Bayview Subdivision Development

Stormwater Management Plan

Dover Investments Pty Ltd

August 2022

byrne.

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Table of Contents

List of Figures

List of Tables

Appendices

Definitions

Abbreviation	Definition
AAPA	Aboriginal Areas Protection Authority
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
ARI	Average Recurrence Interval
CCTV	Closed Circuit Television
CICL	Cast Iron Cement Lined
CoD	City of Darwin
CPTED	Crime Prevention Through Environmental Design
DBYD	Dial Before You Dig
DDA	Disability and Discrimination Act
DICL	Ductile Iron Cement Lined
DIPL	Department of Infrastructure Planning and Logistics
DN	Nominal Diameter
EP	Equivalent Population
ESCP	Erosion and Sediment Control Plan
GPS	Global Positioning System
HV	High Voltage
IECA	International Erosion Control Association
LED	Light Emitting Diode
LV	Low Voltage
MH	Maintenance Hole
MMDD	Maximum Modified Dry Density
NBNCO	National Broadband Network Company
NT	Northern Territory
NTG	Northern Territory Government
NT SDG	Northern Territory Subdivision Guidelines
PUP	Public Utility Plant
PVC	Poly Vinyl Chloride
PWC	Power and Water Corporation
RCD	Residual Current Device
RCP	Reinforced Concrete Pipe
RHS	Rectangular Hollow Section
RL	Reduced Level

Abbreviation	Definition
RODP	Road Owner Distribution Pillar
SID	Safety in Design
TBC	To Be Confirmed
TCSD	Transport and Civil Services Department
VC	Vertical Curve
VIAC	Vehicle Impact Absorbing Column
WSAA	Water Services Association of Australia
XLPE	Cross Linked Polyethylene

1 Introduction

1.1 Scope

Byrne Consultants has been commissioned by Dover Investments Pty Ltd to develop a Stormwater Management Plan (SMP) for the proposed development of Lots A, B and C forming Stage 11 of Bayview Subdivision. The objective of this report is to document the proposed developments stormwater management strategy including design criteria, catchment area, flow calculations, legal point of discharge, and preliminary stormwater network modelling design.

1.2 Limitations

The limitations of this report include:

- No flood modelling has been undertaken as part of this study.
- No detailed engineering survey of existing lots has been undertaken as part of the assessment.
- Publicly available lidar survey was used for the assessment.
- Plans provided in the Appendices are preliminary only and not for construction purposes.

2 Site Conditions

2.1 Site Description

Dover Investments Pty Ltd is progressing the development of Bayview subdivision to create a low to medium density residential development. The proposed sites are located within the Bayview Subdivision, Darwin, NT and consists of three (3) proposed development sites labelled Lot's A, B & C as shown in Figure 2.1.

Lot's A & B is proposed to feature low density residential (LR) blocks and Lot C is proposed to feature both low density (LR) and medium density residential blocks (LMR) as described under the NT Planning Scheme.

The proposed development areas are:

Lot A - 10,600 m^2

Lot B - 800 m^2 and

Lot C - 11,200 m^2

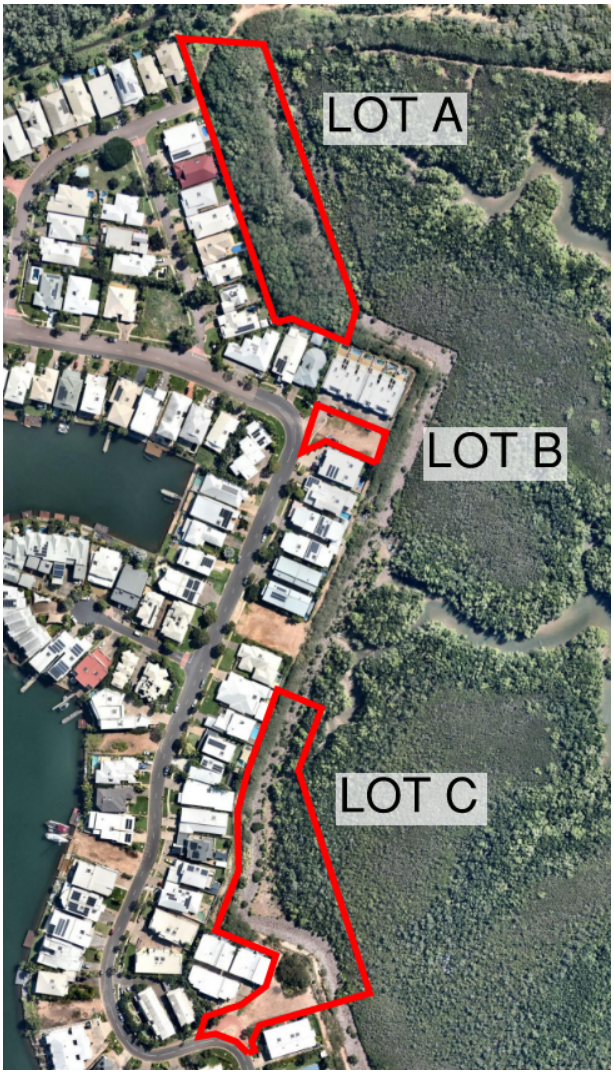

Figure 2.1 – Bayview Subdivision Project Area

2.2 Proposed Development

The proposed development consists of three (3) separate land developments with two (2) new road reserves as detailed in Figures 2.2, 2.3 and 2.4.

The intended use of the lots is as follows:

- Lot A – 14 residential lots (LR).
- Lot B – 2 residential lots (LR).
- Lot C – 3 residential lots (LR).
- Lot C – 2 residential lots (LMR, approx. 9 dwellings)

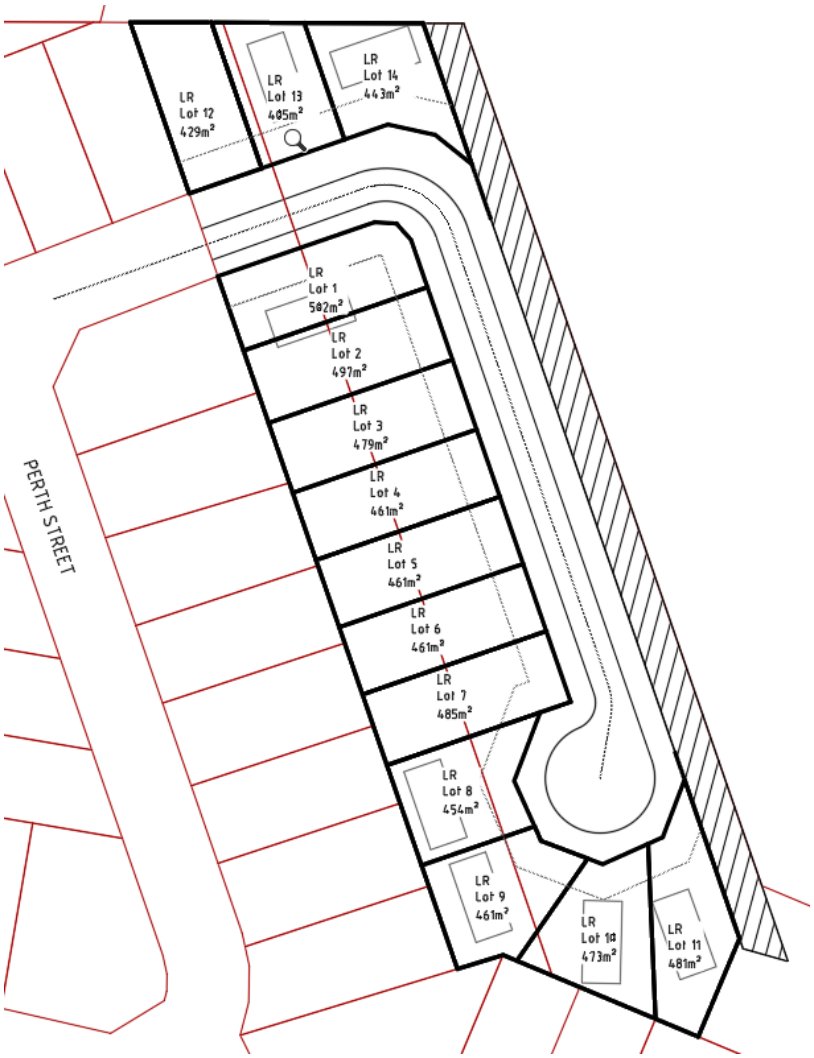

Figure 2.2 – Lot A Bayview Subdivision Development Intent

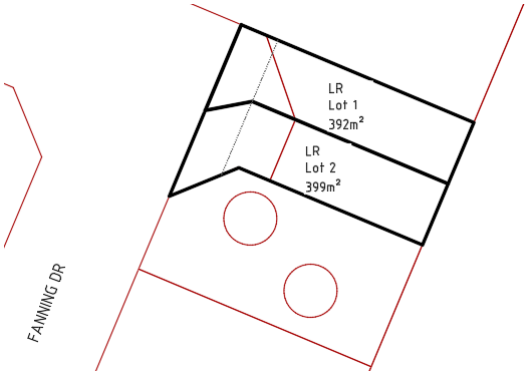

Figure 2.3 – Lot B Bayview Subdivision Development Intent

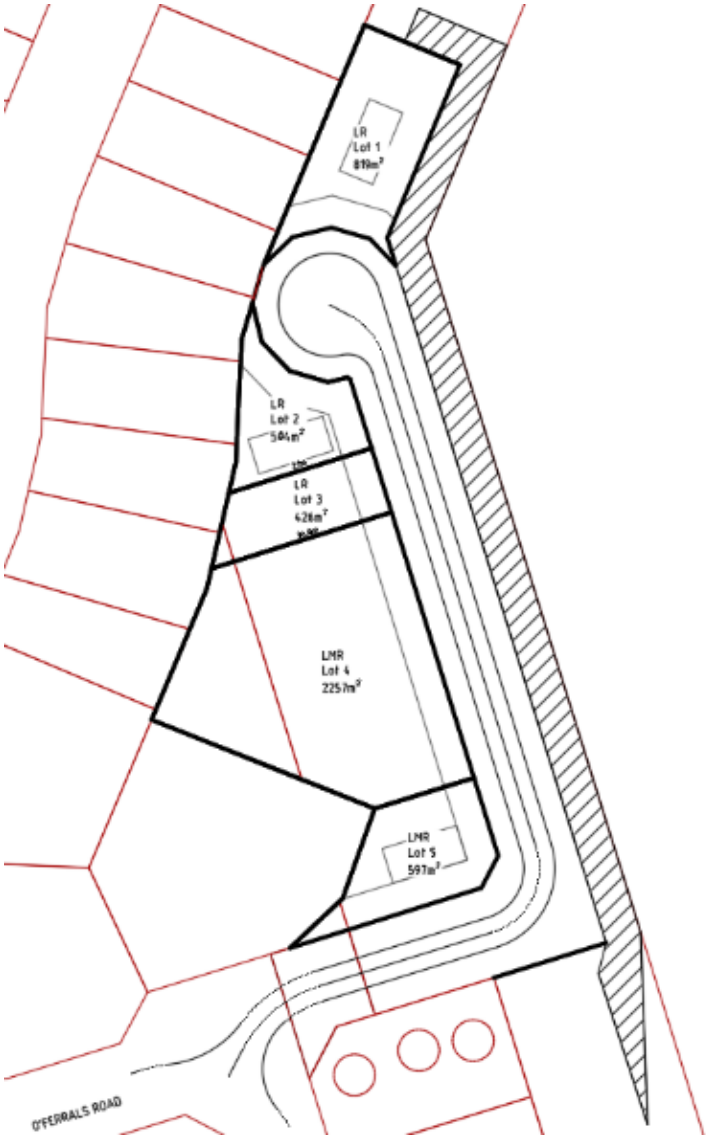

Figure 2.4 – Lot C Bayview Subdivision Development Intent

3 Design Basis

3.1 Requirements

The design has been based on Northern Territory Government (NTG) and other design standards including:

- Northern Territory Subdivision Development Guidelines (NT SDG), (2020)
- Australian Rainfall and Runoff (Geoscience Australia)
- Stormwater Drainage Design in Small Urban Catchments (ARRB Special Report No. 34)
- Austroads Guidelines, including Guide to Road Design – Part 5: Drainage

3.2 Design Criteria

Table 3.1 – Design Criteria

Parameter	Criteria Value	Comments
Design Storms	Minor Storm: Q2 Major Storm: Q100	As per NT SDG Table 19
Flow Widths	≤ 2.5 metres from kerb invert	As per NT SDG Table 21
Flow Depths	Minor Storm: Flows must not overtop kerb Major Storm: Flow contained within the road reserve boundaries	As per NT SDG Table 21 & 22
Freeboard	Min 300mm freeboard to allotment boundaries	As per NT SDG Table 22

3.3 Constraints

The stormwater design constraints include:

- Topography – The site is constrained by existing dwellings to the west and mangroves to the east.
- Stormwater – The existing stormwater network system and existing outlet locations.
- Stormwater – The construction of a revetment wall which prevents overland flow path discharge to the east.

3.4 Assumptions

The design assumptions include:

- The development of the surrounding lots will be in accordance with Darwin's Inner Suburbs Plan (Residential).
- All existing stormwater pipe sizes are as per the diameters identified in available sources including DBYD and City of Darwin Open Hub Data (ArcGIS).
- There are no blocked stormwater pipes on site or within the downstream catchment.

4 Existing Topography and Drainage Patterns

4.1 Existing Conditions

4.1.1 Lot A

The site generally falls from west to east from an existing urban residential environment to a vegetated mangrove creek. From google imagery and CoD Stormwater Network Mapping, the existing site indicates that stormwater is collected in a series of stormwater pits located along Latrobe Street. The existing underground stormwater pipe system discharges into the mangroves at the end of Latrobe Street through a 525mm diameter RCP.

4.1.2 Lot B

The project area consists of a vacant lot which drains towards O'Ferrals Road reserve at an approximate grade of 1%. Stormwater discharge from the lot is collected by the existing stormwater network (pit and pipes) which is directed via the trunk underground drainage network to via a drainage easement through Lot 7502 before discharging into the adjacent mangroves area. No upgrades to the existing drainage system are proposed to service Lot B.

4.1.3 Lot C

The site generally falls from west to east from an existing urban residential environment to a vegetated mangrove creek. From google imagery and CoD Stormwater Network Mapping, stormwater is collected via the truck stormwater network located within O'Ferrals Road reserve. The trunk drainage network then discharges stormwater into the mangrove creek via a 1200mm diameter RCP which runs through Lot PT8169. Do designated easement through PT8169 was identified, so the pipe alignment would need to be confirmed.

4.2 Upstream Network Catchment Assessment

For the purposes of preliminary investigations, a high-level upstream catchment assessment has been conducted. Existing pit and pipe networks have been modelled and catchment boundaries defined for the purpose of preliminary hydrology and hydraulics calculations. It is anticipated that the proposed stormwater design will cause no worsening effects of upstream conditions.

4.3 Flooding Assessment

Department of Environment and Natural Resources storm surge map indicates that the Site is subject to flooding via Extreme Storm Surge (10,000-year ARI) as shown in Figure 4.1. Flood mitigation has been considered during the design process of the development and involves the implementation of raised embankments and revetment walls to RL to 6.5m in line with the current immunity of existing Bayview development. No further flood analysis has been conducted as part of this study.

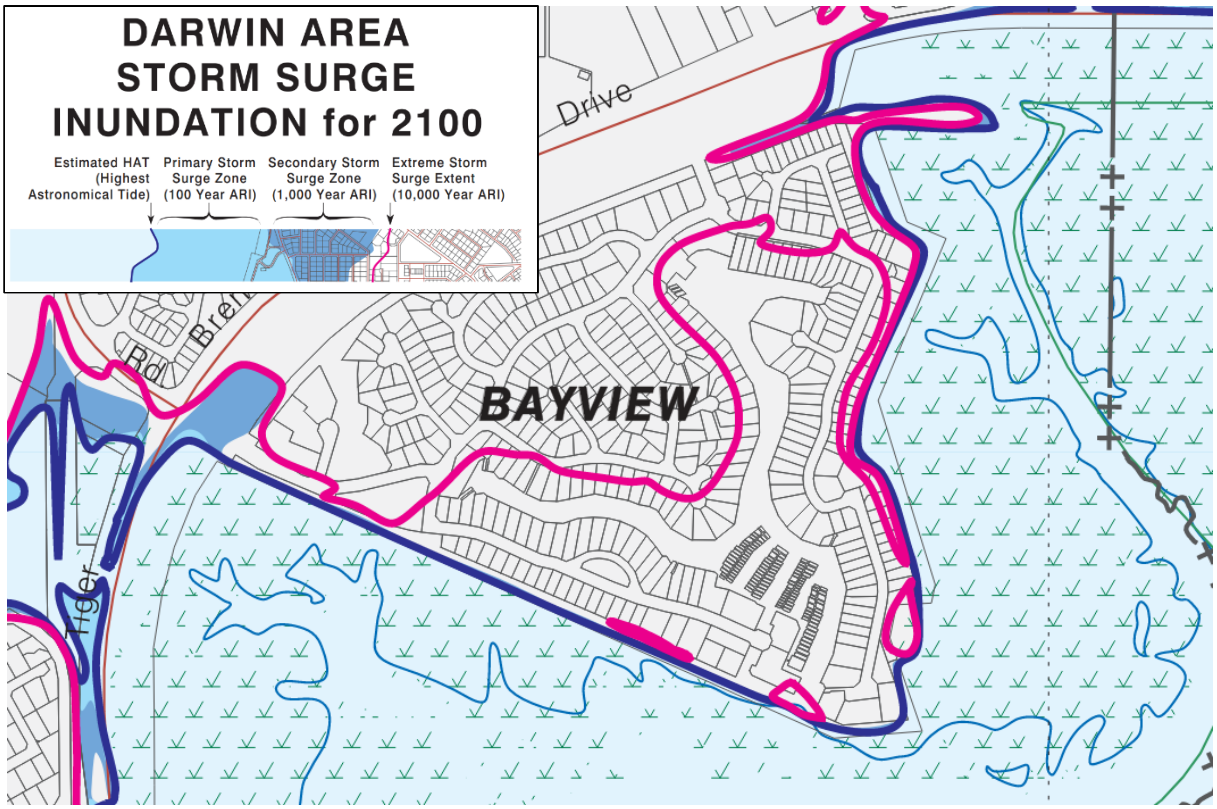

Figure 4.5 – Storm Surge Excerpt

4.4 Lawful Point of Discharge (LPD)

Refer to Appendix B for stormwater drainage plans.

4.4.1 Lot A

The proposed LPD for the development of Lot A is into the mangroves and creek area east of Latrobe Street. An existing 525mm diameter RCP which discharges to the area shall be extended and upsized to account for the additional development catchment area of Lot A.

4.4.2 Lot B

All stormwater from Lot B is collected by the existing stormwater network (pit and pipes) on O'Ferrals Road which is directed via the trunk underground drainage network to a drainage easement through Lot 7502 before discharging into the adjacent mangroves area. No upgrades to the existing drainage system are proposed to service Lot B.

4.4.3 Lot C

The proposed LPD for the development of Lot C shall be via the existing underground stormwater network and 1200mm diameter RCP outlet which discharges to the mangroves area through Lot PT8169

The existing 1200mm RCP discharge pipe shall be extended and upsized to account for the additional development catchment area of Lot C.

5 Stormwater Hydrology Assessment (Quantity)

5.1 Pre-Development Peak Flow Calculations

Pre-development flows were not assessed as part of this study as there is no impact on the downstream stormwater network. The proposed stormwater design is effectively connecting to the downstream end of the existing networks and therefore adding any additional stormwater flows to the upstream networks.

5.2 Post Development Peak Flow Calculations

All stormwater management infrastructure is designed generally in accordance with *Northern Territory Subdivision Development Guidelines (2020).*

5.2.1 Design Storms

The annual exceedance probability (AEP) for residential zones is 50% and 1% for the minor and major design storms respectively as per NT SDG, table 19.

5.2.2 Design Rainfall Intensity

Design rainfall intensities for this study were obtained from the 12D default hydrology data for the Coty of Darwin Region. Refer to Appendix A for the relevant IFD chart adopted din the design.

5.2.3 Time of Concentration

The time of concentration has been calculated utilising the following components:

- 5 min - Standard inlet time within road reserve
- 10 min - Standard inlet time within lot areas

5.2.4 Runoff Coefficients

As per the NT SDG the drainage design has been carried out using a runoff coefficient of 0.73 and 1 for minor and major storms respectively with a coefficient of 0.9 for impervious areas.

5.2.5 Peak Discharges

The stormwater catchment areas and network system for each site is defined in Appendix A and all hydrological and hydraulic calculations can be seen in Appendix B. A summary of post development hydrological calculations can be seen below.

Table 5.2 – Post Development Peak Flow Calculations

Catchment Label (-)	Time Tc (min)	Q100 Runoff C (-)	Q2 Runoff C (-)	Q100 Intensity I (mm/hr)	Q2 Intensity I (mm/hr)	Area A (ha)	Q100 Qc=CIA (L/s)	Q2 Qc=CIA (L/s)
1-1								
1-2	10	1	0.73	283	147	0.129	192.6	85.8
	5	0.9	0.9	366	189	0.129		
1-3								
1-4								
1-5								
2-1	10	1	0.73	283	147	0.0723	107.9	48.1
	5	0.9	0.9	366	189	0.0723		
2-2	10	1	0.73	283	147	0.0623	93.1	41.5
	5	0.9	0.9	366	189	0.0623		
2-3	10	1	0.73	283	147	0.0141	21.1	9.4
	5	0.9	0.9	366	189	0.0141		
2-4	10	1	0.73	283	147	0.0124	18.5	8.2
	5	0.9	0.9	366	189	0.0124		
2-5	10	1	0.73	283	147	0.0459	68.6	30.5
	5	0.9	0.9	366	189	0.0459		
3-1	10	1	0.73	283	147	0.0813	121.4	54.1
	5	0.9	0.9	366	189	0.0813		
4-1	10	1	0.73	283	147	0.0515	76.9	34.3
	5	0.9	0.9	366	189	0.0515		
5-1	10	1	0.73	283	147	0.0719	107.4	47.8
	5	0.9	0.9	366	189	0.0719		
6-1	10	1	0.73	283	147	0.0204	30.4	13.6
	5	0.9	0.9	366	189	0.0204		
6-2	10	1	0.73	283	147	0.0608	90.9	40.5
	5	0.9	0.9	366	189	0.0608		
6-3	10	1	0.73	283	147	0.0179	26.7	11.9
	5	0.9	0.9	366	189	0.0179		
6-4	10	1	0.73	283	147	0.0178	26.6	11.8
	5	0.9	0.9	366	189	0.0178		
6-5								
7-1	10	1	0.73	283	147	0.0631	94.2	42
	5	0.9	0.9	366	189	0.0631		
7-2	10	1	0.73	283	147	0.0139	20.8	9.3
	5	0.9	0.9	366	189	0.0139		
7-3	10	1	0.73	283	147	0.016	23.9	10.6
	5	0.9	0.9	366	189	0.016		
8-1	10	1	0.73	283	147	0.0076	11.3	5
	5	0.9	0.9	366	189	0.0076		
9-1	10	1	0.73	283	147	0.0895	133.7	59.6
	5	0.9	0.9	366	189	0.0895		
10-1	10	1	0.73	283	147	0.0825	123.2	54.9
	5	0.9	0.9	366	189	0.0825		
11-1								
11-2								
12-1	10	1	0.73	283	147	0.0684	102.2	45.6
	5	0.9	0.9	366	189	0.0684		

Catchment Label (-)	Time Tc (min)	Q100 Runoff C (-)	Q2 Runoff C (-)	Q100 Intensity I (mm/hr)	Q2 Intensity I (mm/hr)	Area A (ha)	Q100 Qc=CIA (L/s)	Q2 Qc=CIA (L/s)
EX 1-1	10	1	0.73	283	147	0.0679	101.5	45.2
	5	0.9	0.9	366	189	0.0679		
EX 1-2	10	1	0.73	283	147	0.0352	52.6	23.4
	5	0.9	0.9	366	189	0.0352		
EX 1-3	10	1	0.73	283	147	0.0109	16.2	7.2
	5	0.9	0.9	366	189	0.0109		
EX 1-4	10	1	0.73	283	147	0.1016	151.8	67.6
	5	0.9	0.9	366	189	0.1016		
EX 2-1								

6 Stormwater Quality Assessment

6.1 Design Basis

The NT SDG require that gross pollutant traps are considered as part of the drainage design.

6.2 Assessment

Given the existing stormwater system within the development and associated discharge points do not have a gross pollutant trap installed on the outlets. It is not proposed to provide GPT's as part of this stormwater design. The intention is to connect or extend the proposed stormwater system to the existing discharge outlets and to discharge stormwater under the current site conditions into the mangrove creek.

7 Road Reserve Drainage

7.1 Lot A & C Road

Lot A and C's proposed road reserve cross-section comprises of a standard urban cross-section with kerb and gutter discharging into an underground pit and pipe network.

Subsoil drains have been nominated along both sides of the pavement edge, typically following the grade of the roadway and discharging into the underground stormwater network.

7.2 Lot B Road

Lot B's road reserve (O'Ferrals Road) will remain unchanged with the exception of an extension on the existing property accesses to the existing kerb line.

The existing road comprises of a standard urban cross-section with kerb and gutter discharging into an underground pit and pipe network.

Appendix A Stormwater Drainage Plan

N

CONSTRUCT NEW
900x600 MANHOLE

CONSTRUCT NEW OULET HEADWALL
AND WINGWALL STRUCTURE

CONSTRUCT NEW 2 BAY SEP

CONSTRUCT NEW 3 BAY SEP

CONSTRUCT NEW 2 BAY SEP

CONSTRUCT NEW 2 BAY SEP

BREAK INTO EXISTING OUTLET
LOCATION AND CONSTRUCT
NEW 900x600 MANHOLE

EXISTING SIDE ENTRY PITS

PERTH STREET

Lot 1
Lot 2
Lot 3
Lot 4
Lot 5
Lot 6
Lot 7
Lot 8
Lot 9
Lot 10
Lot 11
Lot 12
Lot 13
Lot 14

ø 1050 RCP
ø 750 RCP
ø 600 RCP
ø 375 RCP
ø 675 RCP
ø 450 RCP

LOT A LAYOUT

2.5 0 2.5 5.0 7.5 10 12.5m
0 1:250-A1 1:500-A3

byrne CONSULTANTS
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DRAWN	TITLE			
BM	BAYVIEW SUBDIVISION LOT A & B STORMWATER DRAINAGE PLAN			
DESIGNED	SCALE	PROJECT No	DRAWING No	AMDT
SC	AS SHOWN	22007	SK013	A

N

CONSTRUCT NEW 2 BAY SEP

CONSTRUCT NEW 2 BAY SEP

CONSTRUCT NEW
900x600 MANHOLE

CONSTRUCT NEW
1200x1200 MANHOLE

CONSTRUCT NEW OULET HEADWALL
AND WINGWALL STRUCTURE

CONSTRUCT NEW 2 BAY SEP

EXISTING MANHOLE

Lot 1

Lot 2

Lot 3

Lot 4

Lot 5

O'FERRALS DR

ø 375 RCP

ø 450 RCP

ø 525 RCP

ø 1350 RCP

ø375RCP

dD

2.5 0 2.5 5.0 7.5 10 12.5m

0 1:250-A1 1:500-A3

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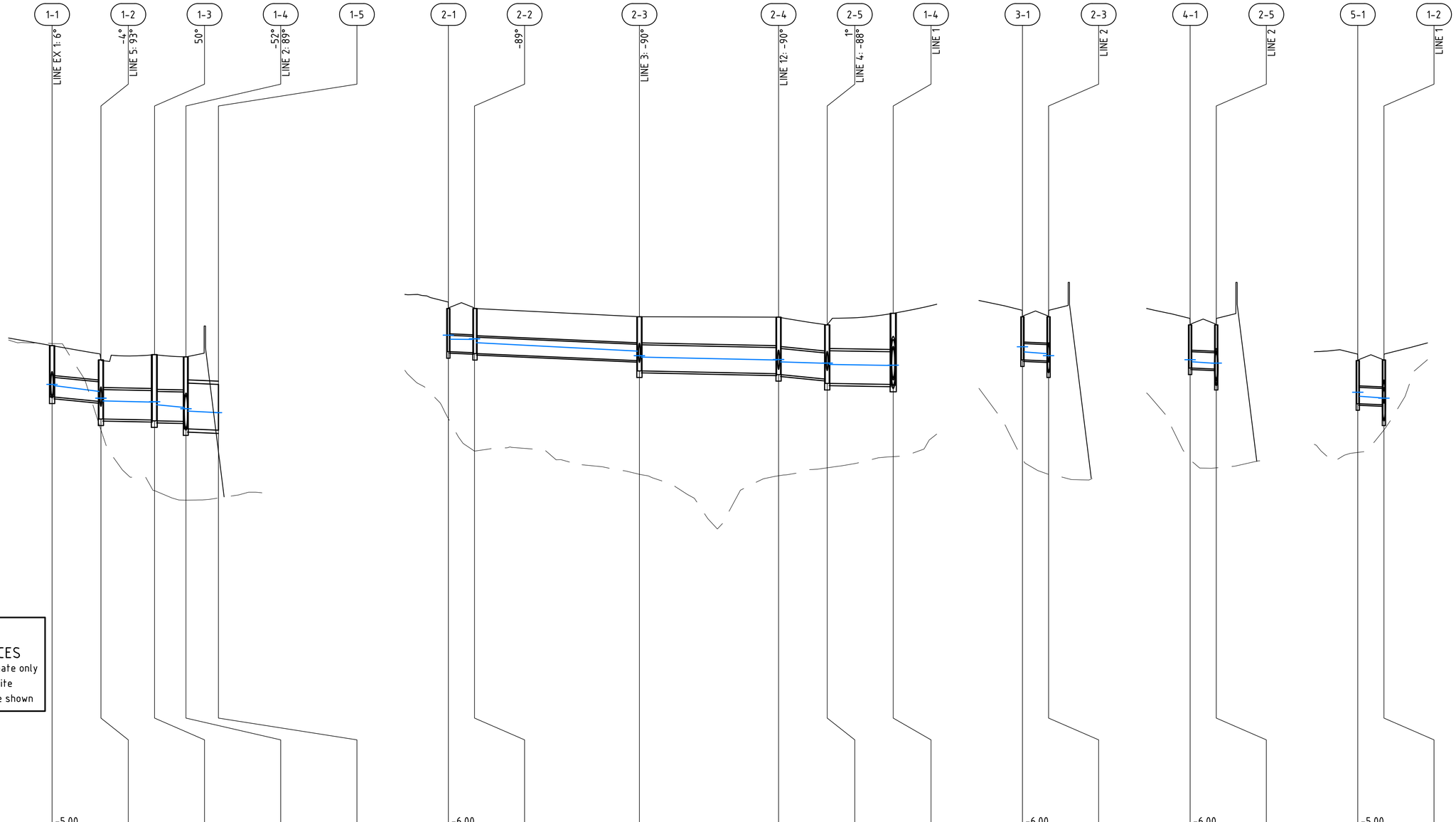
P.O.Box 43420 Casuarina NT 0811
Ph. 08 89472476 Fax: 08 89475098

	TITLE: BAYVIEW SUBDIVISION LOT C STORMWATER DRAINAGE PLAN			
DRAWN: BM				
DESIGNED: SC	SCALE: AS SHOWN	PROJECT No: 22007	DRAWING No: SK014	AMDT: A



LEGEND:

- EXISTING PIPES/PITS
- PROPOSED PIPES/PITS
- HGL
- EXISTING SURFACE
- DESIGN SURFACE

NOTE:

1. EXISTING PIPES MODELLED FOR HYDRAULIC PURPOSES.
2. REFER TO DRG. C135 & C136 FOR MANHOLE DETAILS.

WARNING

BEWARE OF UNDERGROUND SERVICES

The locations of underground services are approximate only and their exact position should be proven on site

No guarantee is given that all existing services are shown

DATUM RL		-5.00								-6.00								-6.00				-6.00				-5.00			
COVER (& NATURAL SURFACE) LEVEL	6.05	(6.10)	5.72	(4.11)	5.84	(2.72)	5.79	(2.50)	5.16	(2.55)	5.90	(3.37)	5.90	(2.63)	5.71	(2.10)	5.70	(2.06)	5.53	(2.24)	5.79	(2.50)	5.71	(2.45)	5.71	(2.10)	5.53	(2.43)	5.53	(2.24)	5.71	(3.60)	5.72	(4.11)
DEPTH TO INVERT		1.18	0.95	1.36	1.50	1.52	1.48	1.65		1.05		0.99	1.01	1.03	1.01	1.24	1.30	1.32	1.24	1.34	1.63	1.65		0.99	1.02	1.24		0.99	1.02	1.34		0.99	1.03	1.36
INVERT LEVEL		4.87	4.77	4.36	4.34	4.32	4.31	4.14		4.11		4.91	4.89	4.87	4.70	4.47	4.40	4.38	4.28	4.18	4.16	4.14		4.72	4.70	4.47		4.53	4.51	4.18		4.71	4.69	4.36
PIPE CHAINAGE	0.00		11.22		23.53		30.74		38.20		-7.65		-1.65		36.22		68.17		79.34		94.49		0.00		6.00		0.00		6.00		0.00		6.00	
PIPE LENGTH			L=11.22		L=12.31		L=7.21		L=7.46				L=6.00		L=37.87		L=31.95		L=11.17		L=15.16				L=6.00				L=6.00				L=6.00	
PIPE SIZE (mm)			450		675		675		1050				375		375		600		600		750				375				375				375	
PIPE GRADE (%)			0.9%		0.18%		0.18%		0.4%				0.4%		0.43%		0.2%		0.92%		0.15%				0.4%				0.4%				0.4%	
PIPE CLASS			Class=RCP		Class=RCP		Class=RCP		Class=RCP				Class=RCP		Class=RCP		Class=RCP		Class=RCP		Class=RCP				Class=RCP				Class=RCP				Class=RCP	
PIT TYPE	MH		SE2		MH		MH		HW OUT		SE2		SE2		SE2		SE2		SS3		MH		SE2		SE2		SS3		SS3		SE2		SE2	
PIT SETOUT	702187.69E 8624695.89N 6.05Z		702198.59E 8624698.54N 5.72Z		702210.35E 8624702.19N 5.84Z		702216.40E 8624698.26N 5.79Z		702223.45E 8624700.68N 5.16Z		702241.81E 8624605.25N 5.90Z		702247.46E 8624607.28N 5.90Z		702235.11E 8624643.08N 5.71Z		702224.71E 8624673.29N 5.70Z		702221.04E 8624683.84N 5.53Z		702216.40E 8624698.26N 5.79Z		702229.44E 8624641.10N 5.71Z		702235.11E 8624643.08N 5.71Z		702215.39E 8624681.79N 5.53Z		702221.04E 8624683.84N 5.53Z		702200.67E 8624692.90N 5.71Z		702198.59E 8624698.54N 5.72Z	
ROAD NAME & ROAD CHAINAGE																																		

LINE 1 LINE 2 LINE 3 LINE 4 LINE 5

HORIZONTAL
5 0 5 10 15 20 25m 1:500-A1 1:1000-A3
0.5 0 0.5 1.0 1.5 2.0 2.5m 1:50-A1 1:100-A3
VERTICAL

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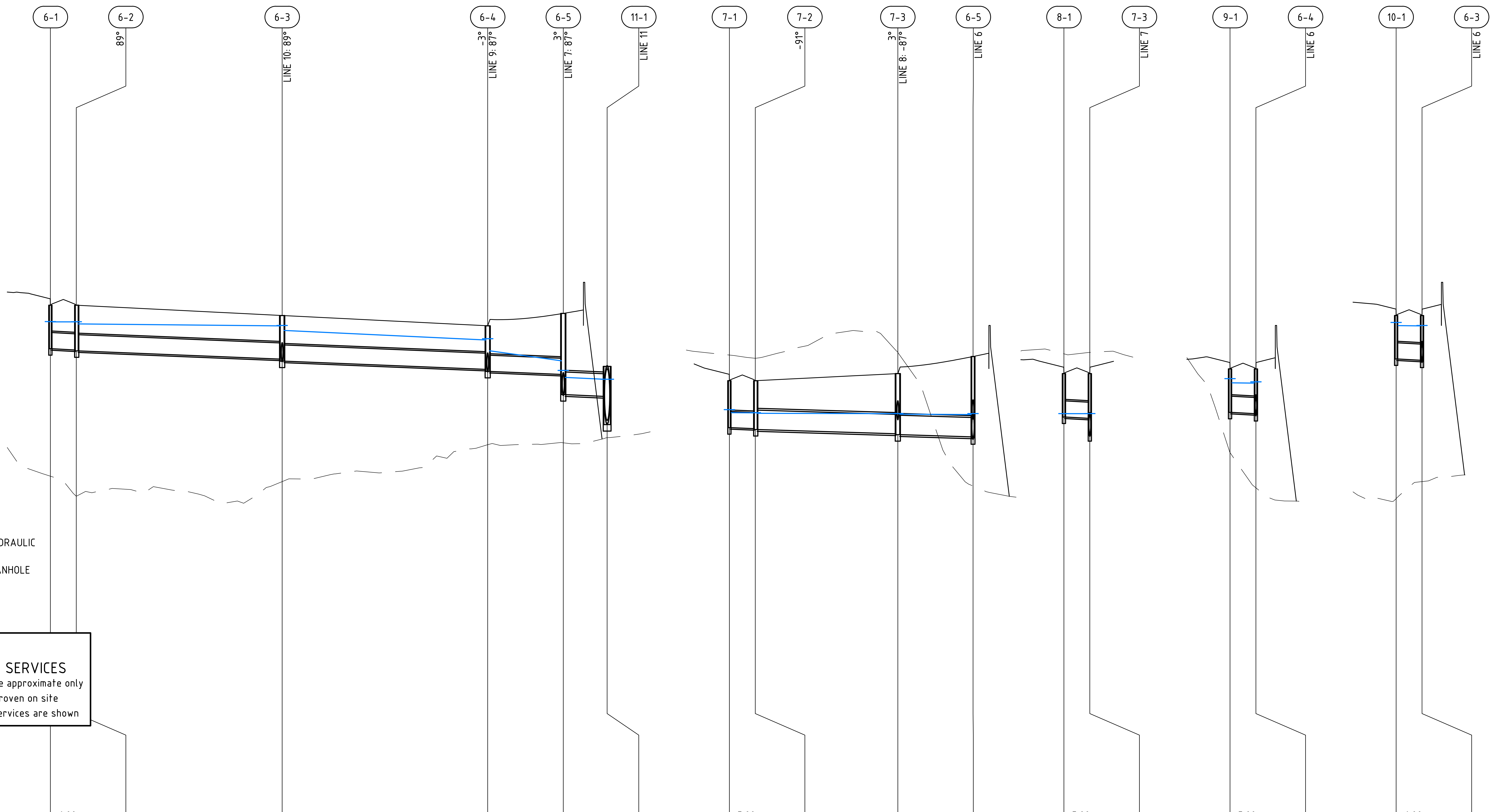
DRAWN BM
DESIGNED SC

TITLE
BAYVIEW SUBDIVISION
STORMWATER LONGITUDINAL SECTIONS

SCALE AS SHOWN | PROJECT No 22007 | DRAWING No SK015 | AMDT A



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DATUM RL		-6.00					
COVER (& NATURAL SURFACE) LEVEL	5.97	(2.00) 5.97	(1.54) 5.73	(1.88) 5.49	(2.73) 5.78	(2.78) 4.55	(2.90)
DEPTH TO INVERT		1.01 1.04	1.06 1.01	1.06 1.01	1.06 1.42	1.88 0.70	1.35
INVERT LEVEL		4.96 4.93	4.91 4.72	4.67 4.48	4.43 4.36	3.90 3.85	3.20
PIPE CHAINAGE	-7.65	-1.65	46.07	93.72	111.24	121.40	
PIPE LENGTH		L=6.00	L=47.72	L=47.64	L=17.52	L=10.17	
PIPE SIZE (mm)		375	375	375	375	525	
PIPE GRADE (%)		0.51%	0.4%	0.4%	0.4%	0.4%	
PIPE CLASS		Class=RCP	Class=RCP	Class=RCP	Class=RCP	Class=RCP	
PIT TYPE	SE2	SE2	SE2	SE2	MH	MHX	
PIT SETOUT	702216.07E 8624254.91N 5.97Z	702223.37E 8624257.17N 5.97Z	702237.48E 8624211.68N 5.73Z	702251.60E 8624166.19N 5.49Z	702256.77E 8624149.51N 5.78Z	702259.77E 8624139.80N 4.55Z	
ROAD NAME & ROAD CHAINAGE							

LINE 6

DATUM RL		-5.00			
COVER (& NATURAL SURFACE) LEVEL	5.22	(5.81) 5.22	(5.74) 5.38	(5.88) 5.78	(2.78)
DEPTH TO INVERT		1.09 1.11	1.13 1.40	1.42 1.86	1.88
INVERT LEVEL		4.13 4.11	4.09 3.99	3.97 3.92	3.90
PIPE CHAINAGE	-7.63	-1.62	31.42	48.85	
PIPE LENGTH		L=6.00	L=33.04	L=17.43	
PIPE SIZE (mm)		375	450	450	
PIPE GRADE (%)		0.38%	0.3%	0.3%	
PIPE CLASS		Class=RCP	Class=RCP	Class=RCP	
PIT TYPE	SE2	SE2	SE2	MH	
PIT SETOUT	702206.49E 8624141.85N 5.22Z	702208.76E 8624134.57N 5.22Z	702240.10E 8624144.32N 5.38Z	702256.77E 8624149.51N 5.78Z	
ROAD NAME & ROAD CHAINAGE					

LINE 7

DATUM RL		-5.00	
COVER (& NATURAL SURFACE) LEVEL	5.38	(5.84) 5.38	(5.88)
DEPTH TO INVERT		1.01 1.04	1.42
INVERT LEVEL		4.38 4.35	3.97
PIPE CHAINAGE	0.00	6.00	
PIPE LENGTH		L=6.00	
PIPE SIZE (mm)		375	
PIPE GRADE (%)		0.51%	
PIPE CLASS		Class=RCP	
PIT TYPE	SE2	SE2	
PIT SETOUT	702237.83E 8624151.63N 5.38Z	702240.10E 8624144.32N 5.38Z	
ROAD NAME & ROAD CHAINAGE			

LINE 8

DATUM RL		-5.00	
COVER (& NATURAL SURFACE) LEVEL	5.49	(3.55) 5.49	(2.73)
DEPTH TO INVERT		1.01 1.04	1.06
INVERT LEVEL		4.48 4.45	4.43
PIPE CHAINAGE	0.00	6.00	
PIPE LENGTH		L=6.00	
PIPE SIZE (mm)		375	
PIPE GRADE (%)		0.51%	
PIPE CLASS		Class=RCP	
PIT TYPE	SE2	SE2	
PIT SETOUT	702244.29E 8624163.92N 5.49Z	702251.60E 8624166.19N 5.49Z	
ROAD NAME & ROAD CHAINAGE			

LINE 9

DATUM RL		-6.00	
COVER (& NATURAL SURFACE) LEVEL	5.73	(1.48) 5.73	(1.88)
DEPTH TO INVERT		1.01 1.04	1.06
INVERT LEVEL		4.72 4.69	4.67
PIPE CHAINAGE	0.00	6.00	
PIPE LENGTH		L=6.00	
PIPE SIZE (mm)		375	
PIPE GRADE (%)		0.51%	
PIPE CLASS		Class=RCP	
PIT TYPE	SE2	SE2	
PIT SETOUT	702230.18E 8624209.41N 5.73Z	702237.48E 8624211.68N 5.73Z	
ROAD NAME & ROAD CHAINAGE			

LINE 10

HORIZONTAL
5 0 5 10 15 20 25m 1:500-A1 1:1000-A3
0.5 0 0.5 1.0 1.5 2.0 2.5m 1:50-A1 1:100-A3
VERTICAL

byrne CONSULTANTS
ABN 78 124 388 192
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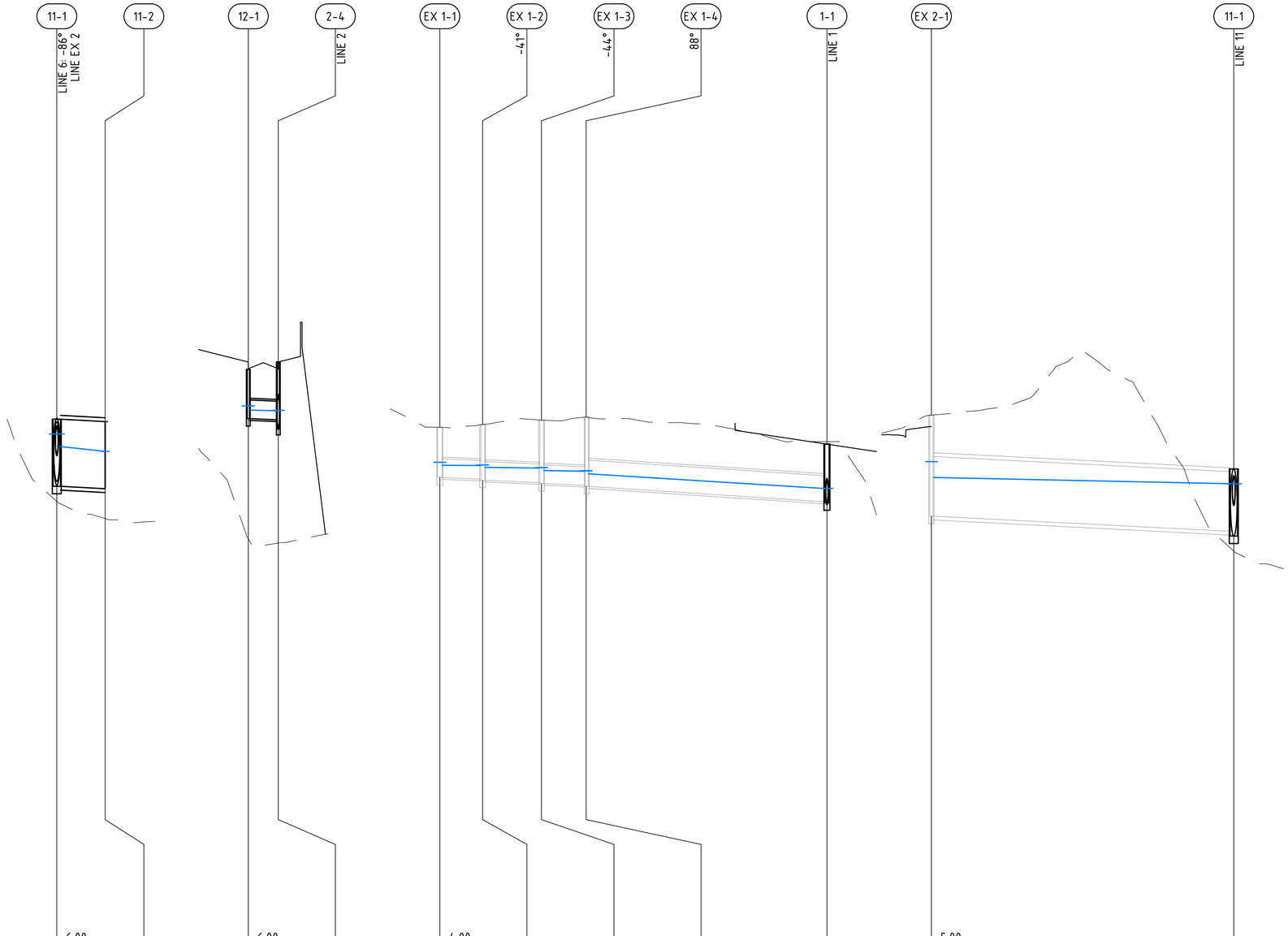
TITLE
BAYVIEW SUBDIVISION
STORMWATER LONGITUDINAL SECTIONS

DRAWN BM
DESIGNED SC
SCALE AS SHOWN
PROJECT No 22007
DRAWING No SK016
AMDT A



LEGEND:

═	EXISTING PIPES/PITS
━	PROPOSED PIPES/PITS
─	HGL
— — —	EXISTING SURFACE
───	DESIGN SURFACE

NOTE:

1. EXISTING PIPES MODELLED FOR HYDRAULIC PURPOSES.
2. REFER TO DRG. C135 & C136 FOR MANHOLE DETAILS.

WARNING

BEWARE OF UNDERGROUND SERVICES

The locations of underground services are approximate only and their exact position should be proven on site

No guarantee is given that all existing services are shown

LINE 11

DATUM RL		-6.00		
COVER (& NATURAL SURFACE) LEVEL	4.55	(2.90)	4.50	(2.55)
DEPTH TO INVERT		1.35		1.35
INVERT LEVEL		3.20		3.15
PIPE CHAINAGE	0.00		9.72	
PIPE LENGTH		L=9.72		
PIPE SIZE (mm)		1350		
PIPE GRADE (%)		0.5%		
PIPE CLASS		Class=RCP		
PIT TYPE	MHX		HW OUT	
PIT SETOUT	702259.77E 8624139.80N 4.55Z		702269.23E 8624142.03N 4.50Z	
ROAD NAME & ROAD CHAINAGE				

LINE 12

DATUM RL		-6.00		
COVER (& NATURAL SURFACE) LEVEL	5.55	(2.14)	5.70	(2.06)
DEPTH TO INVERT		0.99	1.17	1.32
INVERT LEVEL		4.56	4.54	4.38
PIPE CHAINAGE	0.00		6.03	
PIPE LENGTH		L=6.03		
PIPE SIZE (mm)		375		
PIPE GRADE (%)		0.4%		
PIPE CLASS		Class=RCP		
PIT TYPE	SE2		SE2	
PIT SETOUT	702219.01E 8624671.31N 5.55Z		702224.71E 8624673.29N 5.70Z	
ROAD NAME & ROAD CHAINAGE				

LINE EX 1

DATUM RL		-4.00								
COVER (& NATURAL SURFACE) LEVEL	6.39		6.44		6.53		6.59		6.05	(6.10)
DEPTH TO INVERT		1.01	1.10	1.12	1.26	1.28	1.37	1.39	1.16	1.18
INVERT LEVEL		5.38	5.34	5.32	5.28	5.26	5.22	5.20	4.89	4.87
PIPE CHAINAGE	0.00		8.59		20.42		29.41		77.81	
PIPE LENGTH		L=8.59		L=11.82		L=8.99		L=48.40		
PIPE SIZE (mm)		375		375		375		525		
PIPE GRADE (%)		0.4%		0.4%		0.4%		0.64%		
PIPE CLASS		Class=RCP		Class=RCP		Class=RCP		Class=RCP		
PIT TYPE	SE2		SE2		SE2		SE2		MH	
PIT SETOUT	702131.49E 8624657.24N 6.39Z		702139.43E 8624660.54N 6.44Z		702144.71E 8624671.11N 6.53Z		702142.07E 8624679.71N 6.59Z		702187.69E 8624695.89N 6.05Z	
ROAD NAME & ROAD CHAINAGE										

LINE EX 2

DATUM RL		-5.00		
COVER (& NATURAL SURFACE) LEVEL	5.63		4.55	(2.90)
DEPTH TO INVERT		2.03	1.25	1.35
INVERT LEVEL		3.60	3.30	3.20
PIPE CHAINAGE	0.00		60.78	
PIPE LENGTH		L=60.78		
PIPE SIZE (mm)		1200		
PIPE GRADE (%)		0.5%		
PIPE CLASS		Class=RCP		
PIT TYPE	SE2		MHX	
PIT SETOUT	702200.58E 8624126.01N 5.63Z		702259.77E 8624139.80N 4.55Z	
ROAD NAME & ROAD CHAINAGE				

HORIZONTAL
5 0 5 10 15 20 25m 1:500-A1 1:1000-A3
0.5 0 0.5 1.0 1.5 2.0 2.5m 1:50-A1 1:100-A3
VERTICAL

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DRAWN	BM	TITLE	BAYVIEW SUBDIVISION STORMWATER LONGITUDINAL SECTIONS
DESIGNED	SC	SCALE	AS SHOWN
PROJECT No	22007	DRAWING No	SK017
AMDT	A		

Appendix B Stormwater Catchment Plan

LOT A LAYOUT

LOT B LAYOUT

5 0 5 10 15 20 25m

0 1:500-A1 1:1000-A3

byrne CONSULTANTS
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		TITLE	BAYVIEW SUBDIVISION LOT A & B STORMWATER CATCHMENT PLAN	
DRAWN	BM			
DESIGNED	SC	SCALE AS SHOWN	PROJECT No 22007	DRAWING No SK013 / AMDT A

5 0 5 10 15 20 25m

0 1:500-A1 1:1000-A3

byrne CONSULTANTS
ABN 78 124 388 192
P.O.Box 43420 Casuarina NT 0811
Ph. 08 89472476 Fax: 08 89475098

DRAWN BM

DESIGNED SC

TITLE
BAYVIEW SUBDIVISION
LOT C
STORMWATER CATCHMENT PLAN

SCALE	PROJECT No	DRAWING No	AMDT
AS SHOWN	22007	SK014	A

Appendix C Q2 Hydrology and Hydraulics Calcs

12D MODEL - HYDROLOGICAL DESIGN SHEET

Project: NT22007 CONTOURS
Drainage Model: DRAINAGE DESIGN
Rainfall File: $LIB\AUS NT Darwin.12dhydro
Tc Method: Direct
Rainfall Method: IFD Table
Runoff C Method: Direct

Minor 2 Year Storm Event

Node	Node	Setout	Setout	Setout	Catch	Time	Intensity	Runoff	Area	Full	Full	Full	Partial	Partial	Partial	Catchment	Approach	Road	Flooded	Flooded	Flooded	Road	Road	Max Pond	Inlet	Inlet	Bypass	Bypass
Name	Type	Easting	Northing	RL	ID	Tc	I	C	A	CA	Sum CA	Qc=CIA	CA	Sum CA	Qc=CIA	Flow Qc	Flow Qa	Capacity	Depth	Width	Vel.Dep	Grade	Xfall	Depth	Curve Name	Flow Qg	Flow Qb	Node
(-)	(-)	(m)	(m)	(m)	(-)	(min)	(mm/hr)	(-)	(ha)	(ha)	(ha)	(L/s)	(ha)	(ha)	(L/s)	(L/s)	(L/s)	(L/s)	(m)	(m)	(sq.m/s)	(%)	(%)	(m)	(-)	(L/s)	(L/s)	(-)
1-1	MH	702187.69	8624695.89	6.05																								-
1-2	SE2	702198.59	8624698.54	5.72	1P	10	147	0.73	0.129	0.0941	0.2102	85.8	0.0471	0.1631	85.6	85.8	85.8	219	0.097	2.11	0.09	1.4	4		1.0 GRADE	77.3	8.5	2-5
					1I	5	189	0.9	0.129	0.1161			0.1161															
1-3	MH	702210.35	8624702.19	5.84																								-
1-4	MH	702216.4	8624698.26	5.79																								-
1-5	HW OUT	702223.45	8624700.68	5.16																								-
2-1	SE2	702241.81	8624605.25	5.9	1P	10	147	0.73	0.0723	0.0528	0.1178	48.1	0.0264	0.0914	48	48.1	48.1	130.2	0.095	2.07	0.05	0.7	4		0.5 GRADE	48.1		3-1
					1I	5	189	0.9	0.0723	0.065			0.065															
2-2	SE2	702247.46	8624607.28	5.9	1P	10	147	0.73	0.0623	0.0455	0.1016	41.5	0.0228	0.0788	41.4	41.5	41.5	129.8	0.09	1.95	0.05	0.4	4		0.5 GRADE	41.5		2-3
					1I	5	189	0.9	0.0623	0.0561			0.0561															
2-3	SE2	702235.11	8624643.08	5.71	1P	10	147	0.73	0.0141	0.0103	0.023	9.4	0.0051	0.0178	9.4	9.4	9.4	130.2	0.056	1.08	0.02	0.5	4		0.5 GRADE	9.4		2-4
					1I	5	189	0.9	0.0141	0.0127			0.0127															
2-4	SE2	702224.71	8624673.29	5.7	1P	10	147	0.73	0.0124	0.009	0.0201	8.2	0.0045	0.0156	8.2	8.2	8.2	130.2	0.054	1.02	0.02	0.5	4		0.5 GRADE	8.2		2-5
					1I	5	189	0.9	0.0124	0.0111			0.0111															
2-5	SS3	702221.04	8624683.84	5.53	1P	10	147	0.73	0.0459	0.0335	0.0748	30.5	0.0168	0.0581	30.5	30.5	39	534	0.022					0.15	SAG	39		-
					1I	5	189	0.9	0.0459	0.0413			0.0413															
3-1	SE2	702229.44	8624641.1	5.71	1P	10	147	0.73	0.0813	0.0593	0.1324	54.1	0.0297	0.1028	54	54.1	54.1	130.2	0.099	2.16	0.06	0.5	4		0.5 GRADE	54	0.1	12-1
					1I	5	189	0.9	0.0813	0.0731			0.0731															
4-1	SS3	702215.39	8624681.79	5.53	1P	10	147	0.73	0.0515	0.0376	0.0839	34.3	0.0188	0.0651	34.2	34.3	34.3	534	0.018					0.15	SAG	34.3		-
					1I	5	189	0.9	0.0515	0.0464			0.0464															
5-1	SE2	702200.67	8624692.9	5.71	1P	10	147	0.73	0.0719	0.0525	0.1172	47.8	0.0262	0.0909	47.7	47.8	47.8	219	0.08	1.68	0.07	1.4	4		1.0 GRADE	47.8		4-1
					1I	5	189	0.9	0.0719	0.0647			0.0647															
6-1	SE2	702216.07	8624254.91	5.97	1P	10	147	0.73	0.0204	0.0149	0.0332	13.6	0.0074	0.0258	13.5	13.6	13.6	130.2	0.063	1.26	0.03	0.5	3		0.5 GRADE	13.6		10-1
					1I	5	189	0.9	0.0204	0.0183			0.0183															
6-2	SE2	702223.37	8624257.17	5.97	1P	10	147	0.73	0.0608	0.0444	0.0991	40.5	0.0222	0.0769	40.4	40.5	40.5	130.1	0.09	1.93	0.05	0.5	3		0.5 GRADE	40.5		6-3
					1I	5	189	0.9	0.0608	0.0547			0.0547															
6-3	SE2	702237.48	8624211.68	5.73	1P	10	147	0.73	0.0179	0.0131	0.0292	11.9	0.0065	0.0227	11.9	11.9	11.9	130.2	0.06	1.19	0.02	0.5	3		0.5 GRADE	11.9		6-4
					1I	5	189	0.9	0.0179	0.0161			0.0161															
6-4	SE2	702251.6	8624166.19	5.49	1P	10	147	0.73	0.0178	0.013	0.029	11.8	0.0065	0.0225	11.8	11.8	11.8	130.2	0.06	1.19	0.02	0.5	3		0.5 GRADE	11.8		7-3
					1I	5	189	0.9	0.0178	0.016			0.016															
6-5	MH	702256.77	8624149.51	5.78																								-
7-1	SE2	702206.49	8624141.85	5.22	1P	10	147	0.73	0.0631	0.046	0.1028	42	0.023	0.0798	41.9	42	42	130.2	0.091	1.96	0.05	0.5	3		0.5 GRADE	42		LOST
					1I	5	189	0.9	0.0631	0.0568			0.0568															
7-2	SE2	702208.76	8624134.57	5.22	1P	10	147	0.73	0.0139	0.0102	0.0227	9.3	0.0051	0.0176	9.2	9.3	9.3	130.1	0.056	1.07	0.02	0.5	3		0.5 GRADE	9.3		LOST
					1I	5	189	0.9	0.0139	0.0125			0.0125															
7-3	SE2	702240.1	8624144.32	5.38	1P	10	147	0.73	0.016	0.0117	0.026	10.6	0.0058	0.0202	10.6	10.6	10.6	130.2	0.058	1.14	0.02	0.5	3		0.5 GRADE	10.6		7-2
					1I	5	189	0.9	0.016	0.0144			0.0144															
8-1	SE2	702237.83	8624151.63	5.38	1P	10	147	0.73	0.0076	0.0055	0.0123	5	0.0028	0.0096	5	5	5.8					0.5	3		0.5 GRADE	5.8		7-1
					1I	5	189	0.9	0.0076	0.0068			0.0068															
9-1	SE2	702244.29	8624163.92	5.49	1P	10	147	0.73	0.0895	0.0653	0.1459	59.6	0.0327	0.1132	59.4	59.6	59.8	130	0.102	2.25	0.06	0.5	3		0.5 GRADE	59	0.8	8-1
					1I	5	189	0.9	0.0895	0.0806			0.0806															
10-1	SE2	702230.18	8624209.41	5.73	1P	10	147	0.73	0.0825	0.0602	0.1345	54.9	0.0301	0.1044	54.8	54.9	54.9	130.2	0.099	2.17	0.06	0.5	3		0.5 GRADE	54.7	0.2	9-1
					1I	5	189	0.9	0.0825	0.0743			0.0743															
11-1	MHX	702259.77	8624139.8	4.55																								-
11-2	HW OUT	702269.23	8624142.03	4.5																								-
12-1	SE2	702219.01	8624671.31	5.55	1P	10	147	0.73	0.0684	0.05	0.1116	45.6	0.025	0.0866	45.5	45.6	45.7	130.2	0.093	2.02	0.05	0.5	3		0.5 GRADE	45.7		4-1
					1I	5	189	0.9	0.0684	0.0616			0.0616															
EX 1-1	SE2	702131.49	8624657.24	6.39	1P	10	147	0.73	0.0679	0.0496	0.1108	45.2	0.0248	0.086	45.1	45.2	45.2									45.2		-
					1I	5	189	0.9	0.0679	0.0612			0.0612															
EX 1-2	SE2	702139.43	8624660.54	6.44	1P	10	147	0.73	0.0352	0.0257	0.0574	23.4	0.0129	0.0446	23.4	23.4	23.4									23.4		-
					1I	5	189	0.9	0.0352	0.0317			0.0317															
EX 1-3	SE2	702144.71	8624671.11	6.53	1P	10	147	0.73	0.0109	0.0079	0.0177	7.2	0.004	0.0138	7.2	7.2	7.2									7.2		-
					1I	5	189	0.9	0.0109	0.0098			0.0098															
EX 1-4	SE2	702142.07	8624679.71	6.59	1P	10	147	0.73	0.1016	0.0742	0.1656	67.6	0.0371	0.1285	67.5	67.6	67.6									67.6		-
					1I	5	189	0.9	0.1016	0.0914			0.0914															
EX 2-1	SE2	702200.58	8624126.01	5.63													0									0		-

12D MODEL - HYDRAULIC DESIGN SHEET

Project: NT22007 CONTOURS
Drainage Model: DRAINAGE DESIGN
Rainfall File: $LIB\AUS NT Darwin.12dhydro
Rainfall Method: IFD Table
Manning n Roughness: 0.013
Freeboard Limit: 0.15 m

Minor 2 Year Storm Event

Pipe	Pipe	Pipe	Pipe	Full Pipe	Pipe	Pipe	Full-area	Full-area	Full-area	Full-area	Part-area	Part-area	Part-area	Part-area	Catchment	Direct Pipe	Peak	Net Bypass	Pipe	Capacity	Q/Qcap	Full Pipe	Norm Depth	Crit Depth	Capacity Vel	US Node	Pipe	Pipe	DS Node	Cover	Cover	Pipe	Pipe	US Node	US Node	Pipe	P'head Loss	WSE Loss	Pipe	US Node	Pipe	Pipe	DS Node	HGL	HGL	F'board
ID	Type	Length	Size	Area Af	Grade	Grade	Tct	I	Sum CA	Qc=CIA	Tct	I	Sum CA	Qc=CIA	Flow Qc	Flow Qdp	Flow Qrat	Flow Qb	Flow Q	Flow Qcap	Ratio	Vel Vf=Q/Af	Vel Vn=Q/An	Vel Vc=Q/Ac	Vcap=Qcap/Af	Grate RL	US IL	DS IL	Grate RL	Limit	Min	DS Bend	DS Drop	Ku	Kw	V'head	(Ku.V'head)	(Kw.V'head)	T'head Loss	HGL	US HGL	DS HGL	HGL	Grade	Grade	US
(-)	(-)	(m)	(mm)	(sq.m)	(%)	(1 in)	(min)	(mm/hr)	(ha)	(L/s)	(min)	(mm/hr)	(ha)	(L/s)	(L/s)	(L/s)	(L/s)	(L/s)	(L/s)	(L/s)	(-)	(m/s)	(m/s)	(m/s)	(m/s)	(m)	(m)	(m)	(m)	(m)	(m)	(deg)	(m)	(-)	(-)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(%)	(1 in)	(m)
1-1 to 1-2	RCP	11.22	450	0.159	0.9	111.3	10.65	143.11	0.3515	139.7	10.4	144.58	0.3498	140.5	140.5		140.5		140.5	270.3	0.52	0.88	1.72	1.46	1.7	6.05	4.87	4.77	5.72	0.6	0.6	-3.6	0.404	0.6	0.7	0.04	0.02	0.03	0.09	5.16	5.13	5	4.84	1.19	84.4	0.89
1-2 to 1-3	RCP	12.31	675	0.358	0.18	555.5	10.74	142.55	0.6789	268.8	10	147	0.6691	273.2	273.2		273.2	-8.5	264.7	356.8	0.74	0.74	1.09	1.57	1	5.72	4.36	4.34	5.84	0.6	0.6	50.3	0.02	1.81	2.22	0.03	0.05	0.06	0.03	4.84	4.78	4.75	4.76	0.22	446.7	0.88
1-3 to 1-4	RCP	7.21	675	0.358	0.18	555.5	10.84	141.93	0.6789	267.7	10.1	146.38	0.6691	272.1	272.1		272.1	-8.5	263.6	356.8	0.74	0.74	1.09	1.56	1	5.84	4.32	4.31	5.79	0.6	0.76	-51.9	0.171	2.18	2.49	0.03	0.06	0.07	0.02	4.76	4.69	4.63	4.6	0.85	117.2	1.08
1-4 to 1-5	RCP	7.46	1050	0.866	0.4	250	10.9	141.57	1.3442	528.6	10.16	146.02	1.3247	537.3	537.3		537.3		537.3	1734.4	0.31	0.62	1.76	1.73	2	5.79	4.14	4.11	5.16		0.8	0		2.44	2.77	0.02	0.05	0.05	0.03	4.6	4.55	4.51	4.51	0.48	208.2	1.19
2-1 to 2-2	RCP	6	375	0.11	0.4	250	10	147	0.1178	48.1	5	189	0.0914	48	48.1		48.1		48.1	110.9	0.43	0.44	0.97	1.08	1	5.9	4.91	4.89	5.9	0.6	0.6	-89.3	0.02	9.7		0.01	0.09		0	5.29	5.2	5.19	5.2	0.05	1994.1	0.61
2-2 to 2-3	RCP	37.87	375	0.11	0.43	233.5	10.05	146.7	0.2194	89.4	10	147	0.2191	89.5	89.5		89.5		89.5	114.8	0.78	0.81	1.15	1.33	1.04	5.9	4.87	4.7	5.71	0.6	0.6	0	0.236	2.29	2.67	0.03	0.08	0.09	0.17	5.2	5.12	4.92	4.82	0.51	197.3	0.7
2-3 to 2-4	RCP	31.95	600	0.283	0.2	500	10.37	144.81	0.3748	150.8	10.05	146.7	0.372	151.6	151.6		151.6	-0.1	151.4	274.7	0.55	0.54	0.99	1.36	0.97	5.71	4.47	4.4	5.7	0.6	0.6	-0.2	0.02	2.01	2.23	0.01	0.03	0.03	0.07	4.82	4.79	4.72	4.73	0.21	484.3	0.89
2-4 to 2-5	RCP	11.17	600	0.283	0.92	108.8	10.63	143.21	0.5065	201.5	10.05	146.7	0.4992	203.4	203.4		203.4		203.4	588.8	0.35	0.72	1.89	1.49	2.08	5.7	4.38	4.28	5.53	0.6	0.61	1.3	0.1	1.66	2.03	0.03	0.04	0.05	0.08	4.73	4.68	4.64	4.65	0.29	349.7	0.97
2-5 to 1-4	RCP	15.16	750	0.442	0.15	666.7	10.72	142.65	0.6653	263.6	10	147	0.6546	267.3	267.3		267.3	8.5	275.8	431.4	0.64	0.62	1.04	1.54	0.98	5.53	4.18	4.16	5.79	0.6	0.6	88.9	0.02	1.34	1.59	0.02	0.03	0.03	0.02	4.65	4.62	4.59	4.6	0.15	669.8	0.88
3-1 to 2-3	RCP	6	375	0.11	0.4	250	10	147	0.1324	54.1	5	189	0.1028	54	54.1		54.1	-0.1	54	110.9	0.49	0.49	1	1.12	1	5.71	4.72	4.7	5.71	0.6	0.6	-89.7	0.229	9.7		0.01	0.12		0.03	5.02	4.9	4.87	4.82	0.65	152.8	0.69
4-1 to 2-5	RCP	6	375	0.11	0.4	250	10	147	0.0839	34.3	5	189	0.0651	34.2	34.3		34.3		34.3	110.9	0.31	0.31	0.88	0.98	1	5.53	4.53	4.51	5.53	0.6	0.6	-87.9	0.329	9.7		0	0.05		0.03	4.73	4.68	4.64	4.65	0.57	177	0.8
5-1 to 1-2	RCP	6	375	0.11	0.4	250	10	147	0.1172	47.8	5	189	0.0909	47.7	47.8		47.8		47.8	110.9	0.43	0.43	0.97	1.08	1	5.71	4.71	4.69	5.72	0.6	0.6	93	0.326	9.7		0.01	0.09		0.03	4.98	4.89	4.85	4.84	0.63	159.6	0.73
6-1 to 6-2	RCP	6	375	0.11	0.51	196.1	10	147	0.0332	13.6	5	189	0.0258	13.5	13.6		13.6		13.6	125.3	0.11	0.12	0.74	0.75	1.13	5.97	4.96	4.93	5.97	0.6	0.62	88.9	0.02	8.75		0	0.01		0	5.59	5.58	5.58	5.58	0.01	16718	0.38
6-2 to 6-3	RCP	47.72	375	0.11	0.4	250.5	10.05	146.7	0.1324	53.9	10	147	0.1323	54	54		54		54	110.8	0.49	0.49	1	1.12	1	5.97	4.91	4.72	5.73	0.6	0.6	0	0.048	3.88	4.09	0.01	0.05	0.05	0.05	5.58	5.53	5.49	5.5	0.09	1054.3	0.38
6-3 to 6-4	RCP	47.64	375	0.11	0.4	250	10.45	144.31	0.296	118.7	10	147	0.2933	119.8	119.8		119.8	-0.2	119.6	110.9	1.08	1.08	1.08	1.5	1	5.73	4.67	4.48	5.49	0.6	0.6	-2.7	0.048	1.78	1.94	0.06	0.11	0.12	0.22	5.5	5.38	5.16	5.19	0.46	215.2	0.23
6-4 to 6-5	RCP	17.52	375	0.11	0.4	250.8	10.84	141.93	0.4709	185.7	10.05	146.7	0.4636	188.9	188.9		188.9	-0.8	188.2	110.8	1.7	1.7	1.7	1.89	1	5.49	4.43	4.36	5.78	0.6	0.77	2.7	0.469	1.69	1.89	0.15	0.25	0.28	0.2	5.19	4.91	4.68	4.46	1.32	75.6	0.3
6-5 to 11-1	RCP	10.17	525	0.216	0.4	250	10.99	141.06	0.6348	248.7	10.2	145.83	0.6259	253.5	253.5		253.5		253.5	272.1	0.93	1.17	1.43	1.71	1.26	5.78	3.9	3.85	4.55	-10	-1.55	-86.1	0.654	1.97	2.31	0.07	0.14	0.16	0.04	4.46	4.29	4.25	4.25	0.42	239.7	1.32
7-1 to 7-2	RCP	6	375	0.11	0.38	262.3	10	147	0.1028	42	5	189	0.0798	41.9	42		42		42	108.3	0.39	0.38	0.92	1.04	0.98	5.22	4.13	4.11	5.22	0.6	0.7	-90.9	0.02	9.7		0.01	0.07		0	4.55	4.48	4.47	4.48	0.04	2341.1	0.67
7-2 to 7-3	RCP	33.04	450	0.159	0.3	335.6	10.05	146.7	0.1255	51.1	10	147	0.1252	51.1	51.1		51.1		51.1	155.7	0.33	0.32	0.88	1.05	0.98	5.22	4.09	3.99	5.38	0.6	0.64	2.7	0.02	2.18	2.7	0.01	0.01	0.01	0.01	4.48	4.46	4.45	4.46	0.02	4151.6	0.74
7-3 to 6-5	RCP	17.43	450	0.159	0.3	332.7	10.33	145.05	0.1638	66	10	147	0.162	66.2	66.2		66.2	0.8	66.9	156.4	0.43	0.42	0.94	1.14	0.98	5.38	3.97	3.92	5.78	0.6	1.05	87.4	0.02	1.34	1.57	0.01	0.01	0.01	0.01	4.46	4.44	4.43	4.46	0.06	1816.6	0.93
8-1 to 7-3	RCP	6	375	0.11	0.51	196.1	10	147	0.0123	5	5	189	0.0096	5	5		5	0.8	5.8	125.3	0.05	0.05	0.58	0.6	1.13	5.38	4.38	4.35	5.38	0.6	0.62	-86.5	0.378	9.7		0	0		0	4.46	4.45	4.45	4.46	0	39296.7	0.93
9-1 to 6-4	RCP	6	375	0.11	0.51	196.1	10	147	0.1459	59.6	5	189	0.1132	59.4	59.6		59.6	-0.5	59	125.3	0.47	0.53	1.12	1.16	1.13	5.49	4.48	4.45	5.49	0.6	0.62	86.7	0.02	6.65		0.01	0.1		0.01	5.27	5.17	5.16	5.19	0.11	883	0.23
10-1 to 6-3	RCP	6	375	0.11	0.51	196.1	10	147	0.1345	54.9	5	189	0.1044	54.8	54.9		54.9	-0.2	54.7	125.3	0.44	0.5	1.1	1.13	1.13	5.73	4.72	4.69	5.73	0.6	0.62	88.9	0.02	5.91		0.01	0.07		0.01	5.57	5.5	5.49	5.5	0.1	1028.3	0.16
11-1 to 11-2	RCP	9.72	1350	1.431	0.5	200	11.08	140.62	0.6348	248	10.28	145.32	0.6259	252.7	252.7	2000	2252.7		2252.7	3790.2	0.59	1.57	2.75	2.55	2.65	4.55	3.2	3.15	4.5			0		2		0.13	0.25		0.04	4.25	4	3.9	3.9	0.99	100.6	0.3
12-1 to 2-4	RCP	6.03	375	0.11	0.4	250	10	147	0.1116	45.6	5	189	0.0866	45.5	45.6		45.6	0.1	45.7	110.9	0.41	0.41	0.96	1.07	1	5.55	4.56	4.54	5.7	0.6	0.6	-90	0.153	9.7		0.01	0.08		0.02	4.82	4.73	4.72	4.73	0.23	432.2	0.73
EX 1-1 to EX 1-2	RCP	8.59	375	0.11	0.4	250	10	147	0.1108	45.2	5	189	0.086	45.1	45.2		45.2		45.2	110.9	0.41	0.41	0.95	1.06	1	6.39	5.38	5.34	6.44	0.6	0.63	-40.9	0.02	7		0.01	0.06		0.01	5.68	5.62	5.62	5.63	0.05	1954.8	0.7
EX 1-2 to EX 1-3	RCP	11.82	375	0.11	0.4	250	10.07	146.57	0.1682	68.5	10	147	0.1678	68.5	68.5		68.5		68.5	110.9	0.62	0.62	1.06	1.21	1	6.44	5.32	5.28	6.53	0.6	0.75	-43.6	0.02	1.88	2.45	0.02	0.04	0.05	0.02	5.63	5.58	5.57	5.58	0.13	775.7	0.81
EX 1-3 to EX 1-4	RCP	8.99	375	0.11	0.4	250	10.17	145.98	0.1859	75.4	10	147	0.1848	75.5	75.5		75.5		75.5	110.9	0.68	0.68	1.08	1.26	1	6.53	5.26	5.22	6.59	0.6	0.9	87.5	0.02	2.01	2.41	0.02	0.05	0.06	0.02	5.58	5.52	5.5	5.51	0.17	591.8	0.96
EX 1-4 to 1-1	RCP	48.4	525	0.216	0.64	155.9	10.25	145.53	0.3515	142.1	10	147	0.3498	142.8	142.8		142.8		142.8	344.5	0.41	0.66	1.52	1.39	1.59	6.59	5.2	4.89	6.05	0.6	0.6	5.9	0.02	2.31	2.75	0.02	0.05	0.06	0.31	5.51	5.45	5.16	5.16	0.61	163.4	1.08
EX 2-1 to 11-1	RCP	60.78	1200	1.131	0.5	200										2000	2000		2000	2758	0.73	1.77	2.66	2.58	2.44	5.63	3.6	3.3	4.55	0.6	0.05	-0.2	0.096	2		0.16	0.32		0.25	4.7	4.38	4.25	4.25	0.21	481.1	0.93

Appendix D Q100 Hydrology and Hydraulics Calcs

12D MODEL - HYDROLOGICAL DESIGN SHEET

Project: NT22007 CONTOURS
Drainage Model: DRAINAGE DESIGN
Rainfall File: $LIB\AUS NT Darwin.12dhydro
Tc Method: Direct
Rainfall Method: IFD Table
Runoff C Method: Direct

Major 100 Year Storm Event

Node	Node	Setout	Setout	Setout	Catch	Time	Intensity	Runoff	Area	Full	Full	Full	Partial	Partial	Partial	Catchment	Approach	Road	Flooded	Flooded	Flooded	Road	Road	Max Pond	Choke	Inlet	Inlet	Bypass	Bypass
Name	Type	Easting	Northing	RL	ID	Tc	I	C	A	CA	Sum CA	Qc=CIA	CA	Sum CA	Qc=CIA	Flow Qc	Flow Qa	Capacity	Depth	Width	Vel.Dep	Grade	Xfall	Depth	Factor	Curve Name	Flow Qg	Flow Qb	Node
(-)	(-)	(m)	(m)	(m)	(-)	(min)	(mm/hr)	(-)	(ha)	(ha)	(ha)	(L/s)	(ha)	(ha)	(L/s)	(L/s)	(L/s)	(L/s)	(m)	(m)	(sq.m/s)	(%)	(%)	(m)	(-)	(-)	(L/s)	(L/s)	(-)
1-1	MH	702187.69	8624695.89	6.05																									-
1-2	SE2	702198.59	8624698.54	5.72	1P	10	283	1	0.129	0.129	0.245	192.6	0.0645	0.1806	183.6	192.6	192.6	219	0.127	2.88	0.15	1.4	4		0.8	1.0 GRADE	90.4	102.2	2-5
					1I	5	366	0.9	0.129	0.1161			0.1161																
1-3	MH	702210.35	8624702.19	5.84																									-
1-4	MH	702216.4	8624698.26	5.79																									-
1-5	HW OUT	702223.45	8624700.68	5.16																									-
2-1	SE2	702241.81	8624605.25	5.9	1P	10	283	1	0.0723	0.0723	0.1373	107.9	0.0361	0.1012	102.9	107.9	107.9	130.2	0.125	2.81	0.08	0.7	4		0.37	0.5 GRADE	35.2	72.8	3-1
					1I	5	366	0.9	0.0723	0.065			0.065																
2-2	SE2	702247.46	8624607.28	5.9	1P	10	283	1	0.0623	0.0623	0.1184	93.1	0.0312	0.0873	88.7	93.1	93.1	129.8	0.119	2.66	0.08	0.4	4		0.8	0.5 GRADE	67.1	26	2-3
					1I	5	366	0.9	0.0623	0.0561			0.0561																
2-3	SE2	702235.11	8624643.08	5.71	1P	10	283	1	0.0141	0.0141	0.0268	21.1	0.0071	0.0197	20.1	21.1	47	130.2	0.094	2.05	0.05	0.5	4		0.8	0.5 GRADE	37.6	9.4	2-4
					1I	5	366	0.9	0.0141	0.0127			0.0127																
2-4	SE2	702224.71	8624673.29	5.7	1P	10	283	1	0.0124	0.0124	0.0235	18.5	0.0062	0.0173	17.6	18.5	27.9	130.2	0.079	1.67	0.04	0.5	4		0.8	0.5 GRADE	22.3	5.6	2-5
					1I	5	366	0.9	0.0124	0.0111			0.0111																
2-5	SS3	702221.04	8624683.84	5.53	1P	10	283	1	0.0459	0.0459	0.0872	68.6	0.0229	0.0643	65.3	68.6	176.3	267	0.109					0.15	0.5	SAG	176.3		-
					1I	5	366	0.9	0.0459	0.0413			0.0413																
3-1	SE2	702229.44	8624641.1	5.71	1P	10	283	1	0.0813	0.0813	0.1544	121.4	0.0406	0.1138	115.7	121.4	194.1	130.2	0.15	3.02	0.12	0.5	4		0.63	0.5 GRADE	75.2	118.9	12-1
					1I	5	366	0.9	0.0813	0.0731			0.0731																
4-1	SS3	702215.39	8624681.79	5.53	1P	10	283	1	0.0515	0.0515	0.0979	76.9	0.0258	0.0721	73.3	76.9	271.1	267	0.152					0.15	0.5	SAG	271.1		-
					1I	5	366	0.9	0.0515	0.0464			0.0464																
5-1	SE2	702200.67	8624692.9	5.71	1P	10	283	1	0.0719	0.0719	0.1366	107.4	0.0359	0.1006	102.3	107.4	107.4	219	0.104	2.3	0.1	1.4	4		0.8	1.0 GRADE	73.6	33.8	4-1
					1I	5	366	0.9	0.0719	0.0647			0.0647																
6-1	SE2	702216.07	8624254.91	5.97	1P	10	283	1	0.0204	0.0204	0.0387	30.4	0.0102	0.0285	29	30.4	30.4	130.2	0.082	1.73	0.04	0.5	3		0.8	0.5 GRADE	24.4	6.1	10-1
					1I	5	366	0.9	0.0204	0.0183			0.0183																
6-2	SE2	702223.37	8624257.17	5.97	1P	10	283	1	0.0608	0.0608	0.1156	90.9	0.0304	0.0852	86.6	90.9	90.9	130.1	0.118	2.64	0.08	0.5	3		0.8	0.5 GRADE	65.9	24.9	6-3
					1I	5	366	0.9	0.0608	0.0547			0.0547																
6-3	SE2	702237.48	8624211.68	5.73	1P	10	283	1	0.0179	0.0179	0.034	26.7	0.009	0.0251	25.5	26.7	51.7	130.2	0.097	2.12	0.05	0.5	3		0.13	0.5 GRADE	7	44.7	6-4
					1I	5	366	0.9	0.0179	0.0161			0.0161																
6-4	SE2	702251.6	8624166.19	5.49	1P	10	283	1	0.0178	0.0178	0.0338	26.6	0.0089	0.0249	25.3	26.6	71.3	130.2	0.108	2.4	0.07	0.5	3		0.8	0.5 GRADE	55.2	16	7-3
					1I	5	366	0.9	0.0178	0.016			0.016																
6-5	MH	702256.77	8624149.51	5.78																									-
7-1	SE2	702206.49	8624141.85	5.22	1P	10	283	1	0.0631	0.0631	0.1198	94.2	0.0315	0.0883	89.8	94.2	211.4	130.2	0.157	3.4	0.13	0.5	3		0.21	0.5 GRADE	25.4	186	LOST
					1I	5	366	0.9	0.0631	0.0568			0.0568																
7-2	SE2	702208.76	8624134.57	5.22	1P	10	283	1	0.0139	0.0139	0.0264	20.8	0.007	0.0195	19.8	20.8	28.8	130.1	0.08	1.69	0.04	0.5	3		0.8	0.5 GRADE	23	5.8	LOST
					1I	5	366	0.9	0.0139	0.0125			0.0125																
7-3	SE2	702240.1	8624144.32	5.38	1P	10	283	1	0.016	0.016	0.0304	23.9	0.008	0.0224	22.7	23.9	39.9	130.2	0.089	1.92	0.05	0.5	3		0.8	0.5 GRADE	31.9	8	7-2
					1I	5	366	0.9	0.016	0.0144			0.0144																
8-1	SE2	702237.83	8624151.63	5.38	1P	10	283	1	0.0076	0.0076	0.0144	11.3	0.0038	0.0106	10.8	11.3	212.4					0.5	3		0.8	0.5 GRADE	95.2	117.2	7-1
					1I	5	366	0.9	0.0076	0.0068			0.0068																
9-1	SE2	702244.29	8624163.92	5.49	1P	10	283	1	0.0895	0.0895	0.1701	133.7	0.0448	0.1253	127.4	133.7	242.9	130	0.166	3.77	0.14	0.5	3		0.35	0.5 GRADE	41.8	201.1	8-1
					1I	5	366	0.9	0.0895	0.0806			0.0806																
10-1	SE2	702230.18	8624209.41	5.73	1P	10	283	1	0.0825	0.0825	0.1568	123.2	0.0413	0.1155	117.4	123.2	129.3	130.2	0.133	3.01	0.09	0.5	3		0.19	0.5 GRADE	20.1	109.2	9-1
					1I	5	366	0.9	0.0825	0.0743			0.0743																
11-1	MHX	702259.77	8624139.8	4.55																									-
11-2	HW OUT	702269.23	8624142.03	4.5																									-
12-1	SE2	702219.01	8624671.31	5.55	1P	10	283	1	0.0684	0.0684	0.1301	102.2	0.0342	0.0958	97.4	102.2	221.2	130.2	0.16	3.52	0.13	0.5	3		0.51	0.5 GRADE	60.8	160.4	4-1
					1I	5	366	0.9	0.0684	0.0616			0.0616																
EX 1-1	SE2	702131.49	8624657.24	6.39	1P	10	283	1	0.0679	0.0679	0.1291	101.5	0.034	0.0951	96.7	101.5	101.5										101.5		-
					1I	5	366	0.9	0.0679	0.0612			0.0612																
EX 1-2	SE2	702139.43	8624660.54	6.44	1P	10	283	1	0.0352	0.0352	0.0669	52.6	0.0176	0.0493	50.1	52.6	52.6										52.6		-
					1I	5	366	0.9	0.0352	0.0317			0.0317																
EX 1-3	SE2	702144.71	8624671.11	6.53	1P	10	283	1	0.0109	0.0109	0.0207	16.2	0.0054	0.0152	15.5	16.2	16.2										16.2		-
					1I	5	366	0.9	0.0109	0.0098			0.0098																
EX 1-4	SE2	702142.07	8624679.71	6.59	1P	10	283	1	0.1016	0.1016	0.1931	151.8	0.0508	0.1423	144.6	151.8	151.8										151.8		-
					1I	5	366	0.9	0.1016	0.0914			0.0914																
EX 2-1	SE2	702200.58	8624126.01	5.63													0										0		-

12D MODEL - HYDRAULIC DESIGN SHEET

Project: NT22007 CONTOURS
Drainage Model: DRAINAGE DESIGN
Rainfall File: $LIB\AUS NT Darwin.12dhydro
Rainfall Method: IFD Table
Manning n Roughness: 0.013
Freeboard Limit: 0.15 m

Major 100 Year Storm Event

Pipe ID	Pipe Type	Pipe Length	Pipe Size	Full Pipe Area Af	Pipe Grade	Pipe Grade	Full-area Tct	Full-area I	Full-area Sum CA	Full-area Qc=CIA	Part-area Tct	Part-area I	Part-area Sum CA	Part-area Qc=CIA	Catchment Flow Qc	Direct Pipe Flow Qdp	Peak Flow Qrat	Net Bypass Flow Qb	Pipe Flow Q	Excess Pipe Flow Qx	Capacity Flow Qcap	Q/Qcap Ratio	Full Pipe Vel Vf=Q/Af	Norm Depth Vel Vn=Q/An	Crit Depth Vel Vc=Q/Ac	Capacity Vel Vcap=Qcap/Af	US Node Grate RL	Pipe US IL	Pipe DS IL	DS Node Grate RL	Cover Limit	Cover Min	Pipe DS Bend	Pipe Drop	US Node Ku	US Node Kw	Pipe V'head	P'head Loss (Ku.V'head)	WSE Loss (Kw.V'head)	Pipe T'head Loss	US Node HGL	Pipe US HGL	Pipe DS HGL	Pipe HGL	DS Node HGL	HGL Grade
(-)	(-)	(m)	(mm)	(sq.m)	(%)	(1 in)	(min)	(mm/hr)	(ha)	(L/s)	(min)	(mm/hr)	(ha)	(L/s)	(L/s)	(L/s)	(L/s)	(L/s)	(L/s)	(L/s)	(L/s)	(-)	(m/s)	(m/s)	(m/s)	(m/s)	(m)	(m)	(m)	(m)	(m)	(m)	(deg)	(m)	(-)	(-)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(%)
1-1 to 1-2	RCP	11.22	450	0.159	0.9	111.3	10.65	275.87	0.4098	314	10.4	278.56	0.4074	315.2	315.2		315.2		315.2		270.3	1.17	1.98	1.98	2.16	1.7	6.05	4.87	4.77	5.72	0.6	0.6	-3.6	0.404	0.58	0.65	0.2	0.12	0.13	0.14	5.68	5.55	5.41	5.44	1.22
1-2 to 1-3	RCP	12.31	675	0.358	0.18	555.5	10.74	274.84	0.7914	604.2	10	283	0.778	611.6	611.6		611.6	-136	475.5		356.8	1.33	1.33	1.33	1.93	1	5.72	4.36	4.34	5.84	0.6	0.6	50.3	0.02	1.58	1.9	0.09	0.14	0.17	0.04	5.44	5.27	5.23	5.26	0.32
1-3 to 1-4	RCP	7.21	675	0.358	0.18	555.5	10.84	273.71	0.7914	601.7	10.1	281.87	0.778	609.1	609.1		609.1	-136	473.1		356.8	1.33	1.32	1.32	1.93	1	5.84	4.32	4.31	5.79	0.6	0.76	-51.9	0.171	2.18	2.49	0.09	0.19	0.22	0.02	5.26	5.04	5.01	5.05	0.32
1-4 to 1-5	RCP	7.46	1050	0.866	0.4	250	10.9	273.05	1.5669	1188.4	10.18	281.06	1.541	1203.1	1203.1		1203.1		1203.1		1734.4	0.69	1.39	2.16	2.25	2	5.79	4.14	4.11	5.16		0.8	0		2.37	2.75	0.1	0.23	0.27	0.03	5.05	4.78	4.73	4.73	0.67
2-1 to 2-2	RCP	6	375	0.11	0.4	250	10	283	0.1373	107.9	5	366	0.1012	102.9	107.9		107.9	-72.8	35.2		110.9	0.32	0.32	0.89	0.99	1	5.9	4.91	4.89	5.9	0.6	0.6	-89.3	0.02	5.2		0.01	0.03		0	5.82	5.79	5.79	5.8	0.04
2-2 to 2-3	RCP	37.87	375	0.11	0.43	233.5	10.05	282.45	0.2557	200.6	10	283	0.2554	200.7	200.7		200.7	-98.8	102		114.8	0.89	0.92	1.17	1.4	1.04	5.9	4.87	4.7	5.71	0.6	0.6	0	0.236	2.33	2.62	0.04	0.1	0.11	0.13	5.8	5.69	5.56	5.57	0.34
2-3 to 2-4	RCP	31.95	600	0.283	0.2	500	10.37	278.98	0.4369	338.6	10.05	282.45	0.433	339.7	339.7		339.7	-128.4	211.4		274.7	0.77	0.75	1.07	1.51	0.97	5.71	4.47	4.4	5.7	0.6	0.6	-0.2	0.02	1.93	2.08	0.03	0.05	0.06	0.04	5.57	5.51	5.47	5.48	0.12
2-4 to 2-5	RCP	11.17	600	0.283	0.92	108.8	10.63	276.05	0.5904	452.8	10.27	280.07	0.5854	455.4	455.4		455.4	-165.9	289.5		588.8	0.49	1.02	2.07	1.69	2.08	5.7	4.38	4.28	5.53	0.6	0.61	1.3	0.1	1.54	1.81	0.05	0.08	0.1	0.02	5.48	5.39	5.36	5.4	0.22
2-5 to 1-4	RCP	15.16	750	0.442	0.15	666.7	10.72	275.03	0.7755	592.4	10.09	281.98	0.764	598.4	598.4		598.4	136	734.4		431.4	1.7	1.66	1.66	2.19	0.98	5.53	4.18	4.16	5.79	0.6	0.6	88.9	0.02	2	2.3	0.14	0.28	0.32	0.07	5.4	5.08	5.01	5.05	0.43
3-1 to 2-3	RCP	6	375	0.11	0.4	250	10	283	0.1544	121.4	5	366	0.1138	115.7	121.4		121.4	-46.2	75.2		110.9	0.68	0.68	1.08	1.25	1	5.71	4.72	4.7	5.71	0.6	0.6	-89.7	0.229	4.74		0.02	0.11		0.01	5.69	5.57	5.56	5.57	0.18
4-1 to 2-5	RCP	6	375	0.11	0.4	250	10	283	0.0979	76.9	5	366	0.0721	73.3	76.9		76.9	194.2	271.1	183	110.9	2.44	2.45	2.45	2.51	1	5.53	4.53	4.51	5.53	0.6	0.6	-87.9	0.329	4.58		0.03	0.15		0.02	5.53	5.38	5.36	5.4	0.25
5-1 to 1-2	RCP	6	375	0.11	0.4	250	10	283	0.1366	107.4	5	366	0.1006	102.3	107.4		107.4	-33.8	73.6		110.9	0.66	0.67	1.07	1.24	1	5.71	4.71	4.69	5.72	0.6	0.6	93	0.326	5.95		0.02	0.13		0.01	5.56	5.42	5.41	5.44	0.18
6-1 to 6-2	RCP	6	375	0.11	0.51	196.1	10	283	0.0387	30.4	5	366	0.0285	29	30.4		30.4	-6.1	24.4		125.3	0.19	0.22	0.88	0.89	1.13	5.97	4.96	4.93	5.97	0.6	0.62	88.9	0.02	4.89		0	0.01		0	5.9	5.89	5.89	5.89	0.02
6-2 to 6-3	RCP	47.72	375	0.11	0.4	250.5	10.05	282.45	0.1543	121.1	10	283	0.1542	121.2	121.2		121.2	-31	90.2		110.8	0.81	0.82	1.12	1.34	1	5.97	4.91	4.72	5.73	0.6	0.6	0	0.048	2.55	2.76	0.03	0.09	0.09	0.13	5.89	5.8	5.67	5.68	0.26
6-3 to 6-4	RCP	47.64	375	0.11	0.4	250	10.45	278.08	0.3451	266.6	10.05	282.45	0.3422	268.4	268.4		268.4	-153.9	114.5		110.9	1.03	1.04	1.14	1.47	1	5.73	4.67	4.48	5.49	0.6	0.6	-2.7	0.048	1.04	1.19	0.05	0.06	0.07	0.2	5.68	5.62	5.41	5.45	0.43
6-4 to 6-5	RCP	17.52	375	0.11	0.4	250.8	10.84	273.71	0.5489	417.3	10.05	282.45	0.5389	422.8	422.8		422.8	-217.2	205.6		110.8	1.86	1.86	1.86	2.01	1	5.49	4.43	4.36	5.78	0.6	0.77	2.7	0.469	1.43	1.65	0.18	0.25	0.29	0.24	5.45	5.16	4.92	4.95	1.37
6-5 to 11-1	RCP	10.17	525	0.216	0.4	250	10.99	272.1	0.7399	559.3	10.2	280.84	0.7278	567.8	567.8		567.8	-191.7	376		272.1	1.38	1.74	1.74	2.05	1.26	5.78	3.9	3.85	4.55	-10	-1.55	-86.1	0.654	1.91	2.13	0.15	0.29	0.33	0.08	4.95	4.63	4.55	4.55	0.76
7-1 to 7-2	RCP	6	375	0.11	0.38	262.3	10	283	0.1198	94.2	5	366	0.0883	89.8	94.2		94.2	-68.8	25.4		108.3	0.23	0.23	0.8	0.9	0.98	5.22	4.13	4.11	5.22	0.6	0.7	-90.9	0.02	4.53		0	0.01		0	5.13	5.12	5.12	5.12	0.02
7-2 to 7-3	RCP	33.04	450	0.159	0.3	335.6	10.05	282.45	0.1463	114.8	10	283	0.1459	114.7	114.8		114.8	-66.5	48.2		155.7	0.31	0.3	0.86	1.04	0.98	5.22	4.09	3.99	5.38	0.6	0.64	2.7	0.02	2	2.32	0	0.01	0.01	0.01	5.12	5.11	5.1	5.11	0.03
7-3 to 6-5	RCP	17.43	450	0.159	0.3	332.7	10.33	279.42	0.191	148.2	10.28	279.97	0.1907	148.3	148.3		148.3	25.4	173.7		156.4	1.11	1.09	1.09	1.58	0.98	5.38	3.97	3.92	5.78	0.6	1.05	87.4	0.02	1.82	1.95	0.06	0.11	0.12	0.06	5.11	4.99	4.92	4.95	0.37
8-1 to 7-3	RCP	6	375	0.11	0.51	196.1	10	283	0.0144	11.3	5	366	0.0106	10.8	11.3		11.3	83.9	95.2		125.3	0.76	0.86	1.25	1.37	1.13	5.38	4.38	4.35	5.38	0.6	0.62	-86.5	0.378	5		0.04	0.19		0.02	5.3	5.11	5.1	5.11	0.29
9-1 to 6-4	RCP	6	375	0.11	0.51	196.1	10	283	0.1701	133.7	5	366	0.1253	127.4	133.7		133.7	-91.9	41.8		125.3	0.33	0.38	1.02	1.04	1.13	5.49	4.48	4.45	5.49	0.6	0.62	86.7	0.02	4.72		0.01	0.03		0	5.45	5.42	5.41	5.45	0.06
10-1 to 6-3	RCP	6	375	0.11	0.51	196.1	10	283	0.1568	123.2	5	366	0.1155	117.4	123.2		123.2	-103.1	20.1		125.3	0.16	0.18	0.83	0.84	1.13	5.73	4.72	4.69	5.73	0.6	0.62	88.9	0.02	4.76		0	0.01		0	5.68	5.68	5.67	5.68	0.01
11-1 to 11-2	RCP	9.72	1350	1.431	0.5	200	11.08	271.25	0.7399	557.5	10.28	279.91	0.7278	565.9	565.9	3000	3565.9	-191.7	3374.2	477	3790.2	0.89	2.36	2.98	3.02	2.65	4.55	3.2	3.15	4.5			0		2		0.21	0.42		0.04	4.55	4.13	4.14	4.14	-0.03
12-1 to 2-4	RCP	6.03	375	0.11	0.4	250	10	283	0.1301	102.2	5	366	0.0958	97.4	102.2		102.2	-41.4	60.8		110.9	0.55	0.55	1.03	1.17	1	5.55	4.56	4.54	5.7	0.6	0.6	-90	0.153	4.61		0.02	0.07		0.01	5.55	5.48	5.47	5.48	0.12
EX 1-1 to EX 1-2	RCP	8.59	375	0.11	0.4	250	10	283	0.1291	101.5	5	366	0.0951	96.7	101.5		101.5		101.5	96.7	110.9	0.91	0.92	1.14	1.4	1	6.39	5.38	5.34	6.44	0.6	0.63	-40.9	0.02	3.52		0	0		0	6.39	6.39	6.39	6.39	0

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