128 & 130-150 Bunnerong Road, Eastgardens

Pagewood Part II - Due Diligence Report

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Finalisation signatures

The design described in this report is considered to have been finalised.

Signature	**Date**
Michael Guinane Civil Engineer (Author)	29/03/17
Graham Brechney Lead Designer	29/03/17
Anthony McLandsborough Director	29/03/17

Notes: The finalisation signatures shown above do not provide evidence of approval to the design. Approval signatures are shown on the title sheet of the design plans.

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1 Introduction

The development of the 128 & 130-150 Bunnerong Road, Pagewood site is within the Botany Bay City Council Local Government Area (LGA). The site was previously owned by British American Tobacco (BATA) is classified as the land bound by Bunnerong Road to the east, Banks Avenue to the west, Westfield Drive to the south and Heffron Road to the north.

This report is intended to support an application to rezone the site from part IN1 General Industrial Zone and part R3 Medium Density Residential Zone to the R4 High Density Residential.".

The site consists of Lot 1 DP 1187426 & the northern portion of Lot 2 DP 1187426 and is approximately 8.95 Ha in area. The combined site area is 16.5Ha.

This Due Diligence Report addresses the following Civil Infrastructure items, Stormwater Management, Water Quality and Utilities and has been prepared to satisfy Bayside Council (formerly Botany Bay City Council) requirements for the proposed development of the civil works on the site.

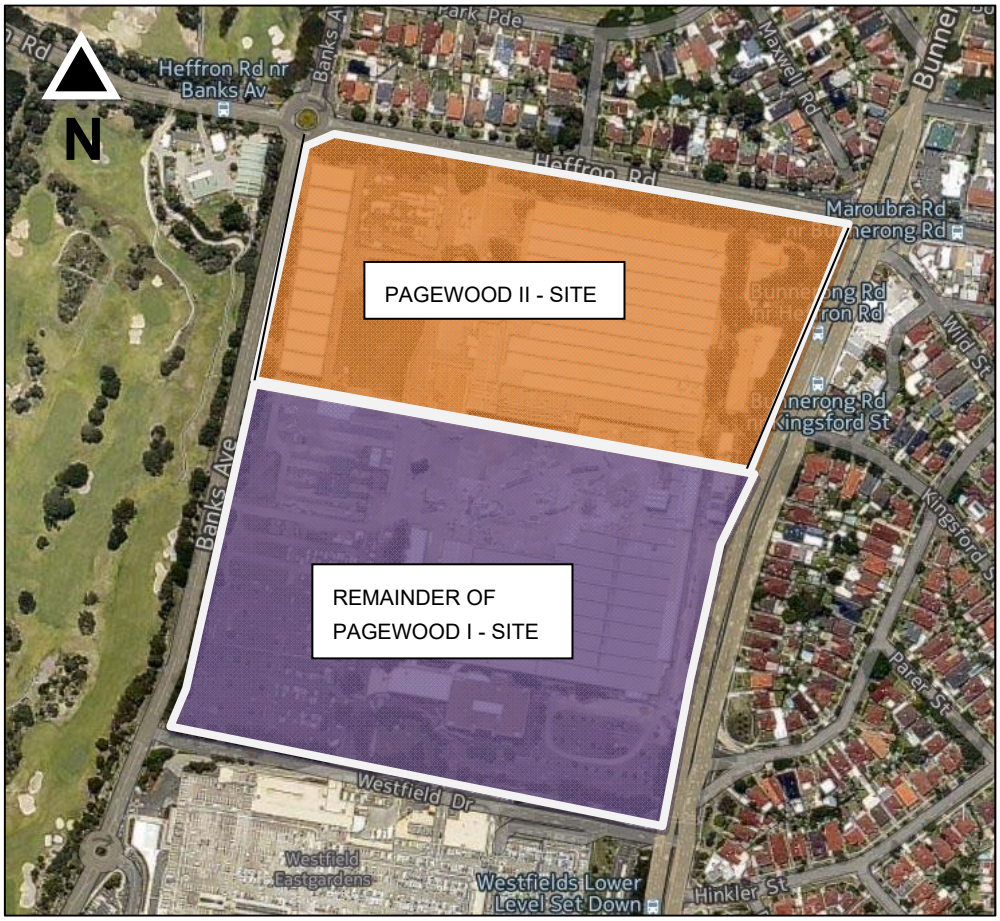

Figure 1 Location Plan

1.1 Existing Site

The entirety of the site currently comprises factory buildings and bitumen carpark which results in the entire site being an impermeable area.

A survey carried out by Denny Linker & Co in May 2011 indicates levels throughout the site are generally flat with a gentle fall towards Heffron Road.

Stormwater from the site currently drains to the north west of the site towards a trunk stormwater pipe network and ultimately to discharge into an existing Sydney Water culvert (2.44m wide by 1.21m high) which drains through the site in a south east direction. No external catchment drains into the site.

1.2 Proposed Development

The development will involve all major road works, stormwater and services. Based on the Hassell Master Plan of march 2017. See Figure 2 below.

This Application seeks approval for the civil works associated with the revised overall development of the site as described below.

Figure 2 Master Plan

2 Road Geometry

This report should be read in conjunction with 128 Bunnerong Road, Pagewood - *Proposed Masterplan Stage 1 Development Application Transport Report* Dated 1st May 2014 prepared by GTA.

2.1 General Design Principles

The roads will be generally designed in accordance with:

- City of Botany Bay Part 9D British American Tobacco Australasia (BATA) Site Development Control Plan –2013.
- Austroads Guide to Road Design Part 3: Geometric Design

The roads will be generally designed in accordance with the DRAFT DCP for the site.

2.2 Access

The site has proposed vehicular access off Heffron Road, Banks Ave and Meriton Boulevard.

2.3 Horizontal and Vertical Geometry

The internal roads will be designed generally in accordance with Councils DCP, AS2890.1, AS1428.1 and NSW Fire Brigades Policy to accommodate 8.8m Garbage Truck, 12.5m Bus and Fire Truck Aerial Appliance Access.

2.3.1 Road Cross Sections

North South Road 2

- 18m wide Road Reserve
- 13m wide Carriageway (2.5m Parking, 3.0 - 4.0m Lane)
- 2m wide Median

Local Street

- 16m wide Road Reserve
- 11m wide Carriageway (2.5m Parking, 3.0m Lane)

All alterations to lane widths from the Council DCP may be proposed in accordance with the relevant Standards and advice from Traffic Consultant. Minimum traffic lane widths are utilised to discourage speeding through Local Streets and encourage pedestrian safety.

2.4 Pavement

Pavement will be designed based on the requirements of:

- Austroads Pavement Design Guide – Part 2 - Pavements Structural Design, 2012 (AGPT02-12),
- Concrete Masonry Association Guidelines (MA44 and T45); and
- Site specific CBR values and traffic ESAs.

3 Stormwater & WSUD Management

3.1 General Design Principles

The stormwater management plan for the site will be generally designed in accordance with the following codes and guidelines:

- City of Botany Bay Technical Guidelines on British American Tobacco Australasia (BATA) Site – July 2013.
- Stormwater Management and Flooding Report, Rezoning of Lot 1 DP 776089 Eastgardens. Report Ref 211530 , 10 October 2011 Revision 8 by Aurecon
- Flood Study Report, Rezoning of Lot 1 DP 776089 Eastgardens. Report Ref 211530 FSR , 02 November 2011 Revision 1 by Aurecon
- Utility Services Infrastructure Report, Rezoning of Lot 1 DP 776089 Eastgardens. Report Ref 211530 , 8 August 2011 Revision 2 by Aurecon
- Australian Standards - AS 3500.3 National Plumbing and Drainage Code - Part 3 – Stormwater Drainage
- Australia publication “Australian Rainfall and Runoff, Volumes 1 and 2 (AR&R)

3.2 Stormwater Management

3.2.1 Hydrology

- Pipe drainage within the site shall be designed to accommodate the 20-year ARI storm event
- The combined piped and overland flow paths shall be designed to accommodate the 100-year ARI storm event
- Where trapped low points are unavoidable and potential for flooding private property is a concern, an overland flowpath capable of carrying the total 100-year ARI storm event shall be provided. Alternatively the pipe and inlet system may be upgraded to accommodate the 100 year ARI storm event
- Rainfall intensities shall be as per the Intensity-Frequency-Duration table in accordance with the Australian Rainfall and Runoff volume 2
- Times of concentration for each subcatchment shall be determined using the kinematic wave equation
- Runoff coefficients shall be calculated in accordance with the AR&R. The fraction impervious shall be determined from analysis of the subcatchments

- Flow width in gutter shall not exceed 1.5m for the minor design storm event.
- Velocity depth rations shall not exceed 0.4 for all storms up to and including the 100 year ARI event
- Blockage factors of 20% and 50% shall be adopted for pits on grade and at sags respectively for all storm events
- The maximum spacing between pits shall be 60m
- The minimum lintel size for any road drainage pit shall be 2.4m (3.6m for East-West Boulevard)

3.2.2 Hydraulics

- A hydraulic grade line HGL design method shall be adopted for all road pipe drainage design. The HGL shall be shown on all drainage long sections
- The minimum pipe size shall be 375mm diameter
- The minimum pipe grade shall be 0.5%
- All pipes shall be Rubber Ring jointed
- The minimum cover over pipes shall be 500mm
- All trafficable pipes shall be Class 3 Reinforced Concrete Pipes or Fibre Reinforced Cement equivalent
- The pipe friction coefficients to be adopted shall be:

Materials	Mannings – n	Colebrook-White – k	Min. Pipe Class
RCP	0.012	0.3	3
FRC	0.01	0.15	3

Table 1 - Pipe Details

- All pipes shall be designed for the ultimate service loads and where applicable, construction loads will be designed for
- Where the tailwater level is unknown 150mm freeboard shall be adopted
- Pit Loss coefficients shall be calculated in accordance with Missouri Charts
- A minimum 150mm freeboard shall be maintained between pit HGL and pit surface levels
- Overland flowpaths shall maintain a minimum of 500mm freeboard to all habitable floor levels
- Pits deeper than 1.2m shall contain step irons at 300mm centres

3.3 Proposed Stormwater

Within Section 2.2 of the *Stormwater Management and Flooding Report* by Aurecon is the clause *"Discussions with Sydney Water indicate that surface water from the new rezoned area (i.e. new proposed residential and retail area) will continue to discharge into the Sydney Water culvert after flow reductions have been achieved through on-site detention."*

Stormwater from the proposed building lots will drain via internal OSD tanks (Some with Infiltration) with water quality devices prior to discharging into the surrounding street network and ultimately the Sydney Water Culvert.

As part of the Initial Pagewood Development, and due to the existing flat gradient of the existing Sydney Water culvert it was proposed to replace the existing 1050mm diameter pipe in the northern portion of the site and box culvert with a new 1200mm diameter pipe laid at a steeper gradient. This new pipe will connect the majority of the Pagewood Part II Development.

Based on the City of Botany Bay Technical Guidelines on the BATA site a maximum Permissible Site Discharge (PSD) of 5,849L/second needs to be achieved. Further to this requirement Sydney Water imposed PSD of 3,657L/sec for water discharging into the Sydney Water Culvert; under the Case Number 124768. Also a minimum Site Storage Requirement (SSR) of 2,970m^3 is required across the site. Refer Appendix A for Sydney Water requirements.

Through DRAINs modelling the above most onerous conditions have been achieved:

- PSD = 3,657 L/s
- SSR = 2,970 m^3

Refer Table 2 below for summary of PSD vs Post Developed Discharge and Appendix D for DRAINs results.

	PSD (m^3/s)	Discharge (m^3/s)
Outlet	3.65	3.56

Table 2 – PSD vs Post Developed Discharge

Refer to Sketch within Appendix C for proposed stormwater networks.

3.4 On-Site Detention (OSD)

On Site Detention tanks will be placed in building lots to detain flows for all storms up to the 100 year ARI events. These tanks will:

- Reduce runoff volumes by infiltration to sub-soils (if allowable); and
- Delay runoff peaks by providing detention storage capacity

To achieve the required minimum OSD volume of 2,970m^3, detention tanks are proposed within each building which will be pro-rated across all buildings, as outlined in Table 3. It is noted the minimum OSD volume is exceeded, in order to achieve the PSD. This is as a result of the Open Space and Road reserve flows bypassing the OSD.

Building No.	Lot Area (Ha)	OSD Volume (m^3)	Method of OSD
Urban Block A	0.191	170	INFILTRATION
Urban Block B	0.506	401	INFILTRATION
Urban Block C	5.30	257	INFILTRATION
Urban Block D	0.110	109	INFILTRATION
Urban Block E	0.369	350	INFILTRATION
Urban Block F	0.394	388	INFILTRATION
Urban Block G	0.136	138	INFILTRATION
Urban Block H	0.365	343	INFILTRATION
Urban Block I	0.380	365	INFILTRATION
Urban Block 3	0.75	333	HED
Urban Block 4	0.64	365	INFILTRATION
Urban Block 5 East	0.80	355	HED
Urban Block 5 West	1.01	513	HED
Urban Block 5 Central	1.00	353	HED
Central Park	0.80	-	N/A
Open Space II	2.17	-	N/A
Road Reserve	1.529	-	N/A
Total	**16.45**	**4440 (Nominal)**	

Table 3 – Minimum OSD Requirements

3.4.1 Infiltration

The infiltration rate for the site has be determined to be 7x10^{-5} by Coffey. Refer Geotechnical Report GEOTLCOV24928AE-AH Dated 26 October 2016.

The tanks have been sized to ensure 100% infiltration into the subgrade with zero outflow. This has the benefit of reducing the required pipe size in the surrounding roadways as well as negating the need to OSD on the Open Space lots.

3.5 Water Sensitive Urban Design (WSUD)

3.5.1 Policy and Guidelines

The stormwater design considers the following guidelines:

- Australian Rainfall Quality (2006)
- Department of Environment and Climate Change NSW (DECC), Management Urban Stormwater: Urban Design (Consultation Draft, 2008)
- Botany Bay Catchment Water Quality Improvement Plan (WQIP)
- Botany Bay Local Environmental Plan (LEP) 2013

3.5.2 Music Modeling Parameters

Climate Date

Rainfall Station 66037 Sydney with 6 minute timestep was used in the MUSIC model.

Pollutant Concentration Parameters

Stormwater pollutant parameters used in the MUSIC model will be adopted from the following guidelines:

- NSW MUSIC Modeling Guidelines (CMA, 2010)
- Using MUSIC in Sydneys Drinking Water Catchment (SCA, 2012)

Pollutant concentration parameters for each land-use type adopted in the MUSIC model are shown in Table 4a and 4b below.

Catchment Type	TSS (mg/L)		TP (mg/L)		TN (mg/L)	
	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Residential/Commercial	1.200	0.170	-0.850	0.190	0.110	0.120
Sealed Roads	1.200	0.170	-0.850	0.190	0.110	0.120

Table 4a Adopted base flow concentration parameters

Catchment Type	TSS (mg/L)		TP (mg/L)		TN (mg/L)	
	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Residential/Commercial	2.15	0.32	-0.60	0.25	0.30	0.19
Sealed Roads	2.43	0.32	-0.30	0.25	0.34	0.19

Table 4b Adopted storm flow concentration parameters

3.5.3 Objectives

These stormwater management objectives will be applied to treating stormwater runoff from the development to meet pollution reduction targets outlined in Table 5.

Pollutants	Retention Objectives
Total Suspended Solids (TSS)	85%
Total Phosphorus	60%
Total Nitrogen (TN)	45%
Gross Pollutants	90%

Table 5 Pollutant Retention

The proposed stormwater management for this development will also ensure the Botany Bay LEP clause 6.3 (as stated below) on Stormwater Management is met.

(c) avoids any significant adverse impacts of stormwater runoff on adjoining properties, native bushland and receiving waters, or if that impact cannot be reasonably avoided, minimises and mitigates the impact

In order to achieve these reductions, a treatment train approach will be implemented into the development where the following treatment measures will be used:

- Rainwater Tanks – used for stormwater re-use from roofed areas
- On Site Detention - stormwater will be captured and detained in OSD tanks (with infiltration if required) to capture water and slow the discharge rates
- Gross Pollutant Traps (GPTs) – used to reduce the gross pollutants from the stormwater runoff
- Tertiary Treatment Devices – used to reduce TSS, TN and TP.
- Vegetated Swales – used to remove coarse and medium sized sediments from roadways and overland flow

3.5.4 Stormwater Quality Improvement Devices (SQIDS)

Proposed SQIDs used in the proposed development are described in Table 7 below.

Element	Water Quality Function	Description	Preliminary Specification
Rainwater Tank (RWT)	Stormwater Harvesting for re-use as Irrigartion and/or grey water	10kL tank min. to be included to collect roof runoff for each Block	Properties assumed for modeling purposes: Volume below pipe: 10kL Depth above overflow pipe: 0.2m Surface Area: 10sq.m Re-use: 5kL/day
On-Site Detention Tank (OSD)	Provide temporary storage and control of stormwater generated within the site	OSD tanks to be included to collect all runoff from each Block	OSD tank properties for modeling purposes: Surface Area: DRAINs Extended detention depth: 1.5m Exfiltration Rate: 0mm/hr Evaporative Loss % of PET: 100%
Pit Inserts (i.e. Enviropods or Similar)	Captures trash, debris, and other pollutants by catch basin inserts installed in stormwater pits	Pit inserts to be installed in all pits on site.	Treatement efficiencies of the pit inserts based on the Enviropod treatement node provided by Stormwater 360: TSS: 55% retention TN: 20% retention TP: 30% retention Gross Pollutant: 100% retention
Primary Gross Pollutant Traps – GPT (i.e. Humeguard or Similar)	Removal of gross pollutants and course sediments of low flow events	Humeguard Unit to be included to collect roof runoff for each Block	Treatment efficiencies of the GPT based on Humeguard node provided by Humes: TSS: 50% retention TN: 20% retention TP: 20% retention Gross Pollutant: 85% retention
Tertiary Gross Pollutant Trap – GPT (i.e. Jellyfish or Similar)	Removal of fine solids, soluble heavy metals, oil and nutrients through filtration of low flow events	Jellyfish Unit to be included to collect roof runoff for each Block	Treatment efficiencies of the GPT based on Jellyfish node provided by Humes: TSS: 85% retention TN: 51% retention TP: 59% retention Gross Pollutant: 99% retention
Swales	Removal of gross pollutants and course sediments of low flow events	Swales to be included to collect runoff from roads and open space	Swale properties for modeling purposes: K (m/yr) 8000 / C* (mg/L) / C** (mg/L) TSS: 6000 / 20.000 / 14.000 TP: 500 / 0.130 / 0.130 TN: / 1.400 / 1.400

Table 7 Statistics – Summary of proposed SQIDs

3.5.5 Sediment and Erosion Control (Construction)

Stormwater runoff generated from within the works area during construction will likely contain sediments and oils from construction machinery. A number of options are available for the removal of these contaminants from stormwater, some of which include:

- Wheel wash down/cattle grid at site access
- Sediment fence at downstream boundary
- Stabilisation of finished areas

Erosion and Sedimentation controls are to be installed and maintained in accordance with Department of Housing (1998), *Managing Urban Stormwater, Soils and Construction*, Fourth Edition. Following are possible levels of control that are to be constructed.

- Silt fences shall be installed along the base of excavated slopes and stockpiles to prevent runoff.
- Kerb inlet sediment traps are to be installed at the completion of the drainage works. Whilst works are underway, geotextile filter fabric fences are to be installed around open pits.

3.6 Flooding and Overland Flows

The Stormwater Management and Flooding Report by Aurecon outlines the flooding affects of the development. Section 4.2 states:

"The proposed stormwater management strategy outlined in this report will lead to a reduction in the peak runoff from the site through the inclusion of a number of techniques:"

- *Increase in permeable surface area by 15% of total site area*
- *On-site detention tanks*

"Our preliminary analysis, based on the rezoning Masterplan, has resulted in the reduction of peak flows for all storms up to the ARI 100-year storm. Detailed analysis is required at the Development Application stage when the building footprint, external access roads and parking and landscaping is detailed to a stage that permits the location of the required vegetated swales and underground pipe system."

Within Section 4.3 of the report Aurecon summarise that with the increase of permeable areas and inclusion of on-site detention basins, the peak stormwater flows off site post development will be less than pre developed rates. This is stated in Section 4.3 as follows:

"The reduction of the existing site discharge to less than the Sydney Water requirement will lead to a reduction in the runoff of stormwater from the site onto

the external roads and the collection of this water into the stormwater pipe system that serves these roads."

3.6.1 Flood Levels

External Flood Levels along Bunnerong Road and Heffron Road have been determined by the Aurecon Report and are to be adopted when setting habitable floor levels with adequate freeboard. Refer to Figure 3 below for extract of Flood levels.

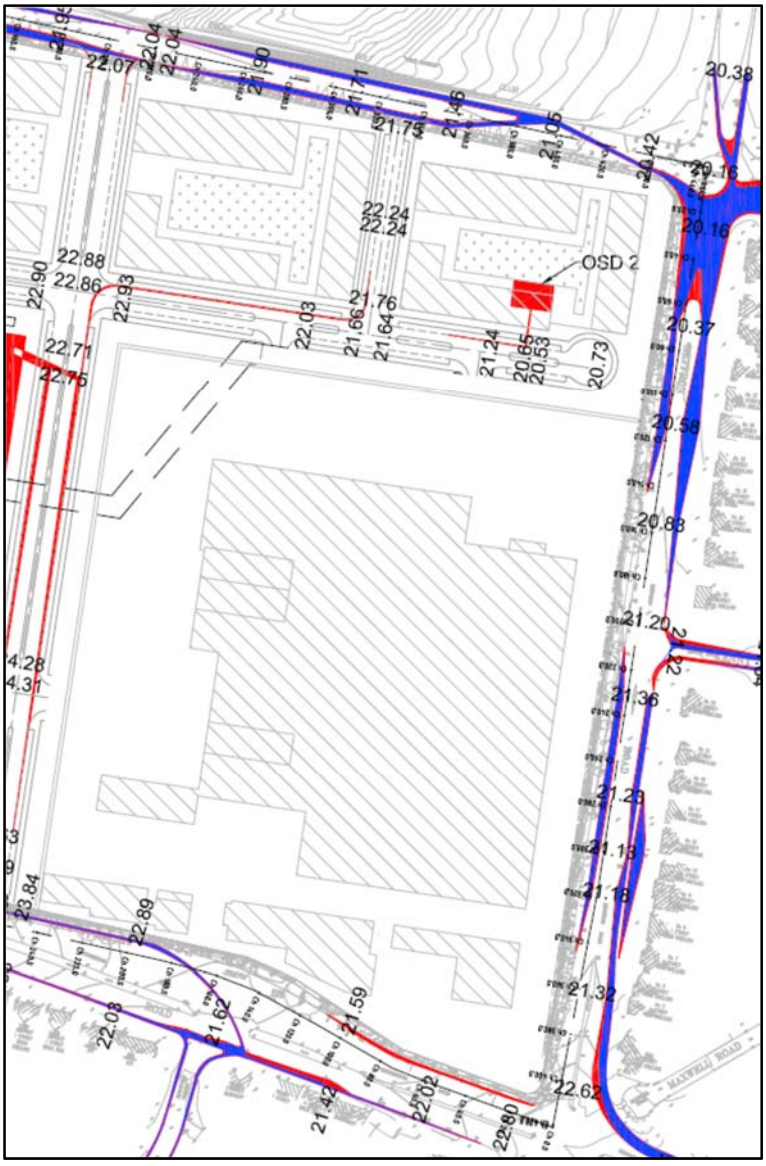

Figure 3 – Flood Levels (*Appendix D – Aurecon Flood Report*)

Car park entry levels and habitable floor levels are to be 300mm above the adjacent top of kerb as per Part 8(v) of the DCP.

4 Utilities

4.1 Aurecon Utilities Report

A Utility Services Infrastructure Report Rezoning of Lot 1 DP 776089 Eastgardens, Report Ref: 211530, 8 August 2011 Revision 2 by Aurecon discusses all utility services across the site and proposed works required to service the development.

Based on the Aurecon Report and the MotMacdonald Feasibility Application the following works are required for each utility to service the development:

4.1.1 Potable Water (WSC MotMacdonald)

The water servicing coordinator will determine if there is enough capacity within the existing water main to service the proposed development. For the internal water reticulation of the site the following will likely be required:

- A water main extension must be constructed along proposed roads to provide frontage to all lots
- New 200mm Diameter mains have been installed within the road reserves of Stage 1 that can provide connections to the proposed additional Urban Blocks.
- A proposed 200mm Diameter main may need to be required to interconnect the two existing water mains in Heffron and Meriton Blv.

A feasibility application under Case Number 160744 has been lodged. The development will be subject to Section 73 Application by Water Servicing Coordinator.

4.1.2 Recycled Water (WSC MotMacdonald)

Based on advice from Sydney Water there is no proposal to provide recycled water to the development from outside sources. Rainwater tanks and grey-water treatment tanks may be incorporated during detailed design to reduce the requirement of potable water.

4.1.3 Sewer (WSC MotMacdonald)

It is anticipated based on previous advice from Sydney Water that there is adequate capacity within the existing sewer to connect the development.

As part of the previous stage of works a section of the existing Sydney Water sewer pipe traversing the site has been relocated to avoid future lots. The existing 375mm Diameter main running through the site may need to be adjusted to suit the proposed layout and sewer reticulation mains extended to service the individual Urban Blocks, subject to Sydney Water requirements.

A feasibility application under Case Number 160744 has been lodged. The development will be subject to Section 73 Application by Water Servicing Coordinator.

4.1.4 Electricity (By Others)

Agreement will need to be reached with Ausgrid for any HV lead in services.

Any reticulation within the development will include the normal cabling, ducting, road crossings, HV substations, lot connection boxes and street lighting. It is anticipated any electrical cables will be installed within a shared trench with gas and telecommunications.

Subject to ASP1 design and Ausgrid Approval.

4.1.5 Telecommunications

This development will require the upgrading of all future telecommunications infrastructure to optical fibre in order to comply with the requirements of the Federal Governments NSW Policy. The extent of these upgrade works will need to be confirmed with Telstra.

4.1.6 Gas

Based on advice from Jemena there is adequate gas supply within the existing gas infrastructure to service the development. Gas mains (PE), compressors, vents and lot connections will be installed as required by Jemena.

For a detailed description of all existing and proposed utilities for the development refer to the Aurecon Utilities Report which formed part of the rezoning of the site.

5 CONCLUSION

This report has demonstrated that a storm water system consistent with good management practices can be provided for the proposed development and can achieve the target requirements for Council and Sydney Waters OSD and WSUD principles.

The Aurecon Utility report indicates all other required services for the development are within the vicinity. All supply and connections will need to be confirmed with the relevant authorities.

Appendix A

Sydney Water Correspondence

From: ORTEGA, FERNANDO [mailto:FERNANDO.ORTEGA@sydneywater.com.au]
Sent: Monday, March 31, 2014 12:07 PM
To: Anthony McLandsborough
Cc: JEYADEVAN, JEYA
Subject: RE: Pagewood Stormwater Options

Good morning Anthony

We are comfortable with Option 3. However, please note this site was part of a previous development application to Sydney Water for Subdivision of Lot 1 DP 776089.

Sydney Water's requirements must be met. Please refer to Case Number 124768 and/or attached Terms of Reply for stormwater which were included in the NOR.

OSD is required for this site. As per Sydney Waters requirements on Case Number 124768 for the proposed subdivision of Lot 1 DP776089 OSD is required for the discharge of stormwater into Sydney Water system.

- OSD of 18 cubic meter / 1000 square meters
- Permissible Site Discharge of 35 litres per second per 1000 square meters
- Must comply with Councils OSD requirements

Water Sensitive Urban Design

Direct Connections to Sydney Waters stormwater system must meet the following stormwater water quality targets, as per WSUD MUSIC model.

90% Gross Pollutants

85% Total Suspended Solids

60% Total Phosphorous

45% Total Nitrogen.

Flood Study, please refer to the flood study for Subdivision of Lot 1 DP 776089.

Stormwater Easement requirements

I will be happy to meet and discuss these with Jeya as he was involved in previous discussions later in the week preferably Thursday afternoon at 1.30 pm or morning

Regards

Fernando Ortega | Senior Asset Planner, Land and Waterways

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Appendix B

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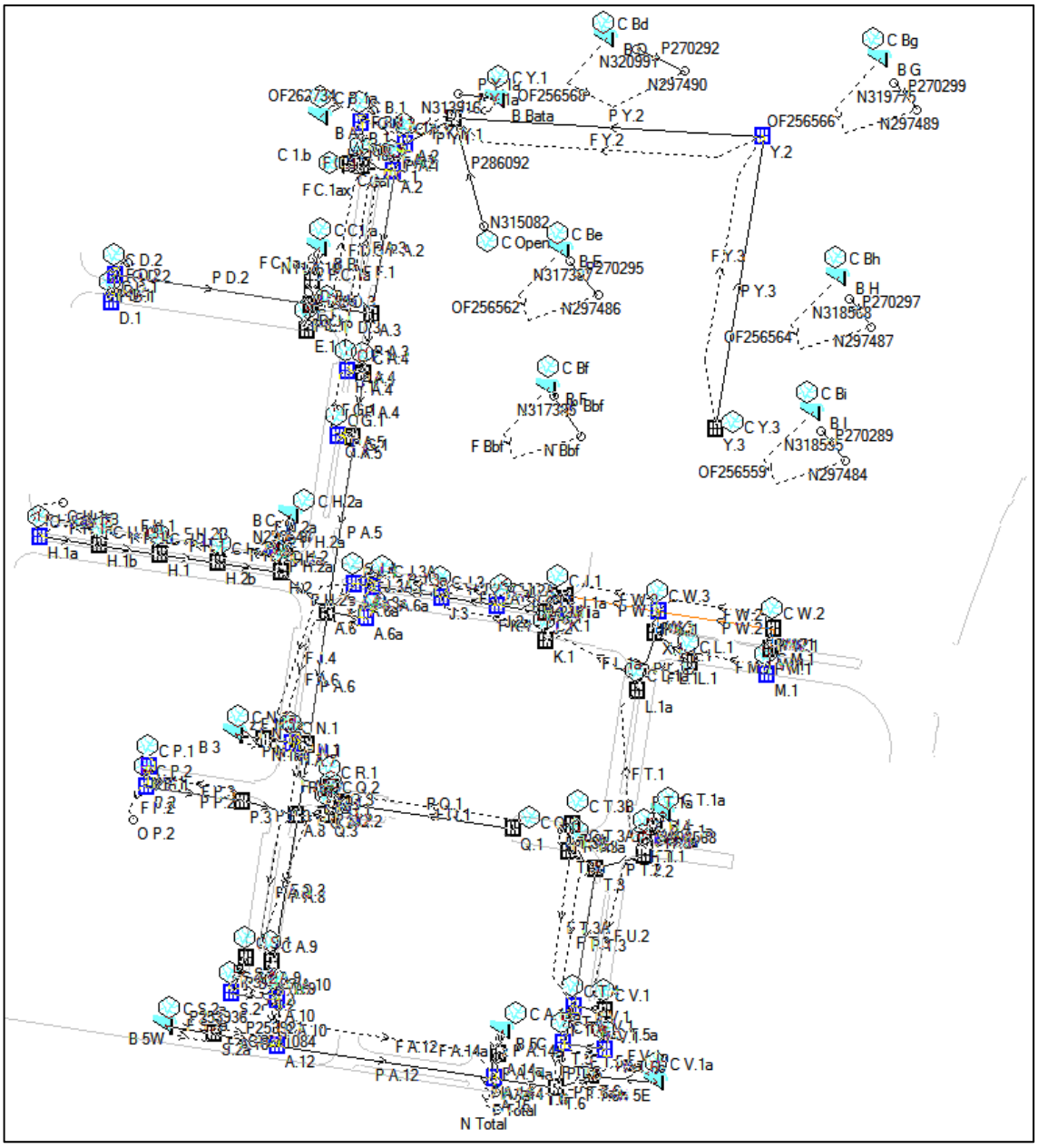
Appendix C

Civil Stormwater Sketch


+RL21.5
HEFFRON ROAD
+RL21.3
PROPOSEDSTORMWATER NETWORK
+RL19.5
+RL21.8
BANKS AVENUE
BUNNERONG ROAD
+RL22.5
IL21.25
CIVIC OPEN SPACE 1000 sqm
+RL22.8
+RL23.2
EXISTING STORMWATER NETWORK
A
B
3-4 storey podium
C
3-4 storey podium
D
E
3-4 storey podium
F
3-4 storey podium
G
H
3-4 storey podium
I
3-4 storey podium

Appendix D

DRAINs Model and Results



DRAINSs Model

9008-01-Pagewood-CC_BATA.drn

PIT / NODE DETAILS Version 13

Name	Type	Family	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	Inflow Hydrograph	Pit is
N.1a	OnGrade	JUNCTION	0.6 x 0.6	INFILL LID	0.2	22.585		0	0.2	335901.2	6242792	No	50206838	1 x Ku	No	New
N.1	Sag	JUNCTION	0.6 x 0.6	GI 30	1.5	22.164	0.23	0	0.2	335912.6	6242790	No	50206839	1 x Ku	No	New
A.7	OnGrade	GRATED KE	2.4m	LINTEL LEFT	0.6	22.393		0	0.2	335919.1	6242789	No	50206808	1 x Ku	No	New
A.8	OnGrade	JUNCTION	1.2 x 1.2	INFILL LID	0.6	22.245		0	0.2	335914.7	6242761	No	50206809	1 x Ku	No	New
A.9	OnGrade	GRATED KE	2.4m	LINTEL LEFT	1	21.564		0	0.2	335904.7	6242700	No	50206810	1 x Ku	No	New
A.10	Sag	GRATED KE	2.4m	LINTE 30	0.6	21.32	0.3	0	0.5	335906.8	6242685	No	50206811	1 x Ku	No	New
A.12	Sag	JUNCTION	1.2 x 1.2	IN 30	1.3	21.6	0.2	0	0.5	335907	6242666	No	50206812	1 x Ku	No	New
A.14	Sag	JUNCTION	1.2 x 1.2	IN 15	2	21.8	0.15	0	0.5	335996	6242653	No	50206813	1 x Ku	No	New
A.15	Node					22.15		0		335996.2	6242646		50206814		No	
S.2a	OnGrade	JUNCTION	0.6 x 0.6	INFILL LID	0.2	21.83		0	0.2	335880.5	6242671	No	50206849	1 x Ku	No	New
T.6a	OnGrade	GROSS POI	HUMEGUARD		0.2	22.126		0	0.2	336035.6	6242654	No	1.65E+08	1 x Ku	No	New
T.6	OnGrade	JUNCTION	1.2 x 1.2	INFILL LID	1.1	22		0	0.2	336021.5	6242649	No	50206853	1 x Ku	No	New
A.14a	OnGrade	JUNCTION	0.6 x 0.6	INFILL LID	0.2	22		0	0.2	335997.4	6242662	No	50206815	1 x Ku	No	New
B.1	Sag	GRATED KE	2.4m	LINTE 30	2.3	21.506	0.2	0	0.5	335941.3	6243045	No	50206816	1 x Ku	No	New
C.1	OnGrade	GRATED KE	2.4m	LINTEL LEFT	0.9	21.587		0	0.2	335941.5	6243027	No	50206818	1 x Ku	No	New
A.2	Sag	GRATED KE	2.4m	LINTE 15	0.9	21.464	0.3	0	0.5	335954.4	6243025	No	50206803	1 x Ku	No	New
A.3	OnGrade	JUNCTION	1.2 x 1.2	INFILL LID	0.5	22.123		0	0.2	335945.5	6242966	No	50206804	1 x Ku	No	New
A.4	OnGrade	GRATED KE	2.4m	LINTEL RIGHT	0.5	22.427		0	0.2	335941.9	6242942	No	50206805	1 x Ku	No	New
A.5	OnGrade	GRATED KE	0.9m	LINTEL LEFT	0.5	22.628		0	0.2	335938	6242915	No	50206806	1 x Ku	No	New
A.6	OnGrade	JUNCTION	1.2 x 1.2	INFILL LID	1.2	22.926		0	0.2	335927.1	6242844	No	50206807	1 x Ku	No	New
C.1a	OnGrade	GRATED KE	2.4m	LINTEL LEFT	0.2	21.7		0	0.2	335936.5	6243027	No	50206817	1 x Ku	No	New
D.1	Sag	GRATED KE	2.4m	LINTE 15	3.1	21.569	0.15	0	0.5	335838.5	6242971	No	50206819	1 x Ku	No	New
D.2	Sag	GRATED KE	2.4m	LINTE 20	1.5	21.569	0.2	0	0.5	335840.1	6242982	No	50206820	1 x Ku	No	New
D.3	OnGrade	GRATED KE	2.4m	LINTEL LEFT	1.7	21.635		0	0.2	335920.3	6242970	No	50206821	1 x Ku	No	New
E.1	OnGrade	GRATED KE	2.4m	LINTEL RIGHT	4	21.736		0	0.2	335918.7	6242959	No	50206822	1 x Ku	No	New
F.1	Sag	JUNCTION	0.6 x 0.6	GI 20	4	22.191	0.2	0	0.5	335935.5	6242943	No	50206823	1 x Ku	No	New
G.1	Sag	JUNCTION	0.6 x 0.6	GI 20	4	22.392	0.2	0	0.5	335931.5	6242916	No	50206824	1 x Ku	No	New
H.1a	Sag	JUNCTION	0.9 x 0.9	GI 15	2.6	21.988	0.15	0	0.5	335809.2	6242875	No	50206825	1 x Ku	No	New
H.1b	OnGrade	JUNCTION	0.9 x 0.9	GRATED SURI	1.2	22.132		0	0.2	335833.5	6242871	No	1.08E+08	1 x Ku	No	New
H.1	OnGrade	JUNCTION	0.9 x 0.9	GRATED SURI	0.4	22.309		0	0.2	335858.8	6242867	No	50206826	1 x Ku	No	New
H.2b	OnGrade	JUNCTION	0.9 x 0.9	GRATED SURI	0.4	22.486		0	0.2	335882.6	6242864	No	1.08E+08	1 x Ku	No	New
H.2	OnGrade	JUNCTION	0.9 x 0.9	GRATED SURI	1.6	22.624		0	0.2	335908.3	6242860	No	50206827	1 x Ku	No	New
K.1	OnGrade	GRATED KE	3.0m	LINTEL RIGHT	3.3	22.852		0	0.2	336017.1	6242832	No	50206834	1 x Ku	No	New
J.2	OnGrade	JUNCTION	1.2 x 1.2	INFILL LID	1.6	23.29		0	0.2	336017.1	6242844	No	50206831	1 x Ku	No	New
J.2a	Sag	JUNCTION	0.9 x 0.9	GI 15	0.5	22.887	0.15	0	0.5	335996.9	6242847	No	1.1E+08	1 x Ku	No	New
J.3	Sag	JUNCTION	0.9 x 0.9	GI 15	0.5	22.643	0.15	0	0.5	335974.3	6242850	No	50206832	1 x Ku	No	New
J.3a	Sag	JUNCTION	0.9 x 0.9	GI 30	0.4	22.5	0.5	0	0.5	335946	6242854	No	1.1E+08	1 x Ku	No	New
J.4	Sag	JUNCTION	0.9 x 0.9	GI 30	1	22.578	0.5	0	0.5	335938.4	6242855	No	50206833	1 x Ku	No	New
L.1	OnGrade	GRATED KE	3.0m	LINTEL LEFT	3	23.2		0	0.2	336076	6242823	No	50206835	1 x Ku	No	New
X.1	OnGrade	JUNCTION	1.2 x 1.2	INFILL LID	1.3	23.412		0	1	336061.9	6242835	No	50206863	1 x Ku	No	New
W.3	Sag	GRATED KE	3.0m	LINTE 15	1.9	23.041	0.12	0	0.5	336063.3	6242844	No	50206862	1 x Ku	No	New
J.1a	OnGrade	JUNCTION	0.9 x 0.9	INFILL LID	0	23.157		0	1	336025.1	6242850	No	50206829	1 x Ku	No	New
J.1	OnGrade	GRATED KE	3.0m	LINTEL LEFT	1	23.157		0	0.2	336022.3	6242850	No	50206830	1 x Ku	No	New
L.1a	OnGrade	JUNCTION	0.6 x 0.6	GRATED SURI	2.5	23.15		0	0.2	336054.4	6242812	No	50206836	1 x Ku	No	New
M.1	Sag	GRATED KE	3.0m	LINTE 15	3.6	23.408	0.15	0	0.5	336107.5	6242818	No	50206837	1 x Ku	No	New
W.1	OnGrade	JUNCTION	1.2 x 1.2	INFILL LID	0.2	23.88		0	1	336109.1	6242829	No	50206860	1 x Ku	No	New
W.2	OnGrade	GRATED KE	3.0m	LINTEL SAG RIGH	2.5	23.525		0	0.2	336110.3	6242837	No	50206861	1 x Ku	No	New
P.1	Sag	GRATED KE	2.4m	LINTE 15	5.9	21.789	0.15	0	0.5	335854.2	6242780	No	50206840	1 x Ku	No	New
P.2	Sag	GRATED KE	2.4m	LINTE 20	0.4	21.711	0.2	0	0.5	335852.9	6242772	No	50206841	1 x Ku	No	New
P.3	OnGrade	JUNCTION	1.2 x 1.2	INFILL LID	0.2	22.25		0	0.2	335892.5	6242766	No	50206842	1 x Ku	No	New
T.3b	OnGrade	GRATED KE	0.9m	LINTEL LEFT	5.9	23.502		0	0.2	336027.8	6242757	No	50206843	1 x Ku	No	New
T.3a	OnGrade	GRATED KE	0.9m	LINTEL LEFT	2	23.442		0	0.2	336026.2	6242746	No	50206844	1 x Ku	No	New
T.3	OnGrade	JUNCTION	1.2 x 1.2	INFILL LID	1.1	23.477		0	0.2	336037.2	6242739	No	50206850	1 x Ku	No	New
T.4	Sag	GRATED KE	2.4m	LINTE 15	1.5	21.893	0.15	0	0.5	336028.4	6242682	No	50206851	1 x Ku	No	New
T.5	Sag	GRATED KE	2.4m	LINTE 25	0.7	21.871	0.2	0	0.5	336024.2	6242667	No	50206852	1 x Ku	No	New
R.1	OnGrade	GRATED KE	0.9m	LINTEL LEFT	5	22.087		0	0.2	335928.6	6242772	No	50206846	1 x Ku	No	New
Q.3	OnGrade	GRATED KE	0.9m	LINTEL LEFT	2.4	22.087		0	0.2	335927	6242761	No	50206845	1 x Ku	No	New
S.1	OnGrade	GRATED KE	2.4m	LINTEL RIGHT	5.9	21.565		0	0.2	335893.9	6242702	No	50206847	1 x Ku	No	New
S.2	Sag	GRATED KE	2.4m	LINTE 15	1.1	21.36	0.15	0	0.5	335887.7	6242687	No	50206848	1 x Ku	No	New
T.5a	Sag	GRATED KE	0.9m	LINTE 20	5.9	21.705	0.17	0	0.5	336041.3	6242664	No	50206854	1 x Ku	No	New
V.1	OnGrade	GRATED KE	2.4m	LINTEL LEFT	0.9	21.982		0	0.2	336041	6242680	No	50206859	1 x Ku	No	New
O B.1	Node					20.83		0		335946.3	6243050		50206865		No	
O D.2	Node					21.569		0		335845.1	6242987		50206866		No	
O H.1a	Node					21.988		0		335818.7	6242889		50206867		No	
O P.2	Node					21.711		0		335847.5	6242759		50206868		No	
N Total	Node					22		0		335996.7	6242639		50207035		No	
A.6a	Sag	STUB (FUTI	CAP SEAL A	30	2	22.776	0.15	0	0	335943.5	6242841	No	50207219	1 x Ku	No	New
N117610	Node					21.9		0		335923.2	6242991		68407187		No	
D.3a	OnGrade	JUNCTION	0.6 x 0.6	INFILL LID	0.2	21.85		0	0.2	335921.3	6242980	No	76594092	1 x Ku	No	New
N313916	Node					22.157		0		335980.9	6243056		1.81E+08		No	
Q.1	OnGrade	DISH DRAI	0.6 x 0.9	V GRATE	5	23.359		0	0.2	336003.6	6242755	No	1.41E+08	1 x Ku	No	New
Q.2	OnGrade	DISH DRAI	0.6 x 0.9	V GRATE	2	22.399		0	0.2	335933.2	6242765	No	1.41E+08	1 x Ku	No	New
N298568	Node					24		0		336064.7	6242760		1.75E+08		No	
T.1a	OnGrade	JUNCTION	0.6 x 0.6	INFILL LID	0.2	23.966		0	0.2	336061.5	6242755	No	50206855	1 x Ku	No	New
T.1	OnGrade	GRATED KE	2.4m	LINTEL RIGHT	1.3	23.731		0	0.2	336058	6242750	No	50206856	1 x Ku	No	New
T.2	OnGrade	GRATED KE	2.4m	LINTEL LEFT	2	23.731		0	0.2	336057.1	6242744	No	50206857	1 x Ku	No	New
N299648	Node					23		0		335911.9	6242880		1.75E+08		No	
H.2a	OnGrade	JUNCTION	0.9 x 0.9	GRATED SURI	0.2	22.971		0	0.2	335910.1	6242872	No	50206828	1 x Ku	No	New
Y.3	OnGrade	STUB (FUTI	CAP SEAL AND BURY		1	22.5		0	0.2	336086.4	6242919	No	1.81E+08	1 x Ku	No	New
Y.2	Sag	STUB (FUTI	CAP SEAL A	30	1	21.8	0.36	0	0.5	336106.2	6243039	No	1.81E+08	1 x Ku	No	New
Y.1	OnGrade	STUB (FUTI	CAP SEAL AND BURY		1	22.157		0	0.2	335979.2	6243046	No	50206864	1 x Ku	No	New
A.1	Sag	GRATED KE	2.4m	LINTE 20	0.6	21.378	0.25	0	0.5	335959.1	6243036	No	50206802	1 x Ku	No	New
N315082	Node					22.2		0		335991.2	6243002		1.81E+08		No	
N317385	Node					22		0		336020.1	6242932		1.82E+08		No	
N Bbf	Node					22		0		336031.4	6242916		1.74E+08		No	
N317387	Node					22		0		336026.6	6242988		1.82E+08		No	

N297486	Node		22	0	336038.4	6242974	1.74E+08	No	
N318555	Node		22	0	336130	6242918	1.83E+08	No	
N297484	Node		22	0	336139.5	6242906	1.74E+08	No	
N318568	Node		22	0	336141.6	6242972	1.83E+08	No	
N297487	Node		22	0	336150.3	6242961	1.74E+08	No	
N319775	Node		22	0	336159.8	6243061	1.83E+08	No	
N297489	Node		22	0	336169.1	6243050	1.74E+08	No	
N320991	Node		22	0	336054.1	6243075	1.84E+08	No	
N297490	Node		22	0	336074.1	6243065	1.74E+08	No	

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	id
B B	21	800		None						335923.8	6242993	No			1960734
	21.5	800													
	22	800													
B C	21.5	520		None						335912.4	6242883	No			1960740
	22	520													
	22.5	520													
B 3	20.43	2		Orifice		180	20.93			335889.7	6242794	Yes	22.13	4	1960746
	20.93	2													
	21.03	253													
	21.43	253													
	21.93	253													
	22.43	253													
B 5W	18.94	2		Orifice		195	19.74			335860.9	6242674	Yes	20.75	4	1960750
	19.74	2													
	19.75	280													
	20.75	280													
	21.75	280													
B 5E	19	2		Orifice		170	19.93			336062.2	6242651	Yes	21.4	4.6	1960755
	19.75	2													
	19.76	200													
	20.76	200													
	21.76	200													
	22.76	200													
B 4	22	750		None						336065.2	6242761	No			1960760
	22.5	750													
	23	750													
B 5C	19.41	2		Orifice		245	19.91			335999	6242672	Yes	21.11	4	1960786
	19.91	2													
	20.01	269													
	20.41	269													
	20.91	269													
	21.41	269													
B Bata	19.5	2		Orifice		745	20			335997	6243054	Yes	21.2	4	97233738
	20	2													
	20.1	553													
	20.5	553													
	21	553													
	21.54	553													
B A	21	350		None						335924.3	6243047	No			1.78E+08
	21.5	350													
	22	350													
B F	21	800		None						336018.1	6242935	No			1.82E+08
	21.5	800													
	22	800													
B E	21	800		None						336023.7	6242992	No			1.82E+08
	21.5	800													
	22	800													
B I	21	800		None						336126.4	6242926	No			1.83E+08
	21.5	800													
	22	800													
B H	21	800		None						336137.1	6242981	No			1.83E+08
	21.5	800													
	22	800													
B G	21	260		None						336154.2	6243071	No			1.83E+08
	21.5	260													
	22	260													
B D	21	220		None						336041.9	6243079	No			1.84E+08
	21.5	220													
	22	220													

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 %	Paved Rough	Grass Rough
C C1.a	B B	0.7	55	45	0	10	15	0								
C H.2a	B C	0.451	55	45	0	10	15	0								
C N.1a	B 3	0.7496	55	45	0	10	10	0								
C N.1	N.1	0.1965	90	10	0	5	10	0								
C A.9	A.9	0.0899	90	10	0	5	10	0								
C A.10	A.10	0.0365	90	10	0	5	10	0								
C S.2a	B 5W	1	55	45	0	10	15	0								
C V.1a	B 5E	0.7995	55	45	0	10	10	0								
C T.1a	B 4	0.6406	55	45	0	10	10	0								
C A.14a	B 5C	1.014	55	45	0	10	15	0								
C B.1	B.1	0.0378	90	10	0	5	10	0								
C C.1	C.1	0.0806	90	10	0	5	10	0								
C A.2	A.2	0.1205	90	10	0	5	10	0								
C A.4	A.4	0.0916	90	10	0	5	10	0								
C 1.b	C.1a	0.2	90	10	0	5	10	0								
C D.1	D.1	0.0582	90	10	0	5	10	0								
C D.2	D.2	0.054	90	10	0	5	10	0								
C D.3	D.3	0.0629	90	10	0	5	10	0								
C E.1	E.1	0.0853	90	10	0	5	10	0								
C F.1	F.1	0.0795	90	10	0	5	10	0								
C G.1	G.1	0.115	90	10	0	5	10	0								
C H.1a	H.1a	0.0825	85	15	0	5	10	0								
C H.1B	H.1b	0.0825	85	15	0	5	10	0								
C H.1	H.1	0.0746	85	15	0	5	10	0								
C H.2B	H.2b	0.0746	85	15	0	5	10	0								
C H.2	H.2	0.0223	85	15	0	5	10	0								
C K.1	K.1	0.088	90	10	0	5	10	0								
C J.2A	J.2a	0.0042	90	10	0	5	10	0								
C J.3	J.3	0.0042	90	10	0	5	10	0								
C J.3A	J.3a	0.1417	85	15	0	5	10	0								
C J.4	J.4	0.0354	85	15	0	5	10	0								
C L.1	L.1	0.0796	90	10	0	5	10	0								
C W.3	W.3	0.0739	90	10	0	5	10	0								
C J.1	J.1	0.0843	90	10	0	5	10	0								
C L.1a	L.1a	0.2064	90	10	0	5	10	0								
C M.1	M.1	0.1218	90	10	0	5	10	0								
C W.2	W.2	0.0646	90	10	0	5	10	0								
C P.1	P.1	0.0608	90	10	0	5	10	0								
C P.2	P.2	0.0557	90	10	0	5	10	0								
C T.3B	T.3b	0.052	90	10	0	5	10	0								
C T.3A	T.3a	0.05	90	10	0	5	10	0								
C T.4	T.4	0.0839	90	10	0	5	10	0								
C T.5	T.5	0.0221	90	10	0	5	10	0								
C R.1	R.1	0.052	90	10	0	5	10	0								
C Q.3	Q.3	0.05	90	10	0	5	10	0								
C S.1	S.1	0.0888	90	10	0	5	10	0								
C S.2	S.2	0.0375	90	10	0	5	10	0								
C T.5a	T.5a	0.0224	90	10	0	5	10	0								
C V.1	V.1	0.0883	90	10	0	5	10	0								
C A.6a	A.6a	0.7979	10	90	0	10	20	0								
C Y.1	B Bata	4.6067	80	20	0	20	30	0								
C Q.1	Q.1	0.0512	80	20	0	5	10	0								
C Q.2	Q.2	0.0407	80	20	0	5	10	0								
C U.1	T.1	0.0953	90	10	0	5	10	0								
C U.2	T.2	0.0923	90	10	0	5	10	0								
C B.1a	B A	0.3	55	45	0	10	15	0								
C Y.3	Y.3	0.89	90	10	0	5	10	0								
C A.1	A.1	0.0379	90	10	0	5	10	0								
C Open	N315082	2.17	5	95	0	5	20	0								
C Bf	B F	0.661	70	30	0	10	15	0								
C Be	B E	0.619	70	30	0	10	15	0								
C Bi	B I	0.636	70	30	0	10	15	0								
C Bh	B H	0.611	70	30	0	10	15	0								
C Bg	B G	0.227	70	30	0	10	15	0								
C Bd	B D	0.184	70	30	0	10	15	0								

PIPE DETAILS

Name	From	To	Length (m)	U/S IL (m)	D/S IL (m)	Slope (%)	Type	Dia (mm)	I.D. (mm)	Rough	Pipe Is	No. Pipes	Chg From	At Chg	Chg (m)		Rl (m)
z P N.1a	B 3	N.1a	2.5	20.709	20.684	1	RCP	375	375	0.3	NewFixed	1	B 3		0	0	22.585
P N.1a	N.1a	N.1	11.525	20.684	20.569	1	RCP	375	375	0.3	New	1	N.1a		0	0	22.585
P N.1	N.1	A.7	6.575	20.4	20.27	1.98	RCP	375	375	0.3	New	1	N.1		0	0	22.164
P A.7	A.7	A.8	28.988	17.964	17.864	0.34	RCP	1200	1200	0.3	New	1	A.7		0	0	22.393
P A.8	A.8	A.9	61.105	17.844	17.601	0.4	RCP	1200	1200	0.3	New	1	A.8		0	0	22.245
P A.9	A.9	A.10	15.837	17.581	17.517	0.4	RCP	1200	1200	0.3	New	1	A.9		0	0	21.564
P A.10	A.10	A.12	18.621	17.497	17.398	0.53	RCP	1200	1200	0.3	New	1	A.10		0		
P A.12	A.12	A.14	98.652	17.36	16.966	0.4	RCP	1200	1200	0.3	New	1	A.12		0		
P A.14	A.14	A.15	10	16.978	16.914	0.64	Box Culver	2.44W x 1.21H		0.3	Existing	1	A.14		0		
P253936	B 5W	S.2a	30	19.44	19.06	1.27	RCP	600	600	0.3	NewFixed	1	B 5W		0	0	21.511
P253921	S.2a	A.12	16	19.061	18.88	1.13	RCP	600	600	0.3	NewFixed	1	S.2a		0	0	21.511
P T.6b	B 5E	T.6a	26.8	19.7	19.45	0.93	RCP	375	375	0.3	NewFixed	1	B 5E		0	0	22.126
P T.6a	T.6a	T.6	10.76	19.11	19.04	0.65	RCP	375	375	0.3	New	1	T.6a		0	0	21.705
P T.6	T.6	A.14	25.849	19.04	18.782	1	RCP	525	525	0.3	New	1	T.6		0		
z P A.14a	B 5C	A.14a	2.5	19.643	19.618	1	RCP	375	375	0.3	NewFixed	1	B 5C		0		
P A.14a	A.14a	A.14	10.026	19.618	19.518	1	RCP	375	375	0.3	New	1	A.14a		0		
P B.1	B.1	C.1	17.968	19.337	19.157	1	RCP	450	450	0.3	New	1	B.1		0	0	20.844
P C.1	C.1	A.2	13	19.037	18.907	1	RCP	525	525	0.3	New	1	C.1		0	0	21.204
P A.2	A.2	A.3	59.389	19.032	18.794	0.4	RCP	1200	1200	0.3	New	1	A.2		0	0	21.072
P A.3	A.3	A.4	24.386	18.774	18.684	0.37	RCP	1200	1200	0.3	New	1	A.3		0	0	21.922
P A.4	A.4	A.5	26.784	18.664	18.537	0.47	RCP	1200	1200	0.3	New	1	A.4		0	0	22.276
P A.5	A.5	A.6	72.354	18.537	18.24	0.41	RCP	1200	1200	0.3	New	1	A.5		0	0	22.533
P A.6	A.6	A.7	55.224	18.22	17.984	0.43	RCP	1200	1200	0.3	New	1	A.6		0	0	22.926
P C.1a	C.1a	C.1	5.1	19.108	19.057	1	RCP	525	525	0.3	New	1	C.1a		0	0	21.298
P D.1	D.1	D.2	11	20.551	20.386	1.5	RCP	375	375	0.3	New	1	D.1		0	0	21.569
P D.2	D.2	D.3	81.132	20.275	19.139	1.4	RCP	375	375	0.3	New	1	D.2		0	0	21.569
P D.3	D.3	A.3	25.458	19.119	18.814	1.2	RCP	450	450	0.3	New	1	D.3		0	0	21.597
P E.1	E.1	D.3	11	20.522	20.412	1	RCP	375	375	0.3	New	1	E.1		0	0	21.597
P F.1	F.1	A.4	6.5	20.965	20.9	1	RCP	375	375	0.3	New	1	F.1		0	0	22.04
P G.1	G.1	A.5	6.5	21.221	21.156	1	RCP	375	375	0.3	New	1	G.1		0	0	22.296
P H.1a	H.1a	H.1b	25.557	20.713	20.457	1	RCP	375	375	0.3	New	1	H.1a		0	0	21.988
P H.1b	H.1b	H.1	24.606	20.427	20.181	1	RCP	375	375	0.3	New	1	H.1b		0	0	21.988
P H.1	H.1	H.2b	24.509	20.151	19.906	1	RCP	375	375	0.3	New	1	H.1		0	0	22.309
P H.2b	H.2b	H.2	25.505	19.886	19.631	1	RCP	375	375	0.3	New	1	H.2b		0	0	22.309
P H.2	H.2	A.6	24.831	19.611	19.363	1	RCP	450	450	0.3	New	1	H.2		0	0	22.624
P K.1	K.1	J.2	11.632	21.125	21.003	1.05	RCP	375	375	0.3	New	1	K.1		0	0	22.852
P J.2a	J.2	J.2a	18.497	20.778	20.593	1	RCP	525	525	0.3	New	1	J.2		0	0	23.29
P J.2	J.2a	J.3	24.772	20.563	20.315	1	RCP	525	525	0.3	New	1	J.2a		0	0	23.29
P J.3a	J.3	J.3a	26.004	20.285	20.025	1	RCP	525	525	0.3	New	1	J.3		0	0	22.643
P J.3	J.3a	J.4	10.273	20.025	19.922	1	RCP	525	525	0.3	New	1	J.3a		0	0	22.643
P J.4	J.4	A.6	16.126	19.892	19.731	1	RCP	525	525	0.3	New	1	J.4		0	0	22.541
P L.1	L.1	X.1	18.624	21.73	21.598	0.71	RCP	375	375	0.3	New	1	L.1		0	0	23.2
P X.1	X.1	W.3	8.934	21.585	21.496	1	RCP	375	375	0.3	Existing	1	X.1		0	0	23.412
P W.3	W.3	J.1a	38.674	21.397	21.01	1	RCP	450	450	0.3	Existing	1	W.3		0	0	23.041
P J.1a	J.1a	J.1	2.801	21.008	20.98	1	RCP	525	525	0.3	New	1	J.1a		0	0	23.151
P J.1	J.1	J.2	8.541	21	20.905	1.11	RCP	525	525	0.3	New	1	J.1		0	0	23.157
P L.1a	L.1a	X.1	24.896	21.718	21.594	0.5	RCP	375	375	0.3	New	1	L.1a		0	0	23.15
P M.1	M.1	W.1	10.6	22.225	22.119	1	RCP	375	375	0.3	New	1	M.1		0	0	23.408
P W.1	W.1	W.2	8.193	22.119	22.023	1.17	RCP	375	375	0.3	Existing	1	W.1		0	0	23.88
P W.2	W.2	W.3	47.58	21.923	21.447	1	RCP	375	375	0.3	Existing	1	W.2		0	0	23.525
P P.1	P.1	P.2	8.498	20.6	20.515	1	RCP	375	375	0.3	New	1	P.1		0	0	21.789
P P.2	P.2	P.3	39.993	20.495	20.095	1	RCP	375	375	0.3	New	1	P.2		0	0	21.711
P P.3	P.3	A.8	22.911	20.075	19.846	1	RCP	375	375	0.3	New	1	P.3		0	0	22.25
P T.3b	T.3b	T.3a	6	21.719	21.599	2	RCP	375	375	0.3	New	1	T.3b		0	0	23.147
P T.3a	T.3a	T.3	10.288	21.569	21.363	2	RCP	375	375	0.3	New	1	T.3a		0		
P T.3	T.3	T.4	57.274	21.343	20.197	2	RCP	375	375	0.3	New	1	T.3		0	0	23.477
P T.4	T.4	T.5	15.691	20.177	20.021	0.99	RCP	525	525	0.3	New	1	T.4		0	0	21.893
P T.5	T.5	T.6	18.387	20.001	19.817	1	RCP	525	525	0.3	New	1	T.5		0		
P R.1	R.1	Q.3	6	20.607	20.487	2	RCP	375	375	0.3	New	1	R.1		0	0	22.03
P Q.3	Q.3	A.8	7.692	19.689	19.535	2	RCP	375	375	0.3	New	1	Q.3		0	0	21.967
P S.1	S.1	S.2	15.78	20.5	20.342	1	RCP	375	375	0.3	New	1	S.1		0	0	21.565
P S.2	S.2	A.10	19.25	20.117	19.929	0.98	RCP	450	450	0.3	New	1	S.2		0	0	21.36
P T.5a	T.5a	T.5	17.25	20.226	20.053	1	RCP	375	375	0.3	New	1	T.5a		0	0	21.705
P V.1	V.1	T.4	12.751	20.551	20.424	1	RCP	375	375	0.3	New	1	V.1		0	0	21.982
P A.6a	A.6a	A.6	16.126	20.089	19.96	0.8	RCP	450	450	0.3	New	1	A.6a		0	0	22.541
z P.C.1a	N117610	D.3a	2.5	21	20.975	1	RCP	450	450	0.3	NewFixed	1	N117610		0	0	21.298
P D.3a	D.3a	D.3	5	19.643	19.593	1	RCP	450	450	0.3	New	1	D.3a		0	0	21.298
P Y.1a	B Bata	N313916	4.4	19.514	19.47	1	RCP	1050	1070	0.3	NewFixed	1	B Bata		0		
P Q.1	Q.1	Q.2	76.793	21.4	19.864	2	RCP	375	375	0.3	New	1	Q.1		0	0	23.074
P Q.2	Q.2	Q.3	6.759	19.844	19.709	2	RCP	375	375	0.3	New	1	Q.2		0		
z P T.1a	N298568	T.1a	2.5	21.985	21.96	1	RCP	450	450	0.3	NewFixed	1	N298568		0	0	23.966
P T.1a	T.1a	T.1	6.553	21.96	21.9	0.92	RCP	450	450	0.3	New	1	T.1a		0	0	23.966
P T.1	T.1	T.2	6	21.9	21.84	1	RCP	375	375	0.3	New	1	T.1		0	0	23.731
P T.2	T.2	T.3	20.603	21.82	21.614	1	RCP	375	375	0.3	New	1	T.2		0	0	23.731
z P H.2a	N299648	H.2a	2.5	21.423	21.398	1	RCP	375	375	0.3	NewFixed	1	N299648		0	0	22.971
P H.2a	H.2a	H.2	11.917	21.398	21.278	1.01	RCP	375	375	0.3	New	1	H.2a		0	0	22.971
P Y.3	Y.3	Y.2	105	21.185	20.45	0.7	RCP	600	600	0.3	New	1	Y.3		0		
P Y.2	Y.2	Y.1	140	20.45	19.47	0.7	RCP	600	600	0.3	New	1	Y.2		0		
P Y.1	Y.1	A.1	22.67	19.47	19.176	1.3	RCP	1050	1070	0.3	New	1	Y.1		0	0	21.035
P A.1	A.1	A.2	11.992	19.1	19.052	0.4	RCP	1200	1200	0.3	New	1	A.1		0	0	20.788
P286092	N315082	Y.1	10	19.54	19.47	0.7	RCP	450	450	0.3	New	1	N315082		0		
P Bbf	N317385	N Bbf	2.5	19.643	19.618	1	RCP	375	375	0.3	NewFixed	1	N317385		0		
P270295	N317387	N297486	2.5	19.643	19.618	1	RCP	375	375	0.3	NewFixed	1	N317387		0		
P270289	N318555	N297484	2.5	19.643	19.618	1	RCP	375	375	0.3	NewFixed	1	N318555		0		
P270297	N318568	N297487	2.5	19.643	19.618	1	RCP	375	375	0.3	NewFixed	1	N318568		0		
P270299	N319775	N297489	2.5	19.643	19.618	1	RCP	375	375	0.3	NewFixed	1	N319775		0		
P270292	N320991	N297490	2.5	19.643	19.618	1	RCP	375	375	0.3	NewFixed	1	N320991		0		

DETAILS of SERVICES CROSSING PIPES

Pipe	Chg (m)	Bottom Elev (m)	Height of S (m)	Chg (m)	Bottom Elev (m)	Height of S (m)	Chg (m)	Bottom Elev (m)	Height of S (m)	etc etc

CHANNEL DETAILS

Name	From	To	Type	Length (m)	U/S IL (m)	D/S IL (m)	Slope (%)	Base Width (m)	L.B. Slope (1:?)	R.B. Slope (1:?)	Manning n	Depth (m)	Roofed

OVERFLOW ROUTE DETAILS

Name	From	To	Travel Time (min)	Spill Level (m)	Crest Length (m)	Weir Coeff. C	Cross Section	Safe Depth Major Stor (m)	Safe Depth Minor Stor (m)	Safe DxV (sq.m/sec)	Bed Slope (%)	D/S Area Contributing %	id	U/S IL	D/S IL
F C.1a	B B	D.3		1	25	2	1.6 7.5 m road	0.14	0.14	0.6	1.7	0	774536	21.298	21.204
F H.2a	B C	H.2		1	23.11	2	1.6 7.5 m road	0.14	0.14	0.6	1	0	774528	22.971	22.624
F N.1a	B 3	N.1		1	22.43	2	1.6 7.5 m road	0.14	0.14	0.6	1	0	774514	22.585	22.164
F N.1	N.1	A.7		1			7.5 m road	0.14	0.14	0.4	0.6	0	50207001	22.164	22.393
F A.7	A.7	A.8		1			7.5 m road	0.14	0.14	0.4	1	0	50206974	22.393	22.245
F A.8	A.8	A.9		1			7.5 m road	0.14	0.14	0.4	0.8	0	50206975	22.245	21.564
F A.9	A.9	A.10		1			7.5 m road	0.14	0.14	0.4	0.8	0	50206976	21.564	21.32
F A.10	A.10	A.12		1			7.5 m road	0.14	0.14	0.4	1	0	50206977	21.32	22.16
F A.12	A.12	A.14		1			7.5 m road	0.14	0.14	0.4	1	0	50206978	22.16	22.102
F A.14	A.14	A.15		1			7.5 m road	0.14	0.14	0.4	1	0	50206979		
F Total	A.15	N Total		1			7.5 m road	0.3	0.15	0.4	1	0	333		
F S.2a	B 5W	S.2a		1	21.93	2	1.6 7.5 m road	0.14	0.14	0.6	0.8	0	774485	21.511	21.36
OF241084	S.2a	A.12		1			7.5 m road	0.14	0.14	0.4	0.8	0	1.64E+08	21.36	21.32
F V.1a	B 5E	T.6a		1	22.36	2	1.6 7.5 m road	0.14	0.14	0.6	2.3	0	774498	22.126	21.982
F T.6a	T.6a	T.6		1			7.5 m road	0.14	0.14	0.6	1	0	1.65E+08	21.705	22.19
F T.6	T.6	A.14		1			7.5 m road	0.14	0.14	0.4	1	0	50207014		
F T.1a	B 4	T.1a		1	24	2	1.6 4 m wide p	0.3	0.15	0.4	2.5	0	774506		
F A.14a	B 5C	A.14		1	22.2	2	1.6 7.5 m road	0.14	0.14	0.6	1	0	50206980	22	22.102
F B.1	B.1	O B.1		1			7.5 m road	0.14	0.14	0.4	1	0	50206981	20.83	21.996
F C.1	C.1	B.1		1			7.5 m road	0.14	0.14	0.4	1	0	50206982	21.204	20.83
F A.2	A.2	A.1		1			7.5 m road	0.14	0.14	0.4	0.6	0	50206969	21.072	20.788
F A.3	A.3	A.2		1			7.5 m road	0.14	0.14	0.4	3	0	50206970	21.922	21.072
F A.4	A.4	F.1		1			7.5 m road	0.14	0.14	0.4	1	0	50206971	22.276	22.04
F A.5	A.5	G.1		1			7.5 m road	0.14	0.14	0.6	1	0	50206972	22.533	22.296
F A.6	A.6	N.1		1			7.5 m road	0.14	0.14	0.4	1	0	50206973	22.926	22.164
F C.1ax	C.1a	C.1		1			7.5 m road	0.14	0.14	0.4	1	0	1.8E+08	21.204	20.83
F D.1	D.1	D.2		1			7.5 m road	0.14	0.14	0.4	1.6	0	50206983	21.569	21.569
F D.2	D.2	O D.2		1			7.5 m road	0.14	0.14	0.4	1	0	50206984		
F D.3	D.3	C.1		1			7.5 m road	0.14	0.14	0.4	1.7	0	50206985	21.597	21.204
F E.1	E.1	D.3		1			7.5 m road	0.14	0.14	0.4	1.7	0	50206986	21.597	21.597
F F.1	F.1	A.2		1			7.5 m road	0.14	0.14	0.4	3	0	50206987	22.04	21.072
F G.1	G.1	F.1		1			7.5 m road	0.14	0.14	0.4	1	0	50206988	22.296	22.04
F H.1a	H.1a	O H.1a		1			7.5 m road	0.14	0.14	0.6	1	0	50206989		
F H.1B	H.1b	H.1a		1			7.5 m road	0.14	0.14	0.4	1	0	1.08E+08	22.309	21.988
F H.1	H.1	H.1b		1			7.5 m road	0.14	0.14	0.4	1	0	50206990	22.309	21.988
F H.2B	H.2b	H.1		1			7.5 m road	0.14	0.14	0.4	1	0	1.08E+08	22.624	22.309
F H.2	H.2	H.2b		1			7.5 m road	0.14	0.14	0.4	1	0	50206991	22.624	22.309
F K.1	K.1	J.3		1			7.5 m road	0.14	0.14	0.4	1	0	50206997	22.852	22.643
F J.2	J.2	J.2a		1			7.5 m road	0.14	0.14	1	1	0	50206994	23.29	22.643
F J.2A	J.2a	J.3		1			7.5 m road	0.14	0.14	1	1	0	1.1E+08	23.29	22.643
F J.3	J.3	J.3a		1			7.5 m road	0.14	0.14	1	1	0	50206995	22.643	22.541
F J.3A	J.3a	J.4		1			7.5 m road	0.14	0.14	1	1	0	1.1E+08	22.643	22.541
F J.4	J.4	N.1		1			7.5 m road	0.14	0.14	0.4	1	0	50206996	22.541	22.164
F L.1	L.1	L.1a		1			7.5 m road	0.14	0.14	0.4	1	0	50206998	23.2	23.15
F X.1	X.1	W.3		1			7.5 m road	0.14	0.14	0.4	1	0	50207023	23.412	23.041
F W.3	W.3	J.1		1			7.5 m road	0.14	0.14	0.4	1	0	50207022	23.041	23.157
F J.1a	J.1a	J.1		1			7.5 m road	0.14	0.14	0.6	1	0	50206992	23.151	23.157
F J.1	J.1	J.3		1			7.5 m road	0.14	0.14	0.4	1	0	50206993	23.157	22.643
F L.1a	L.1a	K.1		1			7.5 m road	0.14	0.14	0.6	1	0	50206999	23.15	22.852
F M.1	M.1	L.1		1			7.5 m road	0.14	0.14	0.4	1	0	50207000	23.408	23.2
F W.1	W.1	W.2		1			7.5 m road	0.14	0.14	0.4	1	0	50207020	23.88	23.525
F W.2	W.2	W.3		1			7.5 m road	0.14	0.14	0.4	1	0	50207021	23.525	23.041
F P.1	P.1	P.2		1			7.5 m road	0.14	0.14	0.4	0.7	0	50207002	21.789	21.711
F P.2	P.2	O P.2		1			7.5 m road	0.14	0.14	0.4	1	0	50207003		
F P.3	P.3	P.2		1			7.5 m road	0.14	0.14	0.4	0.7	0	50207004	22.25	21.711
F T.3B	T.3b	T.3a		1			7.5 m road	0.14	0.14	0.4	2.7	0	50207005	23.147	22.03
F T.3A	T.3a	T.4		1			7.5 m road	0.14	0.14	0.4	2.7	0	1.41E+08	23.147	22.03
F T.3	T.3	T.4		1			7.5 m road	0.14	0.14	0.4	3	0	50207011	23.477	21.893
F T.4	T.4	T.5		1			7.5 m road	0.14	0.14	0.4	0.8	0	50207012	21.893	21.871
F T.5	T.5	T.6		1			7.5 m road	0.14	0.14	0.4	1	0	50207013	21.871	22.19
F R.1	R.1	Q.3		1			7.5 m road	0.14	0.14	0.4	1	0	50207008	22.03	22.164
F Q.3	Q.3	A.9		1			7.5 m road	0.14	0.14	0.4	0.8	0	50207007	21.967	21.564
F S.1	S.1	S.2		1			7.5 m road	0.14	0.14	0.4	0.8	0	50207009	21.565	21.36
F S.2	S.2	A.10		1			7.5 m road	0.14	0.14	0.4	0.8	0	50207010	21.36	21.32
F T.5a	T.5a	T.5		1			7.5 m road	0.14	0.14	0.6	1	0	50207015	21.705	22.19
F V.1	V.1	T.5a		1			7.5 m road	0.14	0.14	0.4	0.8	0	50207019	21.982	21.705
z F A.6a	A.6a	A.6		1			7.5 m road	0.3	0.15	0.4	1	0	50207225		
F Y.1a	B Bata	N313916		1	22.2	4	1.6 7.5 m road	0.3	0.15	0.4	1	0	97233744		
F Q.1	Q.1	Q.2		1			7.5 m road	0.14	0.14	0.4	2.7	0	50207006	23.074	21.967
F Q.2	Q.2	Q.3		1			7.5 m road	0.14	0.14	0.4	2.7	0	1.42E+08	23.074	21.967
F U.1a	T.1a	T.1		1			7.5 m road	0.14	0.14	0.6	0.4	0	50207016	23.966	23.731
F T.1	T.1	L.1a		1			7.5 m road	0.14	0.14	0.4	1	0	50207017	23.731	23.15
F U.2	T.2	V.1		1			7.5 m road	0.14	0.14	0.4	2.3	0	50207018	23.731	21.982
OF262734	B A	B.1		1	25	2	1.6 7.5 m road	0.14	0.14	0.6	1.7	0	1.78E+08	21.298	21.204
F Y.3	Y.3	Y.2		1			7.5 m road	0.14	0.14	0.4	1	0	1.81E+08	22.624	22.309
F Y.2	Y.2	Y.1		1			7.5 m road	0.14	0.14	0.4	1	0	1.81E+08	22.624	22.309
F Y.1	Y.1	A.1		1			7.5 m road	0.14	0.14	0.4	0.6	0	50207024	22.157	20.788

F A.1	A.1	B.1	1			7.5 m road	0.14	0.14	0.4	1	0	50206968	20.788	20.83
F Bbf	B F	N Bbf	1	22.2	2	1.6 7.5 m road	0.14	0.14	0.6	1	0	1.74E+08	22	22.102
OF256562	B E	N297486	1	22.2	2	1.6 7.5 m road	0.14	0.14	0.6	1	0	1.74E+08	22	22.102
OF256559	B I	N297484	1	22.2	2	1.6 7.5 m road	0.14	0.14	0.6	1	0	1.74E+08	22	22.102
OF256564	B H	N297487	1	22.2	2	1.6 7.5 m road	0.14	0.14	0.6	1	0	1.74E+08	22	22.102
OF256566	B G	N297489	1	22.2	2	1.6 7.5 m road	0.14	0.14	0.6	1	0	1.74E+08	22	22.102
OF256568	B D	N297490	1	22.2	2	1.6 7.5 m road	0.14	0.14	0.6	1	0	1.74E+08	22	22.102

PIPE COVER DETAILS

Name	Type	Dia (mm)	Safe Cover	Cover (m)	
z P N.1a	RCP	375	0.6	1.01	
P N.1a	RCP	375	0.6	1.18	
P N.1	RCP	375	0.6	1.35	
P A.7	RCP	1200	0.6	2.97	
P A.8	RCP	1200	0.6	2.68	
P A.9	RCP	1200	0.6	2.52	
P A.10	RCP	1200	0.6	2.54	
P A.12	RCP	1200	0.6	2.95	
P A.14	Box Culver	0	0.6	3.51	
P253936	RCP	600	0.6	0.66	
P253921	RCP	600	0.6	1.63	
P T.6b	RCP	375	0.6	0.79	
P T.6a	RCP	375	0.6	2.18	
P T.6	RCP	525	0.6	2.39	
z P A.14a	RCP	375	0.6	1.06	
P A.14a	RCP	375	0.6	1.87	
P B.1	RCP	450	0.6	1.01	
P C.1	RCP	525	0.6	1.51	
P A.2	RCP	1200	0.6	0.75	
P A.3	RCP	1200	0.6	1.86	
P A.4	RCP	1200	0.6	2.33	
P A.5	RCP	1200	0.6	2.71	
P A.6	RCP	1200	0.6	3.12	
P C.1a	RCP	525	0.6	1.58	
P D.1	RCP	375	0.6	0.61	
P D.2	RCP	375	0.6	0.88	
P D.3	RCP	450	0.6	1.99	
P E.1	RCP	375	0.6	0.67	
P F.1	RCP	375	0.6	0.67	
P G.1	RCP	375	0.6	0.66	
P H.1a	RCP	375	0.6	0.86	
P H.1b	RCP	375	0.6	1.14	
P H.1	RCP	375	0.6	1.75	
P H.2b	RCP	375	0.6	2.01	
P H.2	RCP	450	0.6	2.51	
P K.1	RCP	375	0.6	1.32	
P J.2a	RCP	525	0.6	1.71	
P J.2	RCP	525	0.6	1.75	
P J.3a	RCP	525	0.6	1.79	
P J.3	RCP	525	0.6	1.91	
P J.4	RCP	525	0.6	2.08	
P L.1	RCP	375	0.6	1.01	
P X.1	RCP	375	0.6	1.13	
P W.3	RCP	450	0.6	1.15	
P J.1a	RCP	525	0.6	1.57	
P J.1	RCP	525	0.6	1.48	
P L.1a	RCP	375	0.6	1.02	
P M.1	RCP	375	0.6	0.77	
P W.1	RCP	375	0.6	1.09	
P W.2	RCP	375	0.6	1.17	
P P.1	RCP	375	0.6	0.78	
P P.2	RCP	375	0.6	0.81	
P P.3	RCP	375	0.6	1.74	
P T.3b	RCP	375	0.6	0.99	
P T.3a	RCP	375	0.6	1.46	
P T.3	RCP	375	0.6	1.28	
P T.4	RCP	525	0.6	1.15	
P T.5	RCP	525	0.6	1.3	
P R.1	RCP	375	0.6	1	
P Q.3	RCP	375	0.6	1.87	
P S.1	RCP	375	0.6	0.61	
P S.2	RCP	450	0.6	0.75	
P T.5a	RCP	375	0.6	1.07	
P V.1	RCP	375	0.6	0.97	
P A.6a	RCP	450	0.6	1.96	
z P.C.1a	RCP	450	0.6	-0.24	Unsafe
P D.3a	RCP	450	0.6	1.12	
P Y.1a	RCP	1070	0.6	0.53	Unsafe
P Q.1	RCP	375	0.6	1.26	
P Q.2	RCP	375	0.6	1.97	
z P T.1a	RCP	450	0.6	1.32	
P T.1a	RCP	450	0.6	1.34	
P T.1	RCP	375	0.6	1.42	
P T.2	RCP	375	0.6	1.29	
z P H.2a	RCP	375	0.6	0.91	
P H.2a	RCP	375	0.6	0.94	
P Y.3	RCP	600	0.6	0.67	
P Y.2	RCP	600	0.6	0.7	
P Y.1	RCP	1070	0.6	0.21	Unsafe

P A.1	RCP	1200	0.6	0.4	Unsafe
P286092	RCP	450	0.6	2.17	
P Bbf	RCP	375	0.6	1.95	
P270295	RCP	375	0.6	1.95	
P270289	RCP	375	0.6	1.95	
P270297	RCP	375	0.6	1.95	
P270299	RCP	375	0.6	1.95	
P270292	RCP	375	0.6	1.95	

DRAINS results prepared from Version 2016.14

PIT / NODE DETAILS Version 8

Name	Max HGL	Max Pond HGL	Max Surfac Flow Arrivi (cu.m/s)	Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint
N.1a	20.87		0		1.72		None
N.1	20.77	22.38	0.117	22	1.4	0	Inlet Capacity
A.7	19.34		0		3.05	0	None
A.8	19.17		0		3.07	0	None
A.9	18.91		0.067		2.66	0.012	Inlet Capacity
A.10	18.66	21.38	0.033	2.7	2.66	0	Inlet Capacity
A.12	18.49	21.6	0	0	3.11	0	None
A.14	17.65	21.8	0	0	4.15	0	None
A.15	17.28		0				
S.2a	19.22		0		2.61	0	None
T.6a	19.53		0		2.6	0	None
T.6	19.51		0		2.49	0	None
A.14a	19.88		0		2.12		None
B.1	19.98	21.57	0.043	4.9	1.53	0	Inlet Capacity
C.1	19.97		0.091		1.61	0.021	Inlet Capacity
A.2	19.95	21.57	0.072	2.6	1.52	0	Inlet Capacity
A.3	19.84		0		2.28	0	None
A.4	19.79		0.054		2.64	0.008	Inlet Capacity
A.5	19.73		0		2.9	0	None
A.6	19.62		0		3.31	0	None
C.1a	19.97		0.119		1.73	0.039	Inlet Capacity
D.1	20.71	21.63	0.035	3.2	0.85	0	Inlet Capacity
D.2	20.48	21.63	0.032	2.8	1.09	0	Inlet Capacity
D.3	19.9		0.044		1.73	0.004	Inlet Capacity
E.1	20.7		0.051		1.04	0.007	Inlet Capacity
F.1	21.14	22.35	0.055	11.4	1.05	0	Inlet Capacity
G.1	21.41	22.58	0.068	15.3	0.98	0	Inlet Capacity
H.1a	20.92	22.05	0.053	3.3	1.07	0	Inlet Capacity
H.1b	20.67		0.053		1.46	0.005	Inlet Capacity
H.1	20.42		0.048		1.89	0.005	Inlet Capacity
H.2b	20.2		0.044		2.28	0.004	Inlet Capacity
H.2	19.97		0.013		2.66	0	Inlet Capacity
K.1	21.57		0.101		1.28	0.02	Inlet Capacity
J.2	21.48		0		1.81	0	None
J.2a	21.15	22.89	0.002	0.3	1.73	0	Inlet Capacity
J.3	20.95	22.68	0.027	1.8	1.69	0	Inlet Capacity
J.3a	20.72	22.59	0.083	2.4	1.78	0	Inlet Capacity
J.4	20.54	22.61	0.021	0.9	2.04	0	Inlet Capacity
L.1	22.17		0.047		1.03	0.004	Inlet Capacity
X.1	22.15		0		1.26	0	None
W.3	22.05	23.11	0.046	4.5	0.99	0	Inlet Capacity
J.1a	21.61		0		1.55	0	None
J.1	21.6		0.05		1.55	0.004	Inlet Capacity
L.1a	22.25		0.135		0.9	0.049	Inlet Capacity
M.1	22.46	23.5	0.072	5.2	0.94	0	Inlet Capacity

W.1	22.29		0		1.59	0	None
W.2	22.24		0.038		1.28	0.002	Inlet Capacity
P.1	20.8	21.85	0.036	3.3	0.99	0	Inlet Capacity
P.2	20.67	21.77	0.033	2.9	1.04	0	Inlet Capacity
P.3	20.23		0		2.02	0	None
T.3b	21.88		0.031		1.62	0.007	Inlet Capacity
T.3a	21.76		0.037		1.69	0.009	Inlet Capacity
T.3	21.65		0		1.83	0	None
T.4	20.56	21.98	0.059	5.1	1.33	0	Inlet Capacity
T.5	20.37	21.9	0.013	1.7	1.51	0	Inlet Capacity
R.1	20.76		0.031		1.33	0.007	Inlet Capacity
Q.3	19.97		0.047		2.11	0.014	Inlet Capacity
S.1	20.74		0.053		0.83	0.007	Inlet Capacity
S.2	20.31	21.42	0.03	2.7	1.05	0	Inlet Capacity
T.5a	20.39	21.78	0.023	4.7	1.32	0	Inlet Capacity
V.1	20.72		0.061		1.26	0.01	Inlet Capacity
A.6a	20.61	22.84	0.253	6	2.16	0	Inlet Capacity
N117610	21		0				
D.3a	19.91		0		1.94		None
N313916	19.94		0				
Q.1	21.54		0.03		1.82	0.009	Inlet Capacity
Q.2	20.03		0.033		2.37	0.01	Inlet Capacity
N298568	22.12		0				
T.1a	22.12		0		1.85	0	None
T.1	22.12		0.057		1.61	0.009	Inlet Capacity
T.2	22.08		0.055		1.65	0.008	Inlet Capacity
N299648	21.42		0				
H.2a	21.4		0		1.57		None
Y.3	21.74		0.529		0.76	0	None
Y.2	20.99	21.8	0	0	0.81	0	None
Y.1	20.17		0		1.98	0	None
A.1	19.99	21.43	0.023	1.7	1.39	0	Inlet Capacity
N315082	20.56		0.684				
N317385	19.64		0				
N Bbf	19.62		0				
N317387	19.64		0				
N297486	19.62		0				
N318555	19.64		0				
N297484	19.62		0				
N318568	19.64		0				
N297487	19.62		0				
N319775	19.64		0				
N297489	19.62		0				
N320991	19.64		0				
N297490	19.62		0				

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
C C1.a	0.298	0.202	0.104	10	15	0	AR&R 20 year, 25 minu
C H.2a	0.192	0.13	0.067	10	15	0	AR&R 20 year, 25 minu
C N.1a	0.368	0.216	0.152	10	10	0	AR&R 20 year, 25 minu
C N.1	0.117	0.108	0.009	5	10	0	AR&R 20 year, 25 minu
C A.9	0.053	0.049	0.004	5	10	0	AR&R 20 year, 25 minu
C A.10	0.022	0.02	0.002	5	10	0	AR&R 20 year, 25 minu
C S.2a	0.425	0.288	0.149	10	15	0	AR&R 20 year, 25 minu
C V.1a	0.393	0.23	0.163	10	10	0	AR&R 20 year, 25 minu
C T.1a	0.315	0.185	0.13	10	10	0	AR&R 20 year, 25 minu
C A.14a	0.431	0.292	0.151	10	15	0	AR&R 20 year, 25 minu
C B.1	0.022	0.021	0.002	5	10	0	AR&R 20 year, 25 minu
C C.1	0.048	0.044	0.004	5	10	0	AR&R 20 year, 25 minu
C A.2	0.072	0.066	0.005	5	10	0	AR&R 20 year, 25 minu
C A.4	0.054	0.05	0.004	5	10	0	AR&R 20 year, 25 minu
C 1.b	0.119	0.11	0.009	5	10	0	AR&R 20 year, 25 minu
C D.1	0.035	0.032	0.003	5	10	0	AR&R 20 year, 25 minu
C D.2	0.032	0.03	0.002	5	10	0	AR&R 20 year, 25 minu
C D.3	0.037	0.035	0.003	5	10	0	AR&R 20 year, 25 minu
C E.1	0.051	0.047	0.004	5	10	0	AR&R 20 year, 25 minu
C F.1	0.047	0.044	0.004	5	10	0	AR&R 20 year, 25 minu
C G.1	0.068	0.063	0.005	5	10	0	AR&R 20 year, 25 minu
C H.1a	0.048	0.043	0.006	5	10	0	AR&R 20 year, 25 minu
C H.1B	0.048	0.043	0.006	5	10	0	AR&R 20 year, 25 minu
C H.1	0.044	0.039	0.005	5	10	0	AR&R 20 year, 25 minu
C H.2B	0.044	0.039	0.005	5	10	0	AR&R 20 year, 25 minu
C H.2	0.013	0.012	0.002	5	10	0	AR&R 20 year, 25 minu
C K.1	0.052	0.048	0.004	5	10	0	AR&R 20 year, 25 minu
C J.2A	0.002	0.002	0	5	10	0	AR&R 20 year, 25 minu
C J.3	0.002	0.002	0	5	10	0	AR&R 20 year, 25 minu
C J.3A	0.083	0.073	0.01	5	10	0	AR&R 20 year, 25 minu
C J.4	0.021	0.018	0.002	5	10	0	AR&R 20 year, 25 minu
C L.1	0.047	0.044	0.004	5	10	0	AR&R 20 year, 25 minu
C W.3	0.044	0.041	0.003	5	10	0	AR&R 20 year, 25 minu
C J.1	0.05	0.046	0.004	5	10	0	AR&R 20 year, 25 minu
C L.1a	0.123	0.113	0.009	5	10	0	AR&R 20 year, 25 minu
C M.1	0.072	0.067	0.006	5	10	0	AR&R 20 year, 25 minu
C W.2	0.038	0.035	0.003	5	10	0	AR&R 20 year, 25 minu
C P.1	0.036	0.033	0.003	5	10	0	AR&R 20 year, 25 minu
C P.2	0.033	0.031	0.003	5	10	0	AR&R 20 year, 25 minu
C T.3B	0.031	0.029	0.002	5	10	0	AR&R 20 year, 25 minu
C T.3A	0.03	0.027	0.002	5	10	0	AR&R 20 year, 25 minu
C T.4	0.05	0.046	0.004	5	10	0	AR&R 20 year, 25 minu
C T.5	0.013	0.012	0.001	5	10	0	AR&R 20 year, 25 minu
C R.1	0.031	0.029	0.002	5	10	0	AR&R 20 year, 25 minu
C Q.3	0.03	0.027	0.002	5	10	0	AR&R 20 year, 25 minu
C S.1	0.053	0.049	0.004	5	10	0	AR&R 20 year, 25 minu
C S.2	0.022	0.021	0.002	5	10	0	AR&R 20 year, 25 minu

C T.5a	0.013	0.012	0.001	5	10	0	AR&R 20 year, 25 minu
C V.1	0.052	0.048	0.004	5	10	0	AR&R 20 year, 25 minu
C A.6a	0.253	0.035	0.22	10	20	0	AR&R 20 year, 1.5 hou
C Y.1	1.573	1.388	0.221	20	30	0	AR&R 20 year, 1.5 hou
C Q.1	0.03	0.025	0.005	5	10	0	AR&R 20 year, 25 minu
C Q.2	0.024	0.02	0.004	5	10	0	AR&R 20 year, 25 minu
C U.1	0.057	0.052	0.004	5	10	0	AR&R 20 year, 25 minu
C U.2	0.055	0.051	0.004	5	10	0	AR&R 20 year, 25 minu
C B.1a	0.128	0.086	0.045	10	15	0	AR&R 20 year, 25 minu
C Y.3	0.529	0.489	0.04	5	10	0	AR&R 20 year, 25 minu
C A.1	0.023	0.021	0.002	5	10	0	AR&R 20 year, 25 minu
C Open	0.684	0.063	0.631	5	20	0	AR&R 20 year, 1.5 hou
C Bf	0.303	0.242	0.065	10	15	0	AR&R 20 year, 25 minu
C Be	0.284	0.227	0.061	10	15	0	AR&R 20 year, 25 minu
C Bi	0.291	0.233	0.063	10	15	0	AR&R 20 year, 25 minu
C Bh	0.28	0.224	0.061	10	15	0	AR&R 20 year, 25 minu
C Bg	0.104	0.083	0.022	10	15	0	AR&R 20 year, 25 minu
C Bd	0.084	0.067	0.018	10	15	0	AR&R 20 year, 25 minu

Outflow Volumes for Total Catchment (13.0 impervious + 7.60 pervious = 20.6 total ha)

Storm	Total Rainf	Total Runo	Impervious	Pervious Runoff
	cu.m	cu.m (Runc	cu.m (Runc	cu.m (Runoff %)
AR&R 20 ye	3595.88	2634.91 (7	2137.90 (9	497.01 (37.4%)
AR&R 20 ye	5616.85	4511.51 (8	3412.44 (9	1099.07 (53.0%)
AR&R 20 ye	7215.78	5980.60 (8	4420.51 (9	1560.10 (58.5%)
AR&R 20 ye	8536.78	7179.15 (8	5252.00 (9	1927.15 (61.1%)
AR&R 20 ye	9658.78	8160.18 (8	5956.49 (9	2203.69 (61.8%)
AR&R 20 ye	10622.94	8989.86 (8	6560.18 (9	2429.68 (61.9%)
AR&R 20 ye	12923.55	11153.14 (	8018.43 (9	3134.71 (65.7%)
AR&R 20 ye	14636.91	12711.61 (	9100.89 (9	3610.72 (66.8%)
AR&R 20 ye	17169.81	14937.26 (	10698.25 (	4239.02 (66.8%)
AR&R 20 ye	18981.14	16492.42 (	11840.62 (	4651.81 (66.4%)
AR&R 20 ye	21678.22	18769.91 (	13541.49 (	5228.42 (65.3%)

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
z P N.1a	0.081	1.61	20.883	20.866	AR&R 20 year, 25 minutes storm, average 112
P N.1a	0.081	1.82	20.842	20.768	AR&R 20 year, 25 minutes storm, average 112
P N.1	0.165	2.93	20.59	20.466	AR&R 20 year, 25 minutes storm, average 112
P A.7	2.111	1.87	19.236	19.173	AR&R 20 year, 25 minutes storm, average 112
P A.8	2.225	1.97	19.055	18.907	AR&R 20 year, 25 minutes storm, average 112
P A.9	2.259	2.03	18.777	18.663	AR&R 20 year, 25 minutes storm, average 112
P A.10	2.339	2.32	18.499	18.486	AR&R 20 year, 25 minutes storm, average 112
P A.12	2.428	3.27	18.109	17.819	AR&R 20 year, 25 minutes storm, average 112
P A.14	2.878	3.27	17.339	17.276	AR&R 20 year, 25 minutes storm, average 112
P253936	0.09	1.93	19.573	19.221	AR&R 20 year, 25 minutes storm, average 112
P253921	0.09	1.86	19.198	19.017	AR&R 20 year, 25 minutes storm, average 112
P T.6b	0.079	1.76	19.862	19.61	AR&R 20 year, 25 minutes storm, average 112
P T.6a	0.08	0.72	19.526	19.511	AR&R 20 year, 25 minutes storm, average 112
P T.6	0.345	3.02	19.314	19.094	AR&R 20 year, 25 minutes storm, average 112
z P A.14a	0.147	1.86	19.896	19.878	AR&R 20 year, 25 minutes storm, average 112
P A.14a	0.147	2.11	19.845	19.745	AR&R 20 year, 25 minutes storm, average 112
P B.1	0.036	0.22	19.972	19.974	AR&R 20 year, 25 minutes storm, average 112
P C.1	0.174	0.81	19.956	19.948	AR&R 20 year, 25 minutes storm, average 112
P A.2	1.339	1.57	19.877	19.843	AR&R 20 year, 1.5 hours storm, average 55.6
P A.3	1.397	1.35	19.808	19.791	AR&R 20 year, 1.5 hours storm, average 55.6
P A.4	1.424	1.32	19.755	19.731	AR&R 20 year, 1.5 hours storm, average 55.6
P A.5	1.466	1.31	19.689	19.62	AR&R 20 year, 1.5 hours storm, average 55.6
P A.6	1.947	1.72	19.442	19.34	AR&R 20 year, 25 minutes storm, average 112
P C.1a	0.08	0.37	19.971	19.974	AR&R 20 year, 25 minutes storm, average 112
P D.1	0.032	1.62	20.639	20.478	AR&R 20 year, 25 minutes storm, average 112
P D.2	0.062	1.88	20.401	19.903	AR&R 20 year, 25 minutes storm, average 112
P D.3	0.128	0.81	19.865	19.843	AR&R 20 year, 20 minutes storm, average 124
P E.1	0.044	4.9	20.573	20.526	AR&R 20 year, 25 minutes storm, average 112
P F.1	0.037	2.99	21.029	21.006	AR&R 20 year, 25 minutes storm, average 112
P G.1	0.046	2.97	21.295	21.273	AR&R 20 year, 25 minutes storm, average 112
P H.1a	0.053	1.67	20.836	20.667	AR&R 20 year, 25 minutes storm, average 112
P H.1b	0.1	2.39	20.579	20.42	AR&R 20 year, 25 minutes storm, average 112
P H.1	0.136	2.06	20.367	20.203	AR&R 20 year, 25 minutes storm, average 112
P H.2b	0.174	2.2	20.138	19.968	AR&R 20 year, 25 minutes storm, average 112
P H.2	0.188	2.92	19.803	19.62	AR&R 20 year, 25 minutes storm, average 112
P K.1	0.074	0.67	21.497	21.479	AR&R 20 year, 25 minutes storm, average 112
P J.2a	0.368	1.73	21.28	21.154	AR&R 20 year, 25 minutes storm, average 112
P J.2	0.371	1.72	21.082	20.953	AR&R 20 year, 25 minutes storm, average 112
P J.3a	0.394	1.82	20.87	20.719	AR&R 20 year, 25 minutes storm, average 112
P J.3	0.469	2.17	20.624	20.54	AR&R 20 year, 25 minutes storm, average 112
P J.4	0.489	2.72	20.405	20.138	AR&R 20 year, 25 minutes storm, average 112
P L.1	0.042	0.38	22.155	22.147	AR&R 20 year, 25 minutes storm, average 112
P X.1	0.122	1.1	22.076	22.051	AR&R 20 year, 25 minutes storm, average 112
P W.3	0.263	1.68	21.829	21.609	AR&R 20 year, 25 minutes storm, average 112
P J.1a	0.261	1.21	21.609	21.603	AR&R 20 year, 25 minutes storm, average 112
P J.1	0.3	1.4	21.509	21.479	AR&R 20 year, 25 minutes storm, average 112
P L.1a	0.084	0.76	22.187	22.147	AR&R 20 year, 25 minutes storm, average 112
P M.1	0.067	3.38	22.314	22.29	AR&R 20 year, 25 minutes storm, average 112

P W.1	0.068	1.62	22.27	22.241	AR&R 20 year, 25 minutes storm, average 112
P W.2	0.101	2.16	22.089	22.051	AR&R 20 year, 25 minutes storm, average 112
P P.1	0.033	1.32	20.705	20.668	AR&R 20 year, 25 minutes storm, average 112
P P.2	0.064	1.7	20.634	20.236	AR&R 20 year, 25 minutes storm, average 112
P P.3	0.063	1.7	20.214	19.987	AR&R 20 year, 25 minutes storm, average 112
P T.3b	0.024	1.65	21.79	21.757	AR&R 20 year, 25 minutes storm, average 112
P T.3a	0.051	2.04	21.672	21.649	AR&R 20 year, 25 minutes storm, average 112
P T.3	0.144	3.04	21.509	20.565	AR&R 20 year, 25 minutes storm, average 112
P T.4	0.244	2.79	20.399	20.366	AR&R 20 year, 25 minutes storm, average 112
P T.5	0.267	2.43	20.267	20.083	AR&R 20 year, 25 minutes storm, average 112
P R.1	0.024	1.66	20.678	20.558	AR&R 20 year, 25 minutes storm, average 112
P Q.3	0.096	2.81	19.819	19.68	AR&R 20 year, 25 minutes storm, average 112
P S.1	0.045	1.55	20.617	20.458	AR&R 20 year, 25 minutes storm, average 112
P S.2	0.07	1.7	20.254	20.066	AR&R 20 year, 25 minutes storm, average 112
P T.5a	0.016	0.46	20.358	20.366	AR&R 20 year, 25 minutes storm, average 112
P V.1	0.05	1.64	20.671	20.565	AR&R 20 year, 25 minutes storm, average 112
P A.6a	0.252	2.17	20.431	20.269	AR&R 20 year, 1.5 hours storm, average 55.6
z P.C.1a	0	0	21	20.975	AR&R 20 year, 5 minutes storm, average 209.
P D.3a	0.003	0.04	19.905	19.903	AR&R 20 year, 1.5 hours storm, average 55.6
P Y.1a	1.354	3.54	19.986	19.942	AR&R 20 year, 1.5 hours storm, average 55.6
P Q.1	0.02	1.56	21.465	20.029	AR&R 20 year, 25 minutes storm, average 112
P Q.2	0.041	1.26	19.97	19.972	AR&R 20 year, 25 minutes storm, average 112
z P T.1a	0.003	0.06	22.12	22.119	AR&R 20 year, 25 minutes storm, average 112
P T.1a	0.002	0.04	22.119	22.118	AR&R 20 year, 5 minutes storm, average 209.
P T.1	0.048	0.88	22.085	22.078	AR&R 20 year, 25 minutes storm, average 112
P T.2	0.096	2.73	21.953	21.789	AR&R 20 year, 25 minutes storm, average 112
z P H.2a	0	0	21.423	21.398	AR&R 20 year, 5 minutes storm, average 209.
P H.2a	0	0	21.398	21.278	AR&R 20 year, 5 minutes storm, average 209.
P Y.3	0.527	3.17	21.527	20.988	AR&R 20 year, 25 minutes storm, average 112
P Y.2	0.519	3.2	20.785	20.172	AR&R 20 year, 25 minutes storm, average 112
P Y.1	1.157	2.57	20.005	19.991	AR&R 20 year, 1.5 hours storm, average 55.6
P A.1	1.165	1.35	19.955	19.948	AR&R 20 year, 1.5 hours storm, average 55.6
P286092	0.684	4.3	20.557	20.172	AR&R 20 year, 1.5 hours storm, average 55.6
P Bbf	0	0	19.643	19.618	AR&R 20 year, 5 minutes storm, average 209.
P270295	0	0	19.643	19.618	AR&R 20 year, 5 minutes storm, average 209.
P270289	0	0	19.643	19.618	AR&R 20 year, 5 minutes storm, average 209.
P270297	0	0	19.643	19.618	AR&R 20 year, 5 minutes storm, average 209.
P270299	0	0	19.643	19.618	AR&R 20 year, 5 minutes storm, average 209.
P270292	0	0	19.643	19.618	AR&R 20 year, 5 minutes storm, average 209.

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 Stor
F C.1a	0	0	0	0	0	0	0	
F H.2a	0	0	0	0	0	0	0	
F N.1a	0	0	0	0	0	0	0	
F N.1	0	0	0	0	0	0	0	
F A.7	0	0	0	0	0	0	0	
F A.8	0	0	0	0	0	0	0	
F A.9	0.012	0.012	0	0.053	0.03	0.9	0.65	AR&R 20 ye
F A.10	0	0	0	0	0	0	0	
F A.12	0	0	0	0	0	0	0	
F A.14	0	0	0	0	0	0	0	
F Total	2.878	2.878	0	0.31	0.7	8.34	2.26	AR&R 20 ye
F S.2a	0	0	0	0	0	0	0	
OF241084	0	0	0	0	0	0	0	
F V.1a	0	0	0	0	0	0	0	
F T.6a	0	0	0	0	0	0	0	
F T.6	0	0	0	0	0	0	0	
F T.1a	0	0	0	0	0	0	0	
F A.14a	0	0	0	0	0	0	0	
F B.1	0	0	0	0	0	0	0	
F C.1	0.021	0.021	0	0.061	0.05	1.18	0.77	AR&R 20 ye
F A.2	0	0	0	0	0	0	0	
F A.3	0	0	0	0	0	0	0	
F A.4	0.008	0.008	0	0.045	0.03	0.63	0.66	AR&R 20 ye
F A.5	0	0	0	0	0	0	0	
F A.6	0	0	0	0	0	0	0	
F C.1ax	0.039	0.039	0	0.076	0.06	1.67	0.83	AR&R 20 ye
F D.1	0	0	0	0	0	0	0	
F D.2	0	0	0	0	0	0	0	
F D.3	0.004	0.004	0	0.032	0.02	0.37	0.68	AR&R 20 ye
F E.1	0.007	0.007	0	0.04	0.03	0.46	0.75	AR&R 20 ye
F F.1	0	0	0	0	0	0	0	
F G.1	0	0	0	0	0	0	0	
F H.1a	0	0	0	0	0	0	0	
F H.1B	0.005	0.005	0	0.04	0.02	0.46	0.59	AR&R 20 ye
F H.1	0.005	0.005	0	0.038	0.02	0.44	0.56	AR&R 20 ye
F H.2B	0.004	0.004	0	0.035	0.02	0.4	0.54	AR&R 20 ye
F H.2	0	0	0	0	0	0	0	
F K.1	0.02	0.02	0	0.061	0.05	1.18	0.76	AR&R 20 ye
F J.2	0	0	0	0	0	0	0	
F J.2A	0	0	0	0	0	0	0	
F J.3	0	0	0	0	0	0	0	
F J.3A	0	0	0	0	0	0	0	
F J.4	0	0	0	0	0	0	0	
F L.1	0.004	0.004	0	0.035	0.02	0.4	0.52	AR&R 20 ye
F X.1	0	0	0	0	0	0	0	
F W.3	0	0	0	0	0	0	0	
F J.1a	0	0	0	0	0	0	0	
F J.1	0.004	0.004	0	0.037	0.02	0.42	0.55	AR&R 20 ye
F L.1a	0.049	0.049	0	0.082	0.07	1.86	0.85	AR&R 20 ye

F M.1	0	0	0	0	0	0	0	
F W.1	0	0	0	0	0	0	0	
F W.2	0.002	0.002	0	0.027	0.01	0.31	0.46	AR&R 20 ye
F P.1	0	0	0	0	0	0	0	
F P.2	0	0	0	0	0	0	0	
F P.3	0	0	0	0	0	0	0	
F T.3B	0.007	0.007	0	0.037	0.03	0.42	0.9	AR&R 20 ye
F T.3A	0.009	0.009	0	0.04	0.04	0.47	0.97	AR&R 20 ye
F T.3	0	0	0	0	0	0	0	
F T.4	0	0	0	0	0	0	0	
F T.5	0	0	0	0	0	0	0	
F R.1	0.007	0.007	0	0.044	0.03	0.58	0.63	AR&R 20 ye
F Q.3	0.014	0.014	0	0.056	0.04	0.99	0.65	AR&R 20 ye
F S.1	0.007	0.007	0	0.046	0.03	0.65	0.6	AR&R 20 ye
F S.2	0	0	0	0	0	0	0	
F T.5a	0	0	0	0	0	0	0	
F V.1	0.01	0.01	0	0.05	0.03	0.8	0.62	AR&R 20 ye
z F A.6a	0	0	0	0	0	0	0	
F Y.1a	0	0	0	0	0	0	0	
F Q.1	0.009	0.009	0	0.041	0.04	0.48	0.99	AR&R 20 ye
F Q.2	0.01	0.01	0	0.042	0.04	0.52	1.03	AR&R 20 ye
F U.1a	0	0	0	0	0	0	0	
F T.1	0.009	0.009	0	0.047	0.03	0.69	0.67	AR&R 20 ye
F U.2	0.008	0.008	0	0.04	0.04	0.47	0.88	AR&R 20 ye
OF262734	0	0	0	0	0	0	0	
F Y.3	0	0	0	0	0	0	0	
F Y.2	0	0	0	0	0	0	0	
F Y.1	0	0	0	0	0	0	0	
F A.1	0	0	0	0	0	0	0	
F Bbf	0	0	0	0	0	0	0	
OF256562	0	0	0	0	0	0	0	
OF256559	0	0	0	0	0	0	0	
OF256564	0	0	0	0	0	0	0	
OF256566	0	0	0	0	0	0	0	
OF256568	0	0	0	0	0	0	0	

DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level
B B	21.31	246.5	0	0	0
B C	21.8	157.8	0	0	0
B 3	21.72	184.2	0.081	0.081	0
B 5W	20.74	278.5	0.09	0.09	0
B 5E	20.8	210.8	0.079	0.079	0
B 4	22.3	225	0	0	0
B 5C	20.65	183.1	0.147	0.147	0
B Bata	20.19	68.9	1.354	1.354	0
B A	21.3	104.1	0	0	0
B F	21.3	242.9	0	0	0
B E	21.27	216.5	0	0	0
B I	21.28	227.1	0	0	0
B H	21.26	211.5	0	0	0
B G	21.33	86.7	0	0	0
B D	21.31	68.2	0	0	0

CONTINUITY CHECK for AR&R 20 year, 1.5 hours storm, average 55.6 mm/h, Zone 1

Node	Inflow (cu.m)	Outflow (cu.m)	Storage Ch (cu.m)	Difference %
B B	493.09	492.26	0	0.2
B C	317.69	317.07	0	0.2
B 3	528.5	552.21	0	-4.5
N.1a	552.21	552.3	0	0
N.1	709.02	710.51	0	-0.2
A.7	4961.05	4967.22	0	-0.1
A.8	5208.1	5209.51	0	0
A.9	5286.36	5288.78	0	0
A.10	5418.68	5419.89	0	0
A.12	6158.73	6161.8	0	0
A.14	7845.39	7842.22	0	0
A.15	7842.22	7842.14	0	0
B 5W	704.42	738.94	0	-4.9
S.2a	738.94	738.84	0	0
B 5E	563.69	548.66	0	2.7
T.6a	548.66	548.62	0	0
T.6	950.68	950.53	0	0
B 4	451.65	450.84	0	0.2
B 5C	714.28	732.94	0	-2.6
A.14a	732.94	733.06	0	0
B.1	36.69	37.12	0	-1.2
C.1	262.22	262.49	0	-0.1
A.2	2335.61	2338.78	0	-0.1
A.3	2546.05	2550.73	0	-0.2
A.4	2690.7	2693.47	0	-0.1
A.5	2783.37	2788.85	0	-0.2
A.6	4244.3	4250.55	0	-0.1
C.1a	159.51	159.56	0	0
D.1	46.42	46.62	0	-0.4

D.2	89.69	89.99	0	-0.3
D.3	208.26	208.53	0	-0.1
E.1	68.03	68.1	0	-0.1
F.1	66.21	66.91	0	-1.1
G.1	91.72	92.7	0	-1.1
H.1a	67.81	68.2	0	-0.6
H.1b	135.51	135.82	0	-0.2
H.1	193.58	193.4	0	0.1
H.2b	249.32	249.28	0	0
H.2	264.42	264.67	0	-0.1
K.1	108.96	108.95	0	0
J.2	568.28	566.46	0	0.3
J.2a	569.81	571.79	0	-0.3
J.3	584.95	585.36	0	-0.1
J.3a	696.5	696.88	0	-0.1
J.4	724.65	725.01	0	0
L.1	63.49	63.5	0	0
X.1	192.34	192.62	0	-0.1
W.3	400.62	401.46	0	-0.2
J.1a	401.46	401.75	0	-0.1
J.1	468.98	469.14	0	0
L.1a	169.39	169.24	0	0.1
M.1	97.14	97.46	0	-0.3
W.1	97.46	97.5	0	0
W.2	149.02	149.06	0	0
P.1	48.49	48.68	0	-0.4
P.2	93.1	93.08	0	0
P.3	93.08	93.4	0	-0.3
T.3b	41.47	41.48	0	0
T.3a	81.36	81.35	0	0
T.3	222.9	222.37	0	0.2
T.4	362.44	362.36	0	0
T.5	401.18	402.07	0	-0.2
R.1	41.47	41.49	0	0
Q.3	152.36	152.62	0	-0.2
S.1	70.82	70.86	0	-0.1
S.2	100.77	100.79	0	0
T.5a	20.95	21.2	0	-1.2
V.1	73.29	73.29	0	0
O B.1	0	0	0	0
O D.2	0	0	0	0
O H.1a	0	0	0	0
O P.2	0	0	0	0
N Total	7841.21	7841.21	0	0
A.6a	465.6	465.77	0	0
N117610	0	0	0	0
D.3a	0	0	0	0
B Bata	3547.26	3544.05	0	0.1
N313916	3544.05	3544.05	0	0
Q.1	39.48	39.54	0	-0.1
Q.2	70.92	71	0	-0.1

N298568	0	0.01	0	0
T.1a	0.01	0.02	0	-218.7
T.1	76.03	76.02	0	0
T.2	146.48	147.36	0	-0.6
N299648	0	0	0	0
H.2a	0	0	0	0
B A	211.33	211	0	0.2
Y.3	709.84	710.84	0	-0.1
Y.2	710.84	712.41	0	-0.2
Y.1	1949.25	1950.46	0	-0.1
A.1	1980.68	1983.55	0	-0.1
N315082	1237.26	1236.83	0	0
B F	491.97	491.03	0	0.2
B E	460.71	460.03	0	0.1
N317385	0	0	0	0
N Bbf	0	0	0	0
N317387	0	0	0	0
N297486	0	0	0	0
N318555	0	0	0	0
N297484	0	0	0	0
N318568	0	0	0	0
N297487	0	0	0	0
B I	473.36	472.44	0	0.2
B H	454.76	453.83	0	0.2
N319775	0	0	0	0
N297489	0	0	0	0
B G	168.95	168.64	0	0.2
N320991	0	0	0	0
N297490	0	0	0	0
B D	136.95	136.73	0	0.2

Run Log for 9009 run at 11:16:41 on 29/3/2017

No water upwelling from any pit. Freeboard was adequate at all pits.
The maximum flow in the following overflow routes is unsafe: F Total

DRAINS results prepared from Version 2016.14

PIT / NODE DETAILS Version 8

Name	Max HGL	Max Pond HGL	Max Surfac Flow Arrivi (cu.m/s)	Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint
N.1a	20.87		0		1.72		None
N.1	20.78	22.39	0.138	25.7	1.39	0.045	Inlet Capacity
A.7	20.35		0.045		2.04	0.005	Inlet Capacity
A.8	20.08		0.005		2.16	0.003	Inlet Capacity
A.9	19.65		0.081		1.91	0.018	Inlet Capacity
A.10	19.25	21.39	0.044	3.3	2.07	0	Inlet Capacity
A.12	18.96	21.6	0	0	2.64	0	None
A.14	17.76	21.8	0	0	4.04	0	None
A.15	17.33		0				
S.2a	19.24		0		2.59	0	None
T.6a	19.58		0		2.54	0	None
T.6	19.56		0		2.44	0	None
A.14a	19.88		0		2.12		None
B.1	21.39	21.59	0.06	6.6	0.11	0	Inlet Capacity
C.1	21.37		0.117		0.22	0.034	Inlet Capacity
A.2	21.32	21.58	0.089	3	0.14	0	Inlet Capacity
A.3	21.18		0		0.95	0	None
A.4	21.08		0.064		1.34	0.012	Inlet Capacity
A.5	20.98		0		1.64	0	None
A.6	20.81		0		2.11	0	None
C.1a	21.37		0.14		0.33	0.053	Inlet Capacity
D.1	21.62	21.64	0.041	3.8	-0.05	0	Outlet System
D.2	21.66	21.64	0.038	3.4	-0.09	0	Outlet System
D.3	21.31		0.054		0.33	0.007	Inlet Capacity
E.1	21.34		0.06		0.39	0.01	Inlet Capacity
F.1	21.18	22.39	0.099	17.1	1.01	0.025	Inlet Capacity
G.1	21.42	22.59	0.081	17.1	0.97	0.032	Inlet Capacity
H.1a	21.6	22.06	0.064	3.9	0.39	0	Inlet Capacity
H.1b	21.54		0.063		0.59	0.007	Inlet Capacity
H.1	21.45		0.057		0.86	0.006	Inlet Capacity
H.2b	21.36		0.052		1.13	0.005	Inlet Capacity
H.2	21.04		0.015		1.58	0.001	Inlet Capacity
K.1	22.49		0.143		0.37	0.041	Inlet Capacity
J.2	22.35		0		0.94	0	None
J.2a	21.96	22.9	0.003	0.4	0.92	0	Inlet Capacity
J.3	21.73	22.7	0.048	2.8	0.91	0	Inlet Capacity
J.3a	21.46	22.6	0.098	2.7	1.04	0	Inlet Capacity
J.4	21.26	22.62	0.025	1	1.32	0	Inlet Capacity
L.1	23.11		0.056		0.09	0.006	Inlet Capacity
X.1	23.07		0		0.34	0	None
W.3	22.99	23.11	0.055	5.4	0.05	0	Inlet Capacity
J.1a	22.5		0		0.66	0	None
J.1	22.49		0.059		0.67	0.007	Inlet Capacity
L.1a	23.13		0.163		0.02	0.081	Inlet Capacity
M.1	23.36	23.51	0.085	6.3	0.04	0	Inlet Capacity

W.1	23.26		0		0.62	0	None
W.2	23.25		0.045		0.28	0.003	Inlet Capacity
P.1	20.82	21.86	0.043	3.9	0.97	0	Inlet Capacity
P.2	20.69	21.78	0.039	3.3	1.03	0	Inlet Capacity
P.3	20.25		0		2	0	None
T.3b	21.89		0.036		1.61	0.009	Inlet Capacity
T.3a	21.77		0.044		1.67	0.012	Inlet Capacity
T.3	21.68		0		1.8	0	None
T.4	20.61	21.99	0.071	6.3	1.28	0	Inlet Capacity
T.5	20.4	21.91	0.015	2	1.47	0	Inlet Capacity
R.1	20.77		0.036		1.31	0.009	Inlet Capacity
Q.3	20.17		0.057		1.92	0.018	Inlet Capacity
S.1	20.75		0.062		0.81	0.011	Inlet Capacity
S.2	20.33	21.42	0.037	3.3	1.03	0	Inlet Capacity
T.5a	20.43	21.8	0.031	6.4	1.28	0	Inlet Capacity
V.1	20.73		0.074		1.25	0.015	Inlet Capacity
A.6a	20.96	22.85	0.342	7.7	1.81	0	Inlet Capacity
N117610	21		0				
D.3a	21.31		0		0.54		None
N313916	19.95		0				
Q.1	21.55		0.035		1.8	0.012	Inlet Capacity
Q.2	20.18		0.039		2.22	0.013	Inlet Capacity
N298568	22.15		0				
T.1a	22.14		0		1.82	0	None
T.1	22.14		0.067		1.59	0.013	Inlet Capacity
T.2	22.1		0.065		1.63	0.012	Inlet Capacity
N299648	21.42		0				
H.2a	21.4		0		1.57		None
Y.3	22.48		0.624		0.02	0.057	Inlet Capacity
Y.2	22.01	22	0.057	9.3	-0.21	0	Outlet System
Y.1	21.5		0		0.65	0	None
A.1	21.37	21.43	0.027	1.9	0.01	0	Inlet Capacity
N315082	22.13		0.935				
N317385	19.64		0				
N Bbf	19.62		0				
N317387	19.64		0				
N297486	19.62		0				
N318555	19.64		0				
N297484	19.62		0				
N318568	19.64		0				
N297487	19.62		0				
N319775	19.64		0				
N297489	19.62		0				
N320991	19.64		0				
N297490	19.62		0				

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
C C1.a	0.372	0.243	0.136	10	15	0	AR&R 100 year, 20 mir
C H.2a	0.24	0.157	0.088	10	15	0	AR&R 100 year, 20 mir
C N.1a	0.449	0.26	0.189	10	10	0	AR&R 100 year, 20 mir
C N.1	0.138	0.127	0.011	5	10	0	AR&R 100 year, 25 mir
C A.9	0.063	0.058	0.005	5	10	0	AR&R 100 year, 25 mir
C A.10	0.026	0.024	0.002	5	10	0	AR&R 100 year, 25 mir
C S.2a	0.531	0.347	0.195	10	15	0	AR&R 100 year, 20 mir
C V.1a	0.479	0.278	0.201	10	10	0	AR&R 100 year, 20 mir
C T.1a	0.384	0.223	0.161	10	10	0	AR&R 100 year, 20 mir
C A.14a	0.539	0.352	0.197	10	15	0	AR&R 100 year, 20 mir
C B.1	0.026	0.024	0.002	5	10	0	AR&R 100 year, 25 mir
C C.1	0.056	0.052	0.004	5	10	0	AR&R 100 year, 25 mir
C A.2	0.084	0.078	0.007	5	10	0	AR&R 100 year, 25 mir
C A.4	0.064	0.059	0.005	5	10	0	AR&R 100 year, 25 mir
C 1.b	0.14	0.129	0.011	5	10	0	AR&R 100 year, 25 mir
C D.1	0.041	0.038	0.003	5	10	0	AR&R 100 year, 25 mir
C D.2	0.038	0.035	0.003	5	10	0	AR&R 100 year, 25 mir
C D.3	0.044	0.041	0.003	5	10	0	AR&R 100 year, 25 mir
C E.1	0.06	0.055	0.005	5	10	0	AR&R 100 year, 25 mir
C F.1	0.056	0.051	0.004	5	10	0	AR&R 100 year, 25 mir
C G.1	0.081	0.074	0.006	5	10	0	AR&R 100 year, 25 mir
C H.1a	0.057	0.05	0.007	5	10	0	AR&R 100 year, 25 mir
C H.1B	0.057	0.05	0.007	5	10	0	AR&R 100 year, 25 mir
C H.1	0.052	0.045	0.006	5	10	0	AR&R 100 year, 25 mir
C H.2B	0.052	0.045	0.006	5	10	0	AR&R 100 year, 25 mir
C H.2	0.015	0.014	0.002	5	10	0	AR&R 100 year, 25 mir
C K.1	0.062	0.057	0.005	5	10	0	AR&R 100 year, 25 mir
C J.2A	0.003	0.003	0	5	10	0	AR&R 100 year, 25 mir
C J.3	0.003	0.003	0	5	10	0	AR&R 100 year, 25 mir
C J.3A	0.098	0.086	0.012	5	10	0	AR&R 100 year, 25 mir
C J.4	0.025	0.022	0.003	5	10	0	AR&R 100 year, 25 mir
C L.1	0.056	0.051	0.004	5	10	0	AR&R 100 year, 25 mir
C W.3	0.052	0.048	0.004	5	10	0	AR&R 100 year, 25 mir
C J.1	0.059	0.054	0.005	5	10	0	AR&R 100 year, 25 mir
C L.1a	0.145	0.133	0.011	5	10	0	AR&R 100 year, 25 mir
C M.1	0.085	0.079	0.007	5	10	0	AR&R 100 year, 25 mir
C W.2	0.045	0.042	0.004	5	10	0	AR&R 100 year, 25 mir
C P.1	0.043	0.039	0.003	5	10	0	AR&R 100 year, 25 mir
C P.2	0.039	0.036	0.003	5	10	0	AR&R 100 year, 25 mir
C T.3B	0.036	0.034	0.003	5	10	0	AR&R 100 year, 25 mir
C T.3A	0.035	0.032	0.003	5	10	0	AR&R 100 year, 25 mir
C T.4	0.059	0.054	0.005	5	10	0	AR&R 100 year, 25 mir
C T.5	0.015	0.014	0.001	5	10	0	AR&R 100 year, 25 mir
C R.1	0.036	0.034	0.003	5	10	0	AR&R 100 year, 25 mir
C Q.3	0.035	0.032	0.003	5	10	0	AR&R 100 year, 25 mir
C S.1	0.062	0.057	0.005	5	10	0	AR&R 100 year, 25 mir
C S.2	0.026	0.024	0.002	5	10	0	AR&R 100 year, 25 mir

C T.5a	0.016	0.014	0.001	5	10	0	AR&R 100 year, 25 mir
C V.1	0.062	0.057	0.005	5	10	0	AR&R 100 year, 25 mir
C A.6a	0.342	0.043	0.299	10	20	0	AR&R 100 year, 1.5 ho
C Y.1	2	1.743	0.305	20	30	0	AR&R 100 year, 1.5 ho
C Q.1	0.035	0.029	0.006	5	10	0	AR&R 100 year, 25 mir
C Q.2	0.028	0.023	0.004	5	10	0	AR&R 100 year, 25 mir
C U.1	0.067	0.061	0.005	5	10	0	AR&R 100 year, 25 mir
C U.2	0.065	0.06	0.005	5	10	0	AR&R 100 year, 25 mir
C B.1a	0.159	0.104	0.058	10	15	0	AR&R 100 year, 20 mir
C Y.3	0.624	0.574	0.049	5	10	0	AR&R 100 year, 25 mir
C A.1	0.027	0.024	0.002	5	10	0	AR&R 100 year, 25 mir
C Open	0.935	0.078	0.857	5	20	0	AR&R 100 year, 1.5 ho
C Bf	0.373	0.292	0.086	10	15	0	AR&R 100 year, 20 mir
C Be	0.35	0.274	0.08	10	15	0	AR&R 100 year, 20 mir
C Bi	0.359	0.281	0.083	10	15	0	AR&R 100 year, 20 mir
C Bh	0.345	0.27	0.079	10	15	0	AR&R 100 year, 20 mir
C Bg	0.128	0.1	0.029	10	15	0	AR&R 100 year, 20 mir
C Bd	0.104	0.081	0.024	10	15	0	AR&R 100 year, 20 mir

Outflow Volumes for Total Catchment (13.0 impervious + 7.60 pervious = 20.6 total ha)

Storm	Total Rainf	Total Runo	Impervious	Pervious Runoff
	cu.m	cu.m (Runc	cu.m (Runc	cu.m (Runoff %)
AR&R 100	4606.36	3638.02 (7	2775.18 (9	862.84 (50.7%)
AR&R 100	7243.23	6119.75 (8	4438.11 (9	1681.63 (62.9%)
AR&R 100	9372.28	8103.35 (8	5780.38 (9	2322.97 (67.1%)
AR&R 100	11144.48	9729.20 (8	6895.55 (9	2833.65 (68.8%)
AR&R 100	12652.66	11068.12 (	7841.29 (9	3226.83 (69.0%)
AR&R 100	13968.35	12243.31 (	8665.25 (9	3578.06 (69.4%)
AR&R 100	17061.9	15253.69 (	10627.31 (	4626.38 (73.4%)
AR&R 100	19372.63	17424.63 (	12087.44 (	5337.19 (74.6%)
AR&R 100	22728.15	20480.69 (	14203.78 (	6276.91 (74.8%)
AR&R 100	25157.26	22650.09 (	15735.64 (	6914.45 (74.4%)
AR&R 100	28657.24	25698.10 (	17943.02 (	7755.08 (73.3%)

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
z P N.1a	0.082	1.61	20.885	20.868	AR&R 100 year, 1.5 hours storm, average 73.6
P N.1a	0.082	1.82	20.844	20.776	AR&R 100 year, 1.5 hours storm, average 73.6
P N.1	0.179	3.03	20.598	20.476	AR&R 100 year, 2 hours storm, average 61.1 r
P A.7	2.698	2.39	20.181	20.081	AR&R 100 year, 1.5 hours storm, average 73.6
P A.8	2.848	2.52	19.887	19.65	AR&R 100 year, 1.5 hours storm, average 73.6
P A.9	2.894	2.56	19.316	19.254	AR&R 100 year, 1.5 hours storm, average 73.6
P A.10	2.997	2.65	19.04	18.959	AR&R 100 year, 1.5 hours storm, average 73.6
P A.12	3.08	3.17	18.557	17.929	AR&R 100 year, 1.5 hours storm, average 73.6
P A.14	3.568	3.51	17.395	17.331	AR&R 100 year, 1.5 hours storm, average 73.6
P253936	0.108	2.03	19.585	19.236	AR&R 100 year, 1.5 hours storm, average 73.6
P253921	0.108	1.96	19.21	19.03	AR&R 100 year, 1.5 hours storm, average 73.6
P T.6b	0.082	1.78	19.863	19.613	AR&R 100 year, 1.5 hours storm, average 73.6
P T.6a	0.082	0.74	19.579	19.565	AR&R 100 year, 1.5 hours storm, average 73.6
P T.6	0.393	2.65	19.379	19.122	AR&R 100 year, 25 minutes storm, average 14
z P A.14a	0.15	1.86	19.899	19.881	AR&R 100 year, 1 hour storm, average 94.1 m
P A.14a	0.15	2.11	19.848	19.748	AR&R 100 year, 1 hour storm, average 94.1 m
P B.1	0.059	0.37	21.382	21.371	AR&R 100 year, 20 minutes storm, average 16
P C.1	0.212	0.98	21.337	21.323	AR&R 100 year, 20 minutes storm, average 16
P A.2	1.678	1.48	21.238	21.175	AR&R 100 year, 1.5 hours storm, average 73.6
P A.3	1.699	1.5	21.119	21.083	AR&R 100 year, 1.5 hours storm, average 73.6
P A.4	1.771	1.57	21.021	20.984	AR&R 100 year, 1.5 hours storm, average 73.6
P A.5	1.814	1.6	20.919	20.812	AR&R 100 year, 1.5 hours storm, average 73.6
P A.6	2.521	2.23	20.514	20.354	AR&R 100 year, 1.5 hours storm, average 73.6
P C.1a	0.089	0.41	21.372	21.371	AR&R 100 year, 25 minutes storm, average 14
P D.1	0.067	0.61	21.623	21.659	AR&R 100 year, 2 hours storm, average 61.1 r
P D.2	0.095	0.86	21.659	21.308	AR&R 100 year, 25 minutes storm, average 14
P D.3	0.182	1.14	21.24	21.175	AR&R 100 year, 25 minutes storm, average 14
P E.1	0.053	0.48	21.316	21.308	AR&R 100 year, 1 hour storm, average 94.1 m
P F.1	0.049	1.43	21.096	21.083	AR&R 100 year, 25 minutes storm, average 14
P G.1	0.049	2.96	21.299	21.277	AR&R 100 year, 15 minutes storm, average 18
P H.1a	0.062	0.56	21.562	21.54	AR&R 100 year, 1.5 hours storm, average 73.6
P H.1b	0.115	1.04	21.485	21.449	AR&R 100 year, 20 minutes storm, average 16
P H.1	0.158	1.43	21.413	21.359	AR&R 100 year, 20 minutes storm, average 16
P H.2b	0.202	1.83	21.303	21.043	AR&R 100 year, 20 minutes storm, average 16
P H.2	0.226	1.42	20.934	20.812	AR&R 100 year, 15 minutes storm, average 18
P K.1	0.093	0.84	22.371	22.35	AR&R 100 year, 25 minutes storm, average 14
P J.2a	0.437	2.02	22.067	21.965	AR&R 100 year, 25 minutes storm, average 14
P J.2	0.439	2.03	21.875	21.731	AR&R 100 year, 25 minutes storm, average 14
P J.3a	0.472	2.18	21.631	21.461	AR&R 100 year, 25 minutes storm, average 14
P J.3	0.568	2.62	21.349	21.255	AR&R 100 year, 25 minutes storm, average 14
P J.4	0.592	2.73	20.963	20.812	AR&R 100 year, 25 minutes storm, average 14
P L.1	0.051	0.47	23.084	23.073	AR&R 100 year, 1 hour storm, average 94.1 m
P X.1	0.143	1.29	23.009	22.992	AR&R 100 year, 20 minutes storm, average 16
P W.3	0.299	1.88	22.715	22.497	AR&R 100 year, 25 minutes storm, average 14
P J.1a	0.299	1.38	22.497	22.49	AR&R 100 year, 30 minutes storm, average 13
P J.1	0.349	1.61	22.382	22.35	AR&R 100 year, 25 minutes storm, average 14
P L.1a	0.098	0.89	23.091	23.073	AR&R 100 year, 20 minutes storm, average 16
P M.1	0.08	0.73	23.273	23.263	AR&R 100 year, 25 minutes storm, average 14

P W.1	0.082	0.74	23.258	23.247	AR&R 100 year, 15 minutes storm, average 18
P W.2	0.121	1.1	23.112	22.992	AR&R 100 year, 25 minutes storm, average 14
P P.1	0.04	1.32	20.719	20.685	AR&R 100 year, 25 minutes storm, average 14
P P.2	0.076	1.79	20.648	20.251	AR&R 100 year, 25 minutes storm, average 14
P P.3	0.076	1.79	20.228	20.081	AR&R 100 year, 25 minutes storm, average 14
P T.3b	0.027	1.72	21.795	21.772	AR&R 100 year, 25 minutes storm, average 14
P T.3a	0.058	2.13	21.68	21.677	AR&R 100 year, 25 minutes storm, average 14
P T.3	0.164	3.35	21.514	20.615	AR&R 100 year, 25 minutes storm, average 14
P T.4	0.282	3.13	20.405	20.405	AR&R 100 year, 25 minutes storm, average 14
P T.5	0.314	2.53	20.294	20.11	AR&R 100 year, 25 minutes storm, average 14
P R.1	0.027	1.72	20.683	20.563	AR&R 100 year, 25 minutes storm, average 14
P Q.3	0.123	1.11	20.094	20.081	AR&R 100 year, 25 minutes storm, average 14
P S.1	0.051	1.6	20.625	20.466	AR&R 100 year, 25 minutes storm, average 14
P S.2	0.083	1.79	20.267	20.08	AR&R 100 year, 25 minutes storm, average 14
P T.5a	0.022	0.44	20.4	20.405	AR&R 100 year, 25 minutes storm, average 14
P V.1	0.058	1.68	20.683	20.615	AR&R 100 year, 20 minutes storm, average 16
P A.6a	0.336	2.11	20.926	20.812	AR&R 100 year, 1.5 hours storm, average 73.6
z P.C.1a	0	0	21	21.313	AR&R 100 year, 5 minutes storm, average 268
P D.3a	0.041	0.26	21.312	21.308	AR&R 100 year, 1.5 hours storm, average 73.6
P Y.1a	1.4	3.57	19.995	19.951	AR&R 100 year, 1.5 hours storm, average 73.6
P Q.1	0.023	1.63	21.47	20.183	AR&R 100 year, 25 minutes storm, average 14
P Q.2	0.052	0.51	20.171	20.17	AR&R 100 year, 25 minutes storm, average 14
z P T.1a	0.004	0.07	22.145	22.142	AR&R 100 year, 25 minutes storm, average 14
P T.1a	0.003	0.05	22.142	22.14	AR&R 100 year, 5 minutes storm, average 268
P T.1	0.053	0.86	22.106	22.099	AR&R 100 year, 25 minutes storm, average 14
P T.2	0.109	3.03	21.955	21.802	AR&R 100 year, 25 minutes storm, average 14
z P H.2a	0	0	21.423	21.398	AR&R 100 year, 5 minutes storm, average 268
P H.2a	0	0	21.398	21.278	AR&R 100 year, 5 minutes storm, average 268
P Y.3	0.607	2.15	22.347	22.007	AR&R 100 year, 20 minutes storm, average 16
P Y.2	0.587	2.07	21.905	21.503	AR&R 100 year, 25 minutes storm, average 14
P Y.1	1.435	1.6	21.403	21.368	AR&R 100 year, 1.5 hours storm, average 73.6
P A.1	1.419	1.25	21.329	21.323	AR&R 100 year, 1.5 hours storm, average 73.6
P286092	0.931	5.86	22.13	21.503	AR&R 100 year, 1.5 hours storm, average 73.6
P Bbf	0	0	19.643	19.618	AR&R 100 year, 5 minutes storm, average 268
P270295	0	0	19.643	19.618	AR&R 100 year, 5 minutes storm, average 268
P270289	0	0	19.643	19.618	AR&R 100 year, 5 minutes storm, average 268
P270297	0	0	19.643	19.618	AR&R 100 year, 5 minutes storm, average 268
P270299	0	0	19.643	19.618	AR&R 100 year, 5 minutes storm, average 268
P270292	0	0	19.643	19.618	AR&R 100 year, 5 minutes storm, average 268

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 Stor
F C.1a	0	0	0	0	0	0	0	
F H.2a	0	0	0	0	0	0	0	
F N.1a	0	0	0	0	0	0	0	
F N.1	0.045	0.045	0	0.086	0.06	2.01	0.68	AR&R 100 \
F A.7	0.005	0.005	0	0.038	0.02	0.44	0.56	AR&R 100 \
F A.8	0.003	0.003	0	0.033	0.02	0.38	0.46	AR&R 100 \
F A.9	0.018	0.018	0	0.061	0.04	1.18	0.69	AR&R 100 \
F A.10	0	0	0	0	0	0	0	
F A.12	0	0	0	0	0	0	0	
F A.14	0	0	0	0	0	0	0	
F Total	3.568	3.568	0	0.334	0.8	8.85	2.41	AR&R 100 \
F S.2a	0	0	0	0	0	0	0	
OF241084	0	0	0	0	0	0	0	
F V.1a	0	0	0	0	0	0	0	
F T.6a	0	0	0	0	0	0	0	
F T.6	0	0	0	0	0	0	0	
F T.1a	0	0	0	0	0	0	0	
F A.14a	0	0	0	0	0	0	0	
F B.1	0	0	0	0	0	0	0	
F C.1	0.034	0.034	0	0.072	0.06	1.54	0.82	AR&R 100 \
F A.2	0	0	0	0	0	0	0	
F A.3	0	0	0	0	0	0	0	
F A.4	0.012	0.012	0	0.051	0.04	0.84	0.7	AR&R 100 \
F A.5	0	0	0	0	0	0	0	
F A.6	0	0	0	0	0	0	0	
F C.1ax	0.053	0.053	0	0.083	0.07	1.91	0.87	AR&R 100 \
F D.1	0	0	0	0	0	0	0	
F D.2	0	0	0	0	0	0	0	
F D.3	0.007	0.007	0	0.041	0.03	0.48	0.78	AR&R 100 \
F E.1	0.01	0.01	0	0.045	0.04	0.62	0.85	AR&R 100 \
F F.1	0.025	0.025	0	0.055	0.07	0.95	1.28	AR&R 100 \
F G.1	0.032	0.032	0	0.07	0.06	1.48	0.81	AR&R 100 \
F H.1a	0	0	0	0	0	0	0	
F H.1B	0.007	0.007	0	0.043	0.03	0.56	0.64	AR&R 100 \
F H.1	0.006	0.006	0	0.041	0.02	0.48	0.6	AR&R 100 \
F H.2B	0.005	0.005	0	0.04	0.02	0.46	0.59	AR&R 100 \
F H.2	0.001	0.001	0	0.019	0.01	0.22	0.35	AR&R 100 \
F K.1	0.041	0.041	0	0.077	0.06	1.69	0.84	AR&R 100 \
F J.2	0	0	0	0	0	0	0	
F J.2A	0	0	0	0	0	0	0	
F J.3	0	0	0	0	0	0	0	
F J.3A	0	0	0	0	0	0	0	
F J.4	0	0	0	0	0	0	0	
F L.1	0.006	0.006	0	0.041	0.02	0.48	0.6	AR&R 100 \
F X.1	0	0	0	0	0	0	0	
F W.3	0	0	0	0	0	0	0	
F J.1a	0	0	0	0	0	0	0	
F J.1	0.007	0.007	0	0.043	0.03	0.56	0.63	AR&R 100 \
F L.1a	0.081	0.081	0	0.096	0.09	2.33	0.94	AR&R 100 \

F M.1	0	0	0	0	0	0	0	
F W.1	0	0	0	0	0	0	0	
F W.2	0.003	0.003	0	0.033	0.02	0.38	0.51	AR&R 100 y
F P.1	0	0	0	0	0	0	0	
F P.2	0	0	0	0	0	0	0	
F P.3	0	0	0	0	0	0	0	
F T.3B	0.009	0.009	0	0.04	0.04	0.47	0.98	AR&R 100 y
F T.3A	0.012	0.012	0	0.045	0.05	0.62	1.05	AR&R 100 y
F T.3	0	0	0	0	0	0	0	
F T.4	0	0	0	0	0	0	0	
F T.5	0	0	0	0	0	0	0	
F R.1	0.009	0.009	0	0.047	0.03	0.71	0.67	AR&R 100 y
F Q.3	0.018	0.018	0	0.061	0.04	1.18	0.68	AR&R 100 y
F S.1	0.011	0.011	0	0.052	0.03	0.86	0.63	AR&R 100 y
F S.2	0	0	0	0	0	0	0	
F T.5a	0	0	0	0	0	0	0	
F V.1	0.015	0.015	0	0.058	0.04	1.05	0.67	AR&R 100 y
z F A.6a	0	0	0	0	0	0	0	
F Y.1a	0	0	0	0	0	0	0	
F Q.1	0.012	0.012	0	0.044	0.05	0.58	1.05	AR&R 100 y
F Q.2	0.013	0.013	0	0.045	0.05	0.63	1.08	AR&R 100 y
F U.1a	0	0	0	0	0	0	0	
F T.1	0.013	0.013	0	0.052	0.04	0.88	0.72	AR&R 100 y
F U.2	0.012	0.012	0	0.045	0.04	0.62	1.01	AR&R 100 y
OF262734	0	0	0	0	0	0	0	
F Y.3	0.057	0.057	0	0.086	0.07	1.99	0.87	AR&R 100 y
F Y.2	0	0	0	0	0	0	0	
F Y.1	0	0	0	0	0	0	0	
F A.1	0	0	0	0	0	0	0	
F Bbf	0	0	0	0	0	0	0	
OF256562	0	0	0	0	0	0	0	
OF256559	0	0	0	0	0	0	0	
OF256564	0	0	0	0	0	0	0	
OF256566	0	0	0	0	0	0	0	
OF256568	0	0	0	0	0	0	0	

DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level
B B	21.5	400.8	0	0	0
B C	21.99	256.9	0	0	0
B 3	22.3	332	0.082	0.082	0
B 5W	21.41	467.8	0.108	0.108	0
B 5E	21.63	376.7	0.082	0.082	0
B 4	22.49	364.8	0	0	0
B 5C	21.28	353.2	0.15	0.15	0
B Bata	20.89	458.4	1.4	1.4	0
B A	21.49	169.8	0	0	0
B F	21.48	387.8	0	0	0
B E	21.44	349.4	0	0	0
B I	21.46	364.6	0	0	0
B H	21.43	342.3	0	0	0
B G	21.53	137.4	0	0	0
B D	21.49	108.7	0	0	0

CONTINUITY CHECK for AR&R 100 year, 1.5 hours storm, average 73.6 mm/h, Zone 1

Node	Inflow (cu.m)	Outflow (cu.m)	Storage Ch (cu.m)	Difference %
B B	681.54	660.39	21.31	0
B C	439.1	429.19	10.03	0
B 3	730.47	756.1	0	-3.5
N.1a	756.1	755.7	0	0.1
N.1	965.45	963.41	0	0.2
A.7	6787.13	6781.64	0	0.1
A.8	7098.84	7088.73	0	0.1
A.9	7194.96	7186.72	0	0.1
A.10	7359.55	7356.32	0	0
A.12	8334.54	8324.46	0	0.1
A.14	10613.73	10606.21	0	0.1
A.15	10606.21	10605.58	0	0
B 5W	973.62	979.63	0	-0.6
S.2a	979.63	978.22	0	0.1
B 5E	779.09	749.48	0	3.8
T.6a	749.48	749.2	0	0
T.6	1280.12	1278.12	0	0.2
B 4	624.25	618.84	5.56	0
B 5C	987.26	1011.07	0	-2.4
A.14a	1011.07	1011.15	0	0
B.1	54.83	54.25	0	1.1
C.1	356.19	355.67	0	0.1
A.2	3271.43	3269.49	0	0.1
A.3	3543.53	3540.23	0	0.1
A.4	3730.21	3728.47	0	0
A.5	3841.77	3835.79	0	0.2
A.6	5832.22	5823.72	0	0.1
C.1a	213.49	213.26	0	0.1
D.1	62.12	61.83	0	0.5

D.2	119.48	119.37	0	0.1
D.3	277.36	276.68	0	0.2
E.1	91.05	90.77	0	0.3
F.1	92.97	92.19	0	0.8
G.1	122.76	121.38	0	1.1
H.1a	92	91.51	0	0.5
H.1b	182.68	182.42	0	0.1
H.1	259.78	259.6	0	0.1
H.2b	334.1	333.6	0	0.2
H.2	353.35	353.91	0	-0.2
K.1	153.39	153.2	0	0.1
J.2	750.22	749.09	0	0.2
J.2a	753.57	753.39	0	0
J.3	777.38	777.03	0	0
J.3a	926.4	925.39	0	0.1
J.4	962.7	961.87	0	0.1
L.1	84.97	84.88	0	0.1
X.1	251.52	251.36	0	0.1
W.3	528.13	526.99	0	0.2
J.1a	526.99	526.73	0	0
J.1	616.72	616.51	0	0
L.1a	229.8	229.23	0	0.2
M.1	130.01	129.4	0	0.5
W.1	129.4	129.23	0	0.1
W.2	198.18	197.89	0	0.1
P.1	64.9	64.47	0	0.7
P.2	123.93	122.9	0	0.8
P.3	122.9	123.06	0	-0.1
T.3b	55.51	55.49	0	0
T.3a	108.87	108.78	0	0.1
T.3	290.18	290.11	0	0
T.4	479.14	477.59	0	0.3
T.5	531.45	530.92	0	0.1
R.1	55.51	55.49	0	0
Q.3	204.35	204.4	0	0
S.1	94.79	94.72	0	0.1
S.2	134.75	133.85	0	0.7
T.5a	30.58	30.27	0	1
V.1	100.1	100.1	0	0
O B.1	0	0	0	0
O D.2	0	0	0	0
O H.1a	0	0	0	0
O P.2	0	0	0	0
N Total	10598.82	10598.82	0	0
A.6a	679.46	680.72	0	-0.2
N117610	0	0	0	0
D.3a	0	0.09	0	0
B Bata	4788.14	4762.17	0	0.5
N313916	4762.17	4762.17	0	0
Q.1	53.29	53.24	0	0.1
Q.2	95.6	95.48	0	0.1

N298568	0	0	0	0
T.1a	0	-0.04	0	0
T.1	101.68	101.61	0	0.1
T.2	193.78	193.29	0	0.3
N299648	0	0	0	0
H.2a	0	0	0	0
B A	292.09	288.82	3.35	0
Y.3	950.02	948.69	0	0.1
Y.2	948.69	945.99	0	0.3
Y.1	2764.89	2761.02	0	0.1
A.1	2801.47	2801.6	0	0
N315082	1818.67	1818.89	0	0
B F	670.09	662.45	7.8	0
B E	627.51	626.81	0	0.1
N317385	0	0	0	0
N Bbf	0	0	0	0
N317387	0	0	0	0
N297486	0	0	0	0
N318555	0	0	0	0
N297484	0	0	0	0
N318568	0	0	0	0
N297487	0	0	0	0
B I	644.74	643.9	0	0.1
B H	619.4	618.6	0	0.1
N319775	0	0	0	0
N297489	0	0	0	0
B G	230.12	215.48	14.7	0
N320991	0	0	0	0
N297490	0	0	0	0
B D	186.53	182.21	4.37	0

Run Log for 9009 run at 11:13:55 on 29/3/2017

Upwelling occurred at Y.2 D.2
Freeboard was less than 0.15m at Y.3 W.3 M.1 L.1a L.1 D.1 B.1 A.2 A.1
The maximum flow in the following overflow routes is unsafe: F Total

The following overflow routes carried water uphill (adding energy): F C.1
These results may be invalid. You should check for water flowing round in circles at these locations. Yo

Appendix E

Sewer & Water

04 Master Plan
Site Plan

1975 dwellings
197,466m² GFA
FSR 2.2:1

Solar Access **60%**
Parking Demand **2883**
Parking Supply **5365**

EXISTING SWC POTABLE WATER MAIN

NEW WATER MAINS INSTALLED UNDER STAGE 1 CN140751

PROPOSED DN200 WATER MAIN TO SERVICE NEW SUBLOTS E-H AND IF REQUIRED LOTS D, F, G, I

EXISTING SEWER MAIN

DN450 SEWER MAIN INSTALLED UNDER STAGE 1 CN138908

PROPOSED ADJUSTED SEWER MAIN TO CLEAR FUTURE BUILDING 14 ON LOT F. SEWER MAIN MAY NEED TO BE AMPLIFY | UPSIZE TO DN450.

* Retain and adapt existing characterful brick elements from the factorys primary northern wall

368120AQ MARK-UP SKETCH 1/2/2017.