1. WORKS REPORT

Author	Director Infrastructure and Engineering Services
Responsible Officer	Director Infrastructure and Engineering Services
Link to Strategic Plans	CSP – 4.3.4 Ensure Council's property assets are monitored and well managed

Executive Summary

This report provides information regarding works undertaken for the given period in regards to both operational and capital works.

Report

The Works Report (***Attachment No. 1***) for the period 5 May 2021 to 1 June 2021 is presented to Council for information.

Financial Implications

Council has provision for these services in its Operational Budget.

Legal and Regulatory Compliance

Local Government Act 1993
Roads Act 1993

Risk Management Issues

Nil

Internal/External Consultation

Nil

Attachments

1. Works Report

RECOMMENDATION

That the information be noted.

2. DRINKING WATER QUALITY MANAGEMENT

Author	Manager Utilities
Responsible Officer	Director Infrastructure and Engineering Services
Link to Strategic Plans	CSP – 4.3.4 Ensure Council's property assets are monitored and well managed

Executive Summary

This report provides information regarding the Narromine Shire Council Drinking Water Quality Management System Annual Report to the NSW Department of Health and NSW, DPIE -Water

Report

This annual report documents Narromine Shire Council's (NSC's) Drinking Water Management System (DWMS) implementation and drinking water performance from 1 January to 31 December 2020. A summary of drinking water performance for the period is summarised below.

There were no critical control point exceedances recorded in 2020 in the Narromine or Trangie water supply systems (Table i).

Table i. Critical control point exceedances

	Narromine CCP1	Narromine CCP2	Trangie CCP1	Trangie CCP2
Number of CCP exceedances	0	0	0	0

Narromine water quality

When 2020 began, the Narromine water supply had no means of controlling iron and manganese levels in the drinking water. This became an issue in March/April 2020 as the water quality from one of the bores (bore 9) significantly deteriorated. There were water quality complaints and the bore was taken offline. To address this issue a temporary water treatment plant was installed in April and was commissioned in July 2020 to treat water from bore 9 and bore 6. This plant is capable of removing the iron and manganese. No monitoring results from this period were outside the AWDG guidelines.

Water from the Narromine water supply system has been consistently within limits and ADWG guidelines. There was a decline in free chlorine in the first quarter due to the deterioration of raw water quality from bore 9 but water stayed within ADWG limits. Once this issue was addressed water quality stabilised.
There were no aesthetic or health guideline exceedances or E. coli detections.
All free chlorine results from the Narromine reticulation were above 0.2 mg/L as recommended by the ADWG.

2. DRINKING WATER QUALITY MANAGEMENT (Cont'd)

Trangie water quality

NSW Health verification monitoring of Trangie drinking water recorded high sodium, high pH, high temperature, one occasion of low free chlorine with 0.15 mg/L and two total coliforms detections of 1 cfu/100 mL and 11 cfu/100 mL. There were no health or aesthetic guideline exceedances or *E. coli* detections.

It is known that Trangie raw water has a high sodium and pH and there are no treatment processes that are capable of controlling those characteristics present. There was found to be no issue with the free chlorine at the time of the detections. Following the low free chlorine detection, the reticulation system was flushed and additional monitoring undertaken to ensure the free chlorine returned to above the ADWG guideline (0.2 mg/L).

Continuous improvement plan

Continuous improvement plan progress in 2020 has been summarised in Table ii.

Table ii. Improvement plan progress

	Completed/ Implemented	In progress	Not started	Items added	Total
Number of actions	13	8	5	0	26

Financial Implications

Council has provision for these services in its Operational Budget.

Legal and Regulatory Compliance

Local Government Act 1993
Public Health Act 2010 No 127
Public Health Regulation 2012
Water Management Act 2000 No 92

Risk Management Issues

Nil

Internal/External Consultation

Nil

Attachments

Nil

RECOMMENDATION

That the information be noted.

3. NATURE STRIPS AND TREE POLICY

Author	Director Infrastructure and Engineering Services
Responsible Officer	Director Infrastructure and Engineering Services
Link to Strategic Plans	CSP – 4.2.8 Implement best practice governance standards, transparent decision making and a strong ethical culture 3.2.2 Ensure Regulatory compliance with environmental legislation DP – 4.2.8.2 Maintain a framework of relevant policies and procedures.

Executive Summary

The purpose of this report is to present feedback from public exhibition and seek Council's endorsement to adopt the draft Nature Strips and Tree Policy.

Report

At Council's Ordinary Meeting 14 April 2021, it was resolved (Resolution number 2021/073) that the draft Nature Strips and Tree Policy (***Attachment No. 2***) be adopted and placed on public exhibition for a period for 28 days.

The draft Nature Strips and Tree Policy was subsequently placed on Council's website and Facebook for public viewing. Submissions closed on 15 May 2021.

Council received no submissions.

A cost analysis was conducted to determine what operational budget would be required to include verge and road shoulder mowing, therefore increasing the level of service. A breakdown of costs is presented in the table below:

Description	**Location**	**Frequency (average per week)**	**Cost per annum**
Footpath verge / Nature Strip	Narromine	1x per week	$370,000
Road reserve / Shoulder	Narromine	1x per week	$115,000
		Total	**$485,000**
Footpath verge / Nature Strip	Trangie	1x per week	$150,000
Road reserve / Shoulder	Trangie	1x per week	$109,000
		Total	**$259,000**
		Grand Total	**$744,000**

Notes:

1 It has been assumed that more frequent mowing will take place during the growing season.

3. NATURE STRIPS AND TREE POLICY (Cont'd)

2. No allowance has been made for extra effort required to mow in tight spots or for whipper snipping.

The draft Nature Strips and Tree Policy required clarification regarding footpath maintenance (under section 8.1 of the of the Draft Policy), which have been included and is now presented for adoption (***Attachment No. 2***).

Financial Implications

Should Council wish to increase the level of service to include mowing of the verge then an additional $744,000 per year needs to be allocated to the Operational Budget. CPI needs to be included as well.

Legal and Regulatory Compliance

Council has regulatory responsibilities under the following: -

- Environmental Planning and Assessment Act 1979
- Roads Act 1993
- Civil Liability Act 2002
- *Local Government Act 1993* (NSW)
- *Protection of the Environment Operations Act 1997* (NSW)
- *Protection of the Environment Operations (General) Regulation 2009* (NSW)
- Australian Standard 4373-2007 – Pruning of Amenity Trees
- Australian Standard 2303-2015 – Tree Stock for Landscape Use
- Australian Standard ISO 31000:2009 Risk Management – Principles and Guidelines

Risk Management Issues

1 The policy is to promote a consistent Local Government approach to manage nature strips and trees across the Narromine LGA townships.

2 Should Council wish to increase level of service then the following additional risks should be considered:
   a. Managing of user expectations since some may want a higher level of service while others may not.
   b. Ensuring that areas for mowing is accessible for council workers to ensure smooth programming and implementation of service. Rework or mowing of "skipped" properties due to other reasons have not been budget for.
   c. Potential increase in claims due to alleged damage to property
   d. Increase effort to operators to manoeuvre small plant and equipment in tight spots
   e. More interaction of ratepayers with Council staff.

3. NATURE STRIPS AND TREE POLICY (Cont'd)

Internal/External Consultation

The policy was placed on public exhibition for comment.

Attachments

1. Draft Nature Strips and Tree Policy

RECOMMENDATION

That Council adopt the draft Nature Strips and Tree Policy with the minor change made.

4. DRAFT STORMWATER DRAINAGE STUDY REPORT

Author	Manager Engineering Services
Responsible Officer	Director Infrastructure and Engineering Services
Link to Strategic Plans	CSP – 3.1 Manage our natural environments for current and future generations

Executive Summary

The purpose of this report is to seek Council's approval to place the draft Stormwater Drainage Study Report on public exhibition seeking comments from interested parties.

Report

Narromine Shire Council engaged Storm Consulting to undertake a stormwater drainage study for the Narromine Township (***Attachment No. 3***).

The previous Narrromine Drainage Feasibility Study of the Narromine Northern catchment' dated 21/12/18 indicated many areas of the town were 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.

The objectives of the study were:

- Review of data including the detailed survey 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 identified/presented.

4. DRAFT STORMWATER DRAINAGE STUDY REPORT (Cont'd)

Financial Implications

Council had provision for these services in its Operational Budget.

Legal and Regulatory Compliance

Local Government Act 1993

Risk Management Issues

Identifying stormwater catchments within the township that presented drainage issues and developing options to mitigate these issues.

Internal/External Consultation

Consultants
Executive Leadership Team
Councillor Workshop

Attachments

1. Draft Stormwater Drainage Study Report

RECOMMENDATION

That the Draft Stormwater Drainage Study Report be placed on public exhibition for 28 days.

5. CALE OVAL GRANDSTAND UPGRADE

Author	Manager Waste and Community Facilities
Responsible Officer	Infrastructure and Engineering Services Director
Link to Strategic Plans	Community Strategic Plan Guiding Principle 1. Vibrant Communities - to create a safe, healthy and connected region that encourages participation and creates a strong sense of pride in our community and each other's wellbeing. Action 1.1 A safe, active and healthy community 1.1.4 Promote services and provide facilities that foster healthy lifestyles. 1.1.5 Recognise the importance and consider resources needed to maintain open spaces, to encourage greater use by the community Action 1.2 A vibrant and diverse community that has a strong sense of belonging and wellbeing.

5. CALE OVAL GRANDSTAND UPGRADE (Cont'd)

Executive Summary

This report is presented to Council to consider and approve funding in order to award the tender for the Cale Oval Grandstand Upgrade Project.

Report

Council has called for Tenders for the Cale Oval Grandstand Upgrade. The tender closed on 9 June 2021. The General Manager under delegated authority considered the Evaluation Panel's report and determined to award the tender subject to additional funding being sourced.

If Council wishes to continue with the project which has been identified as an action within Council's Delivery Program, it will need to allocate additional funds in order to meet the budget shortfall. This is due to the current volatile market in raw materials which has increased the expected cost of the project.

Whilst Council could stage the development it is considered that the best approach would be to fund the whole project as originally planned to take advantage of today's cost estimate and project economies of scale. It will also streamline the overall delivery of the project and negate mobilisation and demobilisation costs. Overall, Council's risk would be better managed as well.

Summary of Project

The upgrade of the Cale Oval Grandstand was first identified as a priority through the development of the Cale Oval Concept Plan, adopted by Council in early 2019.

The Cale Oval Grandstand upgrade will involve the removal of all facilities currently on the grounds to allow for the construction of a single storey clubhouse. The clubhouse will include all amenities such as change rooms, bathrooms, kitchen, canteen, audio visual, medical and storage rooms, together with tiered seating for spectators.

Council has worked in consultation with primary grounds users to design the upgraded facility in line with sporting code requirements and desires of specific clubs. The result of this construction will be a multifunctional recreational and sporting facility which meets all state sporting code requirements.

Successful grant funding of $330,000.00 from the Local Roads and Community Infrastructure program, in addition to $925,604.00 from the Resources for Regions fund have allowed Council to progress the project through design and development stage to the distribution of tender documentation for construction of the facility.

Construction is expected to begin in September 2021 and be completed in February 2022 to minimise disruption during peak usage of the grounds during the winter season.

5. CALE OVAL GRANDSTAND UPGRADE (Cont'd)

Financial Implications

Due to the current volatile materials market additional funding of $700,000.00 is required. The funding source is from unrestricted cash reserve.

Legal and Regulatory Compliance

The General Manager has delegated authority to accept or decline tenders.
Council is unable to delegate the borrowing of money, or the voting of money for expenditure on its works, services or operations (section 377 of the Local Government Act 1993). This must be a resolution of Council.

Risk Management Issues

The Cale Oval Strategic Master Plan has listed the grandstand and amenities upgrade as being an identified strategic action within Council's Delivery Program.

If Council does not wish to continue with the project, it will need to forgo the Cale Oval Development Grants in the sum of $1,255,604.00

Internal/External Consultation

Identified project within Council's Delivery Program.

Attachments

Nil

RECOMMENDATION

1. That Council approves the allocation of $700,000.00 from unrestricted cash reserves for the Cale Oval Grandstand Upgrade project.

André Pretorius
Director Infrastructure and Engineering Services

Narromine SHIRE COUNCIL	**MONTHLY WORKS REPORT** **Tuesday, 1 June 2021**	Infrastructure and Engineering Services Narromine Shire Council Tel: 02 6889 9999 Fax: 02 6889 9998 mail@narromine.nsw.gov.au

Road and Park users are to proceed with caution at all work sites and observe work signs to ensure safety.
Speed zones are enforceable with possible short delays.
For all enquiries, please contact Council's Infrastructure and Engineering Services Department on 6889 9999.

URBAN ROADS – Narromine, Trangie, Tomingley	
Various Streets (Narromine)	**Maintenance:** • Routine Maintenance Program such as patching and street sweeping, etc. • Weed spraying of streets, lanes, gutters and footpaths ongoing.
Various Streets (Trangie)	**Maintenance:** • Routine Maintenance Program such as patching and street sweeping, etc. • The mobility access ramps in Dandaloo Street are almost complete, with linemarking still to be completed.
Various Streets (Tomingley)	**Maintenance:** • Routine Maintenance Program by contractor. Contractor 's contract renewed.
UNSEALED ROADS NETWORK	
Various Unsealed Roads	**Maintenance: *Map No. 1*** • Gin Gin Weir Road – Maintenance grade • Backwater Road – Maintenance grade • Gibson's Lane – Maintenance grade • Bundemar Road – Maintenance grade • Frecklingtons Crossing – Maintenance grade • Browns Lane – Maintenance grade **Capital: *Map No. 2*** • Frecklingtons Crossing – Flood damage repair **Roadside spraying completed by Council - Biosecurity** • Wallaby Road • Jones Road
SEALED ROADS NETWORK	
Various Sealed Roads	**Maintenance:** • Pothole patching where required **Capital:** • Backwater Road – Shoulder works • Willydah Road – Rahab **Roadside spraying completed by Council - Biosecurity** • Tantitha Road • Webbs Siding Road • Narromine Treatment Works • Trangie Treatment Works • Mitchell Highway • Collie Road

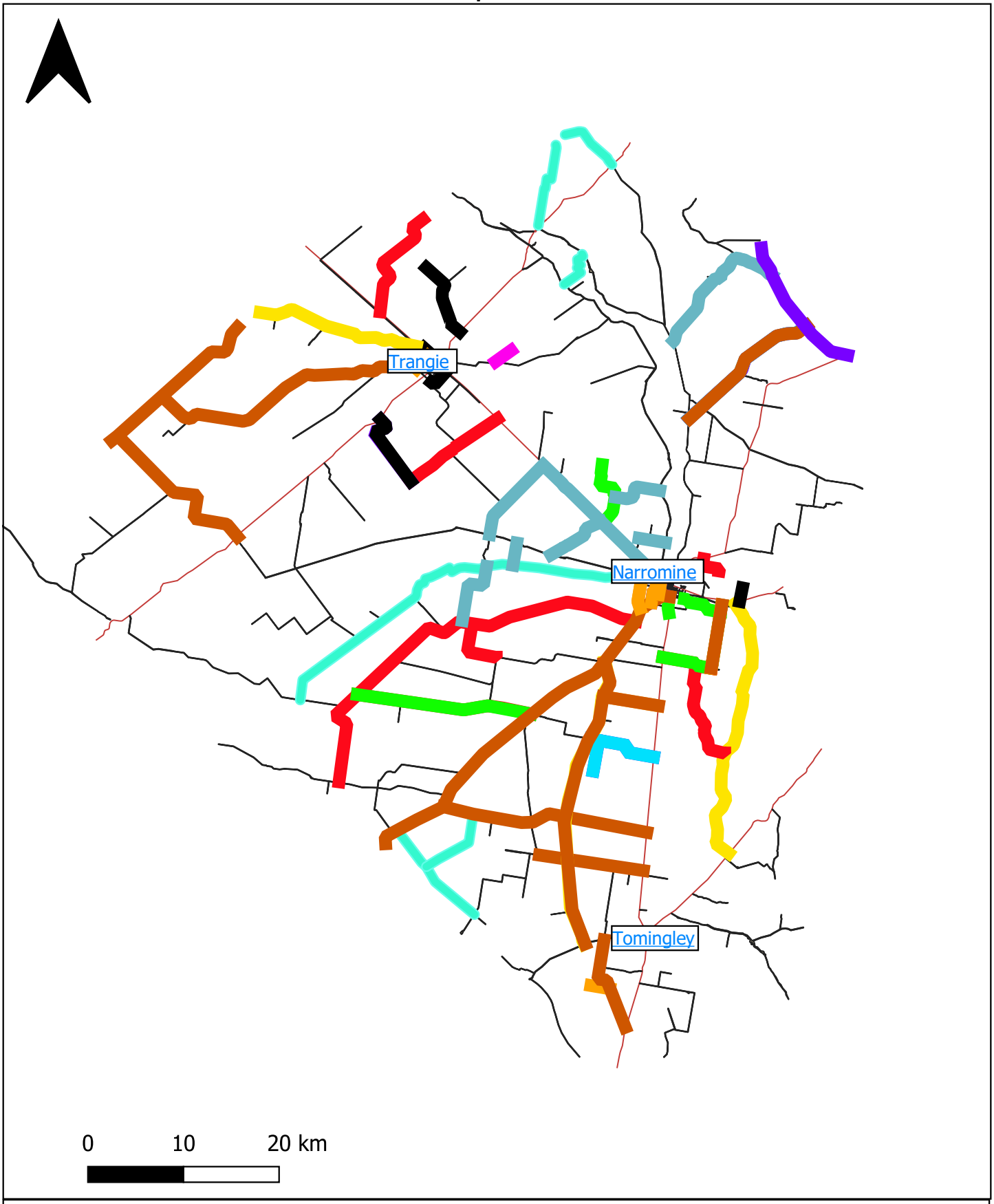
Narromine Shire Council	**MONTHLY WORKS REPORT** **Tuesday, 1 June 2021**	Infrastructure and Engineering Services Narromine Shire Council Tel: 02 6889 9999 Fax: 02 6889 9998 mail@narromine.nsw.gov.au

SWIMMING POOLS	
Narromine Pool	• Closed for winter
Trangie Pool	• Closed for winter
PARKS AND OPEN SPACE NETWORK CBD Gardens, Parks, Ovals, Villages	
Narromine CBD	• Ongoing vegetation management. • Staged reduction of hedge height in main street progressing. • Repairs to irrigation in main street progressing.
Narromine Parks and Reserves	• General maintenance and mowing. • Weed control in all small parks ongoing. • Dundas Park Playground construction is nearing completion. • Wetlands – Construction of carpark complete, with primary pond continuing.
Narromine Sports Grounds	• General maintenance, spraying and mowing. • Netball amenities building construction commenced. • Cale Oval spectator mound construction continuing.
Narromine Streets	• General maintenance. • Street sweeping continues.
Trangie CBD	• General maintenance and weed control ongoing. • Vegetation mowing and slashing continuing.
Trangie Parks	• General maintenance and mowing. • Swift Park Playground construction complete. Watering in of new turf and plantings continues.
Trangie Sports Grounds	• Maintenance program in place for winter sport.
Trangie Streets	• General maintenance. • Street sweeping weekly on Thursdays. • Drainage improvement construction completed in Bimblebox Lane.
Tomingley Village	• Contractor's contract renewed.
AERODROME	
Narromine Aerodrome	• Tree trimming, slashing and weed control continues.
BUILDING MAINTENANCE	
All Buildings	• General maintenance as required.
Vandalism	• Graffiti continues in both Narromine and Trangie.
Narromine Medical Centre	• General maintenance as required.
Council Administration Buildings	• General maintenance as required.

Narromine SHIRE COUNCIL	**MONTHLY WORKS REPORT** **Tuesday, 1 June 2021**	Infrastructure and Engineering Services Narromine Shire Council Tel: 02 6889 9999 Fax: 02 6889 9998 mail@narromine.nsw.gov.au

PUBLIC CONVENIENCES	
Rotary Park (Narromine) Public Toilets	• Toilet facilities cleaned daily.
Burraway Street Public Toilets (adjacent to Pool)	• Toilet facilities cleaned daily.
Manildra Street Toilets (at Saleyards)	• Toilet facilities are now open, 24 hours a day, 7 days a week and are cleaned daily.
Argonauts Park (Trangie) Public Toilets (Goan Waterhole)	• Toilet facilities cleaned every Tuesday, Thursday and Saturday.
Dandaloo Street Trangie (adjacent to Bakery)	• Toilet facilities cleaned every Monday, Wednesday and Friday.
Narromine and Trangie Truck Wash	• Waiting for outcome of land acquisition process for the Trangie Truck wash.
Wetlands	• Toilet block secured and cleaned daily.
CEMETERIES	
Narromine Cemetery	• General maintenance continues. • Topping up of subsiding graves continues. • The continuation of the brick wall fence along Nellie Vale Road is complete. • Weed spraying continues.
Trangie Cemetery	• General maintenance, mowing and weed spraying. • Topping up of subsiding graves continues.
WATER AND SEWER	
Tomingley	• Regular maintenance at the water treatment plant.
Trangie	• Staff have continued reticulation system maintenance. • Staff continue regular sewer pump station and STP system maintenance as required. • Staff continue daily operational Drinking Water Quality Testing as required by legislation
Narromine	• Staff continue daily operational Drinking Water Quality Testing as required by legislation • Staff removed redundant water mains in A'Beckett St, Cathundril St, Nymagee St and water main near Nymagee St. • Installation of new valves in A'Beckett St and Murgah St. • Staff continue reticulation system maintenance.

Map No. 1



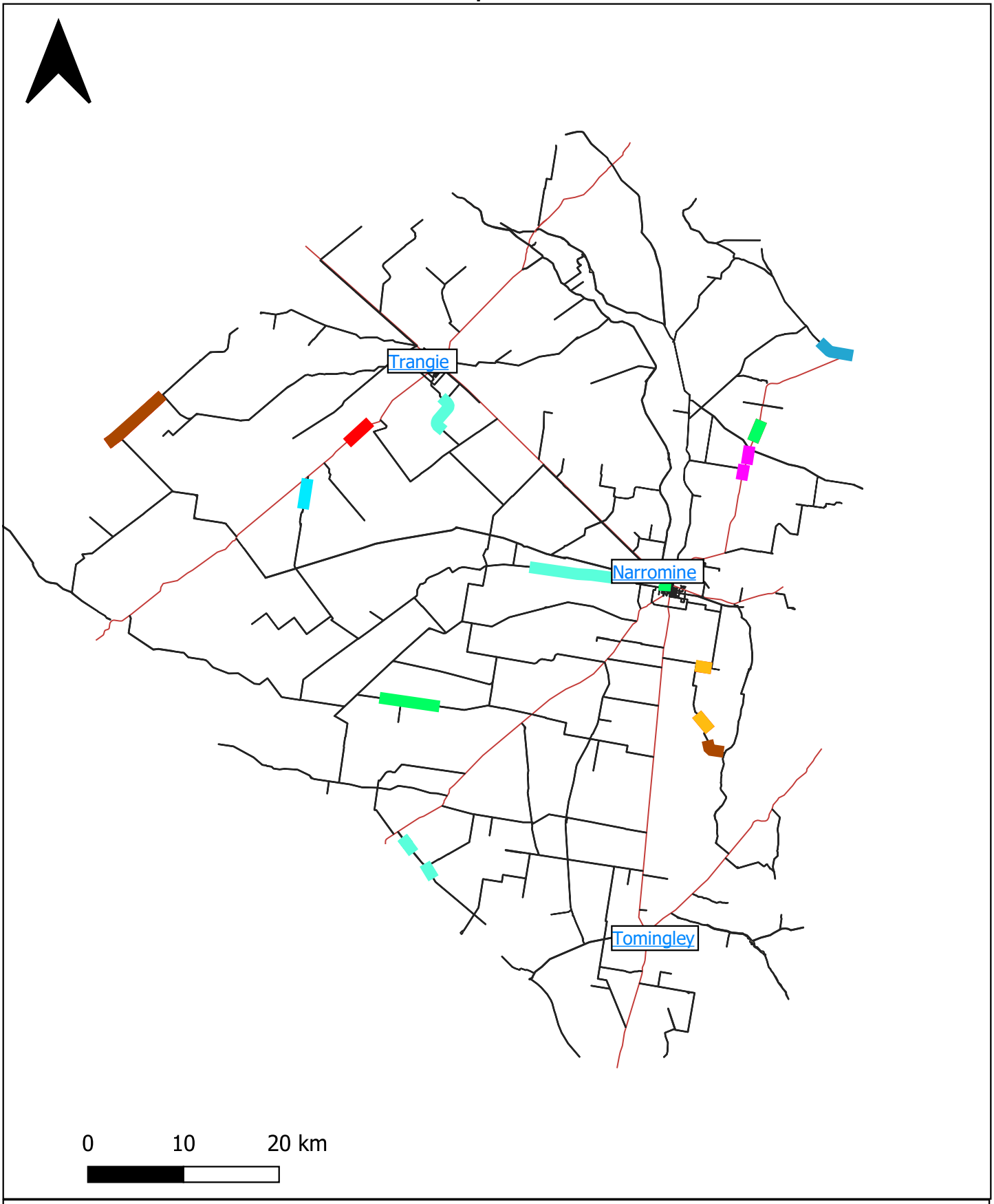
Narromine Shire Council

May
April
March
February
January
December
November
October
September
August
July

Narromine SHIRE COUNCIL

Note - the roads highlighted are visual purposes only and may not be the exact location of work

Map No. 2



Narromine Shire Council

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Narromine SHIRE COUNCIL

Note - the roads highlighted are visual purposes only and may not be the exact location of work

Narromine
SHIRE COUNCIL

NATURE STRIPS and TREE POLICY

MOWING, PLANTING, LANDSCAPING, MAINTENANCE AND REMOVAL

Adopted by Council on XX Month 2021
(Resolution No 2021/XX)

NARROMINE SHIRE COUNCIL – NATURE STRIP AND TREE POLICY – MOWING, PLANTING, LANDSCAPING AND REMOVAL

DOCUMENT VERSION CONTROL

CREATED BY	FIRST ADOPTED	LAST MODIFIED	REVIEW PERIOD
Andre Pretorius Director of Infrastructure and Engineering Services	BY COUNCIL ON XX MONTH 2021 RES NO 2021/XX		3 YEARS

NARROMINE SHIRE COUNCIL – NATURE STRIP AND TREE POLICY – MOWING, PLANTING, LANDSCAPING AND REMOVAL

1 INTRODUCTION

Nature strips are public land and not part of residential property, however it is well recognised that a shared maintenance approach between Council and the community provides the maximum opportunity for individual and town wide benefits. Where this relationship exists, the nature strip can perform its essential role as a conduit of services and make a highly valuable contribution to the street character, which in turn can lead to higher individual property value and sustainability benefits. While many aspects of nature strips maintenance are the responsibility of Council, it is accepted practice that the adjacent landholder or resident is responsible for some maintenance and for ensuring that any landscaping development is safe and appropriate. For example, the landholder is expected to ensure that trees and shrubs growing on private land do not impede access to the nature strip or the footpath. Likewise, residents who wish to landscape their nature strip may do so but only in a way that provides for safe access and use by the public

This policy establishes Council's position with regard to nature strips along urban streets and the planting, managing, maintenance and removal of trees and vegetation with the Council Road Reserve.

Council is responsible for the management and maintenance of trees on the Shire's street roadsides and those on Council owned land.

2 PURPOSE

The purpose of this Policy is to:

- Confirm Council's position in relation to the responsibility and cost of construction and maintenance of nature strips;
- Confirm and recognize the community's role in maintaining nature strips;
- Ensure the mowing, planting and landscaping of nature strips contributes to the overall streetscape and amenity;
- Define appropriate criteria for assessing requests by residents for Council assistance in mowing grassed nature strips;
- Define appropriate criteria for assessing requests by residents to plant out nature strips; and
- Outline the planting, management and removal of trees on public land

3 SCOPE

This policy applies to all Council owned and/or controlled nature strips within the Narromine Shire LGA urban environment.

Council has had a long-standing practice of relying on residents and businesses to maintain those grassed nature strips adjoining their property. This policy restates this practice identifying the importance of community involvement and cooperation.

This policy does not extend to the mowing of grass or landscaping on private property; which is the responsibility of the owner or occupier of the property.

4 DEFINITIONS

Nature strip: means any Council owned and/or controlled land located between a constructed road and a parcel of private property (that is, the street verge) but does not include land reserves for a public purpose or bushland. It is generally that portion of the street verge that is grassed and may contain street trees.

Urban Environment: residential lot

5 LEGISLATION

- Environmental Planning and Assessment Act 1979
- Roads Act 1993
- Civil Liability Act 2002

6 STANDARDS

- Australian Standard 4373-2007 – Pruning of Amenity Trees
- Australian Standard 2303-2015 – Tree Stock for Landscape Use
- Australian Standard ISO 31000:2009 Risk Management – Principles and Guidelines

7 RELATED DOCUMENTS

Statewide Mutual - Best Practice Manual – Trees & Trees Roots - Version 8 – December 2019

Essential Energy Vegetation Management Brochure – 15 January 2018

8 CONTENT

8.1 Principles

Narromine Shire Council is committed to ensuring that the streetscapes are maintained in partnership with the residents of Narromine Shire. Nature strips contribute significantly to the streetscape and visual amenity of local neighbourhoods. Council aims to maintain an overall consistency and appearance of nature strips.

Council maintains the street trees and formed footpaths but relies on residents to maintain the grass. Council also relies on residents to keep garden plants within their property trimmed to ensure it does not obstruct pedestrian access on the footpath, laneway or nature strip and doesn't interfere with cyclist or motorist sightlines.

To ensure safety and amenity the following general principles apply for footpaths or verges:

- The footpath area, either formed concrete, asphalt, bitumen pathway, synthetic turf or unformed grass verge must be maintained with sufficient clearance (generally 1.5 metres wide) to allow pedestrians to walk along comfortably.
- Any construction works within the road reserve will require an S138 application in terms of the Roads Act, 1993 to the Infrastructure and Engineering Department.
- Property owners or residents are responsible for determining the underground and aboveground services within the nature strip (i.e. Dial before you Dig) prior to lodging the application form with Council.
- Groundcovers, native grasses and shrubs up to 50 cm in height to help maintain line of sight can be planted.
- Compacted gravel on up to 50% of the nature strip (but not within the drip line of trees),

with the remainder being low level shrubs or grass (this allows for water filtration and has a cooling effect) can be installed.

- Temporary protective fencing for new grass/shrubs up to 13 weeks can be provided to facilitate the establishment or growing-in period.
- No trees or shrubs must be planted in the footpath area without written consent from Council.
- Council will identify the need for planting of trees within the urban space and ensure that the trees planted will be in accordance with this policy.

9 MOWING OF NATURE STRIPS

9.1 Areas that Council will mow and maintain

Council undertakes to maintain the nature strips or verge areas that meet any or all of the following criteria:

- Adjacent to Council owned or operated community facilities;
- Adjacent to parks and reserves;
- In front of lots where a clean-up Notice/ Order have been issued to that lot. Council will maintain that area every six months, depending on environmental conditions; and
- Nature strips where the resident or owner of the property is unable to physically and financially to undertake the work themselves and has made application to Council and had it approved for Council to maintain that area.

9.2 Areas to be maintained by owners / residents

The property owner or resident of abutting properties are responsible for maintaining the visual amenity by maintaining the vegetation (excluding street trees) and landscape features on the nature strip including watering, weeding, mowing, removal of loose material that poses as a slip or trip hazard and edging turf. Council does not carry out renovations or maintenance of nature strips.

All areas not maintained by Council are expected to be maintained by the owners and/or residents of the adjoining private property. Grassed nature strips are expected to be mowed regularly by residents or property owners and kept neat and tidy such that they provide a safe environment and contribute to the general appearance and aesthetics of the streetscape.

It is recognised that some residents may appoint a contractor to undertake general yard or garden maintenance work for them. It is considered reasonable that the nature strip mowing would be carried out in conjunction with the mowing of the private property. Nature strips will generally not be mowed by Council if other lawns on the private property are being maintained by the resident or a contractor on behalf of the resident.

9.3 Eligibility Criteria for Nature Strip Mowing Service Adjacent to Private Property

Council could provide a nature strip mowing service in circumstances where residents, due to financial reasons, are unable to mow the nature strip adjoining their residence, to ensure that Narromine Shire grassed nature strips and streetscape amenity is maintained. Only where residents meet certain criteria will the nature strip mowing service be provided by Council.

The nature strip mowing service is not an entitlement program. At all times the mowing service will only be provided subject to availability of funding.

The following criteria will be considered in assessing a person's eligibility for inclusion on the nature

strip mowing list:

- Be a permanent resident of Narromine Shire, and occupy the property which is the subject of the nature strip mowing service application; and
- Be receiving or be assessed as eligible to receive home care services such as Meals on Wheels or have a disability or other medical condition which makes it impossible for that person to mow their nature strip; and
- Be the holder of a current Pensioner Concession Card issued by the Commonwealth Government or in receipt of a Service Pension; or some other type of income substitution resulting from a physical disability that restricts a person from mowing their nature strip e.g. worker's compensation or income protection benefit; and
- Have no other members of the household who are able to mow the nature strip.

Council reserves the right to take special conditions into consideration, other than those listed above.

9.4 Mowing Service Schedule

The nature strip mowing service does not provide a guaranteed mowing frequency and site visits under this Policy will generally be no more than 6 times a year, or at Council's discretion.

Council will clean grass clippings from the footpath, driveway and gutter that results from works carried out in the maintenance of the nature strips. No other rubbish, debris or green waste will be cleaned up and/or removed from the nature strip or private property at the time of mowing.

9.5 Approval Process for Nature Strip Mowing Service

Applicants requesting this nature strip mowing service must fill in the relevant application form.

Once the application has been assessed, residents who meet the eligibility criteria will be entered on Council's nature strip mowing list.

All recipients of the service are required to reapply annually to confirm eligibility. Applications forms will be sent out by Council and the service will be suspended if a response is not received.

The Council reserves the right to remove any person from the nature strip mowing list at any time with two weeks written notice, if any of the following occur:

- The person sells or otherwise transfers their interest in the property, and/or ceases to occupy the property.
- The circumstances of the owner / occupier of the property change dramatically, such that the person no longer meets the eligibility criteria stated in this policy.
- The person fails to report any changes in their circumstances, which could make them ineligible for inclusion on the nature strip mowing list.
- Council deems that the person no longer meets the eligibility criteria stated in this policy.

10 GARDENS AND VEGETATION ON NATURE STRIPS

10.1 Bushland vegetation on nature strips

Existing remnant bushland vegetation in specific locations adjacent to Council's bushland reserves

must be maintained with minimum weed infestation so as not to obstruct pedestrian, cyclist or vehicular traffic.

10.2 Gardens on nature strips

Property owners or residents who wish to plant a nature strip abutting their property with anything other than the items listed in Section 8.1 must apply to Council in writing. All costs associated with the Landscaping will be borne by the property owner or resident.

10.3 Existing Gardens on nature strips

The nature strip must not be landscaped to look like private land and/or used for a private purpose.

Garden plants on nature strips must be kept in a safe, clean, healthy and attractive condition. Understorey plants must be kept to a maximum height of 0.5 metre and maintained so as not to obstruct pedestrian, cyclist or vehicular traffic. Sight distances for vehicles entering and exiting driveways, cross overs and intersections must be maintained and vegetation must not interfere with the driving task itself. A clearance zone of 1.5 metres beside the road is required so people can still get in and out of cars and rubbish bins can be collected.

Property owners will be responsible for repairing any damage to infrastructure caused by landscaping works.

Any works considered hazardous will be required by Council to be removed or made safe at the cost of the relevant property owners.

Hard landscaping elements such as large rocks or boulders, railway sleepers or retaining walls will not be permitted as these items are potential hazards or they may interfere with the driving task itself.

Letterboxes must be established on private property with suitable access to Australia Post drivers maintained.

Electrical or solar wiring must not be installed on the nature strip (e.g. lighting of trees etc.).

Mulch material must be kept stable and properly contained. Allowable treatments include granitic sand, screened granite, crusher grit, blue and white metal grit and finely ground organic mulch which have a diameter of less than 10mm.

Nature strip soil levels, including mulch, should not be allowed to significantly drop or protrude above the level of the footpath or kerb. Ideally nature strips are gently graded towards the kerb for drainage purposes.

Fixed irrigation systems are not encouraged by Council as other service providers may need to access underground services in the nature strip, with these systems being damaged and costly for property owners to replace. Council will not be responsible for replacing plants or landscaping as a result of such works.

Council will endeavour to restore the disturbed area; however, Council reserves the right to remove any nature strip landscaping or treatment for the purpose of carrying out works, without being liable to compensate owners for any loss in reinstating the nature strip.

11 TREES IN PUBLIC SPACES

11.1 Tree Planting and Species Selection

Council will proactively identify opportunities to increase its canopy over the local government area, especially within build up areas.

Improving the quality of this canopy cover will be achieved through stock quality, planting, selection criteria and species diversity.

Council's urban forest is a mix of native, exotic, evergreen and deciduous trees.

Council will plant the most appropriate tree species based on site suitability, aesthetic, functional and biological attributes, performance and the potential to contribute to the landscape character.

Council will only use quality nursery stock according to the latest best practice and standards.

Council recognises that low species diversity has the potential to create an unstable ecosystem that is vulnerable to pest and disease attack. Council will increase species diversity by ensuring the street and park tree population does not comprise of more than 50% for any particular family and 30% for any particular genus.

11.2 Tree Removal (whole or limb) and Replacement

Selective tree removal and replacement programs are vital in managing canopy cover to ensure that the numerous benefits trees provide are sustained for future generations.

Council will assess all trees proposed for removal or lopping in Council owned or managed land and implement removal and replacement programs as required.

The risk to public safety (including road users) and property will take priority in tree removal in decisions in emergency situations.

Council will remove and replace poor performing trees to reinvigorate the urban forest.

Council will undertake the staged removal and replacement of trees classified as noxious. The impacts to canopy cover will be a key consideration in removing trees as part of this process.

Council will develop strategies for the installation of new plantings, where feasible, prior to tree removal required for capital work projects.

Council will maintain a spread of tree age classes to minimise the impact of tree removals in close timeframes and/or within specific areas.

11.3 Requests for Street Tree Planting By Residents

Council will consider requests from residents to plant street trees. Requests will be assessed according to policy and standard requirements.

12 Tree Maintenance

Council recognises that trees are a major asset and play an important role in ensuring our Shire is liveable, attractive and healthy.

Our trees grow in a harsh environment and require specialised care and management. They are living dynamic organisms that have the potential to cause damage or injury.

Council will conduct regulation inspections of street and park trees to determine the potential for a tree or one of its limbs to fail and in doing so injure people or damage property. These inspections include a consideration to road user safety.

Risk Management strategies include but are not limited to, replacement, repair or redirecting of footpaths, root pruning, installing root barriers, tree pruning, diverting services or minor infrastructure, enlarging root zones or tree removal.

13 Trees and shrubs in private property

Property owners are required to maintain trees and shrubs within their property. Where a tree or shrub, located in private property, is overhanging onto a road reserve and pose a safety risk or interfere with the driving task, Council will:

a) Approach the property owner and raise the issue in the first instance;
b) Allow for the property owner to address the issue within an agreed timeframe; and
c) Should the issue not be addressed within the agreed timeframe, Council will remove the hazard at no cost to Council.

Offences

a) It is an offence to do any of the following on vegetation located on public land or land that Council own without written consent from Council:
    i. Trim, remove, lop, destroy any tree, shrub or vegetation;
    ii. Remove or damage any tree or trunk protection measure such as a tree guard, bollard, guide post and the like; and
    iii. Attach any sign, marking, fixture, light, etc. to any tree.

Our Reference: 2111

Catchment Survey & Analysis
Narromine, NSW

For
Narromine Shire Council

Stormwater Drainage Study Report

Prepared by:
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TABLE OF CONTENTS

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.

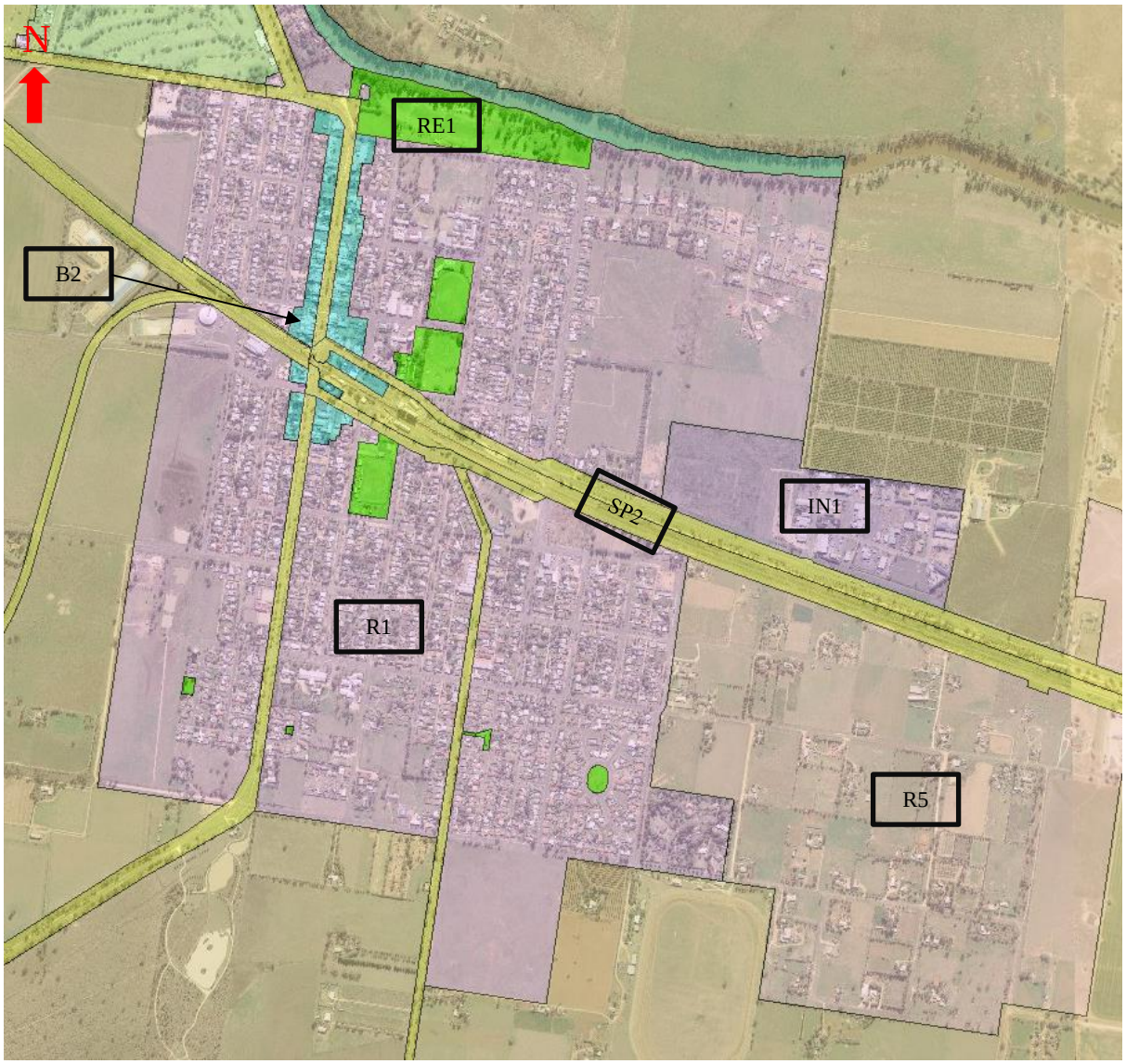

Figure 1 Site Landzone Map (Source: NSW Planning Portal)

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.

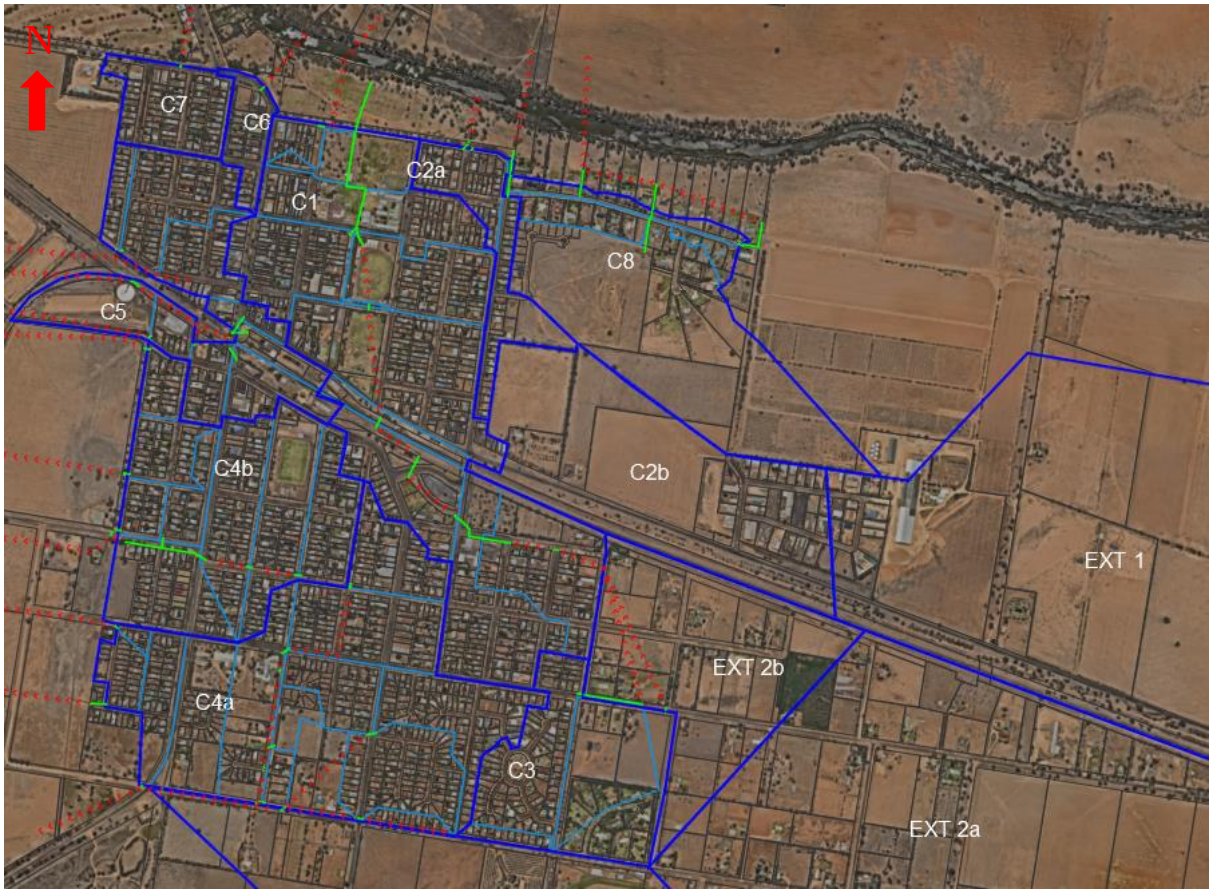

Figure 3 Catchment Map (Catchment boundary - blue, Existing pipe – green, Overland flowpath -red)

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.

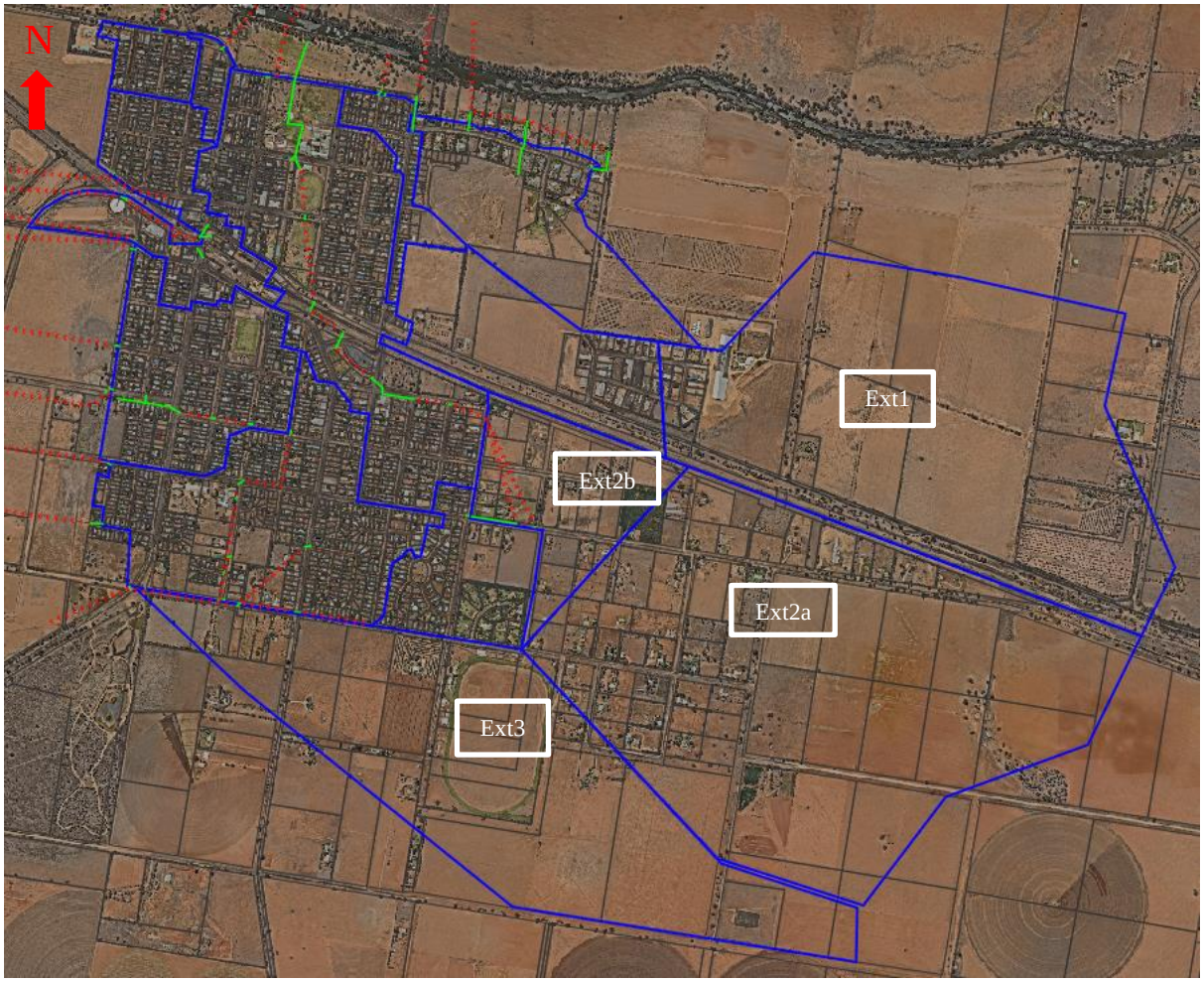

Figure 4 Catchment Map (External Catchment boundary - dark blue, Existing pipe – green, Overland flowpath - red)

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: 32.225S 148.250E 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, 8.6, 2.3, skew=0.24, F2=4.33, F50=15.57

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.

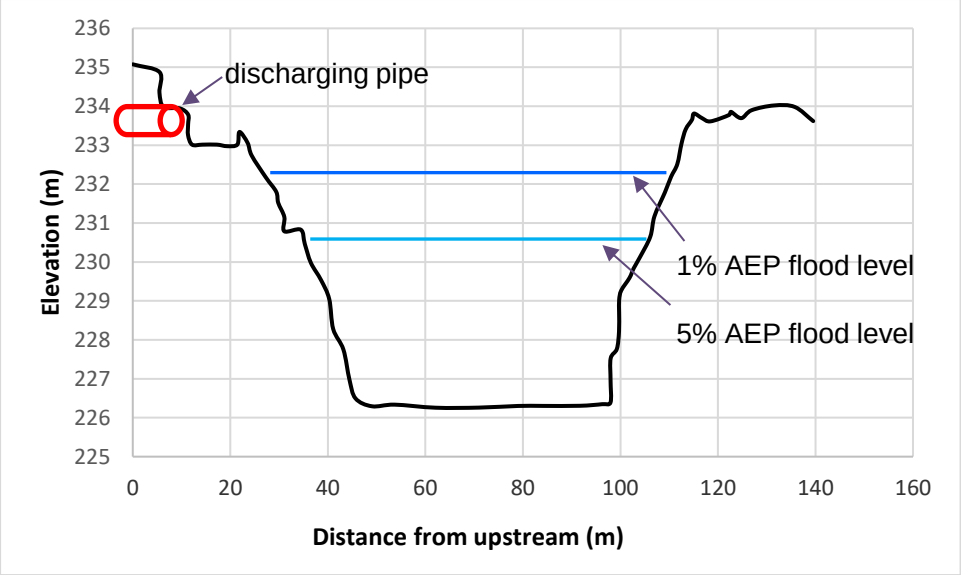

Figure 5 Estimated Macquarie River Flood Levels at Catchment C1 Outlet (based on 'Macquarie River (Narromine to Oxley Station) Floodplain Management Plan' (DECC, 2008)

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[3] (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' (Lyall & 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' (Lyall & 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.

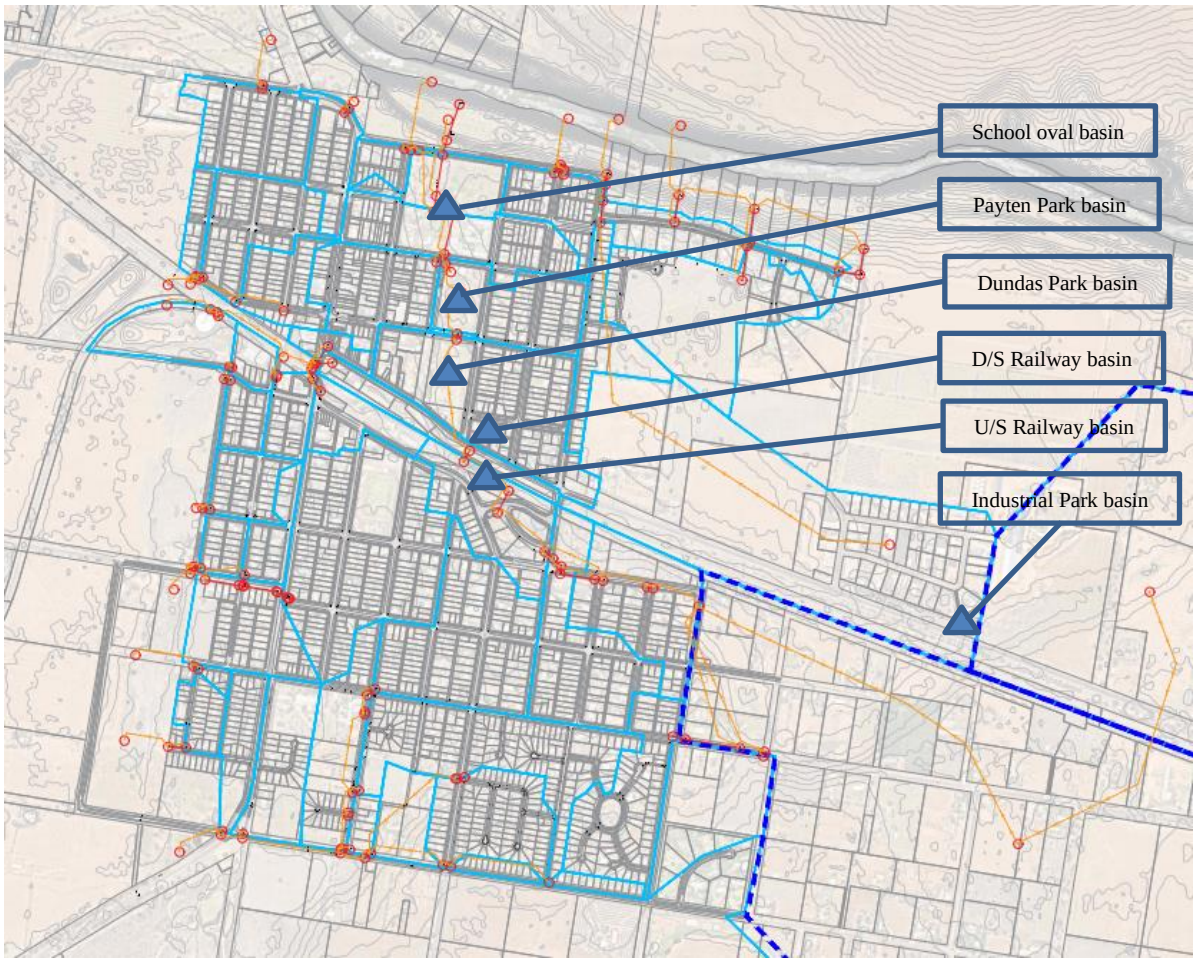

Figure 7 DRAINS Model Layout (Pit/Pipes in Red, Overland Flowpath Link in Orange)

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 in 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.

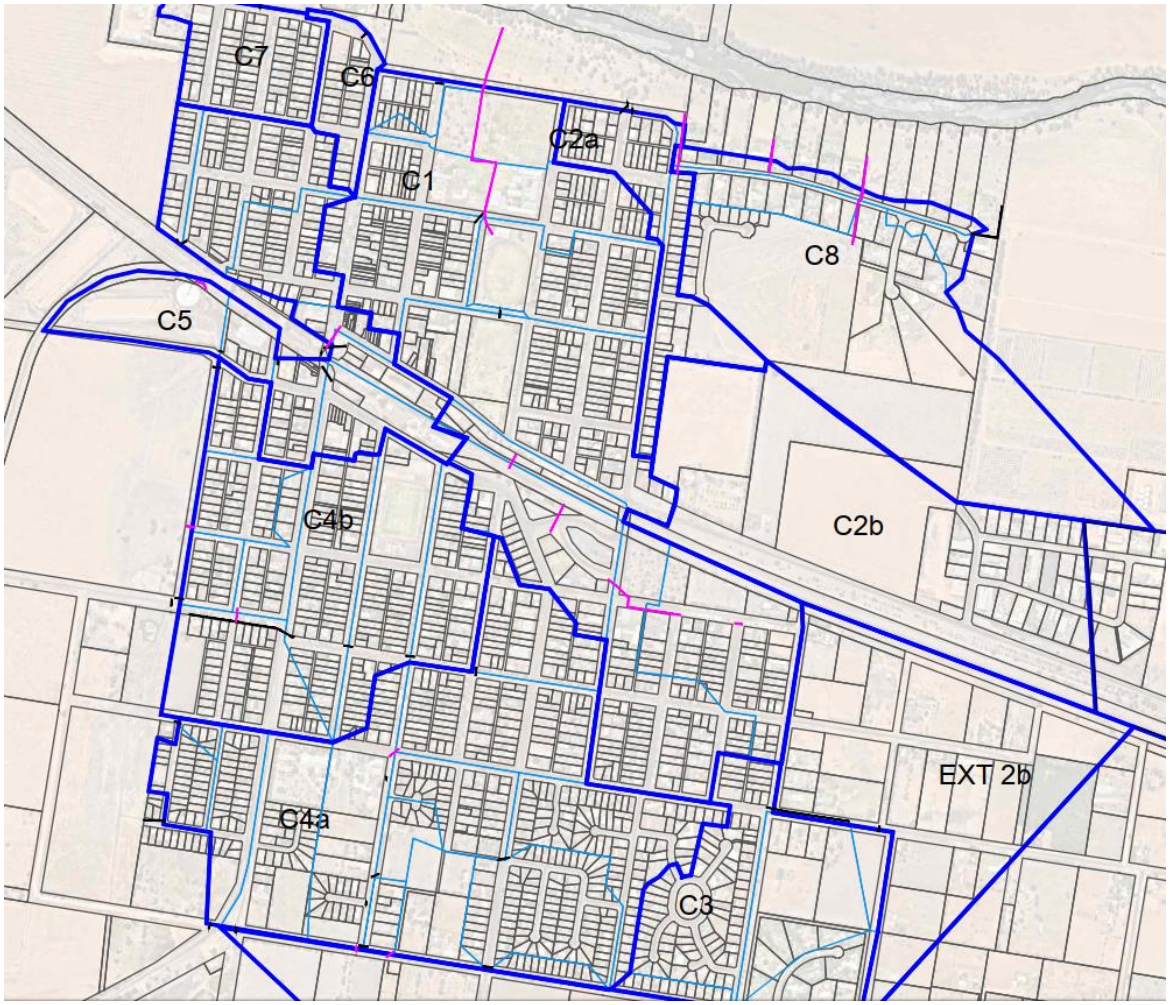

Figure 8 Existing Model – Location of under-capacity pipes in 5yr ARI event (Magenta)

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 C**1 (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.

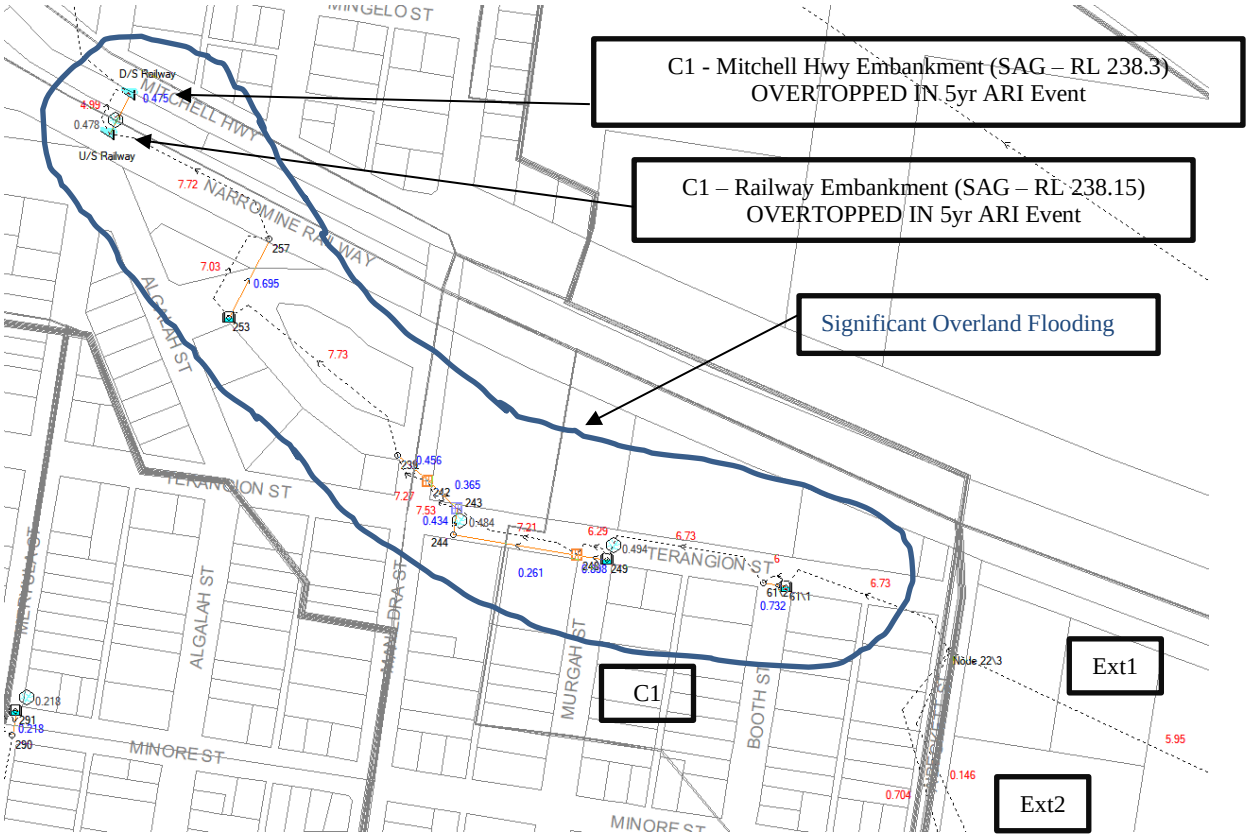

*Figure 9 Existing DRAINS 5yr ARI Results (Catchment C1) – External Catchment Area/Railway Crossing Peak catchment flow rates in m^3/s are given **black**, pipe flows in **blue** and overflows in **red***

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.

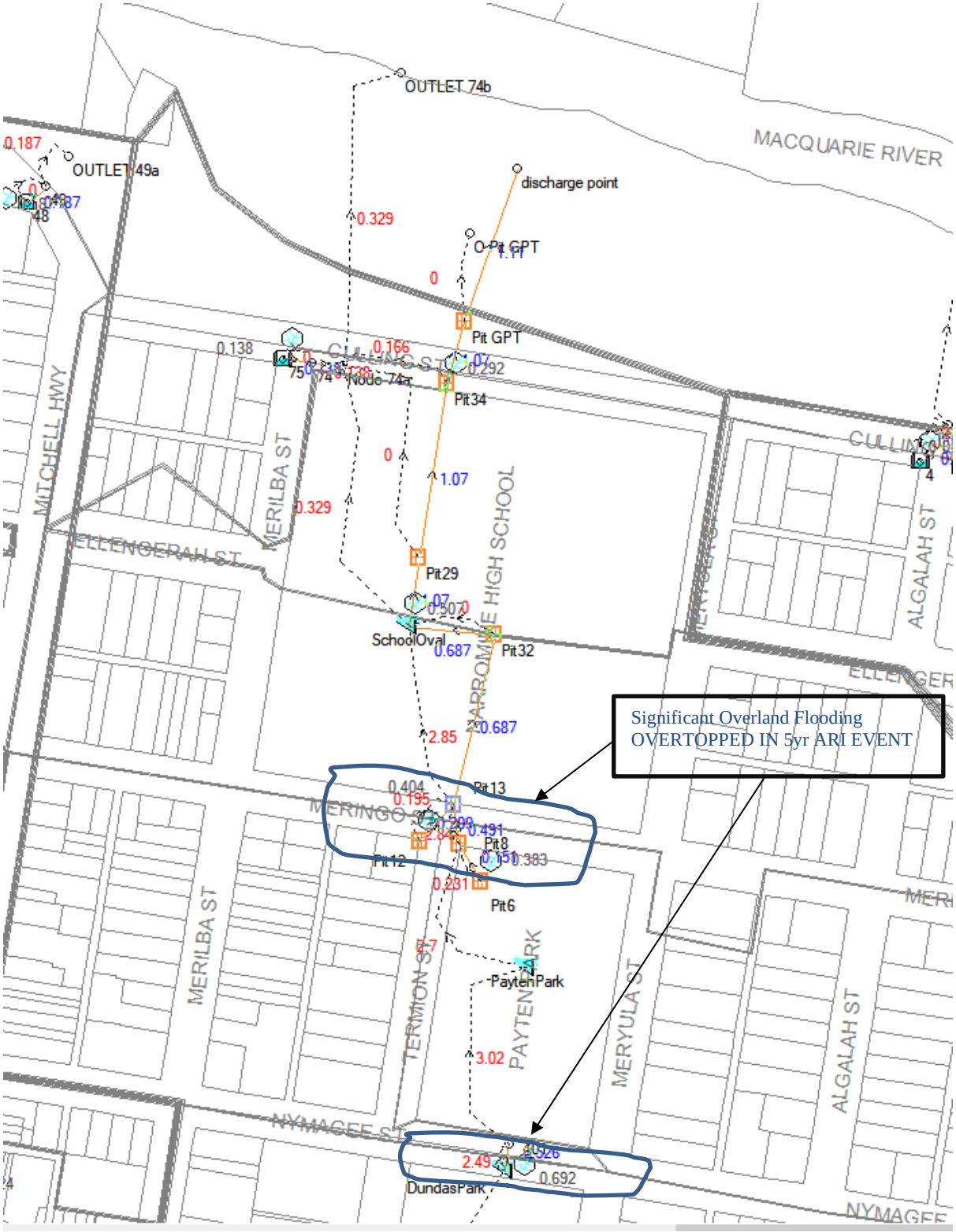

Figure 10 Existing DRAINS 5yr ARI Results (Catchment C1) – Flood Storage Areas/Macquarie River Discharge Location
*Peak catchment flow rates in m^3/s are given **black**, pipe flows in **blue** and overflows in **red***

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.

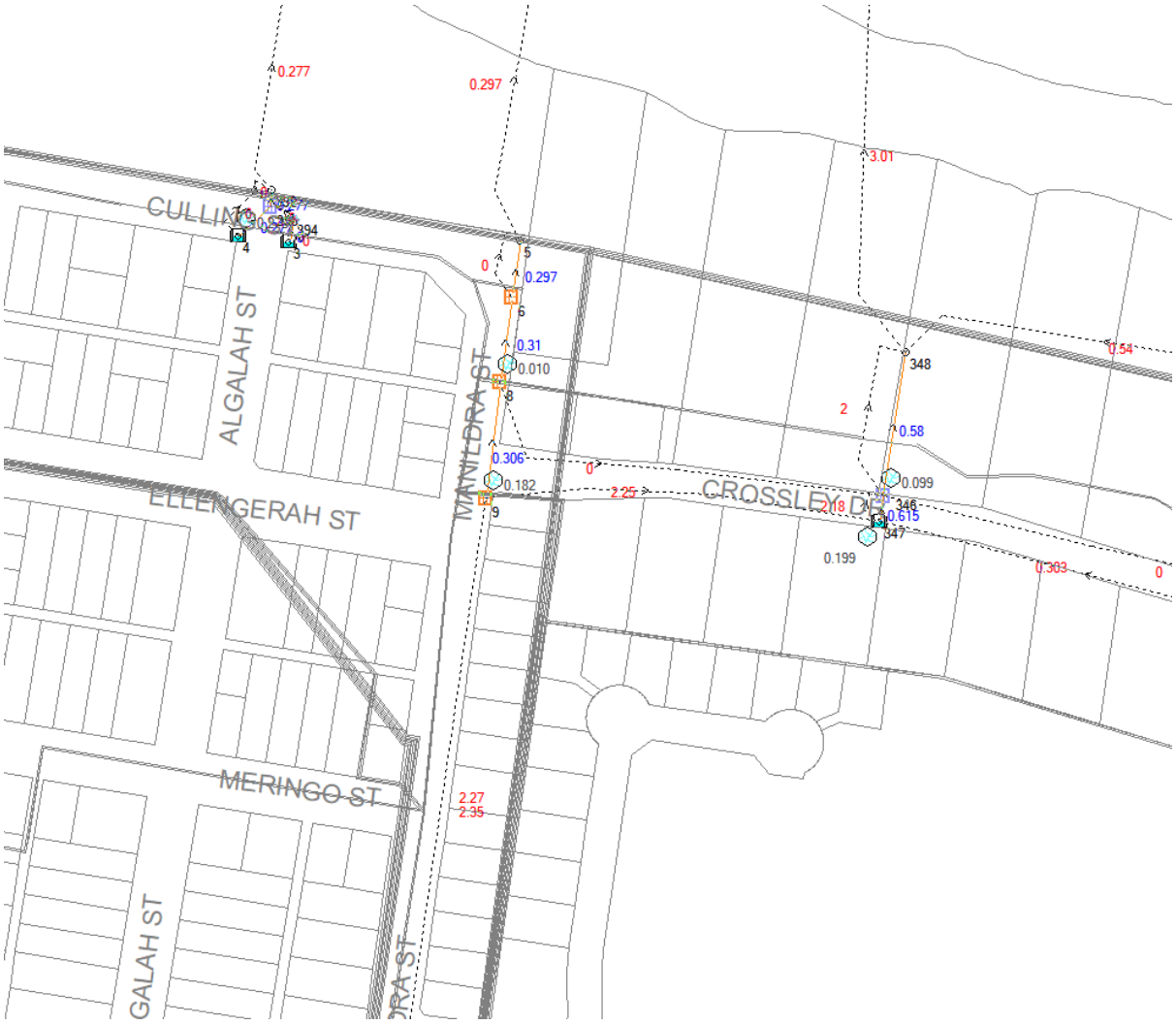

Figure 11 Existing DRAINS 5yr ARI Results (Catchment C2) – Trunk drainage along Manildra St with overland flow from upstream Catchment 2b
*Peak catchment flow rates in m^3/s are given **black**, pipe flows in **blue** and overflows in **red***

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.

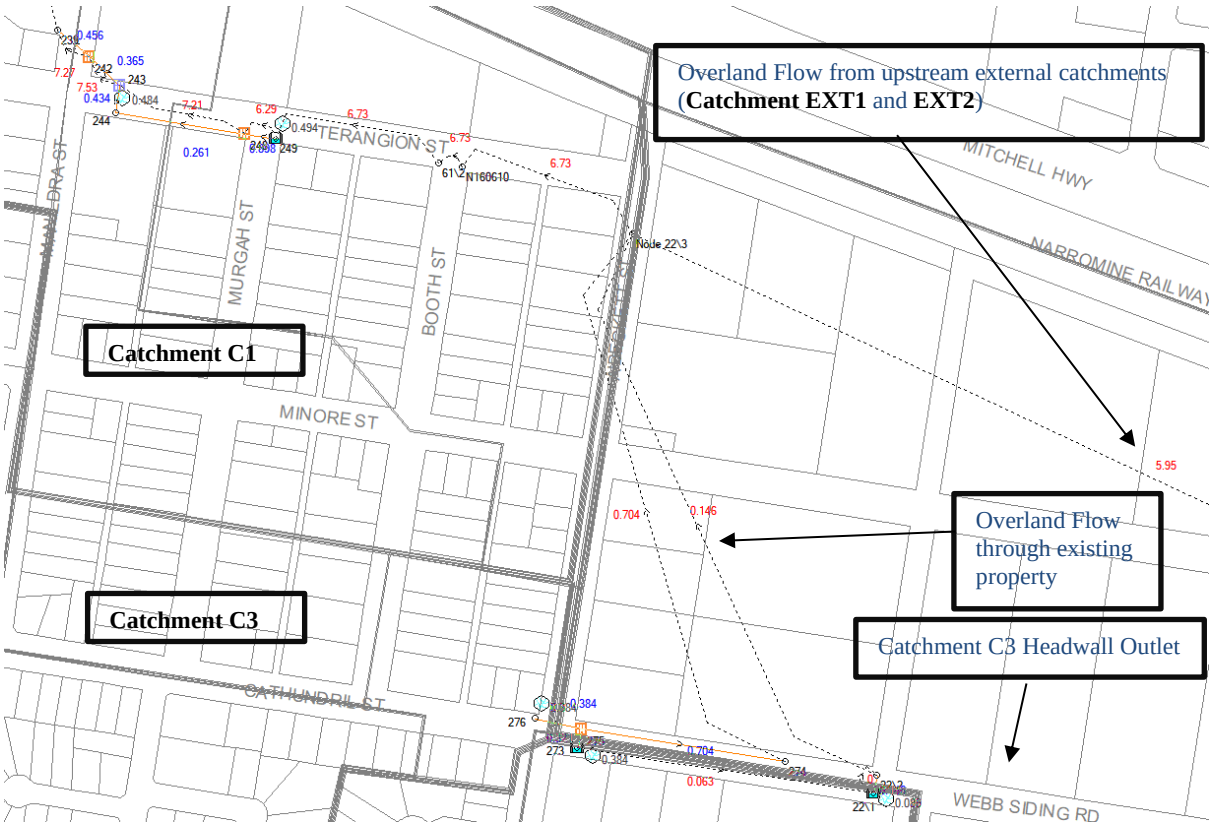

*Figure 12 Existing DRAINS 5yr ARI Results (Catchment C3) – Piped and Swale Drainage along Webbs Siding Rd Peak catchment flow rates in m^3/s are given **black**, pipe flows in **blue** and overflows in **red***

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 Termoin 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 $1.98m^3/s$ at 0.3% grade. Overland flows along Termoin 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 0.5m^3/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.

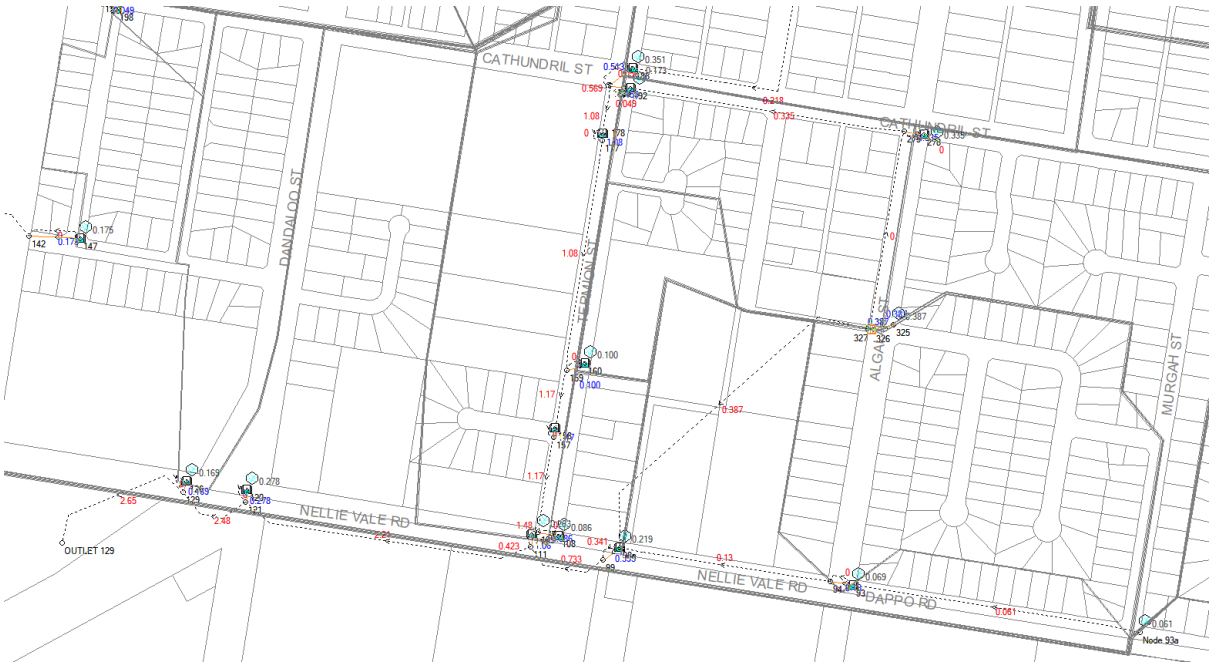

Figure 13 Existing DRAINS 5yr ARI Results (Catchment C4) – Trunk drainage along Temoin St, Nellie Vale Rd and Dappo Rd
*Peak catchment flow rates in m^3/s are given **black**, pipe flows in **blue** and overflows in **red***

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 he 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.

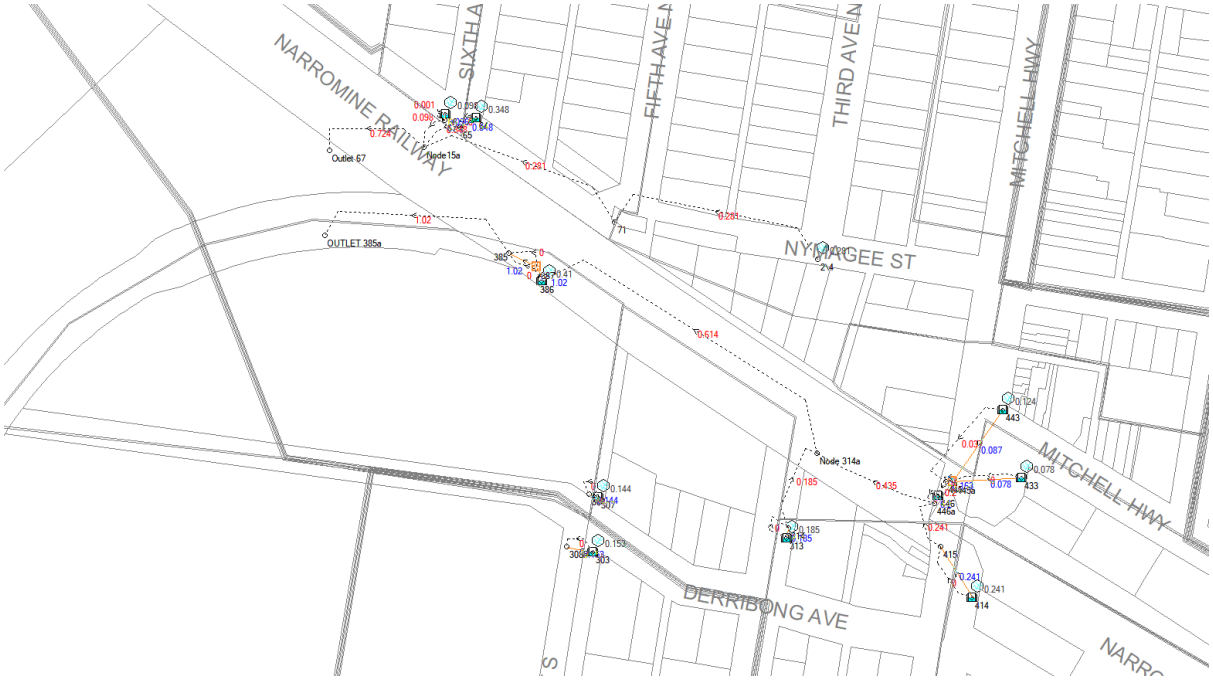

Figure 14 Existing DRAINS 5yr ARI Results (Catchment C5) –Drainage along Nymagee St, Dandaloo St and Derribong Ave
*Peak catchment flow rates in m^3/s are given **black**, pipe flows in **blue** and overflows in **red***

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.

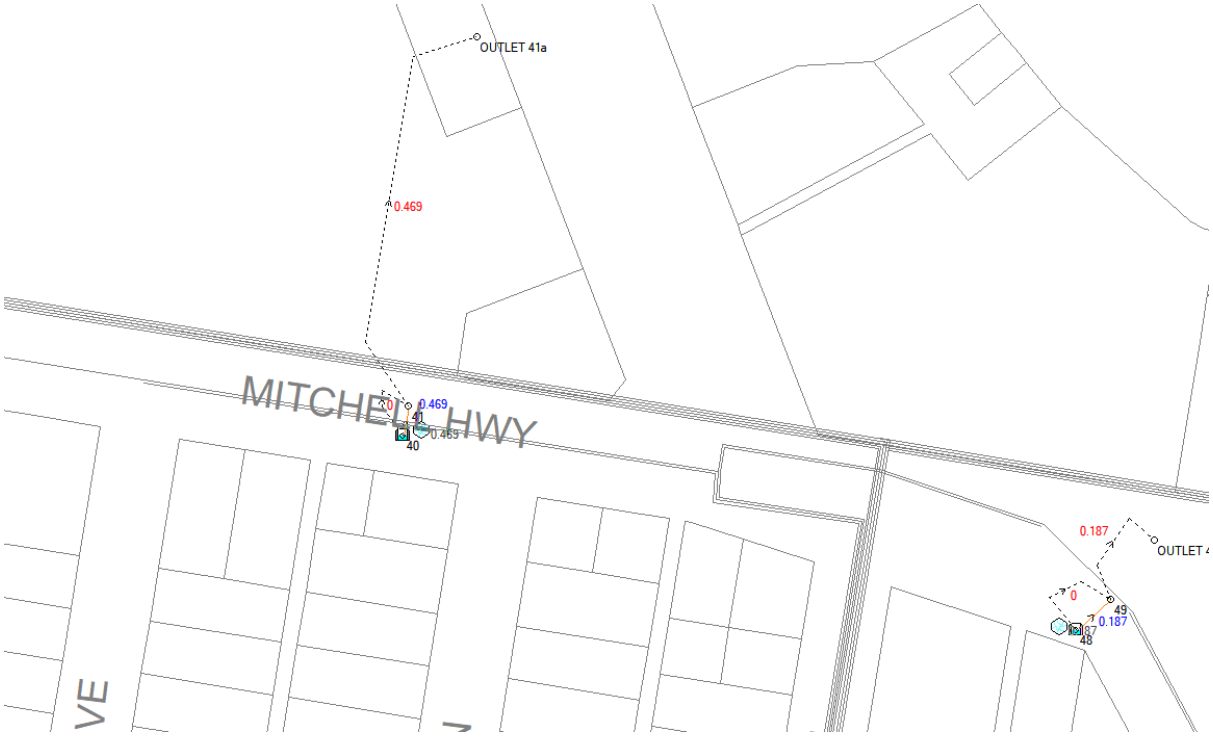

Figure 15 Existing DRAINS 5yr ARI Results (Catchment C6 and C7) –Drainage at intersection of Mitchell Hwy and Fifth Ave and Third Ave
*Peak catchment flow rates in m^3/s are given **black**, pipe flows in **blue** and overflows in **red***

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).

Figure 16 Existing DRAINS 5yr ARI Results (Catchment C8) –Drainage at 7, 13 and 29 Crossley Drive
*Peak catchment flow rates in m^3/s are given **black**, pipe flows in **blue** and overflows in **red***

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.

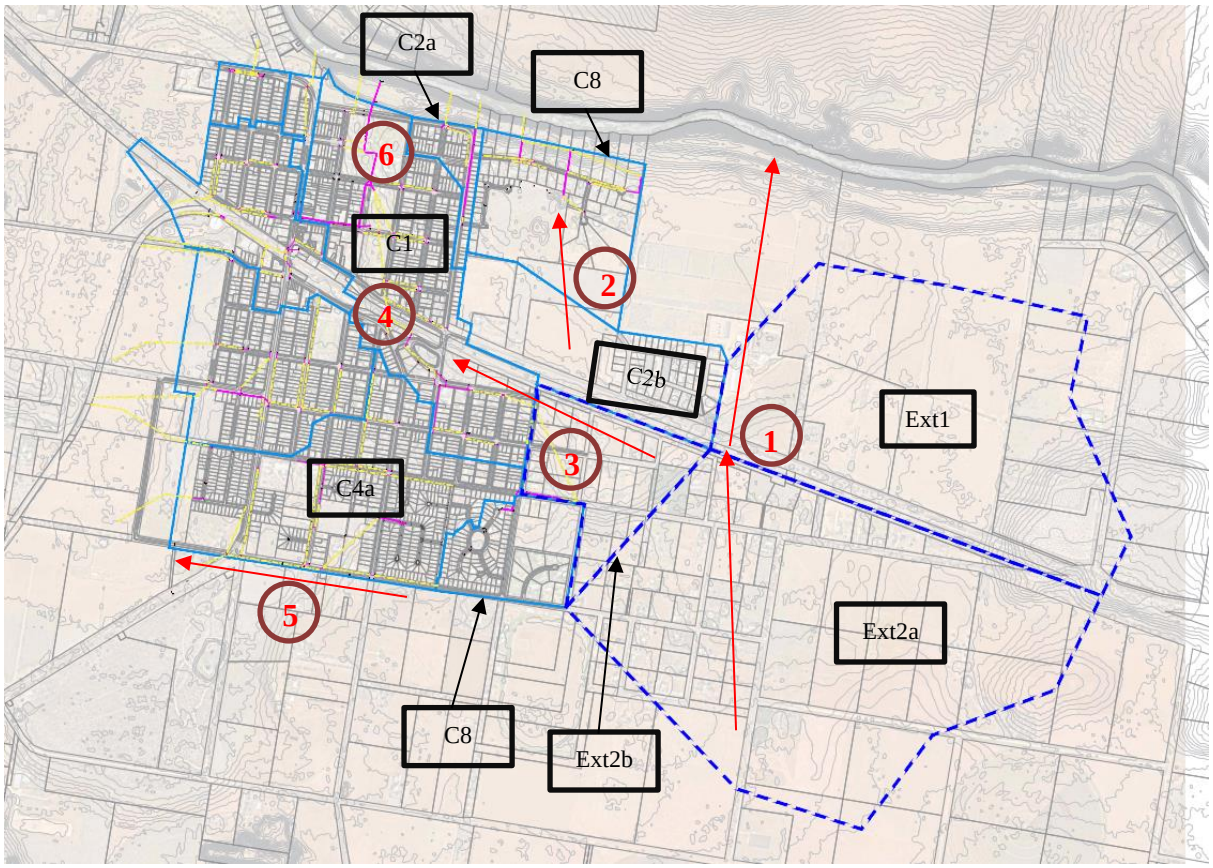

Figure 17 Proposed Option 1 – Proposed Drainage Works

- **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.

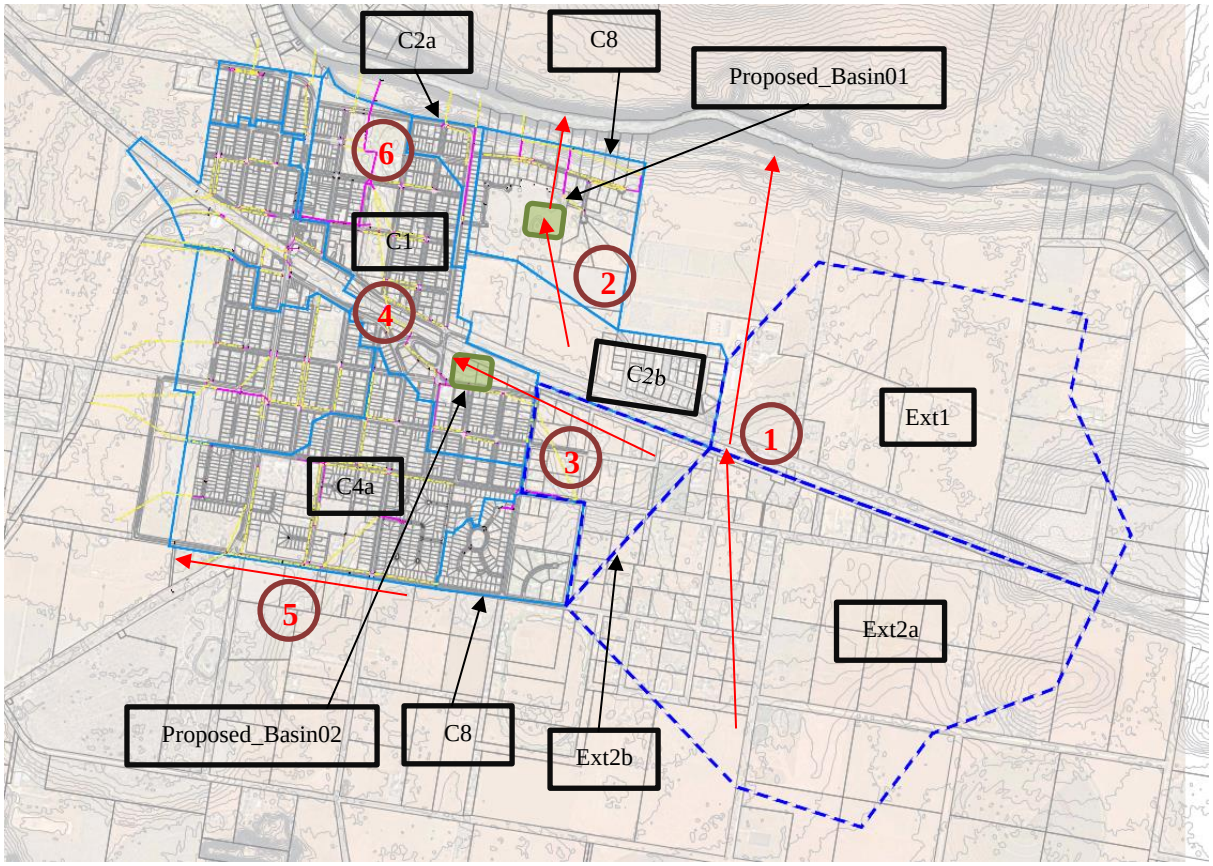

Figure 18 Proposed Option 2 - External Catchment (blue) with diverted overland path (red) and proposed detention basin locations (green)

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.

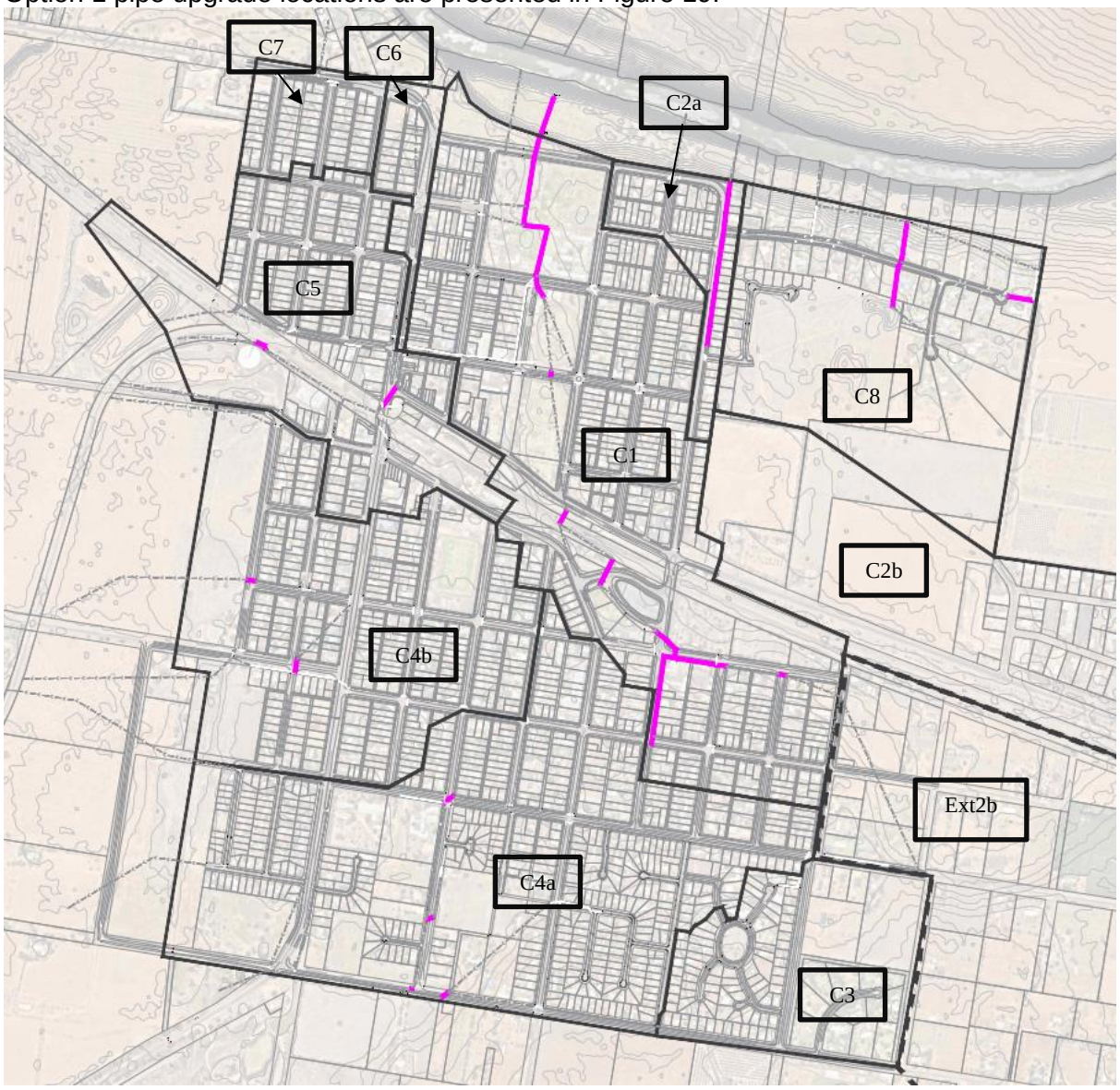

Figure 19 Proposed Option 1 - Pipe Upgrade Locations (Magenta)

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.drn)

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.drn)

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 6m^3/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 m2
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 m2
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.drn)

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	Pipe113448	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/m^2 adopted
- Basin Construction cost rate of \$20/m^2 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 is Misaligned	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		4158808		No					
22\1	Headwall				0.5	239.435		0		618138.1	6431825		4158691							
22\2	Node					238.699		0		618140.9	6431839		4158767		No					
373	Headwall				0.5	237.804		0		616404	6432405		4158693							
374	Node					237.21		0		616382.7	6432409		4158784		No					
249	Headwall				0.5	238.27		0		617644.4	6432366		4158694							
248	OnGrade	NSW RTA S	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		No					
243	Sag	NSW RTA S	SA1	10	1.5	238.031	0.1	0	0	617514.9	6432409	No	4158836	1 x Ku	No	Existing			0.2	0.2
242	OnGrade	NSW RTA S	SA1		1.5	238.124		0	0	617490	6432434	No	4158837	1 x Ku	No	Existing				
239	Node					238.217		0		617464	6432455		4158765		No					
253	Headwall				0.5	238.01		0		617318.9	6432574		4158695							
257	Node					238.002		0		617353.3	6432642		4158766		No					
158	Headwall				0.5	238.304		0		616860.1	6431651		4158698							
157	Node					238.28		0		616858.7	6431642		4158751		No					
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		No					
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		616533.2	6431574		4158820		No					
126	Headwall				0.5	237.836		0		616471.1	6431595		4158702							
129	Node					237.838		0		616466.7	6431583		4158821		No					
147	Headwall				0.5	238.153		0		616358.5	6431852		4158703							
142	Node					237.777		0		616304.4	6431854		4158748		No					
93	Headwall				0.5	241.525		0		617174.6	6431486		4158704							
94	Node					240.544		0		617150.5	6431490		4158817		No					
64	Headwall				0.5	238.063		0		616411.1	6433300		4158705							
65	Node					237.778		0		616399.2	6433293		4158807		No					
188	Headwall				0.5	238.397		0		616942	6432032		4158706							
183	Node					237.977		0		616917.6	6432014		4158755		No					
108	Headwall				0.5	237.89		0		616863.9	6431538		4158707							
109	Node					237.797		0		616841.9	6431541		4158752		No					
198	Headwall				0.5	238.462		0		616397.2	6432093		4158708							
197	Node					238.182		0		616381.7	6432102		4158756		No					
178	Headwall				0.5	238.367		0		616910.7	6431962		4158709							
177	Node					237.845		0		616909.6	6431955		4158753		No					
219	Headwall				0.5	237.835		0		616432.6	6432585		4158710							
901	Node					237.454		0		616410.6	6432588		4158813		No					
40	Headwall				0.5	237.879		0		616593.8	6433881		4158711							
41	Node					237.977		0		616595.8	6433892		4158797		No					
75	Headwall				0.5	238.14		0		617032.4	6433695		4158712							
74	Node					237.855		0		617053.1	6433691		4158809		No					
307	Headwall				0.5	237.934		0		616500.3	6433022		4158713							
304	Node					237.869		0		616493.4	6433025		4158769		No					
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		No					
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		No					
4	Headwall				0.5	238.975		0		617493.5	6433620		4158716							
393	Sag	Surface Inl	G.S.I.P. 90(	1	1.5	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		No					
3	Headwall				0.5	239.375		0		617522.6	6433616		4158717							
394	Node					238.965		0		617524.7	6433629		4158794		No					
110	Headwall				0.5	238.11		0		616835.9	6431539		4158718							
111	Node					237.976		0		616834.1	6431526		4158819		No					
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		No					
376	Headwall				0.5	238.07		0		616374.7	6432405		4158720							
377	Node					237.638		0		616372.8	6432388		4158786		No					
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		No					
160	Headwall				0.5	238.251		0		616892.2	6431719		4158722							
159	Node					237.913		0		616872.3	6431712		4158754		No					
98a	Headwall				0.5	238.306		0		616928.6	6431525		4158723							
99	Node					238.321		0		616910.2	6431512		4158818		No					
446	Headwall				0.5	239.034		0		616749.1	6433023		4158724							
446a	Node					238.995		0		616746.4	6433018		4158801		No					
303	Headwall				0.5	237.904		0		616496.4	6432982		4158725							
308a	Node					237.652		0		616477	6432986		4158772		No					
48	Headwall				0.5	238.544		0		616847.7	6433807		4158726							
49	Node					238.084		0		616860.5	6433819		4158803		No					
313	Headwall				0.5	238.424		0		616638	6432993		4158727							
314	Node					238.285		0		616639.2	6433000		4158775		No					
414	Headwall				0.5	238.893		0		616773.8	6432949		4158728							
415	Node					238.39		0		616750.6	6432987		4158800		No					
276	Node					239.166		0		617858.5	6431886		4158742		No					
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		No					
325	Node					239.119		0		617217.4	6431761		4158744		No					
326	OnGrade	SGGP, 1% g	S.G.G.P. 1.8m	E.K.I.	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		No					
OUTLET 05	Node					227.25		0		617692.1	6433786		4158746		No					
2\4	Node					238.461		0		616660.8	6433196		4158759		No					
71	Node					238.263		0		616512.1	6433224		4158760		No					
Node15a	Node					238.043		0		616372.8	6433279		4158761		No					
Outlet 67	Node					238.19		0		616303.7	6433276		4158762		No					
Node 22\3	Node					238.5		0		617939.1	6432287		4158768		No					
Node 314a	Node					238.638		0		616660.1	6433055		4158776		No					
OUTLET 34	Node					236.422		0		617883.6	6433767		4158781		No					
OUTLET 38	Node					238.703		0		616300.4	6433214		4158790		No					
OUTLET 41	Node					238.823		0		616621.5	6434031		4158798		No					
OUTLET 45	Node					237.839		0		616876.9	6433841		4158804		No					
61\2	Node					238.125		0		617779.1	6432346		4158806		No					
Node 74a	Node					237.8		0		617075.2	6433690		4158810		No					
OUTLET 74	Node					225.623		0		617116.8	6433901		4158811		No					
Node 93a	Node					241.036		0		617477.8	6431436		4158816		No					
OUTLET 12	Node					237.587		0		616317.7	6431281		4158822		No					
9	OnGrade	Surface Inl	Dummy Pit		1.5	238.781		0	0	617635.6	6433469	No	4158824	1 x Ku	No	Existing				
8	OnGrade	SGGP, 1% g	S.G.G.P. 1.8m	E.K.I.	1.5	239.177		0	0	617644.1	6433535	No	4158825	1 x Ku	No	Existing				
6	OnGrade	Junction Pi	JP 900x900		1.5	239.242		0	0	617650.8	6433585	No	4158730	1 x Ku	No	Existing				
5	Node					237.421		0		617655.4	6433617		4158745		No					
Pit12	OnGrade	NSW RTA S	SA2		1.5	238.748		0	0	617130.6	6433346	No	4158828	1 x Ku	No	Existing				
Pit13	Sag	NSW RTA S	SA1	10	1.5	237.718	0.2	0	0	617154.8	6433372	No	4158834	1 x Ku	No	Existing			0.2	0.2
Pit32	OnGrade	NSW RTA S	SA1		1.5	238.521		0	0	617184.7	6433495	No	4158833	1 x Ku	No	Existing				
Pit29	OnGrade	NSW RTA S	SA1		1.5	238.472		0	0	617130.2	6433550	No	4158831	1 x Ku	No	Existing				
Pit34	OnGrade	NSW RTA S	SA1		1.5	238.522		0	0	617150.3	6433676	No	4158832	1 x Ku	No	Existing				
Pit GPT	OnGrade	NSW RTA S	SA3		1.5	238.981		0	0	617162.5	6433722	No	4158829	1 x Ku	No	Existing				
discharge p	Node					234.416		0		617201.3	6433832		4158740		No					
O Pit GPT	Node					238.981		0		617166.5	6433785		4158840		No					
O 392	Node					237		0		617537.2	6433788		4158841		No					

	401	Node						237.924		0		617194.8	6433126		4158796			No									
Pit6		OnGrade	NSW RTA S	SA1			1.5	238.28		0	0	617175	6433316	No	7548994	1 x Ku		No	Existing								
Pit8		OnGrade	NSW RTA S	SA1			1.5	237.9		0	0	617158.7	6433343	No	4158835	1 x Ku		No	Existing								
N172535		Node						240.2		0		618526.9	6432477		17634851			No									
N101397		Node								0		619328	6432331		17788006			No									
N101398		Node								0		618922.7	6431555		17788007			No									
	273	Headwall					0.5	239.49		0		617893.6	6431862		20130780												
	347	Headwall					0.5	239		0		617862.9	6433455		20921376												
	346	Sag	Surface Inl	G.S.I.P. 90(		50	1.5	237.964	1	0	0	617864.8	6433470	No	4158686	1 x Ku		No	Existing				0.5	0.5			
	348	Node						236.807		0		617877.6	6433553		4158780			No									
	291	Headwall					0.5	238.77		0		617135.5	6432236		21521116												
	290	Node						238.395		0		617132.1	6432215		21521117			No									
	278	Headwall					0.5	239.617		0		617250.1	6431961		21670627												
	279	Node						238.418		0		617228.8	6431965		21670628			No									
	192	Headwall					0.5	238.362		0		616939.7	6432010		21670664												
183a		Node						237.977		0		616918	6432012		21670714			No									
	200	Headwall					0.5	238.629		0		616980.3	6432261		21970204												
	199	Node						238.181		0		616959.2	6432265		21970205			No									
	203	Headwall					0.5	238.265		0		616825.7	6432286		21970207												
	202	Node						237.94		0		616804.1	6432290		21970206			No									
	207	Headwall					0.5	238		0		616678.6	6432311		21970321												
	208	OnGrade	Junction Pi	JP 900x900			1.5	237.996		0	0	616675.2	6432311	No	4158734	1 x Ku		No	Existing								
218a		OnGrade	NSW RTA S	SA1			1.5	238.019		0	0	616671.1	6432314	No	4158838	1 x Ku		No	Existing								
209a		OnGrade	NSW RTA S	SA1			1.5	237.972		0	0	616642.1	6432330	No	4158839	1 x Ku		No	Existing								
	213	OnGrade	Junction Pi	JP 900x900			1.5	238.38		0	0	616637.2	6432333	No	4158735	1 x Ku		No	Existing								
216a		OnGrade	Junction Pi	JP 900x900			1.5	238.035		0	0	616538.6	6432349	No	4158736	1 x Ku		No	Existing								
N160610		Node						238.16		0		617798.2	6432343		22719610			No									
N168004		Node								0		617186.4	6431080		23345877			No									
	140	Headwall					2	237.601		0		616206.4	6431407		24366338												
	141	Node						237.428		0		616230	6431366		24366339			No									
	131	Headwall					2	238.07		0		616220.9	6431637		24366340												
	130	Node						238.015		0		616219.5	6431627		24366341			No									
HW47		Headwall					0.5	240.3		0		618841.1	6432176		24666802												
N184609		Node						240.3		0		618797.2	6432046		24666804			No									

DETENTION BASIN DETAILS

Name	Elev	Surf. Area	Not Used	Outlet Type	K	Dia(mm)	Centre RL	Pit Family	Pit Type	x	y	HED	Crest RL	Crest Length	id
SchoolOva	236.16	0		Culvert	0.5					617122.9	6433501	No			6567859
	237.6	5096													
	237.8	14437													
	238	24927													
	238.2	38096													
	238.4	48062													
PaytenParl	237.3	0		None						617207.6	6433254	No			6567865
	237.5	4736													
	237.7	11717													
	237.9	17141													
	238.1	23115													
	238.4	30189													
DundasPar	237.4	0		Culvert	0.5					617192.2	6433107	No			6567870
	237.6	10995													
	237.8	20061													
	238	24654													
	238.4	33890													
	239	33890													
U/S Railwa	237.4	0		Culvert	0.5					617215.3	6432732	No			7549076
	237.5	2160													
	237.6	2550													
	237.7	2940													
	237.8	3330													
	238	7475													
	238.2	29843													
	238.5	29843													
D/S Railwa	237.4	0		None						617233.3	6432766	No			7549087
	237.5	1													
	237.6	21.5													
	237.7	115.25													
	237.8	906													
	238.1	4330													
	238.9	1518													
	239	2049													

SUB-CATCHMENT DETAILS

Name	Pit or Node	Total Area (ha)	Paved Area %	Grass Area %	Supp Area %	Paved Time (min)	Grass Time (min)	Supp Time (min)	Paved Length (m)	Grass Length (m)	Supp Length (m)	Paved Slope(%) %	Grass Slope %	Supp Slope %	Paved Rough	Grass Rough	Supp Rough	Lag Time or Factor	Gutter Length (m)	Gutter Slope %	Gutter FlowFactor	Rainfall Multiplier
C 66	66	2.2312	70	30	0	5	10	0	280	280	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 22\1	22\1	1.6	50	50	0	5	10	0	250	250	-1	1	1	-1	0.13	0.4	-1	-1				1
C 373	373	2.4341	70	30	0	5	10	0	160	160	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 249	249	12.8307	70	30	0	5	10	0	350	350	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 244	244	13.5849	70	30	0	5	10	0	400	400	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 433	433	2.3	70	30	0	5	10	0	440	440	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 443	443	1.8517	70	30	0	5	10	0	125	125	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 120	120	8.4525	70	30	0	5	10	0	460	460	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 126	126	4.9813	70	30	0	5	10	0	435	435	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 147	147	2.9528	70	30	0	5	10	0	160	160	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 93	93	1.3489	70	30	0	5	10	0	210	210	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 64	64	9.1936	70	30	0	5	10	0	360	360	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 188	188	11.069	70	30	0	5	10	0	490	490	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 108	108	1.4484	70	30	0	5	10	0	160	160	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 109	109	9.5378	70	30	0	5	10	0	620	620	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 198	198	0.587	70	30	0	5	10	0	80	80	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 219	219	4.3367	70	30	0	5	10	0	200	200	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 40	40	9.7195	70	30	0	5	10	0	235	235	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 75	75	2.3306	70	30	0	5	10	0	160	160	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 307	307	2.1498	70	30	0	5	10	0	125	125	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 341	341	1.4677	70	30	0	5	10	0	80	80	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 336	336	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
C 4	4	5.5362	70	30	0	5	10	0	220	220	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 387	386	6.5163	70	30	0	5	10	0	140	140	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 215	215	3.6187	70	30	0	5	10	0	160	160	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 379	379	9.5798	70	30	0	5	10	0	370	370	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 160	160	2.188	70	30	0	5	10	0	260	260	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 98a	98a	4.6973	70	30	0	5	10	0	250	250	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 303	303	2.8141	70	30	0	5	10	0	190	190	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 49	48	4.8462	70	30	0	5	10	0	350	350	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 313	313	3.4986	70	30	0	5	10	0	200	200	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 414	414	4.8734	70	30	0	5	10	0	225	225	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 276	276	11.8156	70	30	0	5	10	0	470	470	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 325	325	10.0459	70	30	0	5	10	0	350	350	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 2\4	2\4	5.459	70	30	0	5	10	0	210	210	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C Node 93	Node 93a	1.3695	70	30	0	5	10	0	270	270	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 9	9	6.4492	70	30	0	5	10	0	600	600	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 8	8	0.1017	70	30	0	5	10	0	50	50	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C Pit12	Pit12	9.9596	70	30	0	5	10	0	320	320	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C Basin-pit	SchoolOva	11.3407	70	30	0	5	10	0	270	270	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C Pit34	Pit34	5.8339	70	30	0	5	10	0	220	220	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 400	DundasPar	19.8186	70	30	0	5	10	0	415	415	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C Pit6	Pit6	10.0971	70	30	0	5	10	0	360	360	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 371	U/S Railwa	10.2424	70	30	0	5	10	0	250	250	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 395	D/S Railwa	2.64	70	30	0	5	10	0	440	440	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1

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
C291	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)	Rl (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	237.354	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	Existing	1	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	Existing	1	248	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	Existing	1	244	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	Existing	1	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	Existing	1	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	Existing	1	253	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	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	238.793
P 445a	445a	445	5	238.096	238.07	0.52	RCBC	0.9W x 0.25H		0.013	Existing	1	445a	0	0	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	Existing	1	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	12.431	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	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	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	1.2W x 0.3H		0.013	Existing	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	Existing	1	219	0	0	237.444	0.266	237.477	0.941	237.664	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	0.024	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	238.04	1.246	238.157	1.858	238.187	4.697	238.116
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	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	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 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	238.163	8.236	238.331
P 337	337	338	14.193	236.67	236.612	0.41	RRJ C2	525	525	0.013	Existing	1	337	0	0	239.386	0.036	239.383	0.224	239.388	0.944	239.416
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	0.722	239.432	0.884	239.394	3.549	239.78
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	Existing	1	110	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	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	Existing	2	387	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	237.559	3.422	237.82	5.896	237.899	6.809	237.949
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	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	4.902	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	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	1W x 0.25H		0.013	Existing	1	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	1W x 0.3H		0.013	Existing	1	414	0	0	238.546	0.051	238.549	0.492	238.587	0.909	238.597
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	239.256	5.641	239.256
P 275	275	274	169.991	238.547	238.031	0.3	RRJ C2	600	600	0.013	Existing	2	275	0	0	239.583	3.336	239.607	13.614	239.624	49.098	239.738
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	239.188	6.104	239.267
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	238.987	0.069	239.015
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	239.096	1.609	239.126
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	239.331	32.717	239.235
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	239.235	21.035	239.32
P Pit12	Pit12	Pit13	35.291	236.86	236.68	0.51	RCBC	0.9W x 0.6H		0.012	Existing	1	Pit12	0	0	237.748	5.39	237.719	5.396	237.719	5.397	238.018
P Pit13	Pit13	Pit32	126.749	236.68	236.32	0.28	RCBC	0.9W x 0.6H		0.012	Existing	1	Pit13	0	0	237.718	13.614	237.818	24.556	237.9	34.195	237.937
P Pit32	Pit32	SchoolOval	62.768	236.32	236.16	0.25	RCBC	0.9W x 0.6H		0.012	Existing	1	Pit32	0	0	238.521	0.572	238.514	4.766	238.466	5.242	238.461
P Basin-pit	SchoolOva	Pit29	49.706	236.16	236.03	0.26	RCBC	0.9W x 0.6H		0.012	Existing	1	SchoolOval	0	0	237.748	1.193	237.777	3.739	237.833	7.225	237.916
P Pit29	Pit29	Pit34	127.482	236.03	235.68	0.27	RCBC	0.9W x 0.6H		0.012	Existing	1	Pit29	0	0	238.472	4.672	238.468	9.736	238.421	11.794	238.373
P Pit34	Pit34	Pit GPT	46.911	235.68	235.48	0.43	RRJ C2	825	825	0.013	Existing	1	Pit34	0	0	238.522	0.943	238.466	1.668	238.539	4.108	238.684
P Pit GPT	Pit GPT	discharge p	117.381	235.48	234.26	1.04	RRJ C2	600	600	0.013	Existing	2	Pit GPT	0	0	238.981	1.622	238.901	3.656	238.817	7.433	238.332
P 400	DundasPar	401	18.238	237.95	237.84	0.6	RCBC	1.2W x 0.2H		0.013	Existing	1	DundasPar	0	0	238.041	2.177	238.088	3.176	238.218	4.825	238.366
P Pit6	Pit6	Pit8	31.699	236.88	236.72	0.5	RCBC	0.9W x 0.6H		0.012	Existing	1	Pit6	0	0	237.946	0.184	237.945	2.88	237.933	4.51	237.924
P Pit8	Pit8	Pit13	28.76	236.72	236.68	0.14	RCBC	0.9W x 0.6H		0.012	Existing	1	Pit8	0	0	237.711	0.382	237.709	1.746	237.701	2.355	237.699
P 371	U/S Railwa	D/S Railwa	38.154	237.63	237.55	0.21	RCBC	1W x 0.8H		0.012	Existing	1	U/S Railwa	0	0	238.513	3.006	238.804	7.823	239.065	8.697	239.118
P 273	273	275	15.3	238.6	238.55	0.33	RRJ C2	450	450	0.013	Existing	1	273	0	0	239.166	4.872	239.244	5.597	239.256	5.641	239.256
P 347	347	346	15.401	237.352	237.11	1.57	RRJ C2	525	525	0.013	Existing	1	347	0	0	238.167	0.667	238.199	2.449	238.288	2.88	238.278
P 346	346	348	83.813	237.11	236.296	0.97	RRJ C2	525	525	0.013	Existing	1	346	0	0	237.329	0.008	237.295	0.135	237.301	0.719	237.459
P 291	291	290	21.568	238.313	238.27	0.2	RCBC	0.6W x 0.3H		0.013	Existing	1	291	0	0	238.413	0.59	238.515	3.292	238.708	6.672	238.743
P 278	278	279	21.604	238.49	238.38	0.51	RCBC	1.2W x 0.3H		0.013	Existing	1	278	0	0	238.537	0.234	238.585	0.586	238.798	1.66	238.814
P 192	192	183a	22.404	237.902	237.82	0.37	RCBC	1.2W x 0.25H		0.013	Existing	1	192	0	0	238.129	0.214	238.145	0.738	238.173	1.795	238.262
P 200	200	199	21.445	238.16	238.16	0	RCBC	0.6W x 0.3H		0.013	Existing	1	200	0	0	238.629	0.225	238.607	8.109	238.71	10.324	238.723
P 203	203	202	21.791	237.802	237.687	0.53	RCBC	1.8W x 0.3H		0.013	Existing	1	203	0	0	238.066	1.481	238.227	1.929	238.291	6.017	238.296
P 207	207	208	3.429	237.125	237.107	0.53	RCBC	2.15W x 0.65H		0.013	Existing	1	207	0	0	237.831	0.163	237.827	0.371	237.906	3.429	237.996
P 208	208	218a	4.733	237.107	237.123	-0.34	RCBC	2.15W x 0.65H		0.013	Existing	1	208	0	0	237.996	1.398	238.018	4.733	238.019		
P 218a	218a	209a	33.33	237.123	237.09	0.1	RCBC	2.15W x 0.65H		0.013	Existing	1	218a	0	0	238.019	2.382	238.02	5.048	238.053	8.834	238.19
P 209a	209a	213	5.695	237.09	237.084	0.11	RCBC	2.15W x 0.65H		0.013	Existing	1	209a	0	0	237.972	0.885	237.943	2.412	237.965	2.679	237.943
P 213	213	216a	99.895	237.239	237.136	0.1	RCBC	2.15W x 0.65H		0.013	Existing	1	213	0	0	238.38	2.196	238.371	3.653	238.368	7.262	238.363
P 216a	216a	217a	4.177	237.136	237.132	0.1	RCBC	2.15W x 0.675H		0.013	Existing	1	216a	0	0	238.035	1.46	238.046	1.86	238.065	4.177	238.128
P 140	140	141	46.863	237.08	237	0.17	RCBC	1.2W x 0.3H		0.013	Existing	1	140	0	0	237.601	0.149	237.601	1.843	237.606	3.805	237.609
P 131	131	130	9.963	237.16	237.13	0.3	RRJ C2	375	375	0.013	Existing	4	131	0	0	237.726	0.356	238.076	4.466	238.113	9.768	238.188
Pipe10930	HW47	N184609	50	238.4	238.35	0.1	RCBC	1.5W x 1.5H		0.012	Existing	11	HW47	0								

DETAILS of SERVICES CROSSING PIPES

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

CHANNEL DETAILS

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

OVERFLOW ROUTE DETAILS

Name	From	To	Travel Time (min)	Spill Level (m)	Crest Length (m)	Weir Coeff. C	Cross Section	Safe Depth Major Stor (m)	SafeDepth Minor Stor (m)	Safe DxV (sq.m/sec)	Bed Slope (%)	D/S Area Contributing %	id	U/S IL	D/S IL	Length (m)
F 66	66	67	0.1	238.163	10	1	8 m wide r	0.14	0.14	0.6	0.3	0	4158967	238.163	237.709	4.293
F 67	67	Node15a	0.6				8 m wide r	0.14	0.14	0.6	0.3	0	4159041	237.628	238.043	24.735
F 22\1	22\1	22\2	0.4	239.435	10	1	8 m wide r	0.14	0.14	0.6	0.3	0	4158968	239.435	238.7	14.814
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	0.5				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	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 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	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	238.927	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 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 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	0.7	238.07	10	1	Overflow a	0.05	0	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	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 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		N160610	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 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	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	0.6	0.3	0	4159059	237.718	238.521	126.749
F Pit32	Pit32		SchoolOva	2				8 m wide r	0.14	0.14	0.6	0.3	0	4159058	238.521	238.472	77.791
OF78192	SchoolOva		Node 74a	3.3	238.15	30	1	8 m wide r	0.14	0.14	0.6	0.3	0	7549121	238.15	237.8	127.482
F Pit29	Pit29		Node 74a	3.3				8 m wide r	0.14	0.14	0.6	0.3	0	4159056	238.472	238.522	127.482
F Pit34	Pit34		Node 74a	1.2				8 m wide r	0.14	0.14	0.6	0.3	0	4159057	238.522	238.981	46.911
F Pit GPT	Pit GPT		O Pit GPT	0.3				8 m wide r	0.14	0.14	0.6	0.3	0	4159055			10
OF78154	PaytenParl		Pit8	0.1	238.1	30	1	Overflow a	0.05	0	0.6	0.3	0	7548988	238	237.9	2
OF51128	DundasPar		401	0.9	238.4	10	1	8 m wide r	0.05	0	0.6	0.3	0	4159099	237.454	237.345	20.528
F 401		401	PaytenParl	5				8 m wide r	0.14	0.14	0.6	0.3	0	4159033	237.924	237.946	191.087
F Pit6	Pit6		Pit8	0.8				8 m wide r	0.14	0.14	0.6	0.3	0	4159053	237.946	237.711	31.699
F Pit8	Pit8		Pit13	0.8				8 m wide r	0.14	0.14	0.6	0.3	0	4159060	237.711	237.718	28.76
F 371	U/S Railwa		D/S Railwa	1.6	238.15	10	1	Overflow a	0.05	0	0.6	0.3	0	4158969	238.53	237.55	38.154
F 395	D/S Railwa		DundasPar	9	238.25	24	1	8 m wide r	0.14	0.14	0.6	0.3	0	4159032	238.083	238.3	344.717
OF137218	N172535		9	54.7				Overflow a	0.05	0	0.6	0.3	50	17634853	240.2	238.781	1330.1
OF82141	N101397		HW47	20.9				10m wide	0.25	0.25	0.4	0.3	0	17788017			880.4
OF82144	N101398		N184609	29.2				10m wide	0.25	0.25	0.4	0.3	0	17788020			1227.5
F 273		273	22\1	0.4	239.49	10	1	8 m wide r	0.14	0.14	0.6	0.3	0	20130843	239.435	238.7	16.2
F 347		347	346	3.4	239	30	1.7	Overflow a	0.05	0.2	0.6	0.3	0	20921390	237.964	236.807	83.813
F 346		346	348	2.2				8 m wide r	0.14	0.14	0.6	0.3	0	4158963	237.964	236.807	83.813
F 348		348	OUTLET 34	5.6				8 m wide r	0.14	0.14	0.6	0.3	0	4159025	236.807	236.422	214.181
F 291		291	290	1.3	238.77	10	1	8 m wide r	0.05	0	0.6	0.3	0	21521123	238.397	237.881	30.302
F 290		290	188	1.4				8 m wide r	0.14	0.14	0.6	0.3	0	21521138	237.977	238.367	52.02
OF118859		278	279	1.4	239.617	10	1	8 m wide r	0.14	0.14	0.6	0.3	0	21670752	237.977	238.367	52.02
F 279		279	192	0.5				8 m wide r	0.14	0.14	0.6	0.3	0	21670693	237.454	237.345	19.3
OF118882		192	183a	1.4	238.362	10	1	8 m wide r	0.14	0.14	0.6	0.3	0	21670776	237.977	238.367	52.02
F 183	183a		178	1.4				8 m wide r	0.14	0.14	0.6	0.3	0	4159010	237.977	238.367	52.02
OF121852		200	199	1.2	238.629	10	1	Overflow a	0.05	0	0.6	0.3	0	21970250	238.397	237.881	30.302
OF121886		199	203	1.4				8 m wide r	0.14	0.14	0.6	0.3	0	21970284	237.977	238.367	52.02
OF121872		203	202	1.2	238.265	10	1	Overflow a	0.05	0	0.6	0.3	0	21970270	238.397	237.881	30.302
OF121903		202	207	1.4				8 m wide r	0.14	0.14	0.6	0.3	0	21970301	237.977	238.367	52.02
OF121924		207	208	0.4	238	10	1	Overflow a	0.3	0.15	0.4	0.3	0	21970329	238.397	237.881	30.302
61\1	N160610		61\2	0.5				8 m wide r	0.14	0.14	0.6	0.3	0	4159094	237.454	237.345	19.3
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	237.625	237.838	67.17
OF146119		141	OUTLET 12	1.8				8 m wide r	0.14	0.14	0.6	0.3	0	24366406	237.625	237.838	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	237.625	237.838	67.17
OF146067		130	140	3.6				8 m wide r	0.14	0.14	0.6	0.3	0	24366349	237.838	237.587	137.855
OF149269	HW47		N184609	0.6	240.3	50	1.7	Overflow a	0.05	0	0.6	0.3	0	24666847	239.435	238.7	14.814

OF149261	N184609	Node 22\3	29.2		10m wide	0.25	0.25	0.4	0.3	0	24666834	1227.5

PIPE COVER DETAILS

Name	Type	Dia (mm)	Safe Cover	Cover (m)	
P 66	RRJ C2	300	0.1	-0.41	Unsafe
P 22\1	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 is Misaligned	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		4158808		No					
22\1	Headwall					0.5	239.435		0		618138.1	6431825		4158691							
22\2	Node						238.699		0		618140.9	6431839		4158767		No					
373	Headwall					0.5	237.804		0		616404	6432405		4158693							
374	Node						237.21		0		616382.7	6432409		4158784		No					
249	Headwall					0.5	238.27		0		617644.4	6432366		4158694							
248	OnGrade	NSW RTA S	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		No					
243	Sag	NSW RTA S	SA1	10		1.5	238.031	0.1	0	0	617514.9	6432409	No	4158836	1 x Ku	No	Existing			0.2	0.2
242	OnGrade	NSW RTA S	SA1			1.5	238.124		0	0	617490	6432434	No	4158837	1 x Ku	No	Existing				
239	Node						238.217		0		617464	6432455		4158765		No					
253	Headwall					0.5	238.01		0		617318.9	6432574		4158695							
257	Node						238.002		0		617353.3	6432642		4158766		No					
158	Headwall					0.5	238.304		0		616860.1	6431651		4158698							
157	Node						238.28		0		616858.7	6431642		4158751		No					
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		No					
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		616533.2	6431574		4158820		No					
126	Headwall					0.5	237.836		0		616471.1	6431595		4158702							
129	Node						237.838		0		616466.7	6431583		4158821		No					
147	Headwall					0.5	238.153		0		616358.5	6431852		4158703							
142	Node						237.777		0		616304.4	6431854		4158748		No					
93	Headwall					0.5	241.525		0		617174.6	6431486		4158704							
94	Node						240.544		0		617150.5	6431490		4158817		No					
64	Headwall					0.5	238.063		0		616411.1	6433300		4158705							
65	Node						237.778		0		616399.2	6433293		4158807		No					
188	Headwall					0.5	238.397		0		616942	6432032		4158706							
183	Node						237.977		0		616917.6	6432014		4158755		No					
108	Headwall					0.5	237.89		0		616863.9	6431538		4158707							
109	Node						237.797		0		616841.9	6431541		4158752		No					
198	Headwall					0.5	238.462		0		616397.2	6432093		4158708							
197	Node						238.182		0		616381.7	6432102		4158756		No					
178	Headwall					0.5	238.367		0		616910.7	6431962		4158709							
177	Node						237.845		0		616909.6	6431955		4158753		No					
219	Headwall					0.5	237.835		0		616432.6	6432585		4158710							
901	Node						237.454		0		616410.6	6432588		4158813		No					
40	Headwall					0.5	237.879		0		616593.8	6433881		4158711							
41	Node						237.977		0		616595.8	6433892		4158797		No					
75	Headwall					0.5	238.14		0		617032.4	6433695		4158712							
74	Node						237.855		0		617053.1	6433691		4158809		No					
307	Headwall					0.5	237.934		0		616500.3	6433022		4158713							
304	Node						237.869		0		616493.4	6433025		4158769		No					
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		No					
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	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		No					
4	Headwall					0.5	238.975		0		617493.5	6433620		4158716							
393	Sag	Surface Inl	G.S.I.P. 90(	1		1.5	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		No					
3	Headwall					0.5	239.375		0		617522.6	6433616		4158717							
394	Node						238.965		0		617524.7	6433629		4158794		No					
110	Headwall					0.5	238.11		0		616835.9	6431539		4158718							
111	Node						237.976		0		616834.1	6431526		4158819		No					
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		No					
376	Headwall					0.5	237.716		0		616374.7	6432405		4158720							
377	Node						237.638		0		616372.8	6432388		4158786		No					
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		No					
160	Headwall					0.5	238.251		0		616892.2	6431719		4158722							
159	Node						237.913		0		616872.3	6431712		4158754		No					
98a	Headwall					0.5	238.306		0		616928.6	6431525		4158723							
99	Node						238.321		0		616910.2	6431512		4158818		No					
446	Headwall					0.5	239.034		0		616749.1	6433023		4158724							
446a	Node						238.995		0		616746.4	6433018		4158801		No					
303	Headwall					0.5	237.904		0		616496.4	6432982		4158725							
308a	Node						237.652		0		616477	6432986		4158772		No					
48	Headwall					0.5	238.544		0		616847.7	6433807		4158726							
49	Node						238.084		0		616860.5	6433819		4158803		No					
313	Headwall					0.5	238.424		0		616638	6432993		4158727							
314	Node						238.285		0		616639.2	6433000		4158775		No					
414	Headwall					0.5	238.893		0		616773.8	6432949		4158728							
415	Node						238.39		0		616750.6	6432987		4158800		No					
276	Node						239.166		0		617858.5	6431886		4158742		No					
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		No					
325	Node						239.119		0		617217.4	6431761		4158744		No					
326	OnGrade	SGGP, 1% g	S.G.G.P. 1.8m E.K.I.			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		No					
OUTLET 05	Node						227.25		0		617692.1	6433786		4158746		No					
2\4	Node						238.461		0		616660.8	6433196		4158759		No					
71	Node						238.263		0		616512.1	6433224		4158760		No					
Node15a	Node						238.043		0		616372.8	6433279		4158761		No					
Outlet 67	Node						238.19		0		616303.7	6433276		4158762		No					
Node 22\3	Node						238.5		0		617939.1	6432287		4158768		No					
Node 314a	Node						238.638		0		616660.1	6433055		4158776		No					
OUTLET 34	Node						236.422		0		617883.6	6433767		4158781		No					
OUTLET 38	Node						238.703		0		616300.4	6433214		4158790		No					
OUTLET 41	Node						238.823		0		616621.5	6434031		4158798		No					
OUTLET 45	Node						237.839		0		616876.9	6433841		4158804		No					
61\2	Node						238.125		0		617779.1	6432346		4158806		No					
Node 74a	Node						237.8		0		617075.2	6433690		4158810		No					
OUTLET 74	Node						225.623		0		617116.8	6433901		4158811		No					
Node 93a	Node						241.036		0		617477.8	6431436		4158816		No					
OUTLET 12	Node						237.587		0		616364.4	6431395		4158822		No					
9	OnGrade	Surface Inl	Dummy Pit			1.5	238.781		0	0	617635.6	6433469	No	4158824	1 x Ku	No	Existing				
8	OnGrade	SGGP, 1% g	S.G.G.P. 1.8m E.K.I.			1.5	239.177		0	0	617644.1	6433535	No	4158825	1 x Ku	No	Existing				
6	OnGrade	Junction Pi	JP 900x900			1.5	239.242		0	0	617650.8	6433585	No	4158730	1 x Ku	No	Existing				
5	Node						237.421		0		617655.4	6433617		4158745		No					
Pit12	OnGrade	Surface Inl	Dummy Pit			1.5	238.748		0	0	617130.6	6433346	No	4158828	1 x Ku	No	New				
Pit13	Sag	NSW RTA S	SA1	10		1.5	237.718	0.2	0	0	617154.8	6433372	No	4158834	1 x Ku	No	Existing			0.2	0.2
Pit32	OnGrade	NSW RTA S	SA1			1.5	238.521		0	0	617184.7	6433495	No	4158833	1 x Ku	No	Existing				
Pit29	OnGrade	NSW RTA S	SA1			1.5	238.472		0	0	617130.2	6433550	No	4158831	1 x Ku	No	Existing				
Pit34	OnGrade	NSW RTA S	SA1			1.5	238.522		0	0	617150.3	6433676	No	4158832	1 x Ku	No	Existing				
Pit GPT	OnGrade	NSW RTA S	SA3			1.5	238.981		0	0	617162.5	6433722	No	4158829	1 x Ku	No	Existing				
discharge p	Node						234.416		0		617201.3	6433832		4158740		No					
O Pit GPT	Node						238.981		0		617166.5	6433785		4158840		No					
O 392	Node						237		0		617537.2	6433788		4158841		No					

	401	Node						237.924			0		617194.8	6433126		4158796			No							
Pit6		OnGrade	Surface Inl	Dummy Pit			1.5	238.28			0	0	617175	6433316	No	7548994	1 x Ku		No	New						
Pit8		OnGrade	Surface Inl	Dummy Pit			1.5	237.9			0	0	617158.7	6433343	No	4158835	1 x Ku		No	New						
N192692		Node						238.5			0		617233.5	6432766		25853478			No							
N172535		Node						240.2			0		618526.9	6432477		17634851			No							
N101397		Node									0		619328	6432331		17788006			No							
N101398		Node									0		618922.7	6431555		17788007			No							
	273	Headwall					0.5	239.49			0		617893.6	6431862		20130780										
	347	Headwall					0.5	239			0		617862.9	6433455		20921376										
	346	Sag	Surface Inl	G.S.I.P. 90(		50	1.5	237.964		1	0	0	617864.8	6433470	No	4158686	1 x Ku		No	Existing			0.5	0.5		
	348	Node						236.807			0		617877.6	6433553		4158780			No							
	291	Headwall					0.5	238.77			0		617135.5	6432236		21521116										
	290	Node						238.395			0		617132.1	6432215		21521117			No							
	278	Headwall					0.5	239.617			0		617250.1	6431961		21670627										
	279	Node						238.418			0		617228.8	6431965		21670628			No							
	192	Headwall					0.5	238.362			0		616939.7	6432010		21670664										
183a		Node						237.977			0		616918	6432012		21670714			No							
	200	Headwall					0.5	238.629			0		616980.3	6432261		21970204										
	199	Node						238.181			0		616959.2	6432265		21970205			No							
	203	Headwall					0.5	238.265			0		616825.7	6432286		21970207										
	202	Node						237.94			0		616804.1	6432290		21970206			No							
	207	Headwall					0.5	238			0		616678.6	6432311		21970321										
	208	OnGrade	Junction Pi	JP 900x900			1.5	237.996			0	0	616675.2	6432311	No	4158734	1 x Ku		No	Existing						
218a		OnGrade	NSW RTA !	SA1			1.5	238.019			0	0	616671.1	6432314	No	4158838	1 x Ku		No	Existing						
209a		OnGrade	NSW RTA !	SA1			1.5	237.972			0	0	616642.1	6432330	No	4158839	1 x Ku		No	Existing						
	213	OnGrade	Junction Pi	JP 900x900			1.5	238.38			0	0	616637.2	6432333	No	4158735	1 x Ku		No	Existing						
216a		OnGrade	Junction Pi	JP 900x900			1.5	238.035			0	0	616538.6	6432349	No	4158736	1 x Ku		No	Existing						
HW1103		Headwall					0.5	237.96			0		617183.9	6432792		25853489										
N192689		Node						237.7			0		617184.8	6432845		25853452			No							
N162485		Node									0		619406.1	6433447		25989498			No							
61\1		Node						238.91			0		617797.8	6432343		26126252			No							
N270468		Node									0		618590.9	6431727		36142566			No							
N168004		Node									0		617186.4	6431080		23345877			No							
*(11x) 1.5x		Node						1			0		618774.6	6432121		37773767			No							
	140	Headwall					2	237.601			0		616206.4	6431407		24366338										
	141	Node						237.428			0		616230	6431366		24366339			No							
	131	Headwall					2	238.07			0		616220.9	6431637		24366340										
	130	Node						238.015			0		616219.5	6431627		24366341			No							
HW47		Headwall					0.5	240.3			0		618798.3	6432049		24666802										
N184609		Node						240.3			0		618841.7	6432176		24666804			No							

DETENTION BASIN DETAILS

Name	Elev	Surf. Area	Not Used	Outlet Type	K	Dia(mm)	Centre RL	Pit Family	Pit Type	x	y	HED	Crest RL	Crest Length	id
SchoolOva	236.16	0		Culvert	0.5					617122.9	6433501	No			6567859
	237.6	5096													
	237.8	14437													
	238	24927													
	238.2	38096													
	238.4	48062													
PaytenParl	237.3	0		None						617207.6	6433254	No			6567865
	237.5	4736													
	237.7	11717													
	237.9	17141													
	238.1	23115													
	238.4	30189													
DundasPar	237.4	0		Culvert	0.5					617192.2	6433107	No			6567870
	237.6	10995													
	237.8	20061													
	238	24654													
	238.4	33890													
	239	33890													
U/S Railwa	237.4	0		Culvert	0.5					617215.3	6432732	No			7549076
	237.5	2160													
	237.6	2550													
	237.7	2940													
	237.8	3330													
	238	7475													
	238.2	29843													
	238.5	29843													

SUB-CATCHMENT DETAILS

Name	Pit or Node	Total Area (ha)	Paved Area %	Grass Area %	Supp Area %	Paved Time (min)	Grass Time (min)	Supp Time (min)	Paved Length (m)	Grass Length (m)	Supp Length (m)	Paved Slope(%) %	Grass Slope %	Supp Slope %	Paved Rough	Grass Rough	Supp Rough	Lag Time or Factor	Gutter Length (m)	Gutter Slope %	Gutter FlowFactor	Rainfall Multiplier
C 66	66	2.2312	70	30	0	5	10	0	280	280	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 22\1	22\1	1.4	50	50	0	5	10	0	250	250	-1	1	1	-1	0.13	0.4	-1	-1				1
C 373	373	2.4341	70	30	0	5	10	0	160	160	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 249	249	12.8307	70	30	0	5	10	0	350	350	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 244	244	13.5849	70	30	0	5	10	0	400	400	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 433	433	2.3	70	30	0	5	10	0	440	440	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 443	443	1.8517	70	30	0	5	10	0	125	125	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 120	120	8.4525	70	30	0	5	10	0	460	460	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 126	126	4.9813	70	30	0	5	10	0	435	435	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 147	147	2.9528	70	30	0	5	10	0	160	160	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 93	93	1.3489	70	30	0	5	10	0	210	210	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 64	64	9.1936	70	30	0	5	10	0	360	360	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 188	188	11.069	70	30	0	5	10	0	490	490	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 108	108	1.4484	70	30	0	5	10	0	160	160	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 109	109	9.5378	70	30	0	5	10	0	620	620	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 198	198	0.587	70	30	0	5	10	0	80	80	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 219	219	4.3367	70	30	0	5	10	0	200	200	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 40	40	9.7195	70	30	0	5	10	0	235	235	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 75	75	2.3306	70	30	0	5	10	0	160	160	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 307	307	2.1498	70	30	0	5	10	0	125	125	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 341	341	1.4677	70	30	0	5	10	0	80	80	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 336	336	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
C 4	4	5.5362	70	30	0	5	10	0	220	220	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 387	386	6.5163	70	30	0	5	10	0	140	140	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 215	215	3.6187	70	30	0	5	10	0	160	160	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 379	379	9.5798	70	30	0	5	10	0	370	370	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 160	160	2.188	70	30	0	5	10	0	260	260	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 98a	98a	4.6973	70	30	0	5	10	0	250	250	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 303	303	2.8141	70	30	0	5	10	0	190	190	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 49	48	4.8462	70	30	0	5	10	0	350	350	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 313	313	3.4986	70	30	0	5	10	0	200	200	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 414	414	4.8734	70	30	0	5	10	0	225	225	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 276	276	11.8156	70	30	0	5	10	0	470	470	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 325	325	10.0459	70	30	0	5	10	0	350	350	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 2\4	2\4	5.459	70	30	0	5	10	0	210	210	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C Node 93a	Node 93a	1.3695	70	30	0	5	10	0	270	270	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 9	9	6.4492	70	30	0	5	10	0	600	600	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 8	8	0.1017	70	30	0	5	10	0	50	50	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C Pit12	Pit12	9.9596	70	30	0	5	10	0	320	320	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C Basin-pit	SchoolOva	11.3407	70	30	0	5	10	0	270	270	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C Pit34	Pit34	5.8339	70	30	0	5	10	0	220	220	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C Pit6	PaytenParl	10.0971	70	30	0	5	10	0	360	360	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 400	DundasPar	19.8186	70	30	0	5	10	0	415	415	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 371	U/S Railwa	10.2424	70	30	0	5	10	0	250	250	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
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
C291	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)	Rl (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	237.354	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	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	238.34	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	NewFixed	3	244	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	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	237.963	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	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	238.793
P 445a	445a	445	5	238.096	238.07	0.52	RCBC	0.9W x 0.25H		0.013	Existing	1	445a	0	0	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	12.431	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	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	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	237.664	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	0.024	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	238.04	1.246	238.157	1.858	238.187	4.697	238.116
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	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	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 336	336	337	105.931	237.237	236.67	0.54	RRJ C2	900	900	0.013	NewFixed	3	336	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	239.386	0.036	239.383	0.224	239.388	0.944	239.416
P 338	338	345	104.471	236.612	235.876	0.7	RRJ C2	900	900	0.013	New	3	338	0	0	239.447	0.722	239.432	0.884	239.394	3.549	239.78
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	238.211	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	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	0.393	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	237.559	3.422	237.82	5.896	237.899	6.809	237.949
P 215	215	217a	33.501	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	4.902	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	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	1W x 0.3H		0.013	Existing	1	414	0	0	238.546	0.051	238.549	0.492	238.587	0.909	238.597
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	239.256	5.641	239.256
P 275	275	274	169.991	238.547	238.031	0.3	RRJ C2	600	600	0.013	Existing	2	275	0	0	239.583	3.336	239.607	13.614	239.624	49.098	239.738
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	239.188	6.104	239.267
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	238.987	0.069	239.015
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	239.096	1.609	239.126
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	239.331	32.717	239.235
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	239.235	21.035	239.32
P Pit12	Pit12	Pit13	35.291	236.86	236.68	0.51	RCBC	0.9W x 0.6H		0.012	Existing	1	Pit12	0	0	237.748	5.39	237.719	5.396	237.719	5.397	238.018
P Pit13	Pit13	Pit32	126.749	236.68	236.32	0.28	RCBC	0.9W x 0.6H		0.012	NewFixed	2	Pit13	0	0	237.718	13.614	237.818	24.556	237.9	34.195	237.937
P Pit32	Pit32	SchoolOva	62.768	236.32	236.16	0.25	RCBC	0.9W x 0.6H		0.012	NewFixed	2	Pit32	0	0	238.521	0.572	238.514	4.766	238.466	5.242	238.461
P Basin-pit	SchoolOva	Pit29	49.706	236.16	236.03	0.26	RCBC	0.9W x 0.6H		0.012	NewFixed	2	SchoolOva	0	0	237.748	1.193	237.777	3.739	237.833	7.225	237.916
P Pit29	Pit29	Pit34	127.482	236.03	235.68	0.27	RCBC	0.9W x 0.6H		0.012	NewFixed	2	Pit29	0	0	238.472	4.672	238.468	9.736	238.421	11.794	238.373
P Pit34	Pit34	Pit GPT	46.911	235.68	235.48	0.43	RRJ C2	825	825	0.013	NewFixed	2	Pit34	0	0	238.522	0.943	238.466	1.668	238.539	4.108	238.684
P Pit GPT	Pit GPT	discharge	117.381	235.48	234.26	1.04	RRJ C2	825	825	0.013	New	2	Pit GPT	0	0	238.981	1.622	238.901	3.656	238.817	7.433	238.332
P 400	DundasPar	401	18.238	237.95	237.84	0.6	RCBC	1.2W x 0.2H		0.013	NewFixed	4	DundasPar	0	0	238.041	2.177	238.088	3.176	238.218	4.825	238.366
P Pit6	Pit6	Pit8	31.699	236.88	236.72	0.5	RCBC	0.9W x 0.6H		0.012	Existing	1	Pit6	0	0	237.946	0.184	237.945	2.88	237.933	4.51	237.924
P Pit8	Pit8	Pit13	28.76	236.72	236.68	0.14	RCBC	0.9W x 0.6H		0.012	NewFixed	2	Pit8	0	0	237.711	0.382	237.709	1.746	237.701	2.355	237.699
P 371	U/S Railwa	N192692	38.154	237.63	237.55	0.21	RCBC	2.15W x 0.65H		0.012	NewFixed	2	U/S Railwa	0	0	238.513	3.006	238.804	7.823	239.065	8.697	239.118
P 273	273	275	15.3	238.6	238.55	0.33	RRJ C2	450	450	0.013	NewFixed	2	273	0	0	239.166	4.872	239.244	5.597	239.256	5.641	239.256
P 347	347	346	15.401	237.352	237.11	1.57	RRJ C2	525	525	0.013	Existing	1	347	0	0	238.167	0.667	238.199	2.449	238.288	2.88	238.278
P 346	346	348	83.813	237.11	236.296	0.97	RRJ C2	525	525	0.013	Existing	1	346	0	0	237.329	0.008	237.295	0.135	237.301	0.719	237.459
P 291	291	290	21.568	238.313	238.27	0.2	RCBC	0.6W x 0.3H		0.013	Existing	1	291	0	0	238.413	0.59	238.515	3.292	238.708	6.672	238.743
P 278	278	279	21.604	238.49	238.38	0.51	RCBC	1.2W x 0.3H		0.013	Existing	1	278	0	0	238.537	0.234	238.585	0.586	238.798	1.66	238.814
P 192	192	183a	22.404	237.902	237.82	0.37	RCBC	1.2W x 0.25H		0.013	Existing	1	192	0	0	238.129	0.214	238.145	0.738	238.173	1.795	238.262
P 200	200	199	21.445	238.16	238.16	0	RCBC	0.6W x 0.3H		0.013	Existing	1	200	0	0	238.629	0.225	238.607	8.109	238.71	10.324	238.723
P 203	203	202	21.791	237.802	237.687	0.53	RCBC	1.8W x 0.3H		0.013	Existing	1	203	0	0	238.066	1.481	238.227	1.929	238.291	6.017	238.296
P 207	207	208	3.429	237.125	237.107	0.53	RCBC	2.15W x 0.65H		0.013	Existing	1	207	0	0	237.831	0.163	237.827	0.371	237.906	3.429	237.996
P 208	208	218a	4.733	237.107	237.123	-0.34	RCBC	2.15W x 0.65H		0.013	Existing	1	208	0	0	237.996	1.398	238.018	4.733	238.019		
P 218a	218a	209a	33.33	237.123	237.09	0.1	RCBC	2.15W x 0.65H		0.013	Existing	1	218a	0	0	238.019	2.382	238.02	5.048	238.053	8.834	238.19
P 209a	209a	213	5.695	237.09	237.084	0.11	RCBC	2.15W x 0.65H		0.013	Existing	1	209a	0	0	237.972	0.885	237.943	2.412	237.965	2.679	237.943
P 213	213	216a	99.895	237.239	237.136	0.1	RCBC	2.15W x 0.65H		0.013	Existing	1	213	0	0	238.38	2.196	238.371	3.653	238.368	7.262	238.363
P 216a	216a	217a	4.177	237.136	237.132	0.1	RCBC	2.15W x 0.675H		0.013	Existing	1	216a	0	0	238.035	1.46	238.046	1.86	238.065	4.177	238.128
Pipe11344	HW1103	N192689	50	237.5	237.4	0.2	RCBC	1.5W x 0.3H		0.012	NewFixed	4	HW1103	0								
P 140	140	141	46.863	237.08	237	0.17	RCBC	1.2W x 0.3H		0.013	Existing	1	140	0	0	237.601	0.149	237.601	1.843	237.606	3.805	237.609
P 131	131	130	9.963	237.16	237.13	0.3	RRJ C2	375	375	0.013	Existing	4	131	0	0	237.726	0.356	238.076	4.466	238.113	9.768	238.188
Pipe10930	HW47	N184609	50	238.4	238.35	0.1	RCBC	1.5W x 1.5H		0.012	Existing	11	HW47	0								

DETAILS of SERVICES CROSSING PIPES

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

CHANNEL DETAILS

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

OVERFLOW ROUTE DETAILS

Name	From	To	Travel Time (min)	Spill Level (m)	Crest Length (m)	Weir Coeff. C	Cross Section	Safe Depth Major Stor (m)	SafeDepth Minor Stor (m)	Safe DxV (sq.m/sec)	Bed Slope (%)	D/S Area Contributing %	id	U/S IL	D/S IL	Length (m)
F 66	66	67	0.1	238.163	10	1	8 m wide r	0.14	0.14	0.6	0.3	0	4158967	238.163	237.709	4.293
F 67	67	Node15a	0.6				8 m wide r	0.14	0.14	0.6	0.3	0	4159041	237.628	238.043	24.735
F 22\1	22\1	22\2	0.4	239.435	10	1	8 m wide r	0.14	0.14	0.6	0.3	0	4158968	239.435	238.7	14.814
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	0.5				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	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 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	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	238.927	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 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 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	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 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		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 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	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	0.6	0.3	0	4159059	237.718	238.521	126.749
F Pit32	Pit32		SchoolOva	2				8 m wide r	0.14	0.14	0.6	0.3	0	4159058	238.521	238.472	77.791
OF78192	SchoolOva		Node 74a	3.3	238.15	30	1	8 m wide r	0.14	0.14	0.6	0.3	0	7549121	238.15	237.8	127.482
F Pit29	Pit29		Node 74a	3.3				8 m wide r	0.14	0.14	0.6	0.3	0	4159056	238.472	238.522	127.482
F Pit34	Pit34		Node 74a	1.2				8 m wide r	0.14	0.14	0.6	0.3	0	4159057	238.522	238.981	46.911
F Pit GPT	Pit GPT		O Pit GPT	0.3				8 m wide r	0.14	0.14	0.6	0.3	0	4159055			10
OF78154	PaytenParl		Pit8	0.1	238.1	30	1	Overflow a	0.05	0	0.6	0.3	0	7548988	238	237.9	2
OF51128	DundasPar		401	0.9	238.4	10	1	8 m wide r	0.14	0.14	0.6	0.3	0	4159099	237.454	237.345	20.528
F 401		401	PaytenParl	5				8 m wide r	0.14	0.14	0.6	0.3	0	4159033	237.924	237.946	191.087
F Pit6	Pit6		Pit8	0.8				8 m wide r	0.14	0.14	0.6	0.3	0	4159053	237.946	237.711	31.699
F Pit8	Pit8		Pit13	0.8				8 m wide r	0.14	0.14	0.6	0.3	0	4159060	237.711	237.718	28.76
F 371	U/S Railwa		N192692	1.6	238.15	10	1	Overflow a	0.05	0	0.6	0.3	0	4158969	238.53	237.55	38.154
OF153962	N192692		HW1103	1				Swale with	0.45	0.3	1	0.3	0	25853481	238.53	237.55	38.154
OF137218	N172535		336	54.7				Overflow a	0.05	0	0.6	0.3	50	17634853	240.2	238.781	1330.1
OF82141	N101397		N162485	20.9				10m wide	0.25	0.25	0.4	0.3	0	17788017			880.4
OF82144	N101398		HW47	29.2				10m wide	0.25	0.25	0.4	0.3	0	17788020			1227.5
F 273		273	22\1	0.4	239.49	10	1	8 m wide r	0.14	0.14	0.6	0.3	0	20130843	239.435	238.7	16.2
F 347		347	346	3.4	239	30	1.7	Overflow a	0.05	0.2	0.6	0.3	0	20921390	237.964	236.807	83.813
F 346		346	348	2.2				8 m wide r	0.14	0.14	0.6	0.3	0	4158963	237.964	236.807	83.813
F 348		348	OUTLET 34	5.6				8 m wide r	0.14	0.14	0.6	0.3	0	4159025	236.807	236.422	214.181
F 291		291	290	1.3	238.77	10	1	8 m wide r	0.05	0	0.6	0.3	0	21521123	238.397	237.881	30.302
F 290		290	188	1.4				8 m wide r	0.14	0.14	0.6	0.3	0	21521138	237.977	238.367	52.02
OF118859		278	279	1.4	239.617	10	1	8 m wide r	0.14	0.14	0.6	0.3	0	21670752	237.977	238.367	52.02
F 279		279	192	0.5				8 m wide r	0.14	0.14	0.6	0.3	0	21670693	237.454	237.345	19.3
OF118882		192	183a	1.4	238.362	10	1	8 m wide r	0.14	0.14	0.6	0.3	0	21670776	237.977	238.367	52.02
F 183	183a		178	1.4				8 m wide r	0.14	0.14	0.6	0.3	0	4159010	237.977	238.367	52.02
OF121852		200	199	1.2	238.629	10	1	Overflow a	0.05	0	0.6	0.3	0	21970250	238.397	237.881	30.302
OF121886		199	203	1.4				8 m wide r	0.14	0.14	0.6	0.3	0	21970284	237.977	238.367	52.02
OF121872		203	202	1.2	238.265	10	1	Overflow a	0.05	0	0.6	0.3	0	21970270	238.397	237.881	30.302
OF121903		202	207	1.4				8 m wide r	0.14	0.14	0.6	0.3	0	21970301	237.977	238.367	52.02
OF121924		207	208	0.4	238	10	1	Overflow a	0.3	0.15	0.4	0.3	0	21970329	238.397	237.881	30.302
OF153967	HW1103		N192689	1.6	237.96	10	1	Overflow a	0.05	0	0.6	0.3	0	25853486	238.53	237.55	38.154
F 395	N192689		DundasPar	9				8 m wide r	0.14	0.14	0.6	0.3	0	4159032	238.083	238.3	344.717
OF51123	61\1		61\2	0.5				8 m wide r	0.14	0.14	0.6	0.3	0	4159094	237.454	237.345	19.3
OF218457	N270468		Node 22\3	12.8				8 m wide r	0.14	0.14	0.6	0.3	0	36142545	238.699	238.5	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 22\1	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	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		4158808		No					
22\1	Headwall				0.5	239.435		0		618138.1	6431825		4158691							
22\2	Node					238.699		0		618140.9	6431839		4158767		No					
373	Headwall				0.5	237.804		0		616404	6432405		4158693							
374	Node					237.21		0		616382.7	6432409		4158784		No					
249	Headwall				0.5	238.27		0		617644.4	6432366		4158694							
248	OnGrade	NSW RTA S	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		No					
243	Sag	NSW RTA S	SA1	10	1.5	238.031	0.1	0	0	617514.9	6432409	No	4158836	1 x Ku	No	Existing			0.2	0.2
242	OnGrade	NSW RTA S	SA1		1.5	238.124		0	0	617490	6432434	No	4158837	1 x Ku	No	Existing				
239	Node					238.217		0		617464	6432455		4158765		No					
253	Headwall				0.5	238.01		0		617318.9	6432574		4158695							
257	Node					238.002		0		617353.3	6432642		4158766		No					
158	Headwall				0.5	238.304		0		616860.1	6431651		4158698							
157	Node					238.28		0		616858.7	6431642		4158751		No					
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		No					
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		616533.2	6431574		4158820		No					
126	Headwall				0.5	237.836		0		616471.1	6431595		4158702							
129	Node					237.838		0		616466.7	6431583		4158821		No					
147	Headwall				0.5	238.153		0		616358.5	6431852		4158703							
142	Node					237.777		0		616304.4	6431854		4158748		No					
93	Headwall				0.5	241.525		0		617174.6	6431486		4158704							
94	Node					240.544		0		617150.5	6431490		4158817		No					
64	Headwall				0.5	238.063		0		616411.1	6433300		4158705							
65	Node					237.778		0		616399.2	6433293		4158807		No					
188	Headwall				0.5	238.397		0		616942	6432032		4158706							
183	Node					237.977		0		616917.6	6432014		4158755		No					
108	Headwall				0.5	237.89		0		616863.9	6431538		4158707							
109	Node					237.797		0		616841.9	6431541		4158752		No					
198	Headwall				0.5	238.462		0		616397.2	6432093		4158708							
197	Node					238.182		0		616381.7	6432102		4158756		No					
178	Headwall				0.5	238.367		0		616910.7	6431962		4158709							
177	Node					237.845		0		616909.6	6431955		4158753		No					
219	Headwall				0.5	237.835		0		616432.6	6432585		4158710							
901	Node					237.454		0		616410.6	6432588		4158813		No					
40	Headwall				0.5	237.879		0		616593.8	6433881		4158711							
41	Node					237.977		0		616595.8	6433892		4158797		No					
75	Headwall				0.5	238.14		0		617032.4	6433695		4158712							
74	Node					237.855		0		617053.1	6433691		4158809		No					
307	Headwall				0.5	237.934		0		616500.3	6433022		4158713							
304	Node					237.869		0		616493.4	6433025		4158769		No					
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		No					
4	Headwall				0.5	238.975		0		617493.5	6433620		4158716							
393	Sag	Surface Inl	G.S.I.P. 90(	1	1.5	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		No					
3	Headwall				0.5	239.375		0		617522.6	6433616		4158717							
394	Node					238.965		0		617524.7	6433629		4158794		No					
110	Headwall				0.5	238.11		0		616835.9	6431539		4158718							
111	Node					237.976		0		616834.1	6431526		4158819		No					
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		No					
376	Headwall				0.5	237.716		0		616374.7	6432405		4158720							
377	Node					237.638		0		616372.8	6432388		4158786		No					
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		No					
160	Headwall				0.5	238.251		0		616892.2	6431719		4158722							
159	Node					237.913		0		616872.3	6431712		4158754		No					
98a	Headwall				0.5	238.306		0		616928.6	6431525		4158723							
99	Node					238.321		0		616910.2	6431512		4158818		No					
446	Headwall				0.5	239.034		0		616749.1	6433023		4158724							
446a	Node					238.995		0		616746.4	6433018		4158801		No					
303	Headwall				0.5	237.904		0		616496.4	6432982		4158725							
308a	Node					237.652		0		616477	6432986		4158772		No					
48	Headwall				0.5	238.544		0		616847.7	6433807		4158726							
49	Node					238.084		0		616860.5	6433819		4158803		No					
313	Headwall				0.5	238.424		0		616638	6432993		4158727							
314	Node					238.285		0		616639.2	6433000		4158775		No					
414	Headwall				0.5	238.893		0		616773.8	6432949		4158728							
415	Node					238.39		0		616750.6	6432987		4158800		No					
276	Node					239.166		0		617858.5	6431886		4158742		No					
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		No					
325	Node					239.119		0		617217.4	6431761		4158744		No					
326	OnGrade	SGGP, 1% ł	S.G.G.P. 1.8m	E.K.I.	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		No					
OUTLET 05	Node					227.25		0		617692.1	6433786		4158746		No					
2\4	Node					238.461		0		616660.8	6433196		4158759		No					
71	Node					238.263		0		616512.1	6433224		4158760		No					
Node15a	Node					238.043		0		616372.8	6433279		4158761		No					
Outlet 67	Node					238.19		0		616303.7	6433276		4158762		No					
Node 22\3	Node					238.5		0		617939.1	6432287		4158768		No					
Node 314a	Node					238.638		0		616660.1	6433055		4158776		No					
OUTLET 34	Node					236.422		0		617883.6	6433767		4158781		No					
OUTLET 38	Node					238.703		0		616300.4	6433214		4158790		No					
OUTLET 41	Node					238.823		0		616621.5	6434031		4158798		No					
OUTLET 45	Node					237.839		0		616876.9	6433841		4158804		No					
61\2	Node					238.125		0		617779.1	6432346		4158806		No					
Node 74a	Node					237.8		0		617075.2	6433690		4158810		No					
OUTLET 74	Node					225.623		0		617116.8	6433901		4158811		No					
Node 93a	Node					241.036		0		617477.8	6431436		4158816		No					
OUTLET 12	Node					237.587		0		616368.4	6431369		4158822		No					
9	OnGrade	Surface Inl	Dummy Pit		1.5	238.781		0	0	617635.6	6433469	No	4158824	1 x Ku	No	Existing				
8	OnGrade	SGGP, 1% ł	S.G.G.P. 1.8m	E.K.I.	1.5	239.177		0	0	617644.1	6433535	No	4158825	1 x Ku	No	Existing				
6	OnGrade	Junction Pi	JP 900x900		1.5	239.242		0	0	617650.8	6433585	No	4158730	1 x Ku	No	Existing				
5	Node					237.421		0		617655.4	6433617		4158745		No					
Pit12	OnGrade	Surface Inl	Dummy Pit		1.5	238.748		0	0	617130.6	6433346	No	4158828	1 x Ku	No	New				
Pit13	Sag	NSW RTA S	SA1	10	1.5	237.718	0.2	0	0	617154.8	6433372	No	4158834	1 x Ku	No	Existing			0.2	0.2
Pit32	OnGrade	NSW RTA S	SA1		1.5	238.521		0	0	617184.7	6433495	No	4158833	1 x Ku	No	Existing				
Pit29	OnGrade	NSW RTA S	SA1		1.5	238.472		0	0	617130.2	6433550	No	4158831	1 x Ku	No	Existing				
Pit34	OnGrade	NSW RTA S	SA1		1.5	238.522		0	0	617150.3	6433676	No	4158832	1 x Ku	No	Existing				
Pit GPT	OnGrade	NSW RTA S	SA3		1.5	238.981		0	0	617162.5	6433722	No	4158829	1 x Ku	No	Existing				
discharge (	Node					234.416		0		617201.3	6433832		4158740		No					
O Pit GPT	Node					238.981		0		617166.5	6433785		4158840		No					
O 392	Node					237		0		617537.2	6433788		4158841		No					
401	Node					237.924		0		617194.8	6433126		4158796		No					
Pit6	OnGrade	Surface Inl	Dummy Pit		1.5	238.28		0	0	617175	6433316	No	7548994	1 x Ku	No	New				
Pit8	OnGrade	Surface Inl	Dummy Pit		1.5	237.9		0	0	617158.7	6433343	No	4158835	1 x Ku	No	New				
N192692	Node					238.5		0		617233.5	6432766		25853478		No					

N172535	Node						240.2		0		618526.9	6432477		17634851		No									
N101397	Node								0		619328	6432331		17788006		No									
N101398	Node								0		618922.7	6431555		17788007		No									
273	Headwall					0.5	239.49		0		617893.6	6431862		20130780											
347	Headwall					0.5	239		0		617862.9	6433455		20921376											
346	Sag	Surface Inl	G.S.I.P. 90(	50	1.5	237.964	1	0	0	617864.8	6433470	No		4158686	1 x Ku	No	Existing			0.5	0.5				
348	Node						236.807		0		617877.6	6433553		4158780		No									
291	Headwall					0.5	238.77		0		617135.5	6432236		21521116											
290	Node						238.395		0		617132.1	6432215		21521117		No									
278	Headwall					0.5	239.617		0		617250.1	6431961		21670627											
279	Node						238.418		0		617228.8	6431965		21670628		No									
192	Headwall					0.5	238.362		0		616939.7	6432010		21670664											
183a	Node						237.977		0		616918	6432012		21670714		No									
200	Headwall					0.5	238.629		0		616980.3	6432261		21970204											
199	Node						238.181		0		616959.2	6432265		21970205		No									
203	Headwall					0.5	238.265		0		616825.7	6432286		21970207											
202	Node						237.94		0		616804.1	6432290		21970206		No									
207	Headwall					0.5	238		0		616678.6	6432311		21970321											
208	OnGrade	Junction Pi	JP 900x900		1.5	237.996		0	0	616675.2	6432311	No		4158734	1 x Ku	No	Existing								
218a	OnGrade	NSW RTA !	SA1		1.5	238.019		0	0	616671.1	6432314	No		4158838	1 x Ku	No	Existing								
209a	OnGrade	NSW RTA !	SA1		1.5	237.972		0	0	616642.1	6432330	No		4158839	1 x Ku	No	Existing								
213	OnGrade	Junction Pi	JP 900x900		1.5	238.38		0	0	616637.2	6432333	No		4158735	1 x Ku	No	Existing								
216a	OnGrade	Junction Pi	JP 900x900		1.5	238.035		0	0	616538.6	6432349	No		4158736	1 x Ku	No	Existing								
HW1103	Headwall					0.5	237.96		0		617183.9	6432792		25853489											
N192689	Node						237.7		0		617184.8	6432845		25853452		No									
N162485	Node								0		619406.1	6433447		25989498		No									
61\1	Node						238.91		0		617797.8	6432343		26126252		No									
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		No									
N230386	Node						238.002		0		617467.7	6432585		32367864		No									
N270468	Node								0		618590.9	6431727		36142566		No									
N168004	Node								0		617186.4	6431080		23345877		No									
140	Headwall					2	237.601		0		616206.4	6431407		24366338											
141	Node						237.428		0		616230	6431366		24366339		No									
131	Headwall					2	238.07		0		616220.9	6431637		24366340											
130	Node						238.015		0		616219.5	6431627		24366341		No									
HW47	Headwall					0.5	240.3		0		618798.3	6432049		24666802											
N184609	Node						240.3		0		618841.7	6432176		24666804		No									

DETENTION BASIN DETAILS

Name	Elev	Surf. Area	Not Used	Outlet Type	K	Dia(mm)	Centre RL	Pit Family	Pit Type	x	y	HED	Crest RL	Crest Length	id
SchoolOva	236.16	0		Culvert	0.5					617122.9	6433501	No			6567859
	237.6	5096													
	237.8	14437													
	238	24927													
	238.2	38096													
	238.4	48062													
PaytenParl	237.3	0		None						617207.6	6433254	No			6567865
	237.5	4736													
	237.7	11717													
	237.9	17141													
	238.1	23115													
	238.4	30189													
DundasPar	237.4	0		Culvert	0.5					617192.2	6433107	No			6567870
	237.6	10995													
	237.8	20061													
	238	24654													
	238.4	33890													
	239	33890													
U/S Railwa	237.4	0		Culvert	0.5					617215.3	6432732	No			7549076
	237.5	2160													
	237.6	2550													
	237.7	2940													
	237.8	3330													
	238	7475													
	238.2	29843													
	238.5	29843													
Proposed_	237.237	15000		Culvert	0.5					618072.5	6433291	No			30672238
	238	15000													
	239	15000													
Proposed_	237.6	30000		Culvert	0.5					617607	6432487	No			31048040
	237.8	30000													
	238	30000													

SUB-CATCHMENT DETAILS

Name	Pit or Node	Total Area (ha)	Paved Area %	Grass Area %	Supp Area %	Paved Time (min)	Grass Time (min)	Supp Time (min)	Paved Length (m)	Grass Length (m)	Supp Length (m)	Paved Slope(%)	Grass Slope %	Supp Slope %	Paved Rough	Grass Rough	Supp Rough	Lag Time or Factor	Gutter Length (m)	Gutter Slope %	Gutter FlowFactor	Rainfall Multiplier
C 66	66	2.2312	70	30	0	5	10	0	280	280	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 22\1	22\1	1.4	50	50	0	5	10	0	250	250	-1	1	1	-1	0.13	0.4	-1	-1				1
C 373	373	2.4341	70	30	0	5	10	0	160	160	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 249	249	12.8307	70	30	0	5	10	0	350	350	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 244	244	13.5849	70	30	0	5	10	0	400	400	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 433	433	2.3	70	30	0	5	10	0	440	440	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 443	443	1.8517	70	30	0	5	10	0	125	125	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 120	120	8.4525	70	30	0	5	10	0	460	460	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 126	126	4.9813	70	30	0	5	10	0	435	435	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 147	147	2.9528	70	30	0	5	10	0	160	160	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 93	93	1.3489	70	30	0	5	10	0	210	210	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 64	64	9.1936	70	30	0	5	10	0	360	360	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 188	188	11.069	70	30	0	5	10	0	490	490	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 108	108	1.4484	70	30	0	5	10	0	160	160	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 109	109	9.5378	70	30	0	5	10	0	620	620	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 198	198	0.587	70	30	0	5	10	0	80	80	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 219	219	4.3367	70	30	0	5	10	0	200	200	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 40	40	9.7195	70	30	0	5	10	0	235	235	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 75	75	2.3306	70	30	0	5	10	0	160	160	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 307	307	2.1498	70	30	0	5	10	0	125	125	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 341	341	1.4677	70	30	0	5	10	0	80	80	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 4	4	5.5362	70	30	0	5	10	0	220	220	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 387	386	6.5163	70	30	0	5	10	0	140	140	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 215	215	3.6187	70	30	0	5	10	0	160	160	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 379	379	9.5798	70	30	0	5	10	0	370	370	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 160	160	2.188	70	30	0	5	10	0	260	260	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 98a	98a	4.6973	70	30	0	5	10	0	250	250	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 303	303	2.8141	70	30	0	5	10	0	190	190	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 49	48	4.8462	70	30	0	5	10	0	350	350	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 313	313	3.4986	70	30	0	5	10	0	200	200	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 414	414	4.8734	70	30	0	5	10	0	225	225	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 276	276	11.8156	70	30	0	5	10	0	470	470	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 325	325	10.0459	70	30	0	5	10	0	350	350	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 2\4	2\4	5.459	70	30	0	5	10	0	210	210	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C Node 93	Node 93a	1.3695	70	30	0	5	10	0	270	270	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 9	9	6.4492	70	30	0	5	10	0	600	600	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 8	8	0.1017	70	30	0	5	10	0	50	50	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C Pit12	Pit12	9.9596	70	30	0	5	10	0	320	320	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C Basin-pit	SchoolOva	11.3407	70	30	0	5	10	0	270	270	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C Pit34	Pit34	5.8339	70	30	0	5	10	0	220	220	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C Pit6	PaytenParl	10.0971	70	30	0	5	10	0	360	360	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 400	DundasPar	19.8186	70	30	0	5	10	0	415	415	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1
C 371	U/S Railwa	10.2424	70	30	0	5	10	0	250	250	-1	0.2	0.2	-1	0.13	0.4	-1	-1				1

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
C291	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
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)	Rl (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	237.354	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	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	238.34	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	NewFixed	3	244	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	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	237.963	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	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	238.793	
P 445a	445a	445	5	238.096	238.07	0.52	RCBC	0.9W x 0.25H		0.013	Existing	1	445a	0	0	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	12.431	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	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	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	237.664	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	0.024	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	238.04	1.246	238.157	1.858	238.187	4.697	238.116	
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	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	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	238.211	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	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	0.393	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	237.559	3.422	237.82	5.896	237.899	6.809	237.949	
P 215	215	217a	33.501	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	4.902	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	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	1W x 0.3H		0.013	Existing	1	414	0	0	238.546	0.051	238.549	0.492	238.587	0.909	238.597	
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	239.256	5.641	239.256	
P 275	275	274	169.991	238.547	238.031	0.3	RRJ C2	600	600	0.013	Existing	2	275	0	0	239.583	3.336	239.607	13.614	239.624	49.098	239.738	
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	239.188	6.104	239.267	
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	238.987	0.069	239.015	
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	239.096	1.609	239.126	
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	239.331	32.717	239.235	
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	239.235	21.035	239.32	
P Pit12	Pit12	Pit13	35.291	236.86	236.68	0.51	RCBC	0.9W x 0.6H		0.012	Existing	1	Pit12	0	0	237.748	5.39	237.719	5.396	237.719	5.397	238.018	
P Pit13	Pit13	Pit32	126.749	236.68	236.32	0.28	RCBC	0.9W x 0.6H		0.012	Existing	1	Pit13	0	0	237.718	13.614	237.818	24.556	237.9	34.195	237.937	
P Pit32	Pit32	SchoolOva	62.768	236.32	236.16	0.25	RCBC	0.9W x 0.6H		0.012	Existing	1	Pit32	0	0	238.521	0.572	238.514	4.766	238.466	5.242	238.461	
P Basin-pit	SchoolOva	Pit29	49.706	236.16	236.03	0.26	RCBC	0.9W x 0.6H		0.012	Existing	1	SchoolOval	0	0	237.748	1.193	237.777	3.739	237.833	7.225	237.916	
P Pit29	Pit29	Pit34	127.482	236.03	235.68	0.27	RCBC	0.9W x 0.6H		0.012	Existing	1	Pit29	0	0	238.472	4.672	238.468	9.736	238.421	11.794	238.373	
P Pit34	Pit34	Pit GPT	46.911	235.68	235.48	0.43	RRJ C2	825	825	0.013	Existing	1	Pit34	0	0	238.522	0.943	238.466	1.668	238.539	4.108	238.684	
P Pit GPT	Pit GPT	discharge	117.381	235.48	234.26	1.04	RRJ C2	600	600	0.013	Existing	2	Pit GPT	0	0	238.981	1.622	238.901	3.656	238.817	7.433	238.332	
P 400	DundasPar	401	18.238	237.95	237.84	0.6	RCBC	1.2W x 0.2H		0.013	NewFixed	4	DundasPar	0	0	238.041	2.177	238.088	3.176	238.218	4.825	238.366	
P Pit6	Pit6	Pit8	31.699	236.88	236.72	0.5	RCBC	0.9W x 0.6H		0.012	Existing	1	Pit6	0	0	237.946	0.184	237.945	2.88	237.933	4.51	237.924	
P Pit8	Pit8	Pit13	28.76	236.72	236.68	0.14	RCBC	0.9W x 0.6H		0.012	Existing	1	Pit8	0	0	237.711	0.382	237.709	1.746	237.701	2.355	237.699	
P 371	U/S Railwa	N192692	38.154	237.63	237.55	0.21	RCBC	2.15W x 0.65H		0.012	NewFixed	1	U/S Railwa	0	0	238.513	3.006	238.804	7.823	239.065	8.697	239.118	
P 273	273	275	15.3	238.6	238.55	0.33	RRJ C2	450	450	0.013	NewFixed	2	273	0	0	239.166	4.872	239.244	5.597	239.256	5.641	239.256	
P 347	347	346	15.401	237.352	237.11	1.57	RRJ C2	525	525	0.013	Existing	1	347	0	0	238.167	0.667	238.199	2.449	238.288	2.88	238.278	
P 346	346	348	83.813	237.11	236.296	0.97	RRJ C2	525	525	0.013	Existing	1	346	0	0	237.329	0.008	237.295	0.135	237.301	0.719	237.459	
P 291	291	290	21.568	238.313	238.27	0.2	RCBC	0.6W x 0.3H		0.013	Existing	1	291	0	0	238.413	0.59	238.515	3.292	238.708	6.672	238.743	
P 278	278	279	21.604	238.49	238.38	0.51	RCBC	1.2W x 0.3H		0.013	Existing	1	278	0	0	238.537	0.234	238.585	0.586	238.798	1.66	238.814	
P 192	192	183a	22.404	237.902	237.82	0.37	RCBC	1.2W x 0.25H		0.013	Existing	1	192	0	0	238.129	0.214	238.145	0.738	238.173	1.795	238.262	
P 200	200	199	21.445	238.16	238.16	0	RCBC	0.6W x 0.3H		0.013	Existing	1	200	0	0	238.629	0.225	238.607	8.109	238.71	10.324	238.723	
P 203	203	202	21.791	237.802	237.687	0.53	RCBC	1.8W x 0.3H		0.013	Existing	1	203	0	0	238.066	1.481	238.227	1.929	238.291	6.017	238.296	
P 207	207	208	3.429	237.125	237.107	0.53	RCBC	2.15W x 0.65H		0.013	Existing	1	207	0	0	237.831	0.163	237.827	0.371	237.906	3.429	237.996	
P 208	208	218a	4.733	237.107	237.123	-0.34	RCBC	2.15W x 0.65H		0.013	Existing	1	208	0	0	237.996	1.398	238.018	4.733	238.019			
P 218a	218a	209a	33.33	237.123	237.09	0.1	RCBC	2.15W x 0.65H		0.013	Existing	1	218a	0	0	238.019	2.382	238.02	5.048	238.053	8.834	238.19	
P 209a	209a	213	5.695	237.09	237.084	0.11	RCBC	2.15W x 0.65H		0.013	Existing	1	209a	0	0	237.972	0.885	237.943	2.412	237.965	2.679	237.943	
P 213	213	216a	99.895	237.239	237.136	0.1	RCBC	2.15W x 0.65H		0.013	Existing	1	213	0	0	238.38	2.196	238.371	3.653	238.368	7.262	238.363	
P 216a	216a	217a	4.177	237.136	237.132	0.1	RCBC	2.15W x 0.675H		0.013	Existing	1	216a	0	0	238.035	1.46	238.046	1.86	238.065	4.177	238.128	
Pipe11344	HW1103	N192689	50	237.5	237.4	0.2	RCBC	1.5W x 0.3H		0.012	NewFixed	2	HW1103	0									
P 336	Proposed_	337	105.931	237.237	236.67	0.54	RRJ C2	525	525	0.013	Existing	1	Proposed_	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	525	525	0.013	Existing	1	337	0	0	239.386	0.036	239.383	0.224	239.388	0.944	239.416	
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	0.722	239.432	0.884	239.394	3.549	239.78	
Pipe14830	Proposed_	N230386	170.8	237.6	237.55	0.03	RCBC	1.8W x 0.3H		0.012	NewFixed	2	Proposed_	0									
P 140	140	141	46.863	237.08	237	0.17	RCBC	1.2W x 0.3H		0.013	Existing	1	140	0	0	237.601	0.149	237.601	1.843	237.606	3.805	237.609	
P 131	131	130	9.963	237.16	237.13	0.3	RRJ C2	375	375	0.013	Existing	4	131	0	0	237.726	0.356	238.076	4.466	238.113	9.768	238.188	
Pipe10930	HW47	N184609	50	238.4	238.35	0.1	RCBC	1.5W x 1.5H		0.012	Existing	11	HW47	0									

DETAILS of SERVICES CROSSING PIPES

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

CHANNEL DETAILS

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

OVERFLOW ROUTE DETAILS

Name	From	To	Travel Time (min)	Spill Level (m)	Crest Length (m)	Weir Coeff. C	Cross Section	Safe Depth Major Stor (m)	SafeDepth Minor Stor (m)	Safe DxV (sq.m/sec)	Bed Slope (%)	D/S Area Contributing %	id	U/S IL	D/S IL	Length (m)
F 66	66	67	0.1	238.163	10	1	8 m wide r	0.14	0.14	0.6	0.3	0	4158967	238.163	237.709	4.293
F 67	67	Node15a	0.6				8 m wide r	0.14	0.14	0.6	0.3	0	4159041	237.628	238.043	24.735
F 22\1	22\1	22\2	0.4	239.435	10	1	8 m wide r	0.14	0.14	0.6	0.3	0	4158968	239.435	238.7	14.814

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	0.5				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_	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	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	239.38	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	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 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	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 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_	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 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	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	0.6	0.3	0	4159059	237.718	238.521	126.749
F Pit32	Pit32	SchoolOva	2				8 m wide r	0.14	0.14	0.6	0.3	0	4159058	238.521	238.472	77.791
OF78192	SchoolOva	Node 74a	3.3	238.15	30	1	8 m wide r	0.14	0.14	0.6	0.3	0	7549121	238.15	237.8	127.482
F Pit29	Pit29	Node 74a	3.3				8 m wide r	0.14	0.14	0.6	0.3	0	4159056	238.472	238.522	127.482
F Pit34	Pit34	Node 74a	1.2				8 m wide r	0.14	0.14	0.6	0.3	0	4159057	238.522	238.981	46.911
F Pit GPT	Pit GPT	O Pit GPT	0.3				8 m wide r	0.14	0.14	0.6	0.3	0	4159055			10
OF78154	PaytenParl	Pit8	0.1	238.1	30	1	Overflow a	0.05	0	0.6	0.3	0	7548988	238	237.9	2
OF51128	DundasPar	401	0.9	238.4	10	1	8 m wide r	0.05	0	0.6	0.3	0	4159099	237.454	237.345	20.528
F 401	401	PaytenParl	5				8 m wide r	0.14	0.14	0.6	0.3	0	4159033	237.924	237.946	191.087
F Pit6	Pit6	Pit8	0.8				8 m wide r	0.14	0.14	0.6	0.3	0	4159053	237.946	237.711	31.699
F Pit8	Pit8	Pit13	0.8				8 m wide r	0.14	0.14	0.6	0.3	0	4159060	237.711	237.718	28.76
F 371	U/S Railwa	N192692	1.6	238.15	10	1	Overflow a	0.05	0	0.6	0.3	0	4158969	238.53	237.55	38.154
OF153962	N192692	HW1103	1				Swale with	0.45	0.3	1	0.3	0	25853481	238.53	237.55	38.154
OF137218	N172535	Proposed_	54.7				Overflow a	0.05	0	0.6	0.3	50	17634853	240.2	238.781	1330.1
OF82141	N101397	N162485	20.9				10m wide	0.25	0.25	0.4	0.3	0	17788017			880.4
OF82144	N101398	HW47	29.2				10m wide	0.25	0.25	0.4	0.3	0	17788020			1227.5
F 273	273	22\1	0.4	239.49	10	1	8 m wide r	0.14	0.14	0.6	0.3	0	20130843	239.435	238.7	16.2
F 347	347	346	3.4	239	30	1.7	Overflow a	0.05	0.2	0.6	0.3	0	20921390	237.964	236.807	83.813
F 346	346	348	2.2				8 m wide r	0.14	0.14	0.6	0.3	0	4158963	237.964	236.807	83.813
F 348	348	OUTLET 34	5.6				8 m wide r	0.14	0.14	0.6	0.3	0	4159025	236.807	236.422	214.181
F 291	291	290	1.3	238.77	10	1	8 m wide r	0.05	0	0.6	0.3	0	21521123	238.397	237.881	30.302
F 290	290	188	1.4				8 m wide r	0.14	0.14	0.6	0.3	0	21521138	237.977	238.367	52.02
OF118859	278	279	1.4	239.617	10	1	8 m wide r	0.14	0.14	0.6	0.3	0	21670752	237.977	238.367	52.02
F 279	279	192	0.5				8 m wide r	0.14	0.14	0.6	0.3	0	21670693	237.454	237.345	19.3
OF118882	192	183a	1.4	238.362	10	1	8 m wide r	0.14	0.14	0.6	0.3	0	21670776	237.977	238.367	52.02
F 183	183a	178	1.4				8 m wide r	0.14	0.14	0.6	0.3	0	4159010	237.977	238.367	52.02
OF121852	200	199	1.2	238.629	10	1	Overflow a	0.05	0	0.6	0.3	0	21970250	238.397	237.881	30.302
OF121886	199	203	1.4				8 m wide r	0.14	0.14	0.6	0.3	0	21970284	237.977	238.367	52.02
OF121872	203	202	1.2	238.265	10	1	Overflow a	0.05	0	0.6	0.3	0	21970270	238.397	237.881	30.302
OF121903	202	207	1.4				8 m wide r	0.14	0.14	0.6	0.3	0	21970301	237.977	238.367	52.02
OF121924	207	208	0.4	238	10	1	Overflow a	0.3	0.15	0.4	0.3	0	21970329	238.397	237.881	30.302
OF153967	HW1103	N192689	1.6	237.96	10	1	Overflow a	0.05	0	0.6	0.3	0	25853486	238.53	237.55	38.154
F 395	N192689	DundasPar	9				8 m wide r	0.14	0.14	0.6	0.3	0	4159032	238.083	238.3	344.717
OF51123	61\1	61\2	0.5				8 m wide r	0.14	0.14	0.6	0.3	0	4159094	237.454	237.345	19.3
F 336	Proposed_	337	5.8	239.6	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
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 22\3	12.8				8 m wide r	0.14	0.14	0.6	0.3	0	36142545	238.699	238.5	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 22\1	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 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

DRAINS results prepared from Version 2020.061

PIT / NODE DETAILS Version 8

Name	Max HGL	Max Pond HGL	Max Surfac Flow Arrivi (cu.m/s)	Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint
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
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
214a	237.5		0		0.6		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
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
218a		237.77		0		0.25	None
209a		237.74		0		0.24	None
	213	237.71		0		0.67	None
216a		237.62		0		0.42	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 93	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
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
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 (Runc	Impervious cu.m (Runc	Pervious Runoff cu.m (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 22\1	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	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

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 22\1	0	0	0.142	0	0	0	0	
F 22\2	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 314	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 74a	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 93a	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 Total	Max Q Low Level	Max Q High Level
SchoolOval	238.21	14692.3	1.467	1.07	0.397
PaytenPark	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 p	10782.49	10782.49	0	0
O Pit GPT	0	0	0	0
O 392	1771.7	1771.7	0	0
PaytenPark	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 downstrea

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

ım 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, I

:mium Hydraulic model).

F Pit13, F Pit8

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

DRAINS results prepared from Version 2020.061

PIT / NODE DETAILS Version 8

Name	Max HGL	Max Pond HGL	Max Surfac Flow Arrivi (cu.m/s)	Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint
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	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	0.44	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)	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 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 93	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 Runoff cu.m (Runoff %)
AR&R 5 yea	105636.5	29505.33 (.	29326.82 (!	178.51 (0.2%)
AR&R 5 yea	159753.7	46859.27 (.	45749.73 (!	1109.55 (1.0%)
AR&R 5 yea	200925.8	60429.38 (.	57923.57 (!	2505.81 (1.8%)
AR&R 5 yea	233735.4	71149.49 (.	67057.59 (!	4091.91 (2.5%)
AR&R 5 yea	283666.8	86929.34 (.	79442.00 (!	7487.33 (3.8%)
AR&R 5 yea	336007	108547.88	96071.26 (!	12476.62 (5.4%)
AR&R 5 yea	373579.6	125539.02	108878.06	16660.95 (6.5%)
AR&R 5 yea	426217.5	150598.97	126961.52	23637.45 (8.1%)
AR&R 5 yea	463312	166546.89	139489.83	27057.07 (8.5%)
AR&R 5 yea	516040	186695.05	157035.97	29659.07 (8.4%)
AR&R 5 yea	571492.3	204604.53	174760.63	29843.90 (7.6%)
AR&R 5 yea	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 22\1	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

P Pit GPT	1.458	2.74	235.892	234.672	AR&R 5 year, 6 hours storm, average 9.5 mm/h, Zone 2
P 400	1.374	1.43	238.15	238.04	AR&R 5 year, 3 hours storm, average 15.9 mm/h, Zone 2
P Pit6	0.012	0.02	237.885	237.88	AR&R 5 year, 4.5 hours storm, average 11.7 mm/h, Zone 2
P Pit8	1.335	1.24	237.787	237.738	AR&R 5 year, 6 hours storm, average 9.5 mm/h, Zone 2
P 371	2.26	1.73	237.934	237.854	AR&R 5 year, 1.5 hours storm, average 26.2 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(	2.26	1.55	237.744	237.644	AR&R 5 year, 1.5 hours storm, average 26.2 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

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	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	0.124	0.07	3.26	0.59	AR&R 5 year, 2 hours storm, average 21.4 mm/h, Zone 2
F 22\1	0	0	0	0	0	0	0	
F 22\2	0.078	0.078	0	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	0	0	0	0	
F 374	0.144	0.144	0	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	0	0	0	0	
OF51143	0	0	0	0	0	0	0	
OF51134	0	0	0	0	0	0	0	
OF51139	0	0	0	0	0	0	0	
F 239	0.914	0.914	0	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	0	0	0	0	
F 257	2.122	2.122	0	0.343	0.47	8.85	1.36	AR&R 5 year, 45 minutes storm, average 41.4 mm/h, Zone 2
F 158	0	0	0	0	0	0	0	
F 157	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 433	0	0	0	0	0	0	0	
F 445a	0	0	0	0	0	0	0	
F 445	0.2	0.2	0	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	0	0	0	0	
F 120	0	0	0	0	0	0	0	
F 121	3.913	3.913	0	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	0	0	0	0	
F 129	4.079	4.079	0	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	0	0	0	0	
F 142	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
F 93	0	0	0	0	0	0	0	
F 94	0.13	0.13	0	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	0	0	0	0	
F 65	0.348	0.348	0	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	0	0	0	0	
OF118839	0.569	0.569	0	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	0	0	0	0	
F 109	1.483	1.483	0	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	0	0	0	0	
F 197	1.731	1.731	0	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	7.7E+14	0	0	0	0	
F 177	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
OF51117	0	0	0	0	0	0	0	
F 901	0.229	0.229	0	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	0	0	0	0	
F 41	0.469	0.469	0	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	0	0	0	0	
F 74	0.138	0.138	0	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	0	0	0	0	
F 341	0	0	0	0	0	0	0	
F 343	0.122	0.122	0	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	0	0	0	0	0	0	
F 337	0.01	0.01	0	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	0	0	0	0	
F 345	2.903	2.903	0	0.382	0.58	8.85	1.52	AR&R 5 year, 1 hour storm, average 34.5 mm/h, Zone 2
F 4	0	0	0	0	0	0	0	
F 393	0	0	0	0	0	0	0	
F 392	0.277	0.277	0	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	0	0	0	0	
F 394	0	0	0	0	0	0	0	
F 110	0	0	0	0	0	0	0	
F 111	3.639	3.639	0	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	0	0	0	0	
OF51147	0	0	0	0	0	0	0	
F 385	1.021	1.021	0	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	1.711	1.711	0	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	0	0	0	0	
F 379	1.345	1.345	0	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	0	0	0	0	

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 Node15a	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
PaytenPark	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 p	8061.68	8061.68	0	0
O Pit GPT	0	0	0	0
O 392	1771.24	1771.24	0	0
PaytenPark	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

ıe 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

DRAINS results prepared from Version 2020.061

PIT / NODE DETAILS Version 8

Name	Max HGL	Max Pond HGL	Max Surfac Flow Arrivi (cu.m/s)	Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint
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		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		None
214a	237.53		0		0.57		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		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	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	Inlet Capacity
Pit GPT	235.97		0		3.01	0	None
discharge p	234.63		0				
401	237.98		0				
Pit6	237.89		0		0.39	0	None
Pit8	237.89		0.906		0.01	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	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	237.83		0.874		0.13	0	None
N192689	237.61		0.089				
337	237.6		0.051		1.79	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	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)	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 93a	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
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 (Runc	Impervious cu.m (Runc	Pervious Runoff cu.m (Runoff %)
AR&R 5 yea	105636.5	29505.33 (.	29326.82 (!	178.51 (0.2%)
AR&R 5 yea	159753.7	46859.27 (.	45749.73 (!	1109.55 (1.0%)
AR&R 5 yea	200925.8	60429.38 (.	57923.57 (!	2505.81 (1.8%)
AR&R 5 yea	233735.4	71149.49 (.	67057.59 (!	4091.91 (2.5%)
AR&R 5 yea	283666.8	86929.34 (.	79442.00 (!	7487.33 (3.8%)
AR&R 5 yea	336007	108547.88	96071.26 (!	12476.62 (5.4%)
AR&R 5 yea	373579.6	125539.02	108878.06	16660.95 (6.5%)
AR&R 5 yea	426217.5	150598.97	126961.52	23637.45 (8.1%)
AR&R 5 yea	463312	166546.89	139489.83	27057.07 (8.5%)
AR&R 5 yea	516040	186695.05	157035.97	29659.07 (8.4%)
AR&R 5 yea	571492.3	204604.53	174760.63	29843.90 (7.6%)
AR&R 5 yea	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 22\1	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

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 22\1	0	0	0.142	0	0	0	0	
F 22\2	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 31	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 74	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 93	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
PaytenPark	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 p	7607.89	7607.89	0	0
O Pit GPT	0	0	0	0
O 392	1771.28	1771.28	0	0
PaytenPark	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

ıe 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).

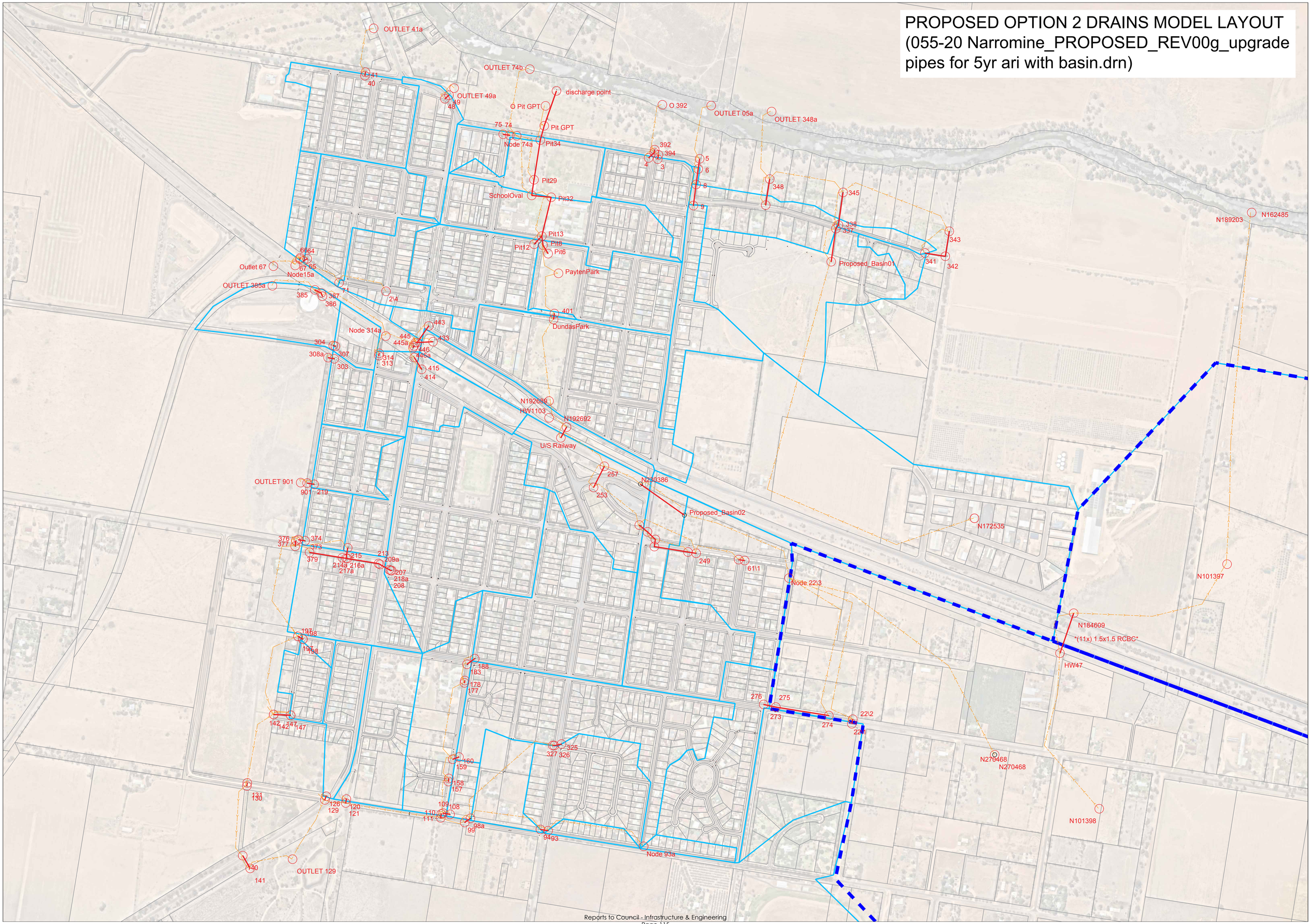
i95, F 401, F 41, F 415, F 446a, F 445, F 49, F 65, F Node 74a, F 901, F 99, F 111, F 121, F 129, F Pit34, F Pit13, F Pit8

Appendix C – DRAINS Model Layout

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

PROPOSED OPTION 1 DRAINS MODEL LAYOUT (055-20 Narromine_PROPOSED_REV00g_upgrade pipes for 5yr ari.drn)

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



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