
**NARROMINE SHIRE COUNCIL
ORDINARY MEETING BUSINESS PAPER – 11 AUGUST 2021
SUPPLEMENTARY REPORT TO COUNCIL
INFRASTRUCTURE AND ENGINEERING SERVICES**

1. NARROMINE DRAFT STORMWATER DRAINAGE STUDY REPORT

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This supplementary report is presented to Council and should be considered with Item 2 of the Infrastructure and Engineering Services Report – Draft Stormwater Drainage Study Report.

The Narromine Draft Stormwater Drainage Study Report was inadvertently excluded from the business papers and is now attached for consideration (**Attachment No. 1**)



Our Reference: 2111

Catchment Survey & Analysis
Narromine, NSW

For
Narromine Shire Council

Stormwater Drainage Study Report

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DOCUMENT CONTROL				
Revision	Date	Comment	Prepared	Reviewed
A	03.09.20	Draft Report	JK	DD
B	02.02.21	Final Report (Council Comments)	JK	RK

1 Introduction

Storm Consulting has been engaged by Narromine Shire Council to undertake the data collection within the drainage catchments, report on the hydrology and hydraulics of the existing stormwater drainage system and to provide options to alleviate flooding in key flood prone areas within the Narromine Township located approximately 40km west of Dubbo in the Orana region, NSW.

Previous Storm Consulting study '*Drainage Feasibility Study of the Narromine Northern Catchment (Rev A)*' dated 21/12/18 indicated many areas of the town are flood prone due to undersized stormwater network located on extremely flat terrain. The study also provided a hydrologic and hydraulic assessment of the main Northern Catchment. This report focuses on the remaining township catchments not covered in the previous study.

The objectives of the study are:

- Review of data including the detailed survey by Craig&Rhodes and flood study reports received from Council
- Analyse the drainage system under existing conditions for 1yr, 10yr, 20yr, 50yr and 100yr ARI including peak flows, volumes and velocities
- identify drainage options to improve existing drainage capacity in accordance with major/minor drainage philosophy for:
 - 5-year Average Recurrence Interval (ARI) / 20% Annual Exceedance Probability (AEP)
- provide a cost estimate for the proposed work for each option presented.

2 Available data

Data available and reviewed for the study are as following:

- Council GIS layers including catchment extent, pipes, channel and culvert layers. This data provides includes on pipe/channel inverts but limited information on pit type, size and grate elevation.
- Survey information received from Council (29/06/2018 & 25/07/2018). This information is provided in Appendix C.
- Existing western channel and proposed wetland design
- Detailed Survey by Craig & Rhodes (dated 11/06/20)
- Narromine Drainage Study, PPK Consultants (1993)
- Macquarie River (Narromine to Oxley Station) Floodplain Management Plan (2008).
- Narromine Riverbank Levee Feasibility Study, Lyall & Associates (2013)

3 Review of Available Data

3.1 Existing Landuse

The existing town landuse is largely characterised by General Residential ‘single detached lot’ areas (R1) and Large Lot Residential (R5) with industrial (IN1) and commercial (B1) precincts and open space areas (RE1) as presented in Figure 1.



Figure 1 Site Landzone Map (Source: NSW Planning Portal)

3.2 Existing Topography

The existing surface elevation model was developed using a combination of 1m grid size LiDAR data obtained from Geoscience Australia and detailed survey showing road features (road centreline, kerb and gutter and roadside ditch drains). Existing surface elevation model showing catchment breakup in blue with overland flowpath in red is presented in Figure 2.



Figure 2 Existing Topography showing existing catchments (blue) and landform overland flowpath (red)

The surface elevation model, presented in Figure 2, shows approximately half of the township catchments draining towards Macquarie River to the North. The remaining half of the township catchments drains east and southwards towards an existing natural overland flowpath running south-west. Two large external catchments (shown in dark blue in Figure 2) drains northwards towards Macquarie River via an existing natural overland flowpath running through the middle of the town.

3.3 Catchment Map

Based on the landform and existing drainage network, the town consists of 9 internal catchment areas (Catchment C1 to C8) comprising of the main Narromine Township of the town as well as the eastern industrial lands and totals approximately 400ha in size. This is consistent with the mapping and labels in *Figure 1 of 'Narromine Drainage Study' (PPK Consultants, 1993)*.

Existing internal catchments with catchment IDs are shown in Figure 3.

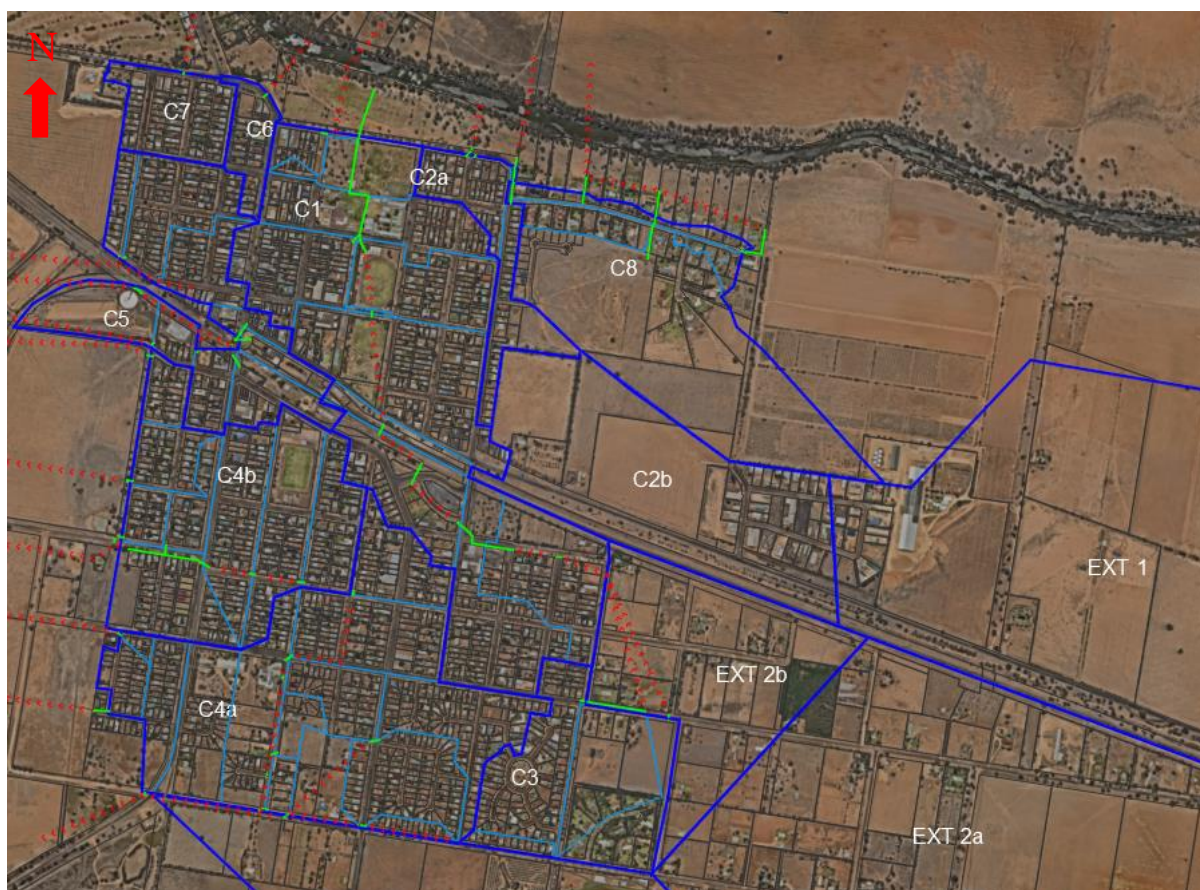


Figure 3 Catchment Map (Catchment boundary - blue, Existing pipe – green, Overland flowpath -red)

Two large external catchments (Catchment Ext1 and Ext2) of approximately 495 ha in size drains to Macquarie River via an existing natural channel running through the town as shown in Figure 2 and Figure 3.

The external catchments are very large in comparison to the internal town catchments with a total area of approximately 400ha.

Location and size of the catchments are presented in Figure 4.

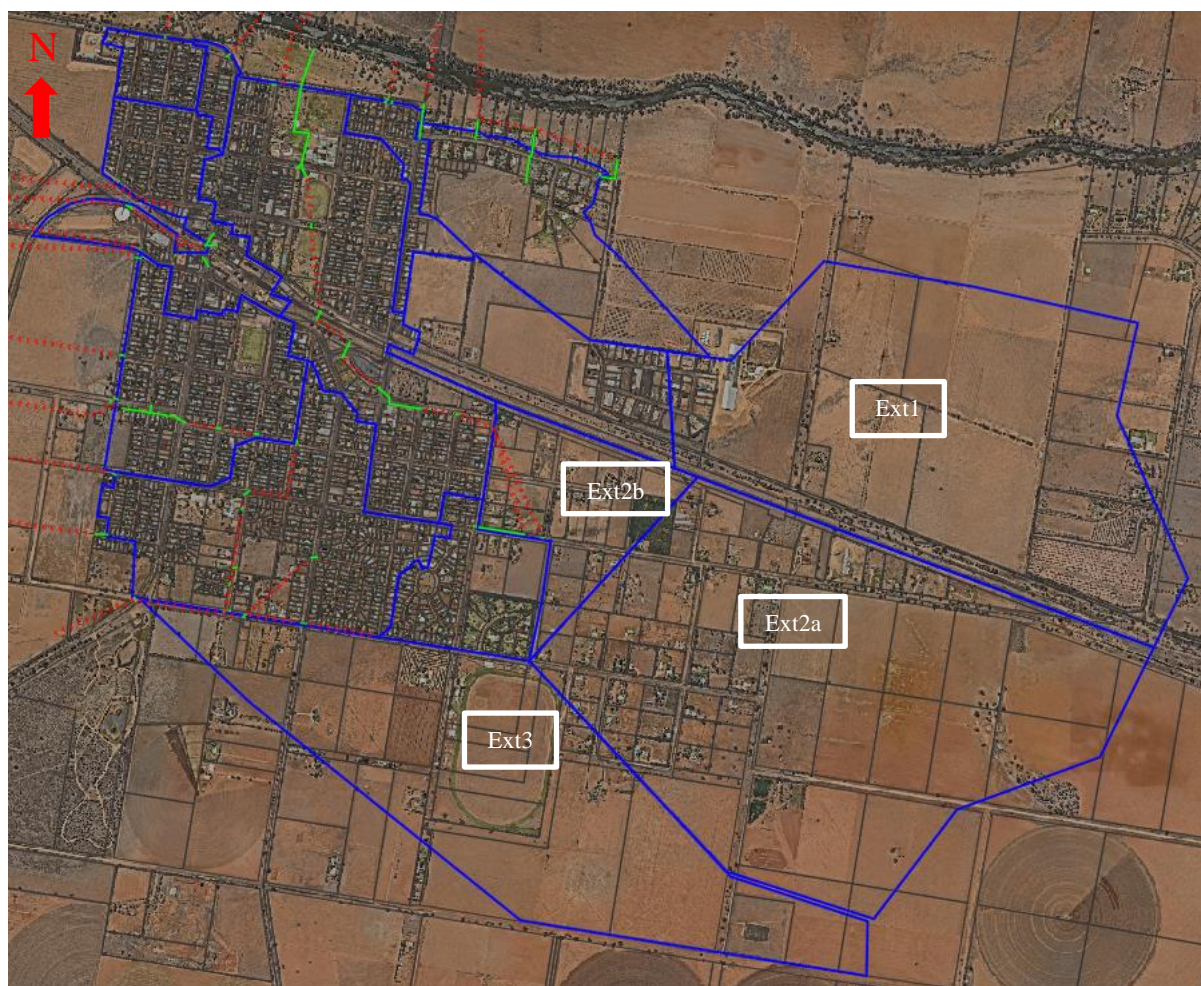


Figure 4 Catchment Map (External Catchment boundary - dark blue, Existing pipe – green, Overland flowpath - red)

Catchment summary is provided in Table 1.

Table 1 Catchment Summary

ID	Area (ha)	Max. RL	Min.RL	Approx. Slope
C1	99.8	239.5	237.5	0.20%
C2a	11.6	239	238.8	0.06%
C2b	51.2	239.2	238.6	0.08%
C3	28.6	241.4	239.5	0.36%
C4a	79.1	241.1	237.5	0.40%
C4b	48.6	239.1	238.2	0.13%
C5	38.9	239.3	238	0.21%
C6	5.1	239.1	238.5	0.27%
C7	10	239	238.1	0.28%
C8	50.5	239.9	239.4	0.07%
Ext1	203.9	246.9	238.8	0.57%
Ext2a	256.4	245.6	239.9	0.36%
Ext2b	40.7	241.5	237.8	0.58%
Ext3	163.7	243.2	237.5	0.45%

3.4 Existing Drainage Network

The existing drainage network has been compiled from:

- Council GIS layers including catchment extent, pipes, channel and culvert layers. This data provides includes on pipe/channel inverts but limited information on pit type, size and grate elevation.
- Survey information received from Council (29/06/2018 & 25/07/2018). This information is provided in Appendix C.
- Existing western channel and proposed wetland design
- Detailed Survey by Craig & Rhodes (dated 11/06/20)

The existing pit and pipe information from Council's GIS system are largely characterised as having shallow grade (<0.3%) and shallow cover (<0.5m) with some drainage lines recorded as being laid against grade.

Overland flowpaths have been determined using the detailed survey by Craig & Rhodes (dated 11/06/20) which includes all local road features within the main township including kerb and gutter levels and roadside swale levels.

Rationalised assumptions of pipe sizes, pit type and invert levels have been made in areas where drainage data is unavailable or where drainage data has been assessed as erroneous.

4 Model Methodology

Existing and proposed hydraulic models have been developed in DRAINS (Version 2020.034) to assess the performance of the existing drainage, identify flood prone areas within the developed catchments and to provide drainage strategies to mitigate flood risks. The proposed options are discussed in detail in Section 7.

4.1 Hydrology

The study was undertaken in accordance with Australian Rainfall and Runoff 1987 (Pilgrim 1987). Intensity Frequency Duration (IFD) data adopted for the study area, obtained from the Bureau of Meteorology (BoM), is shown in Table 2.

Table 2 - Intensity Frequency Duration Data – Narromine

Intensity-Frequency-Duration Table							
Location: 32.225 S 148.250 E NEAR.. Meryula St Narromine Issued: 5/7/2018							
Rainfall intensity in mm/h for various durations and Average Recurrence Interval							
Average Recurrence Interval							
Duration	1 YEAR	2 YEARS	5 YEARS	10 YEARS	20 YEARS	50 YEARS	100 YEARS
5Mins	67.4	88.3	117	136	160	194	222
6Mins	62.6	82.1	109	126	149	181	206
10Mins	51.0	66.9	88.5	103	121	147	167
20Mins	37.4	48.9	64.8	75.0	88.5	107	122
30Mins	30.2	39.6	52.4	60.6	71.5	86.6	98.8
1Hr	20.0	26.1	34.5	39.9	47.0	56.9	64.8
2Hrs	12.5	16.3	21.4	24.6	29.0	35.0	39.8
3Hrs	9.32	12.2	15.9	18.3	21.4	25.8	29.3
6Hrs	5.61	7.29	9.45	10.8	12.6	15.1	17.1
12Hrs	3.38	4.39	5.67	6.48	7.56	9.04	10.2
24Hrs	2.04	2.66	3.45	3.95	4.62	5.55	6.29
48Hrs	1.19	1.57	2.06	2.37	2.80	3.38	3.85
72Hrs	.840	1.10	1.46	1.69	2.00	2.42	2.75

(Raw data: 26.99, 4.47, 1.12, 54.99, 6.6, 2.3, skew=0.24, F2=4.33, F50=15.57) © Australian Government, Bureau of Meteorology

DRAINS standard model (ILSAX) was used to simulate the rainfall-runoff process and consider storage within the overland flow routes. The following design parameters were adopted for the analysis:

- Soil type 3 (slow infiltration),
- Depression storage – 5mm (pervious areas),
- Depression storage – 1mm (impervious areas).

Storm durations of 5 min, 10 min, 15 min, 20 min, 30 min, 1 hr, 2 hr, 3 hr, 4.5 hr and 6 hr were assessed for storms ranging from 1yr ARI to 100yr ARI events to determine existing drainage capacity and determine critical flood prone locations.

4.2 Catchment Parameters

Catchment fraction impervious values has been determined based on the landtype breakup as shown in Figure 1 Site Landzone Map (Source: NSW Planning Portal) and applying the fraction impervious values provided in Table 3. Where a catchment includes multiple landtypes, a weighted average fraction impervious values has been adopted.

Both the existing and proposed models adopts the landtype breakup as shown in Figure 1 Site Landzone Map (Source: NSW Planning Portal).

Table 3 Landtype % Impervious Values

Landtype	Fraction Impervious (%)
R1 Residential	70
IN1 Industrial	70
RE1 Open Space	10
R5 Large Lot Residential	10

Catchment Time of concentration have been internally calculated by DRAINS using catchment parameter inputs for each catchment (flow path length, flow path slope and retardance coefficient).

4.3 Tailwater Levels

Existing tailwater conditions for the outlet pipes has been investigated using available flood study reports. Two flood study reports were considered:

- Macquarie River (Narromine to Oxley Station) Floodplain Management Plan (2008).
- Narromine Riverbank Levee Feasibility Study, Lyall & Associates (2013)

Based on *Table 4.1* of the 'Macquarie River (Narromine to Oxley Station) Floodplain Management Plan' (DECC, 2008), Macquarie River flood levels for the 5% AEP (20yr ARI) and 1% AEP (100yr ARI) has been estimated by applying Manning's Equation across the river cross section located at **Catchment C1** discharge location. The water level at this outlet has been calculated as 230.46m and 232.16m for the 5% and 1% AEP events, respectively.

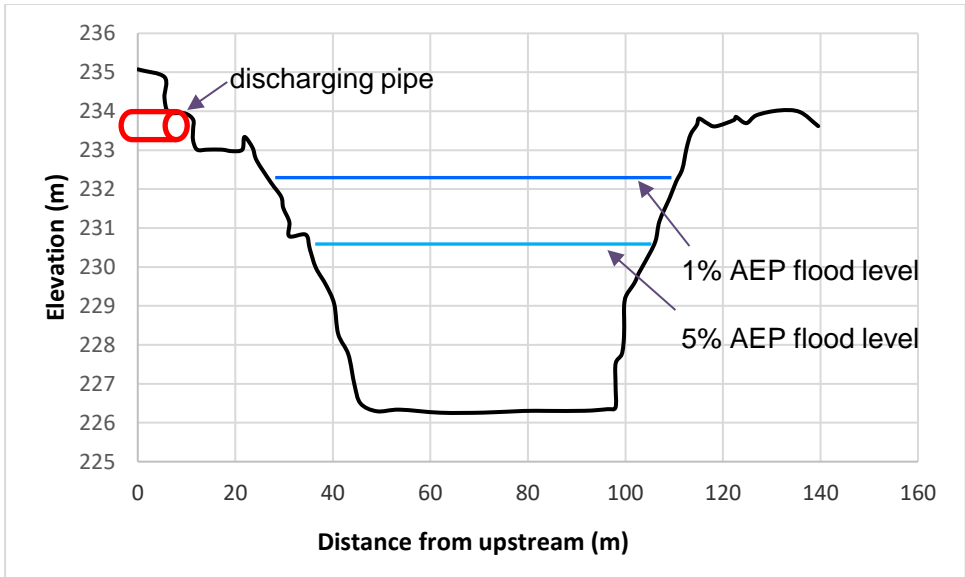


Figure 5 Estimated Macquarie River Flood Levels at Catchment C1 Outlet (based on 'Macquarie River (Narromine to Oxley Station) Floodplain Management Plan' (DECC, 2008)

The 'Narromine Riverbank Levee Feasibility Study' (Lyall & Associates, 2013) report also provides a peak 1%AEP Macquarie River flood level adjacent to the study area (approximately MIKE11 River Chainage 7.30). 5%AEP flood levels were not provided in the report. 1%AEP flood levels from the 'Narromine Riverbank Levee Feasibility Study' (Lyall & Associates, 2013) is presented in Figure 6.



TABLE 3.2
COMPARISON OF 1% AEP PEAK FLOOD LEVELS
PRESENT STUDY VS LACE, 2009a

MIKE 11 Model Reach	MIKE 11 River Chainage	Location	Peak Flood Level (m AHD)		Difference in Peak Flood Levels ⁽²⁾ (Present vs 2009) (m)
			LACE, 2009a	Present Study	
Macquarie River ⁽¹⁾	0.00	Upstream limit of hydraulic model	242.50	243.2	+0.70
	1.35		242.37	243.04	+0.67
	3.25	Adjacent to eastern end of River Drive	241.93	242.24	+0.31
	5.50		240.66	240.81	+0.15
	6.50	Adjacent to eastern end of Crossley Drive	240.07	240.43	+0.36
	7.30	Adjacent to northern end of Manildra Street	239.55	239.98	+0.43
	8.15		239.08	239.55	+0.47
	8.75	Narromine-Eumungerie Road Bridge and Narromine Flood Gauge	238.67	239.12	+0.45
9.40		238.15	238.74	+0.59	

Figure 6 Catchment C1 Outlet Tailwater Levels (based on 'Narromine Riverbank Levee Feasibility Study' (Lyall & Associates, 2013))

Linearly interpolating the flood levels presented in Figure 6, '*Narromine Riverbank Levee Feasibility Study*' (Lyll & Associates, 2013) determined the 1%AEP flood levels at approximately 239.3 at the location of **Catchment C1** outlet location, drowning out the outlet pipe and flooding large areas of Narromine Township. It is noted that this 1%AEP flood level is also significantly higher than the flood level provided in '*Macquarie River (Narromine to Oxley Station) Floodplain Management Plan*' (DECC, 2008).

The '*Narromine Riverbank Levee Feasibility Study*' (Lyll & Associates, 2013)' indicated that the Macquarie River overtops and floods majority of the town (100yr ARI flood level ~RL 239.40) in the 100yr ARI major event. As such, the proposed drainage design and analysis has been primarily focused on the peak 5yr ARI minor event.

Flood levels calculated from *Table 4.1* of the '*Macquarie River (Narromine to Oxley Station) Floodplain Management Plan*' (DECC, 2008) estimates the 20yr ARI (5%AEP) flood level to be well below the existing **Catchment C1** discharge outlet. As such, free discharge has been adopted for the 5yr ARI model runs.

5 Existing Model Methodology

This study extends to the entire Narromine township catchments as well including the previous DRAINS modelling of **Catchment C1** in 'Drainage Feasibility Study of the Narromine Northern Catchment (Rev A - dated 21/12/18)' study. The previous model has been updated as necessary to include the external catchments (**Catchment Ext 1, Ext 2 and Ext 3**) and updating the basin stage-storage data to reflect the updated existing surface data.

Modelling of the catchments has been undertaken using DRAINS (Ver 2020.061) incorporating the available drainage data and catchment analysis as discussed in Section 3.

DRAINS modelling has been limited to the main trunk lines for each of the catchments.

Open space areas at Narromine High School, Dundas Park and Payten were identified as providing flood storage before spilling onto the existing roads. Stage-storage of these areas were updated using LPI Lidar data and modelled as detention basin nodes in the DRAINS models.

Existing DRAINS model layout including existing flood storage areas are presented in Figure 7.

The Stage-Storage data for the existing storage areas (school oval basin, Payten Park basin, Dundas Park basin, Railway basin, Industrial Park basin) are presented in Appendix A.

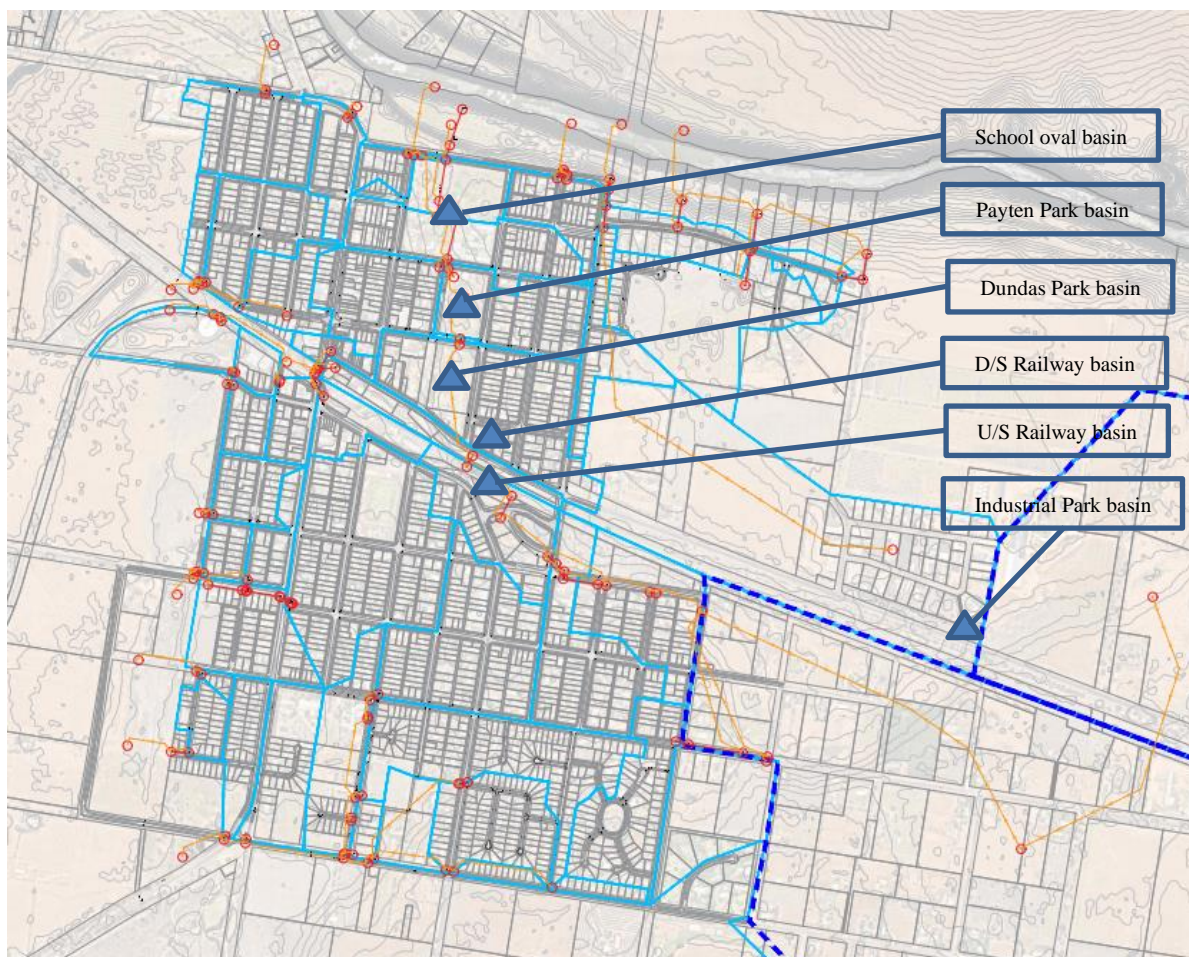


Figure 7 DRAINS Model Layout (Pit/Pipes in Red, Overland Flowpath Link in Orange)

6 Existing Model Results

Many drainage design guidelines, such as AUSPEC, recommends the stormwater drainage to be designed to the major/minor drainage philosophy.

In the minor event (typically peak 5yr ARI), surface runoff are entirely collected and conveyed by the pit and pipe network and discharged to the downstream watercourse.

In the major event (typically peak 100yr ARI event), surface flows are conveyed via a combination of subsurface pit and pipe and overland flow within the road reserve. The pit and pipe network is generally sized to ensure overland flow is safely contained within the road reserve in the 100yr ARI event.

As discussed in Section 4.3 , Macquarie River overtops and floods majority of the town in the major event (100yr ARI flood level ~RL 239.40). As such, the existing DRAINS model has been run for 5yr ARI storms ranging from 5minutes to 6hours durations.

5yr ARI modelling results show the existing drainage within **Catchment C1, C2 and C8** to be significantly undersized with significant overland flow present. The modelling also indicates the drainage within the remaining catchments (**Catchment C3, C4a, C4b, C5, C6 and C7**) to be generally adequately sized with some drainage upgrades required for the peak 5yr ARI event.

Locations of undersized pipes is presented in

Figure 8.

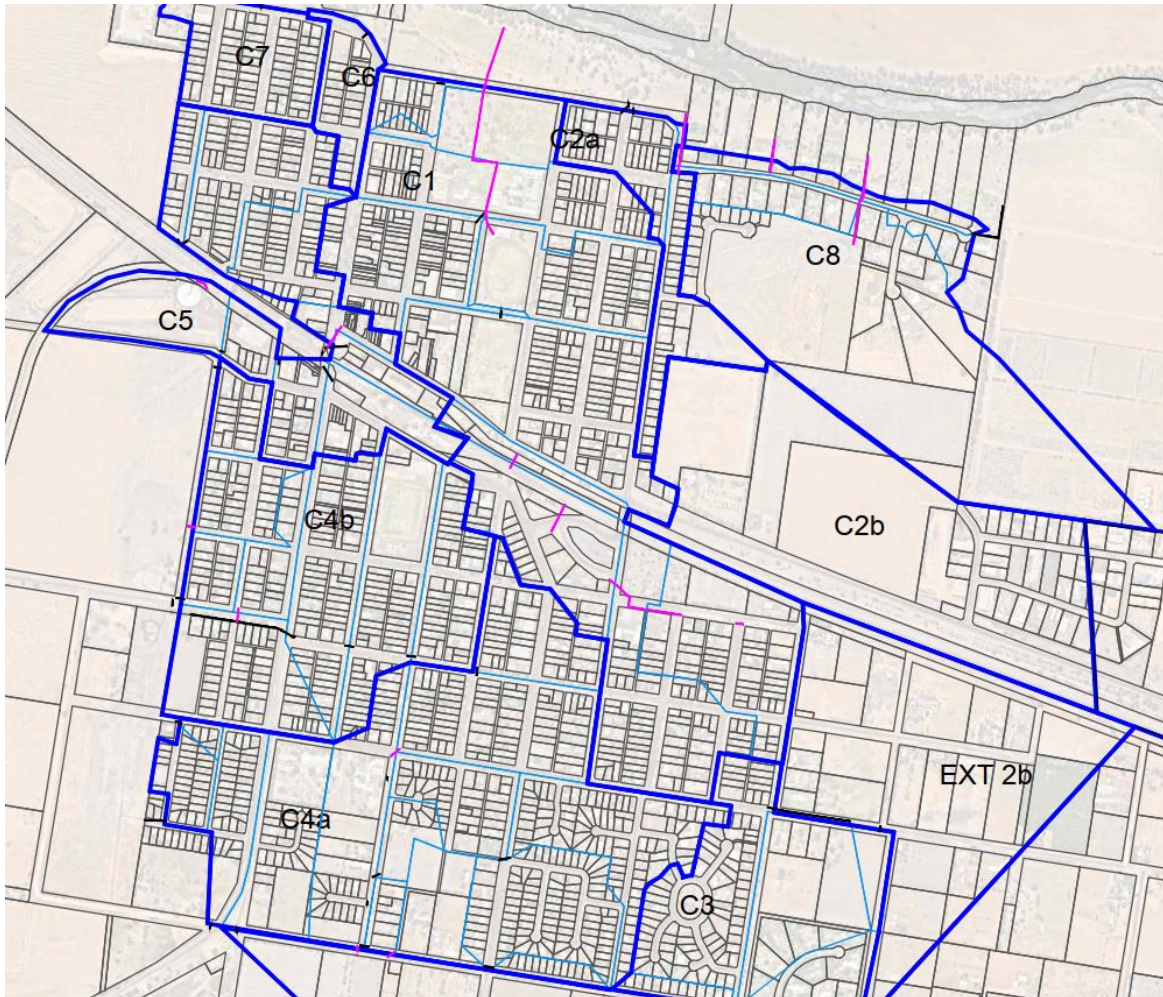


Figure 8 Existing Model – Location of under-capacity pipes in 5yr ARI event (Magenta)

6.1.1 Catchment C1

Four key drainage areas are identified in Catchment C1:

- Terangion Street Drainage (including External Catchments (**Catchment Ext1, Ext2**) and **Catchment C3**)
- Narromine Railway Culvert Crossing (Int. Algalah St and Merulya St)
- Flood Storage Areas (Payten Park, Dundas Park, Narromine High School Oval)
- Macquarie River Discharge Point (Int. Culling St and Meryula St)

The upstream External Catchments, **Catchment Ext 1** and **Ext2** (refer Figure 4), has a total contributing watershed area of 495ha draining to **Catchment C1**. While the landuse of the external catchment is largely undeveloped/existing, the external catchment is approximately four times the size of the internal **Catchment C1** (125ha). The DRAINS modelling indicates the external catchments as having the most significant detrimental impact to the existing drainage network.

Unsurprisingly, the 5yr ARI run results show significant overland flooding within Terangion Street drainage (Upstream end of Catchment C1) as the existing drainage is inadequately sized to convey the external catchment runoff.

The modelling indicates that the single 1000x800 RCBC (IL 237.63) underneath the railway line to be undersized and overtops the existing **C1-Railway Embankment (SAG - RL 238.15)** in the 5yr ARI runs even with the inclusion of the natural detention basin (DRAINS Node *U/S Railway*) as presented in Figure 9.

A second natural detention basin (DRAINS Node *D/S Railway*) is formed by **C1 – Mitchell Hwy Embankment (SAG – RL 238.3)** and is located immediately downstream of the **C1-Railway Embankment (SAG – RL 238.15)**. The embankment is locally higher than the adjacent grassed corridor with no pipe crossing present to relieve the flood storage area. The basin continues to pond until overtopping the embankment sag RL 238.3 which subjects the railway culvert to undesirable tailwater conditions. The '**D/S Railway**' basin node provides little benefit to drainage in its vicinity. Combination of Mitchell Hwy embankment sag RL being 150mm higher than the Railway Embankment sag RL, undersized RCBC underneath the railway and large upstream flows results in the flooding issues presented in Figure 9.

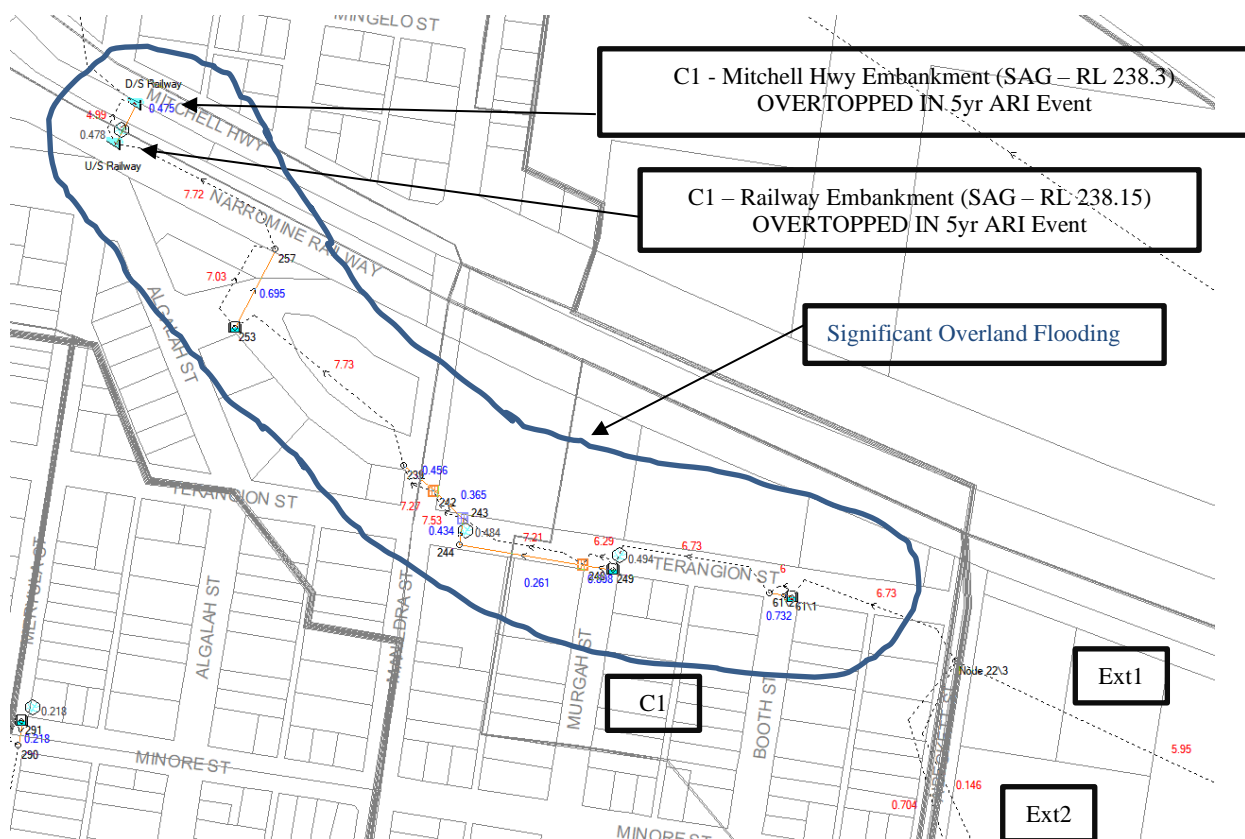


Figure 9 Existing DRAINS 5yr ARI Results (Catchment C1) – External Catchment Area/Railway Crossing
Peak catchment flow rates in m³/s are given **black**, pipe flows in **blue** and overflows in **red**

Further downstream to the flood storage areas (Payten Park, Dundas Park, Narromine HS), there are still significant overland flooding between the flood storage areas at Nymagee St, Meringo St and Culling St in the peak 5yr ARI event as shown in Figure 10.

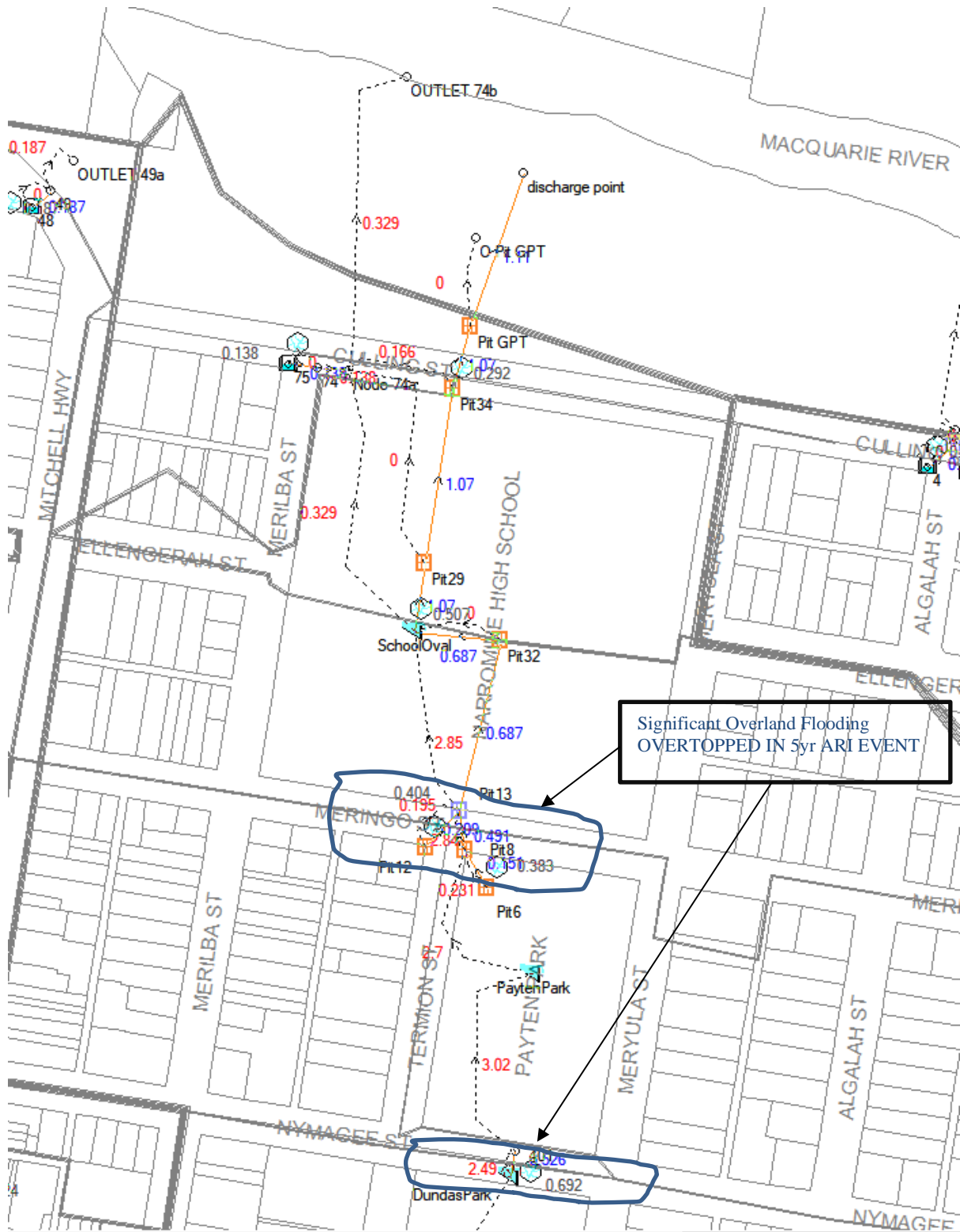


Figure 10 Existing DRAINS 5yr ARI Results (Catchment C1) – Flood Storage Areas/Macquarie River Discharge Location
 Peak catchment flow rates in m^3/s are given **black**, pipe flows in **blue** and overflows in **red**

6.1.2 Catchment C2

Two key locations are identified in Catchment C2:

- Upstream Industrial/Large Lot Residential Catchment (**Catchment C2b**)
- Trunk drainage along Manildra St.

The existing lidar surface indicates the upstream industrial/large lot residential catchment, **Catchment C2b**, flows overland through the rear of existing lots at the intersection of Manildra and Nymagee St and onto the existing Manildra St pit and pipe network. Available pit and pipe data indicate that there are no interallotment drainage pits/pipes and easement to convey the overland flow from **Catchment 2b** to the existing drainage network.

Furthermore, the existing drainage along Manildra St has insufficient capacity for the 5yr ARI runoff generated from its upstream catchment. As such, the DRAINS modelling indicates significant overland flows along Manildra St in the peak 5yr ARI event as shown in Figure 11.

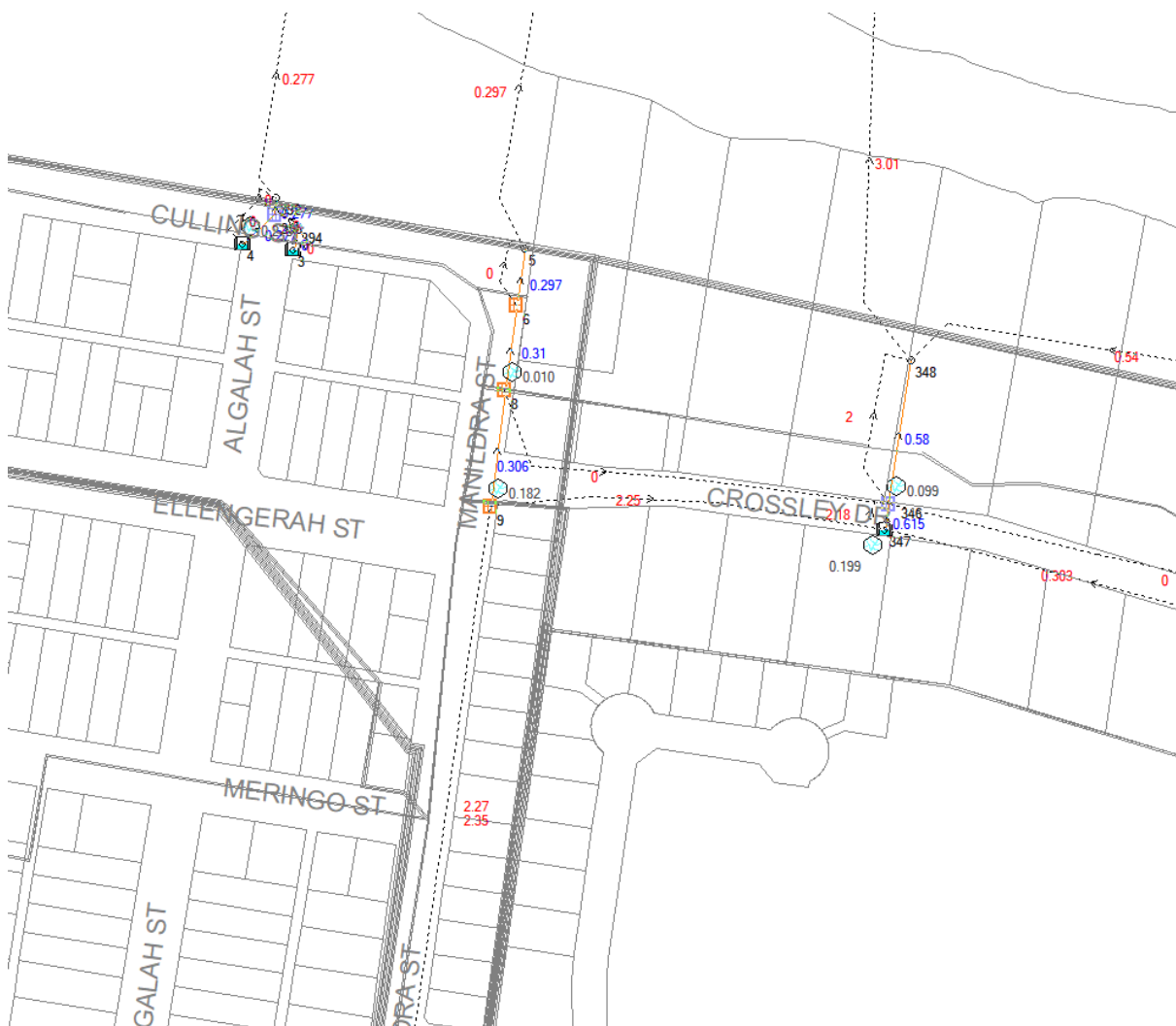


Figure 11 Existing DRAINS 5yr ARI Results (Catchment C2) – Trunk drainage along Manildra St with overland flow from upstream Catchment 2b

Peak catchment flow rates in m³/s are given **black**, pipe flows in **blue** and overflows in **red**

6.1.3 Catchment C3

Catchment C3, of approximately 27.8ha of low-density residential housing, drains to the existing drainage and swale along Webbs Siding Rd and overland flows through existing property towards the Terangion Street drainage within **Catchment C1** as discussed in Section 6.1.1.

5yr DRAINS results indicate that the street drainage within **Catchment C3** is suitably sized to convey the peak 5yr ARI event.

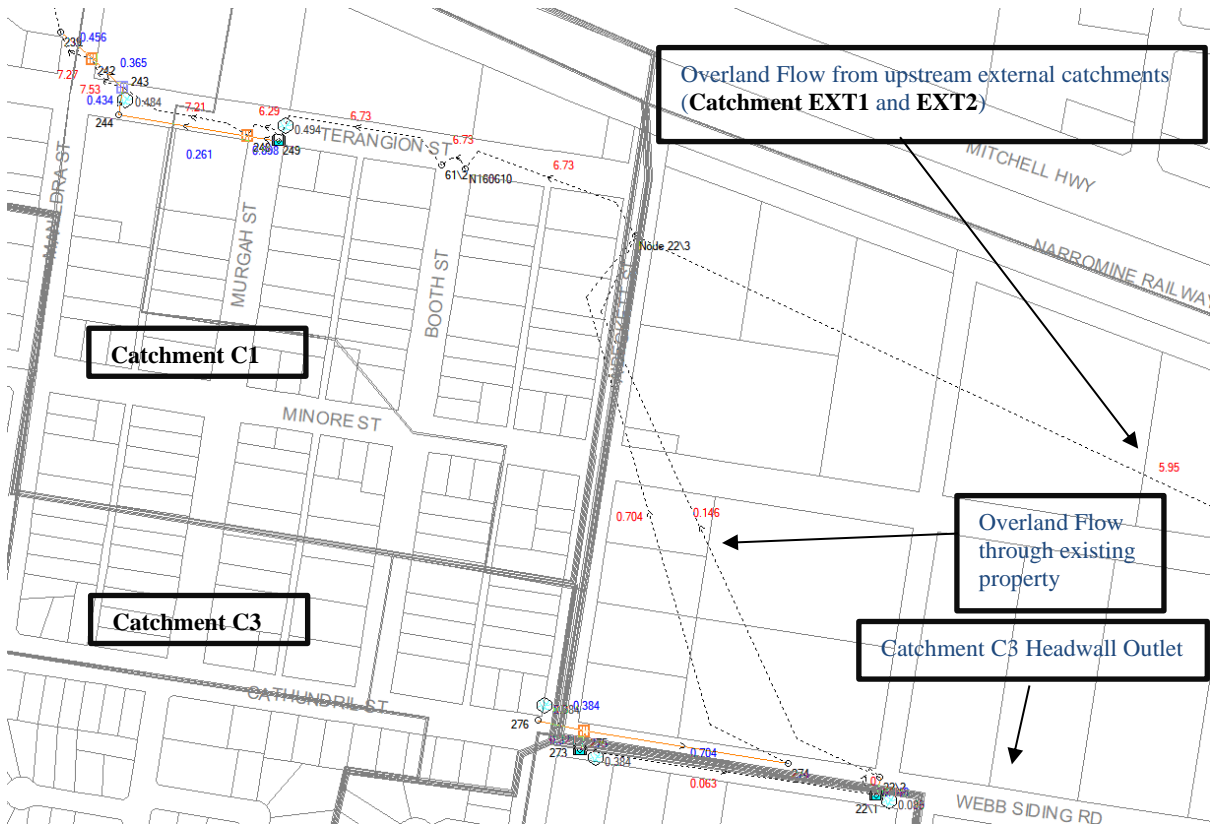


Figure 12 Existing DRAINS 5yr ARI Results (Catchment C3) – Piped and Swale Drainage along Webbs Siding Rd Peak catchment flow rates in m³/s are given **black**, pipe flows in **blue** and overflows in **red**

6.1.4 Catchment C4

Three key locations are identified in Catchment C4:

- Drainage/Swale along Temoin St
- Trunk drainage/Swale along Nellie Vale Rd and Dappo Rd
- Drainage along Tancred St, Cathundril St, Backwater Rd and Terangion St

Catchments draining to Temoin St are conveyed towards the trunk drainage and swale along Nellie Vale Road via a combination of piped drainage running underneath existing roads/driveways and swales as shown in Figure 13. Some overland flows are present overtopping the pipe headwall inlet onto the existing road. The existing swale capacity along Temoin St is calculated to be approximately 1.98m³/s at 0.3% grade. Overland flows along Temoin are contained within the roadside swale without overtopping in the 5yr ARI event.

Similarly, the trunk drainage along Nellie Vale Road and Dappo Road are conveyed to the downstream discharge location via a combination of piped drainage under roads and roadside swales as shown in Figure 13. The existing swale capacity along Nellie Vale Rd and Dappo Rd is calculated to be approximately $0.5\text{m}^3/\text{s}$ at 0.3% grade. The overland flows along Nellie Vale Rd and Dappo Rd exceeds the swale capacity and is likely to spill onto the road in the 5yr ARI event.

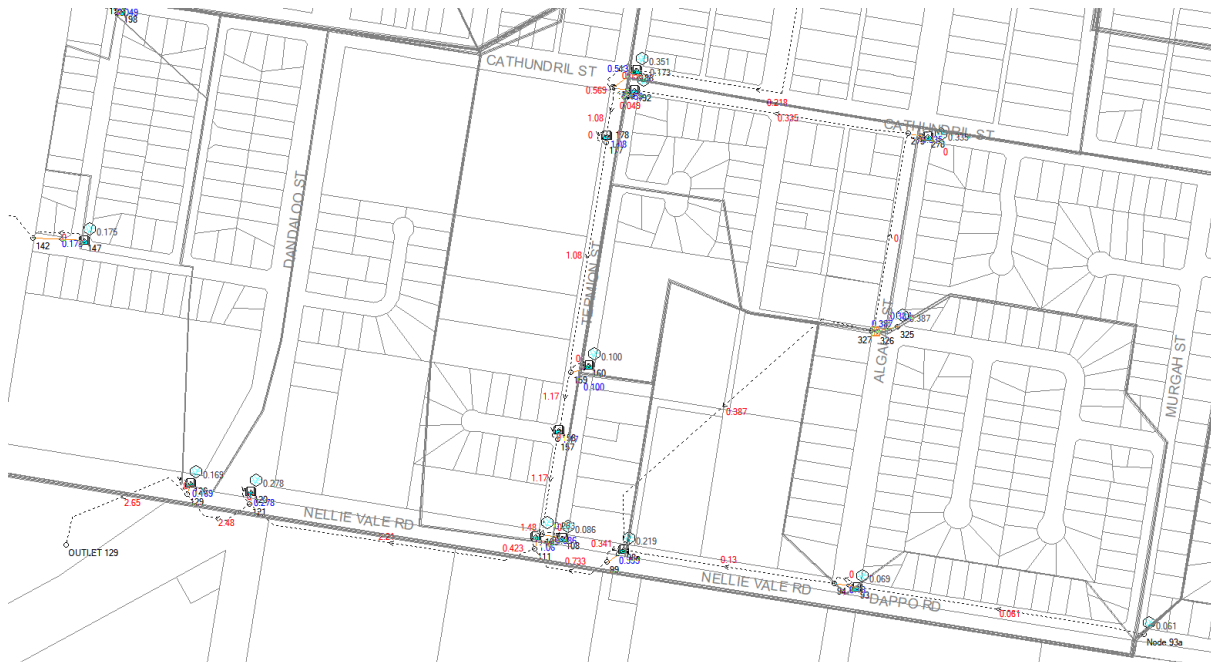


Figure 13 Existing DRAINS 5yr ARI Results (Catchment C4) – Trunk drainage along Temoin St, Nellie Vale Rd and Dappo Rd

Peak catchment flow rates in m^3/s are given **black**, pipe flows in **blue** and overflows in **red**

Catchments draining along Tancred St, Cathundril St, Backwater Rd and Terangion St are relatively small. The existing drainage along these roads are generally sufficiently sized to entirely convey 5yr ARI event flows within the pipes to be discharged westwards towards the existing open channel, ultimately draining to the south-western wetlands. Small overland flows are reported along Backwater Rd and Terangion St in the 5yr ARI event.

6.1.5 Catchment C5

Catchment C5 generally drains westwards towards existing swales adjacent to the Narromine Railway Line via combination of piped and overland flow within the kerb and gutter as shown in Figure 14. The 5yr ARI results show that the existing drainage are sufficiently sized to convey the 5yr ARI flows, although overtopping flows have been reported in some areas. Swale information adjacent the railway line was not available to check existing swale capacity.

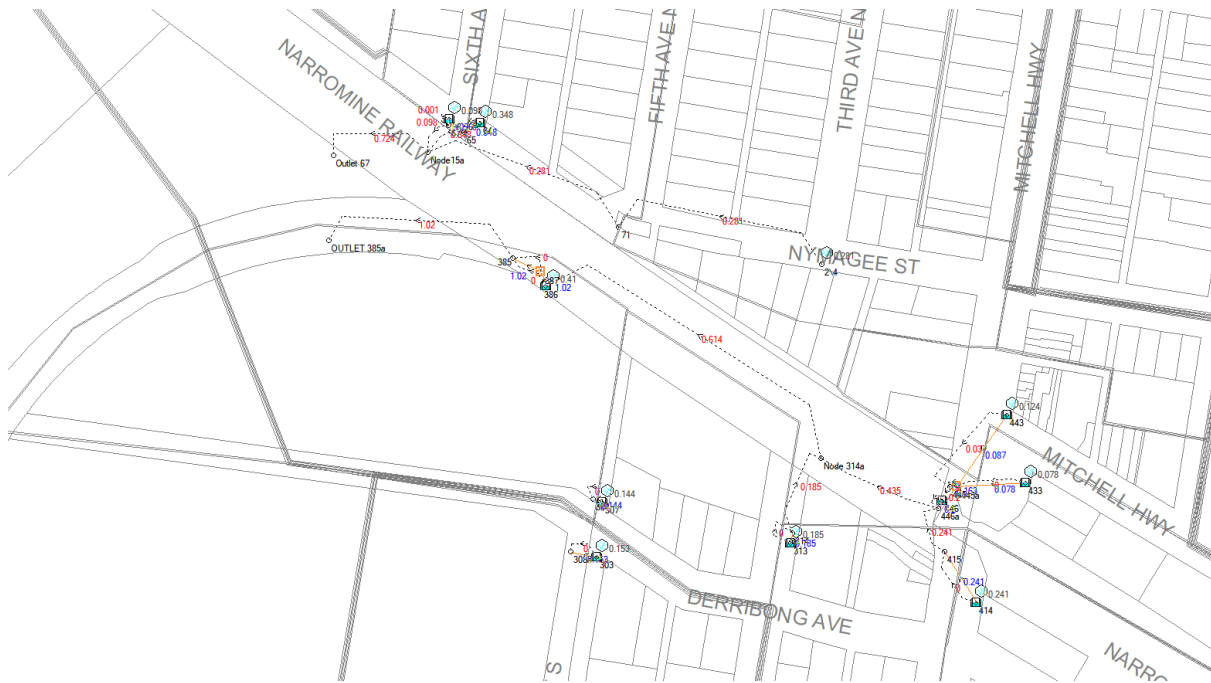


Figure 14 Existing DRAINS 5yr ARI Results (Catchment C5) – Drainage along Nymagee St, Dandaloo St and Derribong Ave
 Peak catchment flow rates in m^3/s are given **black**, pipe flows in **blue** and overflows in **red**

6.1.6 Catchment C6 and C7

Catchment C6 and C7 are relatively small catchment of approximately 9.8ha and 4.8ha respectively as shown in Figure 15. No local road drainage are present within the catchments. Surface flows are collected via kerb and gutter to the trunk drainage pipe crossing Mitchell Hwy. The trunk drainage conveys the collected surface runoff and is discharged into Macquarie River.

The 5yr ARI results show that the existing trunk drainage are sufficiently sized to convey the 5yr ARI flows entirely within the pipe.

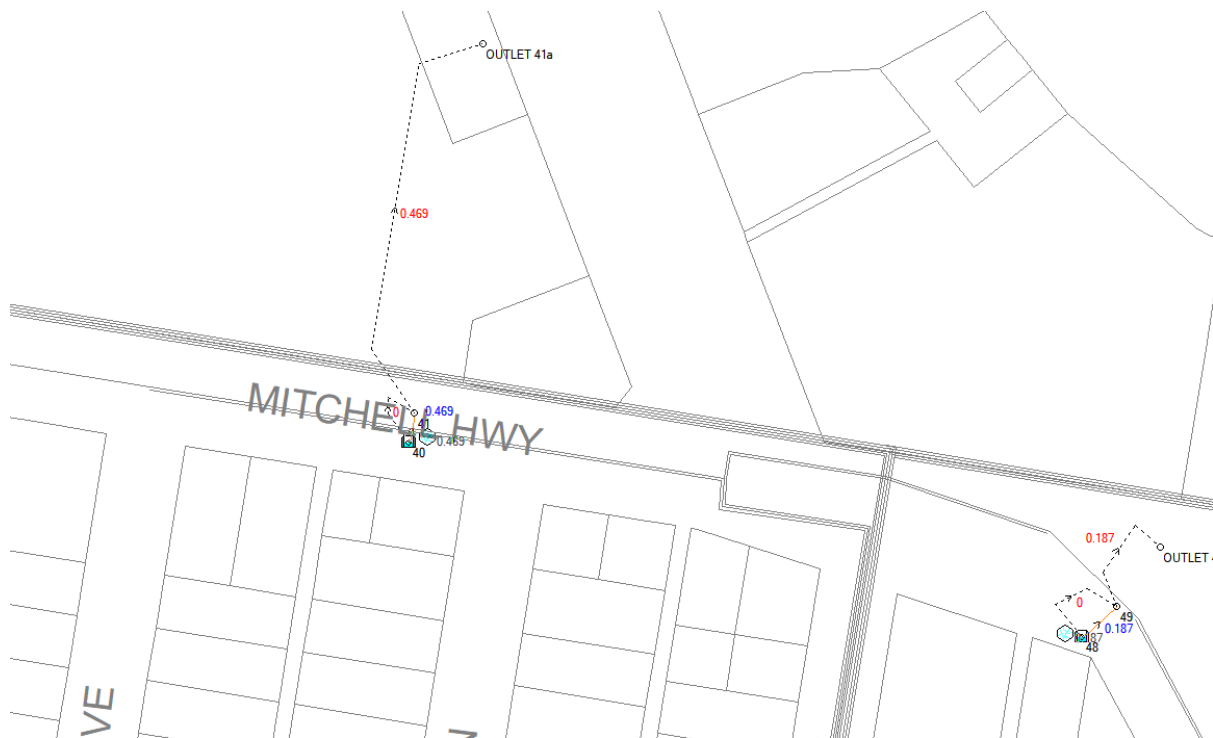


Figure 15 Existing DRAINS 5yr ARI Results (Catchment C6 and C7) – Drainage at intersection of Mitchell Hwy and Fifth Ave and Third Ave
Peak catchment flow rates in m^3/s are given **black**, pipe flows in **blue** and overflows in **red**

6.1.7 Catchment C8

Three key locations are identified in Catchment C8:

- Trunk drainage running through 7 Crossley Dr
- Drainage running through 13 Crossley Dr
- Drainage running through 29 Crossley Dr

Catchment C8 generally drains northwards with an existing sag inlet pit located at 7 Crossley Drive. 5yr ARI results show that the existing drainage are undersized to convey catchment runoff with overland flow at most pit/pipe locations.

6.1.8 Assumptions, Limitations and Other Items of Note

Following observations have been noted during review and analysis of the existing drainage network:

- Trapped low points have been identified at road sag locations without a sag pit
- DRAINS does not allow for bifurcation of overland flowpaths. Bifurcation of surface flows are likely at intersections and may not be accurately captured with DRAINS (2D hydrologic/hydraulic modelling software such as TUFLOW would be more appropriate).

7 Proposed Drainage Strategy

Two proposed options have been developed to contain surface runoff within the pit and pipe network and surface ditch drains/open swales for the peak 5yr ARI event to alleviate existing flood prone areas in accordance with the minor drainage philosophy recommended in ARR87 and typically specified in AUSPEC.

As discussed in Section 4.3 , Macquarie River overtops and floods majority of the town in the major event (100yr ARI flood level ~RL 239.40). As such, the DRAINS modelling results focuses on the 5yr ARI minor event.

The two proposed options are:

- **Proposed Option 1**

The following drainage works are proposed in Option1 (Refer to Figure 17 for drainage works location):

1. The large external catchments, **Catchment Ext 1** and **Ext2**, currently draining through the town is a significant factor in the existing flooding issues as discussed in Section 3.3. It is proposed to divert the existing catchments away from the **Catchment C1** drainage network, providing significant relief to the existing drainage network. Based on the existing topography, approximately 92% of the external catchment (**Catchment Ext1 + Ext2a** - 460ha) will be diverted, via open channel, northwards towards Macquarie River. Remaining 8% of the external catchment (**Catchment Ext2b** - 40ha) will drain to **Catchment C1** as presented in Figure 17.
2. The large industrial **Catchment C2b** currently drains through the rear of properties and to the existing drainage network along Manildra Street located within **Catchment C2a**. The existing 750RCP line along Manildra Street does not have the capacity to accommodate runoff from **Catchment C2b**. It is proposed to divert **Catchment C2b** to **Catchment C8** away from Manildra Street via an open channel.
3. The existing drainage at Terangion Street has insufficient capacity to convey runoff from **Catchment C8** and **Ext2b** even with the diversion of the external catchments, A bypass channel, adjacent the Narromine Railway line, is proposed to divert **Catchment C8** and **Ext2b** away from the existing drainage along Terangion street and to the railway culvert adjacent Narromine Christian School.
4. As discussed in Section 6.1.1, the flood storage area (**Node D/S Railway**) immediately downstream of the railway culvert creates tailwater conditions reducing the capacity of the upstream railway culvert and overtopping of the railway embankment. A pipe crossing underneath Mitchell Highway is proposed to provide a hydraulic connection between the flood storage area and Dundas Park to prevent the overtopping of the railway or Mitchell Highway in the peak 5yr ARI event.

Existing flood storage areas at Narromine High School Oval, Payten Park and Dundas Park remains unchanged.

5. Catchment C4a drains via combination of open drains and pit and pipe towards Nellie Vale Road. An existing open drain collects and conveys **Catchment C4a** runoff to the existing wetlands appears to be undersized. An upgrade of the existing open drain is

proposed to convey **Catchment C4a** runoff in the 5yr ARI event without flooding Nellie Vale Road.

6. Some pipe sections have insufficient capacity even with the proposed drainage works discussed above. Drainage upgrades are required to contain runoff within the 5yr ARI pit and pipe network in the 5yr ARI event.

Pipe capacity has been increased by providing multiple pipes of equal size and invert level to the existing pipe. Where pit capacity is an issue, a 'dummy pit' with large inlet capacity has been provided to ensure surface runoff is captured and conveyed by the subsurface drainage system.

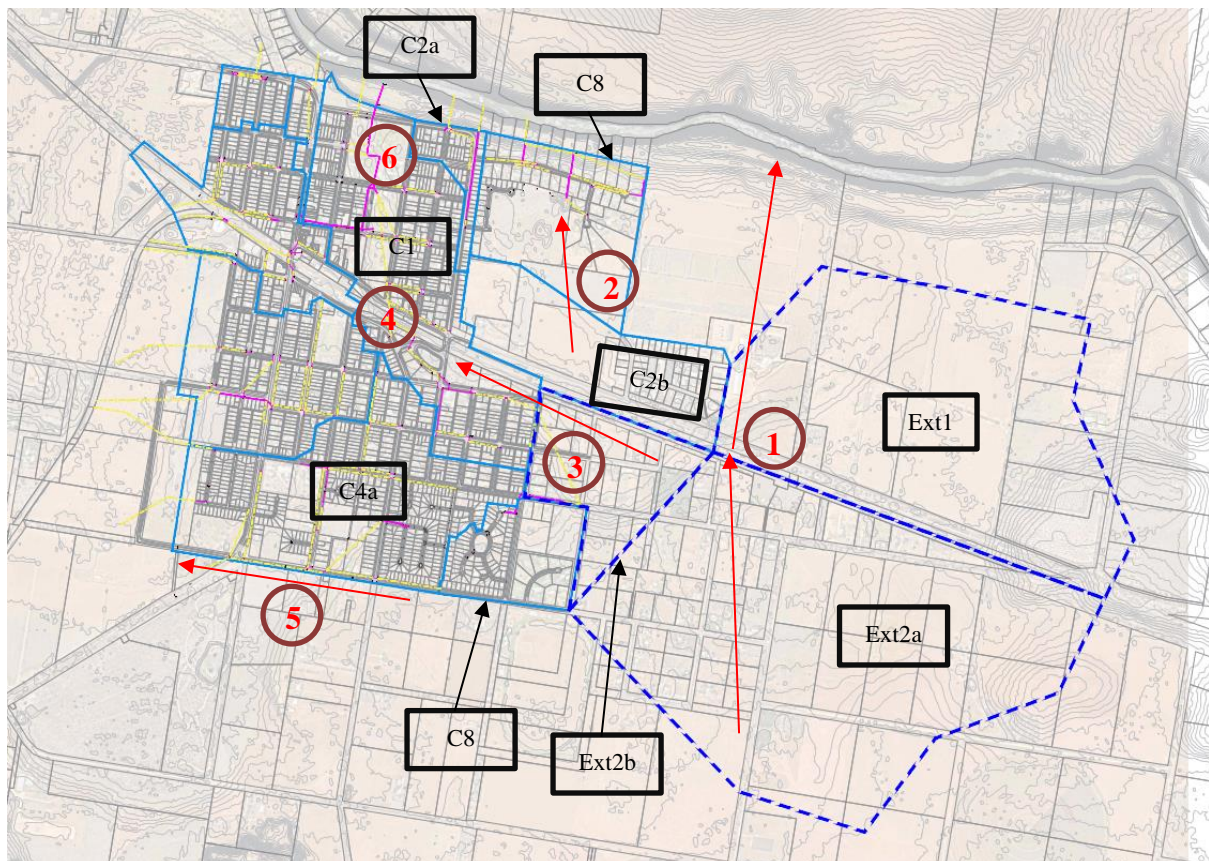


Figure 17 Proposed Option 1 – Proposed Drainage Works

- **Proposed Option 2**

Option 1 requires significant upsizing of existing drainage to manage flooding in the 5yr ARI event. The works are anticipated to include excavation, removal/relaying of pipes and road restoration works which may be overly cost prohibitive.

Option 2 proposes detention basins to reduce the scope and drainage upgrade works while providing green space, providing benefits to surrounding communities as well as achieving stormwater objectives as discussed in Option 1.

Two proposed detention basins are proposed and are located upstream of **Catchment C1** and **Catchment C2b** drainage network, outside of the developed residential areas. The basins will be sufficiently sized to attenuate upstream catchment flows and relieve downstream drainage network in **Catchment C1** and **Catchment C2a** as presented in Figure 18.

Provision of 'Proposed_Basin01' will remove the need to upgrade the 525RCP trunk line in **Catchment C8** proposed in Option1.

Provision of 'Proposed_Basin02' provides significant benefits to pipe network downstream of the basin in **Catchment C1**, reducing the scope of drainage upgrades required relative to Option1.

Option 2 may be a viable alternative if the costs of Option 1 is significantly higher than the cost to implement Option 2. The opinion of probable cost for both Option 1 and Option 2 is presented in Section 9.

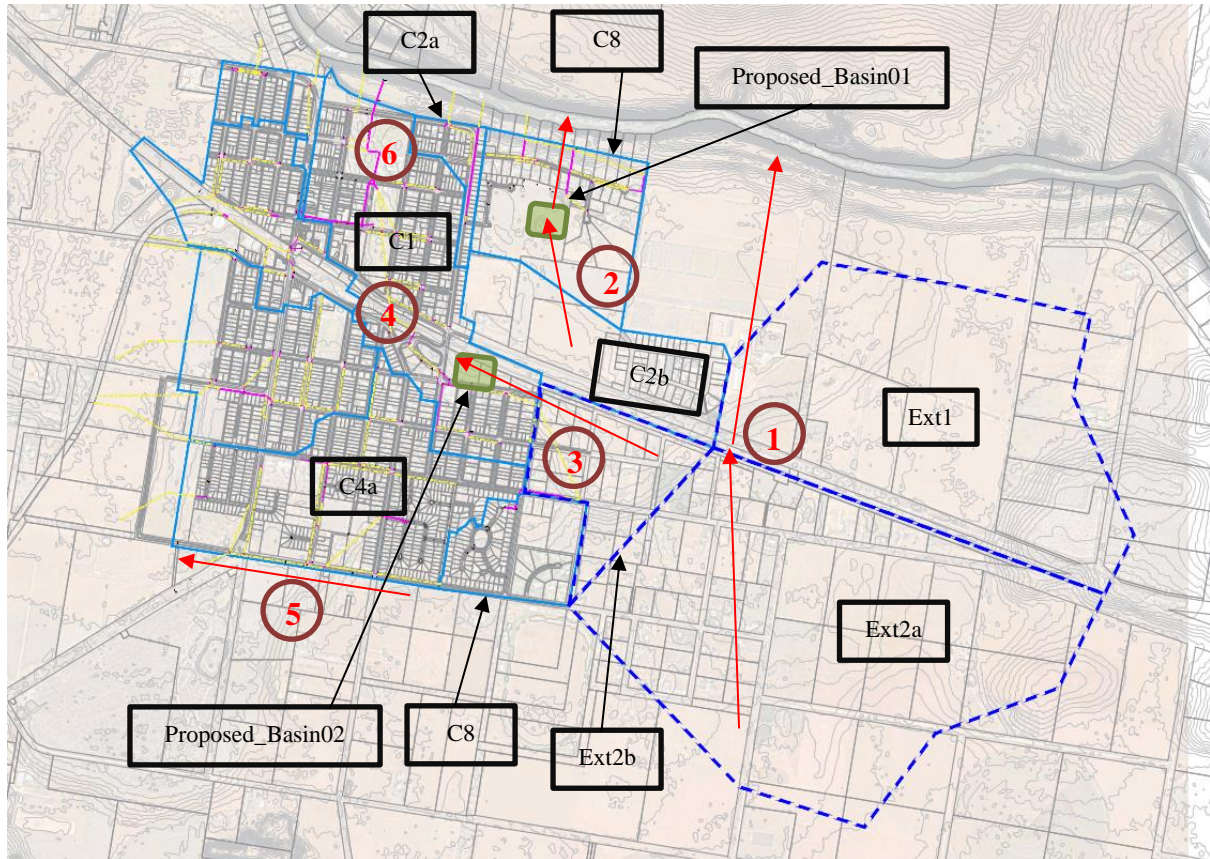


Figure 18 Proposed Option 2 - External Catchment (blue) with diverted overland path (red) and proposed detention basin locations (green)

8 Proposed Strategy Results

Modelling of the two drainage strategy, Option 1 and Option 2 has been undertaken using DRAINS (Ver 2020.061) by modifying the existing DRAINS model to provide the desired drainage outcomes

DRAINS modelling has been limited to the main trunk lines for each of the catchments.

8.1 Proposed Option 1 Model Results

Option 1 pipe upgrade locations are presented in Figure 19.

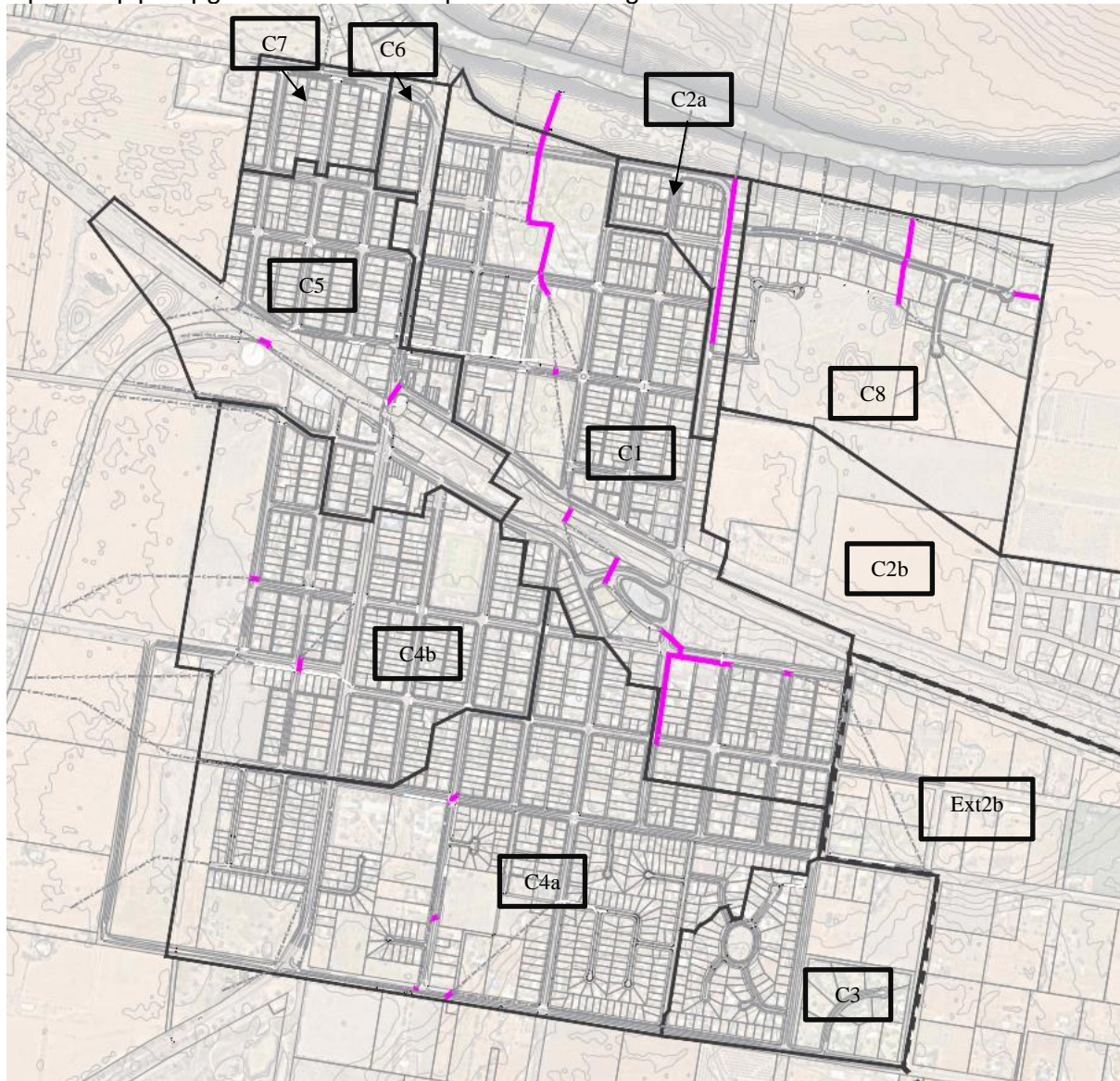


Figure 19 Proposed Option 1 - Pipe Upgrade Locations (Magenta)

8.1.1 Catchment C1

The existing model reported significant flooding within **Catchment C1**. Even with the diversion of the external catchment away from **Catchment C1**, the existing drainage capacity is severely limited by the shallow pipe grades (most pipe grades range from 0.3% – 0.1%) and shallow pipe depths (majority pipes >0.5m cover). As such considerable drainage upgrades are required within **Catchment C1** to contain peak 5yr ARI flows within the drainage network.

As discussed in Section 6.1.1, the backwater effects from 'D/S Railway' node significantly reduces the capacity of the railway culvert crossing (**P 371**). As such, it is proposed to remove the 'D/S Railway' flood storage area and provide a new pipe (**Pipe113448**) to convey flows from railway culvert to Dundas Park flood storage area.

Table 4 outlines the proposed Option 1 pipe upgrades required and comparison with existing pipe sizes.

*Table 4 Proposed Works Option 1 – Catchment C1
(Ref: 055-20 Narromine_PROPOSED_REV00d_upgrade pipes for 5yr ari.drn)*

CATCHMENT C1 WORKS			
Pipe/OLF ID	Existing	Proposed - Option 1	Remarks
P 249	1.2 x 0.3 RCBC	(3x) 1.2 x 0.3 RCBC	
P 248	1.5 x 0.3 RCBC	(3x) 1.2 x 0.3 RCBC	
P 244	1.2 x 0.3 RCBC	(3x) 1.2 x 0.3 RCBC	
P 243	1.2 x 0.3 RCBC	(3x) 1.2 x 0.3 RCBC	
P 242	1.2 x 0.3 RCBC	(3x) 1.2 x 0.3 RCBC	
P 253	1.2 x 0.3 RCBC	(3x) 1.2 x 0.3 RCBC	
P 371	750 RCP	(2X) 2.15x0.65 RCBC	Remove 'D/S Railway' flood storage area
P 400	1.2 x 0.2 RCBC	(4x) 1.2 x 0.25 RCBC	
P Pit8	0.9 x 0.6 RCBC	(2x) 0.9 x 0.6 RCBC	Pit 12, Pit6, Pit8 undersized
P Pit13	0.9 x 0.6 RCBC	(2x) 0.9 x 0.6 RCBC	
P Pit32	0.9 x 0.6 RCBC	(2x) 0.9 x 0.6 RCBC	
P Basin-pit33	0.9 x 0.6 RCBC	(2x) 0.9 x 0.6 RCBC	
P Pit29	0.9 x 0.6 RCBC	(2x) 0.9 x 0.6 RCBC	
P Pit34	(1x) 825	(2x) 825	
P Pit GPT	(2x) 600	(2x) 825	
P Pit34	(1x) 825	(2x) 825	
Pipe113448		(4x) 1.5 x 0.3 RCBC	Lay new pipe under Mitchell Hwy
F Node 22\3		5m x 0.4 SWALE	

8.1.2 Catchment C2

The existing model reports under capacity of the existing **Catchment C2a** drainage and significant overland flows. This is largely due to the huge upstream inflows from **Catchment C2b** draining through the rear of properties located at intersection of Manildra St and Nymagee St.

It is proposed to divert **Catchment C2b** away from the existing **Catchment C2a** pipe network and residential houses along Manildra avenue. 5yr ARI DRAINS modelling of this strategy indicates that the existing **Catchment C2a** pipe network requires no upgrade if **Catchment C2b** is diverted towards **Catchment C8**.

Table 5 outlines the proposed Option 1 upgrades required and comparison with existing pipe sizes.

*Table 5 Proposed Works Option 1 – Catchment C2
(Ref: 055-20 Narromine_PROPOSED_REV00d_upgrade pipes for 5yr ari.drn)*

CATCHMENT C2 WORKS

Pipe/OLF ID	Existing	Proposed - Option 1	Remarks
OF137218	N/A	10m x 0.4 SWALE	Construct swale to Node 336 (Catchment C8)

8.1.3 Catchment C3

Existing model reported some overland flows from **Node 273**. Twin 450 RCP has been provided to remove overland flows in Option 1.

Table 6 outlines the proposed Option 1 pipe upgrades required and comparison with existing pipe sizes.

Table 6 Proposed Works Option 1 – Catchment C3
(Ref: 055-20 Narromine_PROPOSED_REV00d_upgrade pipes for 5yr ari.drm)

CATCHMENT C3 WORKS			
Pipe ID	Existing	Proposed - Option 1	Remarks
P 273	450 RCP	(2x) 450 RCP	

8.1.4 Catchment C4

Runoff from **Catchment C4** is conveyed to the downstream discharge location via a combination of roadside open swales with piped headwall connections under roads and driveways. The existing model reports overflows in some locations due to undersized pipes.

Table 7 outlines the proposed Option 1 pipe upgrades required and comparison with existing pipe sizes.

Table 7 Proposed Works Option 1 – Catchment C4
(Ref: 055-20 Narromine_PROPOSED_REV00d_upgrade pipes for 5yr ari.drm)

CATCHMENT C4 WORKS			
Pipe ID	Existing	Proposed - Option 1	Remarks
P 188	(1x) 1.2W x 0.3H	(1x) 1.5W x 0.3H	
P 110	(1x) 1.5W x 0.4H	(2x) 1.5W x 0.4H	
P 215	(1x) 0.4W x 0.2H	(3x) 0.4W x 0.2H	
P 98a	(1x) 1W x 0.25H	(2x) 1.2W x 0.25H	
P 188	(1x) 1.2W x 0.3H	(1x) 1.5W x 0.3H	
F 121		10m x 0.5 SWALE	Upgrade existing swale

8.1.5 Catchment C5

Existing model reported some overland flows from **Catchment C5**.

Table 8 outlines the proposed Option 1 pipe upgrades required and comparison with existing pipe sizes.

Table 8 Proposed Works Option 1 – Catchment C5
(Ref: 055-20 Narromine_PROPOSED_REV00d_upgrade pipes for 5yr ari.drn)

CATCHMENT C5 WORKS			
Pipe ID	Existing	Proposed - Option 1	Remarks
P 443	300 RCP	(2x) 300 RCP	
P 387	(2x) 600 RCP	(3x) 600 RCP	

8.1.6 Catchment C6 and C7

5yr ARI flows are conveyed within the **Catchment C6** and **C7** drainage network. No works are proposed.

8.1.7 Catchment C8

Runoff from **Catchment C8** is conveyed to the downstream discharge location via a combination of roadside open swales with piped headwall connections under roads and driveways. The existing model reports overflows in some locations due to undersized pipes and a large rural catchment draining to Node **336**.

Table 9 outlines the proposed Option 1 pipe upgrades required and comparison with existing pipe sizes.

Table 9 Proposed Works Option 1 – Catchment C8
(Ref: 055-20 Narromine_PROPOSED_REV00d_upgrade pipes for 5yr ari.drn)

CATCHMENT C8 WORKS			
Pipe ID	Existing	Proposed - Option 1	Remarks
P 336	525 RCP	(3x) 900 RCP	Any overflow will spill to existing properties
P 337	525 RCP	(3x) 900 RCP	
P 338	525 RCP	(3x) 900 RCP	

8.1.8 External Catchments (**Catchment Ext1** and **Ext2**)

The external **Catchment Ext1** and **Ext2**, contribute significant watershed area currently draining through the main township of Narromine. The 5yr DRAINS modelling indicate approximately 6m³/s peak combined flow generated by **Catchment Ext1** and **Ext2**, which has been modelled as rural landtype.

It is proposed to divert, via an open swale, the external catchment runoff towards Macquarie River northwards.

Table 10 Proposed Works Option 1 – Catchment External
(Ref: 055-20 Narromine_PROPOSED_REV00d_upgrade pipes for 5yr ari.drn)

CATCHMENT EXT WORKS			
Pipe/OLF ID	Existing	Proposed - Option 1	Remarks
OF82144	N/A	15m x 0.4 SWALE	

8.2 Proposed Option 2 Model Results

Option 2 proposes two detention basins located upstream of **Catchment C1** and **C8** as well as the redirection of the industrial catchment (**Catchment C2b**) towards **Catchment C8** detention basin as presented in Figure 18.

Table 11 provides detention basin sizing details.

The Stage-Storage data for the proposed basins (Proposed_Basin01, Proposed_Basin02) are presented in Appendix A.

Table 11 Detention Basin Sizing Details

Proposed_Basin01	
Base RL	237.24
Embankment RL	238.5
Base Area	15000 m ²
Discharge Control	525 RCP @ RL 237.24
5yr ARI Live Storage	19917 m ³

Proposed_Basin02	
Base RL	237.6
Embankment RL	238
Base Area	30000 m ²
Discharge Control	(2x)1.8x0.3 RCBC @ RL 237.6
5yr ARI Live Storage	11543 m ³

Proposed Option 2 model resulted in reduction in pipe upgrades within **Catchment C1** and **C2**, compared to Option 1 pipe upgrades.

The proposed basins benefits downstream drainage network within **Catchment C1** and **C2** only. **Catchment C3** to **C8** will require drainage upgrades as proposed in Option 1.

Table 12 provides the Option 2 pipe sizing for **Catchment C1** and **C2**. Existing and Option 1 pipe sizing has also been provided for comparison.

Table 12 Proposed Option 2 – Catchment C1 - Required Pipe Upgrades with Existing and Option 1 comparison (Ref: 055-20 Narromine_PROPOSED_REV00d_upgrade pipes for 5yr ari.dm)

CATCHMENT C1 PIPE UPGRADES				
Pipe ID	Existing	Proposed - Option 1	Proposed - Option 2	Remarks
P 249	(1x) 1.2W x 0.3H	(3x) 1.2W x 0.3H	(3x) 1.2W x 0.3H	
P 248	(1x) 1.5W x 0.3H	(3x) 1.5W x 0.3H	(3x) 1.5W x 0.3H	
P 244	(1x) 1.2W x 0.3H	(3x) 1.2W x 0.3H	(3x) 1.2W x 0.3H	
P 243	(1x) 1.2W x 0.3H	(3x) 1.2W x 0.3H	(3x) 1.2W x 0.3H	
P 242	(1x) 1.2W x 0.3H	(3x) 1.2W x 0.3H	(3x) 1.2W x 0.3H	
P 253	(1x) 1.2W x 0.3H	(3x) 1.2W x 0.3H	(3x) 1.2W x 0.3H	
P 371	(1x) 750	(2x) 2.15W x 0.65H	(1x) 2.15W x 0.65H	Remove 'D/S Railway' flood storage area

P 400	(1x) 1.2W x 0.2H	(4x) 1.2W x 0.2H	(4x) 1.2W x 0.2H	
P Pit8	(1x) 0.9W x 0.6H	(2x) 0.9W x 0.6H	EXISTING	Pit 12, Pit6, Pit8 undersized
P Pit13	(1x) 0.9W x 0.6H	(2x) 0.9W x 0.6H	EXISTING	
P Pit32	(1x) 0.9W x 0.6H	(2x) 0.9W x 0.6H	EXISTING	
P Basin-pit33	(1x) 0.9W x 0.6H	(2x) 0.9W x 0.6H	EXISTING	
P Pit29	(1x) 0.9W x 0.6H	(2x) 0.9W x 0.6H	EXISTING	
P Pit34	(1x) 825	(2x) 825	EXISTING	
P Pit GPT	(2x) 600	(2x) 825	EXISTING	
P 400	(1x) 1.2W x 0.2H	(4x) 1.2W x 0.2H	(4x) 1.2W x 0.2H	
Pipe113448	-	(2x) 1.5W x 0.3H	2x) 1.5W x 0.3H	Lay new pipe under Mitchell Hwy
F Node 22\3		5m x 0.4 SWALE	5m x 0.4 SWALE	Lay new pipe under Mitchell Hwy

CATCHMENT C8 PIPE UPGRADES

Pipe ID	Existing	Proposed - Option 1	Proposed - Option 2	Remarks
P 336	(1x) 525	(3x) 900	EXISTING	
P 337	(1x) 525	(3x) 900	EXISTING	
P 338	(1x) 525	(3x) 900	EXISTING	

9 Opinion of Probable Cost

The proposed Option 1 Opinion of Probable Cost is shown in Table 13.

Table 13 Proposed Option 1 Opinion of Probable Cost

ID	Pipe/ OLF ID	LENGTH (m)	Existing	Proposed - Option 1	Option 1 Cost (\$)	Proposed - Option 2	Option 2 Cost (\$)
C1	P 249	26	(1x) 1.2W x 0.3H	(3x) 1.2W x 0.3H	\$ 63,370	(3x) 1.2W x 0.3H	\$ 63,370
C1	P 248	108	(1x) 1.5W x 0.3H	(3x) 1.5W x 0.3H	\$ 323,658	(3x) 1.5W x 0.3H	\$ 323,658
C1	P 244	23	(1x) 1.2W x 0.3H	(3x) 1.2W x 0.3H	\$ 54,312	(3x) 1.2W x 0.3H	\$ 54,312
C1	P 243	35	(1x) 1.2W x 0.3H	(3x) 1.2W x 0.3H	\$ 83,662	(3x) 1.2W x 0.3H	\$ 83,662
C1	P 242	34	(1x) 1.2W x 0.3H	(3x) 1.2W x 0.3H	\$ 80,602	(3x) 1.2W x 0.3H	\$ 80,602
C1	P 253	76	(1x) 1.2W x 0.3H	(3x) 1.2W x 0.3H	\$ 181,363	(3x) 1.2W x 0.3H	\$ 181,363
C1	P 371	38	(1x) 750	(2x) 2.15W x 0.65H	\$ 114,462	(1x) 2.15W x 0.65H	\$ 114,462
C1	P 400	18	(1x) 1.2W x 0.2H	(4x) 1.2W x 0.2H	\$ 60,185	(4x) 1.2W x 0.2H	\$ 60,185
C1	P Pit8	29	(1x) 0.9W x 0.6H	(2x) 0.9W x 0.6H	\$ 51,768	EXISTING	\$ -
C1	P Pit13	127	(1x) 0.9W x 0.6H	(2x) 0.9W x 0.6H	\$ 228,148	EXISTING	\$ -
C1	P Pit32	63	(1x) 0.9W x 0.6H	(2x) 0.9W x 0.6H	\$ 112,982	EXISTING	\$ -
C1	P Basin- pit33	50	(1x) 0.9W x 0.6H	(2x) 0.9W x 0.6H	\$ 89,471	EXISTING	\$ -
C1	P Pit29	127	(1x) 0.9W x 0.6H	(2x) 0.9W x 0.6H	\$ 229,468	EXISTING	\$ -
C1	P Pit34	47	(1x) 825	(2x) 825	\$ 37,529	EXISTING	\$ -
C1	P Pit GPT	117	(2x) 600	(2x) 825	\$ 93,905	EXISTING	\$ -
C1	Pipe1134 48	50	-	(2x) 1.5W x 0.3H	\$ 75,000	(2x) 1.5W x 0.3H	\$ 75,000
C2	P 9	67	(1x) 600	EXISTING	\$ -	EXISTING	\$ -
C2	P 8	50	(1x) 600	EXISTING	\$ -	EXISTING	\$ -
C2	P 6	33	(1x) 900	EXISTING	\$ -	EXISTING	\$ -
C3	P 273	15	(1x) 450	(2x) 450	\$ 5,355	(2x) 450	\$ 5,355
C4	P 188	30	(1x) 1.2W x 0.3H	(1x) 1.5W x 0.3H	\$ 45,453	(1x) 1.5W x 0.3H	\$ 45,453
C4	P 219	22	(1x) 0.6W x 0.22H	(2x) 0.6W x 0.22H	\$ 35,610	(2x) 0.6W x 0.22H	\$ 35,610
C4	P 110	13	(1x) 1.5W x 0.4H	(2x) 1.5W x 0.4H	\$ 20,138	(2x) 1.5W x 0.4H	\$ 20,138
C4	P 215	34	(1x) 0.4W x 0.2H	(3x) 0.4W x 0.2H	\$ 67,002	(3x) 0.4W x 0.2H	\$ 67,002
C4	P 98a	23	(1x) 1W x 0.25H	(2x) 1.2W x 0.25H	\$ 31,788	(2x) 1.2W x 0.25H	\$ 31,788

C5	P 443	64	(1x) 300	(2x) 300	\$ 15,987	(2x) 300	\$ 15,987
C5	P 387	23	(2x) 600	(3x) 600	\$ 18,028	(3x) 600	\$ 18,028
C8	P 336	106	(1x) 525	(3x) 900	\$ 169,490	EXISTING	\$ -
C8	P 337	14	(1x) 525	(3x) 900	\$ 22,709	EXISTING	\$ -
C8	P 338	104	(1x) 525	(3x) 900	\$ 167,154	EXISTING	\$ -
C1	F Node 22\3	1530	-	5m x 0.4 SWALE	\$ 250,533	5m x 0.4 SWALE	\$ 250,533
C2	OF137218	1330	-	10m x 0.4 SWALE	\$ 217,801	10m x 0.4 SWALE	\$ 217,801
C4	F 121	680	-	10m x 0.5 SWALE	\$ 111,357	10m x 0.5 SWALE	\$ 111,357
EXT	OF82144	1230	-	15m x 0.4 SWALE	\$ 201,425	15m x 0.4 SWALE	\$ 201,425
C8	Proposed_Basin01	-	-	-	\$ -	15000 m ² BASE	\$ 307,050
C1	Proposed_Basin02	-	-	-	\$ -	30000 m ² BASE	\$ 614,100
TOTAL					\$ 3,259,732		\$ 2,978,259

NOTE:

- Land Acquisition cost rate of \$0.47/m² adopted
- Basin Construction cost rate of \$20/m² adopted
- Refer to '055-20 Cost Estimate.xlsx' for detailed cost estimate information
- Cost estimate figures are sensitive to land acquisition and basin construction cost rates

10 Conclusion

Storm Consulting has carried out an assessment of the existing stormwater network and prepared two options for upgrading this network to improve conditions of the catchment during the 5yr ARI rainfall events.

In conclusion, the DRAINS modelling identified several undersized existing drainage areas with overland flooding reported in the minor event (5yr ARI). Further, the current drainage system requires regular maintenance at culvert inlets/outlets to prevent the drainage system from getting blocked which compromises the drainage system efficiency.

The study has identified the following drainage works (Option 1) to improve the existing drainage network:

1. Diversion of External Catchments via open channel
2. Diversion of Industrial Catchment via open channel
3. Diversion of catchments upstream of Terangion Street drainage network
4. Remove flood storage area opposite Dundas Park and Narromine Railway
5. Upgrade existing catch drain at Nellie Vale Road
6. Upgrade existing drainage pit and pipes

In addition to the drainage works, the study has also identified an alternative option (Option 2) to utilise detention basins to reduce the scope of drainage upgrades required.

The existing and proposed DRAINS modelling and analysis have been limited to trunk drainage pits and pipes. It is recommended that further detailed modelling of smaller culvert crossings (e.g driveway culverts) be included in the detailed analysis to ensure adequate conveyance of flows into the trunk drainage network.

An opinion of probable cost has been provided to compare costs between Option 1 and Option 2. While Option 2 is relatively cheaper to Option 1, it is noted that the costing of Option 2 is highly sensitive to the land acquisition prices and basin construction costs.

Appendix A – Model Development

A1. DRAINS model data for the existing conditions

PIT / NODE DETAILS		Version 15																		
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	Internal Width (mm)	Inflow Misaligned (m)	Minor Safe Pond Dept (m)	Major Safe Pond Depth (m)
66	Headwall				0.5	238.163		0					616388.5	6433303		4158690				
67	Node					237.628		0					616387.7	6433295		4158688				
221	Headwall				0.5	239.435		0					618138.1	6431825		4158691				
222	Node					238.699		0					618140.9	6431839		4158767				
373	Headwall				0.5	237.804		0					616404	6432405		4158693				
374	Node					237.21		0					616382.7	6432409		4158784				
249	Headwall				0.5	238.27		0					617644.4	6432366		4158694				
248	OnGrade	NSW RTA 5 SA1			1.5	238.22		0	0	617618.3	6432370	No			4158830	1 x Ku	No	Existing		
244	Node					238.13		0					617511.8	6432387		4158741				
243	Sag	NSW RTA 5 SA1			10	238.031		0.1	0	617514.9	6432409	No			4158836	1 x Ku	No	Existing	0.2	0.2
242	OnGrade	NSW RTA 5 SA1			1.5	238.124		0	0	617490	6432434	No			4158837	1 x Ku	No	Existing		
239	Node					238.217		0					617464	6432455		4158765				
253	Headwall				0.5	238.01		0					617318.9	6432574		4158695				
257	Node					238.002		0					617353.3	6432642		4158766				
158	Headwall				0.5	238.304		0					616860.1	6431651		4158698				
157	Node					238.28		0					616858.7	6431642		4158751				
433	Headwall				0.5	238.9		0					616809.8	6433037		4158699				
445a	OnGrade	Junction Pi JP 900x900			1.5	239.086		0	0	616759.5	6433034	No			4158729	1 x Ku	No	Existing		
445	Node					239.103		0					616754.5	6433034		4158802				
443	Headwall				0.5	238.89		0					616796.3	6433087		4158700				
120	Headwall				0.5	237.942		0					616535	6431586		4158701				
121	Node					237.625		0					616532.2	6431574		4158820				
126	Headwall				0.5	237.826		0					616471.1	6431595		4158702				
129	Node					237.838		0					616466.7	6431583		4158821				
147	Headwall				0.5	238.153		0					616358.5	6431852		4158703				
142	Node					237.777		0					616304.4	6431854		4158748				
93	Headwall				0.5	241.525		0					617174.6	6431486		4158704				
94	Node					240.544		0					617150.5	6431490		4158817				
64	Headwall				0.5	238.063		0					616411.1	6433300		4158705				
65	Node					237.778		0					616399.2	6433293		4158807				
188	Headwall				0.5	238.397		0					616942	6432032		4158706				
183	Node					237.977		0					616917.6	6432014		4158755				
108	Headwall				0.5	237.89		0					616893.9	6431538		4158707				
109	Node					237.797		0					616841.9	6431541		4158752				
198	Headwall				0.5	238.462		0					616397.2	6432093		4158708				
197	Node					238.182		0					616381.7	6432102		4158756				
178	Headwall				0.5	238.367		0					616910.7	6431962		4158709				
177	Node					237.845		0					616909.6	6431955		4158753				
219	Headwall				0.5	237.835		0					616432.6	6432585		4158710				
901	Node					237.454		0					616410.6	6432588		4158813				
40	Headwall				0.5	237.879		0					616593.8	6433881		4158711				
41	Node					237.977		0					616595.8	6433892		4158797				
75	Headwall				0.5	238.14		0					617024.4	6433695		4158712				
74	Node					237.855		0					617053.1	6433691		4158809				
307	Headwall				0.5	237.934		0					616500.3	6433022		4158713				
304	Node					237.869		0					616493.4	6433025		4158769				
341	Headwall				0.5	239.1		0					618370.2	6433318		4158714				
342	OnGrade	Junction Pi JP 900x900			1.5	239.487		0	0	618434.4	6433308	No			4158732	1 x Ku	No	Existing		
343	Node					238.363		0					618447.2	6433387		4158778				
336	Headwall				0.5	237.912		0					618072.5	6433291		4158715				
337	OnGrade	Surface Inl G.S.I.P. 900x900			1.5	239.386		0	0	618087.4	6433395	No			4158687	1 x Ku	No	Existing		
338	OnGrade	Surface Inl G.S.I.P. 900x900			1.5	239.447		0	0	618095.7	6433407	No			4158688	1 x Ku	No	Existing		
345	Node					236.048		0					618110.3	6433510		4158779				
4	Headwall				0.5	238.975		0					617493.5	6433620		4158716				
393	Sag	Surface Inl G.S.I.P. 900			1	238.452		0.5	0	617511.3	6433637	No			4158689	1 x Ku	No	Existing	0.5	0.55
392	Node					237.884		0					617512.6	6433646		4158792				
3	Headwall				0.5	239.375		0					617522.6	6433616		4158717				
394	Node					238.965		0					617524.7	6433629		4158794				
110	Headwall				0.5	238.11		0					616835.9	6431539		4158718				
111	Node					237.976		0					616834.1	6431526		4158819				
386	Headwall				0.5	238.481		0					616459.1	6433181		4158719				
387	OnGrade	Junction Pi JP 900x900			1.5	238.462		0	0	616454.4	6433191	No			4158733	1 x Ku	No	Existing		
385	Node					238.201		0					616435	6433201		4158789				
376	Headwall				0.5	238.07		0					616374.7	6432405		4158720				
377	Node					237.638		0					616372.8	6432388		4158786				
215	Headwall				0.5	238.23		0					616539.4	6432383		4158721				
217a	OnGrade	Junction Pi JP 900x900			1.5	238.128		0	0	616534.4	6432350	No			4158737	1 x Ku	No	Existing		
214a	OnGrade	Junction Pi JP 900x900			1.5	238.093		0	0	616522.3	6432352	No			4158738	1 x Ku	No	Existing		
379	Node					238.29		0					616418.3	6432369		4158785				
160	Headwall				0.5	238.251		0					616892.2	6431719		4158722				
159	Node					237.913		0					616872.3	6431712		4158754				
98a	Headwall				0.5	238.306		0					616928.6	6431525		4158723				
99	Node					238.321		0					616910.2	6431512		4158818				
446	Headwall				0.5	239.034		0					616749.1	6433023		4158724				
446a	Node					238.995		0					616746.4	6433018		4158801				
303	Headwall				0.5	237.904		0					616496.4	6432982		4158725				
308a	Node					237.652		0					616477	6432986		4158772				
48	Headwall				0.5	238.544		0					616847.7	6433807		4158726				
49	Node					238.084		0					616860.5	6433819		4158803				
313	Headwall				0.5	238.424		0					616638	6432993		4158727				
314	Node					238.285		0					616639.2	6433000		4158775				
414	Headwall				0.5	238.893		0					616773.8	6432949		4158728				
415	Node					238.39		0					616750.6	6432987		4158800				
276	Node					239.166		0					617858.5	6431886		4158742				
275	OnGrade	Junction Pi JP 900x900			1.5	239.583		0	0	617897	6431878	No			4158731	1 x Ku	No	Existing		
274	Node					238.358		0					618064.9	6431851		4158764				
325	Node					239.119		0					617217.4	6431761		4158744				
326	OnGrade	SGGP, 1% 5 G.G.P. 1.8m E.K.L.			1.5	238.878		0	0	617194.4	6431756	No			4158826	1 x Ku	No	Existing		
327	Node					238.742		0					617189.7	6431756		4158777				
OUTLET 05	Node		</																	

Ind1	N172535	49.927	50	50	0	0	0	0	1200	1200	-1	0.13	0.13	-1	0.013	0.4	-1	0	1
Ext1	N101397	203.3	10	90	0	0	0	0	1200	1200	-1	0.13	0.13	-1	0.013	0.4	-1	0	1
Ext2	N101398	299.4	10	90	0	0	0	0	1200	1200	-1	0.13	0.13	-1	0.013	0.4	-1	0	1
C 273	273	9.57	50	50	0	5	10	0	330	330	-1	0.5	0.5	-1	0.13	0.4	-1	-1	1
C 347	347	3.756	70	30	0	5	10	0	200	200	-1	0.2	0.2	-1	0.13	0.4	-1	-1	1
C 346	346	1.878	70	30	0	5	10	0	200	200	-1	0.2	0.2	-1	0.13	0.4	-1	-1	1
C 291	291	6.885	70	30	0	5	10	0	490	490	-1	0.2	0.2	-1	0.13	0.4	-1	-1	1
C 278	278	10.585	70	30	0	5	10	0	490	490	-1	0.2	0.2	-1	0.13	0.4	-1	-1	1
C 192	192	5.454	70	30	0	5	10	0	490	490	-1	0.2	0.2	-1	0.13	0.4	-1	-1	1
C 200	200	6.644	70	30	0	5	10	0	540	540	-1	0.2	0.2	-1	0.13	0.4	-1	-1	1
C 203	203	10.229	70	30	0	5	10	0	540	540	-1	0.2	0.2	-1	0.13	0.4	-1	-1	1
C 207	207	9.668	70	30	0	5	10	0	540	540	-1	0.2	0.2	-1	0.13	0.4	-1	-1	1
Ext3	N168004	163.7	10	90	0	0	0	0	2500	2500	-1	0.2	0.2	-1	0.013	0.4	-1	0	1

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)	RI (m)	Chg (m)	RI (m)	etc (m)
P 66	66	67	4.293	237.713	237.709	0.09	RRJ C2	300	300	0.013	Existing	1	66	0	0	237.64	2.115	238.001	2.116
P 221\1	221\1	221\2	14.814	238.91	238.7	1.42	RRJ C2	375	375	0.013	Existing	1	221\1	0	0	238.909	3.468	239.579	4.005
P 273	273	374	21.583	237.354	237.21	0.67	RRJ C2	300	300	0.013	Existing	3	373	0	0	237.354	0.152	237.367	1.015
P 249	249	248	26.404	237.82	237.82	0	RCBC	1.2W x 0.3H	0.013	Existing	1	249	0	0	237.988	0.029	237.99	0.184	
P 248	248	244	107.886	237.82	237.68	0.13	RCBC	1.5W x 0.3H	0.013	Existing	1	248	0	0	238.34	13.875	238.347	13.876	
P 244	244	243	22.63	237.68	237.71	-0.13	RCBC	1.2W x 0.3H	0.013	Existing	1	244	0	0	238.032	0.714	238.033	0.715	
P 243	243	242	34.859	237.71	237.66	0.14	RCBC	1.2W x 0.3H	0.013	Existing	1	243	0	0	238.031	0.082	238.037	0.422	
P 242	242	239	33.584	237.66	237.59	0.21	RCBC	1.2W x 0.3H	0.013	Existing	1	242	0	0	238.124	0.234	238.142	0.541	
P 253	253	257	75.568	237.56	237.51	0.07	RCBC	1.2W x 0.3H	0.013	Existing	1	253	0	0	237.93	1.4	237.963	2.197	
P 158	158	157	9.854	237.588	237.537	0.52	RCBC	1.2W x 0.46H	0.013	Existing	1	158	0	0	238.304	0.755	238.332	0.983	
P 433	433	445a	50.422	238.45	238.096	0.7	RCBC	0.9W x 0.3H	0.013	Existing	1	433	0	0	238.792	3.304	238.788	4.853	
P 445a	445a	445	5	238.096	238.07	0.52	RCBC	0.9W x 0.25H	0.013	Existing	1	445a	0	0	239.086	0.213	239.087	4.488	
P 443	443	445a	63.947	238.44	238.096	0.54	RRJ C2	300	300	0.013	Existing	1	443	0	0	238.714	0.122	238.907	0.394
P 120	120	121	12.595	237.391	237.351	0.32	RCBC	1.2W x 0.3H	0.013	Existing	1	120	0	0	237.942	1.366	238.004	6.291	
P 126	126	129	12.431	237.328	237.366	-0.31	RRJ C2	375	375	0.013	Existing	2	126	0	0	237.836	0.421	237.872	0.849
P 147	147	142	54.113	237.653	237.489	0.3	RCBC	0.75W x 0.25H	0.013	Existing	1	147	0	0	238.153	0.144	238.153	0.365	
P 93	93	94	24.495	240.319	240.321	-0.01	RRJ C2	300	300	0.013	Existing	1	93	0	0	240.536	0.008	240.536	0.519
P 64	64	65	13.45	237.513	237.447	0.49	RCBC	1.5W x 0.4H	0.013	Existing	1	64	0	0	237.854	0.884	238.04	1.475	
P 188	188	183	30.302	237.947	237.881	0.22	RCBC	1.2W x 0.3H	0.013	Existing	1	188	0	0	238.111	3.061	238.242	8.613	
P 108	108	109	22.352	237.54	237.499	0.18	RCBC	0.75W x 0.2H	0.013	Existing	1	108	0	0	237.781	1.099	237.782	3.769	
P 198	198	197	17.978	238.041	238.002	0.22	RCBC	0.6W x 0.2H	0.013	Existing	1	198	0	0	238.462	0.093	238.465	0.171	
P 178	178	177	7.698	237.767	238.058	-3.78	RRJ C2	450	450	0.013	Existing	6	178	0	0	237.86	7.698	237.845	0.218
P 219	219	901	22.256	237.465	237.169	1.33	RCBC	0.6W x 0.22H	0.013	Existing	1	219	0	0	237.444	0.266	237.477	0.941	
P 40	40	41	11.163	237.43	237.408	0.2	RCBC	1.2W x 0.3H	0.013	Existing	1	40	0	0	237.879	0.024	237.886	0.805	
P 75	75	74	20.974	237.74	237.59	0.72	RCBC	0.6W x 0.25H	0.013	Existing	1	75	0	0	238.04	1.246	238.157	1.858	
P 307	307	304	7.268	237.564	237.572	-0.11	RCBC	0.95W x 0.22H	0.013	Existing	1	307	0	0	237.661	0.874	237.697	1.736	
P 341	341	342	65.012	238.405	238.34	0.1	RRJ C2	525	525	0.013	Existing	1	341	0	0	238.927	0.024	238.928	1.125
P 342	342	343	80.355	238.34	237.906	0.54	RRJ C2	525	525	0.013	Existing	1	342	0	0	239.487	1.931	239.486	2.255
P 336	336	337	105.931	237.237	236.67	0.54	RRJ C2	525	525	0.013	Existing	1	336	0	0	237.833	2.352	237.992	4.503
P 337	337	338	14.193	236.612	236.612	0.41	RRJ C2	525	525	0.013	Existing	1	337	0	0	239.366	0.036	239.383	0.234
P 338	338	345	104.471	236.612	235.876	0.7	RRJ C2	525	525	0.013	Existing	1	338	0	0	239.447	0.772	239.432	0.884
P 4	4	393	24.502	237.92	237.75	0.69	RRJ C2	450	450	0.013	Existing	1	393	0	0	238.975	0.682	238.971	0.69
P 393	393	392	9.45	237.75	237.651	1.05	RRJ C2	450	450	0.013	Existing	1	393	0	0	238.452	0.601	238.437	1.422
P 3	3	394	13.697	238.625	238.407	1.59	RRJ C2	600	600	0.013	Existing	1	3	0	0	238.789	0.073	238.794	0.123
P 110	110	111	12.586	237.56	237.53	0.24	RCBC	1.5W x 0.4H	0.013	Existing	1	110	0	0	238.052	1.026	238.194	2.281	
P 386	386	387	10.937	237.398	237.427	-0.27	RRJ C2	600	600	0.013	Existing	2	386	0	0	238.481	2.369	238.494	4.201
P 387	387	385	22.535	237.427	237.295	0.59	RRJ C2	600	600	0.013	Existing	2	387	0	0	238.462	0.393	238.458	3.02
P 376	376	377	17.341	237.391	237.184	0.04	RRJ C2	375	375	0.013	Existing	2	376	0	0	237.559	3.422	237.82	5.896
P 215	215	217a	33.501	237.72	237.77	-0.15	RCBC	0.4W x 0.2H	0.013	Existing	1	215	0	0	237.897	3.21	238.234	8.094	
P 217a	217a	214a	12.448	237.132	237.119	0.11	RCBC	2.15W x 0.675H	0.013	Existing	1	217a	0	0	238.128	0.216	238.134	2.979	
P 214a	214a	379	105.321	237.119	237.014	0.1	RCBC	2.15W x 0.65H	0.013	Existing	1	214a	0	0	238.093	2.302	238.019	2.303	
P 160	160	159	21.081	237.801	237.626	0.83	RCBC	1.2W x 0.3H	0.013	Existing	1	160	0	0	237.963	0.537	237.963	0.538	
P 98a	98a	99	22.706	237.9	237.7	0.88	RCBC	1W x 0.25H	0.013	Existing	1	98a	0	0	238.306	0.283	238.316	7.405	
P 446	446	446a	5.999	237.86	237.85	0.17	RRJ C2	750	750	0.013	Existing	2	446	0	0	239.034	3.846	239.008	5.999
P 303	303	308a	19.785	237.534	237.462	0.36	RCBC	0.6W x 0.22H	0.013	Existing	1	303	0	0	237.723	2.351	237.815	2.6	
P 48	48	49	17.33	237.794	237.555	1.38	RRJ C2	600	600	0.013	Existing	1	48	0	0	238.073	0.79	238.009	2.488
P 313	313	314	7.362	237.974	237.961	0.18	RCBC	0.9W x 0.3H	0.013	Existing	1	313	0	0	238.08	0.213	238.359	0.823	
P 414	414	415	44.137	238.443	238.099	0.78	RCBC	1W x 0.3H	0.013	Existing	1	414	0	0	238.546	0.051	238.549	0.492	
P 276	276	275	39.417	238.533	238.547	-0.04	RCBC	2.4W x 0.25H	0.013	Existing	1	276	0	0	239.166	4.872	239.244	5.597	
P 275	275	274	169.991	238.547	238.021	0.3	RRJ C2	600	600	0.013	Existing	2	275	0	0	239.583	3.336	239.607	13.614
P 325	325	326	23.448	238.379	238.199	0.77	RCBC	1.2W x 0.4H	0.013	Existing	1	325	0	0	239.119	0.155	239.144	0.741	
P 326	326	327	4.81	238.199	238.213	-0.29	RCBC	1.2W x 0.4H	0.013	Existing	1	326	0	0	238.878	0.036	238.872	0.062	
P 9	9	8	67.437	238.101	238.13	-0.04	RRJ C2	600	600	0.013	Existing	1	9	0	0	238.781	0.543	238.783	0.544
P 8	8	6	49.521	238.13	237.741	0.79	RRJ C2	600	600	0.013	Existing	1	8	0	0	239.177	16.024	239.292	25.85
P 6	6	5	32.743	237.741	237.675	0.2	RRJ C2	900	900	0.013	Existing	1	6	0	0	239.242	2.441	239.259	3.606
P Pit12	Pit12	Pit13	35.291	236.86	236.68	0.51	RCBC	0.9W x 0.6H	0.012	Existing	1	Pit12	0						

OF51139	242	239	0.5			8 m wide r	0.14	0.14	0.6	0.3	0	4165466	237.454	237.345	19.3
F 239	239	253	4.9			8 m wide r	0.14	0.14	0.6	0.3	0	4159016	238.217	238.01	187.839
F 253	253	257	2	238.01	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158972	238.01	237.51	75.568
F 257	257	U/S Raiwa	4.3			8 m wide r	0.14	0.14	0.6	0.3	0	4159017	238.002	238.53	164.967
F 158	158	157	0.3	238.304	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158973	238.304	237.537	9.864
F 157	157	109	2.7			8 m wide r	0.14	0.14	0.6	0.3	0	4159006	238.28	237.797	101.637
F 433	433	445a	1.3	238.9	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158974	238.9	238.096	50.422
F 445a	445a	445	0.1			8 m wide r	0.14	0.14	0.6	0.3	0	4159002	239.086	239.103	5
F 445	445	446	0.3			8 m wide r	0.14	0.14	0.6	0.3	0	4159037	239.103	239.034	11.897
F 443	443	445	1.8	238.89	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158975	238.89	238.07	67.134
F 120	120	121	0.3	237.942	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158976	237.942	237.351	12.595
F 121	121	129	1.8			8 m wide r	0.14	0.14	0.6	0.3	0	4159049	237.625	237.838	67.17
F 126	126	129	0.3	237.836	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158977	237.836	237.366	12.431
F 129	129	OUTLET 12	3.6			8 m wide r	0.14	0.14	0.6	0.3	0	4159050	237.838	237.587	137.855
F 147	147	142	1.4	238.153	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158978	238.153	237.489	54.113
F 142	142	131	3.6			8 m wide r	0.14	0.14	0.6	0.3	0	4159005	237.777	237.43	136.088
F 93	93	94	0.6	241.525	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158979	241.525	240.321	24.495
F 94	94	98a	5.9			8 m wide r	0.14	0.14	0.6	0.3	0	4159046	240.544	238.306	224.69
F 64	64	65	0.4	238.063	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158980	238.063	237.447	13.45
F 65	65	Node15a	0.8			8 m wide r	0.14	0.14	0.6	0.3	0	4159040	237.778	238.043	30.178
F 188	188	183	0.8	238.397	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158981	238.397	237.881	30.302
OF118839	183	183a	1.4			8 m wide r	0.14	0.14	0.6	0.3	0	21670731	237.977	238.367	52.02
F 108	108	109	0.6	237.89	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158982	237.89	237.499	22.352
F 109	109	110	0.2			8 m wide r	0.14	0.14	0.6	0.3	0	4159007	237.797	238.11	6.574
F 198	198	197	0.5	238.462	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4159063	238.153	237.489	17.9
F 197	197	142	4.7			8 m wide r	0.14	0.14	0.6	0.3	0	4159011	238.182	237.413	181.058
F 178	178	177	0.2	238.367	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158983	238.367	238.058	7.698
F 177	177	159	6.4			8 m wide r	0.14	0.14	0.6	0.3	0	4159008	237.845	237.913	245.049
OF51117	219	901	0.5	237.835	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4159087	237.83	237.454	20.528
F 901	901	376	0.5			8 m wide r	0.14	0.14	0.6	0.3	0	4159044	237.454	237.345	20.528
F 40	40	41	0.3	237.879	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158984	237.879	237.408	11.163
F 41	41	OUTLET 41	3.7			8 m wide r	0.14	0.14	0.6	0.3	0	4159034	237.977	238.823	141.593
F 75	75	74	0.5	238.14	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158985	238.14	237.59	20.974
F 74	74	Node 74a	0.6			8 m wide r	0.14	0.14	0.6	0.3	0	4159042	237.855	237.8	22.17
F 307	307	304	0.2	237.934	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158986	237.934	237.572	7.268
F 341	341	343	2.7	239.1	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158987	238.327	237.906	103.477
F 343	343	345	9.4			8 m wide r	0.14	0.14	0.6	0.3	0	4159023	238.363	236.048	358.791
F 336	336	337	5.8	237.912	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158988	237.912	235.876	223.083
F 337	337	347	0.4			8 m wide r	0.14	0.14	0.6	0.3	0	4158964	239.386	239.447	14.193
F 338	338	346	2.7			8 m wide r	0.14	0.14	0.6	0.3	0	4158965	239.447	236.048	104.471
F 345	345	348	6.2			8 m wide r	0.14	0.14	0.6	0.3	0	4159024	236.048	236.807	236.476
F 4	4	393	0.6	238.975	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158989	238.975	237.75	24.502
F 393	393	392	0.2			8 m wide r	0.14	0.14	0.6	0.3	0	4158966	238.452	237.884	9.433
F 392	392	O 392	0.3			8 m wide r	0.14	0.14	0.6	0.3	0	4159030	237.884	237	10
F 3	3	394	0.4	239.375	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158990	239.375	238.407	13.697
F 384	384	393	0.4			8 m wide r	0.14	0.14	0.6	0.3	0	4159031	238.965	238.452	15.238
F 110	110	111	0.3	238.11	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158991	238.11	237.53	12.586
F 111	111	121	8			8 m wide r	0.14	0.14	0.6	0.3	0	4159048	237.976	237.625	304.655
F 386	386	385	0.8	238.481	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158992	238.481	237.295	31.275
OF51147	387	385	0.5			8 m wide r	0.14	0.14	0.6	0.3	0	4165474	237.454	237.345	19.3
F 385	385	OUTLET 38	3.5			8 m wide r	0.14	0.14	0.6	0.3	0	4159029	238.201	238.703	135.19
F 376	376	377	0.7	238.07	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158993	237.716	237.184	17.341
F 377	377	377	1.9			8 m wide r	0.14	0.14	0.6	0.3	0	4159028	237.638	237.068	70.804
F 215	215	379	3.2	238.23	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158994	238.07	237.014	121.942
F 379	379	377	1.3			8 m wide r	0.14	0.14	0.6	0.3	0	4159027	238.29	237.638	49.564
F 160	160	159	0.6	238.251	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158995	238.251	237.626	21.081
F 159	159	158	1.6			8 m wide r	0.14	0.14	0.6	0.3	0	4159009	237.913	238.304	62.087
F 98a	98a	99	0.6	238.306	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158996	238.306	237.7	22.706
F 99	99	111	2			8 m wide r	0.14	0.14	0.6	0.3	0	4159047	238.321	237.976	77.392
F 446	446	446a	0.2	239.034	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158997	239.034	237.85	5.999
F 446a	446a	Node 314a	2.5			8 m wide r	0.14	0.14	0.6	0.3	0	4159036	238.995	238.638	93.774
F 303	303	308a	0.5	237.904	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158998	237.904	237.462	19.785
F 48	48	49	0.5	238.544	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158999	238.544	237.555	17.33
F 49	49	OUTLET 49	0.7			8 m wide r	0.14	0.14	0.6	0.3	0	4159038	238.084	237.839	27.606
F 313	313	314	0.2	238.424	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4159000	238.424	237.961	7.362
F 314	314	Node 314a	1.5			8 m wide r	0.14	0.14	0.6	0.3	0	4159020	238.285	238.638	58.809
F 414	414	415	1.2	238.893	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4159001	238.893	238.099	44.137
F 415	415	446a	0.8			8 m wide r	0.14	0.14	0.6	0.3	0	4159035	238.39	238.995	31.682
F 274	274	Node 2213	11.9			8 m wide r	0.14	0.14	0.6	0.3	0	4159015	238.358	238.5	453.669
OF51150	326	279	0.5			8 m wide r	0.14	0.14	0.6	0.3	0	4165477	237.454	237.345	19.3
F 327	327	98a	9.1			8 m wide r	0.14	0.14	0.6	0.3	0	4159022	238.742	238.306	348.726
F 214	214	71	4			8 m wide r	0.14	0.14	0.6	0.3	0	4159012	238.461	238.263	151.259
F 71	71	Node15a	3.9			8 m wide r	0.14	0.14	0.6	0.3	0	4159013	238.263	238.043	149.726
F Node15a	Node15a	Outlet 67	1.8			8 m wide r	0.14	0.14	0.6	0.3	0	4159014	238.043	238.19	69.114
F Node 221	Node 2213	N10610	4			8 m wide r	0.14	0.14	0.6	0.3	0	4159019	238.5	238.91	151.593
F Node 31	Node 314a	386	6.2			8 m wide r	0.14	0.14	0.6	0.3	0	4159021	238.638	238.481	237.377
F 612	612	249	1.6			8 m wide r	0.14	0.14	0.6	0.3	0	4159039	238.125	238.27	136.148
F Node 74	Node 74a	OUTLET 74	5.6			8 m wide r	0.14	0.14	0.6	0.3	0	4159043	237.8	225.623	215.741
F Node 93	Node 93a	93	8			8 m wide r	0.14	0.14	0.6	0.3	0	4159045	241.036	241.525	307.196
F 9	9	347	1.8			8 m wide r	0.14	0.14	0.6	0.3	0	4159051	238.781	239.177	67.437
F 8	8	346	1.3			8 m wide r	0.14	0.14	0.6	0.3	0	4159052	239.177	239.242	49.521
F 6	6	5	0.9			8 m wide r	0.14	0.14	0.6	0.3	0	4159003	239.242	237.421	32.743
F 5	5	OUTLET 05	4.5			8 m wide r	0.14	0.14	0.6	0.3	0	4159004	237.421	227.25	172.752
F Pit12	Pit12	Pit13	0.9			8 m wide r	0.14	0.14	0.6	0.3	0	4159054	237.748	237.718	35.291
F Pit13	Pit13	SchoolOva	5.2			Overflow a	0.05	0							

PIPE COVER DETAILS

Name	Type	Dia (mm)	Safe Cover	Cover (m)
P 66	RRJ C2	300	0.1	-0.41 Unsafe
P 221	RRJ C2	375	0.1	-0.41 Unsafe
P 373	RRJ C2	300	0.1	-0.33 Unsafe
P 249	RCBC	0	0.15	-0.23 Unsafe
P 248	RCBC	0	0.15	-0.28 Unsafe
P 244	RCBC	0	0.15	-0.09 Unsafe
P 243	RCBC	0	0.15	-0.13 Unsafe
P 242	RCBC	0	0.15	0.06 Unsafe
P 253	RCBC	0	0.15	-0.1 Unsafe
P 158	RCBC	0	0.15	0.08 Unsafe
P 433	RCBC	0	0.15	-0.06 Unsafe
P 445a	RCBC	0	0.15	0.64
P 443	RRJ C2	300	0.1	-0.06 Unsafe
P 120	RCBC	0	0.15	-0.13 Unsafe
P 126	RRJ C2	375	0.1	0.06 Unsafe
P 147	RCBC	0	0.15	-0.06 Unsafe
P 93	RRJ C2	300	0.1	-0.12 Unsafe
P 64	RCBC	0	0.15	-0.17 Unsafe
P 188	RCBC	0	0.15	-0.33 Unsafe
P 108	RCBC	0	0.15	-0.06 Unsafe
P 198	RCBC	0	0.15	-0.12 Unsafe
P 178	RRJ C2	450	0.1	-0.71 Unsafe
P 219	RCBC	0	0.15	-0.34 Unsafe
P 40	RCBC	0	0.15	0.05 Unsafe
P 75	RCBC	0	0.15	-0.09 Unsafe
P 307	RCBC	0	0.15	-0.22 Unsafe
P 341	RRJ C2	525	0.1	-0.05 Unsafe
P 342	RRJ C2	525	0.1	-0.11 Unsafe
P 336	RRJ C2	525	0.1	0.03 Unsafe
P 337	RRJ C2	525	0.1	2.14
P 338	RRJ C2	525	0.1	-0.4 Unsafe
P 4	RRJ C2	450	0.1	0.21
P 393	RRJ C2	450	0.1	-0.26 Unsafe
P 3	RRJ C2	600	0.1	-0.48 Unsafe
P 110	RCBC	0	0.15	-0.05 Unsafe
P 386	RRJ C2	600	0.1	0.39
P 387	RRJ C2	600	0.1	0.26
P 376	RRJ C2	375	0.1	-0.04 Unsafe
P 215	RCBC	0	0.15	-0.12 Unsafe
P 217a	RCBC	0	0.15	0.2
P 214a	RCBC	0	0.15	0.15
P 160	RCBC	0	0.15	-0.3 Unsafe
P 98a	RCBC	0	0.15	0.06 Unsafe
P 446	RRJ C2	750	0.1	0.33
P 303	RCBC	0	0.15	-0.13 Unsafe
P 48	RRJ C2	600	0.1	-0.37 Unsafe
P 313	RCBC	0	0.15	-0.29 Unsafe
P 414	RCBC	0	0.15	-0.3 Unsafe
P 276	RCBC	0	0.15	0.28
P 275	RRJ C2	600	0.1	-0.32 Unsafe
P 325	RCBC	0	0.15	0.18
P 326	RCBC	0	0.15	0.03 Unsafe
P 9	RRJ C2	600	0.1	0.03 Unsafe
P 8	RRJ C2	600	0.1	0.4
P 6	RRJ C2	900	0.1	-1.23 Unsafe
P Pit12	RCBC	0	0.15	0.19
P Pit13	RCBC	0	0.15	0.34
P Pit32	RCBC	0	0.15	-0.7 Unsafe
P Basin-pit	RCBC	0	0.15	-0.7 Unsafe
P Pit29	RCBC	0	0.15	1.5
P Pit34	RRJ C2	825	0.1	1.91
P Pit GPT	RRJ C2	600	0.1	-0.49 Unsafe
P 400	RCBC	0	0.15	-0.85 Unsafe
P Pit6	RCBC	0	0.15	0.29
P Pit8	RCBC	0	0.15	0.28
P 371	RCBC	0	0.15	-1.23 Unsafe
P 273	RRJ C2	450	0.1	0.07 Unsafe
P 347	RRJ C2	525	0.1	-0.35 Unsafe
P 346	RRJ C2	525	0.1	-0.38 Unsafe
P 291	RCBC	0	0.15	-0.3 Unsafe
P 278	RCBC	0	0.15	-0.36 Unsafe
P 192	RCBC	0	0.15	-0.24 Unsafe
P 200	RCBC	0	0.15	-0.38 Unsafe
P 203	RCBC	0	0.15	-0.15 Unsafe
P 207	RCBC	0	0.15	-0.05 Unsafe
P 208	RCBC	0	0.15	0.14 Unsafe
P 218a	RCBC	0	0.15	0.13 Unsafe
P 209a	RCBC	0	0.15	0.1 Unsafe
P 213	RCBC	0	0.15	0.14 Unsafe
P 216a	RCBC	0	0.15	0.12 Unsafe
P 140	RCBC	0	0.15	0.03 Unsafe
P 131	RRJ C2	375	0.1	0.16
Pipe10930	RCBC	0	0.15	0.2

This model has no pipes with non-return valves

A2. DRAINS model data for the proposed Option 1

PIT / NODE DETAILS		Version 15																		
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	Internal Width (mm)	Inflow Misaligned (m)	Minor Safe Pond Dept (m)	Major Safe Pond Depth (m)
66	Headwall				0.5	238.163		0					616388.5	6433303		4158690				
67	Node					237.628		0					616387.7	6433299		4158688				
221	Headwall				0.5	239.435		0					618138.1	6431825		4158691				
222	Node					238.699		0					618140.9	6431839		4158767				
373	Headwall				0.5	237.804		0					616404	6432405		4158693				
374	Node					237.21		0					616382.7	6432409		4158784				
249	Headwall				0.5	238.27		0					617644.4	6432366		4158694				
248	OnGrade	NSW RTA 5 SA1			1.5	238.22		0	0	617618.3	6432370	No			4158830	1 x Ku	No	Existing		
244	Node					238.13		0					617511.8	6432387		4158741				
243	Sag	NSW RTA 5 SA1			10	238.031	0.1	0	0	617514.9	6432409	No			4158836	1 x Ku	No	Existing	0.2	0.2
242	OnGrade	NSW RTA 5 SA1			1.5	238.124		0	0	617490	6432434	No			4158837	1 x Ku	No	Existing		
239	Node					238.217		0					617464	6432455		4158765				
253	Headwall				0.5	238.01		0					617318.9	6432574		4158695				
257	Node					238.002		0					617353.3	6432642		4158766				
158	Headwall				0.5	238.304		0					616860.1	6431651		4158698				
157	Node					238.28		0					616858.7	6431642		4158751				
433	Headwall				0.5	238.9		0					616809.8	6433037		4158699				
445a	OnGrade	Junction Pi JP 900x900			1.5	239.086		0	0	616759.5	6433034	No			4158729	1 x Ku	No	Existing		
445	Node					239.103		0					616754.5	6433034		4158802				
443	Headwall				0.5	238.89		0					616796.3	6433087		4158700				
120	Headwall				0.5	237.942		0					616535	6431586		4158701				
121	Node					237.625		0					616532.2	6431574		4158820				
126	Headwall				0.5	237.826		0					616471.1	6431595		4158702				
129	Node					237.838		0					616466.7	6431583		4158821				
147	Headwall				0.5	238.153		0					616358.5	6431852		4158703				
142	Node					237.777		0					616304.4	6431854		4158748				
93	Headwall				0.5	241.525		0					617174.6	6431486		4158704				
94	Node					240.544		0					617150.5	6431490		4158817				
64	Headwall				0.5	238.063		0					616411.1	6433300		4158705				
65	Node					237.778		0					616399.2	6433293		4158807				
188	Headwall				0.5	238.397		0					616942	6432032		4158706				
183	Node					237.977		0					616917.6	6432014		4158755				
108	Headwall				0.5	237.89		0					616893.9	6431538		4158707				
109	Node					237.797		0					616841.9	6431541		4158752				
198	Headwall				0.5	238.462		0					616397.2	6432093		4158708				
197	Node					238.182		0					616381.7	6432102		4158756				
178	Headwall				0.5	238.367		0					616910.7	6431962		4158709				
177	Node					237.845		0					616909.6	6431955		4158753				
219	Headwall				0.5	237.835		0					616432.6	6432585		4158710				
901	Node					237.454		0					616410.6	6432588		4158813				
40	Headwall				0.5	237.879		0					616595.8	6433881		4158711				
41	Node					237.977		0					616595.8	6433882		4158797				
75	Headwall				0.5	238.14		0					617024.4	6433695		4158712				
74	Node					237.855		0					617053.1	6433691		4158809				
307	Headwall				0.5	237.934		0					616500.3	6433022		4158713				
304	Node					237.869		0					616493.4	6433025		4158769				
341	Headwall				0.5	239.1		0					618370.2	6433318		4158714				
342	OnGrade	Junction Pi JP 900x900			1.5	239.487		0	0	618434.4	6433308	No			4158732	1 x Ku	No	Existing		
343	Node					238.363		0					618447.2	6433387		4158778				
336	Headwall				0.5	238.46		0					618072.5	6433291		4158715				
337	OnGrade	Surface Inl G.S.I.P. 900x900			1.5	239.386		0	0	618087.4	6433399	No			4158687	1 x Ku	No	Existing		
338	OnGrade	Surface Inl G.S.I.P. 900x900			1.5	239.447		0	0	618095.7	6433407	No			4158688	1 x Ku	No	Existing		
345	Node					236.048		0					618110.3	6433510		4158779				
4	Headwall				0.5	238.975		0					617493.5	6433620		4158716				
393	Sag	Surface Inl G.S.I.P. 900			1	238.452	0.5	0	0	617511.3	6433637	No			4158689	1 x Ku	No	Existing	0.5	0.55
392	Node					237.884		0					617512.6	6433646		4158792				
3	Headwall				0.5	239.375		0					617522.6	6433616		4158717				
394	Node					238.965		0					617524.7	6433629		4158794				
110	Headwall				0.5	238.11		0					616835.9	6431539		4158718				
111	Node					237.976		0					616834.1	6431526		4158819				
386	Headwall				0.5	238.481		0					616459.1	6433181		4158719				
387	OnGrade	Junction Pi JP 900x900			1.5	238.462		0	0	616454.4	6433191	No			4158733	1 x Ku	No	Existing		
385	Node					238.201		0					616435	6433201		4158789				
376	Headwall				0.5	237.716		0					616374.7	6432405		4158720				
377	Node					237.638		0					616372.8	6432388		4158786				
215	Headwall				0.5	238.23		0					616539.4	6432383		4158721				
217a	OnGrade	Junction Pi JP 900x900			1.5	238.128		0	0	616534.4	6432350	No			4158737	1 x Ku	No	Existing		
214a	OnGrade	Junction Pi JP 900x900			1.5	238.093		0	0	616522.3	6432352	No			4158738	1 x Ku	No	Existing		
379	Node					238.29		0					616418.3	6432369		4158785				
160	Headwall				0.5	238.251		0					616892.2	6431719		4158722				
159	Node					237.913		0					616872.3	6431712		4158754				
98a	Headwall				0.5	238.306		0					616928.6	6431525		4158723				
99	Node					238.321		0					616910.2	6431512		4158818				
446	Headwall				0.5	239.034		0					616749.1	6433023		4158724				
446a	Node					238.995		0					616746.4	6433018		4158801				
303	Headwall				0.5	237.904		0					616496.4	6432982		4158725				
308a	Node					237.652		0					616477	6432986		4158772				
48	Headwall				0.5	238.544		0					616847.7	6433807		4158726				
49	Node					238.084		0					616860.5	6433819		4158803				
313	Headwall				0.5	238.424		0					616638	6432993		4158727				
314	Node					238.285		0					616639.2	6433000		4158775				
414	Headwall				0.5	238.893		0					616773.8	6432949		4158728				
415	Node					238.39		0					616750.6	6432987		4158800				
276	Node					239.166		0					617858.5	6431886		4158742				
275	OnGrade	Junction Pi JP 900x900			1.5	239.583		0	0	617897	6431878	No			4158731	1 x Ku	No	Existing		
274	Node					238.358		0					618064.9	6431851		4158764				
325	Node					239.119		0					617217.4	6431761		4158744				
326	OnGrade	SGGP, 1% S.G.G.P. 1.8m E.K.L.			1.5	238.878		0	0	617194.4	6431756	No			4158826	1 x Ku	No	Existing		
327	Node					238.742		0					617189.7	6431756		4158777				
OUTLET 05	Node																			

C 273	273	9.57	50	50	0	5	10	0	330	330	-1	0.5	0.5	-1	0.13	0.4	-1	-1	1
C 347	347	3.756	70	30	0	5	10	0	200	200	-1	0.2	0.2	-1	0.13	0.4	-1	-1	1
C 346	346	1.878	70	30	0	5	10	0	200	200	-1	0.2	0.2	-1	0.13	0.4	-1	-1	1
C 291	291	6.885	70	30	0	5	10	0	490	490	-1	0.2	0.2	-1	0.13	0.4	-1	-1	1
C 278	278	10.585	70	30	0	5	10	0	490	490	-1	0.2	0.2	-1	0.13	0.4	-1	-1	1
C 192	192	5.454	70	30	0	5	10	0	490	490	-1	0.2	0.2	-1	0.13	0.4	-1	-1	1
C 200	200	6.644	70	30	0	5	10	0	540	540	-1	0.2	0.2	-1	0.13	0.4	-1	-1	1
C 203	203	10.229	70	30	0	5	10	0	540	540	-1	0.2	0.2	-1	0.13	0.4	-1	-1	1
C 207	207	9.668	70	30	0	5	10	0	540	540	-1	0.2	0.2	-1	0.13	0.4	-1	-1	1
C 395	N192689	2.64	70	30	0	5	10	0	440	440	-1	0.2	0.2	-1	0.13	0.4	-1	-1	1
Ext2b	N270468	22.7	10	90	0	0	0	0	400	400	-1	0.13	0.13	-1	0.013	0.4	-1	0	1
Ext3	N168004	163.7	10	90	0	0	0	0	2500	2500	-1	0.2	0.2	-1	0.013	0.4	-1	0	1

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)	RI (m)	Chg (m)	RI (m)	etc (m)				
P 66	66	67	4.293	237.713	237.709	0.09	RRJ C2	300	300	0.013	Existing	1	66	0	0	237.64	2.115	238.001	2.116	238.024	2.812	238.023	
P 221\1	221\1	222\2	14.814	238.91	238.7	1.42	RRJ C2	375	375	0.013	Existing	1	221\1	0	0	238.909	3.468	239.579	4.005	239.591	6.846	239.642	
P 373	373	374	21.583	237.354	237.21	0.67	RRJ C2	300	300	0.013	Existing	3	373	0	0	237.354	0.152	237.367	1.015	237.569	1.745	237.704	
P 249	249	248	26.404	237.82	237.82	0	RCBC	1.2W x 0.3H	0.013	New/Exd	3	249	0	0	0	237.988	0.029	237.99	0.184	238	1.837	238.227	
P 248	248	244	107.886	237.82	237.68	0.13	RCBC	1.5W x 0.3H	0.013	New/Exd	3	248	0	0	0	238.34	13.875	238.347	13.876	237.918	16.311	237.947	
P 244	244	243	22.63	237.68	237.71	-0.13	RCBC	1.2W x 0.3H	0.013	New/Exd	3	244	0	0	0	238.032	0.714	238.033	0.715	238.301	0.726	238.301	
P 243	243	242	34.859	237.71	237.66	0.14	RCBC	1.2W x 0.3H	0.013	New/Exd	3	243	0	0	0	238.031	0.082	238.037	0.422	238.043	0.905	238.061	
P 242	242	239	33.584	237.66	237.59	0.21	RCBC	1.2W x 0.3H	0.013	New/Exd	3	242	0	0	0	238.124	0.234	238.142	0.541	238.173	1.597	238.212	
P 253	253	257	75.588	237.56	237.51	0.07	RCBC	1.2W x 0.3H	0.013	New/Exd	3	253	0	0	0	237.93	1.4	237.963	2.197	237.996	4.525	238.089	
P 158	158	157	9.864	237.588	237.537	0.52	RCBC	1.2W x 0.46H	0.013	Existing	2	158	0	0	0	238.304	0.755	238.332	0.983	238.277	1.19	238.226	
P 453	453	445a	50.422	238.45	238.096	0.7	RCBC	0.9W x 0.3H	0.013	Existing	1	453	0	0	0	239.788	3.504	238.788	4.853	238.792	8.563	238.793	
P 445a	445a	445	5	238.096	238.07	0.52	RCBC	0.9W x 0.25H	0.013	Existing	1	445a	0	0	0	239.086	0.213	239.087	4.488	239.102	5	239.103	
P 443	443	445a	63.947	238.44	238.096	0.54	RRJ C2	300	300	0.013	New/Exd	2	443	0	0	0	238.714	0.122	238.700	0.394	238.916	0.558	238.913
P 120	120	121	12.595	237.391	237.351	0.32	RCBC	1.2W x 0.3H	0.013	Existing	1	120	0	0	0	237.942	1.366	238.004	6.291	238.161	6.542	238.17	
P 126	126	129	12.431	237.328	237.366	-0.31	RRJ C2	375	375	0.013	Existing	2	126	0	0	0	237.836	0.421	237.872	0.849	237.898	7.168	237.9
P 147	147	142	54.113	237.653	237.489	0.3	RCBC	0.75W x 0.25H	0.013	Existing	1	147	0	0	0	238.153	0.144	238.153	0.365	238.176	0.568	238.167	
P 93	93	94	24.495	240.319	240.321	-0.01	RRJ C2	300	300	0.013	Existing	1	93	0	0	0	240.536	0.008	240.536	0.519	240.535	3.029	240.641
P 64	64	65	13.45	237.513	237.447	0.49	RCBC	1.5W x 0.4H	0.013	Existing	1	64	0	0	0	237.854	0.884	238.04	1.475	238.137	3.028	238.188	
P 188	188	183	30.302	237.947	237.881	0.22	RCBC	1.5W x 0.3H	0.013	New/Exd	1	188	0	0	0	238.111	3.061	238.242	8.613	238.545	8.614	238.338	
P 108	108	109	22.352	237.54	237.499	0.18	RCBC	0.75W x 0.2H	0.013	Existing	1	108	0	0	0	237.781	1.099	237.782	3.769	237.781	3.77	237.991	
P 198	198	197	17.978	238.041	238.002	0.23	RCBC	0.6W x 0.2H	0.013	Existing	1	198	0	0	0	238.462	0.093	238.465	0.171	238.464	0.218	238.464	
P 178	178	177	7.698	237.767	238.058	-3.78	RRJ C2	450	450	0.013	Existing	6	178	0	0	0	237.86	7.698	237.845				
P 219	219	901	22.256	237.465	237.169	1.33	RCBC	0.6W x 0.22H	0.013	New/Exd	2	219	0	0	0	237.444	0.266	237.477	0.941	237.664	3.642	237.785	
P 40	40	41	11.163	237.43	237.408	0.2	RCBC	1.2W x 0.3H	0.013	Existing	1	40	0	0	0	237.879	0.024	237.886	0.805	238.113	2.349	238.196	
P 75	75	74	20.974	237.74	237.59	0.72	RCBC	0.6W x 0.25H	0.013	Existing	1	75	0	0	0	238.04	1.246	238.157	1.858	238.187	4.697	238.161	
P 307	307	304	7.268	237.564	237.572	-0.11	RCBC	0.95W x 0.22H	0.013	Existing	1	307	0	0	0	237.661	0.874	237.697	1.736	237.689	2.784	237.718	
P 341	341	342	65.012	238.405	238.34	0.1	RRJ C2	525	525	0.013	Existing	1	341	0	0	0	238.927	0.024	238.928	1.125	239.01	1.42	239.038
P 342	342	343	80.355	238.34	237.906	0.54	RRJ C2	525	525	0.013	Existing	1	342	0	0	0	239.485	1.931	239.486	2.255	239.485	3.927	239.484
P 336	336	337	105.931	237.237	236.67	0.54	RRJ C2	900	900	0.013	New/Exd	3	336	0	0	0	237.833	2.352	237.992	4.503	238.163	8.236	238.331
P 337	337	338	14.193	236.67	236.612	0.41	RRJ C2	900	900	0.013	New	3	337	0	0	0	239.386	0.036	239.383	0.24	239.388	0.944	239.466
P 338	338	345	104.471	236.612	235.876	0.7	RRJ C2	900	900	0.013	New	3	338	0	0	0	239.472	2.332	239.432	0.884	239.394	3.549	239.776
P 4	4	393	24.502	237.92	237.75	0.69	RRJ C2	450	450	0.013	Existing	1	4	0	0	0	238.975	0.682	238.971	0.69	238.971	0.839	238.97
P 393	393	392	9.45	237.75	237.651	1.05	RRJ C2	450	450	0.013	Existing	1	393	0	0	0	238.452	0.601	238.437	1.422	238.653	4.076	239.444
P 3	3	394	13.697	238.625	238.407	1.59	RRJ C2	600	600	0.013	Existing	1	3	0	0	0	238.789	0.073	238.794	0.123	238.798	3.243	239.15
P 110	110	111	12.586	237.56	237.53	0.24	RCBC	1.5W x 0.4H	0.013	New/Exd	2	110	0	0	0	238.052	1.026	238.194	2.281	238.211	7.218	238.302	
P 386	386	387	10.937	237.398	237.427	-0.27	RRJ C2	600	600	0.013	Existing	2	386	0	0	0	238.481	2.369	238.494	4.201	238.499	6.272	238.493
P 387	387	385	22.535	237.427	237.295	0.59	RRJ C2	600	600	0.013	New	3	387	0	0	0	238.462	0.393	238.458	3.02	238.426	5.928	238.391
P 376	376	377	17.341	237.191	237.184	0.04	RRJ C2	375	375	0.013	Existing	2	376	0	0	0	237.559	3.422	237.82	5.896	237.889	6.809	237.949
P 215	215	217a	33.501	237.72	237.77	-0.15	RCBC	0.4W x 0.2H	0.013	New/Exd	3	215	0	0	0	237.897	3.21	238.234	8.094	238.23	14.911	238.346	
P 217a	217a	214a	12.348	237.132	237.119	0.11	RCBC	1.5W x 0.675H	0.013	Existing	1	217a	0	0	0	238.128	0.216	238.134	2.979	238.131	10.979	238.136	
P 214a	214a	379	105.211	237.119	237.014	0.43	RCBC	1.5W x 0.65H	0.013	Existing	1	214a	0	0	0	238.023	2.302	238.019	2.302	238.25	4.902	238.247	
P 160	160	159	21.081	237.801	237.626	0.83	RCBC	1.2W x 0.3H	0.013	Existing	1	160	0	0	0	237.963	0.537	237.963	0.538	237.893	6.936	238.322	
P 98a	98a	99	22.706	237.9	237.7	0.88	RCBC	1.2W x 0.25H	0.013	New/Exd	2	98a	0	0	0	238.306	0.283	238.316	7.405	238.399	7.768	238.405	
P 446	446	446a	5.999	237.86	237.85	0.17	RRJ C2	750	750	0.013	Existing	2	446	0	0	0	239.034	3.846	239.008	5.999	238.995		
P 303	303	308a	19.785	237.534	237.462	0.36	RCBC	0.6W x 0.22H	0.013	Existing	1	303	0	0	0	237.723	2.351	237.815	2.6	237.823	2.866	237.826	
P 48	48	49	17.33	237.794	237.555	1.38	RRJ C2	600	600	0.013	Existing	1	48	0	0	0	238.073	0.79	238.09	2.488	238.139	4.697	238.214
P 313	313	314	7.362	237.974	237.961	0.18	RCBC	0.9W x 0.3H	0.013	Existing	1	313	0</										

OF51139	242	239	0.5			8 m wide r	0.14	0.14	0.6	0.3	0	4165466	237.454	237.345	19.3
F 239	239	253	4.9			8 m wide r	0.14	0.14	0.6	0.3	0	4159016	238.217	238.01	187.839
F 253	253	257	2	238.01	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158972	238.01	237.51	75.568
F 257	257	U/S Raiwa	4.3			8 m wide r	0.14	0.14	0.6	0.3	0	4159017	238.002	238.53	164.967
F 158	158	157	0.3	238.304	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158973	238.304	237.537	9.864
F 157	157	109	2.7			8 m wide r	0.14	0.14	0.6	0.3	0	4159006	238.28	237.797	101.637
F 433	433	445a	1.3	238.9	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158974	238.9	238.096	50.422
F 445a	445a	445	0.1			8 m wide r	0.14	0.14	0.6	0.3	0	4159002	239.086	239.103	5
F 445	445	446	0.3			8 m wide r	0.14	0.14	0.6	0.3	0	4159037	239.103	239.034	11.897
F 443	443	445	1.8	238.89	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158975	238.89	238.07	67.134
F 120	120	121	0.3	237.942	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158976	237.942	237.351	12.595
F 121	121	129	1.8			8 m wide r	0.14	0.14	0.6	0.3	0	4159049	237.625	237.838	67.17
F 126	126	129	0.3	237.836	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158977	237.836	237.366	12.431
F 129	129	OUTLET 12	3.6			8 m wide r	0.14	0.14	0.6	0.3	0	4159050	237.838	237.587	137.855
F 147	147	142	1.4	238.153	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158978	238.153	237.489	54.113
F 142	142	131	3.6			8 m wide r	0.14	0.14	0.6	0.3	0	4159005	237.777	237.43	136.088
F 93	93	94	0.6	241.525	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158979	241.525	240.321	24.495
F 94	94	98a	5.9			8 m wide r	0.14	0.14	0.6	0.3	0	4159046	240.544	238.306	224.69
F 64	64	65	0.4	238.063	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158980	238.063	237.447	13.45
F 65	65	Node15a	0.8			8 m wide r	0.14	0.14	0.6	0.3	0	4159040	237.778	238.043	30.178
F 188	188	183	0.8	238.397	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158981	238.397	237.881	30.302
OF118839	183	183a	1.4			8 m wide r	0.14	0.14	0.6	0.3	0	21670731	237.977	238.367	52.02
F 108	108	109	0.6	237.89	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158982	237.89	237.499	22.352
F 109	109	110	0.2			8 m wide r	0.14	0.14	0.6	0.3	0	4159007	237.797	238.11	6.574
F 198	198	197	0.5	238.462	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4159063	238.153	237.489	17.9
F 197	197	142	4.7			8 m wide r	0.14	0.14	0.6	0.3	0	4159011	238.182	237.413	181.058
F 178	178	177	0.2	238.367	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158983	238.367	238.058	7.698
F 177	177	159	6.4			8 m wide r	0.14	0.14	0.6	0.3	0	4159008	237.845	237.913	245.049
OF51117	219	901	0.5	237.835	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4159087	237.83	237.454	20.528
F 901	901	377	0.5			8 m wide r	0.14	0.14	0.6	0.3	0	4159044	237.454	237.345	20.528
F 40	40	41	0.3	237.879	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158984	237.879	237.408	11.163
F 41	41	OUTLET 41	3.7			8 m wide r	0.14	0.14	0.6	0.3	0	4159034	237.977	238.823	141.593
F 75	75	74	0.5	238.14	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158985	238.14	237.59	20.974
F 74	74	Node 74a	0.6			8 m wide r	0.14	0.14	0.6	0.3	0	4159042	237.855	237.8	22.17
F 307	307	304	0.2	237.934	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158986	237.934	237.572	7.268
F 341	341	343	2.7	239.1	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158987	238.327	237.906	103.477
F 343	343	345	9.4			8 m wide r	0.14	0.14	0.6	0.3	0	4159023	238.363	236.048	358.791
F 336	336	337	5.8	238.46	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158988	237.912	235.876	223.083
F 337	337	347	0.4			8 m wide r	0.14	0.14	0.6	0.3	0	4158964	239.386	239.447	14.193
F 338	338	346	2.7			8 m wide r	0.14	0.14	0.6	0.3	0	4158965	239.447	236.048	104.471
F 345	345	348	6.2			8 m wide r	0.14	0.14	0.6	0.3	0	4159024	236.048	236.807	236.476
F 4	4	393	0.6	238.975	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158989	238.975	237.75	24.502
F 393	393	392	0.2			8 m wide r	0.14	0.14	0.6	0.3	0	4158966	238.452	237.884	9.433
F 392	392	O 392	0.3			8 m wide r	0.14	0.14	0.6	0.3	0	4159030	237.884	237	10
F 3	3	394	0.4	239.375	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158990	239.375	238.407	13.697
F 384	384	393	0.4			8 m wide r	0.14	0.14	0.6	0.3	0	4159031	238.965	238.452	15.238
F 110	110	111	0.3	238.11	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158991	238.11	237.53	12.586
F 111	111	121	8			8 m wide r	0.14	0.14	0.6	0.3	0	4159048	237.976	237.625	304.655
F 386	386	385	0.8	238.481	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158992	238.481	237.295	31.275
OF51147	387	385	0.5			8 m wide r	0.14	0.14	0.6	0.3	0	4165474	237.454	237.345	19.3
F 385	385	OUTLET 38	3.5			8 m wide r	0.14	0.14	0.6	0.3	0	4159029	238.201	238.703	135.19
F 376	376	377	0.5	237.716	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158993	237.716	237.184	17.341
F 377	377	377	1.9			8 m wide r	0.14	0.14	0.6	0.3	0	4159028	237.638	237.068	70.804
F 215	215	379	3.2	238.23	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158994	238.07	237.014	121.942
F 379	379	377	1.3			8 m wide r	0.14	0.14	0.6	0.3	0	4159027	238.29	237.638	49.564
F 160	160	159	0.6	238.251	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158995	238.251	237.626	21.081
F 159	159	158	1.6			8 m wide r	0.14	0.14	0.6	0.3	0	4159009	237.913	238.304	62.087
F 98a	98a	99	0.6	238.306	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158996	238.306	237.7	22.706
F 99	99	111	2			8 m wide r	0.14	0.14	0.6	0.3	0	4159047	238.321	237.976	77.392
F 446	446	446a	0.2	239.034	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158997	239.034	237.85	5.999
F 446a	446a	Node 314a	2.5			8 m wide r	0.14	0.14	0.6	0.3	0	4159036	238.995	238.638	93.774
F 303	303	308a	0.5	237.904	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158998	237.904	237.462	19.785
F 48	48	49	0.5	238.544	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158999	238.544	237.555	17.33
F 49	49	OUTLET 48	0.7			8 m wide r	0.14	0.14	0.6	0.3	0	4159038	238.084	237.839	27.606
F 313	313	314	0.2	238.424	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4159000	238.424	237.961	7.362
F 314	314	Node 314a	1.5			8 m wide r	0.14	0.14	0.6	0.3	0	4159020	238.285	238.638	58.809
F 414	414	415	0.4	238.893	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4159001	238.892	238.099	44.137
F 415	415	446a	1.2			8 m wide r	0.14	0.14	0.6	0.3	0	4159035	238.39	238.995	31.682
F 274	274	Node 2213	11.9			8 m wide r	0.14	0.14	0.6	0.3	0	4159015	238.358	238.5	453.669
OF51150	326	279	0.5			8 m wide r	0.14	0.14	0.6	0.3	0	4165477	237.454	237.345	19.3
F 327	327	98a	9.1			8 m wide r	0.14	0.14	0.6	0.3	0	4159022	238.742	238.306	348.726
F 214	214	71	4			8 m wide r	0.14	0.14	0.6	0.3	0	4159012	238.461	238.263	151.259
F 71	71	Node15a	3.9			8 m wide r	0.14	0.14	0.6	0.3	0	4159013	238.263	238.043	149.726
F Node15a	Node15a	Outlet 67	1.8			8 m wide r	0.14	0.14	0.6	0.3	0	4159014	238.043	238.19	69.114
F Node 221	Node 2213	257	4			8 m wide r	0.14	0.14	0.6	0.3	0	4159019	238.5	238.91	151.593
F Node 31	Node 314a	386	6.2			8 m wide r	0.14	0.14	0.6	0.3	0	4159021	238.638	238.481	237.377
F 612	612	249	3.6			8 m wide r	0.14	0.14	0.6	0.3	0	4159039	238.125	238.27	136.148
F Node 74	Node 74a	OUTLET 74	5.6			8 m wide r	0.14	0.14	0.6	0.3	0	4159043	237.8	225.623	215.741
F Node 93	Node 93a	93	8			8 m wide r	0.14	0.14	0.6	0.3	0	4159045	241.036	241.525	307.196
F 9	9	347	1.8			8 m wide r	0.14	0.14	0.6	0.3	0	4159051	238.781	239.177	67.437
F 8	8	346	1.3			8 m wide r	0.14	0.14	0.6	0.3	0	4159052	239.177	239.242	49.521
F 16	6	5	0.9			8 m wide r	0.14	0.14	0.6	0.3	0	4159003	239.242	237.421	32.743
F 5	5	OUTLET 05	4.5			8 m wide r	0.14	0.14	0.6	0.3	0	4159004	237.421	227.25	172.752
F Pit12	Pit12	Pit13	0.9			8 m wide r	0.14	0.14	0.6	0.3	0	4159054	237.748	237.718	35.291
F Pit13	Pit13	SchoolOva	5.2			Overflow a	0.05	0							

OF146085	131	130	1.8	238.07	10	1.7	8 m wide r	0.14	0.14	0.6	0.3	0	24366368	67.17
OF146067	130	140	3.6				8 m wide r	0.14	0.14	0.6	0.3	0	24366349	137.855
OF149269	HW47	N184609	0.6	240.3	50	1.7	Overflow a	0.05	0	0.6	0.3	0	24666847	14.814
OF205948	N184609	N101397	29.2				10m wide	0.25	0.25	0.4	0.3	0	37957058	1227.5

PIPE COVER DETAILS

Name	Type	Dia (mm)	Safe Cover	Cover (m)	
P 66	RRJ C2	300	0.1	-0.41	Unsafe
P 221	RRJ C2	375	0.1	-0.41	Unsafe
P 373	RRJ C2	300	0.1	-0.33	Unsafe
P 249	RCBC	0	0.15	-0.23	Unsafe
P 248	RCBC	0	0.15	-0.28	Unsafe
P 244	RCBC	0	0.15	-0.09	Unsafe
P 243	RCBC	0	0.15	-0.13	Unsafe
P 242	RCBC	0	0.15	0.06	Unsafe
P 253	RCBC	0	0.15	-0.1	Unsafe
P 158	RCBC	0	0.15	0.08	Unsafe
P 433	RCBC	0	0.15	-0.06	Unsafe
P 445a	RCBC	0	0.15	0.64	
P 443	RRJ C2	300	0.1	-0.06	Unsafe
P 120	RCBC	0	0.15	-0.13	Unsafe
P 126	RRJ C2	375	0.1	0.06	Unsafe
P 147	RCBC	0	0.15	-0.06	Unsafe
P 93	RRJ C2	300	0.1	-0.12	Unsafe
P 64	RCBC	0	0.15	-0.17	Unsafe
P 188	RCBC	0	0.15	-0.33	Unsafe
P 108	RCBC	0	0.15	-0.06	Unsafe
P 198	RCBC	0	0.15	-0.12	Unsafe
P 178	RRJ C2	450	0.1	-0.71	Unsafe
P 219	RCBC	0	0.15	-0.34	Unsafe
P 40	RCBC	0	0.15	0.05	Unsafe
P 75	RCBC	0	0.15	-0.09	Unsafe
P 307	RCBC	0	0.15	-0.22	Unsafe
P 341	RRJ C2	525	0.1	-0.05	Unsafe
P 342	RRJ C2	525	0.1	-0.11	Unsafe
P 336	RRJ C2	900	0.1	-0.38	Unsafe
P 337	RRJ C2	900	0.1	1.74	
P 338	RRJ C2	900	0.1	-0.8	Unsafe
P 4	RRJ C2	450	0.1	0.21	
P 393	RRJ C2	450	0.1	-0.26	Unsafe
P 3	RRJ C2	600	0.1	-0.48	Unsafe
P 110	RCBC	0	0.15	-0.05	Unsafe
P 386	RRJ C2	600	0.1	0.39	
P 387	RRJ C2	600	0.1	0.26	
P 376	RRJ C2	375	0.1	-0.04	Unsafe
P 215	RCBC	0	0.15	-0.12	Unsafe
P 217a	RCBC	0	0.15	0.2	
P 214a	RCBC	0	0.15	0.15	
P 160	RCBC	0	0.15	-0.3	Unsafe
P 98a	RCBC	0	0.15	0.06	Unsafe
P 446	RRJ C2	750	0.1	0.33	
P 303	RCBC	0	0.15	-0.13	Unsafe
P 48	RRJ C2	600	0.1	-0.37	Unsafe
P 313	RCBC	0	0.15	-0.29	Unsafe
P 414	RCBC	0	0.15	-0.3	Unsafe
P 276	RCBC	0	0.15	0.28	
P 275	RRJ C2	600	0.1	-0.32	Unsafe
P 325	RCBC	0	0.15	0.18	
P 326	RCBC	0	0.15	0.03	Unsafe
P 9	RRJ C2	600	0.1	0.03	Unsafe
P 8	RRJ C2	600	0.1	0.4	
P 6	RRJ C2	900	0.1	-1.23	Unsafe
P Pit12	RCBC	0	0.15	0.19	
P Pit13	RCBC	0	0.15	0.34	
P Pit32	RCBC	0	0.15	-0.7	Unsafe
P Basin-pit	RCBC	0	0.15	-0.7	Unsafe
P Pit29	RCBC	0	0.15	1.5	
P Pit34	RRJ C2	825	0.1	1.91	
P Pit GPT	RRJ C2	825	0.1	-0.73	Unsafe
P 400	RCBC	0	0.15	-0.85	Unsafe
P Pit6	RCBC	0	0.15	0.29	
P Pit8	RCBC	0	0.15	0.28	
P 371	RCBC	0	0.15	-0.98	Unsafe
P 273	RRJ C2	450	0.1	0.07	Unsafe
P 347	RRJ C2	525	0.1	-0.35	Unsafe
P 346	RRJ C2	525	0.1	-0.38	Unsafe
P 291	RCBC	0	0.15	-0.3	Unsafe
P 278	RCBC	0	0.15	-0.36	Unsafe
P 192	RCBC	0	0.15	-0.24	Unsafe
P 200	RCBC	0	0.15	-0.38	Unsafe
P 203	RCBC	0	0.15	-0.15	Unsafe
P 207	RCBC	0	0.15	-0.05	Unsafe
P 208	RCBC	0	0.15	0.14	Unsafe
P 218a	RCBC	0	0.15	0.13	Unsafe
P 209a	RCBC	0	0.15	0.1	Unsafe
P 213	RCBC	0	0.15	0.14	Unsafe
P 216a	RCBC	0	0.15	0.12	Unsafe
Pipe11344	RCBC	0	0.15	-0.1	Unsafe
P 140	RCBC	0	0.15	0.03	Unsafe
P 131	RRJ C2	375	0.1	0.16	
Pipe10930	RCBC	0	0.15	0.2	

This model has no pipes with non-return valves

A3. DRAINS model data for the proposed Option 2

PIT / NODE DETAILS		Version 15																				
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	Internal Width (mm)	Inflow is Misaligned (m)	Minor Safe Dept (m)	Pond Depth	Major Safe Depth	
66	Headwall				0.5	238.163		0					616388.5	6433303		4158690						
67	Node					237.628		0					616387.7	6433299		4158808						
221	Headwall				0.5	239.435		0					618138.1	6431825		4158691						
222	Node					238.699		0					618140.9	6431839		4158767						
373	Headwall				0.5	237.804		0					616404	6432405		4158693						
374	Node					237.21		0					616382.7	6432409		4158784						
249	Headwall				0.5	238.27		0					617644.4	6432366		4158694						
248	OnGrade	NSW RTA 5 SA1			1.5	238.22		0	0			617618.3	6432370	No	4158830	1 x Ku	No	Existing				
244	Node					238.13		0					617511.8	6432387		4158741						
243	Sag	NSW RTA 5 SA1			10	238.031	0.1	0	0			617514.9	6432409	No	4158836	1 x Ku	No	Existing		0.2	0.2	
242	OnGrade	NSW RTA 5 SA1			1.5	238.124		0	0			617490	6432434	No	4158837	1 x Ku	No	Existing				
239	Node					238.217		0					617464	6432455		4158765						
253	Headwall				0.5	238.01		0					617318.9	6432574		4158695						
257	Node					238.002		0					617353.3	6432642		4158766						
158	Headwall				0.5	238.304		0					616860.1	6431651		4158698						
157	Node					238.28		0					616858.7	6431642		4158751						
433	Headwall				0.5	238.9		0					616809.8	6433037		4158699						
445a	OnGrade	Junction Pi JP 900x900			1.5	239.086		0	0			616759.5	6433034	No	4158729	1 x Ku	No	Existing				
445	Node					239.103		0					616754.5	6433034		4158802						
443	Headwall				0.5	238.89		0					616796.3	6433087		4158700						
120	Headwall				0.5	237.942		0					616535	6431586		4158701						
121	Node					237.625		0					616532.2	6431574		4158820						
126	Headwall				0.5	237.826		0					616471.1	6431595		4158702						
129	Node					237.838		0					616466.7	6431583		4158821						
147	Headwall				0.5	238.153		0					616358.5	6431852		4158703						
142	Node					237.777		0					616304.4	6431854		4158748						
93	Headwall				0.5	241.525		0					617174.6	6431486		4158704						
94	Node					240.544		0					617150.5	6431490		4158817						
64	Headwall				0.5	238.063		0					616411.1	6433300		4158705						
65	Node					237.778		0					616399.2	6433293		4158807						
188	Headwall				0.5	238.397		0					616942	6432032		4158706						
183	Node					237.977		0					616917.6	6432014		4158755						
108	Headwall				0.5	237.889		0					616803.9	6431538		4158707						
109	Node					237.797		0					616841.9	6431541		4158752						
198	Headwall				0.5	238.462		0					616397.2	6432093		4158708						
197	Node					238.182		0					616381.7	6432102		4158756						
178	Headwall				0.5	238.367		0					616910.7	6431962		4158709						
177	Node					237.845		0					616909.6	6431955		4158753						
219	Headwall				0.5	237.835		0					616432.6	6432585		4158710						
901	Node					237.454		0					616410.6	6432588		4158813						
40	Headwall				0.5	237.879		0					616593.8	6433881		4158711						
41	Node					237.977		0					616593.8	6433882		4158797						
75	Headwall				0.5	238.14		0					617029.4	6433695		4158712						
74	Node					237.855		0					617053.1	6433691		4158809						
307	Headwall				0.5	237.934		0					616500.3	6433022		4158713						
304	Node					237.869		0					616493.4	6433025		4158769						
341	Headwall				0.5	239.38		0					618370.2	6433318		4158714						
342	OnGrade	Junction Pi JP 900x900			1.5	239.487		0	0			618434.4	6433308	No	4158732	1 x Ku	No	Existing				
343	Node					238.363		0					618447.2	6433387		4158778						
4	Headwall				0.5	238.975		0					617493.5	6433620		4158716						
393	Sag	Surface Inl G.S.I.P. 90k			1	238.452	0.5	0	0			617511.3	6433637	No	4158689	1 x Ku	No	Existing		0.5	0.55	
392	Node					237.884		0					617512.6	6433646		4158792						
5	Headwall				0.5	239.375		0					617522.6	6433616		4158717						
394	Node					238.965		0					617524.7	6433629		4158794						
110	Headwall				0.5	238.11		0					616835.9	6431539		4158718						
111	Node					237.976		0					616834.1	6431526		4158819						
386	Headwall				0.5	238.481		0					616459.1	6433181		4158719						
387	OnGrade	Junction Pi JP 900x900			1.5	238.462		0	0			616455.4	6433191	No	4158733	1 x Ku	No	Existing				
385	Node					238.201		0					616435	6433201		4158789						
376	Headwall				0.5	237.716		0					616374.7	6432405		4158720						
377	Node					237.638		0					616372.8	6432388		4158786						
215	Headwall				0.5	238.23		0					616339.4	6432383		4158721						
217a	OnGrade	Junction Pi JP 900x900			1.5	238.128		0	0			616534.4	6432350	No	4158737	1 x Ku	No	Existing				
214a	OnGrade	Junction Pi JP 900x900			1.5	238.093		0	0			616522.3	6432352	No	4158738	1 x Ku	No	Existing				
379	Node					238.29		0					616418.3	6432369		4158785						
160	Headwall				0.5	238.251		0					616892.2	6431719		4158722						
159	Node					237.913		0					616872.3	6431712		4158754						
98a	Headwall				0.5	238.306		0					616928.6	6431525		4158723						
99	Node					238.321		0					616910.2	6431512		4158818						
446	Headwall				0.5	239.034		0					616749.1	6433023		4158724						
446a	Node					238.995		0					616746.4	6433018		4158801						
303	Headwall				0.5	237.904		0					616486.4	6432982		4158725						
308a	Node					237.652		0					616477	6432986		4158772						
48	Headwall				0.5	238.544		0					616847.7	6433807		4158726						
49	Node					238.084		0					616860.5	6433819		4158803						
313	Headwall				0.5	238.424		0					616638	6432993		4158727						
314	Node					238.285		0					616639.2	6433000		4158775						
414	Headwall				0.5	238.893		0					616773.8	6432949		4158728						
415	Node					238.39		0					616750.6	6432987		4158800						
276	Node					239.166		0					617858.5	6431886		4158742						
275	OnGrade	Junction Pi JP 900x900			1.5	239.583		0	0			617897	6431878	No	4158731	1 x Ku	No	Existing				
274	Node					238.358		0					618064.9	6431851		4158764						
225	Node					239.119		0					617217.4	6431761		4158744						
226	OnGrade	SGGP, 1% S.G.G.P. 1.8m E.K.L.			1.5	238.878		0	0			617194.4	6431756	No	4158826	1 x Ku	No	Existing				
327	Node					238.742		0		</												

Ind1	N172535	49.927	50	50	0	0	0	0	1200	1200	-1	0.13	0.13	-1	0.013	0.4	-1	0	1
Ext1	N101397	203.3	10	90	0	0	0	0	1200	1200	-1	0.13	0.13	-1	0.013	0.4	-1	0	1
Ext2a	N101398	275.9	10	90	0	0	0	0	1200	1200	-1	0.13	0.13	-1	0.013	0.4	-1	0	1
C 273	273	9.57	50	50	0	5	10	0	330	330	-1	0.5	0.5	-1	0.13	0.4	-1	-1	1
C 347	347	3.756	70	30	0	5	10	0	200	200	-1	0.2	0.2	-1	0.13	0.4	-1	-1	1
C 346	346	1.878	70	30	0	5	10	0	200	200	-1	0.2	0.2	-1	0.13	0.4	-1	-1	1
C 291	291	6.885	70	30	0	5	10	0	490	490	-1	0.3	0.4	-1	0.13	0.4	-1	-1	1
C 278	278	10.585	70	30	0	5	10	0	490	490	-1	0.2	0.2	-1	0.13	0.4	-1	-1	1
C 192	192	5.454	70	30	0	5	10	0	490	490	-1	0.2	0.2	-1	0.13	0.4	-1	-1	1
C 200	200	6.644	70	30	0	5	10	0	540	540	-1	0.2	0.2	-1	0.13	0.4	-1	-1	1
C 203	203	10.229	70	30	0	5	10	0	540	540	-1	0.2	0.2	-1	0.13	0.4	-1	-1	1
C 207	207	9.668	70	30	0	5	10	0	540	540	-1	0.2	0.2	-1	0.13	0.4	-1	-1	1
Cat113175	N192689	2.64	70	30	0	5	10	0	440	440	-1	0.2	0.2	-1	0.13	0.4	-1	-1	1
C 336	Proposed_	41.67	50	50	0	5	10	0	1000	1000	-1	0.2	0.2	-1	0.13	0.4	-1	-1	1
C 337	337	1.1099	70	30	0	5	10	0	260	260	-1	0.2	0.2	-1	0.13	0.4	-1	-1	1
Ext2b	N270468	22.7	10	90	0	0	0	0	400	400	-1	0.13	0.13	-1	0.013	0.4	-1	0	1
Ext3	N168004	163.7	10	90	0	0	0	0	2500	2500	-1	0.2	0.2	-1	0.013	0.4	-1	0	1

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)	Ri (m)	Chg (m)	RL (m)	etc (m)			
P 66	66	67	4.293	237.713	237.709	0.09	RRJ C2	300	300	0.013	Existing	1	66	0	0	237.64	2.115	238.001	2.116	238.024	2.812	238.023
P 22\1	22\1	22\2	14.814	238.91	238.7	1.42	RRJ C2	375	375	0.013	Existing	1	22\1	0	0	238.909	3.468	239.579	4.005	239.591	6.846	239.642
P 373	373	374	21.583	237.354	237.21	0.67	RRJ C2	300	300	0.013	Existing	3	373	0	0	237.356	0.152	237.367	1.015	237.569	1.745	237.704
P 249	249	248	26.404	237.82	237.82	0	RCBC	1.2W x 0.3H	0.013	NewFixed	3	249	0	0	237.988	0.029	237.99	0.184	238	1.837	238.227	
P 248	248	244	107.886	237.82	237.68	0.13	RCBC	1.5W x 0.3H	0.013	NewFixed	3	248	0	0	238.24	13.875	238.347	13.876	237.918	16.311	237.945	
P 244	244	243	22.63	237.68	237.71	-0.13	RCBC	1.2W x 0.3H	0.013	NewFixed	3	244	0	0	238.032	0.714	238.033	0.715	238.201	0.726	238.201	
P 243	243	242	34.859	237.71	237.66	0.14	RCBC	1.2W x 0.3H	0.013	NewFixed	3	243	0	0	238.031	0.082	238.037	0.422	238.043	0.905	238.061	
P 242	242	239	33.584	237.66	237.59	0.21	RCBC	1.2W x 0.3H	0.013	NewFixed	3	242	0	0	238.124	0.234	238.142	0.541	238.173	1.597	238.212	
P 253	253	257	75.568	237.56	237.51	0.07	RCBC	1.2W x 0.3H	0.013	NewFixed	3	253	0	0	237.93	1.4	237.966	2.197	237.996	4.525	238.089	
P 158	158	157	9.864	237.588	237.537	0.52	RCBC	1.2W x 0.46H	0.013	Existing	2	158	0	0	238.304	0.755	238.332	0.983	238.277	1.19	238.226	
P 433	433	445a	50.422	238.45	238.096	0.7	RCBC	0.9W x 0.3H	0.013	Existing	1	433	0	0	238.788	3.304	238.788	4.853	238.792	8.563	238.923	
P 445a	445a	445	5	238.096	238.07	0.52	RCBC	0.9W x 0.25H	0.013	Existing	1	445a	0	0	239.086	0.213	239.087	4.488	239.102	5	239.103	
P 443	443	445a	63.947	238.44	238.096	0.54	RRJ C2	300	300	0.013	NewFixed	2	443	0	0	238.714	0.122	238.907	0.394	238.916	0.558	238.913
P 120	120	121	12.595	237.391	237.351	0.32	RCBC	1.2W x 0.3H	0.013	Existing	1	120	0	0	237.942	1.366	238.004	6.291	238.161	6.462	238.17	
P 126	126	129	12.413	237.328	237.366	-0.31	RRJ C2	375	375	0.013	Existing	2	126	0	0	237.836	0.421	237.872	0.849	237.898	7.168	237.9
P 147	147	142	53.113	237.653	237.489	0.3	RCBC	0.75W x 0.25H	0.013	Existing	1	147	0	0	238.153	0.144	238.153	0.365	238.16	0.568	238.167	
P 93	93	94	24.495	240.319	240.321	-0.01	RRJ C2	300	300	0.013	Existing	1	93	0	0	240.536	0.008	240.536	0.519	240.535	3.029	240.641
P 64	64	65	13.45	237.513	237.447	0.49	RCBC	1.5W x 0.4H	0.013	Existing	1	64	0	0	237.854	0.884	238.04	1.475	238.137	3.028	238.188	
P 188	188	183	30.302	237.947	237.881	0.22	RCBC	1.5W x 0.3H	0.013	NewFixed	1	188	0	0	238.111	3.061	238.242	8.613	238.545	8.614	238.338	
P 108	108	109	22.352	237.54	237.499	0.18	RCBC	0.75W x 0.2H	0.013	Existing	1	108	0	0	237.781	1.099	237.782	3.769	237.781	3.77	237.991	
P 198	198	197	17.978	238.041	238.002	0.22	RCBC	0.6W x 0.2H	0.013	Existing	1	198	0	0	238.462	0.093	238.465	0.171	238.464	0.218	238.464	
P 178	178	177	7.698	237.767	238.058	-3.78	RRJ C2	450	450	0.013	Existing	6	178	0	0	237.86	7.698	237.845				
P 219	219	901	22.256	237.465	237.169	1.33	RCBC	0.6W x 0.22H	0.013	NewFixed	2	219	0	0	237.444	0.266	237.477	0.941	237.613	3.462	237.785	
P 40	40	41	11.163	237.43	237.408	0.2	RCBC	1.2W x 0.3H	0.013	Existing	1	40	0	0	237.879	0.202	237.886	0.805	238.213	2.349	238.196	
P 75	75	74	20.974	237.74	237.59	0.72	RCBC	0.6W x 0.25H	0.013	Existing	1	75	0	0	238.04	1.246	238.157	1.858	238.187	4.697	238.165	
P 307	307	304	7.22	237.68	237.573	-0.11	RCBC	0.95W x 0.22H	0.013	Existing	1	307	0	0	237.661	0.874	237.697	1.736	237.689	2.784	237.719	
P 341	341	342	65.012	238.405	238.34	0.1	RRJ C2	525	525	0.013	Existing	1	341	0	0	238.927	0.024	238.928	1.125	239.01	1.42	239.038
P 342	342	343	80.355	238.34	237.906	0.54	RRJ C2	525	525	0.013	Existing	1	342	0	0	239.487	1.931	239.486	2.255	239.485	3.927	239.484
P 4	4	393	24.502	237.92	237.75	0.69	RRJ C2	450	450	0.013	Existing	1	4	0	0	238.975	0.682	238.971	0.69	238.971	0.839	238.97
P 393	393	392	9.45	237.75	237.651	1.05	RRJ C2	450	450	0.013	Existing	1	393	0	0	238.452	0.601	238.437	1.422	238.653	4.076	239.444
P 3	3	394	13.697	238.625	238.407	1.59	RRJ C2	600	600	0.013	Existing	1	3	0	0	238.789	0.073	238.794	0.123	238.798	3.243	239.15
P 110	110	111	12.586	237.56	237.53	0.24	RCBC	1.5W x 0.4H	0.013	NewFixed	2	110	0	0	238.052	1.026	238.194	2.281	238.117	7.218	238.302	
P 386	386	387	10.937	237.398	237.427	-0.27	RRJ C2	600	600	0.013	Existing	2	386	0	0	238.481	2.369	238.494	4.201	238.499	6.272	238.493
P 387	387	385	22.535	237.427	237.295	0.59	RRJ C2	600	600	0.013	New	3	387	0	0	238.462	0.399	238.458	3.02	238.426	5.928	238.391
P 376	376	377	17.341	237.191	237.184	0.04	RRJ C2	375	375	0.013	Existing	2	376	0	0	237.559	3.422	237.82	5.896	237.899	6.809	237.945
P 215	215	217a	35.501	237.72	237.77	-0.15	RCBC	0.4W x 0.2H	0.013	NewFixed	3	215	0	0	237.897	3.21	238.234	8.094	238.23	14.911	238.346	
P 217a	217a	214a	12.348	237.132	237.119	0.11	RCBC	2.15W x 0.675H	0.013	Existing	1	217a	0	0	238.128	0.216	238.134	2.979	238.131	10.979	238.136	
P 214a	214a	379	105.321	237.119	237.014	0.1	RCBC	2.15W x 0.65H	0.013	Existing	1	214a	0	0	238.093	2.302	238.019	2.303	238.25	4.002	238.247	
P 160	160	159	21.081	237.801	237.626	0.83	RCBC	1.2W x 0.3H	0.013	Existing	1	160	0	0	237.963	0.537	237.963	0.538	237.893	6.936	238.322	
P 98a	98a	99	22.706	237.9	237.7	0.88	RCBC	1.2W x 0.25H	0.013	NewFixed	2	98a	0	0	238.306	0.283	238.316	7.405	238.399	7.768	238.405	
P 446	446	446a	5.999	237.86	237.85	0.17	RRJ C2	750	750	0.013	Existing	2	446	0	0	239.034	3.846	239.008	5.999	238.995		
P 303	303	308a	19.785	237.534	237.462	0.36	RCBC	0.6W x 0.22H	0.013	Existing	1	303	0	0	237.723	2.351	237.815	2.6	237.823	2.866	237.826	
P 48	48	49	17.33	237.794	237.555	1.38	RRJ C2	600	600	0.013	Existing	1	48	0	0	238.073	0.79	238.09	2.488	238.139	4.697	238.314
P 313	313	314	7.362	237.974	237.961	0.18	RCBC	0.9W x 0.3H	0.013	Existing	1	313	0	0	238.08	0.213	238.359	0.823	238.351	7.362	238.285	
P 414	414	415	44.137	238.443	238.099	0.78	RCBC	1.														

F 22\2	22\2	Node 22\3	12.8			8 m wide r	0.14	0.14	0.6	0.3	0	4159018	238.699	238.5	491.001
F 373	373	374	0.6	237.804	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158970	237.804	237.21	21.583
F 374	374	376	0.2			8 m wide r	0.14	0.14	0.6	0.3	0	4159026	237.21	237.716	8.695
F 249	249	248	5.3	238.27	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158971	238.27	237.59	201.388
OF51143	248	243	0.3			8 m wide r	0.14	0.14	0.6	0.3	0	4165470	237.454	237.345	19.3
OF51134	243	242	0.8			Overflow a	0.05	0	0.6	0.3	0	4165461	237.454	237.345	19.3
OF51139	242	239	0.5			8 m wide r	0.14	0.14	0.6	0.3	0	4165466	237.454	237.345	19.3
F 239	239	Proposed_d	4.9			8 m wide r	0.14	0.14	0.6	0.3	0	4159016	238.217	238.01	187.839
F 253	253	257	2	238.01	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158972	238.01	237.51	75.568
F 257	257	U/S Railwa	4.3			8 m wide r	0.14	0.14	0.6	0.3	0	4159017	238.002	238.53	164.967
F 158	158	157	0.3	238.304	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158973	238.304	237.537	9.864
F 157	157	109	2.7			8 m wide r	0.14	0.14	0.6	0.3	0	4159006	238.28	237.797	101.637
F 433	433	445a	1.3	238.9	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158974	238.9	238.096	50.422
F 445a	445a	445	0.1			8 m wide r	0.14	0.14	0.6	0.3	0	4159002	239.086	239.103	5
F 445	445	446	0.3			8 m wide r	0.14	0.14	0.6	0.3	0	4159037	239.103	239.034	11.897
F 443	443	445	1.8	238.89	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158975	238.89	236.07	67.134
F 120	120	121	0.3	237.942	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158976	237.942	237.351	12.595
F 121	121	129	1.8			8 m wide r	0.14	0.14	0.6	0.3	0	4159049	237.625	237.838	67.17
F 126	126	129	0.3	237.836	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158977	237.836	237.366	12.431
F 129	129	OUTLET 12	3.6			8 m wide r	0.14	0.14	0.6	0.3	0	4159050	237.838	237.587	137.855
F 147	147	142	1.4	238.153	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158978	238.153	237.489	54.113
F 142	142	131	3.6			8 m wide r	0.14	0.14	0.6	0.3	0	4159005	237.777	237.43	136.088
F 93	93	94	0.6	241.525	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158979	241.525	240.321	24.495
F 94	94	98a	5.9			8 m wide r	0.14	0.14	0.6	0.3	0	4159046	240.544	238.306	224.69
F 64	64	65	0.4	238.063	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158980	238.063	237.447	13.45
F 65	65	Node15a	0.8			8 m wide r	0.14	0.14	0.6	0.3	0	4159040	237.778	238.043	30.178
F 188	188	183	0.8	238.397	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158981	238.397	237.881	30.302
OF118839	183	183a	1.4			8 m wide r	0.14	0.14	0.6	0.3	0	21670731	237.977	238.367	52.02
F 108	108	109	0.6	237.89	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158982	237.89	237.499	22.352
F 109	109	110	0.2			8 m wide r	0.14	0.14	0.6	0.3	0	4159007	237.797	238.11	6.574
F 198	198	197	0.5	238.462	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4159063	238.153	237.489	17.9
F 197	197	142	4.7			8 m wide r	0.14	0.14	0.6	0.3	0	4159011	238.182	237.413	181.058
F 178	178	177	0.2	238.367	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158983	238.367	238.058	7.698
F 177	177	159	6.4			8 m wide r	0.14	0.14	0.6	0.3	0	4159008	237.845	237.913	245.049
OF51117	219	901	0.5	237.835	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4159087	237.83	237.454	20.528
F 901	901	377	0.6			8 m wide r	0.14	0.14	0.6	0.3	0	4159044	237.454	237.345	20.528
F 40	40	41	0.3	237.879	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158984	237.879	237.408	11.163
F 41	41	OUTLET 41	3.7			8 m wide r	0.14	0.14	0.6	0.3	0	4159034	237.977	238.823	141.593
F 75	75	74	0.5	238.14	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158985	238.14	237.59	20.974
F 74	74	Node 74a	0.6			8 m wide r	0.14	0.14	0.6	0.3	0	4159042	237.855	237.8	22.17
F 307	307	304	0.2	237.934	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158986	237.934	237.572	7.268
F 341	341	343	2.7	239.38	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158987	238.927	237.906	103.477
F 343	343	345	9.4			8 m wide r	0.14	0.14	0.6	0.3	0	4159023	238.363	236.048	358.791
F 4	4	393	0.6	238.975	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158989	238.975	237.75	24.502
F 393	393	392	0.2			8 m wide r	0.14	0.14	0.6	0.3	0	4158986	238.452	237.884	9.433
F 392	392	O 393	0.3			8 m wide r	0.14	0.14	0.6	0.3	0	4159030	237.884	237	10
F 3	3	394	0.3	239.375	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158990	239.375	238.407	13.697
F 394	394	393	0.4			8 m wide r	0.14	0.14	0.6	0.3	0	4159031	238.965	238.452	15.238
F 110	110	111	0.3	238.11	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158991	238.11	237.53	12.586
F 111	111	121	8			8 m wide r	0.14	0.14	0.6	0.3	0	4159048	237.976	237.625	304.655
F 386	386	385	0.8	238.481	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158992	238.481	237.295	31.275
OF51147	387	385	0.5			8 m wide r	0.14	0.14	0.6	0.3	0	4165474	237.454	237.345	19.3
F 385	385	OUTLET 38	3.5			8 m wide r	0.14	0.14	0.6	0.3	0	4159029	238.201	238.703	135.19
F 376	376	377	0.5	237.716	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158993	237.716	237.184	17.341
F 377	377	197	1.9			8 m wide r	0.14	0.14	0.6	0.3	0	4159028	237.638	237.068	70.804
F 215	215	379	3.2	238.23	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158994	238.07	237.014	121.942
F 379	379	377	1.3			8 m wide r	0.14	0.14	0.6	0.3	0	4159027	238.29	237.638	49.564
F 160	160	159	0.6	238.251	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158995	238.251	237.626	21.081
F 159	159	158	1.6			8 m wide r	0.14	0.14	0.6	0.3	0	4159009	237.913	238.304	62.087
F 98a	98a	99	0.6	238.306	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158996	238.306	237.7	22.706
F 99	99	111	2			8 m wide r	0.14	0.14	0.6	0.3	0	4159047	238.321	237.976	77.392
F 446	446	446a	0.2	239.034	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158997	239.034	237.85	9.999
F 446a	446a	Node 314a	2.5			8 m wide r	0.14	0.14	0.6	0.3	0	4159036	238.995	238.638	93.774
F 303	303	308a	0.5	237.904	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158998	237.904	237.462	19.785
F 48	48	49	0.5	238.544	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4158999	238.544	237.555	17.33
F 49	49	OUTLET 49	0.7			8 m wide r	0.14	0.14	0.6	0.3	0	4159038	238.084	237.839	27.606
F 313	313	314	0.2	238.424	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4159000	238.424	237.961	7.362
F 314	314	Node 314a	1.5			8 m wide r	0.14	0.14	0.6	0.3	0	4159020	238.285	238.638	58.809
F 414	414	415	1.2	238.893	10	1.8 m wide r	0.14	0.14	0.6	0.3	0	4159001	238.893	238.099	44.137
F 415	415	446a	0.8			8 m wide r	0.14	0.14	0.6	0.3	0	4159035	238.39	238.995	31.682
F 274	274	Node 22\3	11.9			8 m wide r	0.14	0.14	0.6	0.3	0	4159015	238.358	238.5	453.669
OF51150	326	279	0.5			8 m wide r	0.14	0.14	0.6	0.3	0	4165477	237.454	237.345	19.3
F 327	327	98a	9.1			8 m wide r	0.14	0.14	0.6	0.3	0	4159022	238.742	238.306	348.726
F 2\4	2\4	71	4			8 m wide r	0.14	0.14	0.6	0.3	0	4159012	238.461	238.263	151.259
F 71	71	Node15a	3.9			8 m wide r	0.14	0.14	0.6	0.3	0	4159013	238.263	238.043	149.726
F Node15a Node15a	Outlet 67		1.8			8 m wide r	0.14	0.14	0.6	0.3	0	4159014	238.043	238.19	69.114
F Node 22\ Node 22\3	Proposed_d		4			8 m wide r	0.14	0.14	0.6	0.3	0	4159019	238.5	238.81	151.593
F Node 31\ Node 31a		386	6.2			8 m wide r	0.14	0.14	0.6	0.3	0	4159021	238.638	238.481	237.377
F 61\2	61\2	249	3.6			8 m wide r	0.14	0.14	0.6	0.3	0	4159039	238.125	238.27	136.148
F Node 74\ Node 74a	OUTLET 74		5.6			8 m wide r	0.14	0.14	0.6	0.3	0	4159043	237.8	225.623	215.741
F Node 93\ Node 93a		93	8			8 m wide r	0.14	0.14	0.6	0.3	0	4159045	241.036	241.525	307.196
F 9	9	347	1.8			8 m wide r	0.14	0.14	0.6	0.3	0	4159051	238.781	239.177	67.437
F 8	8	346	1.3			8 m wide r	0.14	0.14	0.6	0.3	0	4159052	239.177	239.242	49.521
F 6	6	5	0.9			8 m wide r	0.14	0.14	0.6	0.3	0	4159003	239.242	237.421	32.743
F 5	5	OUTLET 05	4.5			8 m wide r	0.14								

F 338	338	346	2.7			8 m wide r	0.14	0.14	0.6	0.3	0	4158965	239.447	236.048	104.471
F 345	345	348	6.2			8 m wide r	0.14	0.14	0.6	0.3	0	4159024	236.048	236.807	236.476
OF206891	Proposed_N230386		4	238	10	1 8 m wide r	0.14	0.14	0.6	0.3	0	31048062			151.593
OF185927	N230386	257	4.3			8 m wide r	0.14	0.14	0.6	0.3	0	32367897	238.002	238.53	164.967
OF218457	N270468	Node 2213	12.8			8 m wide r	0.14	0.14	0.6	0.3	0	36142545	238.699	238.53	491.001
OF135437	N168004	99	29.2			10m wide	0.25	0.25	0.4	0.3	0	23345881			1227.5
OF146104	140	141	1.8	237.601	10	1.7 8 m wide r	0.14	0.14	0.6	0.3	0	24366391			67.17
OF146119	141	OUTLET 12	1.8			8 m wide r	0.14	0.14	0.6	0.3	0	24366406			67.17
OF146085	131	130	1.8	238.07	10	1.7 8 m wide r	0.14	0.14	0.6	0.3	0	24366368			67.17
OF146067	130	140	3.6			8 m wide r	0.14	0.14	0.6	0.3	0	24366349			137.855
OF149269	HW47	N184609	0.6	240.3	50	1.7 Overflow a	0.05	0	0.6	0.3	0	24666847			14.814
OF205948	N184609	N101397	29.2			10m wide	0.25	0.25	0.4	0.3	0	37957058			1227.5

PIPE COVER DETAILS

Name	Type	Dia (mm)	Safe Cover	Cover (m)	
P 66	RRJ C2	300	0.1	-0.41	Unsafe
P 221	RRJ C2	375	0.1	-0.41	Unsafe
P 373	RRJ C2	300	0.1	-0.33	Unsafe
P 249	RCBC	0	0.15	-0.23	Unsafe
P 248	RCBC	0	0.15	-0.28	Unsafe
P 244	RCBC	0	0.15	-0.09	Unsafe
P 243	RCBC	0	0.15	-0.13	Unsafe
P 242	RCBC	0	0.15	0.06	Unsafe
P 253	RCBC	0	0.15	-0.1	Unsafe
P 158	RCBC	0	0.15	0.08	Unsafe
P 453	RCBC	0	0.15	-0.06	Unsafe
P 445a	RCBC	0	0.15	0.64	
P 443	RRJ C2	300	0.1	-0.06	Unsafe
P 120	RCBC	0	0.15	-0.13	Unsafe
P 126	RRJ C2	375	0.1	0.06	Unsafe
P 147	RCBC	0	0.15	-0.06	Unsafe
P 93	RRJ C2	300	0.1	-0.12	Unsafe
P 64	RCBC	0	0.15	-0.17	Unsafe
P 188	RCBC	0	0.15	-0.33	Unsafe
P 108	RCBC	0	0.15	-0.06	Unsafe
P 198	RCBC	0	0.15	-0.12	Unsafe
P 178	RRJ C2	450	0.1	-0.71	Unsafe
P 219	RCBC	0	0.15	-0.34	Unsafe
P 40	RCBC	0	0.15	0.05	Unsafe
P 75	RCBC	0	0.15	-0.09	Unsafe
P 307	RCBC	0	0.15	-0.22	Unsafe
P 341	RRJ C2	525	0.1	-0.05	Unsafe
P 342	RRJ C2	525	0.1	-0.11	Unsafe
P 4	RRJ C2	450	0.1	0.21	
P 393	RRJ C2	450	0.1	-0.26	Unsafe
P 3	RRJ C2	600	0.1	-0.48	Unsafe
P 110	RCBC	0	0.15	-0.05	Unsafe
P 386	RRJ C2	600	0.1	0.39	
P 387	RRJ C2	600	0.1	0.26	
P 376	RRJ C2	375	0.1	-0.04	Unsafe
P 215	RCBC	0	0.15	-0.12	Unsafe
P 217a	RCBC	0	0.15	0.2	
P 214a	RCBC	0	0.15	0.15	
P 160	RCBC	0	0.15	-0.3	Unsafe
P 98a	RCBC	0	0.15	0.06	Unsafe
P 446	RRJ C2	750	0.1	0.33	
P 303	RCBC	0	0.15	-0.13	Unsafe
P 48	RRJ C2	600	0.1	-0.37	Unsafe
P 313	RCBC	0	0.15	-0.29	Unsafe
P 414	RCBC	0	0.15	-0.3	Unsafe
P 276	RCBC	0	0.15	0.28	
P 275	RRJ C2	600	0.1	-0.32	Unsafe
P 325	RCBC	0	0.15	0.18	
P 326	RCBC	0	0.15	0.03	Unsafe
P 9	RRJ C2	600	0.1	0.03	Unsafe
P 8	RRJ C2	600	0.1	0.4	
P 6	RRJ C2	900	0.1	-1.23	Unsafe
P Pit12	RCBC	0	0.15	0.19	
P Pit13	RCBC	0	0.15	0.34	
P Pit32	RCBC	0	0.15	-0.7	Unsafe
P Basin-pit	RCBC	0	0.15	-0.7	Unsafe
P Pit29	RCBC	0	0.15	1.5	
P Pit34	RRJ C2	825	0.1	1.91	
P Pit GPT	RRJ C2	600	0.1	-0.49	Unsafe
P 400	RCBC	0	0.15	-0.85	Unsafe
P Pit6	RCBC	0	0.15	0.29	
P Pit8	RCBC	0	0.15	0.28	
P 371	RCBC	0	0.15	-0.98	Unsafe
P 273	RRJ C2	450	0.1	0.07	Unsafe
P 347	RRJ C2	525	0.1	-0.35	Unsafe
P 346	RRJ C2	525	0.1	-0.38	Unsafe
P 291	RCBC	0	0.15	-0.3	Unsafe
P 278	RCBC	0	0.15	-0.36	Unsafe
P 192	RCBC	0	0.15	-0.24	Unsafe
P 200	RCBC	0	0.15	-0.38	Unsafe
P 203	RCBC	0	0.15	-0.15	Unsafe
P 207	RCBC	0	0.15	-0.05	Unsafe
P 208	RCBC	0	0.15	0.14	Unsafe
P 218a	RCBC	0	0.15	0.13	Unsafe
P 209a	RCBC	0	0.15	0.1	Unsafe
P 213	RCBC	0	0.15	0.14	Unsafe
P 216a	RCBC	0	0.15	0.12	Unsafe
Pipe11344	RCBC	0	0.15	-0.1	Unsafe
P 336	RRJ C2	525	0.1	-0.57	Unsafe
P 337	RRJ C2	525	0.1	2.14	
P 338	RRJ C2	525	0.1	-0.4	Unsafe
Pipe14830	RCBC	0	0.15	-0.4	Unsafe
P 140	RCBC	0	0.15	0.03	Unsafe
P 131	RRJ C2	375	0.1	0.16	
Pipe10930	RCBC	0	0.15	0.2	

This model has no pipes with non-return valves

Appendix B - DRAINS Model Figures & Results

B1. DRAINS model results for the existing conditions under 5yr ARI design event

PIT / NODE DETAILS Name	Max HGL	Max Pond HGL	Version 8		Min Freeboard (m)	Overflow (cu.m/s)	Constraint	
			Max Surf Flow (cu.m/s)	Max Pond Volume (cu.m)				
	66	238.17		0.098		0	0.001	Headwall height/system capacity
	67	237.63		0.001				
22\1		239.36		0.146		0.07	0	None
22\2		238.7		0				
	373	237.63		0.144		0.18	0	None
	374	237.38		0				
	249	239.01		7.221		-0.74	6.31	Headwall height/system capacity
	248	238.22		6.31		0	7.231	Outlet System
	244	238.26		0.484				
	243	238.13	238.13	7.231	8.6	0	7.55	Outlet System
	242	238.12		7.55		0.01	7.286	Inlet Capacity
	239	237.84		7.286				
	253	238.8		7.742		-0.79	7.046	Headwall height/system capacity
	257	237.81		7.046				
	158	238.05		1.174		0.25	0	None
	157	237.81		0				
	433	238.6		0.078		0.3	0	None
445a		238.29		0		0.8	0	None
	445	238.21		0.037				
	443	238.91		0.124		-0.02	0.037	Headwall height/system capacity
	120	237.67		0.278		0.27	0	None
	121	237.53		3.641				
	126	237.67		0.169		0.16	0	None
	129	237.58		3.914				
	147	237.94		0.175		0.21	0	None
	142	237.67		1.73				
	93	241.21		0.131		0.32	0	None
	94	240.59		0				
	64	237.8		0.348		0.27	0	None
	65	237.61		0				
	188	238.43		0.569		-0.03	0.056	Headwall height/system capacity
	183	238.15		0.056				
	108	237.72		0.086		0.17	0	None
	109	237.61		1.435				
	198	238.18		0.049		0.28	0	None
	197	238.09		1.71				
	178	238.35		1.077		0.02	0	None
	177	237.85		0				
	219	237.86		0.229		-0.03	0.048	Headwall height/system capacity
	901	237.32		0.048				
	40	237.85		0.469		0.03	0	None
	41	237.66		0				
	75	238.02		0.138		0.12	0	None
	74	237.75		0				
	307	237.78		0.144		0.16	0	None
	304	237.7		0				
	341	238.78		0.122		0.32	0	None
	342	238.59		0		0.9	None	None
	343	238.13		0				
	336	238.07		0.676		-0.15	0.6	Headwall height/system capacity
	337	238.03		0.651		1.35	0.303	Inlet Capacity
	338	237.61		0		1.84	0	None
	345	236.31		0.122				
	4	238.71		0.278		0.26	0	None
	393	238.33	238.45	0	0	0.13	0	None
	392	238		0				
	3	238.62		0		0.75	0	None
	394	238.41		0				
	110	238.23		1.483		-0.12	0.423	Headwall height/system capacity
	111	237.9		2.584				
	386	238.41		1.023		0.07	0	None
	387	238.17		0		0.29	0	None
	385	237.76		0				
	376	237.85		0.37		0.22	0	None
	377	237.5		1.35				
	215	238.28		0.214		-0.05	0.123	Headwall height/system capacity
217a		237.57		0		0.56	None	None
214a		237.5		0		0.6	None	None
	379	237.27		0.475				
	160	237.94		0.1		0.31	0	None
	159	237.7		1.077				
98a		238.41		0.734		-0.11	0.341	Headwall height/system capacity
	99	237.95		1.802				
	446	238.17		0.2		0.87	0	None
446a		238.04		0.241				
	303	237.85		0.153		0.05	0	None
308a		237.65		0				
	48	238.24		0.187		0.31	0	None
	49	237.76		0				
	313	238.23		0.185		0.19	0	None
	314	238.12		0				
	414	238.73		0.241		0.16	0	None
	415	238.25		0				
	276	239.15		0.384				
	275	239.1		0		0.48	None	None
	274	238.42		0				
	325	238.58		0.387				
	326	238.52		0		0.36	0	None
	327	238.43		0				

9	238.78		2.446		0	2.246	Outlet System
8	238.54		0.01		0.64	0	None
6	238.14		0		1.1	0	None
5	237.42		0				
Pit12	237.93		0.404		0.81	0.195	Inlet Capacity
Pit13	237.92	237.92	2.912	8.6	0	2.92	Outlet System
Pit32	238.09		0		0.43	0	None
Pit29	237.63		0		0.84	0	None
Pit34	236.63		0.292		1.89	0.166	Inlet Capacity
Pit GPT	236.04		0		2.94	0	None
discharge p	234.7		0				
401	238.04		2.57				
Pit6	237.91		0.383		0.37	0.231	Inlet Capacity
Pit8	237.9		2.768		0	2.911	Outlet System
273	239.52		0.384		-0.03	0.063	Headwall height/system capacity
347	239.12		2.563		-0.12	2.184	Headwall height/system capacity
346	238.86	238.96	2.211	42.9	0	1.998	Outlet System
348	236.78		2.424				
291	238.71		0.218		0.06	0	None
290	238.51		0				
278	238.81		0.335		0.8	0	None
279	238.57		0				
192	238.39		0.508		-0.03	0.049	Headwall height/system capacity
183a	238.07		0.618				
200	238.55		0.199		0.08	0	None
199	238.38		0				
203	238.13		0.505		0.14	0	None
202	237.87		0				
207	237.81		0.794		0.19	0	None
208	237.79		0		0.2	None	None
218a	237.77		0		0.25	None	None
209a	237.74		0		0.24	None	None
213	237.71		0		0.67	None	None
216a	237.62		0		0.42	None	None
140	237.79		1.9		-0.19	1.444	Headwall height/system capacity
141	237.25		1.444				
131	238.23		1.9		-0.16	1.11	Headwall height/system capacity
130	237.45		1.11				
HW47	238.61		2.493		1.69	0	None
N184609	238.48		3.672				

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 66	0.098	0.092	0.006	118.64	233.06		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 22\1	0.089	0.076	0.014	59.11	116.21		0 AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
C 373	0.144	0.134	0.01	79.86	156.93		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 249	0.494	0.464	0.032	134.93	265.01		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 244	0.484	0.454	0.032	145.76	286.29		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 433	0.078	0.073	0.005	154.05	302.55		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 443	0.124	0.115	0.009	62.86	123.57		0 AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
C 120	0.278	0.261	0.018	158.08	310.45		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 126	0.169	0.159	0.011	153.03	300.55		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 147	0.175	0.163	0.012	79.86	156.93		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 93	0.069	0.065	0.005	93.13	182.97		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 64	0.348	0.327	0.023	137.14	269.36		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 188	0.351	0.329	0.023	163.99	322.06		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 108	0.086	0.08	0.006	79.86	156.93		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 109	0.263	0.247	0.017	188.1	369.38		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 198	0.049	0.045	0.004	49.27	96.89		0 AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
C 219	0.229	0.214	0.016	90.58	177.98		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 40	0.469	0.438	0.032	99.28	195.05		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 75	0.138	0.128	0.009	79.86	156.93		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 307	0.144	0.134	0.011	62.86	123.57		0 AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
C 341	0.122	0.113	0.009	49.27	96.89		0 AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
C 336	0.676	0.58	0.098	229.79	451.21		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 337	0.051	0.048	0.003	113.7	223.36		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 4	0.278	0.259	0.019	95.62	187.87		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 387	0.41	0.381	0.03	66.93	131.56		0 AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
C 215	0.214	0.199	0.015	79.86	156.93		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 379	0.357	0.335	0.023	139.33	273.66		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 160	0.1	0.094	0.007	113.7	223.36		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 98a	0.219	0.205	0.014	111.17	218.4		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 303	0.153	0.143	0.01	87.99	172.89		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 49	0.187	0.175	0.012	134.93	265.01		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 313	0.185	0.173	0.013	90.58	177.98		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 414	0.241	0.225	0.016	96.85	190.28		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 276	0.384	0.36	0.025	160.06	314.36		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 325	0.387	0.363	0.025	134.93	265.01		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 2\4	0.281	0.262	0.019	93.13	182.97		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C Node 93i	0.061	0.057	0.004	116.19	228.24		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 9	0.182	0.17	0.012	184.53	362.38		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 8	0.01	0.009	0.001	36.05	70.94		0 AR&R 5 year, 45 minutes storm, average 41.4 mm/h, Zone 2
C Pit12	0.404	0.379	0.026	128.12	251.67		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C Basin-pit	0.507	0.476	0.033	116.19	228.24		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C Pit34	0.292	0.273	0.02	95.62	187.87		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 400	0.692	0.649	0.045	148.91	292.46		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C Pit6	0.383	0.359	0.025	137.14	269.36		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 371	0.478	0.448	0.031	111.17	218.4		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 395	0.089	0.084	0.006	154.05	302.55		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
ind1	2.269	2.17	0.101	64.25	502.05		0 AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
Ext1	2.493	1.767	0.742	64.25	502.05		0 AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
Ext2	3.672	2.603	1.093	64.25	502.05		0 AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
C 273	0.384	0.33	0.056	92.8	182.33		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2

C 347	0.199	0.186	0.013	90.58	177.98	0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 346	0.099	0.093	0.007	90.58	177.98	0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 291	0.218	0.205	0.014	163.99	322.06	0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 278	0.335	0.315	0.022	163.99	322.06	0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 192	0.173	0.162	0.011	163.99	322.06	0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 200	0.199	0.187	0.013	173.54	340.8	0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 203	0.306	0.287	0.02	173.54	340.8	0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 207	0.289	0.272	0.019	173.54	340.8	0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
Ext3	1.471	1.042	0.438	87.7	685.29	0 AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2

Outflow Volumes for Total Catchment (338 impervious + 745 pervious = 1084 total ha)

Storm	Total Rainf cu.m	Total Runo cu.m	Impervious cu.m	Pervious cu.m	Runoff (Runoff %)
AR&R 5 ye:	105734.1	29517.55	(29342.73	(174.81	(0.2%)
AR&R 5 ye:	159901.3	46861.02	(45774.41	(1086.61	(1.0%)
AR&R 5 ye:	201111.4	60408.15	(57954.09	(2454.06	(1.8%)
AR&R 5 ye:	233951.3	71103.36	(67095.88	(4007.49	(2.5%)
AR&R 5 ye:	283928.9	86821.02	(79487.78	(7333.24	(3.8%)
AR&R 5 ye:	336317.4	108345.38	96125.27	(12220.10	(5.3%)
AR&R 5 ye:	373924.7	125257.09	108938.78	16318.30	(6.3%)
AR&R 5 ye:	426611.2	150180.52	127030.63	23149.89	(7.9%)
AR&R 5 ye:	463740	166062.83	139564.44	26498.39	(8.3%)
AR&R 5 ye:	516516.7	186165.34	157120.19	29045.15	(8.2%)
AR&R 5 ye:	572020.3	204076.42	174853.83	29222.59	(7.4%)
AR&R 5 ye:	614684.1	216186.44	188311.44	27875.00	(6.6%)

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
P 66	0.096	1.58	237.954	237.95	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 221	0.146	2.04	239.141	238.931	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 373	0.144	1.17	237.523	237.379	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 249	0.899	2.5	238.256	238.22	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 248	0.264	0.59	238.22	238.264	AR&R 5 year, 3 hours storm, average 15.9 mm/h, Zone 2
P 244	0.434	1.21	238.264	238.131	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 243	0.365	1.01	238.125	238.119	AR&R 5 year, 30 minutes storm, average 52.4 mm/h, Zone 2
P 242	0.456	1.55	238.007	237.835	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 253	0.696	1.93	237.86	237.81	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 158	1.174	1.81	237.859	237.808	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 433	0.078	0.59	238.595	238.291	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 445a	0.163	1.26	238.24	238.214	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 443	0.087	1.5	238.669	238.325	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 120	0.278	1.31	237.567	237.527	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 126	0.169	1.31	237.541	237.579	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 147	0.175	1.32	237.83	237.666	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 93	0.13	1.94	240.59	240.592	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 64	0.348	1.41	237.678	237.612	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 188	0.513	1.61	238.212	238.146	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 108	0.086	1.04	237.65	237.609	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 198	0.049	0.93	238.129	238.09	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 178	1.077	1.62	238.063	238.354	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 219	0.181	1.94	237.62	237.324	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 40	0.469	1.56	237.68	237.658	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 75	0.138	1.44	237.899	237.749	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 307	0.144	1.14	237.697	237.705	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 341	0.122	1.22	238.651	238.586	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 342	0.122	1.36	238.566	238.133	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 336	0.311	1.44	238.062	238.031	AR&R 5 year, 15 minutes storm, average 74.2 mm/h, Zone 2
P 337	0.42	1.94	237.744	237.611	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 338	0.42	2.19	237.323	236.311	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 4	0.277	1.74	238.496	238.326	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 393	0.277	2.07	238.2	238.005	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 3	0	0	238.625	238.407	AR&R 5 year, 5 minutes storm, average 117 mm/h, Zone 2
P 110	1.06	1.91	237.931	237.901	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 386	1.021	1.8	238.246	238.171	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 387	1.021	2.16	238.027	237.762	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 376	0.37	1.87	237.505	237.498	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 215	0.091	1.3	237.894	237.944	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 217a	0.881	1.09	237.506	237.497	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 214a	0.881	1.59	237.407	237.272	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 160	0.1	1.14	237.874	237.699	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 98a	0.393	1.57	238.15	237.95	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 446	0.2	1.13	238.051	238.041	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 303	0.153	1.36	237.722	237.65	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 48	0.187	2.14	238.002	237.763	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 313	0.185	1.26	238.137	238.124	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 414	0.241	1.61	238.593	238.249	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 276	0.384	0.64	239.153	239.103	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 275	0.704	1.82	238.941	238.419	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 325	0.387	1.57	238.585	238.518	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 326	0.387	1.47	238.44	238.433	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 9	0.306	1.5	238.701	238.537	AR&R 5 year, 5 minutes storm, average 117 mm/h, Zone 2
P 8	0.31	2.01	238.451	238.142	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 6	0.297	1.52	238.053	237.991	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P Pit12	0.209	0.39	237.934	237.918	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P Pit13	0.689	1.28	237.918	238.093	AR&R 5 year, 6 hours storm, average 9.5 mm/h, Zone 2
P Pit32	0.689	1.28	238.093	238.206	AR&R 5 year, 6 hours storm, average 9.5 mm/h, Zone 2
P Basin-pit	1.07	1.98	237.763	237.633	AR&R 5 year, 6 hours storm, average 9.5 mm/h, Zone 2
P Pit29	1.07	1.98	237.333	236.628	AR&R 5 year, 6 hours storm, average 9.5 mm/h, Zone 2
P Pit34	1.071	2.47	236.446	236.103	AR&R 5 year, 6 hours storm, average 9.5 mm/h, Zone 2
P Pit GPT	1.107	2.47	235.924	234.704	AR&R 5 year, 6 hours storm, average 9.5 mm/h, Zone 2
P 400	0.529	2.21	238.15	238.04	AR&R 5 year, 3 hours storm, average 15.9 mm/h, Zone 2
P Pit6	0.151	0.28	237.914	237.9	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P Pit8	0.494	0.91	237.9	237.918	AR&R 5 year, 4.5 hours storm, average 11.7 mm/h, Zone 2

P 371	0.844	1.06	238.711	238.631	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 273	0.321	2.02	239.153	239.103	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 347	0.615	2.84	239.047	238.858	AR&R 5 year, 5 minutes storm, average 117 mm/h, Zone 2
P 346	0.58	2.77	238.307	236.783	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 291	0.218	1.53	238.551	238.508	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 278	0.335	1.49	238.677	238.567	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 192	0.459	1.55	238.148	238.066	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 200	0.199	1.48	238.384	238.384	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 203	0.505	1.57	237.981	237.866	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 207	0.795	0.57	237.804	237.794	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 208	0.794	0.57	237.769	237.768	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 218a	0.794	0.6	237.738	237.737	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 209a	0.794	0.6	237.708	237.711	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 213	0.794	0.87	237.664	237.619	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 216a	0.794	0.84	237.574	237.572	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 140	0.456	1.55	237.325	237.245	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 131	0.79	1.96	237.482	237.452	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
Pipe10930 ^l	2.491	1.14	238.533	238.483	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2

CHANNEL DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Due to Storm
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OVERFLOW ROUTE DETAILS

Name	Max Q	U/S	Max Q/D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm
F 66	0.001	0.001	0.142	0.029	0.01	0.33	0.26	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2	
F 67	0.098	0.098	0.142	0.124	0.07	3.26	0.59	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2	
F 221	0	0	0.142	0	0	0	0		
F 222	0.146	0.146	0.142	0.141	0.09	3.85	0.64	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2	
F 373	0	0	0.142	0	0	0	0		
F 374	0.144	0.144	0.142	0.141	0.09	3.83	0.64	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2	
F 249	6.31	6.31	0.142	0.516	1.05	8.85	2.04	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2	
OF51143	7.231	7.231	0.142	0.547	1.17	8.85	2.14	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2	
OF51134	7.55	7.55	0	0.296	0.39	29.77	1.31	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2	
OF51139	7.286	7.286	0.142	0.549	1.18	8.85	2.15	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2	
F 239	7.742	7.742	0.142	0.563	1.24	8.85	2.2	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2	
F 253	7.046	7.046	0.142	0.541	1.15	8.85	2.12	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2	
F 257	7.742	7.742	0.142	0.563	1.24	8.85	2.2	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2	
F 158	0	0	0.142	0	0	0	0		
F 157	1.174	1.174	0.142	0.279	0.32	7.58	1.14	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2	
F 433	0	0	0.142	0	0	0	0		
F 445a	0	0	0.142	0	0	0	0		
F 445	0.2	0.2	0.142	0.16	0.1	4.59	0.65	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2	
F 443	0.037	0.037	0.142	0.09	0.04	2.14	0.5	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2	
F 120	0	0	0.142	0	0	0	0		
F 121	3.914	3.914	0.142	0.426	0.73	8.85	1.7	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2	
F 126	0	0	0.142	0	0	0	0		
F 129	4.08	4.08	0.142	0.433	0.75	8.85	1.73	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2	
F 147	0	0	0.142	0	0	0	0		
F 142	1.9	1.9	0.142	0.331	0.43	8.85	1.3	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2	
F 93	0	0	0.142	0	0	0	0		
F 94	0.13	0.13	0.142	0.136	0.09	3.68	0.62	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2	
F 64	0	0	0.142	0	0	0	0		
F 65	0.348	0.348	0.142	0.189	0.15	5.32	0.77	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2	
F 188	0.056	0.056	0.142	0.103	0.05	2.57	0.53	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2	
OF118839	0.569	0.569	0.142	0.22	0.2	6.1	0.91	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2	
F 108	0	0	0.142	0	0	0	0		
F 109	1.483	1.483	0.142	0.303	0.37	8.17	1.22	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2	
F 198	0	0	0.142	0	0	0	0		
F 197	1.73	1.73	0.142	0.32	0.41	8.59	1.27	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2	
F 178	0	0	0.142	0	0	0	0		
F 177	1.077	1.077	0.142	0.271	0.3	7.39	1.1	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2	
OF51117	0.048	0.048	0.142	0.099	0.05	2.42	0.52	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2	
F 901	0.229	0.229	0.142	0.166	0.11	4.76	0.68	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2	
F 40	0	0	0.142	0	0	0	0		
F 41	0.469	0.469	0.142	0.207	0.18	5.77	0.85	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2	
F 75	0	0	0.142	0	0	0	0		
F 74	0.138	0.138	0.142	0.138	0.09	3.75	0.64	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2	
F 307	0	0	0.142	0	0	0	0		
F 341	0	0	0.142	0	0	0	0		
F 343	0.122	0.122	0.142	0.133	0.08	3.58	0.62	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2	
F 336	0.6	0.6	0.142	0.224	0.21	6.19	0.92	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2	
F 337	0.303	0.303	0.142	0.181	0.13	5.13	0.74	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2	
F 338	0	0	0.142	0	0	0	0		
F 345	0.54	0.54	0.142	0.216	0.19	6.01	0.89	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2	
F 4	0	0	0.142	0	0	0	0		
F 393	0	0	0.142	0	0	0	0		
F 392	0.277	0.277	0.142	0.176	0.13	5	0.72	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2	
F 3	0	0	0.142	0	0	0	0		
F 394	0	0	0.142	0	0	0	0		
F 110	0.423	0.423	0.142	0.2	0.17	5.6	0.83	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2	
F 111	3.641	3.641	0.142	0.415	0.69	8.85	1.66	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2	
F 386	0	0	0.142	0	0	0	0		
OF51147	0	0	0.142	0	0	0	0		
F 385	1.021	1.021	0.142	0.266	0.29	7.26	1.09	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2	
F 376	0	0	0	0	0	0	0		
F 377	1.71	1.71	0.142	0.319	0.4	8.57	1.27	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2	
F 215	0.123	0.123	0.142	0.134	0.08	3.6	0.62	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2	
F 379	1.35	1.35	0.142	0.293	0.35	7.93	1.18	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2	
F 160	0	0	0.142	0	0	0	0		
F 159	1.174	1.174	0.142	0.279	0.32	7.58	1.14	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2	
F 98a	0.341	0.341	0.142	0.187	0.14	5.28	0.77	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2	
F 99	2.175	2.175	0.142	0.346	0.47	8.85	1.37	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2	
F 446	0	0	0.142	0	0	0	0		
F 446a	0.435	0.435	0.142	0.202	0.17	5.65	0.83	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2	

F 303	0	0	0.142	0	0	0	0	
F 48	0	0	0.142	0	0	0	0	
F 49	0.187	0.187	0.142	0.156	0.1	4.5	0.65	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
F 313	0	0	0.142	0	0	0	0	
F 314	0.185	0.185	0.142	0.156	0.1	4.5	0.64	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F 414	0	0	0.142	0	0	0	0	
F 415	0.241	0.241	0.142	0.169	0.12	4.82	0.69	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F 274	0.704	0.704	0.142	0.236	0.23	6.49	0.97	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
OF51150	0	0	0.142	0	0	0	0	
F 327	0.387	0.387	0.142	0.195	0.16	5.46	0.8	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
F 2\4	0.281	0.281	0.142	0.177	0.13	5.01	0.73	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F 71	0.281	0.281	0.142	0.177	0.13	5.01	0.73	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F Node15a	0.724	0.724	0.142	0.238	0.23	6.54	0.98	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F Node 22\	6.76	6.76	0.142	0.531	1.11	8.85	2.09	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
F Node 31\4	0.614	0.614	0.142	0.225	0.21	6.24	0.93	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
F 61\2	6.76	6.76	0.142	0.531	1.11	8.85	2.09	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
F Node 74\z	0.397	0.397	0.142	0.196	0.16	5.51	0.81	AR&R 5 year, 6 hours storm, average 9.5 mm/h, Zone 2
F Node 93\z	0.061	0.061	0.142	0.106	0.06	2.68	0.54	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
F 9	2.246	2.246	0.142	0.35	0.48	8.85	1.38	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F 8	0	0	0.142	0	0	0	0	
F 6	0	0	0.142	0	0	0	0	
F 5	0.297	0.297	0.142	0.18	0.13	5.1	0.74	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F Pit12	0.195	0.195	0.142	0.158	0.1	4.55	0.65	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
F Pit13	2.92	2.92	0	0.191	0.19	23.48	0.98	AR&R 5 year, 6 hours storm, average 9.5 mm/h, Zone 2
F Pit32	0	0	0.142	0	0	0	0	
OF78192	0.397	0.397	0.142	0.196	0.16	5.51	0.81	AR&R 5 year, 6 hours storm, average 9.5 mm/h, Zone 2
F Pit29	0	0	0.142	0	0	0	0	
F Pit34	0.166	0.166	0.142	0.147	0.1	4.05	0.66	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F Pit GPT	0	0	0.142	0	0	0	0	
OF78154	2.767	2.767	0	0.187	0.18	23.19	0.97	AR&R 5 year, 4.5 hours storm, average 11.7 mm/h, Zone 2
OF51128	2.57	2.57	0	0.366	0.53	8.85	1.45	AR&R 5 year, 3 hours storm, average 15.9 mm/h, Zone 2
F 401	3.099	3.099	0.142	0.391	0.61	8.85	1.56	AR&R 5 year, 3 hours storm, average 15.9 mm/h, Zone 2
F Pit6	0.231	0.231	0.142	0.167	0.11	4.78	0.68	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
F Pit8	2.911	2.911	0.142	0.382	0.58	8.85	1.52	AR&R 5 year, 6 hours storm, average 9.5 mm/h, Zone 2
F 371	4.77	4.77	0	0.239	0.27	26.36	1.15	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
F 395	5.647	5.647	0.142	0.493	0.96	8.85	1.95	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
OF137218	2.269	2.354	0	0.173	0.16	22.39	0.92	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
OF82141	2.493	2.493	1.753	0.31	0.25	10	0.8	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
OF82144	3.672	3.672	1.753	0.394	0.37	10	0.93	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
F 273	0.063	0.063	0.142	0.108	0.06	2.72	0.54	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F 347	2.184	2.184	3.226	0.168	0.15	22.07	0.9	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F 346	1.998	1.998	0.142	0.336	0.45	8.85	1.33	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F 348	3.01	3.01	0.142	0.387	0.6	8.85	1.54	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F 291	0	0	0	0	0	0	0	
F 290	0.218	0.218	0.142	0.164	0.11	4.69	0.67	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
OF118859	0	0	0.142	0	0	0	0	
F 279	0.335	0.335	0.142	0.187	0.14	5.27	0.76	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
OF118882	0.049	0.049	0.142	0.099	0.05	2.44	0.52	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
F 183	1.077	1.077	0.142	0.271	0.3	7.39	1.1	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
OF121852	0	0	0	0	0	0	0	
OF121886	0.199	0.199	0.142	0.159	0.1	4.58	0.66	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
OF121872	0	0	0	0	0	0	0	
OF121903	0.505	0.505	0.142	0.211	0.19	5.88	0.88	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
OF121924	0	0	1.701	0	0	0	0	
61\1	6.76	6.76	0.142	0.531	1.11	8.85	2.09	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
OF135437	1.471	1.471	1.753	0.224	0.15	10	0.66	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
OF146104	1.444	1.444	0.142	0.3	0.36	8.1	1.21	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
OF146119	1.9	1.9	0.142	0.331	0.43	8.85	1.3	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
OF146085	1.11	1.11	0.142	0.274	0.31	7.46	1.11	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
OF146067	1.9	1.9	0.142	0.331	0.43	8.85	1.3	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
OF149269	0	0	0	0	0	0	0	
OF149261	6.108	6.108	1.753	0.541	0.61	10	1.13	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2

DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q	Max Q	Max Q
			Total	Low Level	High Level
SchoolOval	238.21	14692.3	1.467	1.07	0.397
PaytenPari	238.3	13980.7	2.767	0	2.767
DundasPar	238.8	33614.8	3.099	0.529	2.57
U/S Railwa	238.76	22158.3	5.615	0.844	4.77
D/S Railwa	238.63	2506.9	5.647	0	5.647

CONTINUITY CHECK for AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2

Node	Inflow (cu.m)	Outflow (cu.m)	Storage Ch (cu.m)	Difference %
66	707.11	706.98	0	0
67	706.98	706.98	0	0
22\1	540.98	540.52	0	0.1
22\2	540.52	540.52	0	0
373	788.1	787.66	0	0.1
374	787.66	787.66	0	0
249	44359.31	44157.92	0	0.5
248	44157.87	43948.84	0	0.5
244	5074.09	5034.29	0	0.8
243	48146.39	48093.34	8.57	0.1
242	48093.14	48498.36	0	-0.8
239	48498.02	48471.5	0	0.1
253	48471.5	48093.45	0	0.8
257	48093.45	47983.04	0	0.2
158	11082.61	11066.71	0	0.1
157	11066.71	11065.87	0	0
433	713.47	712.49	0	0.1
445a	1260.65	1259.06	0	0.1
445	1313.53	1313.51	0	0

443	603.3	602.63	0	0.1
120	2614.39	2613.39	0	0
121	32622.89	32438.79	0	0.6
126	1546.31	1545.44	0	0.1
129	33984.22	33929.96	0	0.2
147	956.04	955.09	0	0.1
142	15461.1	15416.29	0	0.3
93	867.52	867.19	0	0
94	867.19	867.19	0	0
64	2882.41	2881.54	0	0
65	2881.54	2881.51	0	0
188	5526.66	5521.5	0	0.1
183	5521.5	5521.2	0	0
108	468.95	468.7	0	0.1
109	14402.93	14377.98	0	0.2
198	192.76	192.63	0	0.1
197	14522.49	14506.05	0	0.1
178	10449.57	10432.78	0	0.2
177	10432.78	10432.17	0	0
219	1393.97	1393.42	0	0
901	1393.42	1393.42	0	0
40	3104.36	3103.62	0	0
41	3103.62	3103.62	0	0
75	754.58	754.25	0	0
74	754.25	754.25	0	0
307	700.43	700.23	0	0
304	700.23	700.23	0	0
341	481.97	481.17	0	0.2
342	481.17	480	0	0.2
343	480	480	0	0
336	8136.52	8102.57	0	0.4
337	8455.5	8278.71	0	2.1
338	5506.48	5489.74	0	0.3
345	5969.75	5967.3	0	0
4	1773.04	1772.19	0	0
393	1772.19	1771.7	0	0
392	1771.7	1771.7	0	0
3	0	0	0	0
394	0	0	0	0
110	14377.98	14371.82	0	0
111	30023.73	30009.47	0	0
386	6112.16	6108.3	0	0.1
387	6108.3	6106.7	0	0
385	6106.7	6106.65	0	0
376	2181.09	2180.47	0	0
377	14340.68	14329.88	0	0.1
215	1171.64	1170.04	0	0.1
217a	8754.39	8750.89	0	0
214a	8750.89	8731.23	0	0.2
379	12160.93	12160.24	0	0
160	695.73	695.41	0	0
159	11127.56	11082.61	0	0.4
98a	5514.98	5509.37	0	0.1
99	15707.95	15651.85	0	0.4
446	1313.51	1312.94	0	0
446a	2871.21	2871.18	0	0
303	906.19	905.85	0	0
308a	905.85	905.85	0	0
48	1521.3	1520.57	0	0
49	1520.57	1520.56	0	0
313	1124.57	1124.36	0	0
314	1124.36	1124.36	0	0
414	1559.37	1558.28	0	0.1
415	1558.28	1558.28	0	0
276	3649.17	3640.72	0	0.2
275	5973.82	5955.64	0	0.3
274	5955.64	5955.45	0	0
325	3153.57	3153.02	0	0
326	3153.02	3151.52	0	0
327	3151.52	3151.5	0	0
OUTLET 05	3357.88	3357.88	0	0
2\4	1751.54	1751.54	0	0
71	1751.54	1751.54	0	0
Node15a	5340.03	5339.77	0	0
Outlet 67	5339.77	5339.77	0	0
Node 22\3	41384.27	40549	0	2
Node 314a	3995.55	3994.77	0	0
OUTLET 34	20454.44	20454.44	0	0
OUTLET 38	6106.65	6106.65	0	0
OUTLET 41	3103.62	3103.62	0	0
OUTLET 49	1520.56	1520.56	0	0
61\2	40360.93	40331.53	0	0.1
Node 74a	1693	1692.99	0	0
OUTLET 74	1692.99	1692.99	0	0
Node 93a	434.72	434.72	0	0
OUTLET 12	49247.73	49247.73	0	0
9	13158.28	13415.44	0	-2
8	3372.83	3368.61	0	0.1
6	3368.61	3358.41	0	0.3
5	3358.41	3357.88	0	0
Pit12	3138.48	3137.36	0	0
Pit13	6298.97	6285.05	0	0.2
Pit32	5073.12	5064.4	0	0.2
SchoolOval	9876.21	9876.15	0.08	0
Pit29	9876.15	9865.53	0	0.1

Pit34	11733.9	11718.17	0	0.1
Pit GPT	10779.42	10782.49	0	0
discharge r	10782.49	10782.49	0	0
O Pit GPT	0	0	0	0
O 392	1771.7	1771.7	0	0
PaytenParl	5219.69	0	4487.86	14
DundasPar	38783.27	5341.64	31473.49	5.1
401	5341.63	5219.69	0	2.3
Pit6	3165.68	3164.67	0	0
Pit8	3164.68	3161.62	0	0.1
U/S Railwa	51245.67	34301.79	16581.35	0.7
D/S Railwa	35120.63	32614.08	2241.22	0.8
N172535	11210.77	11210.77	0	0
N101397	14187.34	14187.34	0	0
N101398	20893.67	20893.67	0	0
273	2451.86	2449.1	0	0.1
347	14055.72	14047.6	0	0.1
346	14651.23	14642.11	0	0.1
348	20609.38	20454.44	0	0.8
291	2119.88	2118.64	0	0.1
290	2118.64	2118.53	0	0
278	3259.1	3257.19	0	0.1
279	3257.19	3257.03	0	0
192	4936.3	4933.13	0	0.1
183a	10454.34	10449.57	0	0
200	2028.9	2027.51	0	0.1
199	2027.51	2027.36	0	0
203	5151.04	5145.99	0	0.1
202	5145.99	5145.63	0	0
207	8097.97	8089.85	0	0.1
208	8089.85	8085.36	0	0.1
218a	8085.36	8071.23	0	0.2
209a	8071.23	8055.13	0	0.2
213	8055.13	8035.64	0	0.2
216a	8035.64	8014.37	0	0.3
N160610	40549	40360.93	0	0.5
N168004	10198.6	10198.6	0	0
140	15372.65	15319.12	0	0.3
141	15319.12	15317.77	0	0
131	15416.29	15373.83	0	0.3
130	15373.82	15372.65	0	0
HW47	14187.34	14129.44	0	0.4
N184609	35023.14	34888.29	0	0.4

Run Log for 055 run at 09:24:19 on 1/6/2021 using version 2020.061

The maximum water level in these storages exceeds the maximum elevation you specified: U/S Railway.

DRAINS has extrapolated the Elevation vs Storage table to a higher Elevation. Please provide accurate values for higher elevations.

Upwelling occurred at: 242, 243, Pit8, Pit13, 248, 9

Freeboard was less than 0.15m at 393, 346

The maximum flow in these overflow routes is unsafe: OF149261, OF146119, OF146104, OF146085, OF146067, OF121903, OF121886, OF118839, F 279, F 290, OF82144, OF82141, OF137218, OF78192, OF7815-
These sag pits have unsafe water levels for minor storms: 346

These overflow routes carried water uphill (adding energy): OF51139, F 371, F 395, F 9, F Pit8. These results may be invalid. This is likely due to either incorrect surface levels specified at pits or high downstre

IGNORE THESE WARNINGS AT YOUR OWN PERIL\cf1

4, OF51143, OF51139, OF51134, OF51128, 61\1, F 346, F 337, F 371, F 249, F 253, F 336, F 110, F 98a, F 5, F 142, F 157, F 109, F 177, F 159, F 183, F 197, F 2\4, F 71, F Node15a, F 274, F 239, F 257, F 22\2, F Node

am tailwater levels which the Lite Hydraulic model cannot handle. Analysing the latter requires solving the full unsteady flow equations in overflow routes using the Full Unsteady Hydraulic model (Formerly Pre

: 22\3, F 314, F Node 314a, F 327, F 345, F 348, F 374, F 379, F 377, F 385, F 392, F 395, F 401, F 41, F 415, F 446a, F 445, F 49, F 61\2, F 65, F Node 74a, F 901, F 99, F 111, F 121, F 129, F 9, F Pit6, F Pit12, F Pit34, |

mium Hydraulic model).

F Pit13, F Pit8

B2. DRAINS model results for the proposed Option 1 under 5yr ARI design event

PIT / NODE DETAILS Name	Max HGL	Max Pond HGL	Version 8		Min Freeboard (m)	Overflow Flow (cu.m/s)	Constraint
			Max Surfai Flow (cu.m/s)	Max Pond Volume (cu.m)			
66	238.17		0.098			0	0.001 Headwall height/system capacity
67	237.63		0.001				
22\1	239.24		0.078			0.2	0 None
22\2	238.7		0				
373	237.63		0.144			0.18	0 None
374	237.38		0				
249	238.21		0.494			0.06	0 None
248	238.12		0			0.1	0 None
244	238.08		0.484				
243	238.04	238.03	0		0.1	0	0 Outlet System
242	237.92		0			0.21	0 None
239	237.78		0				
253	237.86		0.914			0.15	0 None
257	237.7		1.236				
158	238.05		1.174			0.25	0 None
157	237.81		0				
433	238.6		0.078			0.3	0 None
445a	238.32		0			0.77	0 None
445	238.23		0				
443	238.77		0.124			0.12	0 None
120	237.67		0.278			0.27	0 None
121	237.53		3.639				
126	237.67		0.169			0.16	0 None
129	237.58		3.913				
147	237.94		0.175			0.21	0 None
142	237.67		1.731				
93	241.21		0.131			0.32	0 None
94	240.59		0				
64	237.8		0.348			0.27	0 None
65	237.61		0				
188	238.36		0.569			0.04	0 None
183	238.13		0				
108	237.72		0.086			0.17	0 None
109	237.61		1.435				
198	238.18		0.049			0.28	0 None
197	238.09		1.711				
178	238.35		1.077			0.02	0 None
177	237.85		0				
219	237.72		0.229			0.12	0 None
901	237.28		0				
40	237.85		0.469			0.03	0 None
41	237.66		0				
75	238.02		0.138			0.12	0 None
74	237.75		0				
307	237.78		0.144			0.16	0 None
304	237.7		0				
341	238.78		0.122			0.32	0 None
342	238.59		0			0.9	None
343	238.13		0				
336	238.22		2.935			0.24	0 None
337	237.47		0.051			1.92	0.01 Inlet Capacity
338	237.23		0			2.22	0 None
345	236.4		0.122				
4	238.71		0.278			0.26	0 None
393	238.33	238.45	0		0	0.13	0 None
392	238		0				
3	238.62		0			0.75	0 None
394	238.41		0				
110	238.04		1.483			0.07	0 None
111	237.82		2.174				
386	238.21		1.023			0.27	0 None
387	237.91		0			0.56	0 None
385	237.67		0				
376	237.5		0.144			0.21	0 None
377	237.38		1.573				
215	238.13		0.214			0.1	0 None
217a	237.61		0			0.52	None
214a	237.53		0			0.57	None
379	237.29		0.357				
160	237.94		0.1			0.31	0 None
159	237.7		1.077				
98a	238.26		0.734			0.05	0 None
99	237.87		1.471				
446	238.17		0.2			0.87	0 None
446a	238.04		0.241				
303	237.85		0.153			0.05	0 None
308a	237.65		0				
48	238.24		0.187			0.31	0 None
49	237.76		0				
313	238.23		0.185			0.19	0 None
314	238.12		0				
414	238.73		0.241			0.16	0 None
415	238.25		0				
276	239.33		0.384				
275	239.28		0			0.3	None
274	238.44		0				
325	238.58		0.387				
326	238.52		0			0.36	0 None
327	238.43		0				

9	238.57	0.182	0.21	0 None
8	238.44	0.01	0.74	0 None
6	238.05	0	1.19	0 None
5	237.42	0		
Pit12	237.74	0.404	1.01	0 None
Pit13	237.74	237.92	0.152	8.6 0.002 Outlet System
Pit32	237.32	0	1.2	0 None
Pit29	236.8	0	1.67	0 None
Pit34	236.36	0.292	2.17	0.166 Inlet Capacity
Pit GPT	236.05	0	2.93	0 None
discharge p	234.67	0		
401	238.04	0		
Pit6	237.88	0	0.4	0 None
Pit8	237.88	1.352	0.02	0.152 Inlet Capacity
N192692	237.85	0		
273	239.42	0.384	0.07	0 None
347	237.86	0.209	1.14	0 None
346	237.53	238.03	0.099	1.4 0 Inlet Capacity
348	236.64	2.903		
291	238.71	0.218	0.06	0 None
290	238.51	0		
278	238.81	0.335	0.8	0 None
279	238.57	0		
192	238.39	0.508	-0.03	0.049 Headwall height/system capacity
183a	238.07	0.618		
200	238.55	0.199	0.08	0 None
199	238.38	0		
203	238.13	0.505	0.14	0 None
202	237.87	0		
207	237.84	0.794	0.16	0 None
208	237.82	0	0.18	None
218a	237.79	0	0.23	None
209a	237.76	0	0.22	None
213	237.73	0	0.65	None
216a	237.65	0	0.39	None
HW1103	237.91	2.26	0.05	0 None
N192689	237.64	0.089		
140	237.79	1.901	-0.19	1.445 Headwall height/system capacity
141	237.25	1.445		
131	238.23	1.901	-0.16	1.111 Headwall height/system capacity
130	237.45	1.111		
HW47	238.66	3.384	1.64	0 None
N184609	238.51	0		

SUB-CATCHMENT DETAILS

Name	Max Flow Q (cu.m/s)	Max Q (cu.m/s)	Grassed Max Q (cu.m/s)	Paved Tc (min)	Grassed Tc (min)	Supp. Tc (min)	Due to Storm
C 66	0.098	0.092	0.006	118.64	233.06		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 22\1	0.078	0.066	0.012	59.11	116.21		0 AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
C 373	0.144	0.134	0.01	79.86	156.93		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 249	0.494	0.464	0.032	134.93	265.01		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 244	0.484	0.454	0.032	145.76	286.29		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 433	0.078	0.073	0.005	154.05	302.55		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 443	0.124	0.115	0.009	62.86	123.57		0 AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
C 120	0.278	0.261	0.018	158.08	310.45		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 126	0.169	0.159	0.011	153.03	300.55		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 147	0.175	0.163	0.012	79.86	156.93		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 93	0.069	0.065	0.005	93.13	182.97		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 64	0.348	0.327	0.023	137.14	269.36		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 188	0.351	0.329	0.023	163.99	322.06		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 108	0.086	0.08	0.006	79.86	156.93		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 109	0.263	0.247	0.017	188.1	369.38		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 198	0.049	0.045	0.004	49.27	96.89		0 AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
C 219	0.229	0.214	0.016	90.58	177.98		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 40	0.469	0.438	0.032	99.28	195.05		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 75	0.138	0.128	0.009	79.86	156.93		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 307	0.144	0.134	0.011	62.86	123.57		0 AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
C 341	0.122	0.113	0.009	49.27	96.89		0 AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
C 336	0.676	0.58	0.098	229.79	451.21		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 337	0.051	0.048	0.003	113.7	223.36		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 4	0.278	0.259	0.019	95.62	187.87		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 387	0.41	0.381	0.03	66.93	131.56		0 AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
C 215	0.214	0.199	0.015	79.86	156.93		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 379	0.357	0.335	0.023	139.33	273.66		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 160	0.1	0.094	0.007	113.7	223.36		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 98a	0.219	0.205	0.014	111.17	218.4		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 303	0.153	0.143	0.01	87.99	172.89		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 49	0.187	0.175	0.012	134.93	265.01		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 313	0.185	0.173	0.013	90.58	177.98		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 414	0.241	0.225	0.016	96.85	190.28		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 276	0.384	0.36	0.025	160.06	314.36		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 325	0.387	0.363	0.025	134.93	265.01		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 2\4	0.281	0.262	0.019	93.13	182.97		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C Node 93z	0.061	0.057	0.004	116.19	228.24		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 9	0.182	0.17	0.012	184.53	362.38		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 8	0.01	0.009	0.001	36.05	70.94		0 AR&R 5 year, 45 minutes storm, average 41.4 mm/h, Zone 2
C Pit12	0.404	0.379	0.026	128.12	251.67		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C Basin-pit	0.507	0.476	0.033	116.19	228.24		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C Pit34	0.292	0.273	0.02	95.62	187.87		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C Pit6	0.383	0.359	0.025	137.14	269.36		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 400	0.692	0.649	0.045	148.91	292.46		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 371	0.478	0.448	0.031	111.17	218.4		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
Ind1	2.269	2.17	0.101	64.25	502.05		0 AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
Ext1	2.493	1.767	0.742	64.25	502.05		0 AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2

Ext2a	3.384	2.398	1.007	64.25	502.05	0 AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
C 273	0.384	0.33	0.056	92.8	182.33	0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 347	0.199	0.186	0.013	90.58	177.98	0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 346	0.099	0.093	0.007	90.58	177.98	0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C291	0.218	0.205	0.014	163.99	322.06	0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 278	0.335	0.315	0.022	163.99	322.06	0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 192	0.173	0.162	0.011	163.99	322.06	0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 200	0.199	0.187	0.013	173.54	340.8	0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 203	0.306	0.287	0.02	173.54	340.8	0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 207	0.289	0.272	0.019	173.54	340.8	0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 395	0.089	0.084	0.006	154.05	302.55	0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
Ext2b	0.482	0.336	0.146	28.12	219.73	0 AR&R 5 year, 30 minutes storm, average 52.4 mm/h, Zone 2
Ext3	1.471	1.042	0.438	87.7	685.29	0 AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2

Outflow Volumes for Total Catchment (338 impervious + 745 pervious = 1083 total ha)

Storm	Total Rainf cu.m	Total Runo cu.m (Runc	Impervious cu.m (Runc	Pervious cu.m (Runoff %)	Runoff %
AR&R 5 ye:	105636.5	29505.33	(29326.82	(178.51	(0.2%)
AR&R 5 ye:	159753.7	46859.27	(45749.73	(1109.55	(1.0%)
AR&R 5 ye:	200925.8	60429.38	(57923.57	(2505.81	(1.8%)
AR&R 5 ye:	233735.4	71149.49	(67057.59	(4091.91	(2.5%)
AR&R 5 ye:	283666.8	86929.34	(79442.00	(7487.33	(3.8%)
AR&R 5 ye:	336007	108547.88	96071.26	(12476.62	(5.4%)
AR&R 5 ye:	373579.6	125539.02	108878.06	16660.95	(6.5%)
AR&R 5 ye:	426217.5	150598.97	126961.52	23637.45	(8.1%)
AR&R 5 ye:	463312	166546.89	139489.83	27057.07	(8.5%)
AR&R 5 ye:	516040	186695.05	157035.97	29659.07	(8.4%)
AR&R 5 ye:	571492.3	204604.53	174760.63	29843.90	(7.6%)
AR&R 5 ye:	614116.8	216678.44	188210.88	28467.56	(6.7%)

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
P 66	0.096	1.58	237.954	237.95	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 221	0.078	1.75	239.069	238.859	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 373	0.144	1.17	237.523	237.379	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 249	0.553	0.52	238.117	238.117	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 248	0.461	0.36	238.106	238.083	AR&R 5 year, 45 minutes storm, average 41.4 mm/h, Zone 2
P 244	0.916	0.85	238.083	238.041	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 243	0.914	0.99	238.01	237.916	AR&R 5 year, 3 hours storm, average 15.9 mm/h, Zone 2
P 242	0.914	1.55	237.824	237.777	AR&R 5 year, 3 hours storm, average 15.9 mm/h, Zone 2
P 253	0.913	1.35	237.747	237.697	AR&R 5 year, 3 hours storm, average 15.9 mm/h, Zone 2
P 158	1.174	1.81	237.859	237.808	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 433	0.078	0.59	238.595	238.321	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 445a	0.2	1.35	238.26	238.234	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 443	0.125	1.1	238.665	238.321	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 120	0.278	1.31	237.567	237.527	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 126	0.169	1.31	237.541	237.579	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 147	0.175	1.32	237.83	237.666	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 93	0.13	1.94	240.59	240.592	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 64	0.348	1.41	237.678	237.612	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 188	0.569	1.55	238.192	238.126	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 108	0.086	1.04	237.65	237.609	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 198	0.049	0.93	238.129	238.09	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 178	1.077	1.62	238.063	238.354	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 219	0.229	1.68	237.579	237.283	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 40	0.469	1.56	237.68	237.658	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 75	0.138	1.44	237.899	237.749	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 307	0.144	1.14	237.697	237.705	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 341	0.122	1.22	238.651	238.586	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 342	0.122	1.36	238.566	238.133	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 336	2.873	1.61	238.034	237.467	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 337	2.896	2.45	237.205	237.226	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 338	2.896	2.57	237.126	236.397	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 4	0.277	1.74	238.496	238.326	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 393	0.277	2.07	238.2	238.005	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 3	0	0	238.625	238.407	AR&R 5 year, 5 minutes storm, average 117 mm/h, Zone 2
P 110	1.483	1.69	237.852	237.822	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 386	1.021	2.11	237.877	237.906	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 387	1.021	1.82	237.803	237.674	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 376	0.144	1.24	237.386	237.38	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 215	0.214	1.2	237.868	237.918	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 217a	0.992	1.14	237.536	237.527	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 214a	0.992	1.65	237.43	237.293	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 160	0.1	1.14	237.874	237.699	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 98a	0.733	1.85	238.065	237.865	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 446	0.2	1.13	238.051	238.041	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 303	0.153	1.36	237.722	237.65	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 48	0.187	2.14	238.002	237.763	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 313	0.185	1.26	238.137	238.124	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 414	0.241	1.61	238.593	238.249	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 276	0.384	0.64	239.33	239.281	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 275	0.767	1.89	239.147	238.436	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 325	0.387	1.57	238.585	238.518	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 326	0.387	1.47	238.44	238.433	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 9	0.182	1.23	238.521	238.441	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 8	0.197	1.76	238.381	238.051	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 6	0.184	1.35	237.982	237.923	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P Pit12	0.404	0.75	237.74	237.738	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P Pit13	1.409	1.3	237.612	237.318	AR&R 5 year, 6 hours storm, average 9.5 mm/h, Zone 2
P Pit32	1.408	1.3	237.193	237.049	AR&R 5 year, 6 hours storm, average 9.5 mm/h, Zone 2
P Basin-pit	1.415	1.31	236.927	236.797	AR&R 5 year, 6 hours storm, average 9.5 mm/h, Zone 2
P Pit29	1.415	1.31	236.666	236.356	AR&R 5 year, 6 hours storm, average 9.5 mm/h, Zone 2
P Pit34	1.434	2.22	236.159	236.051	AR&R 5 year, 6 hours storm, average 9.5 mm/h, Zone 2

F 159	1.174	1.174	0	0.279	0.32	7.58	1.14	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F 98a	0	0	0	0	0	0	0	
F 99	2.174	2.174	0	0.346	0.47	8.85	1.37	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
F 446	0	0	0	0	0	0	0	
F 446a	0.435	0.435	0	0.202	0.17	5.65	0.83	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
F 303	0	0	0	0	0	0	0	
F 48	0	0	0	0	0	0	0	
F 49	0.187	0.187	0	0.156	0.1	4.5	0.65	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
F 313	0	0	0	0	0	0	0	
F 314	0.185	0.185	0	0.156	0.1	4.5	0.64	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F 414	0	0	0	0	0	0	0	
F 415	0.241	0.241	0	0.169	0.12	4.82	0.69	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F 274	0.767	0.767	0	0.242	0.24	6.66	1	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
OF51150	0	0	0	0	0	0	0	
F 327	0.387	0.387	0	0.195	0.16	5.46	0.8	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
F 2\4	0.281	0.281	0	0.177	0.13	5.01	0.73	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F 71	0.281	0.281	0	0.177	0.13	5.01	0.73	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F Node 15a	0.724	0.724	0	0.238	0.23	6.54	0.98	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F Node 22\	1.236	1.236	0	0.284	0.33	7.71	1.15	AR&R 5 year, 45 minutes storm, average 41.4 mm/h, Zone 2
F Node 31\	0.615	0.615	0	0.225	0.21	6.24	0.93	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
F 61\2	0	0	0	0	0	0	0	
F Node 74\	0.3	0.3	0	0.181	0.13	5.11	0.74	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F Node 93\	0.061	0.061	0	0.106	0.06	2.68	0.54	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
F 9	0	0	0	0	0	0	0	
F 8	0	0	0	0	0	0	0	
F 6	0	0	0	0	0	0	0	
F 5	0.184	0.184	0	0.155	0.1	4.48	0.65	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F Pit12	0	0	0	0	0	0	0	
F Pit13	0.002	0.002	0	0.008	0	5.04	0.11	AR&R 5 year, 6 hours storm, average 9.5 mm/h, Zone 2
F Pit32	0	0	0	0	0	0	0	
OF78192	0	0	0	0	0	0	0	
F Pit29	0	0	0	0	0	0	0	
F Pit34	0.166	0.166	0	0.147	0.1	4.05	0.66	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F Pit GPT	0	0	0	0	0	0	0	
OF78154	1.352	1.352	0	0.136	0.1	20.14	0.77	AR&R 5 year, 6 hours storm, average 9.5 mm/h, Zone 2
OF51128	0	0	0	0	0	0	0	
F 401	1.374	1.374	0	0.295	0.35	7.98	1.19	AR&R 5 year, 3 hours storm, average 15.9 mm/h, Zone 2
F Pit6	0	0	0	0	0	0	0	
F Pit8	0.152	0.152	0	0.143	0.09	3.92	0.64	AR&R 5 year, 6 hours storm, average 9.5 mm/h, Zone 2
F 371	0	0	0	0	0	0	0	
OF153962	2.26	2.26	0	0.5	1.13	4	2.26	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
OF137218	2.269	2.571	0	0.18	0.17	22.81	0.95	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
OF82141	4.13	4.13	0	0.423	0.41	10	0.98	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
OF82144	3.384	3.384	0	0.374	0.34	10	0.9	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
F 273	0	0	0	0	0	0	0	
F 347	0	0	0	0	0	0	0	
F 346	0	0	0	0	0	0	0	
F 348	2.972	2.972	-4E+28	0.385	0.59	8.85	1.54	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F 291	0	0	0	0	0	0	0	
F 290	0.218	0.218	0	0.164	0.11	4.69	0.67	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
OF118859	0	0	0	0	0	0	0	
F 279	0.335	0.335	0	0.187	0.14	5.27	0.76	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
OF118882	0.049	0.049	0	0.099	0.05	2.44	0.52	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
F 183	1.077	1.077	0	0.271	0.3	7.39	1.1	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
OF121852	0	0	0	0	0	0	0	
OF121886	0.199	0.199	0	0.159	0.1	4.58	0.66	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
OF121872	0	0	0	0	0	0	0	
OF121903	0.505	0.505	0	0.211	0.19	5.88	0.88	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
OF121924	0	0	0	0	0	0	0	
OF153967	0	0	0	0	0	0	0	
F 395	2.348	2.348	0	0.355	0.5	8.85	1.41	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
OF51123	0	0	0	0	0	0	0	
OF218457	0.482	0.482	0	0.209	0.18	5.81	0.86	AR&R 5 year, 30 minutes storm, average 52.4 mm/h, Zone 2
OF135437	1.471	1.471	0	0.224	0.15	10	0.66	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
OF146104	1.445	1.445	0	0.3	0.36	8.1	1.21	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
OF146119	1.901	1.901	0	0.331	0.43	8.85	1.3	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
OF146085	1.111	1.111	0	0.274	0.31	7.46	1.12	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
OF146067	1.901	1.901	0	0.331	0.43	8.85	1.3	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
OF149269	0	0	0	0	0	0	0	
OF205948	3.381	3.381	0	0.374	0.34	10	0.9	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2

DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level
SchoolOval	237.05	575.6	1.415	1.415	0
PaytenParl	238.23	11896.3	1.352	0	1.352
DundasPar	238.36	18676.2	1.374	1.374	0
U/S Railwa	238.09	2925.1	2.26	2.26	0

CONTINUITY CHECK for AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2

Node	Inflow (cu.m)	Outflow (cu.m)	Storage Ch (cu.m)	Difference %
66	707.11	707.32	0	0
67	707.32	707.32	0	0
22\1	371.87	371.47	0	0.1
22\2	371.47	371.47	0	0
373	788.1	787.52	0	0.1
374	787.52	787.52	0	0
249	4027.76	3766.45	0	6.5
248	3766.45	3747.99	0	0.5
244	7985.27	7943.47	0	0.5
243	7943.47	7933.4	0	0.1
242	7933.4	7922.29	0	0.1
239	7922.29	7922.07	0	0

253	7922.07	7893.14	0	0.4
257	16476.87	16460.46	0	0.1
158	11080.63	11063.91	0	0.2
157	11063.91	11063.06	0	0
433	713.47	712.29	0	0.2
445a	1314.64	1311.91	0	0.2
445	1311.91	1311.88	0	0
443	603.3	602.35	0	0.2
120	2614.39	2613.22	0	0
121	32615.12	32430.75	0	0.6
126	1546.31	1545.33	0	0.1
129	33976.07	33921.71	0	0.2
147	956.04	954.75	0	0.1
142	15434.84	15390.04	0	0.3
93	867.52	867.06	0	0.1
94	867.06	867.06	0	0
64	2882.41	2881.32	0	0
65	2881.32	2881.29	0	0
188	5526.45	5520.57	0	0.1
183	5520.57	5520.28	0	0
108	468.95	468.61	0	0.1
109	14400.03	14375.06	0	0.2
198	192.76	192.58	0	0.1
197	14496.57	14480.14	0	0.1
178	10448	10430.89	0	0.2
177	10430.89	10430.29	0	0
219	1393.97	1393.17	0	0.1
901	1393.17	1393.17	0	0
40	3104.36	3103.38	0	0
41	3103.38	3103.38	0	0
75	754.58	754.14	0	0.1
74	754.14	754.14	0	0
307	700.43	700.18	0	0
304	700.18	700.18	0	0
341	481.97	480.83	0	0.2
342	480.83	479.11	0	0.4
343	479.11	479.11	0	0
336	19347.24	19232.5	0	0.6
337	19585.4	19537.34	0	0.2
338	19476.24	19446.18	0	0.2
345	19925.29	19921.67	0	0
4	1773.04	1772.58	0	0
393	1772.58	1771.24	0	0.1
392	1771.24	1771.24	0	0
3	0	0	0	0
394	0	0	0	0
110	14375.06	14366.33	0	0.1
111	30016.15	30001.89	0	0
386	6109.97	6102.61	0	0.1
387	6102.61	6102.93	0	0
385	6102.93	6102.89	0	0
376	787.52	787.12	0	0.1
377	14314.75	14304.01	0	0.1
215	1171.64	1167.99	0	0.3
217a	9165.21	9160.75	0	0
214a	9160.75	9135.58	0	0.3
379	12135.27	12134.57	0	0
160	695.73	695.3	0	0.1
159	11125.57	11080.63	0	0.4
98a	5514.4	5507.36	0	0.1
99	15705.95	15649.84	0	0.4
446	1311.88	1311.21	0	0.1
446a	2869.09	2869.07	0	0
303	906.19	905.73	0	0.1
308a	905.73	905.73	0	0
48	1521.3	1520.41	0	0.1
49	1520.41	1520.4	0	0
313	1124.57	1124.3	0	0
314	1124.3	1124.3	0	0
414	1559.37	1557.89	0	0.1
415	1557.89	1557.89	0	0
276	3649.17	3640.66	0	0.2
275	6089.83	6067.23	0	0.4
274	6067.23	6067.04	0	0
325	3153.57	3152.87	0	0
326	3152.87	3151.06	0	0.1
327	3151.06	3151.04	0	0
OUTLET 05	1965.96	1965.96	0	0
2\4	1751.54	1751.54	0	0
71	1751.54	1751.54	0	0
Node15a	5340.13	5339.89	0	0
Outlet 67	5339.89	5339.89	0	0
Node 22\3	8615.08	8583.72	0	0.4
Node 314a	3993.36	3992.58	0	0
OUTLET 34	21546	21546	0	0
OUTLET 38	6102.89	6102.89	0	0
OUTLET 41	3103.38	3103.38	0	0
OUTLET 49	1520.4	1520.4	0	0
61\2	0	0	0	0
Node 74a	1692.88	1692.88	0	0
OUTLET 74	1692.88	1692.88	0	0
Node 93a	434.72	434.72	0	0
OUTLET 12	49210.01	49210.01	0	0
9	1947.49	1942.94	0	0.2
8	1976.51	1972.38	0	0.2

6	1972.38	1966.16	0	0.3
5	1966.16	1965.96	0	0
Pit12	3138.48	3135.32	0	0.1
Pit13	3910.49	3840.82	0.16	1.8
Pit32	3840.82	3766.89	0	1.9
SchoolOval	7366.77	7326.69	40.11	0
Pit29	7326.69	7256.77	0	1
Pit34	9125.14	9051.38	0	0.8
Pit GPT	8112.63	8061.68	0	0.6
discharge f	8061.68	8061.68	0	0
O Pit GPT	0	0	0	0
O 392	1771.24	1771.24	0	0
PaytenParl	12050.2	806.6	10861.02	3.2
DundasPar	25915.43	8892.09	16826.29	0.8
401	8892.09	8884.52	0	0.1
Pit6	0	-4.23	0	0
Pit8	802.37	775.18	0	3.4
U/S Railwa	19723.13	18967.5	719.72	0.2
N192692	18967.5	18965.77	0	0
N172535	11210.77	11210.77	0	0
N101397	33289.33	32794.09	0	1.5
N101398	19253.74	19253.74	0	0
273	2451.86	2449.17	0	0.1
347	1268.42	1267.82	0	0
346	1871.48	1871.84	0	0
348	21793.45	21546	0	1.1
291	2119.88	2118.44	0	0.1
290	2118.44	2118.33	0	0
278	3259.1	3256.88	0	0.1
279	3256.88	3256.71	0	0
192	4935.99	4932.51	0	0.1
183a	10452.79	10448	0	0
200	2028.9	2027.32	0	0.1
199	2027.32	2027.18	0	0
203	5150.86	5145.35	0	0.1
202	5145.35	5144.98	0	0
207	8097.33	8087.6	0	0.1
208	8087.6	8083.72	0	0
218a	8083.72	8067.57	0	0.2
209a	8067.57	8049.43	0	0.2
213	8049.43	8024.55	0	0.3
216a	8024.55	7997.22	0	0.3
HW1103	18965.77	18929.11	0	0.2
N192689	19748.05	19746.19	0	0
N162485	32794.09	32794.09	0	0
61\1	0	0	0	0
N270468	2176.58	2176.58	0	0
N168004	10198.6	10198.6	0	0
*(11x) 1.5x	0	0	0	0
140	15345.62	15289.7	0	0.4
141	15289.69	15288.35	0	0
131	15390.04	15346.82	0	0.3
130	15346.82	15345.62	0	0
HW47	19253.74	19103.06	0	0.8
N184609	19103.06	19102	0	0

Run Log for 055 run at 09:29:38 on 1/6/2021 using version 2020.061

No water upwelling from any pit.

Freeboard was less than 0.15m at 243, Pit8, Pit13, 248, 393

The maximum flow in these overflow routes is unsafe: OF205948, OF146119, OF146104, OF146085, OF146067, OF218457, OF153962, OF121903, OF121886, OF118839, F 279, F 290, OF82144, OF82141, OF137:

These overflow routes carried water uphill (adding energy): F Pit8. These results may be invalid. This is likely due to either incorrect surface levels specified at pits or high downstream tailwater levels which th

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218, OF78154, F 5, F 142, F 157, F 109, F 177, F 159, F 183, F 197, F 2\4, F 71, F Node15a, F 274, F 239, F 257, F Node 22\3, F 314, F Node 314a, F 327, F 345, F 348, F 374, F 379, F 377, F 385, F 392, F 395, F 401, F
ie Lite Hydraulic model cannot handle. Analysing the latter requires solving the full unsteady flow equations in overflow routes using the Full Unsteady Hydraulic model (Formerly Premium Hydraulic model).

: 41, F 415, F 446a, F 445, F 49, F 65, F Node 74a, F 901, F 99, F 111, F 121, F 129, F Pit34, F Pit13, F Pit8

B3. DRAINS model results for the proposed Option 2 under 5yr ARI design event

PIT / NODE DETAILS Name	Max HGL	Max Pond HGL	Version 8		Min Freeboard (m)	Overflow Flow (cu.m/s)	Constraint	
			Max Surf Flow (cu.m/s)	Max Pond Volume (cu.m)				
66	238.17		0.098			0	0.001	Headwall height/system capacity
67	237.63		0.001					
22\1	239.24		0.078			0.2	0	None
22\2	238.7		0					
373	237.63		0.144			0.18	0	None
374	237.38		0					
249	238.21		0.494			0.06	0	None
248	238.12		0			0.1	0	None
244	238.08		0.484					
243	238.04	238.03	0		0.1	0	0	Outlet System
242	237.92		0			0.21	0	None
239	237.78		0					
253	237.56		0			0.45	0	None
257	237.51		0.82					
158	238.05		1.174			0.25	0	None
157	237.81		0					
433	238.6		0.078			0.3	0	None
445a	238.32		0			0.77	0	None
445	238.23		0					
443	238.77		0.124			0.12	0	None
120	237.67		0.278			0.27	0	None
121	237.53		3.639					
126	237.67		0.169			0.16	0	None
129	237.58		3.913					
147	237.94		0.175			0.21	0	Headwall height/system capacity
142	237.67		1.731					
93	241.21		0.131			0.32	0	None
94	240.59		0					
64	237.8		0.348			0.27	0	Headwall height/system capacity
65	237.61		0					
188	238.36		0.569			0.04	0	Headwall height/system capacity
183	238.13		0					
108	237.72		0.086			0.17	0	None
109	237.61		1.435					
198	238.18		0.049			0.28	0	Headwall height/system capacity
197	238.09		1.711					
178	238.35		1.077			0.02	0	Headwall height/system capacity
177	237.85		0					
219	237.72		0.229			0.12	0	None
901	237.28		0					
40	237.85		0.469			0.03	0	Headwall height/system capacity
41	237.66		0					
75	238.02		0.138			0.12	0	None
74	237.75		0					
307	237.78		0.144			0.16	0	None
304	237.7		0					
341	238.78		0.122			0.6	0	Headwall height/system capacity
342	238.59		0			0.9	0	None
343	238.13		0					
4	238.71		0.278			0.26	0	None
393	238.33	238.45	0		0	0.13	0	None
392	238		0					
3	238.62		0			0.75	0	None
394	238.41		0					
110	238.04		1.483			0.07	0	None
111	237.82		2.174					
386	238.21		1.023			0.27	0	Headwall height/system capacity
387	237.91		0			0.56	0	None
385	237.67		0					
376	237.5		0.144			0.21	0	None
377	237.38		1.573					
215	238.13		0.214			0.1	0	Headwall height/system capacity
217a	237.61		0			0.52	0	None
214a	237.53		0			0.57	0	None
379	237.29		0.357					
160	237.94		0.1			0.31	0	Headwall height/system capacity
159	237.7		1.077					
98a	238.26		0.734			0.05	0	Headwall height/system capacity
99	237.87		1.471					
446	238.17		0.2			0.87	0	Headwall height/system capacity
446a	238.04		0.241					
303	237.85		0.153			0.05	0	None
308a	237.65		0					
48	238.24		0.187			0.31	0	Headwall height/system capacity
49	237.76		0					
313	238.23		0.185			0.19	0	Headwall height/system capacity
314	238.12		0					
414	238.73		0.241			0.16	0	Headwall height/system capacity
415	238.25		0					
276	239.33		0.384					
275	239.28		0			0.3	0	None
274	238.44		0					
325	238.58		0.387					
326	238.52		0			0.36	0	None
327	238.43		0					
9	238.57		0.182			0.21	0	None
8	238.44		0.01			0.74	0	None
6	238.05		0			1.19	0	None
5	237.42		0					

Pit12	237.79		0.404		0.96		0	None
Pit13	237.79	237.92	0.371	8.6	0	0.285	0.285	Outlet System
Pit32	237.49		0		1.04		0	None
Pit29	236.95		0		1.52		0	None
Pit34	236.38		0.292		2.14	0.166	0.166	Inlet Capacity
Pit GPT	235.97		0		3.01		0	None
discharge f	234.63		0					
401	237.98		0					
Pit6	237.89		0		0.39		0	None
Pit8	237.89		0.906		0.01	0.371	0.371	Inlet Capacity
N192692	237.81		0					
273	239.42		0.384		0.07		0	None
347	237.86		0.209		1.14		0	None
346	237.53	238.03	0.099	1.4	0.44		0	Inlet Capacity
348	236.64		0.369					
291	238.71		0.218		0.06		0	None
290	238.51		0					
278	238.81		0.335		0.8		0	None
279	238.57		0					
192	238.39		0.508		-0.03	0.049	0.049	Headwall height/system capacity
183a	238.07		0.618					
200	238.55		0.199		0.08		0	None
199	238.38		0					
203	238.13		0.505		0.14		0	None
202	237.87		0					
207	237.84		0.794		0.16		0	None
208	237.82		0		0.18		None	None
218a	237.79		0		0.23		None	None
209a	237.76		0		0.22		None	None
213	237.73		0		0.65		None	None
216a	237.65		0		0.39		None	None
HW1103	237.83		0.874		0.13		0	None
N192689	237.61		0.089					
337	237.6		0.051		1.79	0.01	0.01	Inlet Capacity
338	237.28		0		2.17		0	None
345	236.28		0.122					
N230386	237.72		0					
140	237.79		1.901		-0.19	1.445	1.445	Headwall height/system capacity
141	237.25		1.445					
131	238.23		1.901		-0.16	1.111	1.111	Headwall height/system capacity
130	237.45		1.111					
HW47	238.66		3.384		1.64		0	None
N184609	238.51		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 66	0.098	0.092	0.006	118.64	233.06		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 22\1	0.078	0.066	0.012	59.11	116.21		0 AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
C 373	0.144	0.134	0.01	79.86	156.93		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 249	0.494	0.464	0.032	134.93	265.01		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 244	0.484	0.454	0.032	145.76	286.29		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 433	0.078	0.073	0.005	154.05	302.55		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 443	0.124	0.115	0.009	62.86	123.57		0 AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
C 120	0.278	0.261	0.018	158.08	310.45		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 126	0.169	0.159	0.011	153.03	300.55		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 147	0.175	0.163	0.012	79.86	156.93		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 93	0.069	0.065	0.005	93.13	182.97		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 64	0.348	0.327	0.023	137.14	269.36		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 188	0.351	0.329	0.023	163.99	322.06		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 108	0.086	0.08	0.006	79.86	156.93		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 109	0.263	0.247	0.017	188.1	369.38		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 198	0.049	0.045	0.004	49.27	96.89		0 AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
C 219	0.229	0.214	0.016	90.58	177.98		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 40	0.469	0.438	0.032	99.28	195.05		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 75	0.138	0.128	0.009	79.86	156.93		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 307	0.144	0.134	0.011	62.86	123.57		0 AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
C 341	0.122	0.113	0.009	49.27	96.89		0 AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
C 4	0.278	0.259	0.019	95.62	187.87		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 387	0.41	0.381	0.03	66.93	131.56		0 AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
C 215	0.214	0.199	0.015	79.86	156.93		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 379	0.357	0.335	0.023	139.33	273.66		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 160	0.1	0.094	0.007	113.7	223.36		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 98a	0.219	0.205	0.014	111.17	218.4		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 303	0.153	0.143	0.01	87.99	172.89		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 49	0.187	0.175	0.012	134.93	265.01		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 313	0.185	0.173	0.013	90.58	177.98		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 414	0.241	0.225	0.016	96.85	190.28		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 276	0.384	0.36	0.025	160.06	314.36		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 325	0.387	0.363	0.025	134.93	265.01		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 2\4	0.281	0.262	0.019	93.13	182.97		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C Node 93i	0.061	0.057	0.004	116.19	228.24		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 9	0.182	0.17	0.012	184.53	362.38		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 8	0.01	0.009	0.001	36.05	70.94		0 AR&R 5 year, 45 minutes storm, average 41.4 mm/h, Zone 2
C Pit12	0.404	0.379	0.026	128.12	251.67		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C Basin-pit	0.507	0.476	0.033	116.19	228.24		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C Pit34	0.292	0.273	0.02	95.62	187.87		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C Pit6	0.383	0.359	0.025	137.14	269.36		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 400	0.692	0.649	0.045	148.91	292.46		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 371	0.478	0.448	0.031	111.17	218.4		0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
ind1	2.269	2.17	0.101	64.25	502.05		0 AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
Ext1	2.493	1.767	0.742	64.25	502.05		0 AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
Ext2a	3.384	2.398	1.007	64.25	502.05		0 AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
C 273	0.384	0.33	0.056	92.8	182.33		0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2

C 347	0.199	0.186	0.013	90.58	177.98	0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 346	0.099	0.093	0.007	90.58	177.98	0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 291	0.218	0.205	0.014	163.99	322.06	0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 278	0.335	0.315	0.022	163.99	322.06	0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 192	0.173	0.162	0.011	163.99	322.06	0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 200	0.199	0.187	0.013	173.54	340.8	0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 203	0.306	0.287	0.02	173.54	340.8	0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 207	0.289	0.272	0.019	173.54	340.8	0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
Cat113175	0.089	0.084	0.006	154.05	302.55	0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
C 336	0.676	0.58	0.098	229.79	451.21	0 AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
C 337	0.051	0.048	0.003	113.7	223.36	0 AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
Ext2b	0.482	0.336	0.146	28.12	219.73	0 AR&R 5 year, 30 minutes storm, average 52.4 mm/h, Zone 2
Ext3	1.471	1.042	0.438	87.7	685.29	0 AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2

Outflow Volumes for Total Catchment (338 impervious + 745 pervious = 1083 total ha)

Storm	Total Rainf cu.m	Total Runo cu.m (Runoff %)	Impervious cu.m (Runoff %)	Pervious cu.m (Runoff %)
AR&R 5 ye:	105636.5	29505.33 (29.236.82 (27.59%)	178.51 (0.2%)	
AR&R 5 ye:	159753.7	46859.27 (29.34%)	45749.73 (28.65%)	1109.55 (0.7%)
AR&R 5 ye:	200925.8	60429.38 (30.07%)	57923.57 (28.83%)	2505.81 (1.2%)
AR&R 5 ye:	233735.4	71149.49 (30.44%)	67057.59 (28.7%)	4091.91 (1.7%)
AR&R 5 ye:	283666.8	86929.34 (30.66%)	79442.00 (27.8%)	7487.33 (2.6%)
AR&R 5 ye:	336007	108547.88 (32.3%)	96071.26 (28.58%)	12476.62 (3.7%)
AR&R 5 ye:	373579.6	125539.02 (33.62%)	108878.06 (29.15%)	16660.95 (4.4%)
AR&R 5 ye:	426217.5	150598.97 (35.33%)	126961.52 (29.78%)	23637.45 (5.5%)
AR&R 5 ye:	463312	166546.89 (35.94%)	139489.83 (29.9%)	27057.07 (5.8%)
AR&R 5 ye:	516040	186695.05 (36.17%)	157035.97 (30.23%)	29659.07 (5.7%)
AR&R 5 ye:	571492.3	204604.53 (35.8%)	174760.63 (30.57%)	29843.90 (5.2%)
AR&R 5 ye:	614116.8	216678.44 (35.29%)	188210.88 (30.64%)	28467.56 (4.6%)

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
P 66	0.096	1.58	237.954	237.95	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 221	0.078	1.75	239.069	238.859	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 373	0.144	1.17	237.523	237.379	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 249	0.553	0.52	238.117	238.117	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 248	0.461	0.36	238.106	238.083	AR&R 5 year, 45 minutes storm, average 41.4 mm/h, Zone 2
P 244	0.916	0.85	238.083	238.041	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 243	0.914	0.99	238.01	237.916	AR&R 5 year, 3 hours storm, average 15.9 mm/h, Zone 2
P 242	0.914	1.55	237.824	237.777	AR&R 5 year, 3 hours storm, average 15.9 mm/h, Zone 2
P 253	0	0	237.56	237.51	AR&R 5 year, 5 minutes storm, average 117 mm/h, Zone 2
P 158	1.174	1.81	237.859	237.808	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 433	0.078	0.59	238.595	238.321	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 445a	0.2	1.35	238.26	238.234	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 443	0.125	1.1	238.665	238.321	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 120	0.278	1.31	237.567	237.527	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 126	0.169	1.31	237.541	237.579	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 147	0.175	1.32	237.83	237.666	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 93	0.13	1.94	240.59	240.592	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 64	0.348	1.41	237.678	237.612	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 188	0.569	1.55	238.192	238.126	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 108	0.086	1.04	237.65	237.609	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 198	0.049	0.93	238.129	238.09	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 178	1.077	1.62	238.063	238.354	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 219	0.229	1.68	237.579	237.283	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 40	0.469	1.56	237.68	237.658	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 75	0.138	1.44	237.899	237.749	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 307	0.144	1.14	237.697	237.705	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 341	0.122	1.22	238.651	238.586	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 342	0.122	1.36	238.566	238.133	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 4	0.277	1.74	238.496	238.326	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 393	0.277	2.07	238.2	238.005	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 3	0	0	238.625	238.407	AR&R 5 year, 5 minutes storm, average 117 mm/h, Zone 2
P 110	1.483	1.69	237.852	237.822	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 386	1.021	2.11	237.877	237.906	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 387	1.021	1.82	237.803	237.674	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 376	0.144	1.24	237.386	237.38	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 215	0.214	1.2	237.868	237.918	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 217a	0.992	1.14	237.536	237.527	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 214a	0.992	1.65	237.43	237.293	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 160	0.1	1.14	237.874	237.699	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 98a	0.733	1.85	238.065	237.865	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 446	0.2	1.13	238.051	238.041	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 303	0.153	1.36	237.722	237.65	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 48	0.187	2.14	238.002	237.763	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 313	0.185	1.26	238.137	238.124	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 414	0.241	1.61	238.593	238.249	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 276	0.384	0.64	239.33	239.281	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 275	0.767	1.89	239.147	238.436	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 325	0.387	1.57	238.585	238.518	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 326	0.387	1.47	238.44	238.433	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 9	0.182	1.23	238.521	238.441	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 8	0.197	1.76	238.381	238.051	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 6	0.184	1.35	237.982	237.923	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P Pit12	0.403	0.75	237.786	237.786	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P Pit13	0.775	1.43	237.696	237.485	AR&R 5 year, 6 hours storm, average 9.5 mm/h, Zone 2
P Pit32	0.775	1.43	237.395	237.291	AR&R 5 year, 6 hours storm, average 9.5 mm/h, Zone 2
P Basin-pit	0.82	1.52	237.083	236.953	AR&R 5 year, 6 hours storm, average 9.5 mm/h, Zone 2
P Pit29	0.82	1.52	236.777	236.384	AR&R 5 year, 6 hours storm, average 9.5 mm/h, Zone 2
P Pit34	0.854	3.29	236.083	236.035	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P Pit GPT	0.882	2.43	235.848	234.632	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 400	0.953	1.41	238.091	237.981	AR&R 5 year, 6 hours storm, average 9.5 mm/h, Zone 2
P Pit6	0.008	0.02	237.891	237.892	AR&R 5 year, 6 hours storm, average 9.5 mm/h, Zone 2

P Pit8	0.747	1.38	237.823	237.786	AR&R 5 year, 4.5 hours storm, average 11.7 mm/h, Zone 2
P 371	0.874	1.58	237.886	237.806	AR&R 5 year, 3 hours storm, average 15.9 mm/h, Zone 2
P 273	0.384	1.21	239.331	239.281	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 347	0.209	1.13	237.768	237.526	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 346	0.319	2.15	237.45	236.636	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
P 291	0.218	1.53	238.551	238.508	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 278	0.335	1.49	238.677	238.567	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 192	0.459	1.55	238.148	238.066	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 200	0.199	1.48	238.384	238.384	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 203	0.505	1.57	237.981	237.866	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 207	0.795	0.57	237.827	237.818	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 208	0.795	0.57	237.793	237.792	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 218a	0.806	0.58	237.773	237.756	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 209a	0.806	0.58	237.74	237.73	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 213	0.798	0.83	237.687	237.648	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
P 216a	0.8	0.79	237.61	237.608	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
Pipe11344:	0.874	1.42	237.705	237.605	AR&R 5 year, 3 hours storm, average 15.9 mm/h, Zone 2
P 336	0.363	1.68	238.165	237.598	AR&R 5 year, 6 hours storm, average 9.5 mm/h, Zone 2
P 337	0.366	1.69	237.38	237.278	AR&R 5 year, 6 hours storm, average 9.5 mm/h, Zone 2
P 338	0.366	2.02	237.137	236.285	AR&R 5 year, 6 hours storm, average 9.5 mm/h, Zone 2
Pipe14830:	0.82	1.31	237.774	237.724	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 140	0.456	1.55	237.325	237.245	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
P 131	0.79	1.96	237.482	237.452	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
Pipe10930:	3.381	1.26	238.562	238.512	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2

CHANNEL DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Due to Storm
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OVERFLOW ROUTE DETAILS

Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm
F 66	0.001	0.001	0.142	0.029	0.01	0.33	0.26	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
F 67	0.098	0.098	0.142	0.124	0.07	3.26	0.59	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
F 221	0	0	0.142	0	0	0	0	
F 222	0.078	0.078	0.142	0.115	0.07	2.96	0.57	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
F 373	0	0	0.142	0	0	0	0	
F 374	0.144	0.144	0.142	0.141	0.09	3.83	0.64	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F 249	0	0	0.142	0	0	0	0	
OF51143	0	0	0.142	0	0	0	0	
OF51134	0	0	0	0	0	0	0	
OF51139	0	0	0.142	0	0	0	0	
F 239	0.914	0.914	0.142	0.257	0.27	7.02	1.05	AR&R 5 year, 3 hours storm, average 15.9 mm/h, Zone 2
F 253	0	0	0.142	0	0	0	0	
F 257	0.82	0.82	0.142	0.248	0.25	6.8	1.02	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
F 158	0	0	0.142	0	0	0	0	
F 157	1.174	1.174	0.142	0.279	0.32	7.58	1.14	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F 433	0	0	0.142	0	0	0	0	
F 445a	0	0	0.142	0	0	0	0	
F 445	0.2	0.2	0.142	0.159	0.1	4.58	0.66	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
F 443	0	0	0.142	0	0	0	0	
F 120	0	0	0.142	0	0	0	0	
F 121	3.913	3.913	0.142	0.426	0.72	8.85	1.7	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F 126	0	0	0.142	0	0	0	0	
F 129	4.079	4.079	0.142	0.433	0.75	8.85	1.73	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F 147	0	0	0.142	0	0	0	0	
F 142	1.901	1.901	0.142	0.331	0.43	8.85	1.3	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
F 93	0	0	0.142	0	0	0	0	
F 94	0.13	0.13	0.142	0.136	0.09	3.68	0.62	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F 64	0	0	0.142	0	0	0	0	
F 65	0.348	0.348	0.142	0.189	0.15	5.32	0.77	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
F 188	0	0	0.142	0	0	0	0	
OF118839	0.569	0.569	0.142	0.22	0.2	6.1	0.91	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
F 108	0	0	0.142	0	0	0	0	
F 109	1.483	1.483	0.142	0.303	0.37	8.17	1.22	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
F 198	0	0	0.142	0	0	0	0	
F 197	1.731	1.731	0.142	0.32	0.41	8.59	1.27	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F 178	0	0	0.142	0	0	0	0	
F 177	1.077	1.077	0.142	0.271	0.3	7.39	1.1	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
OF51117	0	0	0.142	0	0	0	0	
F 901	0.229	0.229	0.142	0.166	0.11	4.76	0.68	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F 40	0	0	0.142	0	0	0	0	
F 41	0.469	0.469	0.142	0.207	0.18	5.77	0.85	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F 75	0	0	0.142	0	0	0	0	
F 74	0.138	0.138	0.142	0.138	0.09	3.75	0.64	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F 307	0	0	0.142	0	0	0	0	
F 341	0	0	0.142	0	0	0	0	
F 343	0.122	0.122	0.142	0.133	0.08	3.58	0.62	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
F 4	0	0	0.142	0	0	0	0	
F 393	0	0	0.142	0	0	0	0	
F 392	0.277	0.277	0.142	0.176	0.13	5	0.72	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F 3	0	0	0.142	0	0	0	0	
F 394	0	0	0.142	0	0	0	0	
F 110	0	0	0.142	0	0	0	0	
F 111	3.639	3.639	0.142	0.415	0.69	8.85	1.65	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F 386	0	0	0.142	0	0	0	0	
OF51147	0	0	0.142	0	0	0	0	
F 385	1.021	1.021	0.142	0.266	0.29	7.26	1.09	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
F 376	0	0	0.142	0	0	0	0	
F 377	1.711	1.711	0.142	0.319	0.4	8.57	1.27	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F 215	0	0	0.142	0	0	0	0	
F 379	1.345	1.345	0.142	0.293	0.35	7.92	1.18	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F 160	0	0	0.142	0	0	0	0	
F 159	1.174	1.174	0.142	0.279	0.32	7.58	1.14	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F 98a	0	0	0.142	0	0	0	0	
F 99	2.174	2.174	0.142	0.346	0.47	8.85	1.37	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2

F 446	0	0	0.142	0	0	0	0	
F 446a	0.435	0.435	0.142	0.202	0.17	5.65	0.83	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
F 303	0	0	0.142	0	0	0	0	
F 48	0	0	0.142	0	0	0	0	
F 49	0.187	0.187	0.142	0.156	0.1	4.5	0.65	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
F 313	0	0	0.142	0	0	0	0	
F 314	0.185	0.185	0.142	0.156	0.1	4.5	0.64	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F 414	0	0	0.142	0	0	0	0	
F 415	0.241	0.241	0.142	0.169	0.12	4.82	0.69	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F 274	0.767	0.767	0.142	0.242	0.24	6.66	1	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
OF51150	0	0	0.142	0	0	0	0	
F 327	0.387	0.387	0.142	0.195	0.16	5.46	0.8	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
F 2\4	0.281	0.281	0.142	0.177	0.13	5.01	0.73	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F 71	0.281	0.281	0.142	0.177	0.13	5.01	0.73	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F Node15a	0.724	0.724	0.142	0.238	0.23	6.54	0.98	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F Node 22\	1.236	1.236	0.142	0.284	0.33	7.71	1.15	AR&R 5 year, 45 minutes storm, average 41.4 mm/h, Zone 2
F Node 314	0.615	0.615	0.142	0.225	0.21	6.24	0.93	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
F 61\2	0	0	0.142	0	0	0	0	
F Node 74z	0.3	0.3	0.142	0.181	0.13	5.11	0.74	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F Node 93z	0.061	0.061	0.142	0.106	0.06	2.68	0.54	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
F 9	0	0	0.142	0	0	0	0	
F 8	0	0	0.142	0	0	0	0	
F 6	0	0	0.142	0	0	0	0	
F 5	0.184	0.184	0.142	0.155	0.1	4.48	0.65	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F Pit12	0	0	0.142	0	0	0	0	
F Pit13	0.285	0.285	0	0.066	0.03	13.26	0.49	AR&R 5 year, 6 hours storm, average 9.5 mm/h, Zone 2
F Pit32	0	0	0.142	0	0	0	0	
OF78192	0	0	0.142	0	0	0	0	
F Pit29	0	0	0.142	0	0	0	0	
F Pit34	0.166	0.166	0.142	0.147	0.1	4.05	0.66	AR&R 5 year, 1.5 hours storm, average 26.2 mm/h, Zone 2
F Pit GPT	0	0	0.142	0	0	0	0	
OF78154	0.906	0.906	0	0.113	0.08	17.95	0.69	AR&R 5 year, 6 hours storm, average 9.5 mm/h, Zone 2
OF51128	0	0	0	0	0	0	0	
F 401	0.953	0.953	0.142	0.26	0.28	7.11	1.07	AR&R 5 year, 6 hours storm, average 9.5 mm/h, Zone 2
F Pit6	0	0	0.142	0	0	0	0	
F Pit8	0.371	0.371	0.142	0.192	0.15	5.41	0.79	AR&R 5 year, 6 hours storm, average 9.5 mm/h, Zone 2
F 371	0	0	0	0	0	0	0	
OF153962	0.874	0.874	0.182	0.5	0.44	4	0.87	AR&R 5 year, 3 hours storm, average 15.9 mm/h, Zone 2
OF137218	2.269	2.571	0	0.18	0.17	22.81	0.95	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
OF82141	4.13	4.13	1.753	0.423	0.41	10	0.98	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
OF82144	3.384	3.384	1.753	0.374	0.34	10	0.9	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
F 273	0	0	0.142	0	0	0	0	
F 347	0	0	3.226	0	0	0	0	
F 346	0	0	0.142	0	0	0	0	
F 348	0.518	0.518	0.142	0.213	0.19	5.93	0.88	AR&R 5 year, 3 hours storm, average 15.9 mm/h, Zone 2
F 291	0	0	0	0	0	0	0	
F 290	0.218	0.218	0.142	0.164	0.11	4.69	0.67	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
OF118859	0	0	0.142	0	0	0	0	
F 279	0.335	0.335	0.142	0.187	0.14	5.27	0.76	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
OF118882	0.049	0.049	0.142	0.099	0.05	2.44	0.52	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
F 183	1.077	1.077	0.142	0.271	0.3	7.39	1.1	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
OF121852	0	0	0	0	0	0	0	
OF121886	0.199	0.199	0.142	0.159	0.1	4.58	0.66	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
OF121872	0	0	0	0	0	0	0	
OF121903	0.505	0.505	0.142	0.211	0.19	5.88	0.88	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
OF121924	0	0	1.701	0	0	0	0	
OF153967	0	0	0	0	0	0	0	
F 395	0.961	0.961	0.142	0.261	0.28	7.12	1.07	AR&R 5 year, 3 hours storm, average 15.9 mm/h, Zone 2
OF51123	0	0	0.142	0	0	0	0	
F 336	0	0	0.142	0	0	0	0	
F 337	0.01	0.01	0.142	0.06	0.02	1.12	0.41	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
F 338	0	0	0.142	0	0	0	0	
F 345	0.369	0.369	0.142	0.192	0.15	5.39	0.79	AR&R 5 year, 6 hours storm, average 9.5 mm/h, Zone 2
OF206891	0	0	0.142	0	0	0	0	
OF185927	0.82	0.82	0.142	0.248	0.25	6.8	1.02	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
OF218457	0.482	0.482	0.142	0.209	0.18	5.81	0.86	AR&R 5 year, 30 minutes storm, average 52.4 mm/h, Zone 2
OF135437	1.471	1.471	1.753	0.224	0.15	10	0.66	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
OF146104	1.445	1.445	0.142	0.3	0.36	8.1	1.21	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
OF146119	1.901	1.901	0.142	0.331	0.43	8.85	1.3	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
OF146085	1.111	1.111	0.142	0.274	0.31	7.46	1.12	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
OF146067	1.901	1.901	0.142	0.331	0.43	8.85	1.3	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
OF149269	0	0	0	0	0	0	0	
OF205948	3.381	3.381	1.753	0.374	0.34	10	0.9	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2

DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level
SchoolOval	237.29	1186.1	0.82	0.82	0
PaytenParl	238.2	11136.1	0.906	0	0.906
DundasPar	238.19	13305.6	0.953	0.953	0
U/S Railwa	238.02	2070.2	0.874	0.874	0
Proposed_	238.56	19915.9	0.363	0.363	0
Proposed_	237.98	11534.7	0.82	0.82	0

CONTINUITY CHECK for AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2

Node	Inflow (cu.m)	Outflow (cu.m)	Storage Ch (cu.m)	Difference %
66	707.11	707.35	0	0
67	707.35	707.35	0	0
22\1	371.87	371.47	0	0.1
22\2	371.47	371.47	0	0
373	788.1	787.52	0	0.1
374	787.52	787.52	0	0
249	4027.76	3766.86	0	6.5

248	3766.86	3749.62	0	0.5
244	7986.9	7947.04	0	0.5
243	7947.04	7937.61	0	0.1
242	7937.61	7927.09	0	0.1
239	7927.09	7926.84	0	0
253	0	0	0	0
257	6658.75	6477.08	0	2.7
158	11081.4	11064.87	0	0.1
157	11064.87	11064.02	0	0
433	713.47	712.4	0	0.1
445a	1314.75	1312.13	0	0.2
445	1312.13	1312.1	0	0
443	603.3	602.35	0	0.2
120	2614.39	2613.33	0	0
121	32616.84	32431.55	0	0.6
126	1546.31	1545.4	0	0.1
129	33976.93	33922.46	0	0.2
147	956.04	954.75	0	0.1
142	15441.24	15394.27	0	0.3
93	867.52	867.1	0	0
94	867.1	867.1	0	0
64	2882.41	2881.45	0	0
65	2881.45	2881.42	0	0
188	5526.59	5521.09	0	0.1
183	5521.09	5520.79	0	0
108	468.95	468.61	0	0.1
109	14400.99	14375.81	0	0.2
198	192.76	192.58	0	0.1
197	14503.77	14486.53	0	0.1
178	10448.92	10431.98	0	0.2
177	10431.98	10431.37	0	0
219	1393.97	1393.17	0	0.1
901	1393.17	1393.17	0	0
40	3104.36	3103.43	0	0
41	3103.43	3103.43	0	0
75	754.58	754.14	0	0.1
74	754.14	754.14	0	0
307	700.43	700.18	0	0
304	700.18	700.18	0	0
341	481.97	480.83	0	0.2
342	480.83	479.12	0	0.4
343	479.12	479.12	0	0
4	1773.04	1772.61	0	0
393	1772.61	1771.28	0	0.1
392	1771.28	1771.28	0	0
3	0	0	0	0
394	0	0	0	0
110	14375.81	14367.57	0	0.1
111	30017.81	30003.49	0	0
386	6110.25	6102.86	0	0.1
387	6102.86	6103.27	0	0
385	6103.27	6103.22	0	0
376	787.52	787.12	0	0.1
377	14322.45	14311.2	0	0.1
215	1171.64	1167.99	0	0.3
217a	9171.25	9167.06	0	0
214a	9167.06	9143.34	0	0.3
379	12143.02	12142.28	0	0
160	695.73	695.33	0	0.1
159	11126.69	11081.4	0	0.4
98a	5514.69	5507.78	0	0.1
99	15706.38	15650.26	0	0.4
446	1312.1	1311.46	0	0
446a	2869.4	2869.38	0	0
303	906.19	905.73	0	0.1
308a	905.73	905.73	0	0
48	1521.3	1520.52	0	0.1
49	1520.52	1520.5	0	0
313	1124.57	1124.3	0	0
314	1124.3	1124.3	0	0
414	1559.37	1557.95	0	0.1
415	1557.95	1557.95	0	0
276	3649.17	3641.14	0	0.2
275	6090.41	6069.1	0	0.3
274	6069.1	6068.91	0	0
325	3153.57	3152.96	0	0
326	3152.96	3151.32	0	0.1
327	3151.32	3151.29	0	0
OUTLET 05	1967.06	1967.06	0	0
2\4	1751.54	1751.54	0	0
71	1751.54	1751.54	0	0
Node15a	5340.29	5340.04	0	0
Outlet 67	5340.04	5340.04	0	0
Node 22\3	8616.96	8584.38	0	0.4
Node 314a	3993.67	3992.85	0	0
OUTLET 34	5216.88	5216.88	0	0
OUTLET 38	6103.22	6103.22	0	0
OUTLET 41	3103.43	3103.43	0	0
OUTLET 49	1520.5	1520.5	0	0
61\2	0	0	0	0
Node 74a	1692.88	1692.88	0	0
OUTLET 74	1692.88	1692.88	0	0
Node 93a	434.72	434.72	0	0
OUTLET 12	49212.79	49212.79	0	0
9	1947.49	1943.27	0	0.2

8	1976.85	1972.95	0	0.2
6	1972.95	1967.27	0	0.3
5	1967.27	1967.06	0	0
Pit12	3138.48	3136.54	0	0.1
Pit13	3134.24	3125.9	0	0.3
Pit32	3125.9	3115.62	0	0.3
SchoolOval	6715.5	6715.47	0.02	0
Pit29	6715.47	6704.45	0	0.2
Pit34	8572.82	8557.49	0	0.2
Pit GPT	7618.74	7607.89	0	0.1
discharge f	7607.89	7607.89	0	0
O Pit GPT	0	0	0	0
O 392	1771.28	1771.28	0	0
PaytenParl	5621.12	0	5425.91	3.5
DundasPar	14660.95	2459.33	11781.85	2.9
401	2459.33	2455.43	0	0.2
Pit6	0	-0.41	0	0
Pit8	-0.41	-2.3	0	0
U/S Railwa	9739.76	7753.56	1804.48	1.9
N192692	7753.56	7749.02	0	0.1
N172535	11210.77	11210.77	0	0
N101397	33292.21	32794.09	0	1.5
N101398	19253.74	19253.74	0	0
273	2451.86	2449.27	0	0.1
347	1268.42	1267.83	0	0
346	1871.48	1871.85	0	0
348	5347.22	5216.88	0	2.4
291	2119.88	2118.57	0	0.1
290	2118.57	2118.46	0	0
278	3259.1	3257.08	0	0.1
279	3257.08	3256.92	0	0
192	4936.19	4932.95	0	0.1
183a	10453.74	10448.92	0	0
200	2028.9	2027.45	0	0.1
199	2027.45	2027.31	0	0
203	5150.99	5145.81	0	0.1
202	5145.81	5145.44	0	0
207	8097.78	8088.25	0	0.1
208	8088.25	8084.55	0	0
218a	8084.55	8069.23	0	0.2
209a	8069.23	8051.83	0	0.2
213	8051.83	8028.8	0	0.3
216a	8028.8	8003.26	0	0.3
HW1103	7749.02	7677.39	0	0.9
N192689	8496.32	8491.76	0	0.1
N162485	32794.09	32794.09	0	0
61\1	0	0	0	0
Proposed_	19347.24	2734.64	16557.56	0.3
337	3087.57	3073.71	0	0.4
338	3012.6	2998.33	0	0.5
345	3477.44	3475.36	0	0.1
Proposed_	16511.23	6662.86	9818.09	0.2
N230386	6662.86	6658.75	0	0.1
N270468	2176.58	2176.58	0	0
N168004	10198.6	10198.6	0	0
140	15348.34	15291.78	0	0.4
141	15291.76	15290.37	0	0
131	15394.27	15349.57	0	0.3
130	15349.59	15348.34	0	0
HW47	19253.74	19105.95	0	0.8
N184609	19105.95	19104.87	0	0

Run Log for 055 run at 15:41:02 on 14/4/2021 using version 2020.061

No water upwelling from any pit.

Freeboard was less than 0.15m at 243, Pit8, Pit13, 248, 393

The maximum flow in these overflow routes is unsafe: OF205948, OF146119, OF146104, OF146085, OF146067, OF218457, OF185927, OF153962, OF121903, OF121886, OF118839, F 279, F 290, OF82144, OF82.

These overflow routes carried water uphill (adding energy): F Pit8. These results may be invalid. This is likely due to either incorrect surface levels specified at pits or high downstream tailwater levels which th

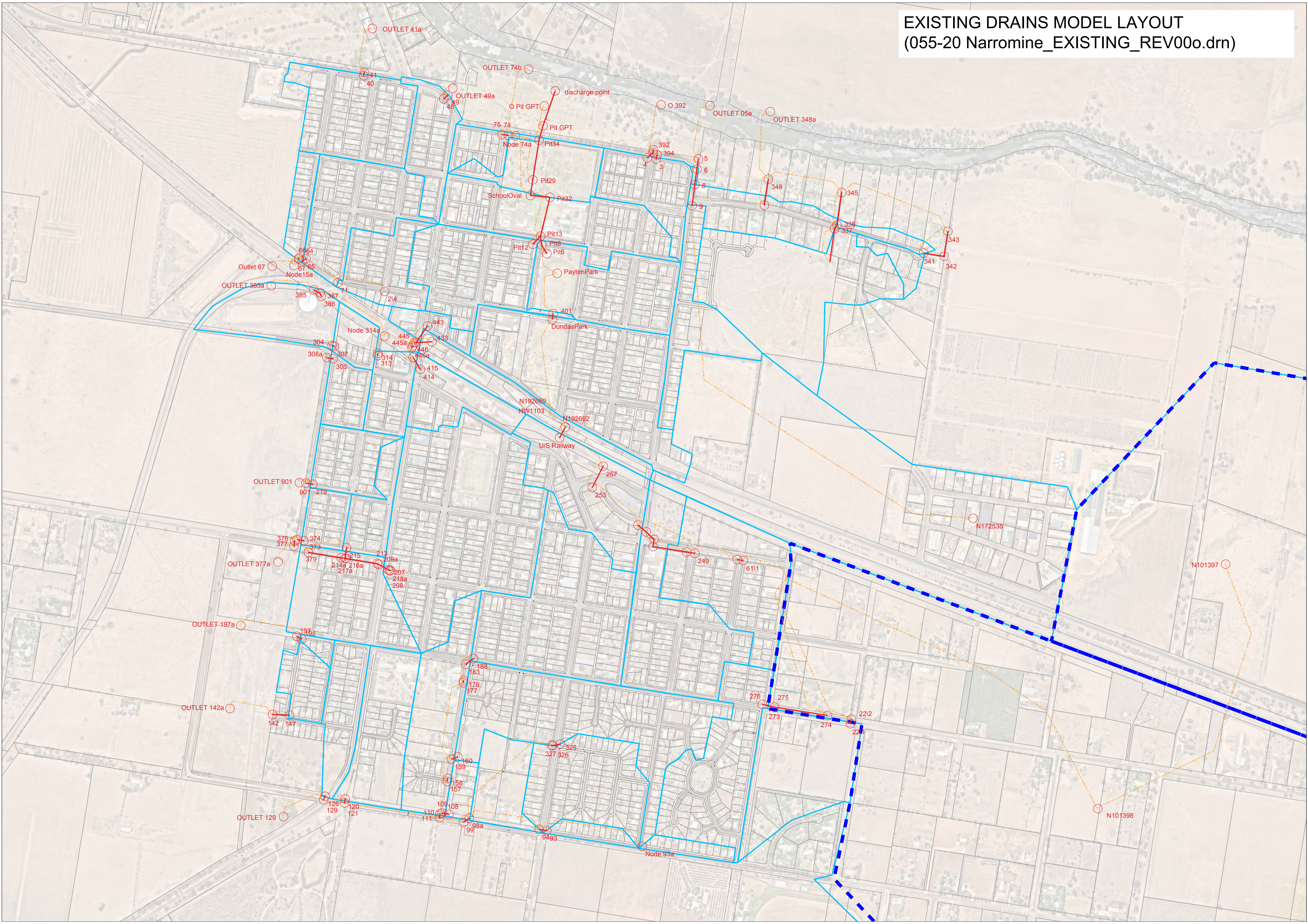
IGNORE THESE WARNINGS AT YOUR OWN PERIL.\cf1

141, OF137218, OF78154, F 5, F 142, F 157, F 109, F 177, F 159, F 183, F 197, F 2\4, F 71, F Node15a, F 274, F 239, F 257, F Node 22\3, F 314, F Node 314a, F 327, F 345, F 348, F 374, F 379, F 377, F 385, F 392, F 3
ie Lite Hydraulic model cannot handle. Analysing the latter requires solving the full unsteady flow equations in overflow routes using the Full Unsteady Hydraulic model (Formerly Premium Hydraulic model).

195, F 401, F 41, F 415, F 446a, F 445, F 49, F 65, F Node 74a, F 901, F 99, F 111, F 121, F 129, F Pit34, F Pit13, F Pit8

Appendix C – DRAINS Model Layout

EXISTING DRAINS MODEL LAYOUT
(055-20 Narromine_EXISTING_REV00o.drn)



PROPOSED OPTION 2 DRAINS MODEL LAYOUT
(055-20 Narromine_PROPOSED_REV00g_upgrade
pipes for 5yr ari with basin.drn)

