAIGHT



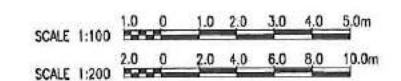
SUB SURFACE DRAINAGE DETAIL
(IF REQUIRED)
N.T.S.

INTERSECTION SETOUT POINTS				
Point #	Easting	Northing	Level	Description
601	8934.033	80233.891	5.898	EC
602	8935.378	80230.637	5.873	EC
603	8939.790	80228.528	5.774	EC
604	8943.749	80227.885	5.655	EC
605	8947.653	80228.807	5.571	EC
606	8950.327	80222.940	5.571	EC
607	8947.073	80220.603	5.662	EC
608	8944.964	80217.191	5.802	EC
609	8944.322	80213.232	5.929	EC
610	8945.243	80209.328	5.979	EC
611	8956.765	80184.084	6.080	EC
612	8958.195	80181.596	6.092	EC
613	8960.068	80179.420	6.105	EC
614	8962.314	80177.632	6.117	EC
615	8964.854	80176.296	6.129	EC
616	8967.898	80174.309	6.144	EC
617	8969.999	80171.342	6.160	EC
618	8970.871	80167.651	6.176	EC
619	8970.263	80163.908	6.192	EC
620	8968.269	80160.682	6.209	EC
621	8965.193	80158.464	6.226	EC
622	8961.502	80157.593	6.209	EC
623	8957.758	80158.200	6.193	EC
624	8954.532	80160.194	6.176	EC
625	8952.314	80163.271	6.160	EC
626	8951.450	80166.802	6.145	EC
627	8951.944	80170.404	6.129	EC
628	8952.599	80173.199	6.117	EC
629	8952.720	80176.066	6.105	EC
630	8952.302	80178.906	6.093	EC
631	8951.361	80181.617	6.080	EC

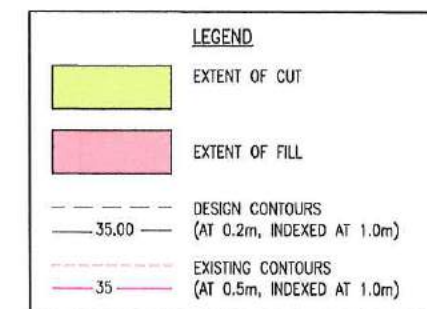
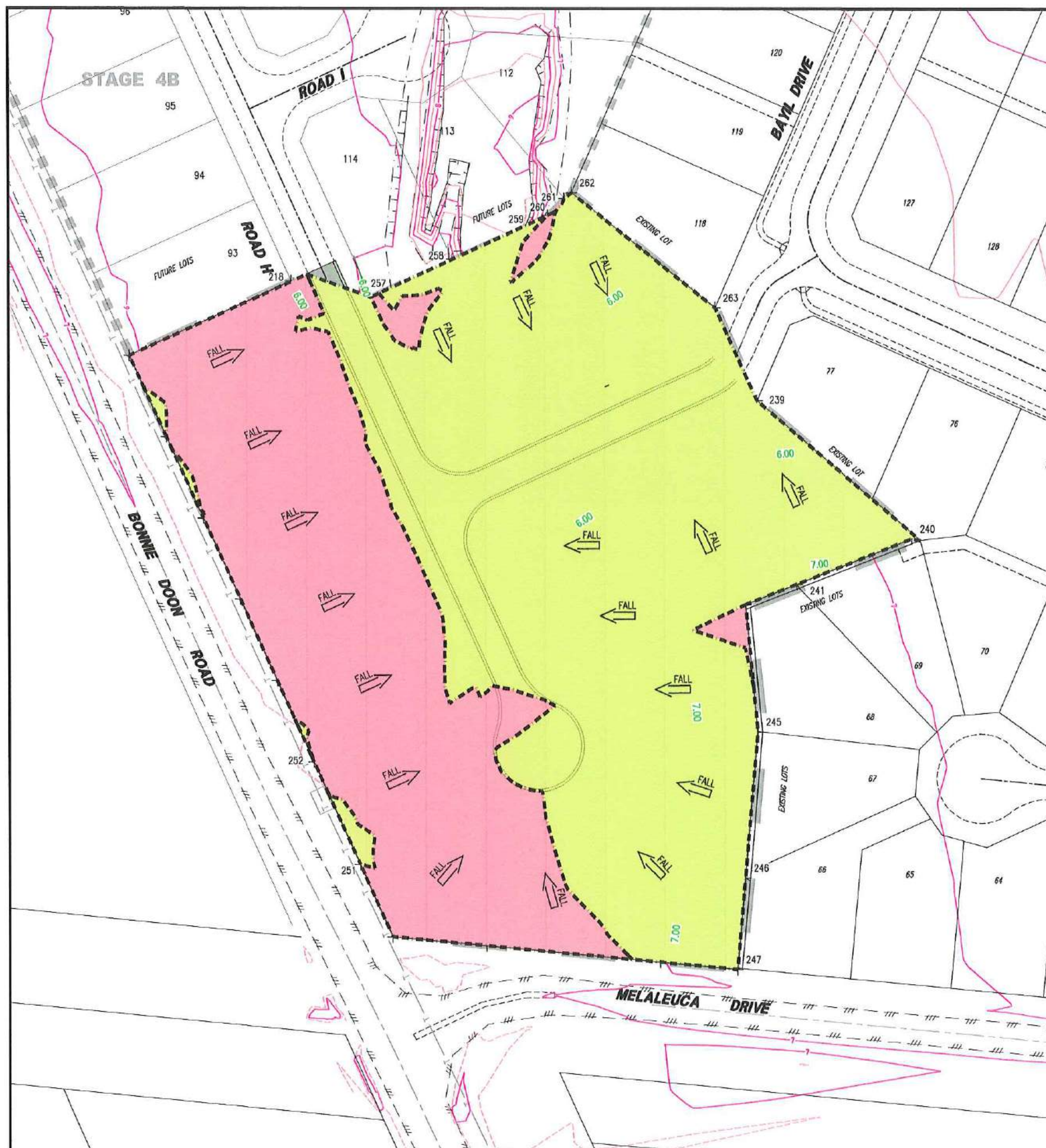
NOTE: EC = EDGE OF CHANNEL = EDGE OF BITUMEN



INTERSECTION DETAILS
SCALE: 1:200



amendments		JIM PAPAS DRAFTING PTY. LTD.		"Ocean Breeze Estate"		SCALE		HOR 1:200/100		DRAWN		J.P.	
A	ORIGINAL ISSUE FOR OPERATIONAL WORKS APPROVAL	27.06.11			STAGE 4A OF PROPOSED RESIDENTIAL SUBDIVISION AT JULAJI CLOSE, COOYA BEACH	VER 1:100	DESIGNED	J.P.		DATE	JUNE 2011	CHECKED	J.P.
						APPROVED							
						DWG NUMBER	1208 - C02	AMDT	A				



BULK EARTHWORKS

PRIOR TO COMMENCEMENT OF WORKS, THE CONTRACTOR SHALL OBTAIN COUNCIL APPROVAL TO REMOVE ANY TREES.

SITE EARTHWORKS SHALL GENERALLY CONSIST OF CLEARANCE OF VEGETATION FOLLOWED BY EXCAVATION OF TOP SOILS AND CUTTING AND FILLING OF MATERIAL TO SUIT FINAL DESIGN LEVELS. TOP SOILS MAY BE STOCKPILED FOR REUSE LATER. THE LOCATION OF SUCH STOCKPILE SITES SHALL BE ON SITE AS DIRECTED BY THE SUPERINTENDENT AFTER CONSULTATION AND AGREEMENT WITH COUNCIL. STOCKPILE SITES SHALL BE PROTECTED BY DIVERSION DRAINS AND SILT FENCES AS APPROPRIATE.

THE EXPOSED SUBGRADE SHALL BE UNIFORMLY COMPACTED TO ACHIEVE A DRY DENSITY RATIO TO A DEPTH OF 250mm OF NOT LESS THAN 98% OF THE MAXIMUM SATURATED VIBRATED DENSITY (AS 1289 TESTS 5.3.1 AND 5.5.1). SUBGRADE COMPACTION SHALL BE ACCOMPANIED BY GENERAL INSPECTION TO ALLOW DETECTION AND RECTIFICATION OF ANY LOCALISED COMPRESSIBLE ZONES WHICH MAY EXIST.

ALL FILLING PLACED AREAS SHALL BE UNIFORMLY COMPACTED IN LAYERS OF NOT MORE THAN 200mm FINAL THICKNESS, UNDER LEVEL 2 SUPERVISION (AS 3798-1996 "GUIDELINES ON EARTHWORKS FOR COMMERCIAL AND RESIDENTIAL DEVELOPMENT") TO THE MAXIMUM DRY DENSITY RATIOS OF 98% (EXPRESSED AS A PERCENTAGE OF THE MAXIMUM VIBRATED DENSITY ESTABLISHED BY TEST METHODS AS 1289 5.3.1, 5.4.1 AND 5.5.1 FOR COHESIONLESS (SAND) MATERIALS OR ALTERNATIVELY, STANDARD COMPACTION, IF APPROPRIATE).

CARE SHALL BE TAKEN TO ENSURE THAT ANY VIBRATORY ROLLING OR CONSTRUCTION ACTIVITIES DO NOT CAUSE DISTRESS (BY WAY OF INDUCED SETTLEMENT) TO ANY ADJACENT MOVEMENT-SENSITIVE FEATURES STRUCTURES ETC.

ANY IMPORTED FILL SHALL COMPRISE LOW PLASTICITY GRANULAR MATERIAL WITH A PLASTICITY INDEX NOT MORE THAN 15%.

ALL BATTERS SHALL BE PROTECTED FROM EROSION, BY HYDROMULCHING WITH AN APPROVED SUITABLE GRASS SPECIES, AND MAINTAINED FOR THE REQUIRED MAINTENANCE PERIOD.

ON COMPLETION OF THE WORKS, TOP SOIL SHALL BE RE-SPREAD TO ALLOTMENTS, BATTERS AND FOOTPATHS AND FILL AREAS TO A DEPTH OF 75mm. (WITH AN ABSOLUTE MINIMUM DEPTH OF 40mm) THE FINISHED EARTHWORKS AREAS SHALL BE DRILL SEED AS SOON AS PRACTICABLE AFTER COMPLETION.

THE FINISHED LEVELS NOTED ON THE DRAWINGS ARE THE LEVELS TO BE ACHIEVED AFTER COMPLETION OF THE EARTHWORKS AND PRIOR TO PLACEMENT OF TOP SOIL IF ANY.

FINISHED LEVEL SETOUT POINTS

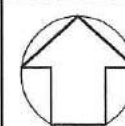
Point #	Easting	Northing	Level	Description
217	8968.861	80254.638	6.075	FL
218	8905.436	80271.331	0.000	FL
219	8913.740	80253.136	6.048	FL
220	8922.044	80234.941	6.108	FL
221	8930.348	80216.747	6.168	FL
222	8938.652	80198.552	6.228	FL
223	8946.956	80180.358	6.304	FL
224	8947.894	80178.302	6.314	FL
225	8946.428	80162.980	6.418	FL
226	8952.411	80154.285	6.455	FL
227	8962.584	80151.470	6.490	FL
228	8968.745	80154.281	6.475	FL
229	8972.186	80155.852	6.490	FL
230	8976.725	80165.381	6.455	FL
231	8975.746	80169.157	6.415	FL
232	8967.540	80180.255	6.365	FL
233	8961.540	80184.530	6.314	FL
234	8955.713	80197.298	6.253	FL
235	8948.949	80212.118	6.191	FL
236	8950.927	80217.418	5.888	FL
237	8979.129	80230.289	5.650	FL
238	8997.320	80238.592	5.550	FL
239	9010.672	80244.685	0.000	FL
240	9045.662	80213.769	6.858	FL
241	9019.598	80203.562	7.159	FL
242	9008.007	80199.022	7.293	FL
243	8996.030	80193.258	7.020	FL
244	8987.553	80211.830	6.460	FL
245	9010.709	80170.487	7.362	FL
246	9007.870	80137.772	7.299	FL
247	9006.092	80117.280	7.259	FL
248	8988.660	80118.895	6.948	FL
249	8949.379	80122.529	6.820	FL
250	8928.214	80124.485	6.820	FL
251	8920.838	80140.660	6.819	FL
252	8910.353	80163.652	6.510	FL
253	8902.054	80181.849	6.450	FL
254	8893.756	80200.046	6.350	FL
255	8885.465	80218.227	6.310	FL
256	8877.159	80236.440	6.216	FL
257	8923.497	80267.885	6.020	FL
258	8941.898	80276.283	6.400	FL
259	8960.092	80284.587	6.610	FL
260	8963.522	80286.152	6.620	FL
261	8967.219	80289.914	6.610	FL
262	8968.909	80291.206	6.620	FL
263	9001.269	80265.470	5.480	FL
264	8997.734	80257.467	5.380	FL
265	8976.825	80247.925	5.624	FL
266	8958.630	80239.621	5.724	FL
267	8943.869	80232.884	5.882	FL
268	8938.569	80234.862	6.121	FL

NOTE: FL = FINISHED LEVEL
REFER TO BULK EARTHWORKS NOTES FOR
DEFINITION OF FINISHED LEVEL

SCALE 1:500 5 0 5 10 15 20 25m

amendments		
A	ORIGINAL ISSUE FOR OPERATIONAL WORKS APPROVAL	27.06.11

**JIM PAPAS DRAFTING
PTY. LTD.**
CIVIL ENGINEERING DESIGN AND DRAFTING
6 Neptune Court Ph. (07) 4036 1699
Mt. Sheridan Q 4868 Mob. 0408 770 394
Email: jimpapas@westnet.com.au



"Ocean Breeze Estate"
STAGE 4A OF PROPOSED RESIDENTIAL SUBDIVISION
AT JULAJI CLOSE, COOYA BEACH

DRAWING TITLE: BULK EARTHWORKS PLAN.

SCALE (AT A1 SIZE)	HOR 1:500 VER	DRAWN DESIGNED	J.P. J.P.
DATE	JUNE 2011	CHECKED	J.P.
APPROVED			
DWG NUMBER	1208 - C03	AMDT	A



LEGEND

- ASPHALT SEAL 30mm THICK REFER DWG. C02 FOR PAVEMENT DETAILS
- ASPHALT SEAL 50mm THICK REFER DWG. C02 FOR PAVEMENT DETAILS
- CONCRETE FOOTPATH AS REQUIRED BY FNQROC DWG. S1035 2.00m WIDE.
- SNS & STREET NAME SIGN (ONE OR TWO AS APPLICABLE) IN ACCORDANCE WITH S1040-CRC
- TRAFFIC CONTROL SIGN AS DESIGNATED TO BE INSTALLED IN ACCORDANCE WITH MUTCD
- +42 FINISHED LEVEL POINT REFER TABLE ON DWG. C3 FOR DETAILS
- CONCRETE STORMWATER CLASS 2 U TO AS 4058 SIZE VARIES
- KERB INLET PIT TO FNQROC STD. DWG. S1050, S1055 OR S1070 AS APPLICABLE. TYPE VARIES.
- 11/1 STORMWATER DRAINAGE PIT NO.
- PROPOSED ROUTE OF SEWER
- DESIGN CONTOURS (AT 0.2m, INDEXED AT 1.0m)
- EXISTING CONTOURS (AT 0.5m, INDEXED AT 1.0m)



amendments		
A	ORIGINAL ISSUE FOR OPERATIONAL WORKS APPROVAL	27.06.11

JIM PAPAS DRAFTING PTY. LTD.
CIVIL ENGINEERING DESIGN AND DRAFTING
 6 Neptune Court Ph. (07) 4036 1690
 Mt. Sheridan Q 4868 Mob. 0408 770 394
 Email: jimpapas@westnet.com.au



"Ocean Breeze Estate"
 STAGE 4A OF PROPOSED RESIDENTIAL SUBDIVISION
 AT JULAJI CLOSE, COOYA BEACH
 DRAWING TITLE: EARTHWORK, ROADWORKS AND STORMWATER DRAINAGE PLAN

SCALE (AT A1 SIZE)	HOR 1:500	DRAWN	J.P.
DATE	VER	DESIGNED	J.P.
		CHECKED	J.P.
APPROVED			
DWG NUMBER	1208 - C04	AMDT	A



- SOIL AND WATER MANAGEMENT**
1. THE CONTRACTOR SHALL PREPARE AN EROSION AND SEDIMENT CONTROL PLAN. THE CONTRACTOR SHALL PROVIDE AND INSTALL ALL DEVICES/MEASURES NECESSARY TO COMPLY WITH THE PROVISIONS OF THE FNQROC DEVELOPMENT MANUAL, THE ENVIRONMENTAL PROTECTION ACT AND THE REQUIREMENTS OF CAIRNS REGIONAL COUNCIL.
 2. THE CONSTRUCTION AND PLACEMENT OF SEDIMENT CONTROL MEASURES SHALL BE IN ACCORDANCE WITH THE CONTRACTOR'S SOIL AND WATER MANAGEMENT PLAN AND SHALL COMPLY WITH THE REQUIREMENTS OF THE FNQROC DEVELOPMENT MANUAL, CAIRNS REGIONAL COUNCIL. OTHER SEDIMENT CONTROL MEASURES SHALL BE INSTALLED AS DIRECTED BY THE SUPERINTENDENT.
 3. ALL SEDIMENT CONTROL MEASURES ARE TO REMAIN IN PLACE UNTIL THE END OF THE MAINTENANCE PERIOD, UNLESS NOTED OTHERWISE. ALL SEDIMENT CONTROL DEVICES ARE TO BE FULLY MAINTAINED IN AN EFFECTIVE WORKING CONDITION DURING CONSTRUCTION AND DURING THE MAINTENANCE PERIOD. THE CONTRACTOR IS TO ENSURE THAT ALL SEDIMENT CONTROL DEVICES ARE KEPT FREE OF SEDIMENT BUILD-UP.
 4. SEDIMENT FENCES ARE TO BE INSTALLED SUCH THAT THE BASE OF THE FENCE IS PLACED 200mm MINIMUM BELOW GROUND LEVEL, AND ANCHORED SECURELY IN SUCH POSITION.
 5. STOCKPILE SITES SHALL BE LOCATED ON SITE AS DIRECTED BY THE SUPERINTENDENT AFTER CONSULTATION AND AGREEMENT WITH COUNCIL. ENCIRCLE ALL STOCKPILES WITH SILT FENCES AND COVER WITH VISQUEEN OR SIMILAR IN TIMES OF HIGH WIND FOR DUST CONTROL.
 6. ALL VEHICLES AND EQUIPMENT ENTRY/EXIT POINTS SHALL HAVE SHAKER GRIDS OR SIMILAR TO PREVENT VEHICLES FROM TRACKING SOIL AND MUD OFF SITE. LOCATION, DETAILS ETC SHALL BE SHOWN ON THE CONTRACTOR'S ESC PLAN.
 7. THE DEVICES AND MEASURES INDICATED ON THIS DRAWING ARE MINIMUM RECOMMENDATIONS ONLY.
 8. ALL KERB INLETS (INCLUDING FIELD INLETS) SHALL HAVE SEDIMENT TRAPS IN ACCORDANCE WITH CONTRACTOR'S ESCP PLAN.
 9. THE FOLLOWING MEASURES SHALL BE UNDERTAKEN IMMEDIATELY UPON COMPLETION OF EACH SECTION OF EARTHWORKS:
 - CUT AND FILL BATTERS >1V:4H TO BE HYDROMULCHED
 - ALL OTHER AREAS SHALL BE GRASS SEED.
 - FOOTPATHS SHALL BE GRASS SEED UPON COMPLETION OF FINAL TRIMMING AS REQUIRED BY THE CONTRACTOR'S ESCP.
 10. TURF STRIPS (400 WIDE) ARE TO BE PROVIDED ALONG THE BACK OF THE KERB AND CHANNEL.
 11. REVEGETATION SHALL BE WATERED AND MAINTAINED UNTIL GROWTH IS ESTABLISHED.
 12. PEST PLANT MANAGEMENT
NO EXCESS SOIL SHALL BE REMOVED FROM THE SITE. A TRUCK SHAKE DOWN AND WASH DOWN AREA IS TO BE LOCATED ON SITE AFTER CONSULTATION WITH COUNCIL. IT SHALL BE PROPERLY MAINTAINED BY THE CONTRACTOR THROUGHOUT THE CONSTRUCTION PHASE OF THE PROJECT. THE CONTRACTOR IS RESPONSIBLE FOR CONTROL OF WEEDS UNTIL THE END OF THE MAINTENANCE PERIOD OR THE SALE OF THE LOTS WHICHEVER OCCURS FIRST.

LEGEND

PROPOSED SILT FENCE
CONSTRUCTED IN ACCORDANCE WITH
DTMR ROAD DRAINAGE DESIGN
MANUAL.
EXTENT AS SHOWN ON PLAN

SCALE 1:500 0 5 10 15 20 25m

amendments			JIM PAPAS DRAFTING PTY. LTD. CIVIL ENGINEERING DESIGN AND DRAFTING 6 Neptune Court Ph. (07) 4036 1690 Mt. Sheridan Q 4868 Mob. 0408 770 394 Email: jimpapas@westnet.com.au	"Ocean Breeze Estate" STAGE 4A OF PROPOSED RESIDENTIAL SUBDIVISION AT JULAJI CLOSE, COOYA BEACH	SCALE (AT A1 SIZE)		HOR 1:500	DRAWN	J.P.
A	ORIGINAL ISSUE FOR OPERATIONAL WORKS APPROVAL	27.06.11			VER	DESIGNED	J.P.		
					DATE	JUNE 2011	CHECKED	J.P.	
					APPROVED				
					DWG NUMBER	1208 - C05	AMDT	A	
					DRAWING TITLE: SOIL AND WATER MANAGEMENT PLAN				



SEWERAGE RETICULATION NOTES

1. ALL SEWER PIPES SHALL BE 150Ø uPVC, CLASS SN8 R/R TO AS1260, UNLESS NOTED OTHERWISE.
2. UNO ALL HCB'S WILL BE TYPE E1 OR E2 IN ACCORDANCE WITH FNQROC CRC SPECIFIC DWG No S3005-CRC.
3. END CAPS ARE TO BE PROVIDED AT ALL LINE ENDS WHERE MANHOLES ARE NOT TO BE CONSTRUCTED.
4. WHERE MANHOLES OCCUR AT THE ENDS OF SEWER LINES, THE HOUSE CONNECTION BRANCH (HCB) FOR THE END ALLOTMENT SERVICED BY THE SEWER LINE SHALL CONNECT INTO THE MANHOLE (NOT THE SEWER LINE) IN ORDER TO AVOID DRY MANHOLE SITUATIONS. REFER TO PLAN FOR HCB LOCATIONS.
5. REFER TO THE SEWERAGE LONGITUDINAL SECTIONS FOR SEWER PIPE GRADES, INVERT LEVELS, STORMWATER CROSSINGS, ETC.
6. CONSTRUCTION OF THE SEWERAGE RETICULATION IS TO BE IN ACCORDANCE WITH THE PROCEDURES, SPECIFICATIONS AND DRAWINGS CONTAINED IN FNQROC DEVELOPMENT MANUAL INCLUDING LOCAL AUTHORITY SPECIFIC CLAUSES.
7. ALL SEWERS TO BE CLEANED, TESTED AND PASSED BEFORE CONNECTION TO EXISTING COUNCIL SEWERS.
8. MANHOLES SHALL BE CONSTRUCTED TO RL'S SHOWN ON THE DRAWINGS (NOMINALLY 50mm ABOVE FINISHED SURFACE LEVELS.)
9. PRIOR TO THE COMMENCEMENT OF CONSTRUCTION THE CONTRACTOR SHALL VERIFY EXISTING INVERT LEVELS AT CONNECTION MANHOLE AND ADVISE THE SUPERINTENDENT OF ANY DISCREPANCIES.
10. THE CONTRACTOR SHALL ALLOW TO VIDEO CHECK (AND RECTIFY, IF NECESSARY) ALL NEW SEWER WORK.

1/1SE

150Ø uPVC SEWER

CONTROL LINE (NO CONSTRUCTION REQD.)

— S — S —

EXISTING SEWERS AND MANHOLES

PROPOSED ROUTE OF STORMWATER DRAINS

PROPOSED STORMWATER PIT

PROPOSED K&C

DESIGN CONTOURS AT 0.2m INDEXED AT 1.0m

MANHOLE NUMBER

LINE DESIGNATION

1/1SE

SEWER DESIGNATION

SEWER MANHOLE

HOUSE CONNECTION BRANCH LOCATION

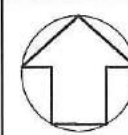
NOTES:

1. HORIZONTAL DATUM IS MGA. VERTICAL DATUM IS AHD. REFER TO DWG C01 FOR DETAILS OF THE SURVEY DATA.
2. REFER DWG. C11 FOR SET OUT DETAILS.
3. REFER DWG. C11 FOR NOTES.

SCALE 1:500 0 5 10 15 20 25m

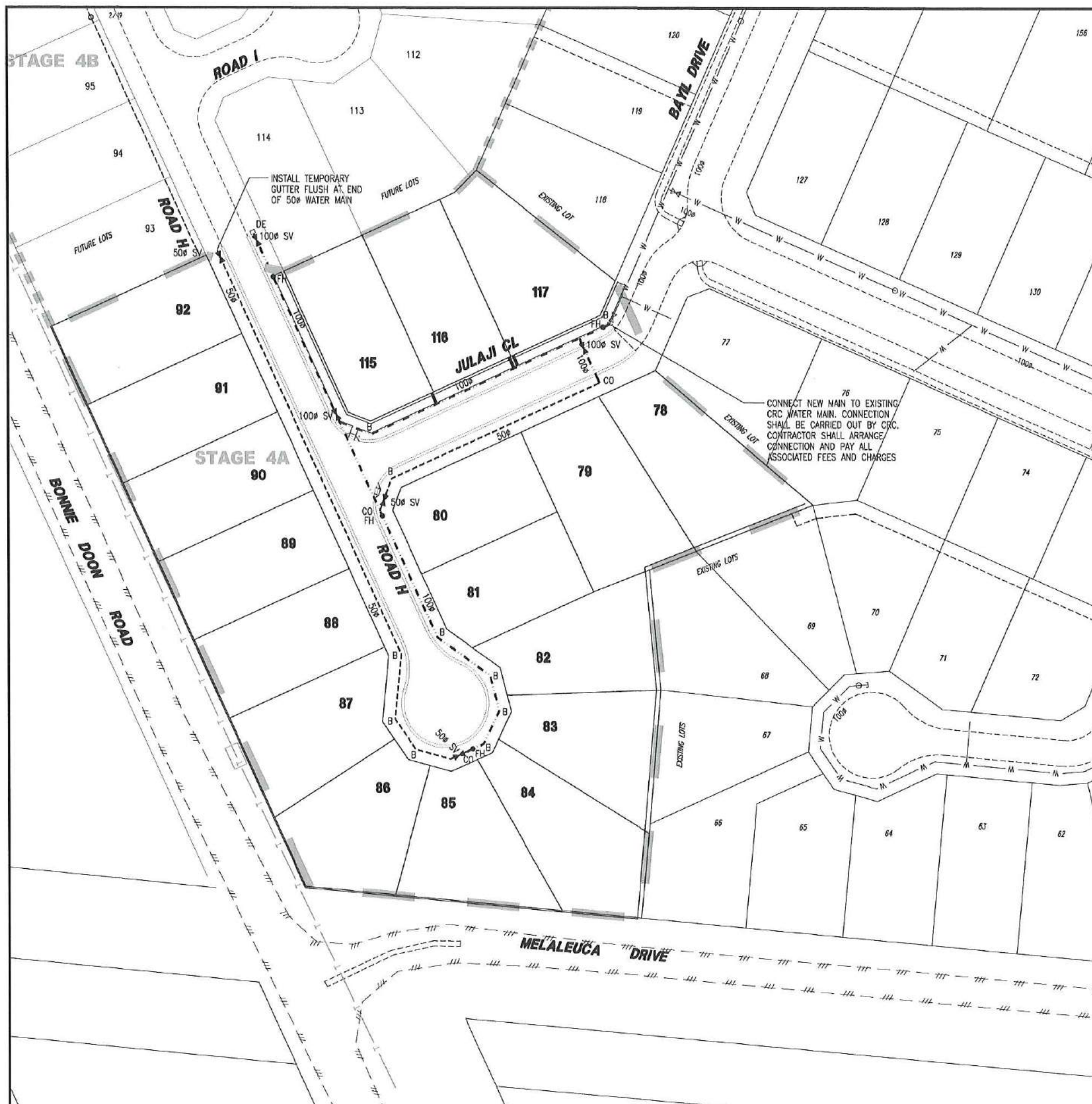
amendments		
A	ORIGINAL ISSUE FOR OPERATIONAL WORKS APPROVAL	27.06.11

JIM PAPAS DRAFTING PTY. LTD.
CIVIL ENGINEERING DESIGN AND DRAFTING
 6 Neptune Court Ph. (07) 4036 1690
 Mt. Sheridan Q 4868 Mob. 0408 770 394
 Email: jimpapas@westnet.com.au



"Ocean Breeze Estate"
 STAGE 4A OF PROPOSED RESIDENTIAL SUBDIVISION
 AT JULAJI CLOSE, COOYA BEACH
 DRAWING TITLE: SEWERAGE RETICULATION PLAN.

SCALE (AT A1 SIZE)	HOR 1:500	DRAWN	J.P.
	VER	DESIGNED	J.P.
DATE	JUNE 2011	CHECKED	J.P.
APPROVED			
DWG NUMBER	1208 - C06	AMDT	A



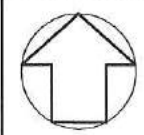
- WATER RETICULATION NOTES**
1. MATERIALS
 50mm - Polyethylene (63mm OD) PN 16 TO AS 1430 COLOUR BLUE
 100mm - uPVC PN 16 SERIES 2 RRJ TO AS 1477
 150mm - uPVC PN 16 SERIES 2 RRJ TO AS 1477
 2. VALVES AND HYDRANTS MUST BE LOCATED OPPOSITE BOUNDARY JUNCTIONS AND TRUNCATIONS AS APPROPRIATE.
 3. ALIGNMENT OF WATER RETICULATION MAINS WITHIN ROAD RESERVES TO BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE LOCAL AUTHORITY. (2.80m IN CAIRNS REGIONAL COUNCIL JURISDICTION)
 4. INSTALLATION OF VALVES AND FIRE HYDRANTS TO BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE LOCAL AUTHORITY.
 5. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH FNQROC DEVELOPMENT MANUAL INCLUDING STANDARD DRAWINGS.
 6. MINIMUM COVER TO ALL WATER MAINS UNDER KERBED ROAD SHALL BE 800mm.
 7. MINIMUM TEST PRESSURE FOR ALL WATER MAINS SHALL BE 1200KPa. THE CONTRACTOR SHALL GIVE THE WATER OFFICER TWENTY FOUR (24) HOURS NOTICE PRIOR TO TESTING.

- LEGEND**
- 100mm uPVC WATER MAIN
 - 50mm uPVC WATER MAIN
 - 100mm SV SLUICE VALVE TO AS 2638 COATED WITH A THERMOSETTING EPOXY POWDER, ME CLASS 16 COMPLETE WITH C.I. COVER, BOX, ANCHOR, MARGIN & MARKER OR 63mm DR BRASS VALVE COMPLETE WITH C.I. COVER, BOX, ANCHOR, MARGIN AND MARKER. SIZES AS NOTED.
 - FH 80mm SPRING HYDRANT (MAXI FLO TYPE) COMPLETE WITH C.I. TEE (ME), RISER, C.I. COVER, BOX, MARGIN & MARKER. ORIENTATE HYDRANT SUCH THAT BOLTS ARE PARALLEL TO WATER MAIN.
 - DE 150mm OR 100mm C.I. DEAD END CAP M.E., OR 63mm DEAD END CAP WITH CONCRETE THRUST BLOCK.
 - B 150mm OR 100mm C.I. BEND M.E. TO SUIT WITH CONCRETE THRUST BLOCK. WHERE NO BENDS ARE SHOWN DEFLECT MAIN IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.
 - 100mm to 63mm JOINT IN ACCORDANCE WITH FNQROC STD. DWG. No. 2020
 - C.I. TEE M.E. COMPLETE WITH CONCRETE THRUST BLOCK. SIZES AS NOTED
 - EXISTING WATER MAIN AND FIXTURES - SIZES AND TYPES AS NOTED
 - INSTALL 80mm uPVC CONDUIT UNDER CONCRETE FOOTPATH TO FACILITATE INSTALLATION OF FUTURE DOMESTIC WATER SERVICE. REFER FNQROC CRC SPECIFIC DWG S2038-CRC FOR FURTHER DETAILS.

SCALE 1:500 0 5 10 15 20 25m

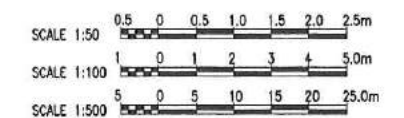
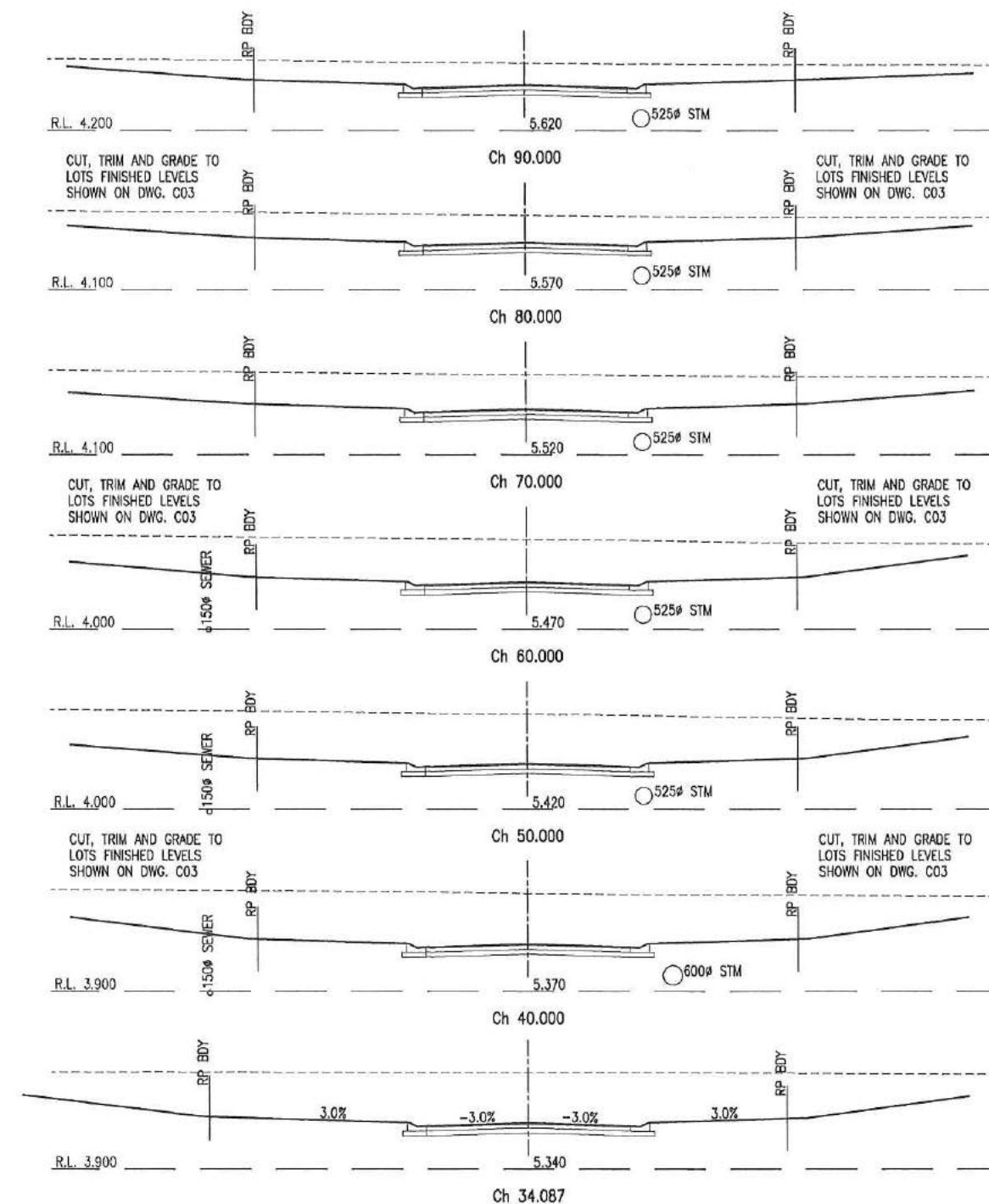
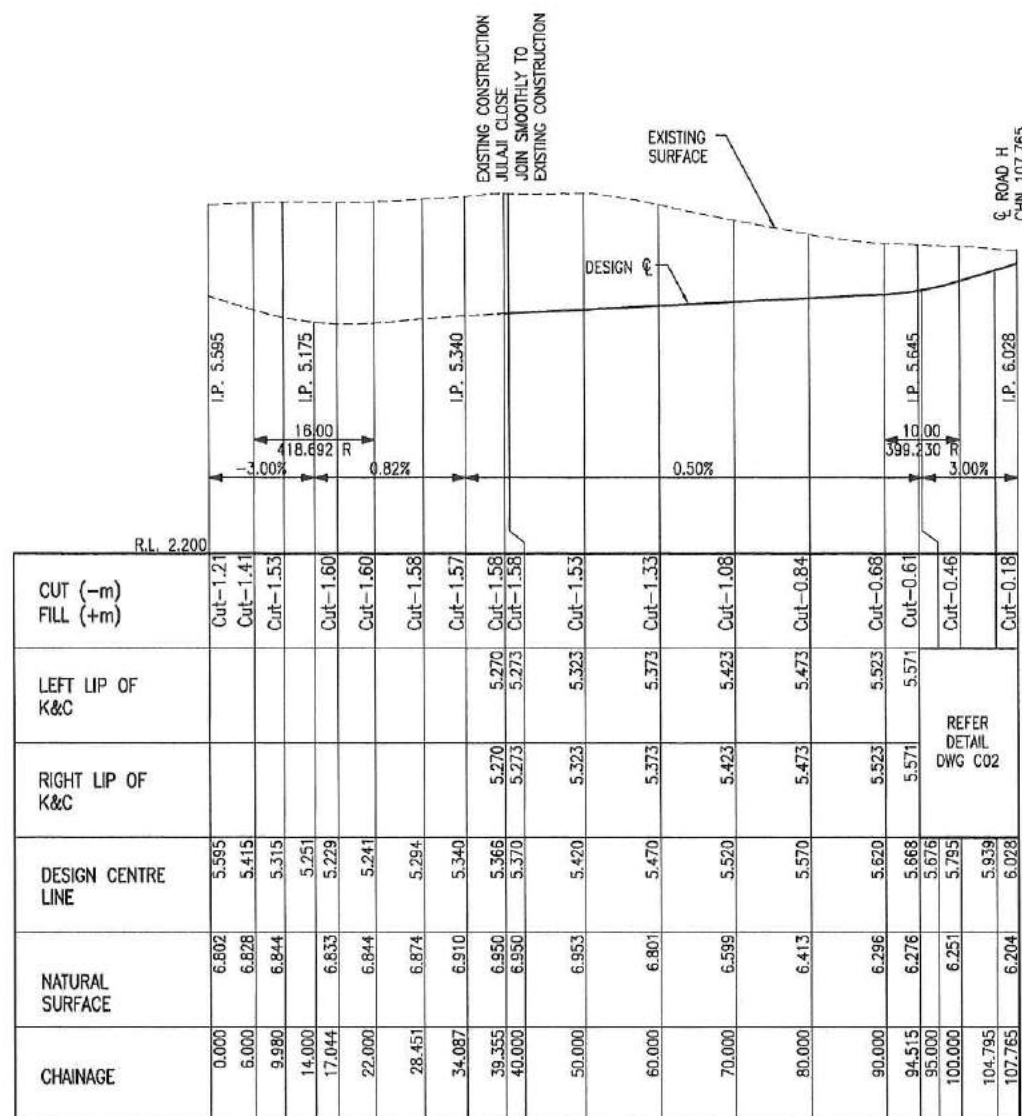
amendments		
A	ORIGINAL ISSUE FOR OPERATIONAL WORKS APPROVAL	27.06.11

JIM PAPAS DRAFTING PTY. LTD.
 CIVIL ENGINEERING DESIGN AND DRAFTING
 6 Neptune Court Ph. (07) 4036 1690
 Mt. Sheridan Q 4868 Mob. 0408 770 394
 Email: jimpapas@westnet.com.au

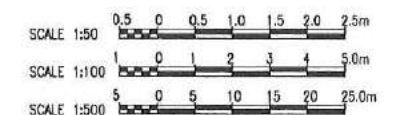
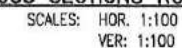
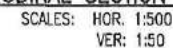


"Ocean Breeze Estate"
 STAGE 4A OF PROPOSED RESIDENTIAL SUBDIVISION
 AT JULAJI CLOSE, COOYA BEACH
 DRAWING TITLE: WATER RETICULATION PLAN

SCALE (AT A1 SIZE)	HOR 1:500	DRAWN	J.P.
DATE	JUNE 2011	DESIGNED	J.P.
APPROVED		CHECKED	J.P.
DWG NUMBER	1208 - C07	AMDT	A



amendments			JIM PAPAS DRAFTING PTY. LTD. CIVIL ENGINEERING DESIGN AND DRAFTING 6 Neptune Court Ph. (07) 4036 1690 Mt. Sheridan Q 4868 Mob. 0408 770 394 Email: jimpapas@westnet.com.au	"Ocean Breeze Estate" STAGE 4A OF PROPOSED RESIDENTIAL SUBDIVISION AT JULAJI CLOSE, COOYA BEACH	SCALE (AT A1 SIZE)	HDR 1:500/100	DRAWN	J.P.	
A	ORIGINAL ISSUE FOR OPERATIONAL WORKS APPROVAL	27.06.11			VER 1:50/100	DESIGNED	J.P.		
					DATE	JUNE 2011	CHECKED	J.P.	
					APPROVED				
					DRAWING TITLE:	JULAJI CLOSE – LONGITUDINAL AND CROSS SECTIONS			
					DWG NUMBER	1208–C08		AMDT	A



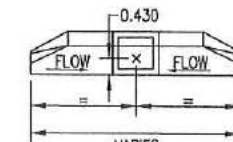
SCALE (AT A1 SIZE)	HOR 1:500/100	DRAWN	J.P.
	VER 1:50/100	DESIGNED	J.P.
DATE	JUNE 2011	CHECKED	J.P.
APPROVED			
DWG NUMBER	1208 - C09	AMOT	A

WATER LEVEL IN STRUCTURE
HYDRAULIC GRADE LEVEL
PIPE FLOW (Cumeecs)
PIPE CAPACITY AT GRADE (Cumeecs)
DEPTH TO INVERT
INVERT LEVEL OF DRAIN
DESIGN SURFACE LEVEL
ROAD CHAINAGE (OFFSET)
RUNNING CHAINAGE

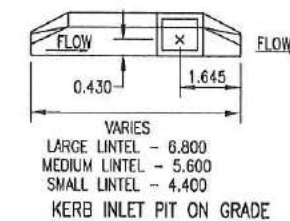
PIPE SIZEmm (Class)	375(2)	375(2)	450(2)	525(2)	CON PIPE CON EXIST THE TO CON	600(2)	Ex 600(2)
PIPE GRADE %	0.400%	0.522%	1.043%	0.400%		0.398%	
PIPE SLOPE 1 in X	250.00	191.59	95.84	250.00		251.11	
FULL PIPE FLOW VELOCITY (m/s)	0.57	1.16	1.03	1.02		0.93	
PART FULL FLOW VELOCITY (m/s)							

LINE 15SW

PIT SCHEDULE									
PIT No.	TYPE	INTERNAL		INLET		OUTLET		F.S.L.	PIT DEPTH
		WIDTH	LEN.	DIA.(CL)	INV R.L.	DIA.(CL)	INV R.L.		
7/12SW	KERB INLET ON GRADE SMALL LINTEL 10% BLOCKAGE	835	930			375(2)	4.751	6.064	1.31
6/12SW	KERB INLET ON GRADE LARGE LINTEL 10% BLOCKAGE	835	930	375(2)	4.721	375(2)	4.701	6.049	1.35
5/12SW	KERB INLET ON GRADE SMALL LINTEL 10% BLOCKAGE	835	930	375(2)	4.595	450(2)	4.575	5.984	1.41
1/15SW	KERB INLET ON GRADE SMALL LINTEL 10% BLOCKAGE	835	930			375(2)	4.628	5.941	1.31
4/12SW	KERB INLET ON GRADE SMALL LINTEL 10% BLOCKAGE	835	930	375(2) 450(2)	4.339 4.339	525(2)	4.319	5.533	1.21
3/12SW	KERB INLET ON GRADE SMALL LINTEL 10% BLOCKAGE	835	930	525(2)	4.135	600(2)	4.115	5.262	1.15



VARIES
LARGE LINTEL - 6.800
MEDIUM LINTEL - 5.600
SMALL LINTEL - 4.400
KERB INLET PIT IN SAG



STORMWATER DRAINAGE SET OUT DETAILS

NOTES:

SET OUT POINT IS CENTRE OF GRATE

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

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

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

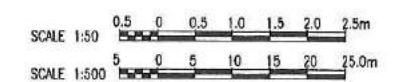
PIPE LENGTHS SHOWN ARE MEASURED FROM
CENTRE OF GRATE TO CENTRE OF GRATE

ALL STORMWATER DRAIN PIPES SHALL BE R.C.
PIPES CLASS 2 W TO AS 4058

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

UNTEL LENGTHS NOTED INCLUDE TRANSITION LENGTHS.

STORMWATER SETOUT POINTS				
Point #	Easting	Northing	Level	Description
420	8999.368	80254.416	6.911	2A/12SW
421	8991.860	80249.455	5.262	3/12SW
422	8950.008	80230.355	5.533	4/12SW
423	8946.305	80208.037	5.984	5/12SW
424	8954.754	80189.525	6.049	6/12SW
425	8949.813	80183.972	6.084	7/12SW
426	8934.126	80218.343	5.941	1/15SW



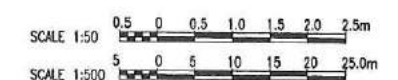
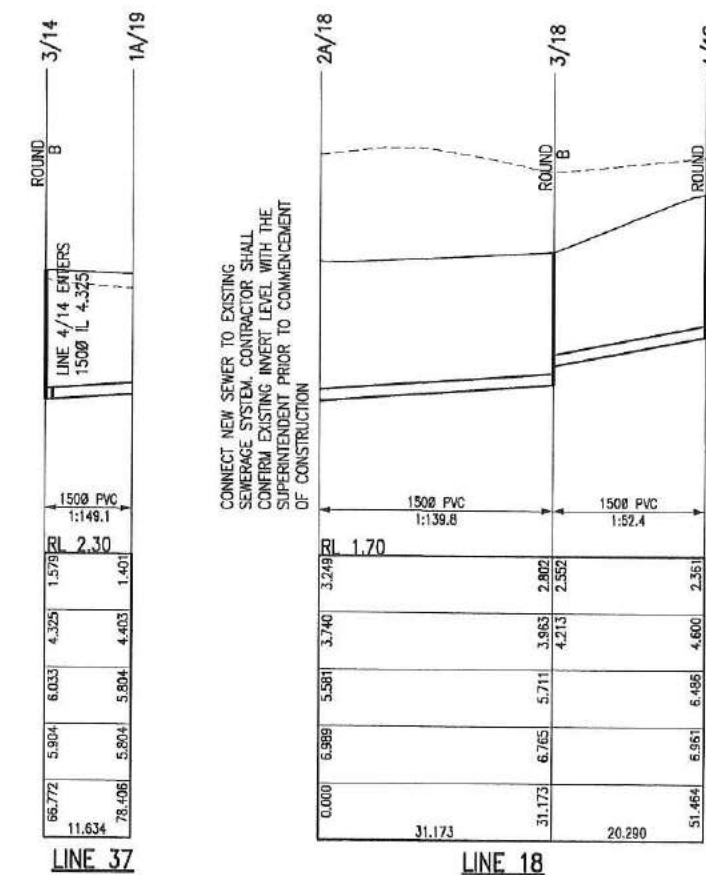
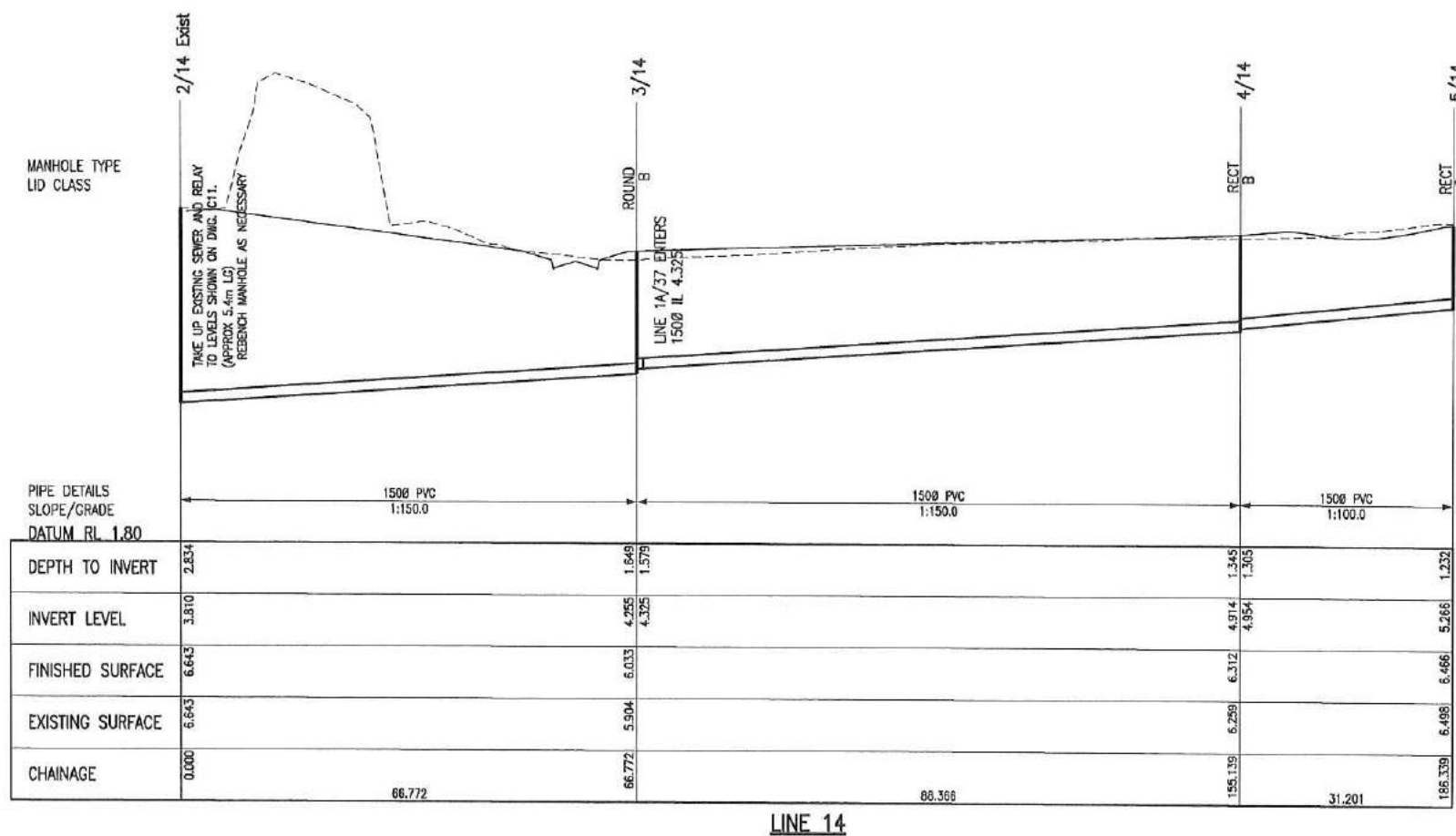
amendments			JIM PAPAS DRAFTING PTY. LTD. CIVIL ENGINEERING DESIGN AND DRAFTING 6 Neptune Court Ph. (07) 4036 1690 Mt. Sheridan Q 4868 Mob. 0408 770 394 Email: jimpapas@westnet.com.au	"Ocean Breeze Estate" STAGE 4A OF PROPOSED RESIDENTIAL SUBDIVISION AT JULAJI CLOSE, COOYA BEACH	SCALE		HOR 1:500		DRAWN		J.P.			
A	ORIGINAL ISSUE FOR OPERATIONAL WORKS APPROVAL	27.06.11			AT A1 SIZE		VER 1:50		DESIGNED		J.P.			
					DATE		JUNE 2011		CHECKED		J.P.			
					APPROVED									
					DRAWING TITLE: STORMWATER DRAINAGE LONGITUDINAL SECTIONS, SET OUT DATA AND PIT SCHEDULE				DWG NUMBER		1208 - C10		AMDT A	

SEWERAGE RETICULATION NOTES

1. ALL SEWER PIPES SHALL BE 1500 uPVC, CLASS SN8 RRI TO AS1260, UNLESS NOTED OTHERWISE.
2. UNO ALL HCB'S WILL BE TYPE E1 OR E2 IN ACCORDANCE WITH FNQROC CRC SPECIFIC DWG No S3005-CRC.
3. END CAPS ARE TO BE PROVIDED AT ALL LINE ENDS WHERE MANHOLES ARE NOT TO BE CONSTRUCTED.
4. WHERE MANHOLES OCCUR AT THE ENDS OF SEWER LINES, THE HOUSE CONNECTION BRANCH (HCB) FOR THE END ALLOTMENT SERVICED BY THE SEWER LINE SHALL CONNECT INTO THE MANHOLE (NOT THE SEWER LINE) IN ORDER TO AVOID DRY MANHOLE SITUATIONS. REFER TO PLAN FOR HCB LOCATIONS.
5. REFER TO THE SEWERAGE LONGITUDINAL SECTIONS FOR SEWER PIPE GRADES, INVERT LEVELS, STORMWATER CROSSINGS, ETC.
6. CONSTRUCTION OF THE SEWERAGE RETICULATION IS TO BE IN ACCORDANCE WITH THE PROCEDURES, SPECIFICATIONS AND DRAWINGS CONTAINED IN FNQROC DEVELOPMENT MANUAL INCLUDING LOCAL AUTHORITY SPECIFIC CLAUSES.
7. ALL SEWERS TO BE CLEANED, TESTED AND PASSED BEFORE CONNECTION TO EXISTING COUNCIL SEWERS.
8. MANHOLES SHALL BE CONSTRUCTED TO RL'S SHOWN ON THE DRAWINGS (NOMINALLY 50mm ABOVE FINISHED SURFACE LEVELS.)
9. PRIOR TO THE COMMENCEMENT OF CONSTRUCTION THE CONTRACTOR SHALL VERIFY EXISTING INVERT LEVELS AT CONNECTION MANHOLE AND ADVISE THE SUPERINTENDENT OF ANY DISCREPANCIES.
10. THE CONTRACTOR SHALL ALLOW TO VIDEO CHECK (AND RECTIFY, IF NECESSARY) ALL NEW SEWER WORK.

SEWER SETOUT POINTS

Point #	Easting	Northing	Level	Description
520	8969.024	80289.213	6.620	2/14
521	8908.279	80261.489	6.083	3/14
522	8944.969	80181.099	6.362	4/14
523	8955.725	80151.811	6.516	5/14
524	8903.449	80272.072	5.800	1A/19
525	9007.383	80241.536	5.631	2A/18
526	8979.024	80228.593	5.761	3/18
527	8987.449	80210.134	6.536	4/18



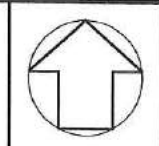
amendments		JIM PAPAS DRAFTING PTY. LTD.		"Ocean Breeze Estate"		SCALE (AT A1 SIZE)		DRAWN	
A	ORIGINAL ISSUE FOR OPERATIONAL WORKS APPROVAL	27.06.11	CIVIL ENGINEERING DESIGN AND DRAFTING	6 Neptune Court Ph. (07) 4036 1690 Mt. Sheridan Q 4868 Mob. 0408 770 394 Email: jimpapas@westnet.com.au	STAGE 4A OF PROPOSED RESIDENTIAL SUBDIVISION AT JULAJI CLOSE, COOYA BEACH	HOR 1:500	VER 1:500	J.P.	J.P.
						DATE	JUNE 2011	CHECKED	J.P.
						APPROVED			
						DWG NUMBER	1208 - C11	AMDT	A



SCALE 1:500 0 5 10 15 20 25m

amendments		
A	ORIGINAL ISSUE FOR OPERATIONAL WORKS APPROVAL	27.06.11

**JIM PAPAS DRAFTING
PTY. LTD.**
CIVIL ENGINEERING DESIGN AND DRAFTING
6 Neptune Court Ph. (07) 4036 1690
Mt. Sheridan Q 4868 Mob. 0408 770 394
Email: jimpapas@westnet.com.au



"Ocean Breeze Estate"
STAGE 4A OF PROPOSED RESIDENTIAL SUBDIVISION
AT JULAJI CLOSE, COOYA BEACH
DRAWING TITLE: STORMWATER DRAINAGE CATCHMENT PLAN

SCALE (AT A1 SIZE)	HOR 1:500	DRAWN	J.P.
DATE	JUNE 2011	DESIGNED	J.P.
APPROVED		CHECKED	J.P.
DWG NUMBER	1208 - C12	AMDT	A

LOCATION				SUB-CATCHMENT RUNOFF										INLET DESIGN										DRAIN DESIGN										HEADLOSSES										PART FULL									
DESIGN ARL	STRUCTURE NO.	DRAIN SECTION	SUB-CATCHMENTS CONTRIBUTING	SUB-CATCHMENT TIME OF CONCENTRATION	RAINFALL INTENSITY	COEFFICIENT OF RUNOFF	SUB-CATCHMENT AREA	EQUIVALENT AREA	SUM OF CONTRIBUTING EQUIVALENT AREAS	SUB-CATCHMENT DISCHARGE	FLOW PAST PREVIOUS GULLIES	FLOW IN K&C (INCLUDING BYPASS)	ROAD GRADE AT INLET	FLOW WIDTH	FLOW DEPTH AT INVERT	GUTTER FLOW VELOCITY	dg x Vg	INLET NUMBER	INLET TYPE	FLOW INTO INLET	WIDTH OF FLOW D/S OF INLET	BYPASS FLOW	CRITICAL TIME OF CONCENTRATION	RAINFALL INTENSITY	TOTAL CONTRIBUTING EQUIVALENT AREA	MAJOR TOTAL FLOW	MAJOR SURFACE FLOW CAPACITY	MAJOR SURFACE FLOW	FLOW IN PIPE	REACH LENGTH	PIPE GRADE	PIPE / BOX DIMENSIONS	FLOW VELOCITY FULL (PIPE GRADE VELOCITY)	TIME OF FLOW IN REACH	STRUCTURE RATIOS FOR 'K' VALUE CALCULATIONS	V2/2g	Ku	hu	kl	hl	kw	hw	Sf	hf	DEPTH	VELOCITY	INVERT LEVELS U/S RL D/S RL	DRAIN SECTION H.G.L. U/S RL D/S RL	U/S H.G.L.	W.S.E.	SURFACE OR K&C INVERT LEVEL	FREEDBOARD	STRUCTURE No.
Years				m/min	mm/h		Ha	Ha	cumecs	cumecs	cumecs		m	m	m/sec	m/sec			cumecs	m	cumecs	min	mm/h	Ha	cumecs	cumecs	cumecs	cumecs	m	%	mm	m/sec	min		m		m	m	m	%	m	m/sec	m	m	m	m	m	m	m	m			
5 100	7/12SW	7/12SW to 8/12SW	7/12SW	15.00	139 220	0.76 0.96	0.301 0.301	0.229 0.289	0.229 0.289	0.088 0.177	0.000	0.088	0.55	2.512	0.095	0.69	0.07	7/12SW	4	0.065	1.347	0.023 1/15SW	15.00 15.00	139 220	0.229 0.289	0.177 1.823	0.112 (Pipe flow= Grate flow)	0.065 7.433	0.40	375(2)	0.57 (1.01)	0.12	Qg 0.065 Qo 0.065 Do 375.000 CHRT 32: Vo2/2gDo 0.04 H/Do Kg side flow 4.25 and flow 3.40	0.017	4.25	0.021			4.25	0.071	0.13	0.009			5.132 5.102	5.739 5.730	5.810	5.810	6.064	0.254	7/12SW		
5 100	8/12SW to 5/12SW	8/12SW to 5/12SW	7/12SW, 8/12 SW	15.00 15.00	139 220	0.76 0.96	0.314 0.314	0.239 0.301	0.239 0.301	0.092 0.184	0.000	0.092	0.45	2.680	0.100	0.64	0.06	5/12SW	4	0.088	1.450	0.024 5/12SW	15.12 15.12	138 220	0.468 0.590	0.381 1.493 (Pipe flow= Sum upstr after flows)	0.229 0.132	20.349 0.52	375(2)	1.16 (1.16)	0.29	Qg 0.088 Qo 0.132 Do 375.000 Angle 67 Chart 43 S/Do 2.5 chart Du/Do 1.00 K0 1.35 K0.5 1.93 Qg/Do 0.49 Qo 1.01 K 1.93 S/Do 3.0 K0 1.33 K0.5 1.66 K 1.66 S/Do 2.5 K0 1.35 K0.5 1.93 K 1.93	0.069	1.75	0.120	Interp CHART 42 S/Do 3.0 K0 1.13 K0.5 1.64 K 1.64 S/Do 2.5 K0 1.25 K0.5 1.82 K 1.83 Interp S/Do 2.71 Ku 1.75	1.82	0.125	0.52	0.106			5.082 4.976	5.610 5.504	5.730	5.735	6.049	0.314	8/12SW				
5 100	5/12SW to 4/12SW	5/12SW to 4/12SW	7/12SW, 8/12 SW, 5/12SW	15.00 15.00	139 220	0.76 0.96	0.086 0.086	0.065 0.083	0.065 0.083	0.025 0.050	0.024	0.049	0.30	2.219	0.087	0.48	0.04	5/12SW	4	0.039	1.021	0.010 2/12Ex	15.41 15.41	137 218	0.533 0.673	0.408 3.562 (Pipe flow= Sum upstr after flows)	0.238 0.170	22.623 1.04	450(2)	1.03 (1.85)	0.37	Qg 0.038 Qo 0.170 Do 450.000 Angle 34 Chart 39 S/Do 2.5 chart Du/Do 0.83 K0 1.90 K0.5 1.79 Qg/Do 0.77 Qo 0.53 K 1.84 S/Do 2.5 K0 1.90 K0.5 1.79 K 1.84 S/Do 2.0 K0 2.11 K0.5 1.90 K 2.00	0.054	1.94	0.105	Interp CHART 35 S/Do 2.5 K0 1.84 K0.5 1.71 K 1.77 S/Do 2.0 K0 2.10 K0.5 1.83 K 1.95 Interp S/Do 2.04 Ku 1.94	1.99	0.107	0.33	0.074			5.032 4.796	5.399 5.325	5.504	5.506	5.984	0.478	5/12SW				
5 100	1/15SW to 1/15SW	1/15SW to 1/15SW	1/15SW	15.00 15.00	139 220	0.76 0.96	0.180 0.180	0.137 0.173	0.137 0.173	0.053 0.108	0.023	0.076	0.30	2.690	0.101	0.53	0.05	1/15SW	4	0.057	1.426	0.019	15.00 15.00	139 220	0.137 0.173	0.106 3.562	0.049 (Pipe flow= Grate flow)	0.057 18.913	1.45	375(2)	0.50 (1.93)	0.33	Qg 0.057 Qo 0.057 Do 375.000 CHRT 32: Vo2/2gDo 0.03 H/Do Kg side flow 6.47 and flow 4.76	0.013	6.47	0.083			6.47	0.083	0.10	0.019			5.009 4.720	5.344 5.325	5.427	5.427	5.941	0.514	1/15SW		
5 100	4/12SW to 3/12SW	4/12SW to 3/12SW	7/12SW, 8/12 SW, 5/12SW, 1/15SW, 4/12SW	15.00 15.00	139 220	0.76 0.96	0.020 0.020	0.015 0.019	0.015 0.019	0.006 0.012	0.000	0.006	1.00	0.499	0.035	0.50	0.02	4/12SW	4	0.005	0.001 3/12SW	15.78 15.78	136 216	0.665 0.665	0.519 2.866 (Pipe flow= Sum upstr after flows)	0.290 0.229	46.004 0.40	525(2)	1.02 (1.27)	0.75	Qg 0.005 Qo 0.229 Do 525.000 Routine 2.24 Join Pipes: 1/15SW and 5/12SW Vel 1.050 Vel 2.1058 En Dia 556 Angle 134 Flow 0.224 Angle 46 Chart 39 S/Do 2.5 chart Du/Do 1.06 K0 1.77 K0.5 1.95 Qg/Do 0.98 Qo 0.06 K 1.78	0.053	1.76	0.094	S/Do 2.0 K0 1.96 K0.5 2.19 K 1.97 S/Do 1.5 K0 2.36 K0.5 2.65 K 2.38 Interp S/Do 1.91 Ku 2.04 CHART 38 S/Do 2.0 K0 1.73 K0.5 1.70 K 1.73 S/Do 1.5 K0 1.89 K0.5 1.73 K 1.88 Interp S/Do 1.91 Ku 1.76	2.04	0.108	0.26	0.119			4.853 4.659	5.231 5.112	5.325	5.339	5.533	0.194	4/12SW					
5 100	3/12SW to 2/12Ex	3/12SW to 2/12Ex	7/12SW, 8/12 SW, 5/12SW, 1/15SW, 4/12SW, 3/12SW	15.00 15.00	139 220	0.76 0.96	0.213 0.213	0.162 0.204	0.162 0.204	0.083 0.125	0.001	0.084	0.58	2.159	0.085	0.65	0.06	3/12SW	4	0.049	1.055	0.015	16.53 16.53	134 212	0.847 1.059	0.630 2.866 (Pipe flow= Sum upstr after flows)	0.357 0.273	26.368 0.40	600(2)	0.93 (1.39)	0.44		0.044	0.40	0.018			0.40	0.018	0.18	0.047			4.726 4.621	5.094 5.047	5.112	5.112	5.262	0.150	3/12SW			

amendments		JIM PAPAS DRAFTING PTY. LTD.		"Ocean Breeze Estate"		SCALE (AT A1 SIZE)		HOR N.T.S.		DRAWN		J.P.	
A	ORIGINAL ISSUE FOR OPERATIONAL WORKS APPROVAL	27.08.11	CIVIL ENGINEERING DESIGN AND DRAFTING			DATE	JUNE 2011	VER		DESIGNED	J.P.	CHECKED	J.P.
			6 Neptune Court Ph. (07) 4036 1690	STAGE 4A OF PROPOSED RESIDENTIAL SUBDIVISION AT JULAJI CLOSE, COOYA BEACH		APPROVED							
			Mt. Sheridan Q 4868 Mob. 0408 770 394			DWG NUMBER	1208 - C13	AMDT	A				
			Email: jimpapas@westnet.com.au	DRAWING TITLE: STORMWATER DRAINAGE CALCULATIONS SHEET									