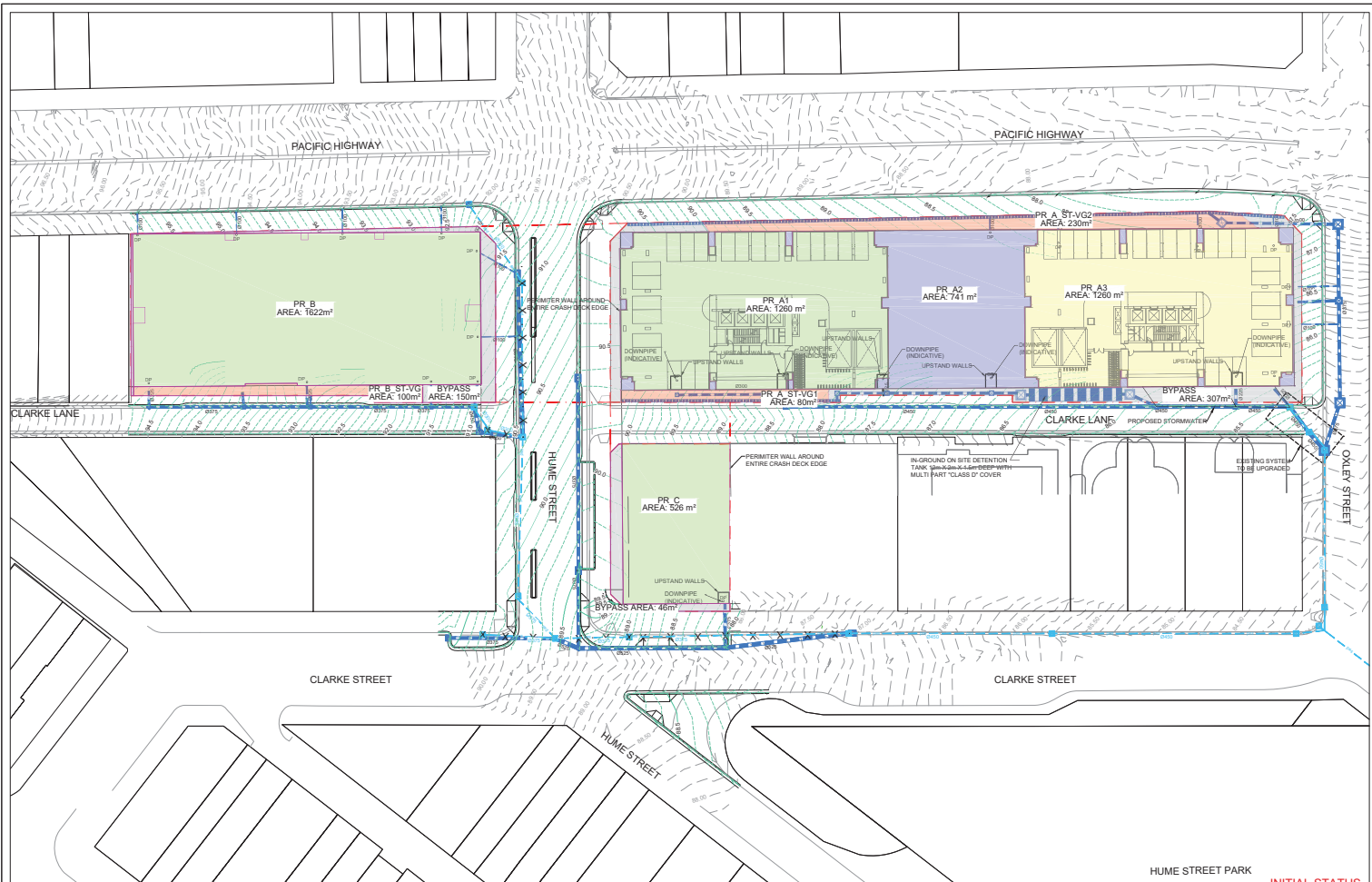


100mm AT FULL SIZE



INITIAL STATUS

REV	BY	DATE	DESCRIPTION	APPD
1	1	1	1	1
2	2	2	2	2
3	3	3	3	3
4	4	4	4	4
5	5	5	5	5
6	6	6	6	6
7	7	7	7	7
8	8	8	8	8
9	9	9	9	9
10	10	10	10	10

A1 Original Co-ordinate System Zone 56 Height Datum: A.M.D. This sheet may be prepared using colour and may be incomplete if copied.



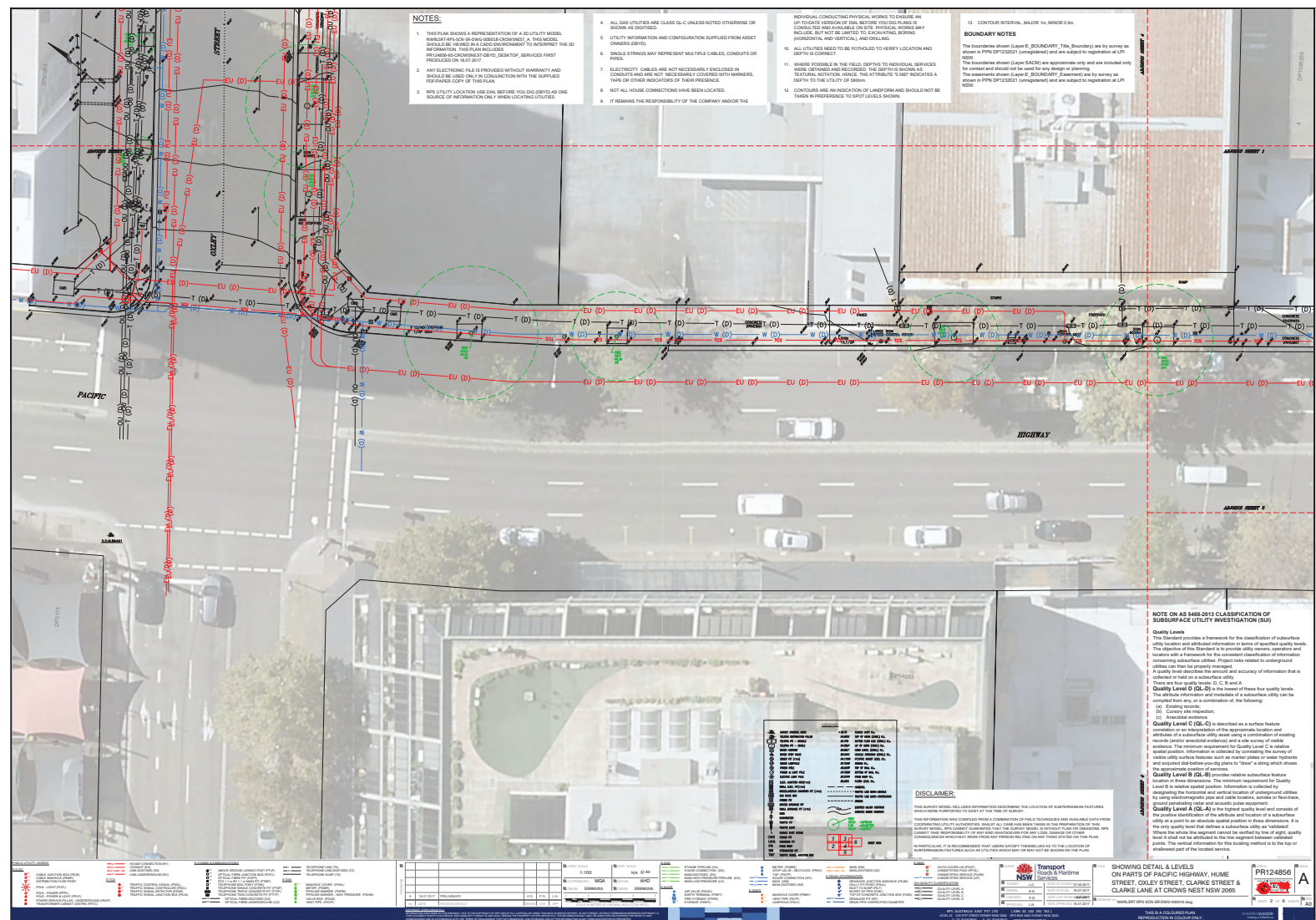
CLIENT
The information shown on this drawing is for the purposes of the Sydney Metro Project only. It is not to be used for any other purpose. The Sydney Metro Project is a jointly owned project between the NSW Government and the Metropolitan Sydney Water Corporation. It is not to be used for any other purpose other than the Sydney Metro Project.

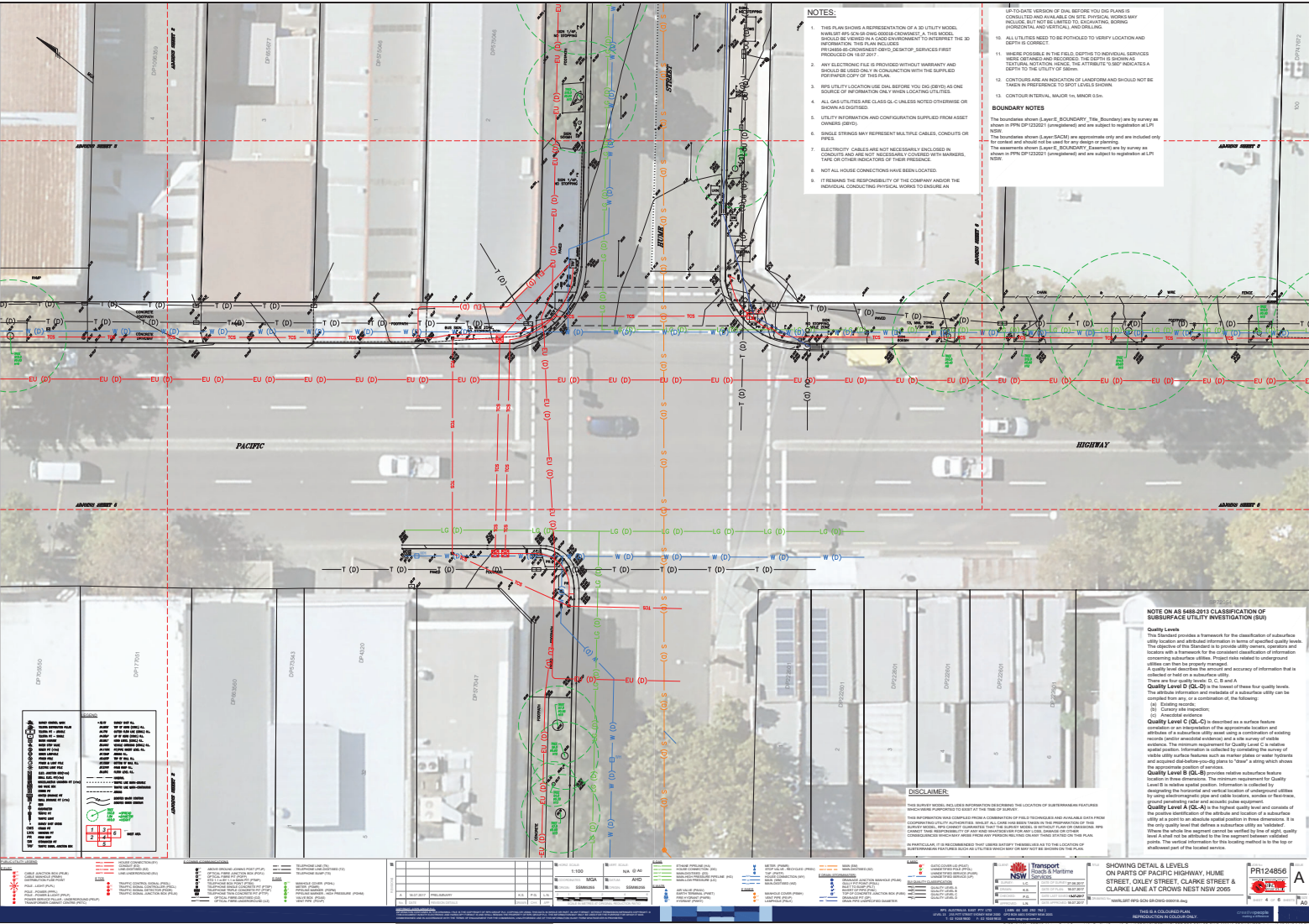
SERVICE PROVIDER
DESIGNED BY: SYDNEY METRO
DRAWN BY: SYDNEY METRO
CHECKED BY: SYDNEY METRO
APPROVED BY: SYDNEY METRO

SYDNEY METRO USDTs
CROWNS NEST STATION
CIVIL ENGINEERING
USDT PROPOSED CATCHMENT PLAN
MUSIC MODEL
STATUS: **INITIAL STATUS**
DRAWN BY: NAWL001-MET-SON-CE-010-002012
SHEET 3 OF 3
REV: P01.1

Appendix D

Pre -Existing Drainage Infrastructure





NOTES:

1. THIS PLAN SHOWS A REPRESENTATION OF A 3D UTILITY MODEL. WHERE APPROPRIATE, THE 3D UTILITY MODEL SHOULD BE VIEWED IN A 3D ENVIRONMENT TO INTERPRET THE 3D INFORMATION. THIS PLAN INCLUDES:
 - 1.1. 3D UTILITY LOCATION (USE ONLY BEFORE YOU DO ANYTHING AS ONE SOURCE OF INFORMATION ONLY WHEN LOCATING UTILITIES)
 - 1.2. 3D UTILITY LOCATION (USE ONLY BEFORE YOU DO ANYTHING AS ONE SOURCE OF INFORMATION ONLY WHEN LOCATING UTILITIES)
2. ANY ELECTRICITY CABLES ARE NOT NECESSARILY ENCLOSED IN CONDUITS AND ARE NOT NECESSARILY COVERED WITH MARKING TAPE OR OTHER INDICATORS OF THEIR PRESENCE.
3. NOT ALL HOUSE CONNECTIONS HAVE BEEN LOCATED.
4. IT REMAINS THE RESPONSIBILITY OF THE COMPANY AND/OR THE INDIVIDUAL CONDUCTING PHYSICAL WORKS TO ENSURE AN

5. UP-TO-DATE VERSION OF DIAL BEFORE YOU DO ANYTHING AS ONE SOURCE OF INFORMATION ONLY WHEN LOCATING UTILITIES.
6. WHERE POSSIBLE, IN THE FIELD, DEPTHS TO INDIVIDUAL SERVICES HAVE BEEN MEASURED AND RECORDED. THE DEPTHS TO SERVICES ARE TEXTUAL NOTATION. THESE, THE ATTRIBUTE TO DEPTHS INDICATES A DEPTH TO THE CITY OF SYDNEY.
7. CONTOURS ARE AN INDICATION OF LANDFORM AND SHOULD NOT BE TAKEN IN REFERENCE TO DEPTHS INDICATED.
8. CONTOUR INTERVAL: MAJOR 1m, MINOR 0.5m.
9. BOUNDARY NOTES

The boundaries shown (Layer: BOUNDARY_Thin_Boundary) are by survey as shown in PPN DP122222 (unpublished) and are subject to registration at LPI NSW.

The boundaries shown (Layer: BOUNDARY_Thin_Boundary) are by survey as shown in PPN DP122222 (unpublished) and are subject to registration at LPI NSW.

NOTE ON AS 4888-2013 CLASSIFICATION OF SUBSURFACE UTILITY INVESTIGATION (SUI)

Quality Levels

This Standard provides a framework for the classification of subsurface utility location and attributed information in terms of specified quality levels. The objective of this Standard is to provide utility owners, operators and installers with a framework for the consistent classification of information concerning subsurface utilities. Project risks related to underground utilities can be properly managed.

A quality level describes the amount and accuracy of information that is collected or used in a subsurface utility.

There are four quality levels: CL, C, B, and A.

Quality Level CL (CL) is the lowest of these four quality levels. The amount of information and the accuracy of a subsurface utility can be completed from any, or a combination of the following:

- (a) Existing records;
- (b) Current site inspection;
- (c) Accidental evidence.

Quality Level C (CL-C) is described as a surface feature (evidence) or an indication of the approximate location and direction of a subsurface utility (evidence) or a combination of existing records (evidence) and a site survey of visible evidence. The information required for Quality Level C is evidence of a subsurface utility (evidence) or a combination of existing records (evidence) and a site survey of visible evidence. Information is collected by combining the survey of visible utility surface features such as meter pits or water hydrants and accepted disallowance of plans to "show" a utility which shows the approximate location of the utility.

Quality Level B (CL-B) is described as a surface feature (evidence) or an indication of the approximate location and direction of a subsurface utility (evidence) or a combination of existing records (evidence) and a site survey of visible evidence. The information required for Quality Level B is evidence of a subsurface utility (evidence) or a combination of existing records (evidence) and a site survey of visible evidence. Information is collected by combining the survey of visible utility surface features such as meter pits or water hydrants and accepted disallowance of plans to "show" a utility which shows the approximate location of the utility.

Quality Level A (CL-A) is the highest quality level and consists of the precise identification of the location and direction of a subsurface utility at a point to an absolute spatial position in three dimensions. It is the only quality level that defines a subsurface utility as "located". Where the utility line segment cannot be verified by line of sight, quality level A shall not be attributed to the line segment between established points. The vertical information for this location method is to the top or bottom of the line segment.

DISCLAIMER

THIS DOCUMENT PROVIDES INFORMATION REGARDING THE LOCATION OF SUBSURFACE UTILITIES. THE INFORMATION IS PROVIDED FOR INFORMATIONAL PURPOSES ONLY AND IS NOT TO BE USED FOR ANY OTHER PURPOSE. THE INFORMATION IS PROVIDED AS IS AND WITHOUT WARRANTY OF ANY KIND. THE INFORMATION IS PROVIDED AS IS AND WITHOUT WARRANTY OF ANY KIND. THE INFORMATION IS PROVIDED AS IS AND WITHOUT WARRANTY OF ANY KIND.

Scale: 1:100

North Arrow

Legend

Symbol	Description
[Symbol]	Water
[Symbol]	Sewer
[Symbol]	Gas
[Symbol]	Electricity
[Symbol]	Other

Project Information

Field	Value
Project Name	...
Client	...
Designer	...
Scale	1:100
Date	...

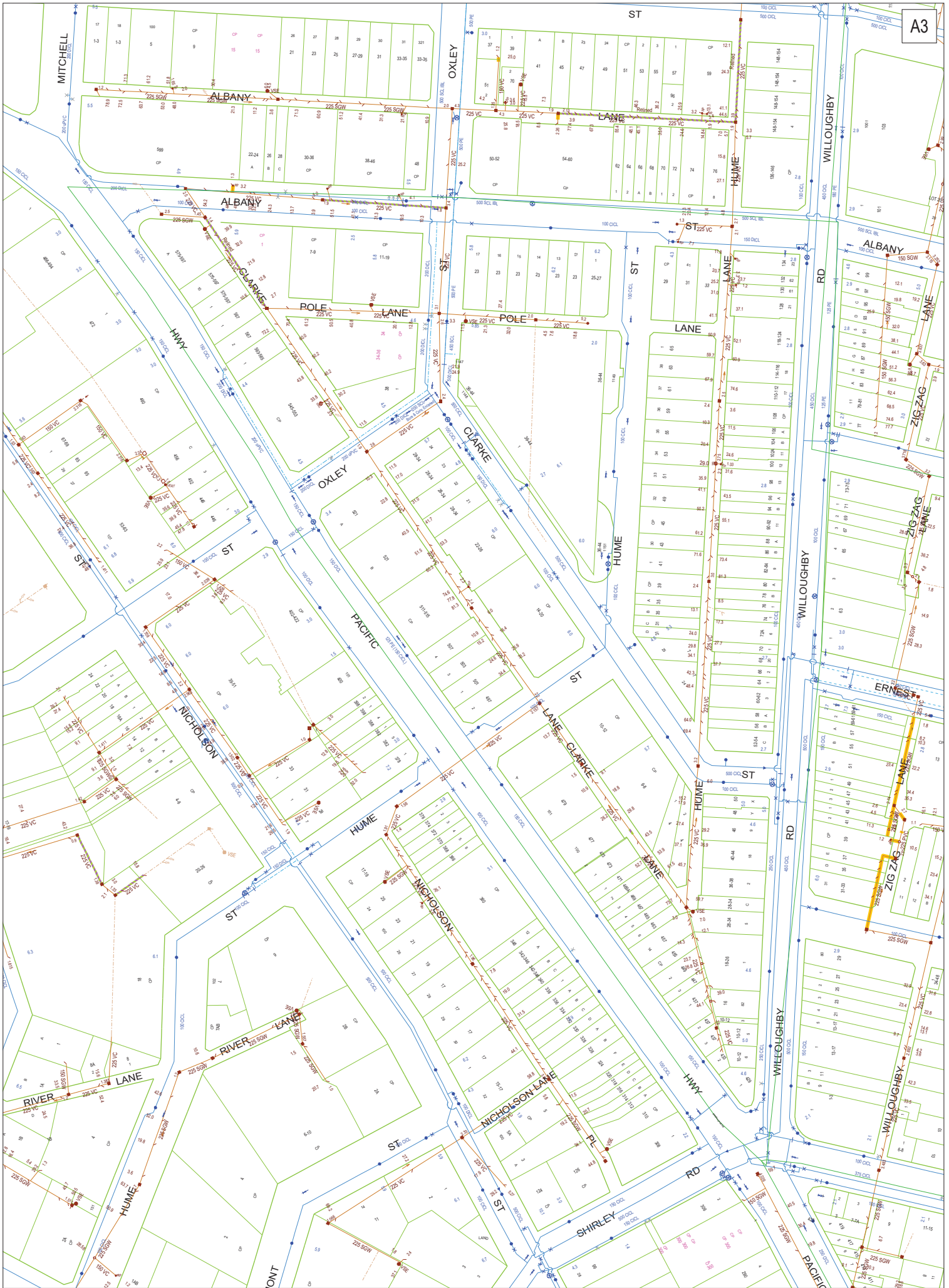
Transport NSW

Showing Detail Levels

ON PARTS OF PACIFIC HIGHWAY, HUME STREET, COLEY STREET, CLARK LANE AT CROSS NEST STREET & CLARK LANE AT CROSS NEST STREET NSW 2005

PR124856

A



Appendix E

Pre-Existing Crows Nest DRAINS Data

Calculation Sheet

Job _____

Design AA008450
Date Jan-18
Checked _____ 0
Date 25/01/2018

Office Sydney
Job No AA008450

SYDNEY METRO CROWS NEST STATION



EXISTING SITES ON SITE DETENTION CALCULATION DRAINS OUTPUT

January 2018



PROJECT TITLE Crow's Nest Station Civil

JOB No PREPARED CHECKED

AA008450 0

AA008450 DATE DATE

31/01/2018 31/01/2018

DATA

DRAINS File Path: F:\10005846\10-Calculations\A-Stormwater\A-DRAINS\C-Models\A-Program\Crows Nest\Crows Nest-Existing.drn
DRAINS Version: 2018.01
Modeller's Name: Akram Arabnejad
Description: ON SITE DETENTION CALCULATION

PIT / NODE DETAILS														
Name	Type	Family	Version 13 Size	Ponding Volume (cu.m)	Pressure Change Coeff. Ku	Surface Elev (m)	Max Pond Depth (m)	Base Inflow (cu.m/s)	Blocking Factor	x	y	Bolt-down lid	id	Part Full Shock Loss
N1	Node							0		248	-184		38885	
N2	Node							0		249	-254		38887	
N7	Node							0		648.4	-246.4		38901	
N10	Node							0		265.6	-616		39129	
N3	Node							0		406	-187		40066	
N4	Node							0		411	-252		40074	
N6	Node							0		578.333	-326.667		40603	
N5	Node							0		452	-314		40613	
N12	Node							0		450.4	-500.8		40631	
N9	Node							0		266.8	-506.8		40659	
N14	Node							0		497.2	-685.6		40725	
N13	Node							0		474.852	-600.64		40741	
N11	Node							0		542.8	-803.2		41110	
N15	Node							0		760	-817.6		41111	
N8	Node							0		780.4	-328		43654	
N22783	Node							0		630.4	-716.8		51254	
N22785	Node							0		694.167	-725		51259	
DETENTION BASIN DETAILS														
Name	Elev	Surf. Area	Not Used	Outlet Type	K	Dia(mm)	Centre RL	Pit Family	Pit Type	x	y	HED	Crest RL	Crest Length
SUB-CATCHMENT DETAILS														
Name	Pit or Node	Total Area (ha)	Paved Area %	Grass Area %	Supp Area %	Paved Time (min)	Grass Time (min)	Supp Time (min)	Paved Length (m)	Grass Length (m)	Supp Length (m)	Paved Slope(%)	Grass Slope %	Supp Slope %
EX-A1	N1	0.0931	100	0	0	5		0	0					
EX-A2	N2	0.0787	100	0	0	5		0	0					
EX-C1	N7	0.0572	100	0	0	5		0	0					
EX-B4	N10	0.048	100	0	0	5		0	0					
EX-A3	N3	0.0994	100	0	0	5		0	0					
EX-A4	N4	0.1205	100	0	0	5		0	0					
EX-B2	N12	0.0179	100	0	0	5		0	0					
EX-B1	N9	0.0334	100	0	0	5		0	0					
EX-B5	N14	0.0184	100	0	0	5		0	0					
EX-B3	N13	0.0684	100	0	0	5		0	0					
PIPE DETAILS														

Name	From	To	Length	U/S IL	D/S IL	Slope	Type	Dia	I.D.	Rough	Pipe Is	No. Pipes	Chg From	At Chg
			(m)	(m)	(m)	(%)		(mm)	(mm)					
DETAILS of SERVICES CROSSING PIPES														
Pipe	Chg	Bottom	Height of Service	Chg	Bottom	Height of S	Chg	Bottom	Height of S	etc				
	(m)	Elev (m)	(m)	(m)	Elev (m)	(m)	(m)	Elev (m)	(m)	etc				
CHANNEL DETAILS														
Name	From	To	Type	Length	U/S IL	D/S IL	Slope	Base Width	L.B. Slope	R.B. Slope	Manning	Depth	Roofed	
				(m)	(m)	(m)	(%)	(m)	(1:?)	(1:?)	n	(m)		
OVERFLOW ROUTE DETAILS														
Name	From	To	Travel	Spill	Crest	Weir	Cross	Safe Depth	SafeDepth	Safe	Bed	D/S Area		Id
			Time	Level	Length	Coeff. C	Section	Major Storm	Minor Storm	DxV	Slope	Contributing		
			(min)	(m)	(m)			(m)	(m)	(sq.m/sec)	(%)	%		
OF1	N1	N2	0.4				7.5 m roadway with 3% crossfall and	0.3	0.15	0.4	3	0		40654
OF2	N2	N5	0.4				7.5 m roadway with 3% crossfall and	0.3	0.15	0.4	3	0		40653
OF6	N7	N8	0.1				7.5 m roadway with 3% crossfall and	0.3	0.15	0.4	1	0		43655
OF11	N10	N11	0.2				7.5 m roadway with 3% crossfall and	0.3	0.15	0.4	3	0		41118
OF3	N3	N4	0.4				7.5 m roadway with 3% crossfall and	0.3	0.15	0.4	3	0		40655
OF4	N4	N5	0.6				7.5 m roadway with 3% crossfall and	0.3	0.15	0.4	1	0		40652
OF5	N5	N6	0.1				7.5 m roadway with 3% crossfall and	0.3	0.15	0.4	6	0		40630
OF12	N12	N13	0.1				7.5 m roadway with 3% crossfall and	0.3	0.15	0.4	5	0		40743
OF10	N9	N10	0.1				7.5 m roadway with 3% crossfall and	0.3	0.15	0.4	3	0		40734
OF14	N14	N22783	0.1				7.5 m roadway with 3% crossfall and	0.3	0.15	0.4	3	0		41119
OF13	N13	N14	0.1				7.5 m roadway with 3% crossfall and	0.3	0.15	0.4	3	0		40748
OF15	N11	N15	0.1				7.5 m roadway with 3% crossfall and	0.3	0.15	0.4	1	0		41124
OF13784	N22783	N22785	0.1				7.5 m roadway with 3% crossfall and	0.3	0.15	0.4	1	0		51264
OF13782	N22785	N11	0.1				7.5 m roadway with 3% crossfall and	0.3	0.15	0.4	1	0		51262
PIPE COVER DETAILS														
Name	Type	Dia (mm)	Safe Cover (m)	Cover (m)										
This model has no pipes with non-return valves														

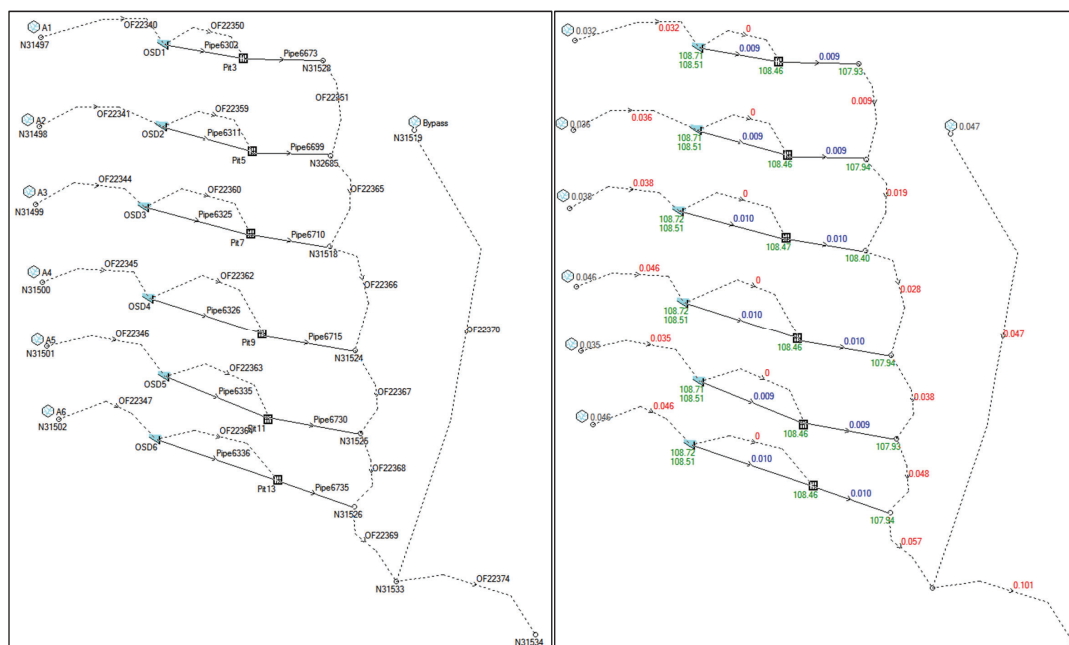


PROJECT Crows Nest JOB No AA008450
PREPARED AA008450 DATE 31/01/2018
CHECKED 0 DATE 31/01/2018
TITLE 100 YEAR ARI

DRAINS File Path:	F:\10005846\100-Calculations\100-Stormwater\100-DRAINS\100-Models\100-Program\100-Crows Nest\100-Crows Nest-Existing.drn
DRAINS Version:	2018.01
Modeller's Name:	Akram Arabnejad
Description:	ON SITE DETENTION CALCULATION

DRAINS results prepared from Version 2018.01								RESULTS 5 YEAR ARI			
PIT / NODE DETAILS				Version 8							
Name	Max HGL	Max Pond HGL	Max Surface Flow Arriving (cu.m/s)	Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint				
SUB-CATCHMENT DETAILS											
Name	Max Flow Q (cu.m/s)	Paved Max Q (cu.m/s)	Grassed Max Q (cu.m/s)	Paved Tc (min)	Grassed Tc (min)	Supp. Tc (min)	Due to Storm				
EX-A1	0.041	0.041	0	5	0	0	AR&R 5 year, 25 minutes storm, average 82.0 mm/h, Zone 1				
EX-A2	0.035	0.035	0	5	0	0	AR&R 5 year, 25 minutes storm, average 82.0 mm/h, Zone 1				
EX-C1	0.025	0.025	0	5	0	0	AR&R 5 year, 25 minutes storm, average 82.0 mm/h, Zone 1				
EX-B4	0.021	0.021	0	5	0	0	AR&R 5 year, 25 minutes storm, average 82.0 mm/h, Zone 1				
EX-A3	0.044	0.044	0	5	0	0	AR&R 5 year, 25 minutes storm, average 82.0 mm/h, Zone 1				
EX-A4	0.054	0.054	0	5	0	0	AR&R 5 year, 25 minutes storm, average 82.0 mm/h, Zone 1				
EX-B2	0.008	0.008	0	5	0	0	AR&R 5 year, 25 minutes storm, average 82.0 mm/h, Zone 1				
EX-B1	0.015	0.015	0	5	0	0	AR&R 5 year, 25 minutes storm, average 82.0 mm/h, Zone 1				
EX-B5	0.008	0.008	0	5	0	0	AR&R 5 year, 25 minutes storm, average 82.0 mm/h, Zone 1				
EX-B3	0.03	0.03	0	5	0	0	AR&R 5 year, 25 minutes storm, average 82.0 mm/h, Zone 1				
Outflow Volumes for Total Catchment (0.63 impervious + 0.00 pervious = 0.63 total ha)											
Storm	Total Rainfall cu.m	Total Runoff cu.m (Runoff %)	Impervious Runoff cu.m (Runoff %)	Pervious Runoff cu.m (Runoff %)							
AR&R 5 year,	83.61	77.26 (92.4%)	77.26 (92.4%)	0.00 (0.0%)							
AR&R 5 year,	130.18	123.83 (95.1%)	123.83 (95.1%)	0.00 (0.0%)							
AR&R 5 year,	165.1	158.75 (96.2%)	158.75 (96.2%)	0.00 (0.0%)							
AR&R 5 year,	192.62	186.27 (96.7%)	186.27 (96.7%)	0.00 (0.0%)							
AR&R 5 year,	216.96	210.61 (97.1%)	210.61 (97.1%)	0.00 (0.0%)							
AR&R 5 year,	238.13	231.78 (97.3%)	231.78 (97.3%)	0.00 (0.0%)							
AR&R 5 year,	290.52	284.17 (97.8%)	284.17 (97.8%)	0.00 (0.0%)							
AR&R 5 year,	330.2	323.85 (98.1%)	323.85 (98.1%)	0.00 (0.0%)							
AR&R 5 year,	387.66	381.31 (98.4%)	381.31 (98.4%)	0.00 (0.0%)							
AR&R 5 year,	433.07	426.72 (98.5%)	426.72 (98.5%)	0.00 (0.0%)							
AR&R 5 year,	504.82	498.48 (98.7%)	498.48 (98.7%)	0.00 (0.0%)							
AR&R 5 year,	585.85	579.49 (98.9%)	579.49 (98.9%)	0.00 (0.0%)							
PIPE DETAILS											
Name	Max Q (cu.m/s)	Max V (m/s)	Max U/S HGL (m)	Max D/S HGL (m)	Due to Storm						
CHANNEL DETAILS											
Name	Max Q (cu.m/s)	Max V (m/s)			Due to Storm						
OVERFLOW ROUTE DETAILS											
Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max Dxv	Max Width	Max V	Due to Storm			
OF1	0.041	0.041	0.532	0.065	0.09	1.29	1.33	AR&R 5 year, 25 minutes storm, average 82.0 mm/h, Zone 1			
OF2	0.075	0.075	0.532	0.078	0.11	1.74	1.46	AR&R 5 year, 25 minutes storm, average 82.0 mm/h, Zone 1			
OF6	0.025	0.025	0.307	0.066	0.05	1.33	0.78	AR&R 5 year, 25 minutes storm, average 82.0 mm/h, Zone 1			
OF11	0.036	0.036	0.532	0.062	0.08	1.2	1.31	AR&R 5 year, 25 minutes storm, average 82.0 mm/h, Zone 1			
OF3	0.044	0.044	0.532	0.066	0.09	1.33	1.36	AR&R 5 year, 25 minutes storm, average 82.0 mm/h, Zone 1			
OF4	0.096	0.096	0.307	0.101	0.1	2.51	0.96	AR&R 5 year, 25 minutes storm, average 82.0 mm/h, Zone 1			
OF5	0.171	0.171	0.635	0.091	0.2	2.17	2.23	AR&R 5 year, 25 minutes storm, average 82.0 mm/h, Zone 1			
OF12	0.008	0.008	0.687	0.034	0.04	0.39	1.2	AR&R 5 year, 25 minutes storm, average 82.0 mm/h, Zone 1			
OF10	0.015	0.015	0.532	0.046	0.05	0.67	1.16	AR&R 5 year, 25 minutes storm, average 82.0 mm/h, Zone 1			
OF14	0.046	0.046	0.532	0.067	0.09	1.37	1.36	AR&R 5 year, 25 minutes storm, average 82.0 mm/h, Zone 1			
OF13	0.038	0.038	0.532	0.063	0.08	1.24	1.33	AR&R 5 year, 25 minutes storm, average 82.0 mm/h, Zone 1			
OF15	0.081	0.081	0.307	0.096	0.09	2.33	0.94	AR&R 5 year, 25 minutes storm, average 82.0 mm/h, Zone 1			
OF13784	0.046	0.046	0.307	0.08	0.07	1.8	0.85	AR&R 5 year, 25 minutes storm, average 82.0 mm/h, Zone 1			
OF13782	0.046	0.046	0.307	0.08	0.07	1.8	0.85	AR&R 5 year, 25 minutes storm, average 82.0 mm/h, Zone 1			
DETENTION BASIN DETAILS											
Name	Max WL	Max Vol	Max Q Total	Max Q Low Level	Max Q High Level						
CONTINUITY CHECK for AR&R 5 year, 25 minutes storm, average 82.0 mm/h, Zone 1											
Node	Inflow (cu.m)	Outflow (cu.m)	Storage Change (cu.m)	Difference %							
N1	30.88	30.88	0	0							
N2	56.98	56.98	0	0							
N7	18.97	18.97	0	0							
N10	27	27	0	0							
N3	32.97	32.97	0	0							
N4	72.93	72.93	0	0							
N6	129.91	129.91	0	0							
N5	129.91	129.91	0	0							
N12	5.94	5.94	0	0							
N9	11.08	11.08	0	0							
N14	34.73	34.73	0	0							
N13	28.62	28.62	0	0							
N11	61.72	61.72	0	0							
N15	61.72	61.72	0	0							
N8	18.97	18.97	0	0							
N22783	34.73	34.73	0	0							
N22785	34.73	34.73	0	0							
Run Log for Crows Nest run at 19:32:57 on 25/1/2018											
Flows were safe in all overflow routes.											

Site A



Proposed Crows Nest Over Station Development DRAINS Data