AREA 1 STORMWATER MANAGEMENT PLAN

RIPLEY VALLEY URBAN CORE

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BACKGROUND

MPN Consulting Pty Ltd has been commissioned by Sekisui House Development Services Pty Ltd to prepare a Stormwater Management Plan for Sekisui House Area 1 Early Release Landholdings in the Ripley Valley Urban Core. The subject land adjoins other properties which create a number of design constraints with regard to the finished land profile and extent of works which need to be considered in the design phase of the project.

In October 2010, authority for the development was declared by the State Government to be administered by the Urban Land Development Authority (ULDA). The overarching design guideline for Area 1 is the ULDA "Residential 30 Guideline" (Res 30).

This report presents preliminary solutions to stormwater quality management, conveyance and detention details to demonstrate compliance with ULDA performance criteria set out in the ULDA Development Assessment Certification Procedures Manual for best practice stormwater management.

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1 OVERVIEW TO THE MANAGEMENT OF STORMWATER IN SOUTH EAST QUEENSLAND

1.1 Water Sensitive Urban Design (WSUD)

At the development scale, WSUD is a planning and design approach that integrates water cycle management into the built form of houses, allotments, streets, suburbs, master-planned communities and structure plan areas. Its aim is to avoid or minimise the effects of development on the natural water cycle and environmental values by:

- Protecting and enhancing the intrinsic values of the natural water cycle by minimising disturbance to natural landforms, wetlands, watercourses and riparian zones
- Protecting the quality of surface water and groundwater to maintain and enhance aquatic ecosystems and enable reuse opportunities.
- Reducing downstream flooding and the effects of drainage on aquatic ecosystems by managing stormwater runoff and peak flows.
- Promoting more efficient use of water by reducing the demand for potable water and encouraging use of alternative water supplies.
- Minimising the generation of wastewater and ensuring it is treated to a sufficient standard to enable the effluent to be reused and/or released into receiving waters.
- Controlling soil erosion during the construction and operational phases of development.
- Using stormwater to maximise the visual and recreational amenity of developments and to promote an understanding of water in the urban environment.

1.2 Compliance

The State Government and Local Authorities require the principles of WSUD to be applied to all new developments in South East Queensland (SEQ) and have introduced legislation accordingly. Implementation and technical guidelines to assist developments to incorporate the principles of WSUD have been prepared by Healthy Waterways and form part of the ULDA performance criteria.

The required treatment of stormwater to comply with the principles of WSUD can be broken into two facets being, stormwater quantity and stormwater quality, which are further discussed below.

1.2.1 *Stormwater Quantity*

Generally any new development will increase the impervious area of the development site. This will therefore increase the peak stormwater runoff from the site. It is a requirement of WSUD that the peak stormwater runoff flow from a site post-development does not increase over the pre-development peak flow. This is to reduce downstream flooding and prevent erosion of downstream gullies and streams. Stormwater detention basins are the most practical solution to attenuate the increase in runoff flows.

Stormwater Detention Basins control the rate of release of stormwater into downstream properties and waterways and provide storage to allow storm water to be released at a reduced rate downstream, thereby providing a no worsening to downstream flooding and erosion of creeks and gullies.

Plate 1 Detention Basin Example

1.2.2 *Stormwater Quality*

Stormwater runoff from any site (developed and undeveloped) will contain pollutants from the site and from airborne deposits. It is required by ICC that the pollutants in the stormwater runoff from a developed site be reduced by a defined percentage set by Healthy Waterways to create a no-worsening effect in the runoff quality when compared with the undeveloped site case.

The reduction of the pollutants in the stormwater discharging from the site will protect the downstream aquatic ecosystems and prevent silts and sediments entering downstream waterways.

Ipswich City Council & Healthy Waterways requires the following pollution load reduction targets for stormwater runoff to be achieved:

Pollutant	Pollutant Load Reduction
Gross Pollutants	90%
Total Suspended Solids	80%
Total Phosphorus	60%
Total Nitrogen	45%

Table 1-1 Water Quality Objectives (Source: Ipswich City Council)

1.2.2.1 Stormwater Treatment Devices

There are a variety of stormwater treatment devices which can be incorporated into a development to reduce stormwater pollutants, namely:

1.2.2.1.1 Rainwater Tanks

On site domestic rainwater harvesting tanks capture rainfall for reuse for external cleaning, toilet flushing and irrigation purposes. The requirements for the design of rainwater tanks are specified in the Queensland Development Code. The incorporation of domestic rainwater tanks into the built form will reduce the amount of treated potable water drawn from Council's water mains, but they do not reduce stormwater detention requirements as they are a retention device without additional capacity for detention of stormwater.

Plate 2 Domestic Rainwater Tank example in Built Form

1.2.2.1.2 Sediment Basins

During the construction of any development, sediment basins, sediment fences and diversion drains are installed to control and minimise the release of sediment from the site into the downstream drainage systems.

Plate 3 Temporary Sediment Basin Example

Sediment basins may also be used post construction to treat coarse and fine sediments.

1.2.2.1.3 Vegetated Swales and Buffer Strips

Vegetated swales are vegetated depressions in the landscape used to convey stormwater. Swales help to remove sediments and nutrients from stormwater by infiltration and filtration, and their gentle slopes move water slowly downstream protecting downstream waterways from damage, and erosion.

A buffer strip is the vegetated slope beside the vegetated swale, which usually separates the swale from the impervious areas which contribute runoff to the swale.

Plate 4 Grassed Swale Example

Plate 5 Example of Buffer Strip and Swale

1.2.2.1.4 Bioretention Swales

Bioretention swales incorporate a vegetated infiltration trench within the invert of the swale. Pollutants are removed by filtration and biological uptake of nutrients within the filtration media. The soil "filter" must meet the FAWB Specification for SEQ to achieve suitable nutrient uptake whilst not leaching additional nutrients during the establishment phase or upon longer term dry periods.

The treated stormwater, once filtered through the bioretention media, is collected by under-drains which then discharge to the trunk stormwater system.

Plate 6 Example of Bioretention Swale

1.2.2.1.5 Bioretention Basins

A bioretention basin is a vegetated bed of porosity sand filter material. Stormwater runoff captured within the bioretention basin filters through the media removing pollutants. Pollutants are also removed through biological uptake of nutrients within the soil media. The soil "filter" must meet the FAWB Specification for SEQ to achieve suitable nutrient uptake whilst not leaching additional nutrients during the establishment phase or upon longer term dry periods.

These basins usually have a holding storage capacity of up to 300mm of water depth to allow filtration to occur over a few hours. The plants selected need to be tolerant of this inundation. The treated stormwater is removed by under-drains which are connected to the stormwater system.

Plate 7 Example Bioretention Basin

1.2.2.1.6 Gross Pollutant Traps

In Australia, gross pollutants are defined as anthropogenic litter greater than 5mm in size. Gross Pollutant Traps retain gross organic and man-made litter washed from urban surfaces. They rely on physical screening rather than flow retardation to remove litter. A number of manufacturers provide GPT's with a proven track record in Ipswich City Council.

Plate 8 Litter Basket Type - Gross Pollutant Trap

Plate 9 Example of Humeguard (under construction)

Plate 10 Inside a Humeguard Showing Trapped Pollutants

Plate 11 Induct Truck at a Humeguard GPT During Waste removal

1.2.3 *Stormwater Treatment Train*

Stormwater carries a wide range of pollutant types and sizes. This range of potential pollutants means no single measure can effectively treat all pollutants carried by stormwater and a combination of stormwater devices is required to reduce pollutants to acceptable levels. The devices are combined to provide a treatment process for the stormwater as it passes each of the devices in turn. Some stormwater devices are better able to remove certain pollutants than others and the removal effectiveness is dependent on their relative location to each other in the treatment train and catchment type and size.

Based on preliminary MUSIC modelling, the area required for a bioretention basin at Ripley is 1.5% of the residential catchment contributing. Typically in SEQ detention basins are about 3 to 4% of the catchment area contributing therefore a bioretention basin and separate detention basin would require about 5% of the contributing catchment for their respective locations.

A simple stormwater treatment train for a large development is represented diagrammatically below in Figure 1-1.

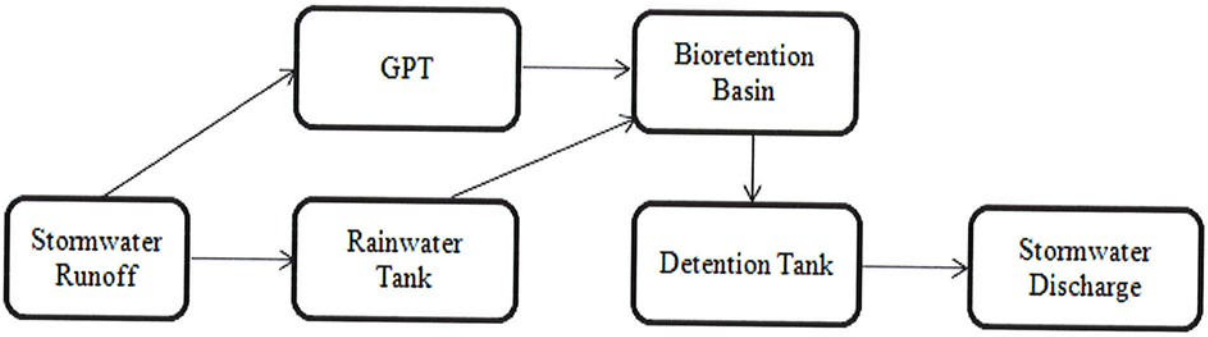


Figure 1-1 Simple Stormwater Treatment Train

Whilst this diagram shows the relative sequence of treatment, the flow routing requirement is more complex as only the 1 in 3 month flow ("low flows" in the diagrams) are targeted by the stormwater quality treatment devices as the level of pollutants is significantly diluted in higher flows.

The treatment can be either "at source" (on an area of land adjacent to the development scaled by the development size) or "end of line" where the discharge from a number of developments is conveyed to a central treatment point prior to detention.

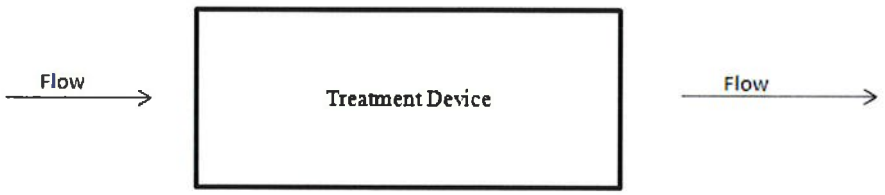
"End of line" treatment devices are proposed for Area 1 and consist of temporary sediment basins during construction phase, gross pollutant traps, and bioretention devices.

The locations of these devices are selected to balance catchment sizes with the available area within public reserves and waterways to allow treatment. The flow routing necessary for these devices to work effectively requires shaping of the land with integrated hydraulic structures to separate the 1 in 3 month design flow (for treatment) from the main stormwater flows. An example of this device is a manhole weir.

"Off-line" treatment devices are preferred to "on-line" as they treat the stormwater prior to discharging into the drainage system.

Diagramatically, the "on-line" and "off-line" locations of a treatment device are represented as follows:

"on - line":



"off - line":

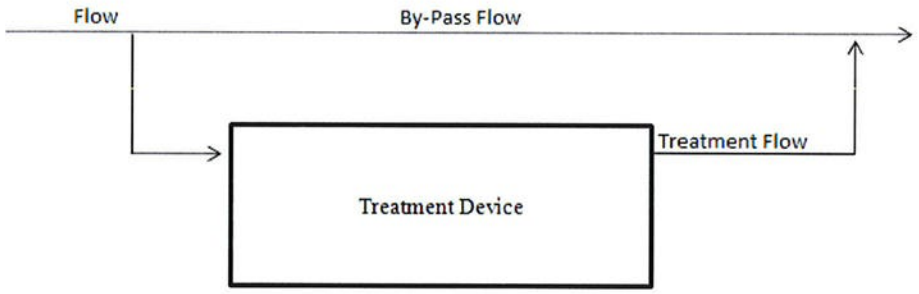


Figure 1-2 "Off-line" and "On-line" Treatment Schematic

The "off-line" treatment particularly suited to bioretention devices and gross pollution traps because:

- Depth of inundation of plants in the bio-retention zones is not to exceed 300mm
- Time of inundation of plants in the bio-retention zones is not to exceed a few hours.
- The treated storage volume (3 month flow from the catchment) is not to be mixed with "follow on" flows.

The treated volume of water is passed via the subsoil drains from the bio-retention system a few hours after the storm has passed. Flows in excess of the 1 in 3 month storm flow / volume will bypass the entry of the bio- retention and pass directly to the drainage channel or gully / pipe system as appropriate to its location.

Studies by USQ (Ian Brodie, 2005) noted that the runoff from the more frequent storms (generally less than 15 to 20mm rainfall depth on a catchment) is a major cause of environmental impact to downstream waterways. Urban development leads to a substantial increase in the frequency of these 'small-to-moderate' runoff events, which in undeveloped catchments may be absent due to infiltration. The flows and pollution associated with these events can lead to a wide range of impacts, including channel erosion, reduced biodiversity, more variable water temperatures and poor water quality (Walsh et al, 2004). The non coarse particle (NCP) loads generated from urban surfaces in small-to-moderate storms are of particular interest. On a per sqm basis, the road surface generated the highest NCP load in the

less than 20mm rainfalls and is thus most likely to be a major contributor to adverse environmental effects. Road drainage is also generally efficient in conveying stormwater directly to waterways which increases the impact potential.

In the Ipswich City Council area, the "development sites" are usually treated rather than the roads, with the discharge targets set to compensate. The new legislation is clear on this aspect which states that WSUD is to follow Best Management Practice (BMP).

The treatment train is designed, based on simulation modelling (in MUSIC) of standardised pollution flows over a representative 10 to 15 year period to demonstrate compliance with discharge pollution removal targets.

During construction, the protection of these devices is particularly important whilst the treatment devices become established and functional. Otherwise the sediment will bury the plants and reduce infiltration into the soil filter which provides the treatment environment for the stormwater.

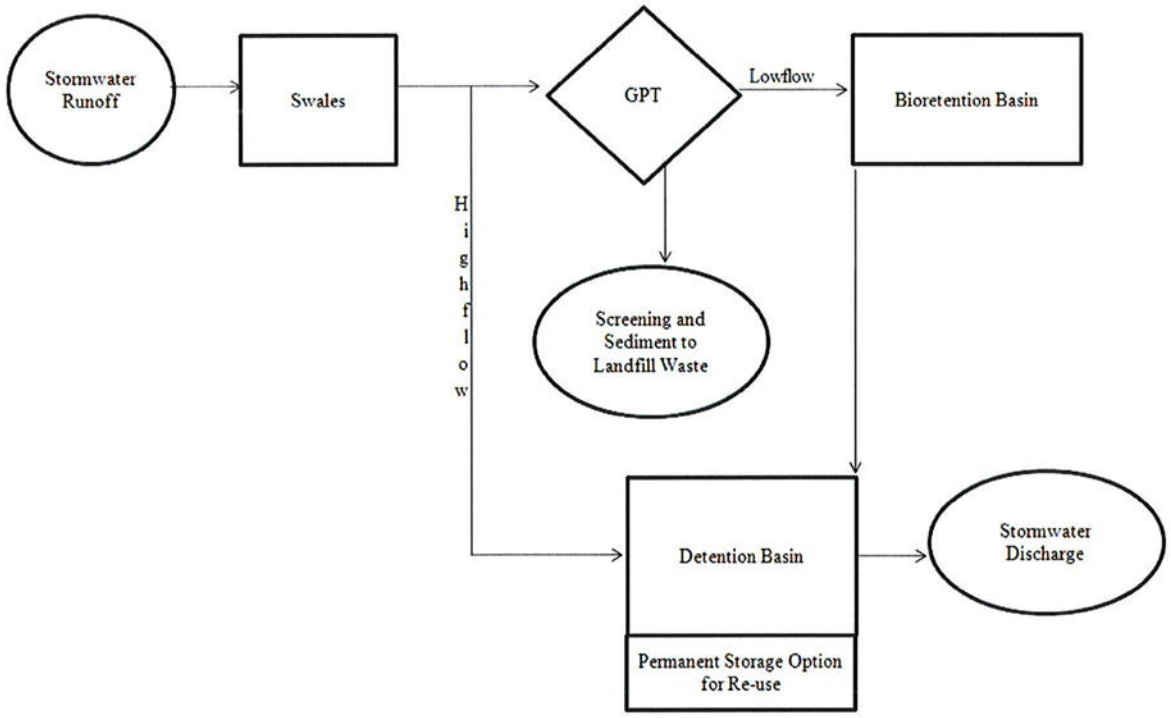


Figure 1-3 Proposed Stormwater Treatment System for Area 1

2 PLANNING AUTHORITIES – JURISDICTION AND STANDARDS

2.1 Queensland Government – South East Queensland Implementation Guidelines Number 7 (SEQIG7)

The State Government requires development to meet the objectives of South East Queensland (SEQ) Regional Plan (2009-2031). The Queensland Department of Infrastructure & Planning (QDIP) has also issued the South East Queensland Regional Plan 2009-2031 Implementation Guideline No. 7 (SEQIG7) which defines the compliance parameters required for development work in respect of WSUD. MPN Consulting Pty Ltd has been advised by John Rush, Manager, Resource and Landscape Planning Specialist and Infrastructure Planning - Planning Group of QDIP that "demonstrating compliance with the SEQIG7 is taken by QDIP and Department of Environment & Resource Management (DERM) as meeting the requirements of the relevant policies for Urban Water Quality and Stormwater Management Strategies under their jurisdiction" viz:

- Environmental Protection (Water) Policy 1997
- State Coastal Management Plan 2001

The Design Objectives for Stormwater Management from the South East Queensland Regional Plan 2009-2031 Implementation Guideline No. 7 (SEQIG7) for water quality and waterway health as referenced therein are:

1. Frequency of Urban Stormwater Flows for In-stream Ecology protection
2. Magnitude and duration of Urban Stormwater Flow for Waterway Stability
3. Loads of Sediment, nutrient and litter in Urban Stormwater for Environmental Protection (Water) Policy compliance

In addition to the above three requirements other aspects of water management which form part of WSUD best management practice are also referenced by the SEQIG7:

4. Control of sediment and erosion
5. Flooding
6. Conservation of potable water
7. Protection and management of riparian corridors
8. Environmentally relevant activities
9. Reuse of grey water

No environmentally relevant activities are proposed within the development and the re-use of grey water is not within the scope of this report.

The conservation of potable water is to be achieved by stormwater harvesting and the planting of native vegetation to reduce water demand.

An integrated plan for the riparian corridors will be undertaken between relevant stakeholders in Ripley Valley. The protection and management of the Bundamba Creek riparian corridor is not within the scope of this report and Area 1 is located 450m from the Creek.

2.2 Urban Land Development Authority (ULDA)

The ULDA is an independent statutory body established under the Urban Land Development Authority Act 2007 as part of the Queensland Housing Affordability Strategy. Within a declared Urban Development Area (UDA) the ULDA assumes the planning powers of local government and some State agencies, including assessment powers, through the assessing and deciding of UDA development applications.

The Ripley Valley Urban Development Area Interim Land Use Plan (ILUP) recognises the Ipswich City Council draft Traditional Neighbourhood Design Code (TND) and Ripley Valley Master Planned Area Structure Plan, being Part 15 of the Ipswich Planning Scheme, which provide the background from which the (UDA) has been established.

The ULDA "Development Assessment Certification Procedures Manual" (DA Manual) requires:

A. Stormwater drainage to meet the performance criteria and requirements of:
   i. Queensland Urban Drainage Manual (QUDM)
   ii. SEQ Regional Plan 2005-2006 Implementation Guideline No 7 "Water Sensitive Urban Design Objectives for Stormwater Management"
   iii. Environmental Protection Policy (Water) 1997 including Schedule 1
   iv. Local Government Standards drawings.
B. Erosion and Sediment Control to meet the performance criteria and requirements of:
   i. The International Erosion Control Association (Australasia).

3 PURPOSE

The purpose of this Stormwater Management Plan is to identify the components of the Stormwater Treatment Train that can be constructed as part of the proposed development which will:

i. Prevent or minimise adverse social and environmental impacts from stormwater runoff originating from the proposed development.
ii. Achieve acceptable levels of stormwater runoff quality and quantity by applying water sensitive urban design principals with the development of the site.

This report aims to identify Stormwater Quality Best Management Practice for the development and demonstrate that water quality impacts will be minimised in receiving waters.

3.1 Criteria

The following performance criteria apply to the design of the drainage layout and treatment system:

- Ipswich City Council require drainage reserves to be established over downstream drainage paths or written approval from all the affected property owners is required from the development site to the point of discharge or attenuation to peak discharge and flow spread.
- Detention is required where the downstream system does not have adequate capacity to convey the increased discharge.
- The minor drainage system is to be piped throughout the development and accommodate existing and proposed future flows from upstream catchments.
- Upstream properties discharge future flows no greater than existing flows (i.e. have attenuation until the ultimate detention is installed).
- The stormwater pipes are to be located under the kerbs of roads.
- Overland flow paths are to be provided at all sag points in roads.
- Inter-allotment drainage is required where lots are lower than the roadway or should the runoff cause nuisance e.g. on large lots with high imperviousness, or in highly built up commercial areas.
- Comply with Stormwater Quality Best Management Practices to achieve the design objectives for Urban Stormwater Management.

3.2 Design Objectives for Urban Stormwater Management

Fundamentally there are five design objectives for Urban Stormwater Management:

1) "Flooding Control ", which aims to mitigate the impacts of development that would increase the temporary inundation of land by expanses of water that overtop the natural or artificial banks of a watercourse, including a drainage channel, stream, creek, river, estuary, lake or dam, and any associated water holding structures. Flooding Routing is discussed in Section 6.4;
2) "Geomorphic Design", which aims to limit the impacts of urban development on in-stream habitat disturbance and erosion by controlling the magnitude and duration of stormwater discharges. Stream Geomorphology is discussed in Section 6.5;
3) "Stormwater Quality Management", which requires specified reductions in pollutant load based on best practice stormwater treatment. Stormwater Quality Management is discussed in Section 7;
4) "Sediment and Erosion Control (during the construction phase of development)" which aims to minimise the impacts of construction within the site to produce the least impact on terrestrial and aquatic ecosystems including the disruption to landforms and natural hydrological features. Sediment and Erosion Control is discussed in Section 9; and
5) "Riparian Corridor Protection" which aims to mitigate the impacts of development on the aquatic ecosystem given the important functions of riparian vegetation. This applies to Bundamba Creek and not Area 1 which is 450m upstream and therefore is beyond the scope of this report as it requires an ecological assessment of the receiving waters in Bundamba Creek. However QUDM makes some general recommendations in respect of the Riparian Vegetation viz:

    - the minimum desirable overbank riparian width is 5 metres from the top of the lower bank;
    - in ideal circumstances, overbank riparian widths of 15 to 60 metres are recommended depending on the size and function of the waterway;
    - riparian vegetation should be preserved as a buffer between public access areas and the vegetated channel to protect wildlife habitat values;
    - for natural streams organic matter is filtered from the runoff as the stormwater passes as sheet flow through the riparian zone;
    - due to the high filtration of stormwater flows entering natural waterways, leaf fall from overhanging riparian vegetation can become an important food source for aquatic life.

This report presents the stormwater management techniques proposed to achieve these criteria (1 - 4). The performance of the treatment measures selected has been analysed in the programs:

i. DRAINS by Watercom for flow routing, and
ii. "Model for Urban Stormwater Improvement Conceptualisation" (MUSIC) by Ewater CRC for quality.

Area 1 will be treated by a combination of swales, bioretention basins and detention storages.

4 EXISTING SITE AND CONTEXT

The Area 1 site consists of about 34.5ha situated between unsealed Fischer Road to the West, unformed Nevis Road to the North, unsealed Aulds Road to the East and Ripley Road to the South, plus a small wedge of land to the east of Aulds Road for the proposed sales office

The site is influenced by a number of external catchments to the South and West. 1 in 100 year ARI flood waters from Bundamba Creek encroach onto a portion of the site in its current form. The flood levels have been modelled by Cardno Limited. Refer Bundamba Creek Flood Study – Urban Core Development dated 4 August 2010 by Cardno Limited attached.

The catchments and legal points of discharge for the site are shown on MPN Consulting Pty Ltd drawing 5874-RP.01 in **Appendix** 1. Ultimately these discharges feed into Bundamba Creek.

The topography consists of undulating low hills with a cross slope to the water courses of up to 10%. The watercourses slope up to approximately 8% in the upper reaches and flatten out to about 2% in the lower portions of the site, before entering a flat area and unformed drainage reserve of slope less than 1% prior to discharging into the Bundamba Creek.

The site is sparsely dotted with trees and the soils are predominantly dispersive clays. Ground water springs have been observed in a few low lying areas after long periods of rainfall. Further details are be described in the Area 1 Geotechnical Report by Butler Partners.

4.1 Proposed Development

The physical works on Area 1 will entail lot reconfiguration works, services and infrastructure works, residential buildings, roads, trunk drainage channels, detention basins incorporating SQIDS, water features and landscaping.

The development will incorporate WSUD principles within its design that minimise the demand for water supply and reduces runoff, whilst providing stormwater quality improvement by reducing pollutants and nutrients from entering the waterways, and managing erosion to protect the aquatic ecosystem. An Integrated Water Management report for the Urban Core has been prepared by Cardno Limited, and is attached in **Appendix** 5.

The catchments and legal points of discharge for the development site are shown on MPN Consulting Pty Ltd drawing 5874-RP.02 in **Appendix** 1. The interim layout for stormwater treatment is shown in MPN Consulting Pty Ltd drawing 5874-RP.03 in **Appendix** 1.

4.2 Proposed Site Drainage Principles

In general it is proposed that land not owned by Sekisui House will treat their own discharges in terms of quality and quantity. The external areas are described in the following sections

for completeness, as these also discharge to the legal points of discharge and are included in the flow analysis (refer to details in **Appendix** 2).

There are four discharge locations and their characteristics are discussed below.

Fischer Road West Discharge
The catchment area at this location consists of 40.732ha of external catchment from the South west, 1.213ha of external catchment from the North and 2.0417ha of Area 1. The component of Area 1 also includes 0.511ha of land owned by others on the corner of Fischer and Nevis Roads (Lot 29 on SP 143798). In the interim the portion of Area 1 which is owned by Sekisui will be treated with a 280sqm bioretention basin and 600sqm detention storage zone adjacent to Nevis Road.

Aulds Road Discharge
The catchment area at this location consists of 23.393ha of external catchment from the south, 0.021ha from the north, 0.060ha from the east and 30.539ha of Area 1. The component of Area 1 also includes 1.859ha of land owned by others alongside Aulds Road being Lot 28 RP887276, Lot 29 RP910173 and 50% of Lot 27 RP891045.

In the interim, the portion of Area 1 which is owned by Sekisui House will be treated by 2 bioretention basins being 1900sqm and 800sqm, and two detention basins 4000sqm and 2400sqm adjacent Aulds Road. Also another set of basins located in the future medium density lot is proposed consisting of a 1700sqm bioretention and 2500sqm of detention storage area as shown on MPN Consulting Pty Ltd drawing 5874-RP.03 in **Appendix** 1.

These basins and detention storages adjacent Aulds Road and the future medium density lot are on interim locations until development of the Lot 281 RP234482 proceeds or permission is obtained from the current owners to construct the ultimate bioretention treatment and detention storage in the ultimate location adjacent to Bundamba Creek.

East Nevis Road Discharge
The catchment area at this location consists of 0.289ha of external catchment from the North and 0.690ha of Area 1. The component of Area 1 also includes 0.369ha of land owned by others fronting Nevis Road and Aulds Road being 50% of Lot 27 RP891045.

Discharge from this catchment will be treated with the bioretention basin adjacent to Lot 281 RP234482 described above in the interim until access to the Lot 281 RP234482 is obtained to construct the ultimate bioretention and detention system.

Sales Office and Display Village
The catchment area at this location consists of 2.749ha of external catchment being part of Lot 281 RP234482 and Lot 1 RP199623, and 1.1ha of Area 1.

Treatment of this outlet will consist of a 250sqm bioretention basin and 1000sqm of detention storage area which are located off-line from the proposed drainage channel.

4.2.1 *Sediment Basins During Construction*

Sediment basins will be needed during construction for all operations where disturbance of site area greater than 1ha occurs, or where soil testing identifies dispersive soils.

The size of the basins is related directly to the amount of exposed earth.

Inspection of the site reveals evidence of significant erosion upstream and downstream of culverts which indicate dispersible soil characteristics. Even gentle (<3%) grades have scour occurring in table drains, and road shoulders. Agricultural lime will be used to treat exposed batters and lots in accordance with the dosage rates indicated in the Soils Scientist Report by Environmental Soil Solutions Australia.

Construction of sediment basins can be located and configured such that they can be converted to permanent detention basins in the final operating phase.

4.2.2 *Stormwater Detention*

The nature of developments creates increased runoff rates and volumes therefore detention is required to mitigate flows such that the development shall cause no worsening of flooding downstream. In addition, subject to staging of the works, the detention basins can act as sedimentation basins during construction.

The Masterplan studies for the Urban Core recommended a series of open space areas along the original drainage paths with the intent on providing smaller "cascading" detention basins that better fit the landform and development constraints. The "end of line" stormwater treatment and flood mitigation measures for Area 1 have been designed to suit the Masterplan. Upstream flows from other catchments will be diverted past the Area 1 treatment devices and stormwater detention basins, as further discussed in section 5.

4.2.3 *Permanent Stormwater Treatment Devices*

The technical Design Guidelines for WSUD requires primary (coarse sediment and litter) treatment for first-order streams, and tertiary treatment (fine sediment and nutrients) to second order streams. The diversion of the drainage system to "off-line" treatment lends to the application of this directive. Bio-retention swales and basins are tertiary treatment devices and provide the most effective removal of pollutants.

Bio-retention swales are suitable for street scale measures and bio-retention basins are also suitable for allotment scale measures and these measures are suitable to gentle sloped areas (slope <3%).

Further details of the proposed Stormwater Treatment Devices are contained in Section 7.

5 TRUNK DRAINAGE

5.1 Context and Philosophy

About 22.3ha of catchment upstream of Area 1 crosses Ripley Road in a culvert about 150m north west of Aulds Road, and traverses the site to cross Aulds Road about 450m north of Ripley Road. This flows 450m to Bundamba Creek through lot 281 RP 234462 owned by others. The development discharge will be controlled such that no worsening of flow rate or flow width occurs at Aulds Road. This will be achieved by a combination of pipe drainage, a surcharge structure with energy dissipater, and detention.

To the south east of Aulds Road, another catchment area of 197.5ha crosses Ripley Road in two culverts and passes to the south east of Area 1. The proposed "Town Park" and "Sales Centre" is located adjacent to this drainage path.

It is intended that trunk drainage flows will be conveyed through Area 1 via a combination of pipes, culverts and swales such that velocities in swales are kept below 2m/s to prevent erosion and velocity, in roads to less than 3m/s such that V x D < 0.6 m^2/s for safety, in accordance with QUDM.

The trunk drainage network is sized to provide relief flows for storm events greater than the defined flood of 1 in 100 years ARI.

Treated stormwater discharges will flow via the site detention basins to outlet into the trunk drainage system.

5.2 Area 1 Neighbourhood Centre and Overland Flow Path

An existing depression runs from Ripley Road through the southern portion of Area 1 and outlets beneath Aulds Road via two 600mm ø RCP's. The existing flows through this part of the site are up to 13.3 m^3/s in a 1 in 100 year ARI storm event, of which 5.13 m^3/s is from the upstream catchment above Ripley Road. The headwater level at Ripley Road is 47.56m AHD in the existing pre-development scenario at the existing 5 x 600mm ø RCP culverts. Flow across the roadway occurs of 1.5 m^3/s with a width of 46.8m and depth of 0.068m, D x V = 0.49m^2/s and V = 0.7 m/s, in the existing case.

The flow at Aulds Road is 20.35 m^3/s, of which 1.85 m^3/s flows through the twin ø 600 culverts, and the remaining 18.5 m^3/s flows across Aulds Road, which acts as a board crested weir, with a width of 89.7m, depth of 0.70m, D x V = 0.67 m^2/s and V = 3.9 m/s, in the existing case. D x V at Aulds Road is greater than the QUDM limit of 0.6 in the existing situation pre-development.

The concept design for the drainage of Area 1 requires a structure at Aulds Road outlet to surcharge flows in excess of the existing twin culverts' capacity in a manner which does not increase the flow rate, flow width or flow depth across Aulds Road. To achieve this objective, flows from Area 1 will be detained such that the flows onto land across Aulds Road are not greater or more concentrated than the existing flows.

In the developed case, the outlet flow at Aulds Road has been reduced to 8.92 m^3/s in a 1 in 100 year event. The reduction in flow creates a narrower spread of water across Aulds Road (35.7m wide) and a reduced depth of 0.113m with corresponding V = 2.6 m/s and D x V = 0.30 m^2/s.

At Ripley Road, the new culverts proposed are 2 of 2.4m x 0.6m RCBC and have been designed such that the 1 in 100 year flow levels are not increased above the pre-existing level of 47.66m AHD. A 15m wide swale adjacent to the minor neighbourhood link roadway is proposed to be built to convey the flows from upstream of Area 1 from the culverts at Ripley Road through the estate to discharge at Aulds Road. The typical cross section is indicated in sketch 5874-PSK42 attached in Appendix 1. The Mannings roughness adopted for the channel is 0.035, for the verges is 0.025, and 0.015 for the road pavement. During a 1 in 100 year ARI design storm event the calculated flow parameters for this cross section meet the QUDM criteria: velocity <2 m/s for a grassed channel and V x D < 0.6 limit on the channel as it is a shared dual purpose reserve, with side slopes of 1 in 6 maximum.

The total flow in the developed case entering the site from Ripley Road is 7.07 m^3/s in a 1 in 100 year ARI design storm. The portion of flow taken in the channel is reduced by the incorporation of a low flow trunk drainage culvert of 1.2m x 0.6m RCBC which can convey 2.41 m^3/s. The channel therefore conveys up to 4.93m^3/s in a 1 in 100 year ARI design event. This results in a peak velocity of 2 m/s in the channel, a peak depth of 0.82m and a D x V of 0.6 m in the channel, which meets QUDM requirements.

Additional capacity exists in the road adjoining the swale to convey flows should one of the culverts under the roads that cross the swale become blocked.

MPN Consulting drawing 5874-RP03 details the combination of drainage elements described on the above sections.

5.3 Area 1 Town Park and Drainage Reserve

The Town Park is proposed to be located in an area just to the east of Area 1 at the confluence of two drainage channels, about 80m south east of the Aulds Road intersection. The realignment of Ripley Road incorporates two culverts sized to ensure that flood levels upstream of Ripley Road are not worse than existing in a 1 in 100 year ARI storm event, at each channel.

Culvert F is located 80m south east of Aulds Road and Culvert G is located 260m south east of Aulds Road. Culvert F is proposed as 3 of 2.4m x 1.2m RCBC's and Culvert G is proposed as 9 of 1.2m x 1.2m RCBC's . The outlet level for each culvert is 41.14 M AHDat F and 41.88 M AHD at G. The 1 in 100 year ARI flows are 29.1 m^3/s at F and 14.3 m^3 at G in the existing pre-developed scenario, and 21.0 m^3/s at F and 33.2 m^3/s at G in the developed scenario for Area 1 with Ripley Road re-aligned. Constraints on the land between Culverts F and G upstream of Ripley Road require a redistribution of the flows between Culverts G and F. The existing site has a channel that flows from culvert G to Culvert F but upon raising Ripley Road the property accesses and building proximities to Ripley Road eliminate the existing channel link.

Sekisui has accepted the re-distribution of flows onto their land. The confluence of the two channels meet about 50m downstream of Ripley Road within the proposed Town Park, which is located on a proposed drainage reserve in accordance with the Ripley Valley Structure Plan.

MPN has modelled the impact of the town park landscaping elements advised by Hassell in HECRAS based on flows no worse than existing. The landscape channels and park areas have been modelled using Manning's roughness of 0.08 for the developed case and 0.035 for the existing undeveloped case.

The critical storm duration is 1 hour and the peak flow for this event is 41.6 m^3/s through the Town Park. The tailwater used for the analysis in HECRAS is 38.75 m AHD from the Bundamba Creek Flood Study by Cardno dated August 2010.

MPN has assessed two development scenarios in HECRAS being:

i. the landscape treatment of the Town Park extending about 130m downstream of Ripley Road and then grading to the existing channel shape; and
ii. the landscape treatment of the Town Park extending about 340m downstream of Ripley Road at which location a filled area will be built that grades down to the existing channel to form a bund. This bund is set at 38.75m AHD to prevent floods from Bundamba Creek encroaching upstream into the Town Park.

The channel profiles and modelling results are shown on MPN drawings 5874-HEC01 to 10 attached in Appendix 1.

In summary, the modelling demonstrates no worsening of flood levels on adjoining properties, no velocities in excess of 2 m/s (thereby mitigating erosion), and all flows being subcritical with Froude number <0.85.

6 STORMWATER QUANTITY MANAGEMENT STRATEGY

6.1 Legal Point of Discharge

The legal points of discharge for the property are based on existing drainage patterns and are shown on MPN Consulting Pty Ltd drawing 5874-RP.01 located in **Appendix** 1 which have been notated as:

- Fischer Road (West near Nevis Road)
- Nevis Road (East into the road reserve)
- Aulds Road (East into the road reserve)
- Sales Office (East into the proposed drainage reserve)

At each location the width and flow rate will not exceed those for the existing pre-development case.

Bundamba Creek is the final legal point of discharge for the Area 1 which is connected via natural drainage channels to each of the outlet points above.

6.2 Site Hydrology

The proposed development will result in increased impervious areas which will increase stormwater runoff (peak flow and volume) due to loss of surface storage and reduced infiltration. It is proposed to limit the increase in stormwater runoff from the site, to not greater than the existing peak stormwater runoff, by provision of on-site stormwater detention. This will be achieved by a combination of Stormwater Quality Improvement Devices (SQID's) and detention basins. It is worth noting that for the defined flood event (i.e. 1 in 100 year flows) QUDM requires that harvest tanks are to be assumed as full at the start of the storm.

6.3 Catchments

The study area has been divided into a number of sub-catchments for the existing case covering an area of 129 ha for the purpose of flow modelling. The MPN Consulting Pty Ltd drawing 5874-RP.01 located in **Appendix** 1 shows the existing case catchments and site context with other external flow paths.

For the developed case, within the site, the sub-catchments are shown in drawing 5874-RP.02 located in **Appendix** 1.

6.4 Proposed Drainage

The stormwater layouts for the development are shown on drawing 5874-RP.03 in **Appendix** 1. These drawings show the location of proposed bioretention basins and detention storages. The details of the basins are shown on 5874-RP.06 in **Appendix** 1.

6.4.1 *Hydraulic Modelling Methodology*

MPN Consulting Pty Ltd has prepared a model of the development catchment which drains into Bundamba Creek. The modelling program used is DRAINS by Watercom Pty. Ltd.

DRAINS uses the Time-Area Method of Catchment Analysis which is a form of catchment routing model in which a hyetograph of rainfall is combined with a time-area diagram to produce a flow hydrograph. The procedure effectively divides a catchment into a number of strips of land, and superimposes the individual flows from these sub-areas, allowing for time lags depending on their distance from the outlet. Hydrological routing is the process of converting a hydrograph that passes through some part of a flow system to allow for the changes that occur during its passage. DRAINS incorporates catchment routing in the time-area calculations and non-linear storage routing calculations. This methodology is more accurate than the QUDM Rational Method and caters for volumetric analysis.

6.4.2 *Calibration*

QUDM requires calibration of all mathematical models to ensure consistency. Recommendations in QUDM are that in the absence of "real event" flow data, that the peak flows for the models must at least be calibrated to the peak flows calculated using the Rational Method. DRAINS incorporates an "extended rational method" which allows peak flows and hydrographs to be developed using runoff coefficients determined from QUDM.

The Intensity Frequency Duration parameters used for the Rational Method Calculations were:

Parameter	Notation	mm/hr
1 hour duration, 2 year ARI intensity read from map 1 for catchment area of interest	2i1	45.20
12 hour duration, 2 year ARI intensity read from map 2 for catchment area of interest	2i12	6.90
72 hour duration, 2 year ARI intensity read from map 3 for catchment area of interest	2i72	1.95
1 hour duration, 50 year ARI intensity read from map 4 for catchment area of interest	50i1	91.00
12 hour duration, 50 year ARI intensity read from map 5 for catchment area of interest	50i12	14.00
12 hour duration, 50 year ARI intensity read from map 6 for catchment area of interest	50i72	3.95
Skewness factors read from map 7 for catchment of interest	G	0.23
6 minute duration geographical factor for 2 year ARI read from map 8 for catchment of interest	F2	4.39
6 minute duration geographical factor for 50 year ARI read from map 9 for catchment of interest	F50	17.20

Table 6-1 I.F.D. Parameters from AR&R

The model having been calibrated can then be used with Australian Rainfall and Runoff (ARR) temporal pattern storms to assess the impact of the post-development flows compared to the pre-developed flows.

6.4.3 *Procedure*

The DRAINS model results for the post development case were compared with the flows calculated for the existing case using ARR storm events to assess achievement of flow retardation that does not result in increased runoff. QUDM requires flooding to be assessed up to the 1 in 100 year ARI. The storm modelling included the average rainfall intensities (ARI) from 1 year to 100 years with durations of 5, 10, 20 , 30 , 60 and 120 minutes in DRAINS. Only the critical storm events are presented in this report. The detailed data and results used in the DRAINS models for the two scenarios (pre and post development) are included in **Appendix** 2. The detailed data and results printouts from DRAINS are contained in **Appendix** 3.

6.4.4 *Model*

Drawing 5874-RP01 in **Appendix** 1 shows the sub-catchments used to assess stormwater flows in the Area 1 catchment for the existing site.

Drawing 5874-RP02 in **Appendix** 1 shows the catchments used to assess stormwater flows in the Area 1 catchment and the impact of the development.

6.4.5 *Assessment*

The critical duration for the site is calculated to be 75 minutes for pre-developed scenario and for the post-development scenario. Assessment of the effectiveness of the detention is based on the all storm events (5, 10, 20, 30, 45, 60, 90 and 120 minutes) for the various ARI storms (2, 5, 10, 20, 50 and 100 years).

6.4.6 *Detention Basins*

A detention system consisting of a number of basins as indicated on MPN Consulting Pty Ltd drawing 5874-RP.03 in **Appendix** 1 will achieve suitable reductions in flow. Flow comparisons for the critical duration storms are set out below to demonstrate achievement of suitable flood mitigation for properties downstream of the site by ameliorating any increases in flows created by the development over those pre-existing.

ARI	Pre	Post
2	6.025	4.14
5	11.4	7.97
10	15.5	10.35
20	20.35	13.4
50	26.25	17.3
100	30.9	20.15

Table 6-2 Flow Comparison table - Pre and Post Development for Critical Storm Duration

The hydrograph details for all storms are contained in the spreadsheet printout in **Appendix** 2.

6.5 Stream Geomorphology

To protect stream geomorphology, two performance criteria have been set which need to be achieved:

- Waterway Stability, and
- Frequent Flow Management

It will be demonstrated in the following sections that the use of domestic rainwater harvesting tanks to QDC requirements and bioretention treatment achieves the Frequent Flow Management criterion. Further, it will be demonstrated that by satisfying the requirement to not increase peak runoff for all storm events from 1 to 100 year ARI storms, the Waterway Stability criterion is also achieved.

6.5.1 *Waterway Stability*

The flow management objectives for SEQ, for flooding management and waterway stability management, are set so that post-development 1 year and 100 year ARI peak discharges along the receiving waterway are attenuated to their predevelopment rates. Controlling both the 1yr ARI and 100yr ARI peak flows will result in the peak flows for all ARI's (i.e. 1yr ARI through to 100yr ARI) being attenuated so as to be similar to the pre-developed rates. Flood management is achieved by the use of detention basins to mitigate the potential increase in flows that would occur from development over the predevelopment site flows for events up to the 100 yr ARI.

Waterway Stability Criteria aims to control the impacts of urban development on channel bed and bank erosion by limiting changes in flow rate and flow duration within the receiving waterway. It is achieved by limiting the post-development peak one-year Average Recurrence Interval (ARI) event discharge to the receiving waterway to the pre-development peak one-year ARI event discharge for 60 minute duration storm events.

The requirement for Waterway Stability is achieved by providing the detention to meet flood mitigation. The detention is required such that the post-development flow does not exceed the pre-development flows for flood control. More specifically for waterway stability, the 1 in 1 year peak flow post-development must not exceed the pre-existing flow rate (ARI = 1, Duration = 60 minutes) within the ephemeral creeks as part of the QUDM requirements and the Waterway Stability criterion of SEQIG.

To demonstrate compliance with Waterway Stability, Healthy Waterways recommend the use of a runoff routing program. As a result MPN Consulting Pty Ltd has analysed Area 1 stormwater runoff in DRAINS. The results contained in the table below demonstrate compliance, as all flows from the developed site are less than 3.49 cum/s, which is the pre-existing 60 minute 1 year ARI flow:

Duration (Min)	5	10	20	30	60	90
Flow (Post Development) (m^3/s)	0.089	0.560	1.280	2.080	2.420	2.650

Table 6-3 1 Year ARI Discharges Post Development for Waterway Stability

6.5.2 *Frequent Flow Management*

Frequent Flow Management aims to minimise the change in frequency of disturbance to aquatic ecosystems by managing the volume and frequency of surface runoff during small rainfall events.

This criteria applies where runoff from or within the site passes through or drains to an unlined channel, or non-tidal waterway or wetland and the receiving waterway is not "highly degraded" (as defined in the Environment Protection Policy (Water)) – Note that Bundamba

Creek (which flows into the Bremer River) is not listed as being within the highly degraded category under the EPP therefore the above criteria applies.

Frequent Flow Management is achieved by capturing 15 mm/day from all impervious surfaces and reusing the volume captured or infiltrating the excess volume not reused, with the added requirement that the runoff capture storage capacity needs to be available within 24 hours after runoff event.

MPN Consulting Pty Ltd has prepared calculations to demonstrate that the use of bioretention basins with 1.5% area and extended detention of 0.3m when combined with QDC regulated 5000L rainwater tanks meet the Frequency of Flow Management criteria set by Healthy Waterways, and are included in **Appendix** 4.

7 STORMWATER QUALITY MANAGEMENT STRATEGY

7.1 Potential Pollutants Generated

The pollutants that could be potentially generated as a result of the development use are as follows:

- Litter
- Sediment
- Nutrients (Nitrogen and Phosphorous)
- Hydrocarbons (oil & grease)
- Surfactants
- Heavy metals.
- Pathogens/Faecal Coliforms (bacteria & viruses)

Water quality objectives for both temporary and permanent methods of water quality control must control the following pollutants:

Water Quality Pollutants	
During Construction	
Litter	Paper, construction packaging, food packaging, cement bags, off-cuts.
Sediment	Unprotected exposed soils and stockpiles during earthworks and building.
Hydrocarbons	Fuel and oil spills, leaks from construction equipment.
Toxic materials	Cement slurry, asphalt prime, solvents, cleaning agents, wash waters (e.g. from tile works).
pH altering substances	Acid sulphate soils, cement slurry and wash waters.

Table 7-1 Pollutants During Construction

Water Quality Pollutants cont.	
Post Construction	
Nutrients	Nitrogen, Phosphorous, Carbon (leaf litter)
Litter	Anthropogenic litter and sediment
Suspended Solids	Suspended fine and course sediment
Chemicals	Hydro-carbons, heavy metals, surfactants and pathogens

Table 7-2 Pollutants During Operation (Part Construction)

Water quality objectives for both temporary and permanent methods of water quality control must meet the following:

WQO Target	Reduction
Gross Pollutants	90%
Total Suspended Solids	80%
Total Phosphorous	60%
Total Nitrogen	45%

Table 7-3 Water Quality Objectives

7.2 Pollutant Control Model

The MUSIC computer modelling program developed by the Co-operative Research Centre for Catchment Hydrology was used to predict the performance of the proposed stormwater treatment train.

At this stage the pollutants modelled in MUSIC are Total Suspended Solids (TSS), Total Phosphorus (TP), Total Nitrogen (TN) and Gross Pollutants.

7.2.1 *Rainfall*

The rainfall data used in the model was based on the Bureau of Meteorology data from rainfall station 40004 Amberley. The model was run for a 10 year period from 1 January 1990 to 31 December 1999. The modelling time step was 6 minutes.

7.2.2 *Rainfall Runoff Properties*

In accordance with the Water by Design MUSIC Modelling guidelines for South East Queensland (Draft 01-December 2009) rainfall runoff properties from Table 3.7 were used. These are listed below:

Parameter	Value
Rainfall Threshold (mm)	1
Soil Storage Capacity (mm)	500
Initial Storage (% Capacity)	10
Field Capacity (mm)	200
Infiltration Capacity Co-efficient a	211
Infiltration Capacity Exponent b	5.0
Initial Depth (mm)	50
Daily Recharge rate (%)	28
Daily Base flow Rate (%)	27
Daily Deep Seepage Rate (%)	0

Table 7-4 MUSIC Rainfall Runoff Parameters (Urban Residential)

7.2.3 *Pollutant Export Parameters*

Specific pollutant export parameters must be applied to each node type, as instructed by Water by Design Guidelines. The values shown below are for Urban Residential areas. Runoff pollutant concentrations are generated stochastically from the defined mean and standard deviation.

	Log_{10} TSS (mg/L)		Lot_{10} TP (mg/L)		Log_{10} TN (mg/L)	
	Base Flow	Storm Flow	Base Flow	Storm Flow	Base Flow	Storm Flow
Mean	1.0	2.18	-0.97	-0.47	0.2	0.26
Std Dev	0.34	0.39	0.31	0.32	0.2	0.23

Table 7-5 Pollutant Export Parameters (Urban Residential)

7.3 Water Quality Objectives

The Water Quality Objectives of the receiving waters for the development are listed below.

Water Quality Objectives (Percentage Base Load Reduction Targets)			
Total Suspended Solids	Total Phosphorous	Total Nitrogen	Gross Pollutants
80%	60%	45%	90%

Table 7-6 Water Quality Objectives

7.4 Catchments

For the Area 1 development a catchment plan of the lot layout has been designed which depicts where stormwater flows will be diverted to for treatment. Each catchment area is split up into areas of lots and areas of roads within the catchment which allows a fraction impervious to be designated to the lot area and the road area accurately representing the total impervious.

According to the Water by Design MUSIC modelling Guidelines for South East Queensland for a medium density (between 15 dwellings/ha and 40 dwellings/ha) residential and mixed use development type the impervious fraction percentage ranges between 50 – 70%. As the Area 1 development targets around 25 + dwellings / ha a fraction impervious for each lot catchment area of 60% has been adopted.

For the road catchment areas a value of 80% impervious has been adopted which is positioned at the conservative end of the fraction impervious range of 60 – 90% given by the Water by Design Guidelines.

7.5 Treatment Plan

Within the Area 1 development there will be four (4) bioretention basins strategically placed at points to collect stormwater runoff from the separate catchments. The catchments are depicted on 5874 RP.03 in **Appendix** 1. All stormwater (pipe drainage capacity is 2yr ARI) will be collected in street gully pits and lot field inlets and conveyed to the bioretention basins via underground stormwater lines.

Catchments 1 situated in the South Eastern Corner of Area 1 will drain to bioretention basin 1 which is positioned just to the east of the catchments. The treated stormwater and overflow will discharge into the detention basin located beside the bioretention basin. Bioretention basin 1 has a treatment surface area of 250sqm.

Bioretention 2 is located within Area 1 to the eastern side and has a total treatment surface area of 1900sqm. Bioretention 2 treats the stormwater runoff from catchment 2. The treated water and overflow will discharge into the detention basin beside the bioretention before discharging under Aulds Road to Bundamba Creek.

Bioretention 5 is located within Area 1 to the south east and has a total treatment surface area of 800sqm. Bioretention 3 treats the stormwater runoff from catchment 5. The treated water and overflow will discharge under Aulds Road to Bundamba Creek and will not be detained.

The stormwater from catchment 3 will be diverted to Bioretention basin 3 located in the future medium density Lot of Area 1. The treated water and overflow will discharge to the detention basin situated beside the bioretention basin before discharging under Aulds Road to Bundamba Creek. Bioretention basin 3 has a treatment surface area of 1700m².

Catchment 4 will be treated by Bioretention basin 4 positioned in the north western corner of area 1. Bioretention basin 4 has a treatment surface area of 280m². The treated water and overflow will discharge to the neighbouring detention basin before discharging under Nevis Road to Bundamba Creek.

The treatment plan MUSIC layout is depicted in the image below.

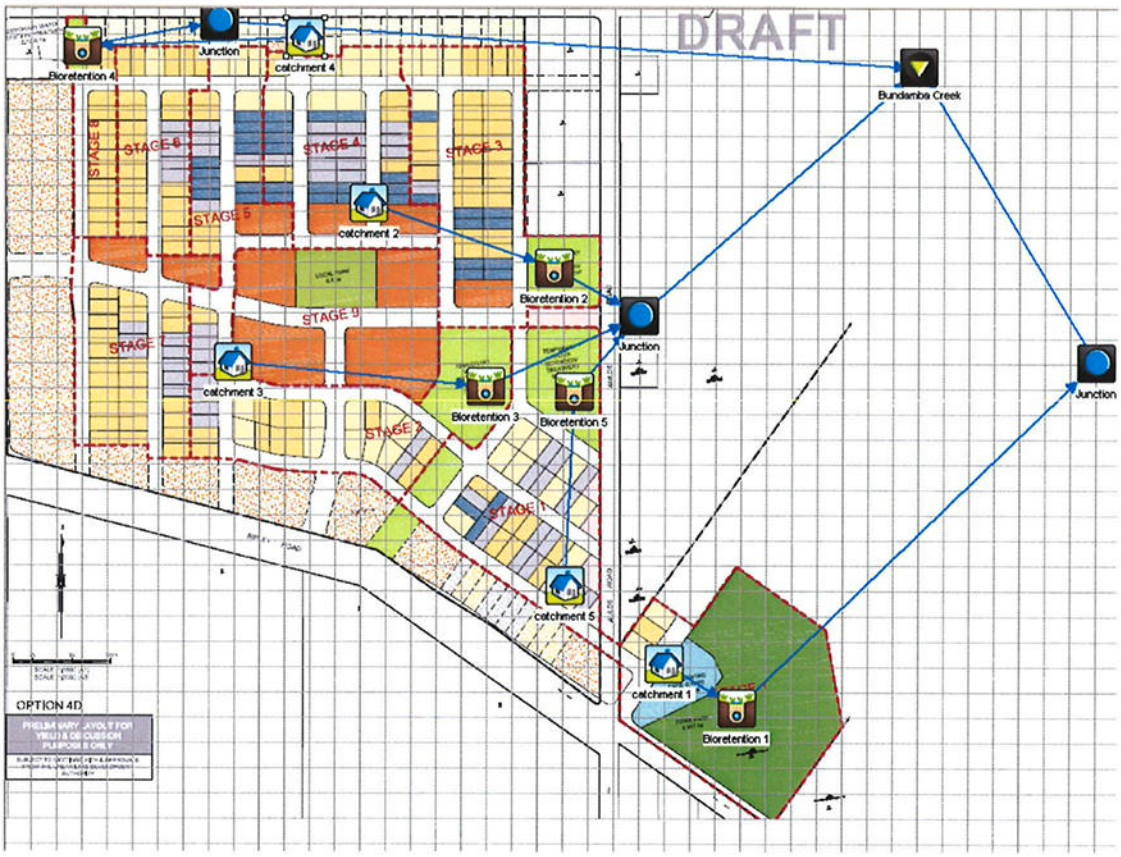


Figure 7-1 MUSIC Treatment Plan

7.6 MUSIC Results

The resulting percentage based load reductions at the outlet of the site for the various pollutants are shown in Table 7-7 below with the corresponding reduction target.

	Total Suspended Sediment (TSS)	Total Phosphorous (TP)	Total Nitrogen (TN)	Gross Pollutants (GP)
Source Load	32800 kg/yr	70.2 kg/yr	319 kg/yr	4730 kg/yr
Residual Load	2740 kg/yr	14.4 kg/yr	174 kg/yr	0 kg/yr
Percentage Reduction	91.6%	79.4%	45.5%	100%
Target Percentage	80%	60%	45%	90%
Achieved	Yes	Yes	Yes	Yes

Table 7-7 Percentage Load Reduction Results

7.7 Pollutant Reduction

7.7.1 *Litter*

Rubbish bins are provided within each lot and along the roadways. As a result of this and with the installation of Gross Pollutant Traps levels of litter existing via the stormwater are expected to be negligible.

7.7.2 *Sediment*

The TSS removal rate of the treatment plan as identified above show that the required percentage reduction of 80% is achieved. The TSS level is therefore considered acceptable.

7.7.3 *Nitrogen and Phosphorous*

The TN and TP removal rates of the treatment plan as shown in the above table achieve the required percentage reduction of 45% and 60% respectively. The TN and TP levels are considered acceptable.

7.7.4 *Hydrocarbons*

The literature from Humes for their Humeceptor units predicts that they will capture up to 98% of Hydrocarbons (free grease and oil) from the stormwater runoff. Maintenance of each unit will be required annually.

7.7.5 *Surfactants*

Residents of the area 1 development will be encouraged to wash their cards on grassed areas only to allow for the reduction of the levels of surfactants by the soil and hence the mitigation of their impact on the creek system.

7.7.6 *Heavy Metals*

Heavy metals in stormwater runoff generally become attached to the fine sediment. As stated previously it has been estimated that the proposed treatment plan will remove 92% of the fine sediment. The removal of the fine sediment should effectively remove most of the heavy metals in the runoff.

7.7.7 *Pathogens / Faecal Coliforms*

Any animals associated with the development would generally be domestic dogs and cats. Residents will be encouraged to pick up their pets' faeces and dispose of them in accordance with Councils Local Laws.

Most home owners generally maintain their yards and the public grounds will be well maintained.

8 MAINTENANCE

Maintenance of each of the treatment devices will be generally in accordance with the requirements below.

Swales and Flow Paths:	Shall be maintained in a clean state and inspected after each rainfall event and at least quarterly. Plant maintenance shall be in accordance with the landscape maintenance specification.
Stormwater pits and pipes:	Shall be maintained in a clean state and inspected 6 monthly.
Bioretention filters:	Shall be maintained in a clean state and inspected after each rainfall event and at least monthly. Plant maintenance shall be in accordance with the landscape maintenance specification. Any dead plants shall be replaced. As a minimum, annually rake the top 50 mm of soil and remove any contaminants and litter. The filter media is to be tested annually and may require replacement after 10 years or as required subject to horticulturalist advice on plant health and soil condition. The filter media shall comply with FAWB Specification.
Detention Basins:	Shall be maintained in a clean state and inspected at least 6 monthly.

All debris shall be removed and disposed of in a legal manner. Any erosion to swales shall be repaired immediately. All sediment deposited in the swales shall be disposed of in a legal manner.

9 EROSION AND SEDIMENT CONTROL DURING CONSTRUCTION

A proposed scheme for the control of soil erosion from the site will be detailed in the engineering drawings. In addition, the scheme must be properly maintained and controls put in place to protect the soil on site and the potentially damaging impacts erosion can have both on and off the site. The following table sets out the proposed management strategy during the construction phase:

9.1 Intent of Erosion and Sediment Control Management Plan

To prevent stormwater contamination (of watercourses) and the release of contaminated stormwater and wastewater by ensuring compliance with the Environmental Protection Act 1994 and Environmental Protection (Water) Policy 1997.

9.2 Implementation Strategy

Establish control measures and best practice approaches to prevent stormwater contamination and minimise the risk and adverse effects of erosion and sedimentation. All Erosion and Sediment Control measures must be designed, constructed and maintained in a manner that is commensurate with the sites erosion risk.

9.3 Erosion and Sediment Control Measures

- Obtain a licence or approval to operate activities which are classed as environmental relevant activities (i.e. they have the potential to cause environmental harm).
- Implement and maintain appropriate control measures to prevent sediment leaden wastewater and other potential pollutants such as oil, paint and wet concrete from entering the stormwater system via stormwater drains and gullies. The control measures which must be considered to be adopted are:
    - Limit site access during construction to minimise disruption to traffic. Install a temporary construction entry/exit sediment trap at all site accesses to minimise mud and sediment from the site being tracked onto public road, particularly during wet weather or when the site is muddy.
    - Install and maintain appropriate sediment fences around construction areas
        - Divert clean stormwater runoff, using catch drains, around construction areas to existing or new stormwater drainage system.
        - Install sandbags and other pollution containment devices around stormwater drains and any other locations where required to prevent sediment entering the trunk stormwater system.
        - Cover open earth/soil areas progressively (with concrete slabs and pavements or mulch) to minimise areas of bare earth/soil.

- Any stockpiles of excavated soil and demolition / construction waste must be located where risk of erosion and sediment is minimal, and must be protected from wind and water erosion.

- Implement and maintain appropriate control measures such as catch drains and sediment fences to prevent ponding of stormwater or discharge of stormwater from the site to adjacent properties.
- Provision of spill/ pollution control equipment which is readily accessible to clean up spills and leaks.
- Inspect spill/pollution control measures are available and maintained in working condition.
- Sediment contained by the sediment control devices such as sandbags, sediment fences and containment bunds must be frequently removed and placed in a controlled area.
- Implement an inspection schedule for any spill or leaks of any potential polluting areas or activities.

9.4 Erosion Sediment Control Management Goals

- Licences, approvals, permits and inspection reports in order.
- Sediment or pollution control devices such as sandbags, sediment fences and containment bunds are in place, maintained and effective.
- Spill/pollution control equipment is readily accessible at designated locations.
- No cumulated sediment contained by the sediment control devices such as sand bags, sediment fences and containment bunds.
- No sediment exceeding a depth of 300mm in the pollution control devices (e.g. Silt trap)

9.5 Erosion and Sediment Control Implementation Program

- Licences, permits or approvals for each environmentally relevant activity must be obtained prior to commencement of this activity.
- Appropriate control measures such as sediment fences, temporary construction entry/exit sediment traps, pollution containment device (e.g. sandbags), stormwater diversions and administrative controls must be installed and established prior to commencement of the earthwork and construction activities.
- Pollution control devices such as spill control equipment must be inspected on a regular basis (at least weekly).

- Other sediment and pollution control equipment such as containment bunds, sand bags and sediment fences must be inspected on a regular basis (at least daily).
- Inspection for any leaks, spills or potential contaminating activity must be performed on a regular basis (at least daily).
- Remove cumulated sediment or other contaminants from sediment/ pollution control devices on a regular basis.
- All erosion and sediment control measures must be inspected within 24 hours of expected rain and within 18 hours of a rainfall event.

9.6 Responsible Person or Organisation

The contractor shall be responsible for the implementation and maintenance of the Erosion and Sediment Control Measures.

9.7 Reporting / Review

Records such as licences, approvals, permits and inspection reports must be reviewed on a regular basis (e.g. at least monthly) to ensure that legal compliance is met, complaints are reviewed and systems are working to prevent contamination.

9.8 Corrective Actions

- Perform clean-up of any spills immediately.
- Any mud or sediment which is tracked onto public roads is to be immediately removed up using dry clean up methods i.e. shovel and broom.
- Remove or relocate any stockpiles of waste where there is a reasonable risk of erosion and sedimentation.

Replace or repair sediment or pollution control devices if they are not maintained in good working condition.

9.9 Dispersive Soils

Environmental Soil Solutions Australia (ESSA) and Butler Partners geotechnical consultants have respectively addressed the dispersive soils and stability of this site (copies of these reports are attached). ESSA have tested the site and reported that the soil material is dispersive and can be managed by minimising the exposure of subsoils to rainfall and by treating both the topsoil and subsoils with Agricultural Lime so that the ground can support revegetation of re-profiled areas. MPN Consulting construction drawings will incorporate the recommendations of the ESSA report so that the risks associated with dispersive soils is minimised. ESSA, further advise that provided their recommendations are incorporated into the earthworks construction management plans then the result will be a stable landscape.

10 DEWATERING

The sedimentation ponds to allow settlement of soil particles treatment by gypsum for any colloidal matter to allow it to settle prior to dewatering. The water will be treated for acidity balance before being discharged to the waterways. Water drawn from the sediment basins during dewatering operations will be pumped. All discharges of water will be made in accordance with the requirements of DERM.

11 EMERGENCY SPILLS

Fuel spills on the site, although unlikely, are a potential risk which would come from a leaking fuel tank expected to be about 70l from a car or small truck or 200L from a larger vehicle. The leak would find its way into the bio-retention system or if a commercial car park it would be trapped in the Humeceptor (a minimum recommendation from open carpark areas). Should such a spill occur, then the contaminated bio-retention soil media would need to be replaced to prevent the hydrocarbons spreading into the ground water.

12 STORMWATER INFRASTRUCTURE

The overland flow channels carrying stormwater from upstream will be defined in a suitable drainage reserve. All buildings and associated structures will be founded below the invert of the stormwater pipes and culverts in accordance with ICC policy for building adjacent to stormwater services. Any trunk drainage infrastructure on private land will need to be contained within a suitable easement. All structures including retaining walls will be designed by a registered structural engineer.

13 SUMMARY

MPN Consulting Pty Ltd has assessed the development of Area 1 in accordance with Engineering principles incorporating information provided by the Australian Runoff Quality Guidelines and Water Sensitive Urban Design principles.

Runoff from the site will be conveyed to the legal point of discharge by a combination of underground pipes, culverts and overland flow. No adverse impact to flood levels will be caused by the development.

Detention of stormwater flows will be provided to ensure that the post-development discharge for all storms up to the 1 in 100 year event is no greater than pre-development flows.

Based on the assessment, it has been shown that the development will not increase downstream flows and the proposed drainage system and treatment devices achieve pollution and nutrient removals which as a minimum achieve the target removal rates set by relevant State Planning Policies.

Further, the proposed drainage system meets the criteria for Runoff Quality, Frequent Flow Management and Waterway Stability.

14 BIBLIOGRAPHY

1) Australian Runoff Quality; A Guide to Water Sensitive Urban Design – Engineers Australia 2006
2) Queensland Urban Drainage Manual 2nd Edition 2007 – Natural Resources and Water(QLD)
3) Australian Rainfall and Runoff - Engineers Australia, National Committee for Water Engineering 1999
4) Planning Scheme Policy 3 General Works 2006 – Ipswich City Council
5) Suspended Solids In Stormwater Runoff From Various Urban Surfaces – Ian Brodie USQ 2005.
6) Walsh, C.J., Leonard, A.W. Ladson, A.R., Fletcher, T.D. Urban Stormwater and the Ecology of Streams. CRC for Freshwater Ecology and CRC for Catchment Hydrology, 2004
7) Brisbane City Council – Stormwater Gardens Technical Manual
8) Concept Design Guidelines for Water Sensitive Urban Design – March 2009 by Healthy Waterways.
9) South East Queensland Regional Plan 2009 – 2031 Implementation Guideline No 7 – July 2009 by Healthy Waterways.
10) Water Sensitive Urban Design – Technical Design Guide – June 2006 by Healthy Waterways

15 DEFINITIONS

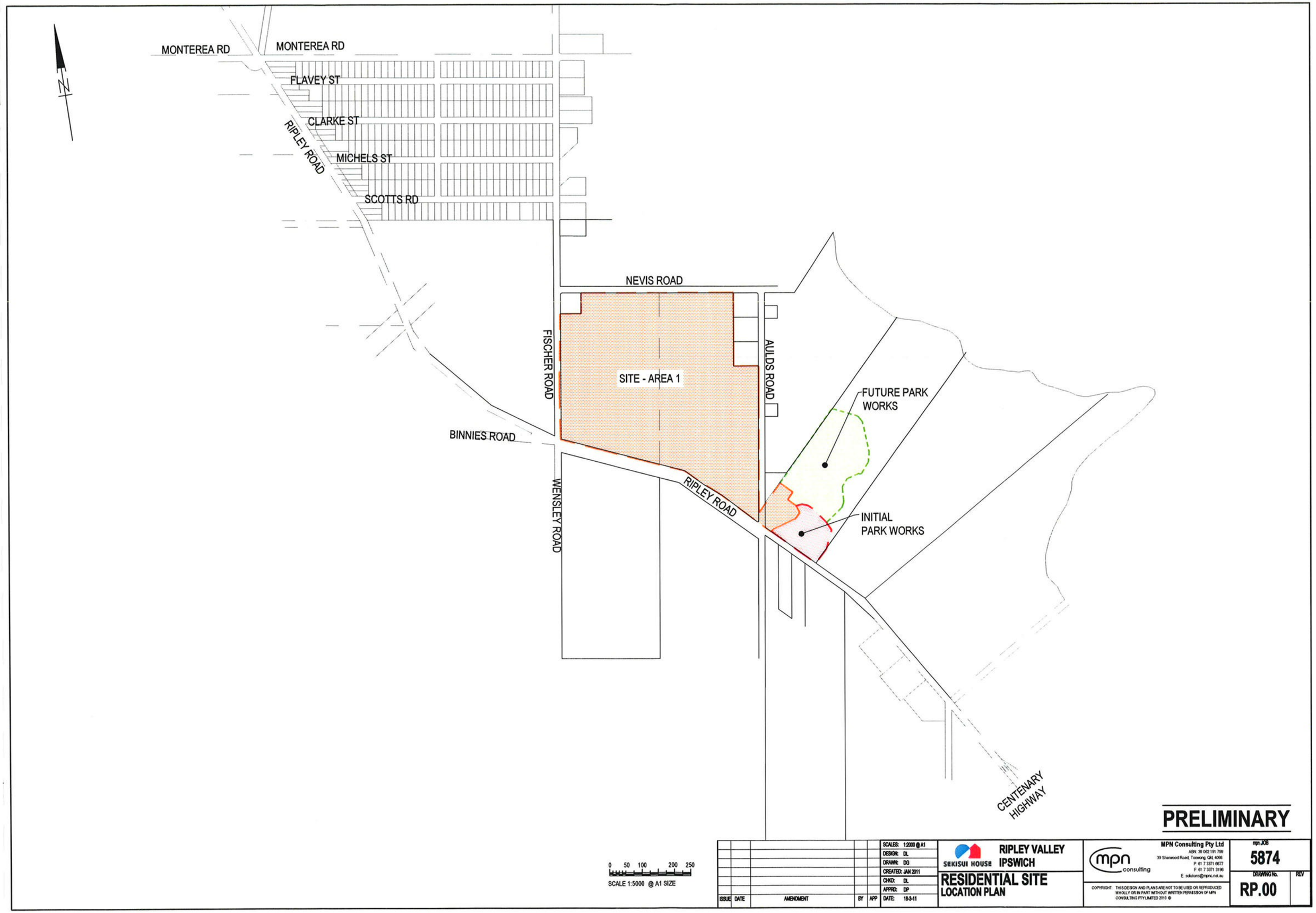
Best Practice (ARQ 2006)	WSUD calls for a considered, approach to the integration of land and water planning at all levels in the urban development process (i.e. strategic planning, concept planning to detailed design). Fundamental to the philosophy of WSUD is the integrated adoption of appropriate Best Planning Practices (BPPs) and Best Management Practices (BMPs). The performance parameters are usually established by the Local Council and are the minimum target requirements for BPPs. Meanwhile, the BMPs are site specific responses to meeting the objectives required by the BPPs. A BMP refers to the structural and non-structural elements of a design that perform the prevention, collection, treatment, conveyance, storage and reuse functions of a water management scheme. Implementation of a BMP for this project is set out in this SWMP to demonstrate that consideration of the BPPs has been made and upon implementation of its recommendation (via the development process) the development will achieve the specified level of performance required to meet the BPP.
Time of concentration (QUDM 2007)	The time of concentration is defined as the travel time for flow from the most remote part of the catchment to the outlet, or the time taken from the start of rainfall until all of the catchment is simultaneously contributing flow to the outlet.
Critical Duration (QUDM 2007)	The concept of critical duration as opposed to the concept of time of concentration used in the Rational Method is a term used in computer based runoff routing models for calculating flood hydrographs from rainfall, catchment and channel inputs. The critical storm duration for a given catchment may be similar in duration to the time of concentration, but the two terms are different and should not be confused. The critical storm duration is determined by testing the model for a range of storm durations and is used to assess the performance of the drainage system and is the time to rise to the peak of the highest flow hydrograph.
Rational Method (QUDM 2007)	Calculation of the flow at the various inlets and junctions along the drainage line is carried out from the top of the system progressively downstream. The total peak flow at any point is not the sum of the calculated sub-area flows contributing at that point, but is dependent on the time of concentration at that point. The actual flow being the product of the sum of the runoff co-efficient, area, values for the contributing sub-catchments, multiplied by appropriate intensity for time of concentration at that point. The Rational Method should not be used to analyse historical (real) storms.

Time Area Method (QUDM 2007)	DRAINS is a computer-based model which incorporates the routing of the time-area relationship developed for the sub-catchments under consideration. DRAINS is suitable for use in urban catchments, but requires calibration with available flow data, or where this is not available it is recommended that the obtained hydrograph be "compared" with the peak discharge derived for the same catchment using the Rational Method.
Second Order Stream	Second Order Stream is a branch of a watercourse that only receives first order streams.

16 NOTATION

AHD	Australian Height Datum
ARI	Average Recurrence Interval
ARQ	Australian Runoff Quality (ref: Engineers Australia)
ARR	Australian Rainfall and Runoff (ref: Engineers Australia)
BMP	Best Management Practice
CRC	Co-operative Research Centre for Catchment Hydrology
DERM	Department of Environment & Resource Management (Queensland)
DTMR	Department of Transport and Main Roads (Queensland)
GIS	Geographical Information System
GP	Gross Pollutants
GPT	Gross Pollutant Trap
ICC	Ipswich City Council
IPWEAQ	Institute of Public Works Engineering Australia (Queensland Branch)
IECA	International Erosion Control Association
MUSIC	Model for Urban Stormwater Improvement Conceptualisation
PSP3	Planning Scheme Policy 3 –General Works
QDC	Queensland Development Code (ref: QDIP)
QDIP	Queensland Department of Infrastructure and Planning
QPW	Queensland Plumbing and Wastewater Code
QUDM	Queensland Urban Drainage Manual
RVSP	Ripley Valley Structure Plan – Part 15 of Ipswich Planning Scheme
SEQ	South East Queensland
SEQIG7	South East Queensland Regional Plan 2009-2031 Implementation Guideline No. 7
SQID	Stormwater Quality Improvement Device
TDG	Technical Design Guide
TN	Total Nitrogen
TP	Total Phosphorus
TSS	Total Suspended Solids
WSUD	Water Sensitive Urban Design

Appendix 1
Drawings



PRELIMINARY

ISSUE	DATE	AMENDMENT	BY	APP

SCALES: 1:2000 @ A1
DESIGN: DL
DRAWN: DG
CREATED: JAN 2011
CHKD: DL
APPRD: DP
DATE: 18-3-11

SEKISUI HOUSE

RIPLEY VALLEY
IPSWICH

RESIDENTIAL SITE
LOCATION PLAN

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mpn JOB
5874

DRAWING No.
RP.00

REV

CATCHMENT	AREA (Ha)
EC4W	29.1642
EC17	28.9340
1	14.2475
2	8.0425
5	12.8943
6	7.5295
12	15.7377
13	0.9387
14	3.8672
14	8.8681
15	9.2700
TOTAL	139.5411

N

LEGEND

- EXISTING CONTOURS
- CATCHMENT BOUNDARY
- PROPERTY BOUNDARY
- CATCHMENT LABEL & AREA — 12 / 15.555Ha
- CATCHMENT FLOW PATHS
- FUTURE DEVELOPMENT
- PROPERTY OWNED BY SEKISUI HOUSE DEVELOPMENT SERVICES
- EXISTING Q100 FLOOD LINE
- PROPERTY DESCRIPTION — 182 / S151860
- EXISTING CULVERTS
- SALES OFFICE

BUNDAMBA CREEK

FISCHER RD OUTLET

NEVIS RD (UNFORMED)

NEVIS RD OUTLET

AULDS RD OUTLET

AULDS RD (UNSEALED)

FISCHER RD (UNSEALED)

BINNIES RD

RIPLEY RD

WESLEY RD (UNSEALED)

Q100 FLOOD LINE PLOTTED BY CARDNO FROM THEIR BUNDAMBA CREEK FLOOD STUDY DATED AUGUST 2010

SALES OFFICE OUTLET

PROPOSED SALES OFFICE

EC4W 29.1642Ha

EC17 28.9340Ha

1 14.2475Ha

2 8.0425Ha

5 12.8943Ha

6 7.5295Ha

10 21.9920Ha

11 14.9321Ha

12 15.7377Ha

13 0.9387Ha

14 3.8672Ha

15 8.8681Ha

15 9.2700Ha

8 SP141675

178 SP141675

79 SP143798

179 SP143798

180 RP910173

1 RP114350

354 RP892012

359 S3173

191 SL18

190 SL18

183 S151860

182 S151860

27 RP891045

3 RP229317

28 RP887276

29 RP910173

2 RP229319

4 RP229319

1 RP199623

REFER TO DRAWING 5874-RP.12 FOR UPSTREAM CATCHMENTS

0 50 100 125

SCALE 1:2500 @ A1 SIZE

PRELIMINARY

ISSUE	DATE	AMENDMENT	BY	APP

SCALES: 1:2000 @ A1
DESIGN: DL
DRAWN: DG
CREATED: JAN 2011
CHKD: DL
APPRD: DP
DATE: 18-3-11

SEKISUI HOUSE RIPLEY VALLEY IPSWICH

RESIDENTIAL SITE
STORMWATER CATCHMENT PLAN
AREA 1 - EXISTING CASE

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DRAWING No. RP.01

REV

CATCHMENT	AREA (Ha)
EC4W	27.0757
EC17	28.9340
1	6.6593
2	6.4876
3	18.7279
4	1.2771
5	3.3105
6	1.4989
7	0.7388
8	0.5116
12	0.6157
13	14.2977
14	8.0562
15	9.7174
TOTAL	127.9854

N

LEGEND
- PROPOSED CONTOURS
- EXISTING CONTOURS
- CATCHMENT BOUNDARY
- PROPOSED PROPERTY BOUNDARY
- EXISTING PROPERTY BOUNDARY
- CATCHMENT LABEL & AREA — 1A 15.555Ha
- CATCHMENT FLOW PATHS
- UNDERGROUND DRAINAGE
- EXISTING Q100 FLOOD LINE
- FUTURE ROAD CLOSURE
- CULVERTS
- SALES OFFICE

BUNDAMBA CREEK

FISCHER RD OUTLET

REFER TO DRAWING 5874-RP.12 FOR UPSTREAM CATCHMENTS

EC4W 27.0757Ha

8 0.5116ha

4 1.2771ha

NEVIS RD

16 0.1408Ha

NEVIS RD OUTLET

7 0.7388ha

3 18.7280ha

6 1.4989ha

FISCHER RD

AULDS RD

AULDS RD OUTLET

PARK

Q100 FLOOD LINE PLOTTED BY CARDNO FROM THEIR BUNDAMBA CREEK FLOOD STUDY DATED AUGUST 2010

15 2.9575Ha

STORMWATER OUTLET STRUCTURE TO SPREAD FLOW AND DISSIPATE ENERGY

BINNIES RD

FUTURE MEDIUM DENSITY

2 6.48764ha

15m WIDE x 1.5m DEEP SWALE

14 8.0562Ha

5 3.3105ha

FUTURE NEIGHBOURHOOD CENTRE

1.5m DEEP SWALE

1 6.6593ha

SALES OFFICE OUTLET

FUTURE RETAINING WALL

FUTURE STORMWATER PIPE

REACH ONE

NEW BUND LOCATION FLOOD RL 38.75

EC17 28.9340Ha

13 14.2977Ha

RIPLEY RD

FUTURE LOTS

ULTIMATE CHANNEL

PROPOSED SALES OFFICE

FUTURE PHASE OF TOWN PARK

EXTENT OF WORKS INITIAL PHASE OF TOWN PARK

REACH TWO

PEDESTRIAN BRIDGE

SALES OFFICE ORNAMENTAL LAKES

12 0.6157Ha

REFER TO DRAWING 5874-RP.12 FOR UPSTREAM CATCHMENTS

INITIAL PHASE OF TOWN PARK

REACH THREE

SPORTS FIELD

PROPOSED CULVERTS WHEN RIPLEY ROAD IS RECONSTRUCTED

REFER TO DRAWING 5874-RP.12 FOR UPSTREAM CATCHMENTS

REACH ONE

15 9.7174Ha

PRELIMINARY

0 50 100 125

SCALE 1:2500 @ A1 SIZE

ISSUE	DATE	AMENDMENT	BY	APP

SCALES: 1:2000 @ A1
DESIGN: DL
DRAWN: DG
CREATED: JAN 2011
CHKD: DL
APPRD: DP
DATE: 18-3-11

SEKISUI HOUSE RIPLEY VALLEY IPSWICH

RESIDENTIAL SITE
STORMWATER CATCHMENT PLAN
AREA 1 - DEVELOPED CASE

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DRAWING No. RP.02

REV

FISCHER RD OUTLET

DET 4

BIO 4

4
1.2771ha

16
0.1408Ha

8
0.5116ha

NEVIS RD

NEVIS RD OUTLET

7
0.7388ha

Ha

3
18.7280ha

6
1.4989ha

BUNDAMBA CREEK

REFER TO DRAWING 5874-RP.12
FOR UPSTREAM CATCHMENTS

FISCHER RD

BIO 3

AULDS RD

AULDS RD OUTLET

LOT 281
RP 234462

PARK

15
2.9575Ha

DET 2

STORMWATER OUTLET STRUCTURE TO
SPREAD FLOW AND DISSIPATE ENERGY

FUTURE MEDIUM
DENSITY

BIO 2

DET 3

2
6.48764ha
FUTURE
NEIGHBOURHOOD
CENTRE

BIO 5

DET 5

RIPLEY RD

WESLEY RD

5
4.2100ha

1
5.7624ha

SALES OFFICE
OUTLET

13
14.2977Ha

BIO 1

DET 1

PROPOSED
SALES OFFICE

RIPLEY RD

12
0.6157Ha

REFER TO DRAWING 5874-RP.12
FOR UPSTREAM CATCHMENTS

0 20 40 60 80 100
SCALE 1:2000 @ A1 SIZE

REFER TO DRAWING 5874-RP.12
FOR UPSTREAM CATCHMENTS

LEGEND

- INTERNAL CATCHMENT BOUNDARY
- PROPOSED PROPERTY BOUNDARY
- EXISTING PROPERTY BOUNDARY
- CATCHMENT LABEL & AREA — 1A 15.555Ha
- BIO-RETENTION BASIN
- STORMWATER DETENTION BASIN
- } FOR DETAILS REFER DRG RP06
- CATCHMENT FLOW PATHS
- EXISTING Q100 FLOOD LINE
- PROPOSED CULVERTS
- SALES OFFICE

Q100 FLOOD LINE PLOTTED BY CARDNO FROM
THEIR BUNDAMBA CREEK FLOOD STUDY
DATED AUGUST 2010

NOTE: DETENTION BASIN 2 SIZE BASED ON

1. BASIN FACES TO BE BATTERED
2. NO DRAINAGE RIGHTS OBTAINED
THROUGH LOT 281 RP 234462

PRELIMINARY

ISSUE	DATE	AMENDMENT	BY	APP

SCALES: 1:2000 @ A1
DESIGN: DL
DRAWN: ND
CREATED: JAN 2011
CHKD: DL
APPRD: DP
DATE: 18-3-11

SEKISUI HOUSE

RIPLEY VALLEY
IPSWICH

RESIDENTIAL SITE
BIO TREATMENT & DETENTION BASIN
AREA 1 - PLAN DEVELOPED CASE

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DRAWING No. RP.03

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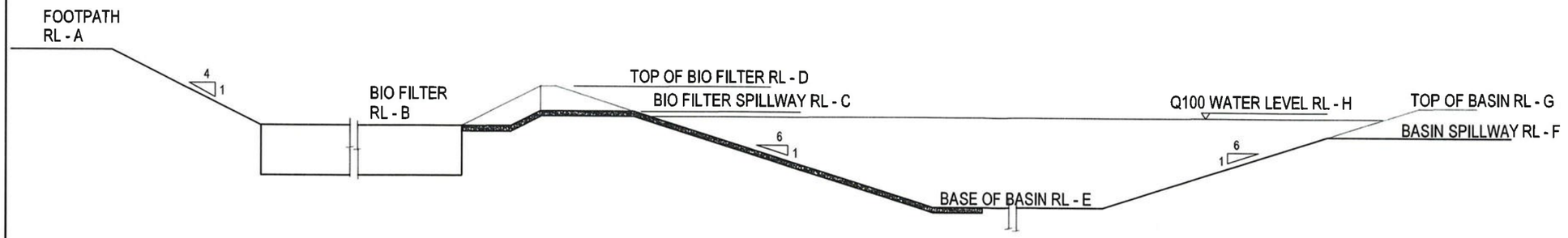

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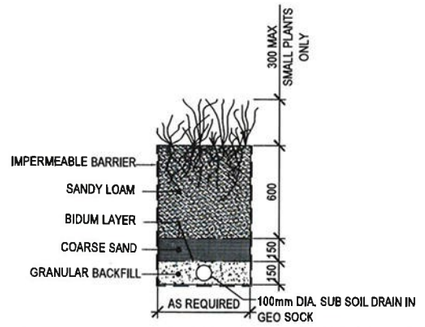
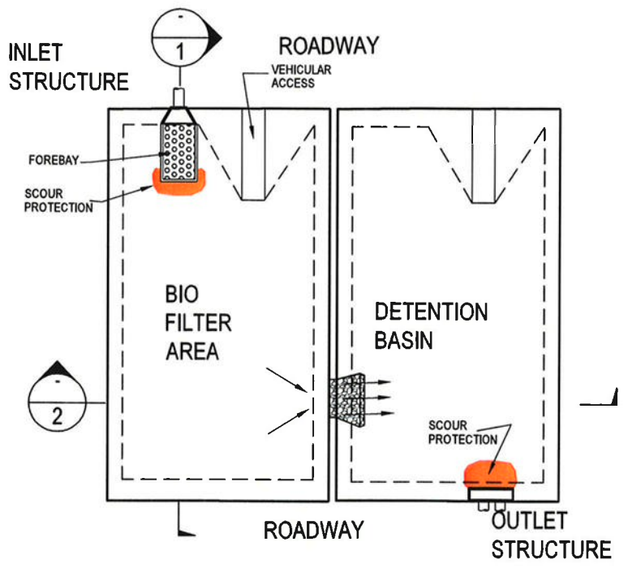
NOT TO SCALE



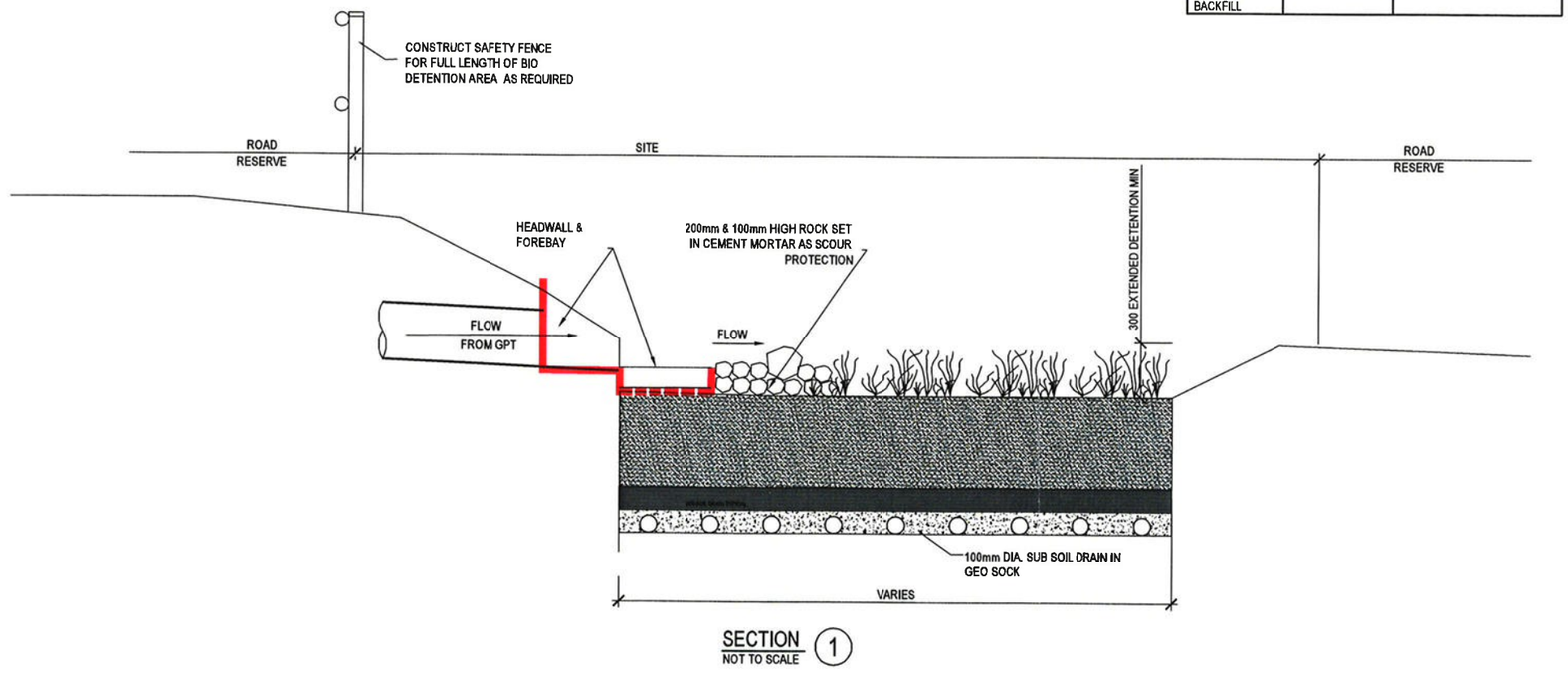
TYPICAL BIO-RETENTION FILTER TRENCH DETAIL

SCALE 1:10

MEDIUM	PARTICLE SIZE	CONTENT/ SIEVE - % PASSING
SANDY LOAM	0.45mm - 0.5mm	5 - 10 % ORGANIC pH 6.0 - 8.0 100 - 200mm/hr HYDRAULIC CONDUCTIVITY.
COARSE SAND	1.0mm TYP.	1.4mm - 100% 1.0mm - 80% 0.7mm - 44% 0.5mm - 8.4%
GRANULAR BACKFILL	5mm - 10mm	



TYPICAL DETENTION BASIN / BIO AREA SCHEMATIC



SECTION (1)
NOT TO SCALE

BIO FILTER No	DETENTION BASIN No	REFERENCE LEVELS (REFER SECTION 2) A	B	C	D	E	F	G	H	BIO RETENTION AREA (m2)	BIO FILTER WEIR LENGTH (m)	DETENTION BASIN BASE (m2)	LOW FLOW PIPE OUTLET SIZE
1	1	42.50	41.00	41.30	41.50	39.40	41.20	42.0	41.30	250	2.0	750	450Ø
2	2	46.00	44.50	44.80	45.00	43.00	44.00	45.00	44.50	1900	6.0	2000	2 x 1050Ø
3	3	45.70	44.50	44.80	45.00	42.50	44.00	44.50	44.20	1700	6.0	3700	2 x 750Ø
4	4	56.40	54.90	55.20	55.40	53.60	55.50	55.70	55.20	280	2.0	650	375Ø
5	-	45.20	43.70	44.00	44.20	42.50	43.50	44.50	44.00	800	4.0	-	-

BIO FILTER & DETENTION BASIN DETAILS

ISSUE	DATE	AMENDMENT	BY	APP

SCALES: NOT TO SCALE
DESIGN: DG
DRAWN: DG
CREATED: FEB 2011
CHKD: DL
APPRD: DP
DATE: 18-3-11

SEKISUI HOUSE RIPLEY VALLEY IPSWICH

STORMWATER BIO-RETENTION & DETENTION BASIN TYP. DETAILS

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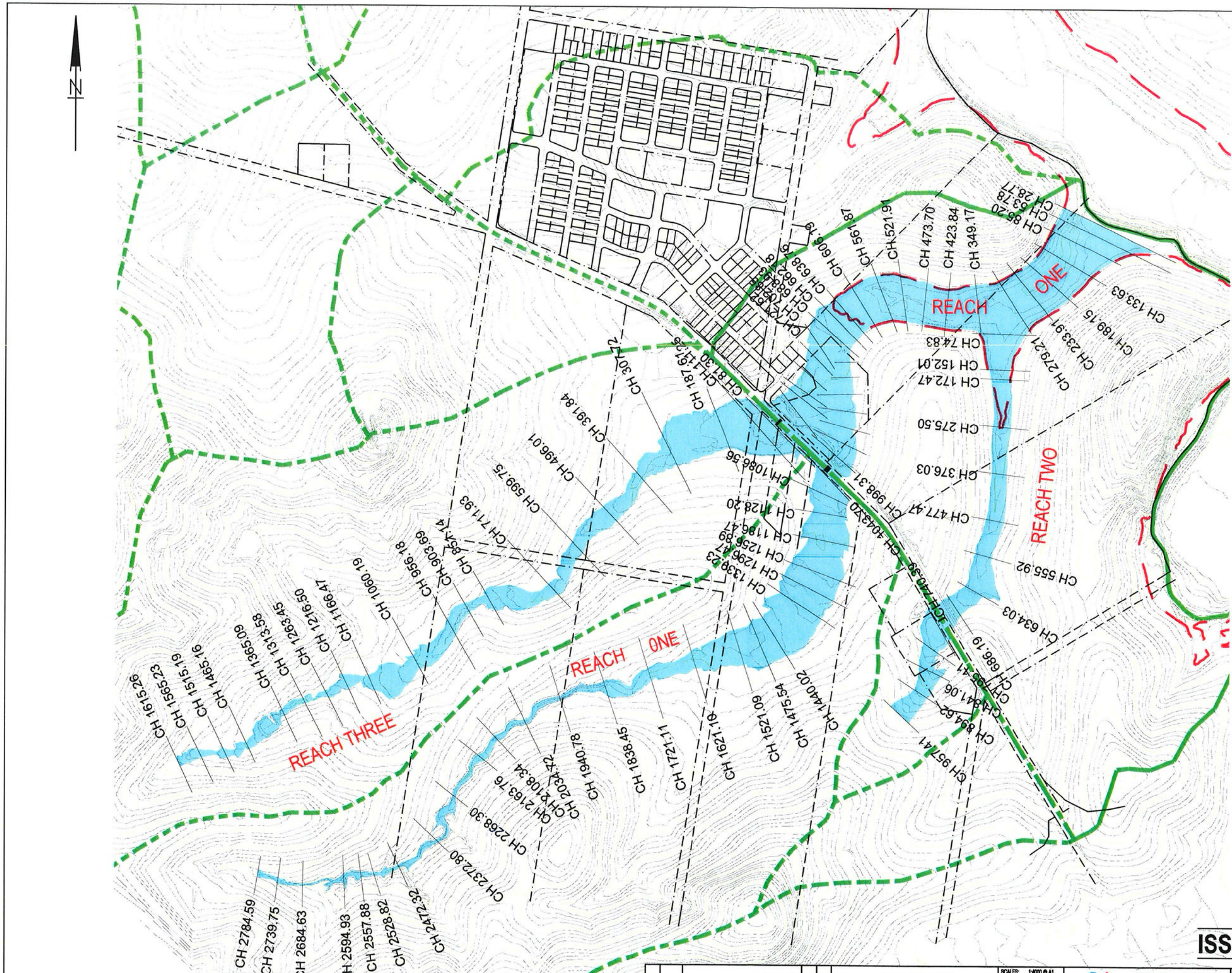
DRAWING No. RP.06

REV



LEGEND

Symbol	Description
CH 745.63	HECRAS SECTION
(blue fill)	Q100 WATER SURFACE EXISTING CULVERTS & EXISTING RIPLEY RD
(black mark)	EXISTING CULVERT
(green symbol)	PROPOSED CULVERT
(green dashed line)	CATCHMENT BOUNDARY
(red dashed line)	EXISTING Q100 FLOOD LINE

NOTE:
PROPOSED CULVERT LOCATIONS ARE PROVISIONAL AND SUBJECT TO AMENDMENT.
REFER TO DRAWING 5874-HEC.10 FOR FLOW DATA.

ISSUED FOR INFORMATION

ISSUE	DATE	AMENDMENT	BY	APP
A	18.03.12	FOR INFORMATION	CB	DL

RIPLEY VALLEY
RESIDENTIAL DEVELOPMENT
RIPLEY ROAD
IPSWICH

SCALES:	1:4000 @ A1
DESIGN:	CB
DRAWN:	CB
CREATED:	MARCH 2012
CHKD:	D.L.
APPRD:	D.P.
DATE:	18.03.12

SEKISUI HOUSE
RIPLEY VALLEY
IPSWICH

Q100 FLOW EXISTING CONDITION RIPLEY RD

MPN Consulting Pty Ltd
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mpn JOB **5874**
DRAWING No. **HEC.01**
REV **A**

N

REACH ONE

REACH TWO

REACH THREE

REACH ONE

LEGEND

CH 745.63 — HECRAS SECTION

Q100 WATER SURFACE PROPOSED CULVERTS & RIPLEY RD RAISED

EXISTING CULVERT

PROPOSED CULVERT

CATCHMENT BOUNDARY

EXISTING Q100 FLOOD LINE

NOTE:
PROPOSED CULVERT LOCATIONS ARE PROVISIONAL AND SUBJECT TO AMENDMENT.

ISSUED FOR INFORMATION

ISSUE	DATE	AMENDMENT	BY	APP
A	18.03.12	FOR INFORMATION	CB	DL

RIPLEY VALLEY
RESIDENTIAL DEVELOPMENT
RIPLEY ROAD
IPSWICH

SCALES: 1:4000 @ A1
DESIGN: CB
DRAWN: CB
CREATED: MARCH 2012
CHKD: D.L.
APPRD: D.P.
DATE: 18.03.12

SEKISUI HOUSE

RIPLEY VALLEY IPSWICH

Q100 FLOW PROPOSED RIPLEY RD ALIGNMENT

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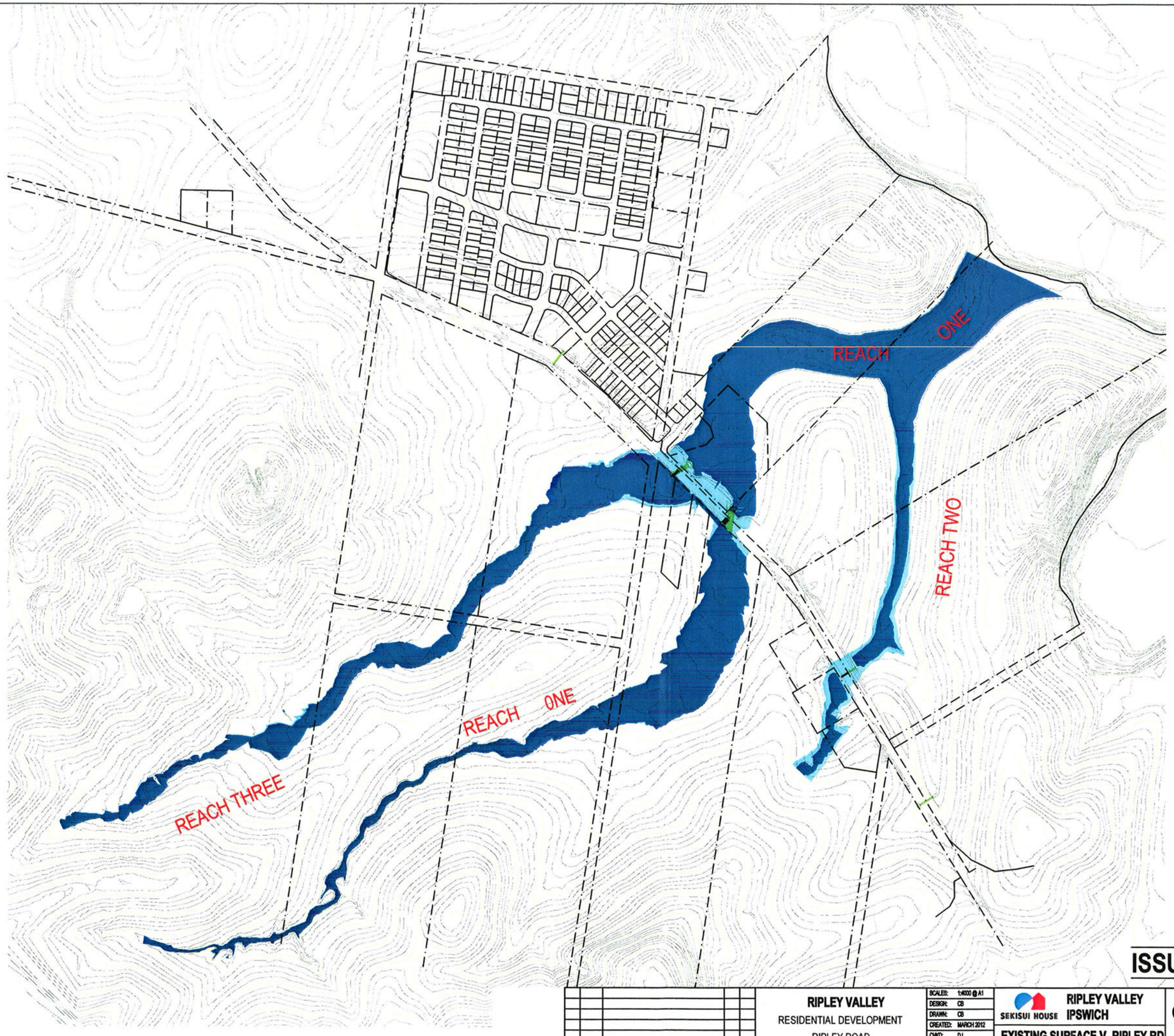
DRAWING No. HEC.02

REV A



LEGEND

- Q100 WATER SURFACE EXISTING CULVERTS & EXISTING RIPLEY RD
- Q100 WATER SURFACE PROPOSED CULVERTS & RIPLEY RD RAISED
- EXISTING CULVERT
- PROPOSED CULVERT

NOTE:
PROPOSED CULVERT LOCATIONS ARE PROVISIONAL AND SUBJECT TO AMENDMENT.

ISSUED FOR INFORMATION

ISSUE	DATE	AMENDMENT	BY	APP
A	16.03.12	FOR INFORMATION	CB	DL

RIPLEY VALLEY
RESIDENTIAL DEVELOPMENT
RIPLEY ROAD
IPSWICH

SCALES:	1:4000 @ A1
DESIGN:	CB
DRAWN:	CB
CREATED:	MARCH 2012
CHKD:	D.L.
APPRD:	D.P.
DATE:	16.03.12

SEKISUI HOUSE
RIPLEY VALLEY IPSWICH
EXISTING SURFACE V. RIPLEY RD REALIGNMENT SURFACE

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mpn JOB: 5874
DRAWING No.: HEC.03
REV: A

N

REACH ONE

REACH TWO

REACH THREE

REACH ONE

SECT 5-2782.11
SECT 5-2737.27
SECT 5-2682.15
SECT 5-2592.45
SECT 5-2555.40
SECT 5-2526.34
SECT 5-2469.84
SECT 5-2370.32
SECT 5-2265.82
SECT 5-2161.28
SECT 5-2105.86
SECT 5-2028.24
SECT 5-1938.30
SECT 5-1835.97
SECT 5-1718.63
SECT 5-1648.62
SECT 5-1518.61
SECT 5-1473.06
SECT 5-1437.45
SECT 5-1336.75
SECT 5-1293.99
SECT 5-1240.38
SECT 5-1184.32
SECT 5-1125.41
SECT 5-1087.89
SECT 5-1039.58
SECT 5-980.95
SECT 5-955.98
SECT 5-931.07
SECT 4-798.67
SECT 4-735.13
SECT 4-690.09
SECT 4-615.04
SECT 4-565.08
SECT 4-540.11
SECT 4-515.13
SECT 4-490.13
SECT 4-465.12
SECT 4-415.43
SECT 4-348.95
SECT 3-28.77
SECT 3-53.78
SECT 3-85.20
SECT 3-133.63
SECT 3-189.15
SECT 3-233.91
SECT 3-279.21
SECT 1-74.83
SECT 1-113.89
SECT 1-152.01
SECT 1-208.01
SECT 1-273.50
SECT 1-376.03
SECT 1-477.47
SECT 1-515.88
SECT 1-555.92
SECT 1-594.56
SECT 1-634.03
SECT 1-686.19
SECT 1-736.11
SECT 1-841.06
SECT 1-894.62
SECT 1-957.41
SECT 2-313.12
SECT 2-193.06
SECT 2-397.25
SECT 2-501.41
SECT 2-605.16
SECT 2-711.34
SECT 2-856.54
SECT 2-909.09
SECT 2-961.59
SECT 2-1065.59
SECT 2-1171.88
SECT 2-1221.91
SECT 2-1268.86
SECT 2-1318.98
SECT 2-1370.50
SECT 2-1470.55
SECT 2-1520.60
SECT 2-1570.63
SECT 2-1620.66

LEGEND

DEPTH OF Q100 FLOW

				Colour
0.00	to	0.50	m	
0.50	to	1.00	m	
1.00	to	1.50	m	
1.50	to	2.00	m	
2.00	to	2.50	m	
2.50	to	5.00	m	

Q100 WATER PROPOSED CHANNEL
RIPLEY RD RAISED, NO BUND

CH 745.63 HECRAS SECTION

EXISTING CULVERT

PROPOSED CULVERT

CATCHMENT BOUNDARY

EXISTING Q100 FLOOD LINE

NOTE:
PROPOSED CULVERT LOCATIONS ARE PROVISIONAL AND SUBJECT TO AMENDMENT.
REFER TO DRAWING 5874-HEC.10 FOR FLOW DATA.

ISSUED FOR INFORMATION

ISSUE	DATE	AMENDMENT	BY	APP
A	18.03.12	FOR INFORMATION	CB	DL

RIPLEY VALLEY
RESIDENTIAL DEVELOPMENT
RIPLEY ROAD
IPSWICH

SCALES: 1:4000 @ A1
DESIGN: CB
DRAWN: CB
CREATED: MARCH 2012
CHKD: D.L.
APPRD: D.P.
DATE: 18.03.12

SEKISUI HOUSE **RIPLEY VALLEY IPSWICH**

Q100 FLOW, PARTIAL CHANNEL WITH NO BUND

MPN Consulting Pty Ltd
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mpn JOB 5874

DRAWING No. HEC.04

REV A

N

REACH ONE

AREA 1

SECT 4-665.05

SECT 4-690.05

SECT 4-615.04

SECT 4-565.08

SECT 4-540.11

SECT 4-515.13

SECT 4-490.13

SECT 4-465.12

SECT 4-415.43

SECT 4-739.67

PEDESTRIAN BRIDGE

SALES OFFICE

SECT 4-764.55

ORNAMENTAL LAKES

SECT 4-782.02

SECT 4-787.03

SECT 4-814.49

SECT 4-838.46

SPORTS FIELD

SECT 5-955.98

SECT 5-980.96

SECT 5-999.33

SECT 5-1052.58

SECT 5-1087.89

SECT 5-931.01

SECT 5-906.07

SECT 2-35.13

SECT 2-22.53

SECT 2-88.15

SECT 2-117.58

SECT 2-193.06

RIPLEY ROAD

REACH THREE

REACH ONE

LEGEND

DEPTH OF Q100 FLOW				Colour
0.00	to	0.50	m	
0.50	to	1.00	m	
1.00	to	1.50	m	
1.50	to	2.00	m	
2.00	to	2.50	m	
2.50	to	5.00	m	

Q100 WATER PROPOSED CHANNEL
RIPLEY RD RAISED, NO BUND

CH 745.63 HECRAS SECTION

EXISTING CULVERT

PROPOSED CULVERT

NOTE:
PROPOSED CULVERT LOCATIONS ARE PROVISIONAL AND SUBJECT TO AMENDMENT.
REFER TO DRAWING 5874-HEC.10 FOR FLOW DATA.

0 10 20 30 40 50
SCALE 1:1000

ISSUED FOR INFORMATION

ISSUE	DATE	AMENDMENT	BY	APP
A	18.03.12	FOR INFORMATION	CB	DL

RIPLEY VALLEY
RESIDENTIAL DEVELOPMENT
RIPLEY ROAD
IPSWICH

SCALES:	1:4000 @ A1
DESIGN:	CB
DRAWN:	CB
CREATED:	MARCH 2012
CHKD:	D.L.
APPRD:	D.P.
DATE:	18.03.12

SEKISUI HOUSE **RIPLEY VALLEY IPSWICH**

PARTIAL CHANNEL WITH NO BUND, PLAN & DETAILS

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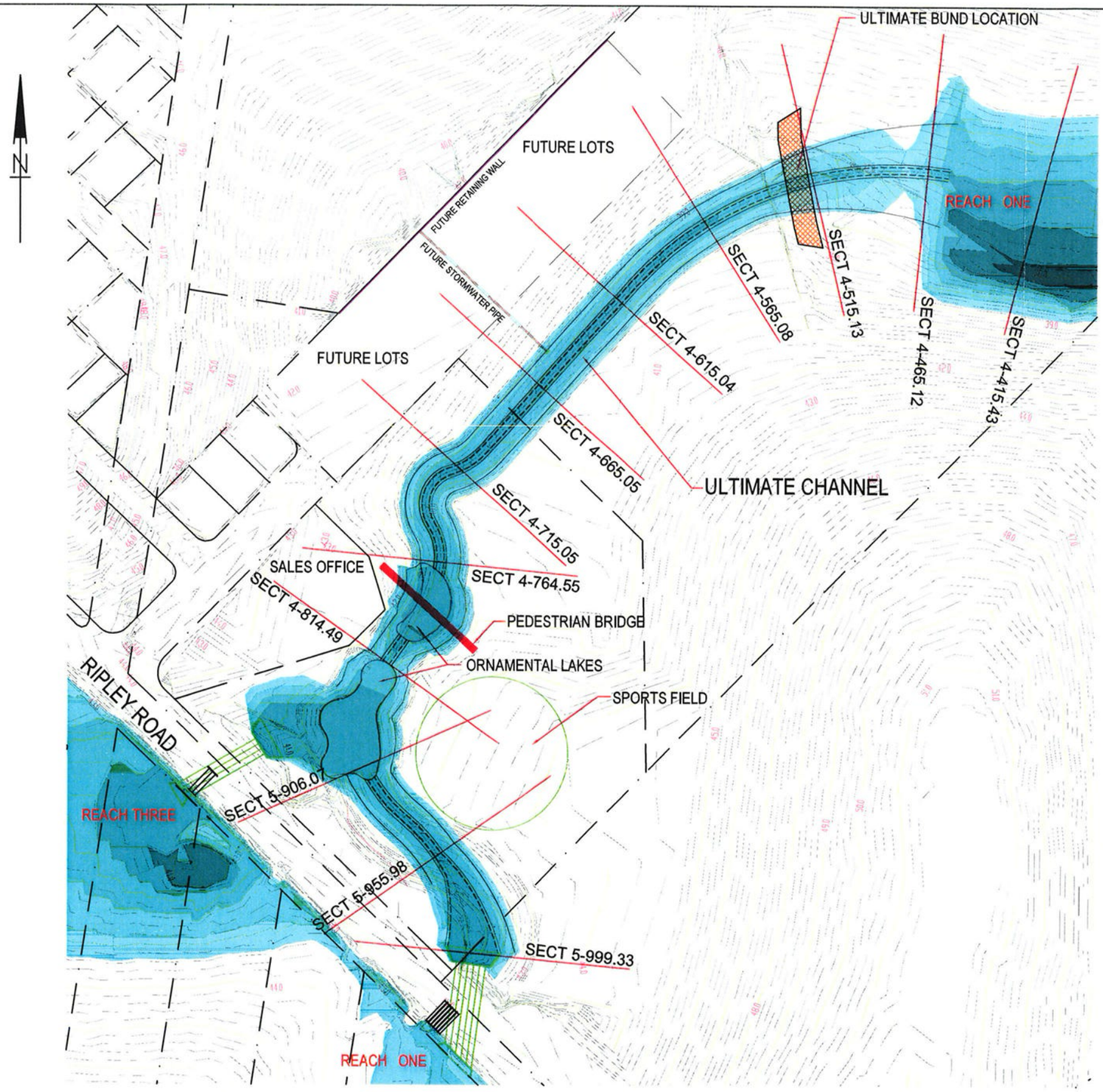
DRAWING No. **HEC.05** REV **A**



LEGEND

DEPTH OF Q100 FLOW				Colour
0.00	to	0.50	m	
0.50	to	1.00	m	
1.00	to	1.50	m	
1.50	to	2.00	m	
2.00	to	2.50	m	
2.50	to	5.00	m	

Q100 WATER SURFACE PROPOSED CULVERTS, RIPLEY RD RAISED AND ULTIMATE CHANNEL AND BUND

SECT 4-814.49 WATER LEVEL CROSS SECTION

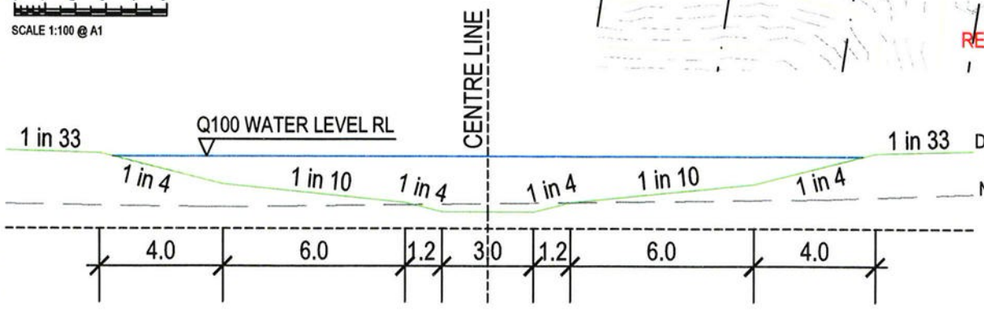
EXISTING CULVERT

PROPOSED CULVERT

NOTE:
PROPOSED CULVERT LOCATIONS ARE PROVISIONAL AND SUBJECT TO AMENDMENT.
REFER TO DRAWINGS 5874-HEC.07 & 08 FOR CROSS SECTIONS.
REFER TO DRAWING 5874-HEC.10 FOR FLOW DATA.

TYPICAL CHANNEL CROSS SECTION

0 1 2 3 4 5
SCALE 1:100 @ A1



ISSUED FOR INFORMATION

ISSUE	DATE	AMENDMENT	BY	APP
A	18.03.12	FOR INFORMATION	CB	DL

RIPLEY VALLEY
RESIDENTIAL DEVELOPMENT
RIPLEY ROAD
IPSWICH

SCALES:	AS SHOWN
DESIGN:	CB
DRAWN:	CB
CREATED:	MARCH 2012
CHKD:	D.L.
APPRD:	D.P.
DATE:	18.03.12

SEKISUI HOUSE **RIPLEY VALLEY IPSWICH**

ULTIMATE CHANNEL WITH BUND PLAN AND DETAILS

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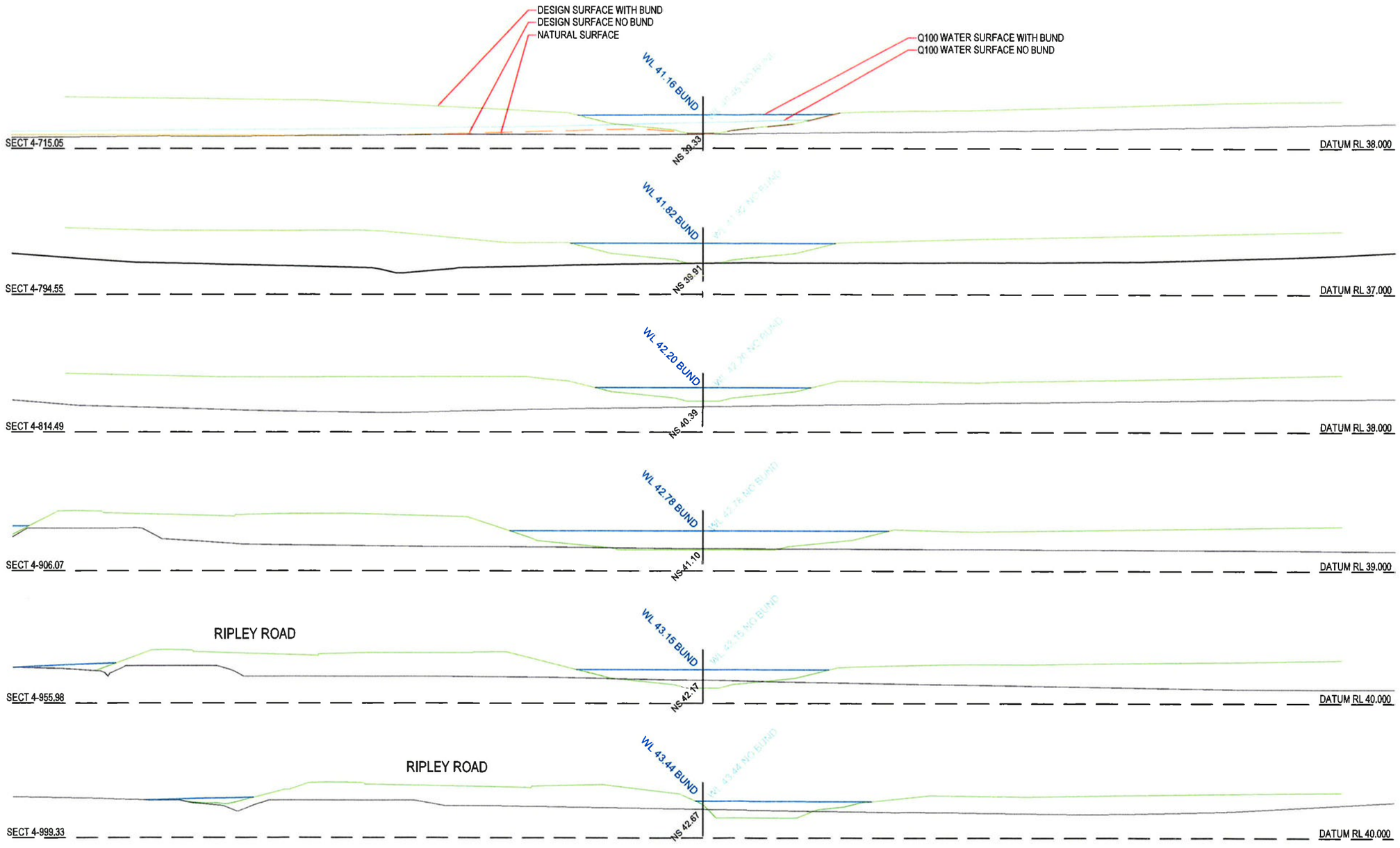
DRAWING No. **HEC.06** REV **A**



ISSUED FOR INFORMATION

0 2 4 6 8 10
SCALE 1:200

ISSUE	DATE	AMENDMENT	BY	APP
A	16.03.12	FOR INFORMATION	CB	DL

RIPLEY VALLEY
RESIDENTIAL DEVELOPMENT
RIPLEY ROAD
IPSWICH

SCALES:	1:1000 @ A1
DESIGN:	CB
DRAWN:	CB
CREATED:	MARCH 2012
CHKD:	D.L.
APPRD:	D.P.
DATE:	16.03.12

SEKISUI HOUSE **RIPLEY VALLEY IPSWICH**

Q100 FLOW ULTIMATE CHANNEL CROSS SECTIONS, SHT 1 OF 2

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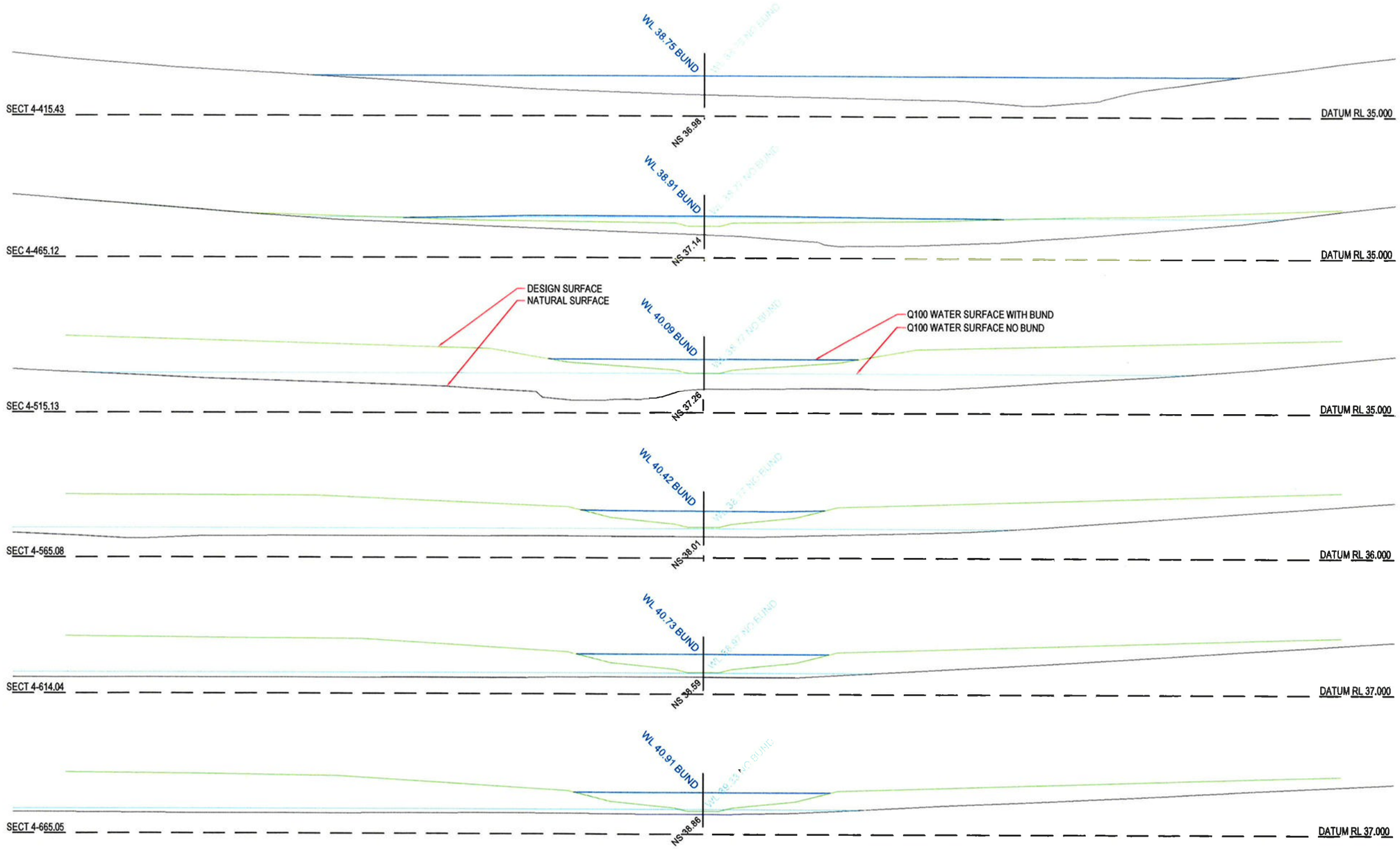
DRAWING No. **HEC.07** REV **A**



ISSUED FOR INFORMATION

0 2 4 6 8 10
SCALE 1:200

ISSUE	DATE	AMENDMENT	BY	APP
A	18.03.12	FOR INFORMATION	CB	DL

RIPLEY VALLEY
RESIDENTIAL DEVELOPMENT
RIPLEY ROAD
IPSWICH

SCALES:	1:1000 @ A1
DESIGN:	CB
DRAWN:	CB
CREATED:	MARCH 2012
CHKD:	D.L.
APPRD:	D.P.
DATE:	18.03.12

SEKISUI HOUSE **RIPLEY VALLEY IPSWICH**

Q100 FLOW ULTIMATE CHANNEL CROSS SECTIONS, SHT 2 OF 2

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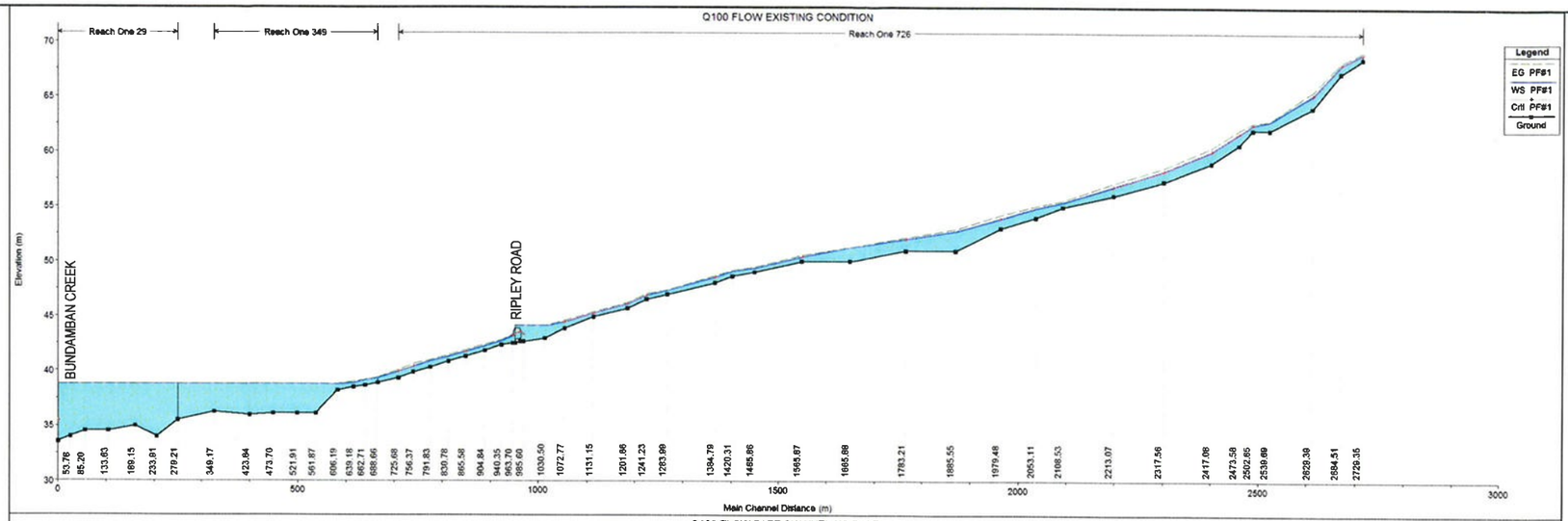
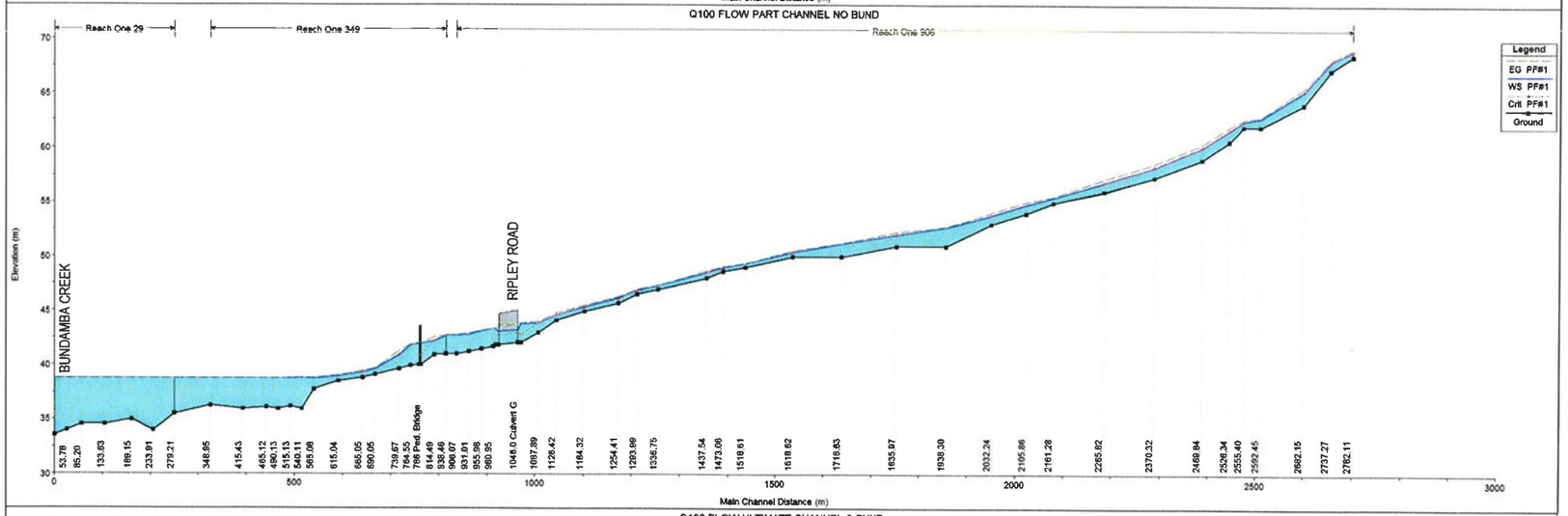
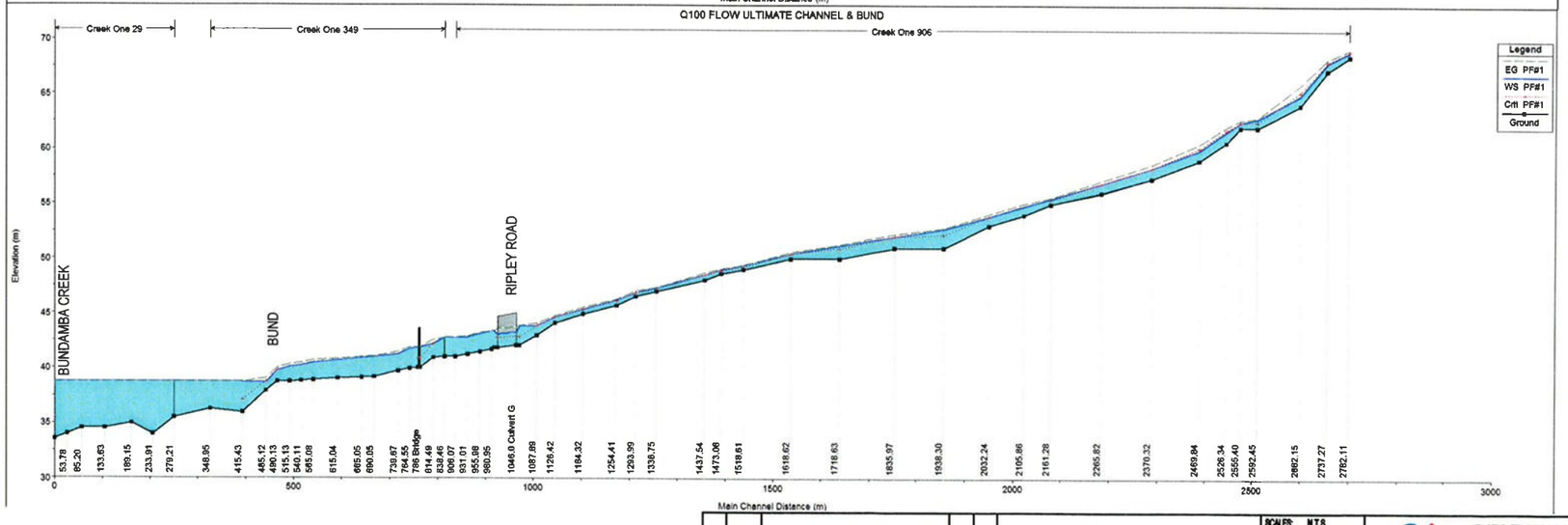
mpn JOB **5874**

DRAWING No. **HEC.08**

REV **A**







ISSUED FOR INFORMATION

ISSUE	DATE	AMENDMENT	BY	APP
A	18.03.12	FOR INFORMATION	CB	DL

RIPLEY VALLEY
RESIDENTIAL DEVELOPMENT
RIPLEY ROAD
IPSWICH

SCALE:	N.T.S.
DESIGN:	CB
DRAWN:	CB
CREATED:	MARCH 2012
CHKD:	D.L.
APPRD:	D.P.
DATE:	18.03.12

SEKISUI HOUSE **RIPLEY VALLEY IPSWICH**

LONGITUDINAL SECTIONS REACH ONE

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mpn JOB **5874**

DRAWING No. **HEC.09**

REV **A**

Q100 Flows with Natural Channel

River	Reach	River Sta	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Max Chl Dpth (m)	dV	Flow Area (m2)	Top Width (m)	Froude No
Reach One	726.00	985.50	Culvert											
Reach One	726.00	939.44	27.00	41.83	42.89		42.96	0.00	1.11	1.06	1.18	24.23	32.85	0.41
Reach One	726.00	938.75	27.00	41.88	42.55	42.55	42.77	0.02	2.05	0.67	1.37	13.16	31.61	1.01
Reach One	726.00	904.66	27.00	41.66	42.30	42.18	42.37	0.01	1.23	0.64	0.79	24.74	70.21	0.62
Reach One	726.00	867.72	27.00	41.43	41.85		41.92	0.01	1.42	0.56	0.80	27.88	79.10	0.82
Reach One	726.00	831.95	27.00	40.96	41.38		41.43	0.01	1.17	0.63	0.74	34.57	83.88	0.66
Reach One	726.00	795.13	27.00	40.51	41.00		41.03	0.01	1.03	0.73	0.75	37.57	82.95	0.62
Reach One	726.00	758.39	27.00	39.94	40.56		40.64	0.01	1.39	0.63	0.88	24.02	49.49	0.67
Reach One	726.00	725.68	27.00	39.34	39.90	39.90	40.11	0.02	2.09	0.56	1.17	14.43	34.45	1.05
Reach One	349.00	688.66	41.60	38.91	39.39	39.25	39.44	0.01	1.04	0.48	0.50	39.91	108.31	0.55
Reach One	349.00	662.71	41.60	38.70	39.21		39.26	0.00	0.99	0.51	0.50	41.82	107.40	0.51
Reach One	349.00	639.18	41.60	38.50	38.99		39.07	0.01	1.21	0.49	0.59	34.30	95.15	0.64
Reach One	349.00	606.19	41.60	38.21	38.80		38.84	0.00	0.94	0.59	0.55	44.42	96.34	0.44
Reach One	349.00	561.87	41.60	36.10	38.78		38.79	0.00	0.41	2.68	1.10	100.98	103.15	0.13
Reach One	349.00	521.91	41.60	36.12	38.77		38.78	0.00	0.35	2.65	0.93	119.89	101.71	0.10
Reach One	349.00	473.70	41.60	36.12	38.77		38.77	0.00	0.32	2.65	0.85	129.68	92.46	0.09
Reach One	349.00	423.84	41.60	36.00	38.76		38.77	0.00	0.32	2.76	0.88	130.99	86.04	0.08
Reach One	349.00	349.17	41.60	36.23	38.76		38.76	0.00	0.25	2.53	0.63	177.18	101.55	0.06
Reach Three	43.00	265.50	Culvert											
Reach Three	43.00	200.26	19.80	40.64	41.17		41.20	0.00	0.71	0.53	0.38	27.89	85.04	0.40
Reach Three	43.00	145.85	19.80	40.17	40.65		40.72	0.01	1.14	0.48	0.55	17.35	62.55	0.69
Reach Three	43.00	128.08	19.80	39.90	40.37	40.37	40.49	0.02	1.57	0.47	0.74	12.59	49.57	1.00
Reach Three	43.00	93.90	19.80	39.00	40.15	39.90	40.19	0.00	0.85	1.15	0.98	23.83	59.39	0.40
Reach Three	43.00	59.23	19.80	39.50	39.79	39.79	39.90	0.02	1.41	0.29	0.41	14.03	68.58	1.00
Reach Three	43.00	43.23	19.80	39.28	39.47	39.55	39.75	0.14	2.34	0.19	0.44	8.48	82.49	2.33

NOTE:

REFER DRAWING 5874-HEC.01 FOR EXISTING Q100 FLOW PLAN
REFER DRAWINGS 5874-HEC.04 & 05 FOR PARTIAL CHANNEL & NO BUND Q100 FLOW PLANS
REFER DRAWINGS 5874-HEC.06 FOR ULTIMATE CHANNEL & BUND Q100 FLOW PLAN

Q100 Flows with Partial Channel & No Bund

River	Reach	River Sta	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Max Chl Dpth (m)	Vel Chnl (m/s)	dV	Flow Area (m2)	Top Width (m)	Froude No
Reach One	906	1046.00	Culvert											
Reach One	906	999.33	32.00	41.82	43.37		43.39	0.00	0.73	1.55	1.13	44.02	34.74	0.21
Reach One	906	980.95	32.00	41.67	43.35		43.39	0.00	0.87	1.68	1.46	36.85	30.45	0.25
Reach One	906	955.98	32.00	41.45	43.15		43.23	0.01	1.31	1.70	2.23	24.48	23.77	0.41
Reach One	906	931.01	32.00	41.22	42.82		42.93	0.01	1.44	1.60	2.30	22.27	23.01	0.47
Reach One	906	906.07	32.00	41.00	42.78		42.80	0.00	0.67	1.78	1.19	47.86	35.70	0.18
Reach One	349	838.46	41.60	41.00	42.74		42.75	0.00	0.59	1.74	1.03	70.89	61.08	0.17
Reach One	349	814.49	41.60	40.93	42.21	42.21	42.59	0.07	2.74	1.27	3.48	15.19	20.40	1.01
Reach One	349	787.03	41.60	40.00	41.99	40.87	42.02	0.00	0.78	1.99	1.55	53.74	38.74	0.20
Reach One	349	786.00	Bridge											
Reach One	349	782.02	41.60	40.00	41.99		42.02	0.00	0.71	1.99	1.41	58.98	42.77	0.19
Reach One	349	764.55	41.60	39.96	41.84		41.94	0.01	1.44	1.88	2.71	28.92	25.22	0.43
Reach One	349	739.67	41.60	39.68	40.96	40.96	41.34	0.07	2.74	1.28	3.51	15.20	20.29	1.01
Reach One	349	690.05	41.60	39.13	39.68		39.75	0.01	1.18	0.55	0.65	36.07	94.99	0.60
Reach One	349	665.05	41.60	38.86	39.33	39.33	39.50	0.02	2.23	0.47	1.05	36.47	110.95	1.10
Reach One	349	615.04	41.60	38.50	38.97		39.04	0.00	1.15	0.47	0.54	38.49	96.39	0.55
Reach One	349	565.08	41.60	37.75	38.77		38.83	0.00	1.64	1.02	1.67	66.52	104.02	0.55
Reach One	349	540.11	41.60	36.00	38.79		38.80	0.00	0.49	2.79	1.37	123.31	105.96	0.12
Reach One	349	515.13	41.60	36.20	38.77		38.80	0.00	0.89	2.57	2.29	122.87	104.72	0.18
Reach One	349	490.13	41.60	36.00	38.77		38.79	0.00	0.81	2.77	2.24	127.04	96.19	0.16
Reach One	349	465.12	43.40	36.11	38.77		38.78	0.00	0.71	2.66	1.89	129.56	92.44	0.14
Reach One	349	415.43	43.40	36.00	38.75		38.77	0.00	0.78	2.75	2.15	130.45	85.87	0.16
Reach One	349	348.95	43.40	36.23	38.76		38.76	0.00	0.34	2.53	0.86	177.41	101.56	0.07
Reach Three	23	83.00	Culvert											
Reach Three	23	35.13	19.80	41.11	42.78		42.79	0.00	0.41	1.67	0.68	48.87	36.72	0.11
Reach Three	23	22.53	19.80	41.03	42.78		42.78	0.00	0.34	1.75	0.60	58.93	45.23	0.09

Q100 FLOWS with Ultimate Channel & Bund

River	Reach	River Sta	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Max Chl Dpth (m)	dV	Flow Area (m2)	Top Width (m)	Froude No
Reach One	906	1046.00	Culvert											
Reach One	906	999.33	32.00	41.82	43.37		43.39	0.00	0.73	1.55	1.13	44.02	34.74	0.21
Reach One	906	980.95	32.00	41.67	43.35		43.39	0.00	0.87	1.68	1.46	36.85	30.45	0.25
Reach One	906	955.98	32.00	41.45	43.15		43.23	0.01	1.31	1.70	2.23	24.49	23.77	0.41
Reach One	906	931.01	32.00	41.22	42.82		42.93	0.01	1.44	1.60	2.30	22.29	23.02	0.47
Reach One	906	906.07	32.00	41.00	42.78		42.80	0.00	0.67	1.78	1.19	47.89	35.71	0.18
Reach One	349	838.46	41.60	41.00	42.74		42.76	0.00	0.59	1.74	1.03	70.96	61.10	0.17
Reach One	349	814.49	41.60	40.93	42.20	42.20	42.59	0.07	2.74	1.27	3.48	15.19	20.40	1.01
Reach One	349	787.03	41.60	40.00	41.91	40.87	41.95	0.00	0.82	1.91	1.57	50.67	36.87	0.22
Reach One	349	786.00	Bridge											
Reach One	349	782.02	41.60	40.00	41.91		41.94	0.00	0.75	1.91	1.43	55.59	40.29	0.20
Reach One	349	764.55	41.60	39.96	41.80		41.91	0.01	1.49	1.84	2.74	27.88	24.88	0.45
Reach One	349	739.67	41.60	39.70	41.26		41.46	0.03	1.96	1.56	3.06	21.20	22.52	0.65
Reach One	349	690.05	41.60	39.22	40.98		41.11	0.00	1.59	1.76	2.80	26.08	24.31	0.49
Reach One	349	665.05	41.60	39.15	40.91		41.04	0.00	1.60	1.76	2.82	25.94	24.25	0.49
Reach One	349	615.04	41.60	39.03	40.73		40.88	0.00	1.69	1.70	2.87	24.67	23.82	0.53
Reach One	349	565.08	41.60	38.90	40.51		40.68	0.00	1.86	1.61	2.99	22.36	23.03	0.60
Reach One	349	540.11	41.60	38.84	40.26		40.52	0.01	2.29	1.42	3.25	18.17	21.53	0.80
Reach One	349	515.13	41.60	38.78	40.11		40.31	0.01	1.98	1.33	2.63	21.00	29.23	0.75
Reach One	349	490.13	41.60	38.72	39.78	39.78	40.04	0.02	2.25	1.06	2.39	18.50	36.95	1.01
Reach One	349	465.12	43.40	37.96	38.69	38.79	39.03	0.21	2.56	0.73	1.87	16.94	56.61	1.49
Reach One	349	415.43	43.40	36.00	38.76	37.08	38.77	0.00	0.34	2.76	0.94	130.99	86.03	0.08
Reach One	349	348.95	43.40	36.23	38.76		38.76	0.00	0.28	2.53	0.71	177.50	101.57	0.06
Reach Three	23	83.00	Culvert											
Reach Three	23	35.13	19.80	41.11	42.78		42.79	0.00	0.40	1.67	0.67	48.91	36.73	0.11
Reach Three	23	22.53	19.80	41.03	42.78		42.78	0.00	0.34	1.75	0.60	58.98	45.25	0.09

ISSUED FOR INFORMATION

ISSUE	DATE	AMENDMENT	BY	APP
A	18.03.12	FOR INFORMATION	CB	DL

RIPLEY VALLEY
RESIDENTIAL DEVELOPMENT
RIPLEY ROAD
IPSWICH

SCALES: AS SHOWN
DESIGN: CB
DRAWN: CB
CREATED: MARCH 2012
CHKD: D.L.
APPRD: D.P.
DATE: 18.03.12

SEKISUI HOUSE RIPLEY VALLEY IPSWICH

Q100 FLOW CHANNEL SECTIONS VELOCITY AND DEPTHS

MPN Consulting Pty Ltd
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mpn JOB 5874

DRAWING No. HEC.10

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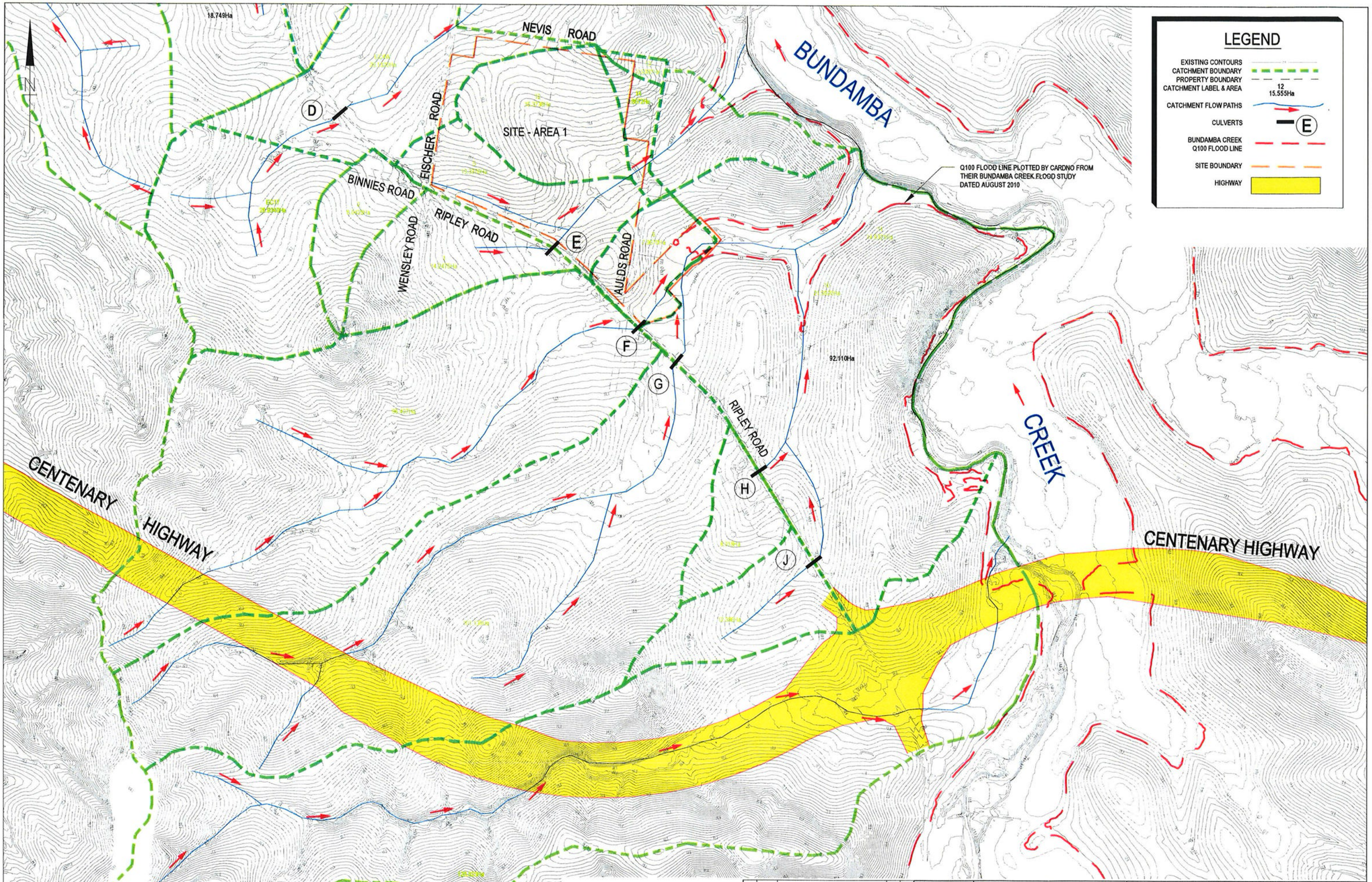

PLAN - STORMWATER CATCHMENTS

PRELIMINARY

0 50 100 200 250

SCALE 1:5000 @ A1 SIZE

ISSUE	DATE	AMENDMENT	BY	APP
-				

SCALES: 1:5000 @ A1
DESIGN: DL
DRAWN: LW
CREATED: NOVEMBER 2008
CHKD: DL
APPRD: DP
DATE: 18-3-11

SEKISUI HOUSE

RIPLEY VALLEY
IPSWICH

RESIDENTIAL SITE
STORMWATER CATCHMENT PLAN
UPSTREAM AREA 1 - EXISTING CASE

mpn consulting

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mpn JOB
5874

DRAWING No.
RP.012

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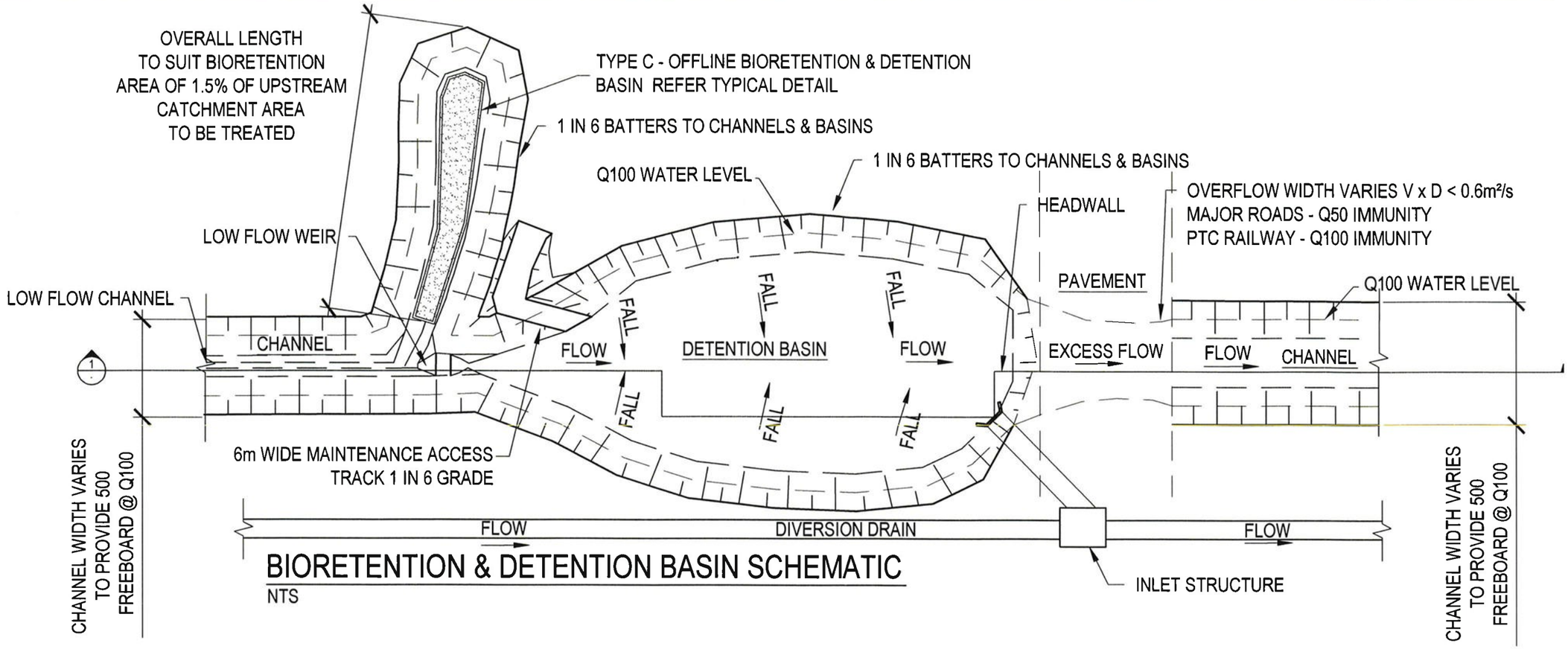
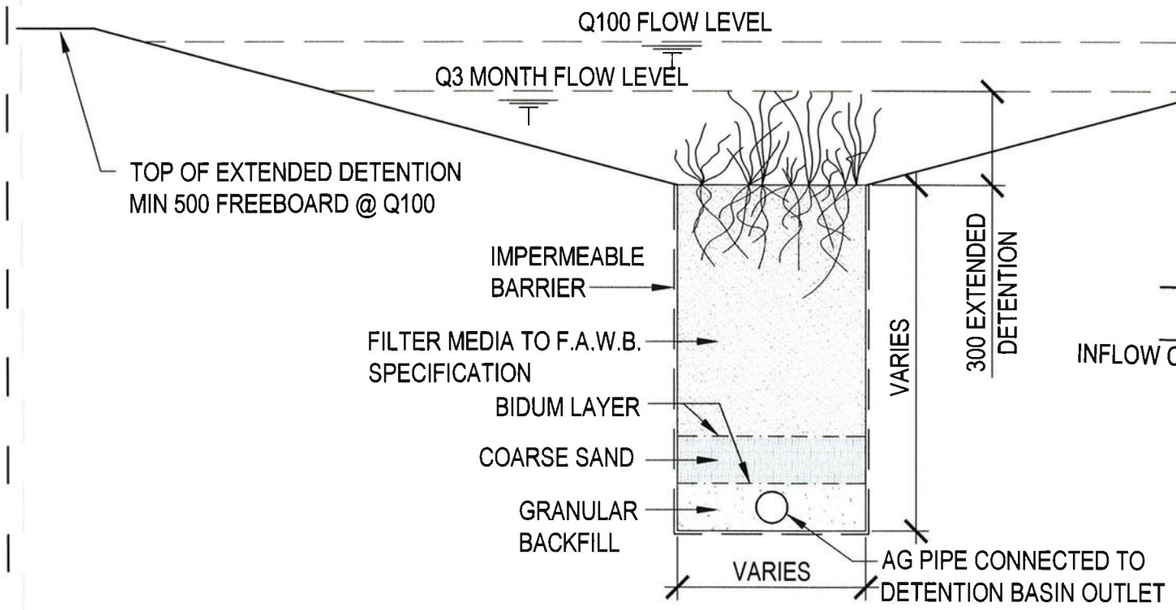


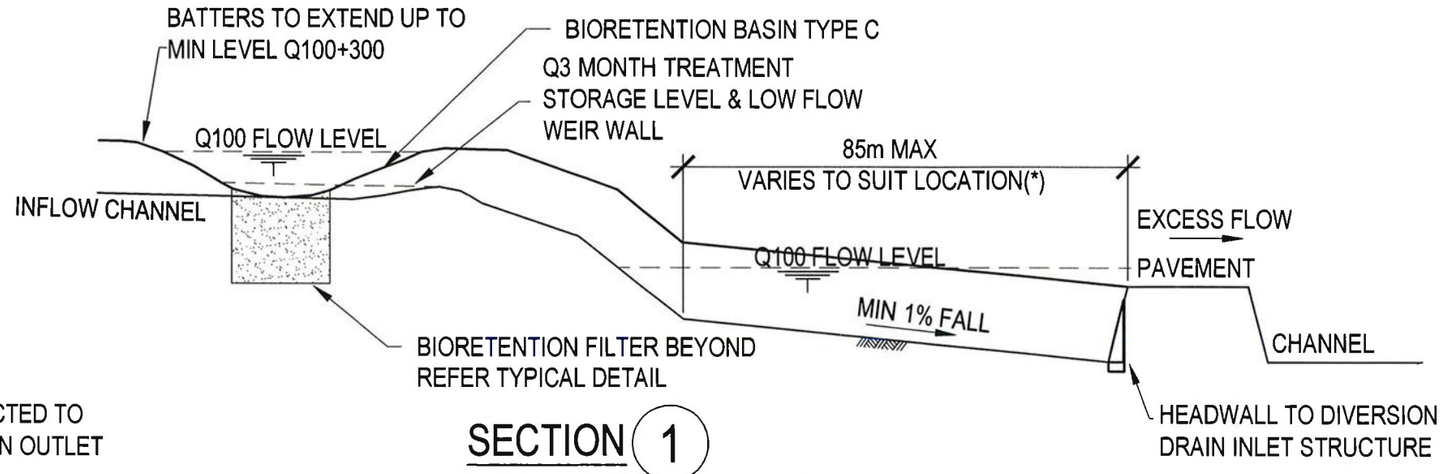
BIORETENTION & DETENTION BASIN SCHEMATIC

NTS



BIO-RETENTION TYPICAL DETAIL

NTS



SECTION 1

NTS. VERTICAL SCALE EXAGGERATED

PRELIMINARY

ISSUE	DATE	AMENDMENT	BY	APP

SCALES: NTS
DESIGN: DL
DRAWN: LW
CREATED: FEB 2011
CHKD: DL
APPRD: DP
DATE: 18-3-11

SEKISUI HOUSE **RIPLEY VALLEY IPSWICH**

RESIDENTIAL SITE
TOWN PARKS
BASIN TREATMENT

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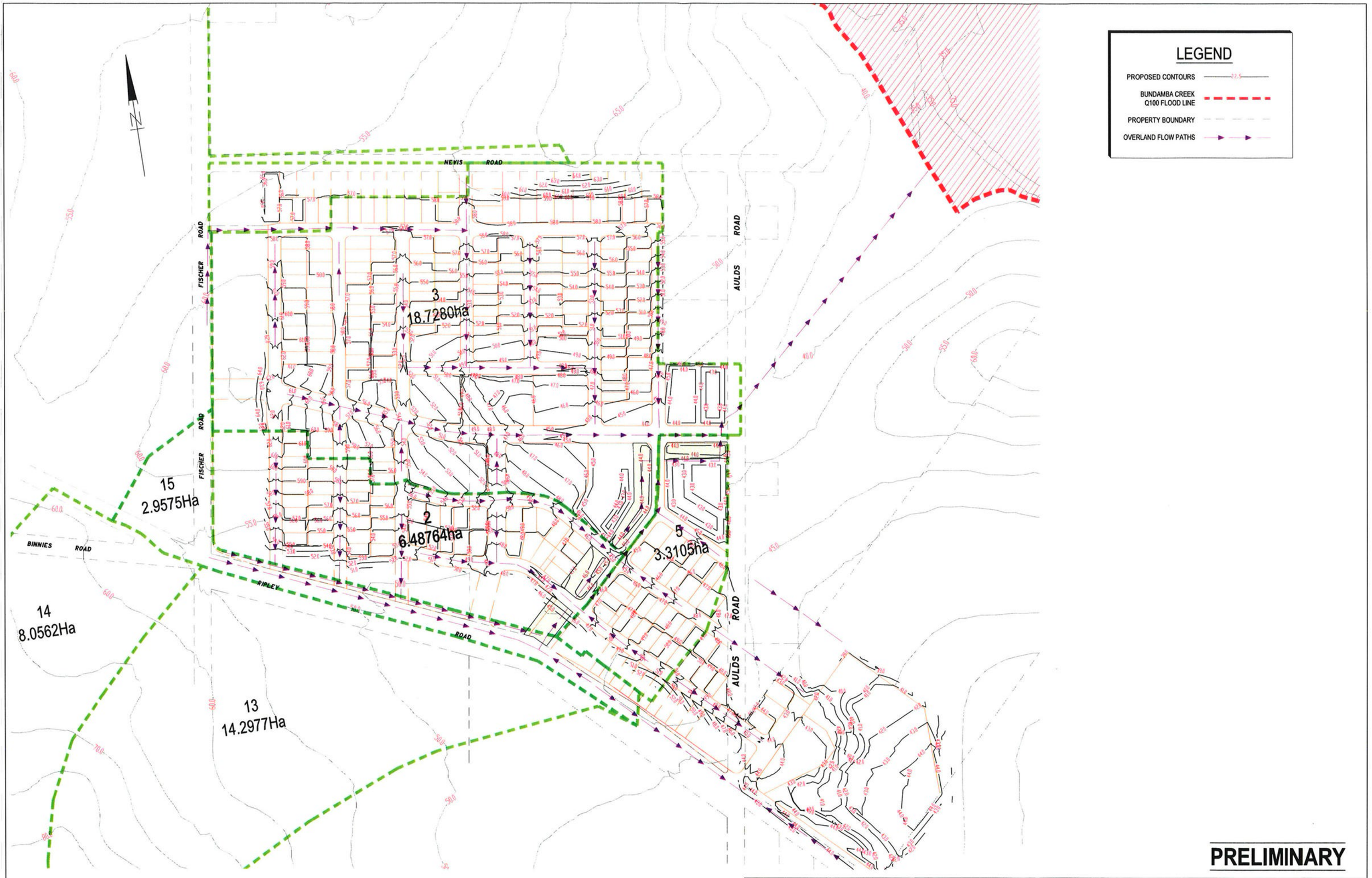
mpn JOB **5874**

DRAWING No. **RP.14**

REV



PRELIMINARY

ISSUE	DATE	AMENDMENT	BY	APP

SCALES: 1:2000 @ A1
DESIGN: DL
DRAWN: LW
CREATED: JAN 2011
CHKD: DL
APPRD: DP
DATE: 18-3-11

SEKISUI HOUSE

RIPLEY VALLEY
IPSWICH

RESIDENTIAL SITE
OVERLAND FLOW PATHS

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mpn JOB: 5874

DRAWING No.: RP.15

REV:

LEGEND

PROPERTY CONTOURS — 22.5

PROPERTY BOUNDARY

PROPOSED STORMWATER — SW — SW — SW

DIRECTION OF FLOW

EXISTING Q100 FLOOD LINE

N

NEVIS ROAD

ROAD

FISCHER ROAD

BINNIES ROAD

RIPLEY ROAD

AULDS ROAD

3
18.7280ha

2
6.48764ha

5
3.3105ha

15
2.9575Ha

14
8.0562Ha

13
14.2977Ha

0 20 40 60 80 100

SCALE 1:2000

PRELIMINARY

ISSUE	DATE	AMENDMENT	BY	APP

SCALES: 1:2000 @ A1
DESIGN: DL
DRAWN: DG
CREATED: FEB 2011
CHKD:
APPRD:
DATE:

SEKISUI HOUSE

RIPLEY VALLEY IPSWICH

PROPOSED STORMWATER DRAINAGE PLAN

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mpn JOB: **5874**

DRAWING No.: **RP.16**

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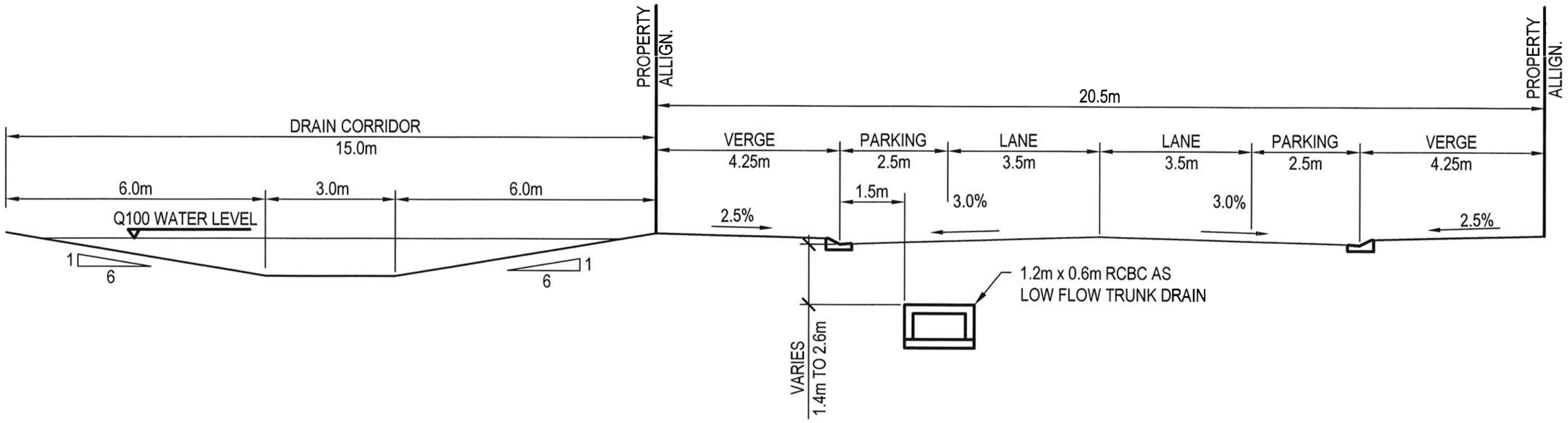

MINOR NEIGHBOURHOOD LINK 20.5m + SWALE 1 in 6 BATTER FACE

SCALE 1 : 100

PRELIMINARY

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PROJECT
RIPLEY VALLEY RESIDENTIAL SITE AREA 1

DWG TITLE
SWALE DRAIN CORRIDOR SECTION SHEET

SCALE	1:100
DRAWN	DG
APPR'D	DL
DATE	MAR 2011
JOB No.	5874
DWG No.	PSK42

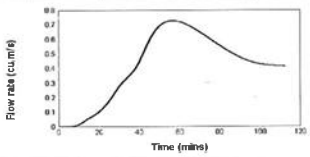
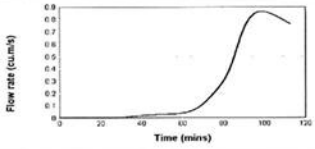
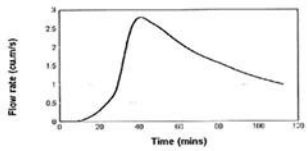
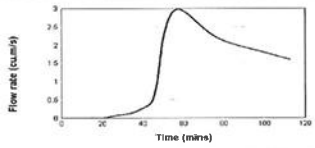
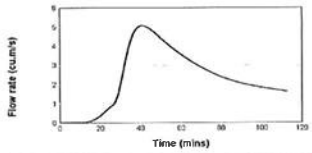
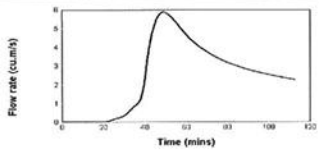
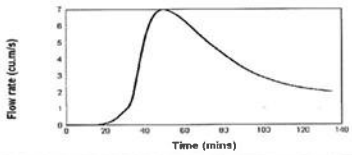
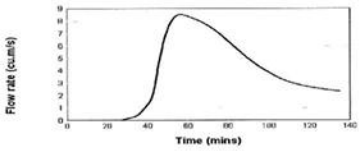
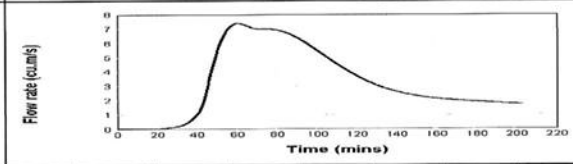
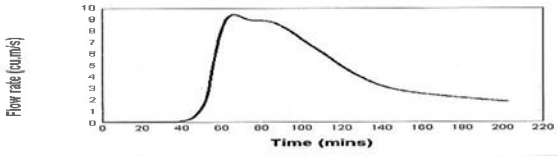
Appendix 2
Flow Tables and Hydrographs

mpn consulting

Ripley Area 1

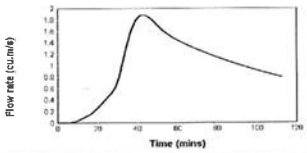
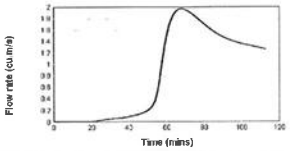
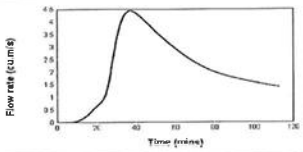
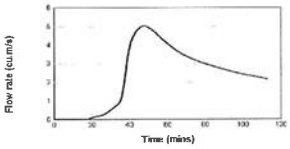
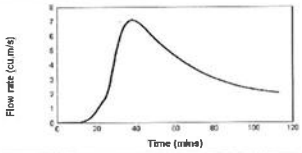
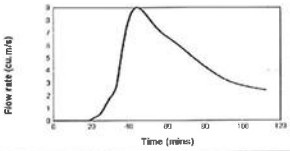
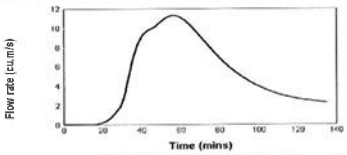
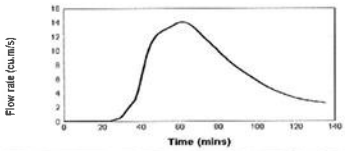
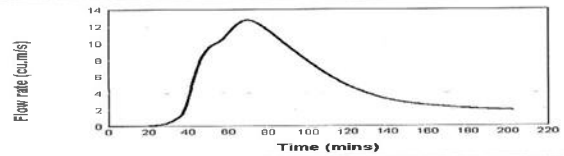
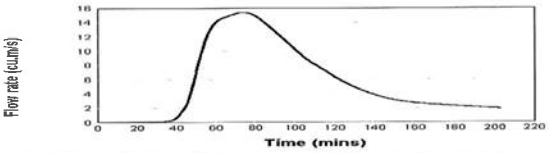
Storm Details		Discharge Zone Post-development Flows					Discharge Zone Pre-development Flows				
ARI (yrs)	Duration (mins)	Fischer Road Outlet	Nevis Road Outlet	Aulds Land Outlet	Sales Area	Outlet	Fischer Road Outlet	Nevis Road Outlet	Aulds Land Outlet	Sales Area	Outlet
2	5	0.433	0.067	1.200	0.351	***0.726***	0.311	0.020	0.849	0.059	***0.861***
	10	0.957	0.135	3.100	0.447	***2.800***	0.967	0.073	2.890	0.249	***2.970***
	20	1.310	0.201	4.690	0.528	***5.050***	1.680	0.162	5.640	0.695	***5.870***
	45	1.750	0.185	4.770	0.719	***6.960***	2.990	0.167	6.830	1.020	***8.490***
	90	2.740	0.159	5.140	0.726	***7.380***	3.900	0.185	7.430	1.170	***9.440***

Area 1 Outlet Hydrographs

2	5		
	10		
	20		
	45		
	90		

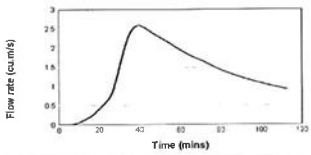
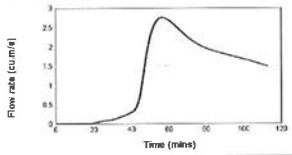
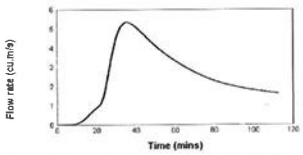
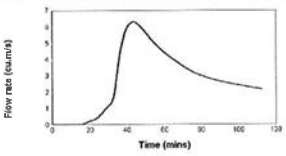
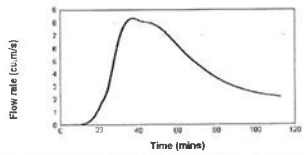
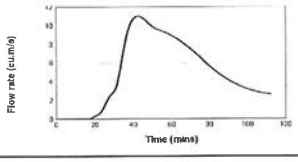
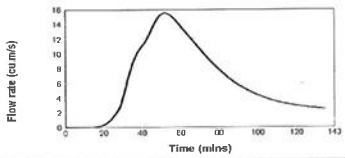
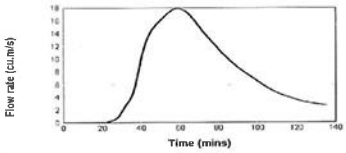
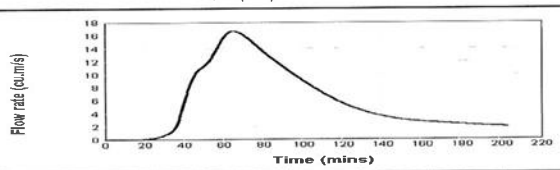
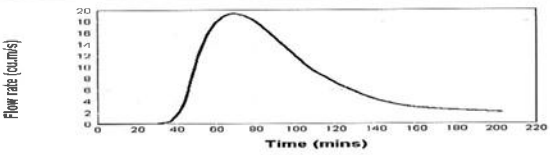
Storm Details		Discharge Zone Post-development Flows					Discharge Zone Pre-development Flows				
ARI (yrs)	Duration (mins)	Fischer Road Outlet	Nevis Road Outlet	Aulds Land Outlet	Sales Area	Outlet	Fischer Road Outlet	Nevis Road Outlet	Aulds Land Outlet	Sales Area	Outlet
5	5	0.714	0.114	2.350	0.411	***1.880***	0.638	0.047	1.920	0.150	***1.970***
	10	1.230	0.206	4.390	0.516	***4.430***	1.530	0.143	4.840	0.551	***5.010***
	20	1.640	0.298	6.110	1.220	***7.090***	2.980	0.278	8.930	1.320	***8.990***
	45	4.980	0.276	6.690	1.390	***11.300***	5.950	0.274	10.100	1.590	***14.000***
	90	6.160	0.221	6.880	1.660	***12.700***	7.040	0.265	10.700	1.950	***15.400***

Area 1 Outlet Hydrographs

5	5		
	10		
	20		
	45		
	90		

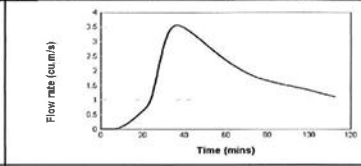
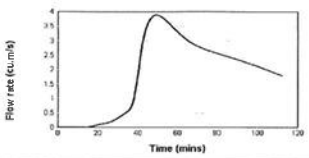
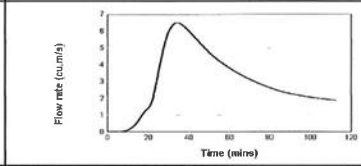
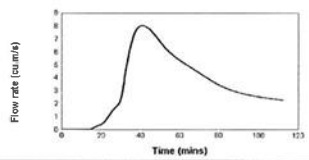
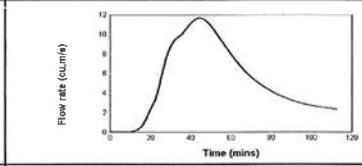
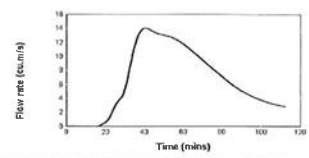
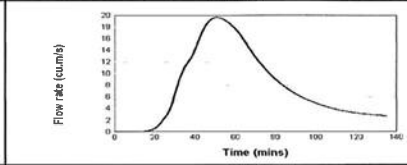
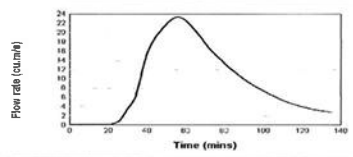
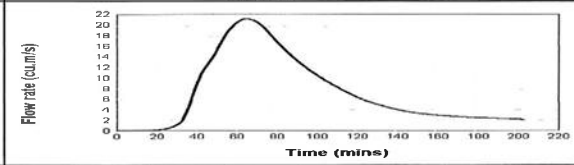
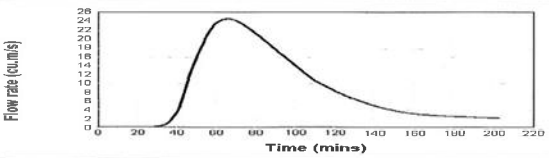
Storm Details		Discharge Zone Post-development Flows					Discharge Zone Pre-development Flows				
ARI (yrs)	Duration (mins)	Fischer Road Outlet	Nevis Road Outlet	Aulds Land Outlet	Sales Area	Outlet	Fischer Road Outlet	Nevis Road Outlet	Aulds Land Outlet	Sales Area	Outlet
10	5	0.936	0.148	3.010	0.445	***2.580***	0.892	0.069	2.680	0.232	***2.750***
	10	1.350	0.256	5.210	0.561	***5.320***	1.750	0.196	6.180	0.804	***6.280***
	20	2.970	0.381	6.820	1.760	***8.310***	4.310	0.355	10.900	1.760	***11.000***
	45	7.080	0.331	8.300	1.800	***15.500***	7.780	0.345	12.000	1.970	***17.900***
	90	8.100	0.261	8.410	2.140	***16.600***	8.820	0.310	12.900	2.390	***19.300***

Area 1 Outlet Hydrographs

10	5		
	10		
	20		
	45		
	90		

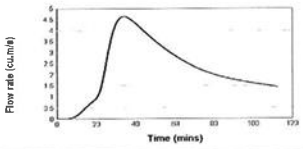
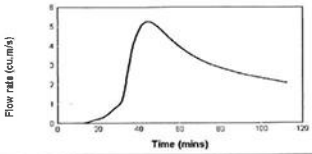
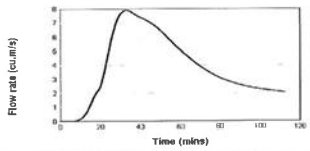
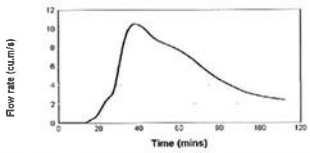
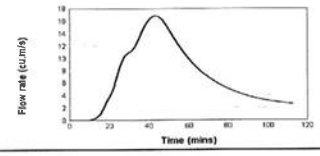
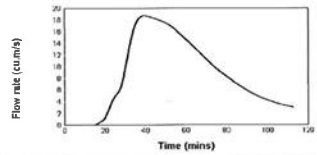
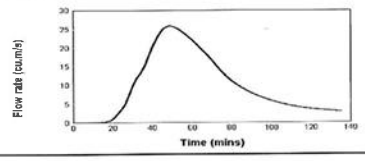
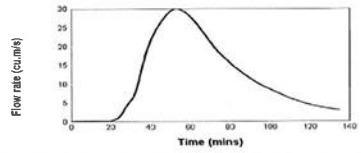
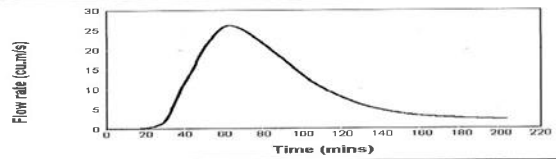
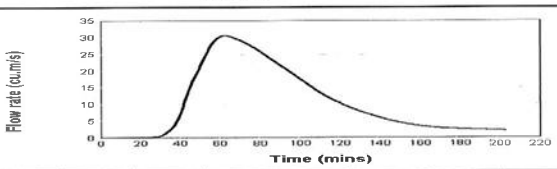
Storm Details		Discharge Zone Post-development Flows					Discharge Zone Pre-development Flows				
ARI (yrs)	Duration (mins)	Fischer Road Outlet	Nevis Road Outlet	Aulds Land Outlet	Sales Area	Outlet	Fischer Road Outlet	Nevis Road Outlet	Aulds Land Outlet	Sales Area	Outlet
20	5	1.100	0.199	3.740	0.486	***3.560***	1.320	0.104	3.740	0.370	***3.880***
	10	1.480	0.340	5.900	1.080	***6.470***	2.370	0.273	8.090	1.170	***8.020***
	20	5.330	0.505	8.130	2.400	***11.600***	6.090	0.457	13.400	2.400	***14.000***
	45	9.500	0.430	9.210	2.390	***19.600***	10.300	0.443	14.700	2.580	***23.300***
	90	10.600	0.317	10.100	2.650	***21.100***	11.100	0.368	15.500	2.910	***24.400***

Area 1 Outlet Hydrographs

20	5		
	10		
	20		
	45		
	90		

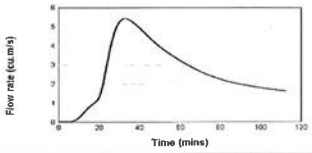
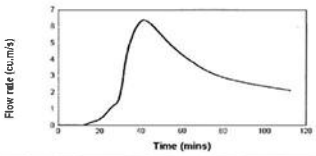
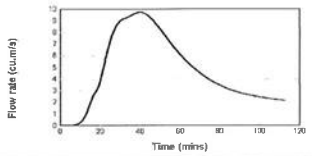
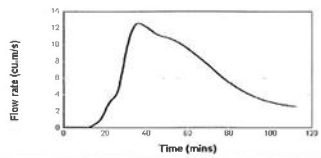
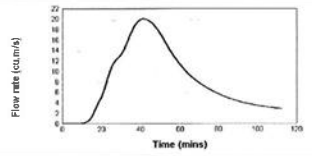
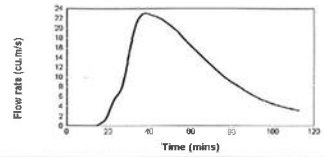
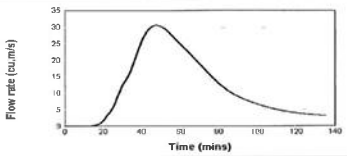
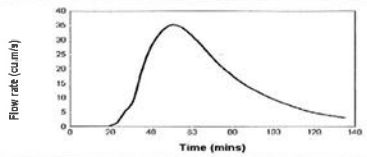
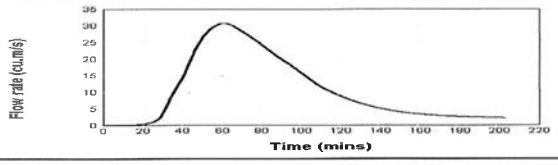
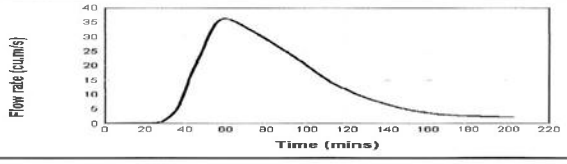
Storm Details		Discharge Zone Post-development Flows					Discharge Zone Pre-development Flows				
ARI (yrs)	Duration (mins)	Fischer Road Outlet	Nevis Road Outlet	Aulds Land Outlet	Sales Area	Outlet	Fischer Road Outlet	Nevis Road Outlet	Aulds Land Outlet	Sales Area	Outlet
50	5	1.260	0.296	4.740	0.531	***4.640***	1.580	0.160	5.150	0.612	***5.240***
	10	2.580	0.487	6.970	1.830	***7.880***	3.870	0.390	10.600	1.730	***10.500***
	20	8.430	0.633	9.120	3.320	***16.800***	8.420	0.575	17.200	3.240	***18.700***
	45	13.200	0.540	11.100	3.130	***25.800***	13.200	0.537	18.200	3.290	***29.900***
	90	13.200	0.348	11.000	3.030	***26.000***	13.500	0.408	17.900	3.310	***30.400***

Area 1 Outlet Hydrographs

50	5		
	10		
	20		
	45		
	90		

Storm Details		Discharge Zone Post-development Flows								Discharge Zone Pre-development Flows							
ARI (yrs)	Duration (mins)	Fischer Road Outlet	Nevis Road Outlet	Aulds Land Outlet	Sales Area	Outlet				Fischer Road Outlet	Nevis Road Outlet	Aulds Land Outlet	Sales Area	Outlet			
100	5	1.370	0.385	5.400	0.629	***5.420***				1.760	0.210	6.340	0.831	***6.370***			
	10	4.140	0.608	8.070	2.470	***9.720***				5.150	0.484	12.600	2.240	***12.600***			
	20	10.900	0.755	10.000	4.060	***20.000***				10.300	0.678	20.400	3.920	***23.000***			
	45	16.000	0.682	12.300	3.870	***30.400***				15.100	0.634	21.500	3.960	***35.100***			
	90	15.800	0.425	12.500	3.610	***30.700***				15.400	0.476	21.000	3.850	***36.300***			

Area 1 Outlet Hydrographs

100	5		
	10		
	20		
	45		
	90		

Appendix 3
Drains Data and Results Tables

PIT / NODE DETAILS			Version 9												
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	
Pit317	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 3600r	5.9		41.6		0	0	9965.144	38357.23	No	745	1 x Ku	
Pit302	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0.6		41.5		0	0	9953.54	38369.38	No	724	1 x Ku	
Pit314	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.9		41.4		0	0	9971.697	38386.65	No	736	1 x Ku	
N1053	Node					40		0		9979.528	38395.94		2062		
Pit311	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 4800r	5.1		41.8		0	0	9901.497	38419.41	No	733	1 x Ku	
Pit312	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0.8		41.7		0	0	9910.137	38413.29	No	734	1 x Ku	
Pit313	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	2		41.6		0	0	9928.137	38431.65	No	735	1 x Ku	
Pit309	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	4.6		42.1		0	0	9864.717	38264.67	No	731	1 x Ku	
Pit308	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0.8		42.1		0	0	9852.717	38276.97	No	730	1 x Ku	
Pit299	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0.3		42		0	0	9890.8	38312.95	No	721	1 x Ku	
Pit300	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0.4		41.9		0	0	9913.717	38327.36	No	722	1 x Ku	
Pit307	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 3600r	5.6		43		0	0	9815.217	38215.17	No	729	1 x Ku	
Pit306	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.3		42.7		0	0	9803.517	38230.17	No	728	1 x Ku	
Pit303	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	4.3		43		0	0	9756.417	38176.47	No	725	1 x Ku	
Pit305	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.5		42.8		0	0	9771.717	38195.37	No	727	1 x Ku	
Pit301	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 3600r	5.9		41.9		0	0	9926.738	38316.08	No	723	1 x Ku	
Pit295	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 3600r	4.6		42		0	0	9850.349	38368.85	No	717	1 x Ku	
Pit296	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.3		41.9		0	0	9858.856	38361.91	No	718	1 x Ku	
Pit293	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.5		54.5		0	0	9490.017	38791.57	No	677	1 x Ku	
Pit290	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0.6		54.6		0	0	9476.625	38794.17	No	674	1 x Ku	
Pit291	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.3		52		0	0	9470.145	38742.33	No	675	1 x Ku	
Pit1035	OnGrade	BCC Lip in L	BCC LIL D 2.5 2400mm	0.4		49.6		0	0	9466.471	38702.04	No	4031	1 x Ku	
Pit185	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0.8		49.5		0	0	9465.491	38694.35	No	528	1 x Ku	
Pit1032	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0.3		49.3		0	0	9474.717	38691.91	No	4022	1 x Ku	
Pit49	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0.8		48.6		0	0	9542.967	38680.97	No	312	1 x Ku	
Pit1309	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0.8		48.5		0	0	9566.598	38677.19	No	2.04E+08	1 x Ku	
Pit48	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0.9		48.4		0	0	9614.717	38668.47	No	311	1 x Ku	
Pit72	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0.7		44.75		0	0	9606.717	38616.57	No	358	1 x Ku	
Pit73	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0.7		44.7		0	0	9615.717	38607.27	No	359	1 x Ku	
Pit74	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	2.6		44.5		0	0	9635.5	38604.76	No	361	1 x Ku	
Pit64	Sag	BCC Kerb ir	BCC KIL D&	5	2.1	44.1	0.2	0	0	9671.335	38602.76	No	329	1 x Ku	
N66678	Node					42.6		0		9690.078	38603.15		2.1E+08		
Pit292	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.5		52.3		0	0	9483.537	38746.65	No	676	1 x Ku	
Pit285	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	5.4		57.3		0	0	9337.017	38873.37	No	669	1 x Ku	
Pit253	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0.9		57.3		0	0	9350.517	38870.67	No	637	1 x Ku	
Pit251	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0.9		57.25		0	0	9353.817	38892.27	No	635	1 x Ku	
Pit283	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0.6		57.4		0	0	9404.217	38882.07	No	667	1 x Ku	
Pit286	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.4		57.8		0	0	9477.057	38870.63	No	670	1 x Ku	
Pit288	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0.4		57.4		0	0	9476.193	38855.94	No	672	1 x Ku	
Pit289	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.5		57.2		0	0	9485.697	38848.17	No	673	1 x Ku	
Pit284	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.5		57		0	0	9402.417	38867.07	No	668	1 x Ku	
Pit279	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.5		53.85		0	0	9397.617	38770.77	No	663	1 x Ku	
Pit280	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	4.6		53.75		0	0	9410.217	38767.77	No	664	1 x Ku	

Pit281	OnGrade	BCC Kerb in	BCC KIL D&E 2.5 2400r	0.8	53.7	0	0	9406.917	38749.77	No	665	1 x Ku						
Pit268	OnGrade	SPECIAL	Gully450sq-b	2.4	57.1	0	0	9376.017	38860.77	No	652	1 x Ku						
Pit269	OnGrade	SPECIAL	Gully450sq-b	0.3	57	0	0	9373.617	38848.17	No	653	1 x Ku						
Pit270	OnGrade	SPECIAL	Gully450sq-b	4.2	56.7	0	0	9371.217	38837.37	No	654	1 x Ku						
Pit271	OnGrade	SPECIAL	Gully450sq-b	1.3	56.6	0	0	9370.617	38826.27	No	655	1 x Ku						
Pit272	OnGrade	SPECIAL	Gully450sq-b	0.9	56.4	0	0	9367.917	38814.27	No	656	1 x Ku						
Pit273	OnGrade	SPECIAL	Gully450sq-b	0.2	56.1	0	0	9365.217	38798.97	No	657	1 x Ku						
Pit274	OnGrade	SPECIAL	Gully450sq-b	0.1	56	0	0	9363.117	38782.77	No	658	1 x Ku						
Pit275	OnGrade	SPECIAL	Gully450sq-b	0.4	55.85	0	0	9360.117	38761.17	No	659	1 x Ku						
Pit276	OnGrade	SPECIAL	Gully450sq-b	2.3	55.8	0	0	9358.917	38753.37	No	660	1 x Ku						
Pit278	OnGrade	BCC Kerb in	BCC KIL D&E 2.5 2400r	1.6	53.8	0	0	9394.017	38748.87	No	662	1 x Ku						
Pit260	OnGrade	SPECIAL	Gully450sq-b	4.9	60.6	0	0	9266.217	38725.77	No	644	1 x Ku						
Pit259	OnGrade	SPECIAL	Gully450sq-b	1.2	60.55	0	0	9270.488	38736.39	No	643	1 x Ku						
Pit258	OnGrade	SPECIAL	Gully450sq-b	1.2	60.5	0	0	9276.117	38752.47	No	642	1 x Ku						
Pit257	OnGrade	SPECIAL	Gully450sq-b	0.8	60	0	0	9283.017	38768.97	No	641	1 x Ku						
Pit256	OnGrade	SPECIAL	Gully450sq-b	0.6	59.5	0	0	9288.417	38786.97	No	640	1 x Ku						
Pit261	OnGrade	SPECIAL	Gully450sq-b	0.4	59.1	0	0	9291.717	38808.57	No	645	1 x Ku						
Pit262	OnGrade	SPECIAL	Gully450sq-b	0.3	58.7	0	0	9292.917	38820.57	No	646	1 x Ku						
Pit263	OnGrade	SPECIAL	Gully450sq-b	0.3	58.5	0	0	9294.717	38830.17	No	647	1 x Ku						
Pit264	OnGrade	SPECIAL	Gully450sq-b	0.2	58.2	0	0	9296.817	38840.37	No	648	1 x Ku						
Pit265	OnGrade	SPECIAL	Gully450sq-b	0.2	57.9	0	0	9298.317	38850.87	No	649	1 x Ku						
Pit266	OnGrade	SPECIAL	Gully450sq-b	0.2	57.75	0	0	9300.117	38861.67	No	650	1 x Ku						
Pit267	OnGrade	BCC Kerb in	BCC KIL D&E 2.5 2400r	0.2	57.6	0	0	9303.122	38882.53	No	651	1 x Ku						
Pit249	OnGrade	BCC Kerb in	BCC KIL D&E 2.5 2400r	2.6	57.1	0	0	9305.217	38896.77	No	633	1 x Ku						
Pit250	OnGrade	BCC Kerb in	BCC KIL D&E 2.5 2400r	0.1	57.2	0	0	9330.417	38893.77	No	634	1 x Ku						
Pit255	OnGrade	BCC Kerb in	BCC KIL D&E 2.5 2400r	5.2	57.45	0	0	9323.517	38782.77	No	639	1 x Ku						
Pit254	OnGrade	BCC Kerb in	BCC KIL D&E 2.5 2400r	1.5	57.45	0	0	9335.817	38780.37	No	638	1 x Ku						
Pit252	OnGrade	BCC Kerb in	BCC KIL D&E 2.5 2400r	5.9	57.25	0	0	9328.617	38882.37	No	636	1 x Ku						
Pit247	OnGrade	BCC Kerb in	BCC KIL D&E 2.5 2400r	3.2	57.9	0	0	9262.317	38884.17	No	631	1 x Ku						
Pit246	OnGrade	BCC Kerb in	BCC KIL D&E 2.5 2400r	0.8	57.9	0	0	9274.317	38883.57	No	630	1 x Ku						
Pit248	OnGrade	BCC Kerb in	BCC KIL D&E 2.5 2400r	5.8	57	0	0	9276.117	38900.67	No	632	1 x Ku						
Pit245	OnGrade	BCC Kerb in	BCC KIL D&E 2.5 2400r	3.6	60.8	0	0	9251.217	38806.47	No	629	1 x Ku						
Pit244	OnGrade	BCC Kerb in	BCC KIL D&E 2.5 2400r	2.3	60.7	0	0	9263.817	38804.67	No	628	1 x Ku						
Pit242	OnGrade	BCC Kerb in	BCC KIL D&E 2.5 2400r	1.5	63	0	0	9214.617	38758.17	No	626	1 x Ku						
Pit243	OnGrade	BCC Kerb in	BCC KIL D&E 2.5 2400r	1.5	62.8	0	0	9242.817	38749.17	No	627	1 x Ku						
Pit241	OnGrade	BCC Kerb in	BCC KIL D&E 2.5 2400r	1.5	60	0	0	9182.12	38823.72	No	625	1 x Ku						
Pit240	OnGrade	BCC Kerb in	BCC KIL D&E 2.5 2400r	2.9	60.2	0	0	9191.148	38822.5	No	624	1 x Ku						
Pit239	OnGrade	BCC Kerb in	BCC KIL D&E 2.5 2400r	5	57	0	0	9201.873	38891.8	No	623	1 x Ku						
Pit237	OnGrade	BCC Kerb in	BCC KIL D&E 2.5 2400r	0.6	56.5	0	0	9217.425	38908.65	No	621	1 x Ku						
Pit238	OnGrade	BCC Kerb in	BCC KIL D&E 2.5 2400r	2.1	56.5	0	0	9192.369	38895.69	No	622	1 x Ku						
Pit233	OnGrade	BCC Kerb in	BCC KIL D&E 2.5 2400r	3.3	60	0	0	9198.439	38674.76	No	602	1 x Ku						
Pit232	OnGrade	BCC Kerb in	BCC KIL D&E 2.5 2400r	1.5	58.5	0	0	9242.85	38666.48	No	601	1 x Ku						
Pit220	OnGrade	BCC Kerb in	BCC KIL D&E 2.5 2400r	1.8	56.2	0	0	9234.878	38611.69	No	587	1 x Ku						
Pit1043	OnGrade	BCC Kerb in	BCC KIL D&E 2.5 2400r	1.8	53.6	0	0	9221.417	38547.21	No	4382	1 x Ku						
Pit221	OnGrade	BCC Kerb in	BCC KIL D&E 2.5 2400r	1.1	52.7	0	0	9212.068	38514.23	No	588	1 x Ku						
Pit223	OnGrade	BCC Kerb in	BCC KIL D&E 2.5 2400r	0.4	52	0	0	9243.691	38501.27	No	590	1 x Ku						
Pit222	OnGrade	BCC Kerb in	BCC KIL D&E 2.5 2400r	0.6	51.6	0	0	9260.798	38492.46	No	589	1 x Ku						

Pit217	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0.8	51.1		0	0	9285.163	38484.16	No	583	1 x Ku						
Pit218	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0.5	50.5		0	0	9331.3	38463.43	No	584	1 x Ku						
Pit209	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0.6	50.2		0	0	9352.917	38453.97	No	561	1 x Ku						
Pit210	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0.2	50		0	0	9396.417	38433.87	No	567	1 x Ku						
Pit211	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0	49.2		0	0	9416.817	38424.27	No	568	1 x Ku						
Pit212	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.3	47.9		0	0	9445.317	38408.37	No	569	1 x Ku						
Pit216	Sag	BCC Kerb ir	BCC KIL D& 5	0.6	47.8	0.2	0	0	9462.876	38454.53	No	573	1 x Ku						
Pit57587	OnGrade	BCC Lip in l	BCC LIL D 2.5 2400mm	1.5	47.5		0	0	9472.018	38469.19	No	2.1E+08	1 x Ku						
Pit57586	OnGrade	BCC Lip in l	BCC LIL D 2.5 2400mm	1.5	47		0	0	9504.105	38460.13	No	2.1E+08	1 x Ku						
Pit57588	OnGrade	BCC Lip in l	BCC LIL D 2.5 2400mm	1.5	46.9		0	0	9534.477	38435.88	No	2.1E+08	1 x Ku						
Pit111	OnGrade	SPECIAL	Gully450sq-b	0.2	46.5		0	0	9555.917	38454.53	No	420	1 x Ku						
Pit151	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	4.1	46.1		0	0	9577.37	38474.79	No	480	1 x Ku						
Pit24717	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	4.1	46		0	0	9594.395	38479.3	No	2.08E+08	1 x Ku						
Pit125	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	2	46.1		0	0	9635.618	38516.55	No	436	1 x Ku						
N1622	Node				44.6		0		9647.342	38529.85		2.07E+08							
Pit225	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.5	58.8		0	0	9151.617	38621.37	No	594	1 x Ku						
Pit226	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.5	58.5		0	0	9159.897	38618.85	No	595	1 x Ku						
Pit227	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.5	55.2		0	0	9147.657	38551.17	No	596	1 x Ku						
Pit228	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.5	54.8		0	0	9155.577	38537.85	No	597	1 x Ku						
Pit224	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	3.2	53		0	0	9191.332	38522.52	No	591	1 x Ku						
Pit219	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	4.8	56.5		0	0	9222.436	38616.87	No	586	1 x Ku						
Pit196	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	4.8	63.3		0	0	9211.809	38727.64	No	539	1 x Ku						
Pit229	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.8	63		0	0	9209.377	38705.49	No	598	1 x Ku						
Pit230	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0.2	60.6		0	0	9246.182	38695.24	No	599	1 x Ku						
Pit234	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	2.8	60		0	0	9253.648	38693.33	Yes	603	1 x Ku						
Pit177	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0.5	58.3		0	0	9294.417	38679.87	No	520	1 x Ku						
Pit178	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0.3	56.8		0	0	9320.821	38670.29	No	521	1 x Ku						
Pit169	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0.5	55		0	0	9355.917	38655.27	No	512	1 x Ku						
Pit171	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.1	54.5		0	0	9368.517	38649.87	No	514	1 x Ku						
Pit168	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1	53		0	0	9395.718	38639.71	No	511	1 x Ku						
Pit167	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0.6	50.8		0	0	9438.967	38625.97	No	510	1 x Ku						
Pit123	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0.7	48		0	0	9476.713	38617.25	No	434	1 x Ku						
Pit57623	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	5	50.3		0	0	9472.018	38556.63	No	2.1E+08	1 x Ku						
Pit118	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	5	49.6		0	0	9499.467	38537.47	No	429	1 x Ku						
Pit119	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0.9	48.7		0	0	9521.643	38531.53	No	430	1 x Ku						
Pit121	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.5	47.9		0	0	9541.609	38513	No	432	1 x Ku						
Pit194	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.3	55.6		0	0	9292.617	38585.97	No	537	1 x Ku						
Pit193	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.4	55.5		0	0	9304.917	38579.97	No	536	1 x Ku						
Pit1057	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.5	52.1		0	0	9289.984	38520.12	No	5717	1 x Ku						
Pit192	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	5	52.1		0	0	9355.317	38522.67	No	535	1 x Ku						
Pit191	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.8	51.9		0	0	9368.817	38516.97	No	534	1 x Ku						
Pit1070	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.8	50.5		0	0	9359.924	38486.49	No	7112	1 x Ku						
Pit189	OnGrade	SPECIAL	Gully450sq-b	3.1	52.3		0	0	9390.417	38529.57	No	532	1 x Ku						
Pit188	OnGrade	SPECIAL	Gully450sq-b	2.2	51.8		0	0	9400.317	38527.17	No	531	1 x Ku						
Pit190	OnGrade	SPECIAL	Gully450sq-b	1.1	51.2		0	0	9397.317	38516.07	No	533	1 x Ku						
Pit198	OnGrade	SPECIAL	Gully450sq-b	0.7	51.1		0	0	9394.017	38504.67	No	550	1 x Ku						
Pit199	OnGrade	SPECIAL	Gully450sq-b	1.1	51		0	0	9390.717	38486.97	No	551	1 x Ku						

Pit200	OnGrade	SPECIAL	Gully450sq-b	2	51.2	0	0	9386.817	38471.67	No	552	1 x Ku						
Pit201	OnGrade	SPECIAL	Gully450sq-b	0.6	50.5	0	0	9403.317	38465.07	No	553	1 x Ku						
Pit202	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0.9	50	0	0	9415.917	38460.27	No	554	1 x Ku						
Pit203	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	2.1	49.5	0	0	9429.117	38453.97	No	555	1 x Ku						
Pit187	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.5	52.2	0	0	9429.717	38548.47	No	530	1 x Ku						
Pit186	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.5	52.3	0	0	9434.217	38561.97	No	529	1 x Ku						
Pit184	OnGrade	SPECIAL	Gully450sq-b	3.2	56.4	0	0	9341.817	38695.47	No	527	1 x Ku						
Pit183	OnGrade	SPECIAL	Gully450sq-b	1.7	56.3	0	0	9346.617	38704.47	No	526	1 x Ku						
Pit277	OnGrade	SPECIAL	Gully450sq-b	1.2	56.2	0	0	9351.717	38722.47	No	661	1 x Ku						
Pit182	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	3.7	59	0	0	9288.717	38702.67	No	525	1 x Ku						
Pit179	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	5.9	58.6	0	0	9287.817	38666.37	No	522	1 x Ku						
Pit180	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.2	58.5	0	0	9283.917	38656.17	No	523	1 x Ku						
Pit181	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.8	58.3	0	0	9279.117	38642.97	No	524	1 x Ku						
Pit1052	OnGrade	BCC Lip in l	BCC LIL D 2.5 2400mm	2.3	57.1	0	0	9313.262	38631.44	No	4820	1 x Ku						
Pit176	OnGrade	SPECIAL	Gully450sq-b	5	55.1	0	0	9339.104	38576.14	No	519	1 x Ku						
Pit1063	OnGrade	SPECIAL	Gully450sq-b	1.7	54.4	0	0	9332.981	38562.91	No	7093	1 x Ku						
Pit1065	OnGrade	SPECIAL	Gully450sq-b	0.9	53.6	0	0	9329.797	38548.46	No	7095	1 x Ku						
Pit1066	OnGrade	SPECIAL	Gully450sq-b	0.6	52.8	0	0	9325.388	38533.28	No	7096	1 x Ku						
Pit1067	OnGrade	SPECIAL	Gully450sq-b	0	52.1	0	0	9322.693	38518.83	No	7097	1 x Ku						
Pit1068	OnGrade	SPECIAL	Gully450sq-b	1.7	51.3	0	0	9318.04	38504.37	No	7098	1 x Ku						
Pit1069	OnGrade	BCC Lip in l	BCC LIL D 2.5 2400mm	0.7	50.5	0	0	9347.432	38491.39	No	7099	1 x Ku						
Pit175	OnGrade	SPECIAL	Gully450sq-b	5.6	55.8	0	0	9345.117	38593.47	No	518	1 x Ku						
Pit174	OnGrade	SPECIAL	Gully450sq-b	1.8	55.7	0	0	9351.417	38609.37	No	517	1 x Ku						
Pit173	OnGrade	SPECIAL	Gully450sq-b	1.1	55.3	0	0	9358.017	38626.47	No	516	1 x Ku						
Pit172	OnGrade	SPECIAL	Gully450sq-b	0.7	54.9	0	0	9362.817	38635.47	No	515	1 x Ku						
Pit170	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	5.9	55.1	0	0	9362.517	38672.07	No	513	1 x Ku						
Pit166	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	5.9	50.9	0	0	9443.717	38643.47	No	509	1 x Ku						
Pit165	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	4.8	46.3	0	0	9676.217	38268.09	No	508	1 x Ku						
Pit164	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	2	46.2	0	0	9688.092	38279.55	No	507	1 x Ku						
Pit304	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0.6	43.2	0	0	9762.717	38203.47	No	726	1 x Ku						
Pit162	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	5.9	48.1	0	0	9585.467	38361.47	No	497	1 x Ku						
Pit163	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0.9	47.8	0	0	9595.717	38370.97	No	498	1 x Ku						
Pit161	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	2.7	47.5	0	0	9596.217	38382.47	No	496	1 x Ku						
Pit148	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.9	45.5	0	0	9641.467	38428.72	No	477	1 x Ku						
Pit135	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.2	44.9	0	0	9678.445	38466.45	No	460	1 x Ku						
Pit132	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	2.2	44.6	0	0	9690.717	38480.22	No	443	1 x Ku						
Pit102	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	5.9	44.4	0	0	9707.028	38512.67	No	408	1 x Ku						
Pit98	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	4.7	44.3	0	0	9709.55	38530.59	No	401	1 x Ku						
Pit158	OnGrade	SPECIAL	Gully450sq-b	3.3	46.8	0	0	9658.625	38342.32	No	493	1 x Ku						
Pit157	OnGrade	SPECIAL	Gully450sq-b	0.2	46.85	0	0	9654.429	38347.38	No	492	1 x Ku						
Pit156	OnGrade	SPECIAL	Gully450sq-b	0.2	46.9	0	0	9645.314	38356.06	No	491	1 x Ku						
Pit155	OnGrade	SPECIAL	Gully450sq-b	0.2	46.95	0	0	9636.344	38364.6	No	490	1 x Ku						
Pit154	OnGrade	SPECIAL	Gully450sq-b	2.5	47	0	0	9628.098	38372.12	No	489	1 x Ku						
Pit153	OnGrade	SPECIAL	Gully450sq-b	0.2	46.7	0	0	9633.162	38376.75	No	488	1 x Ku						
Pit152	OnGrade	SPECIAL	Gully450sq-b	0.2	46.2	0	0	9642.276	38385.72	No	487	1 x Ku						
Pit145	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	3.1	46.1	0	0	9652.467	38394.47	No	474	1 x Ku						
Pit146	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	3	45.8	0	0	9633.967	38411.97	No	475	1 x Ku						

Pit147	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.5	45.7	0	0	9643.967	38420.72	No	476	1 x Ku					
Pit144	OnGrade	SPECIAL	Gully450sq-b	1.5	46.3	0	0	9722.717	38372.47	No	473	1 x Ku					
Pit143	OnGrade	SPECIAL	Gully450sq-b	0.2	46.1	0	0	9716.467	38379.22	No	472	1 x Ku					
Pit142	OnGrade	SPECIAL	Gully450sq-b	0.2	45.9	0	0	9703.217	38394.97	No	471	1 x Ku					
Pit141	OnGrade	SPECIAL	Gully450sq-b	3.9	45.85	0	0	9693.717	38404.47	No	470	1 x Ku					
Pit140	OnGrade	SPECIAL	Gully450sq-b	0.9	45.8	0	0	9685.967	38412.97	No	469	1 x Ku					
Pit139	OnGrade	SPECIAL	Gully450sq-b	2.6	45.7	0	0	9678.648	38419.9	No	465	1 x Ku					
Pit138	OnGrade	SPECIAL	Gully450sq-b	0.7	45.6	0	0	9683.335	38424.76	No	464	1 x Ku					
Pit137	OnGrade	SPECIAL	Gully450sq-b	0.5	45.5	0	0	9691.669	38433.78	No	463	1 x Ku					
Pit136	OnGrade	SPECIAL	Gully450sq-b	2.5	45.4	0	0	9702.085	38443.33	No	462	1 x Ku					
Pit122	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0.3	48	0	0	9558.733	38530.64	No	433	1 x Ku					
Pit103	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0.7	46	0	0	9588.119	38565.82	No	412	1 x Ku					
N1629	Node				44.6	0		9602.353	38571.42		2.07E+08						
Pit117	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	2.9	50.2	0	0	9481.355	38528.58	No	428	1 x Ku					
Pit101	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.2	45	0	0	9718.092	38521.84	No	407	1 x Ku					
Pit99	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	3.2	42.3	0	0	9774.117	38661.57	No	405	1 x Ku					
Pit760	OnGrade	SPECIAL	Surcharge Pit 1000 x 1	1	42	0	0	9765.067	38577.76	No	1562	1 x Ku					
N805	Node				41.1	0		9779.495	38588.71		1561						
Pit87	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	2.6	46.8	0	0	9518.092	38598.51	No	385	1 x Ku					
Pit86	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0.7	46.2	0	0	9536.009	38594.13	No	384	1 x Ku					
Pit85	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0.7	45	0	0	9546.009	38603.09	No	383	1 x Ku					
Pit84	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0.2	45	0	0	9549.342	38618.3	No	382	1 x Ku					
Pit82	OnGrade	SPECIAL	Gully450sq-b	5.7	48.5	0	0	9644.342	38686.63	No	372	1 x Ku					
Pit81	OnGrade	SPECIAL	Gully450sq-b	1.8	48.1	0	0	9640.8	38677.26	No	371	1 x Ku					
Pit80	OnGrade	SPECIAL	Gully450sq-b	1	47.6	0	0	9639.759	38666.84	No	370	1 x Ku					
Pit79	OnGrade	SPECIAL	Gully450sq-b	0.6	47.1	0	0	9638.717	38656.84	No	369	1 x Ku					
Pit78	OnGrade	SPECIAL	Gully450sq-b	0.4	46.7	0	0	9637.05	38647.47	No	368	1 x Ku					
Pit75	OnGrade	SPECIAL	Gully450sq-b	1.6	46.3	0	0	9677.222	38643.09	No	364	1 x Ku					
Pit63	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0.3	45.9	0	0	9687.971	38641.91	No	328	1 x Ku					
N998	Node				44.2	0		9695.531	38640.14		1765						
Pit77	OnGrade	SPECIAL	Gully450sq-b	0.3	46	0	0	9636.009	38637.67	No	367	1 x Ku					
Pit57610	OnGrade	SPECIAL	Gully450sq-b	0	45	0	0	9674.33	38630.17	No	2.1E+08	1 x Ku					
Pit59	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	2.9	48.7	0	0	9699.58	38718.57	No	322	1 x Ku					
Pit58	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0.6	48.8	0	0	9691.505	38720.8	No	321	1 x Ku					
Pit57	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0.7	47	0	0	9686.967	38689.97	No	320	1 x Ku					
Pit53	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	2.1	53.5	0	0	9551.967	38786.22	No	316	1 x Ku					
Pit54	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	3	53.5	0	0	9564.217	38784.47	No	317	1 x Ku					
Pit50	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.5	51	0	0	9557.958	38734.9	No	313	1 x Ku					
Pit51	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.5	50.7	0	0	9548.467	38713.97	No	314	1 x Ku					
Pit52	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	3.2	51	0	0	9542.967	38735.97	No	315	1 x Ku					
Pit45	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	3.8	53.4	0	0	9625.384	38771.01	No	308	1 x Ku					
Pit44	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.1	53.3	0	0	9638.081	38768.83	No	300	1 x Ku					
Pit46	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.7	50.6	0	0	9629.717	38713.47	No	309	1 x Ku					
Pit47	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.6	50	0	0	9619.467	38697.72	No	310	1 x Ku					
Pit38	OnGrade	SPECIAL	Gully450sq-b	5.2	54	0	0	9667.016	38789.37	No	294	1 x Ku					
Pit39	OnGrade	SPECIAL	Gully450sq-b	1.6	53	0	0	9664.556	38774.76	No	295	1 x Ku					
Pit40	OnGrade	SPECIAL	Gully450sq-b	1	52.3	0	0	9661.807	38760.87	No	296	1 x Ku					

Pit41	OnGrade	SPECIAL	Gully450sq-b	0.7	51.4	0	0	9659.493	38746.26	No	297	1 x Ku					
Pit42	OnGrade	SPECIAL	Gully450sq-b	0.5	50.7	0	0	9657.467	38733.23	No	298	1 x Ku					
Pit43	OnGrade	SPECIAL	Gully450sq-b	0	49.7	0	0	9654.863	38715.73	No	299	1 x Ku					
Pit56	OnGrade	SPECIAL	Gully450sq-b	0.3	49	0	0	9651.717	38701.22	No	319	1 x Ku					
Pit55	OnGrade	SPECIAL	Gully450sq-b	2	48.7	0	0	9651.217	38695.72	No	318	1 x Ku					
Pit36	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	4.6	55.5	0	0	9659.717	38806.97	No	280	1 x Ku					
Pit37	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0.1	55.2	0	0	9669.186	38804.99	No	293	1 x Ku					
Pit998	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0.5	55.1	0	0	9703.569	38798.79	No	3194	1 x Ku					
Pit35	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	3.7	57.5	0	0	9729.467	38915.72	No	279	1 x Ku					
Pit34	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0.2	57.1	0	0	9728.217	38897.22	No	278	1 x Ku					
Pit30	OnGrade	SPECIAL	Gully450sq-b	1.8	57.6	0	0	9723.467	38860.72	No	274	1 x Ku					
Pit29	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	2	56.5	0	0	9718.917	38831.37	No	273	1 x Ku					
Pit28	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	2.4	56.8	0	0	9708.417	38834.07	No	272	1 x Ku					
Pit27	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	5.2	56.7	0	0	9624.217	38835.97	No	271	1 x Ku					
Pit26	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.5	56.8	0	0	9626.467	38848.47	No	270	1 x Ku					
Pit25	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	2.2	56.7	0	0	9550.967	38844.47	No	269	1 x Ku					
Pit24	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	0	56.8	0	0	9551.467	38857.72	No	268	1 x Ku					
Pit20	OnGrade	SPECIAL	Gully450sq-b	3.5	59.6	0	0	9598.217	38885.47	No	264	1 x Ku					
Pit19	OnGrade	SPECIAL	Gully450sq-b	1.4	59.5	0	0	9578.717	38887.72	No	263	1 x Ku					
Pit18	OnGrade	SPECIAL	Gully450sq-b	0.1	59.45	0	0	9560.217	38890.97	No	262	1 x Ku					
Pit17	OnGrade	SPECIAL	Gully450sq-b	0.7	59.4	0	0	9541.967	38893.72	No	261	1 x Ku					
Pit16	OnGrade	SPECIAL	Gully450sq-b	2	59.3	0	0	9535.217	38893.97	No	259	1 x Ku					
Pit23	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	2.1	57.2	0	0	9529.467	38858.97	No	267	1 x Ku					
Pit15	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.5	65.5	0	0	9606.217	38934.47	No	258	1 x Ku					
Pit14	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.5	62.2	0	0	9604.217	38918.97	No	257	1 x Ku					
Pit12	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.5	60.5	0	0	9520.217	38931.47	No	255	1 x Ku					
Pit9	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.5	60	0	0	9489.717	38935.47	No	252	1 x Ku					
Pit6	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	4.3	57.5	0	0	9398.577	38950.05	No	249	1 x Ku					
Pit235	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	5.2	55.3	0	0	9299.306	38965.04	No	616	1 x Ku					
N664	Node				55.4	0		9289.916	38958.19		1403						
Pit13	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.5	61.9	0	0	9522.717	38946.47	No	256	1 x Ku					
Pit11	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.5	60.2	0	0	9509.467	38922.72	No	254	1 x Ku					
Pit10	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.5	60.3	0	0	9495.717	38926.22	No	253	1 x Ku					
Pit8	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.5	57.5	0	0	9400.737	38966.25	No	251	1 x Ku					
Pit1	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.5	100	0	0	7763.717	40142.47	No	1	1 x Ku					
N2	Node				100	0		8761.185	40141.12		2353						
HW-BSN5	Headwall			0.5	55	0		9272.158	38963.09		1400						
Pit5	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.2	54.5	0	0	9268.036	38979.89	No	245	1 x Ku					
Pit4	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	2.7	53	0	0	9201.297	38985.33	No	244	1 x Ku					
Pit3	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.4	52	0	0	9205.617	39019.89	No	243	1 x Ku					
N659	Node				51	0		9217.489	39028.2		1395						
Pit635	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.5	54.8	0	0	9301.374	38982.17	No	1419	1 x Ku					
HW-BSN3	Headwall			0.5	46	0		9533.162	38633.27		1549						
N807	Node				44.3	0		9726.752	38647.87		1569						
N1049	Node				38.9	0		9790.705	38594.93		1905						
Pit21	OnGrade	SPECIAL	Gully450sq-b	5.9	59.5	0	0	9628.249	38879.64	No	265	1 x Ku					
Pit22	OnGrade	SPECIAL	Gully450sq-b	1.9	59.3	0	0	9647.857	38876.33	No	266	1 x Ku					

Pit33	OnGrade	SPECIAL	Gully450sq-b	1.1	58.7		0	0	9664.717	38873.22	No	277	1 x Ku						
Pit32	OnGrade	SPECIAL	Gully450sq-b	0.8	58.3		0	0	9682.717	38868.97	No	276	1 x Ku						
Pit31	OnGrade	SPECIAL	Gully450sq-b	0	57.7		0	0	9700.217	38865.72	No	275	1 x Ku						
Pit996	OnGrade	BCC Lip in L	BCC LIL D 2.5 2400mm	5	56.75		0	0	9279.793	38928.58	No	2824	1 x Ku						
Pit994	OnGrade	BCC Lip in L	BCC LIL D 2.5 2400mm	2.4	56.3		0	0	9261.944	38930.19	No	2814	1 x Ku						
N1064	Node				55.9		0		9263.214	38938.65		2815							
N1071	Node				50.2		0		9802.708	38880.56		3741							
Pit1000	OnGrade	SPECIAL	Gully450sq-b	4.9	56.5		0	0	9522.348	38833.33	No	3749	1 x Ku						
Pit1001	OnGrade	SPECIAL	Gully450sq-b	1.6	55.5		0	0	9521.501	38817.67	No	3750	1 x Ku						
Pit1009	OnGrade	SPECIAL	Gully450sq-b	0.9	54.7		0	0	9520.072	38803.38	No	3758	1 x Ku						
Pit1010	OnGrade	SPECIAL	Surcharge Pit 1000x60	0	54.2		0	0	9517.215	38790.11	No	3759	1 x Ku						
Pit1011	OnGrade	SPECIAL	Gully450sq-b	0.5	53.5		0	0	9514.969	38776.84	No	3760	1 x Ku						
Pit1012	OnGrade	SPECIAL	Gully450sq-b	0.4	52.7		0	0	9513.745	38763.98	No	3761	1 x Ku						
Pit1013	OnGrade	SPECIAL	Gully450sq-b	0.3	52.2		0	0	9511.704	38752.55	No	3762	1 x Ku						
Pit1014	OnGrade	BCC Lip in L	BCC LIL D 2.5 2400mm	0.3	51.3		0	0	9509.254	38736.02	No	3763	1 x Ku						
Pit1022	OnGrade	BCC Lip in L	BCC LIL D 2.5 2400mm	2.1	51.1		0	0	9507.816	38720.74	No	3798	1 x Ku						
Pit1028	OnGrade	BCC Lip in L	BCC LIL D 2.5 2400mm	3.9	52.1		0	0	9423.852	38686.17	No	4006	1 x Ku						
Pit1024	OnGrade	BCC Lip in L	BCC LIL D 2.5 2400mm	1.9	52		0	0	9431.2	38707.92	No	3991	1 x Ku						
Pit1037	OnGrade	BCC Kerb in	BCC KIL D&E 2.5 2400r	2.8	59.2		0	0	9195.265	38652.18	No	4374	1 x Ku						
Pit1038	OnGrade	BCC Kerb in	BCC KIL D&E 2.5 2400r	0.7	58.3		0	0	9193.854	38633.49	No	4375	1 x Ku						
Pit1039	OnGrade	BCC Kerb in	BCC KIL D&E 2.5 2400r	0.4	57.3		0	0	9189.621	38612.33	No	4376	1 x Ku						
Pit1040	OnGrade	BCC Kerb in	BCC KIL D&E 2.5 2400r	0.2	56.2		0	0	9185.742	38589.05	No	4377	1 x Ku						
Pit1041	OnGrade	BCC Kerb in	BCC KIL D&E 2.5 2400r	1.5	55.1		0	0	9180.804	38566.12	No	4378	1 x Ku						
Pit1042	OnGrade	BCC Kerb in	BCC KIL D&E 2.5 2400r	0.6	53.9		0	0	9207.257	38554.48	No	4379	1 x Ku						
Pit1055	OnGrade	BCC Kerb in	BCC KIL D&E 2.5 2400r	5.3	52.5		0	0	9276.863	38526.47	No	5715	1 x Ku						
Pit1083	OnGrade	BCC Kerb in	BCC KIL D&E 2.5 2400r	0.7	48.8		0	0	9501.657	38499.44	Yes	25621	1 x Ku						
Pit114	OnGrade	SPECIAL	Gully450sq-b	0.3	48		0	0	9514.301	38493.6	No	425	1 x Ku						
Pit108	OnGrade	SPECIAL	Gully450sq-b	0.7	47.3		0	0	9525.754	38487.59	No	417	1 x Ku						
Pit109	OnGrade	SPECIAL	Gully450sq-b	0.2	46.8		0	0	9537.802	38474.69	No	418	1 x Ku						
Pit110	OnGrade	SPECIAL	Gully450sq-b	0.2	46.6		0	0	9546.307	38465.19	No	419	1 x Ku						
OUT	Node				37		0		9993.076	38838.22		27805							
HW6	Headwall			0.5	40.2		0		9980.151	38429.82		29732							
N1014	Node				40.7		0		9993.678	38445.57		1785							
HW9	Headwall			0.5	48.5		0		9484.762	38345.45		40306							
Pit35783	Sag	BCC Lip in L	BCC LIL D 2 10	1.5	47.5	1.4	0	0	9513.077	38375.54	Yes	2.09E+08	1 x Ku						
Pit1b	OnGrade	BCC Lip in L	BCC LIL D 2.5 2400mm	1.5	46.5		0	0	9524.589	38366.73	Yes	2.09E+08	1 x Ku						
Pit1094	OnGrade	BCC Kerb in	BCC KIL D&E 2.5 2400r	0.7	43.94		0	0	9666.903	38503.59	Yes	40304	1 x Ku						
Pit1090	OnGrade	BCC Kerb in	BCC KIL D&E 2.5 2400r	1.8	44.2		0	0	9679.927	38589.81	No	40295	1 x Ku						
Pit1315	OnGrade	BCC Kerb in	BCC KIL D&E 2.5 2400r	1.8	44		0	0	9754.094	38579.09	No	2.04E+08	1 x Ku						
Pit1098	OnGrade	BCC Kerb in	BCC KIL D&E 2.5 2400r	4.9	43.1		0	0	9759.69	38275.7	No	284336	1 x Ku						
Pit297	OnGrade	BCC Kerb in	BCC KIL D&E 2.5 2400r	7.2	43		0	0	9805.384	38322.5	No	719	1 x Ku						
Pit298	OnGrade	BCC Kerb in	BCC KIL D&E 2.5 2400r	1.8	42.9		0	0	9813.891	38315.03	No	720	1 x Ku						
END	Node				36		0		10092.08	38880.35		19971751							
N1231	Node				46.2		0		9680.051	38365.95		26560658							
N1270	Node				56		0		9191.642	38914.37		48391341							
N1446	Node				46.5		0		9426.775	38356.67		1.89E+08							
N1449	Node				50.35		0		9258.145	38371.82		1.89E+08							

N1451	Node				46.97		0		9362.854	38356.1		1.89E+08							
Pit1305	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.3	43.2		0	0	9776.852	38256.41	No	2.03E+08	1 x Ku						
N1456	Node				57		0		9095.113	38509.58		2.03E+08							
N1458	Node				55.5		0		9108.318	38562.91		2.03E+08							
N1459	Node				54		0		9142.182	38524.78		2.03E+08							
N1461	Node				53		0		9082.006	38897.31		2.03E+08							
HW20	Headwall			0.5	52.3		0		9188.478	39017.64		2.03E+08							
N1465	Node				65		0		8563.561	38430.85		2.03E+08							
HWBSN4a	Headwall			0.5	44.5		0		9754.982	38589.31		2.06E+08							
HWBSN4b	Headwall			0.5	44.5		0		9753.663	38587.88		2.06E+08							
N30841	Node				42.4		0		9648.086	38565.54		2.08E+08							
HWBSN3	Headwall			0.5	44		0		9663.712	38571.74		2.07E+08							
N28574	Node				42.1		0		9681.633	38569.45		2.08E+08							
HW10	Headwall			0.5	45.2		0		9590.701	38458.52		2.08E+08							
N28560	Node				43.7		0		9605.329	38469.57		2.08E+08							
HW13	Headwall			0.5	43		0		9749.93	38561.21		2.08E+08							
Pit25375	Sag	BCC Kerb ir	BCC KIL D& 5	1.2	48.2	0.2	0	0	9452.088	38396.61	No	2.08E+08	1 x Ku						
Pit1080	OnGrade	BCC Kerb ir	BCC KIL D&E 2.5 2400r	1.2	47.8		0	0	9461.82	38405.92	Yes	16384	1 x Ku						
HW126	Headwall			0.5	43		0		9741.277	38568.38		2.08E+08							
HW45	Headwall			0.5	46.2		0		9534.141	38405.92		2.09E+08							
N28567	Node				44.4		0		9550.388	38419.43		2.08E+08							
N50029	Node				45.87		0		9516.996	38380.93		2.09E+08							

DETENTION BASIN DETAILS																			
Name	Elev	Surf. Area	Init Vol. (cu	Outlet Type	K	Dia(mm)	Centre RL	Pit Family	Pit Type	x	y	HED	Crest RL	Crest Length	id				
BIO2B	42.2	300	0	None						9730.09	38527.9	No			2.04E+08				
	42.5	1000																	
BSN4	42.5	934	0	None						9737.139	38596.83	No			29020				
	44.5	3945																	
BSN5	51.6	250	0	None						9274.147	38948.59	No			29048				
	53.7	650																	
BSN1	38.4	250	0	None						9979.269	38411.01	No			29735				
	41	750																	
BIO2A	44	700	0	None						9704.815	38613.14	No			2.04E+08				
	44.3	2000																	
	44.5	2000																	
BIO5	52.9	280	0	None						9282	38953.25	No			2.05E+08				
	53.9	280																	
BSN3	43	168	0	Culvert	0.5					9638.327	38562.1	No			2.07E+08				
	45	2061																	
BIO3B	44.5	75	0	None						9647.796	38539.68	No			2.07E+08				
	44.8	500																	
	45	500																	
BIO3A	44.5	125	0	None						9613.219	38576.17	No			2.07E+08				
	44.8	750																	
	45	750																	
Basin873	41	1280	0	None						9744.786	38526.92	No			2.08E+08				

	43	3738							
SUB-CATCHMENT DETAILS									
Name	Pit or	Total	Roofed	Impervious	Pervious	Impervious	Pervious	Impervious	Pervious
	Node	Area (ha)	%	%	%	Tc (min)	Tc (min)	C10	C10
EC4	Pit311	1.54	0	60	40	5	5	0.9	0.58
C1I	Pit312	0.364	0	60	40	5	5	0.9	0.58
C1F	Pit308	0.334	0	60	40	5	5	0.9	0.58
C1H	Pit299	0.273	0	60	40	5	5	0.9	0.58
C1B	Pit307	0.611	0	90	10	5	5	0.9	0.58
C1D	Pit306	0.295	0	60	40	5	5	0.9	0.58
C1A	Pit303	0.402	0	60	40	5	5	0.9	0.58
C1J	Pit301	0.487	0	60	40	5	5	0.9	0.58
EC3	Pit295	1.121	0	60	40	5	5	0.9	0.58
C1G	Pit296	0.174	0	60	40	5	5	0.9	0.58
C5D	Pit290	0.424	0	60	40	5	5	0.9	0.58
C3E	Pit1035	0.204	0	60	40	5	5	0.9	0.58
C3C	Pit185	0.28	0	60	40	5	5	0.9	0.58
C3F	Pit49	0.619	0	60	40	5	5	0.9	0.58
C3H	Pit74	0.413	0	60	40	5	5	0.9	0.58
C5F	Pit283	0.481	0	60	40	5	5	0.9	0.58
C5C	Pit280	0.375	0	60	40	5	5	0.9	0.58
C6D	Pit268	0.218	0	60	40	5	5	0.9	0.58
C6C	Pit270	0.875	0	60	40	5	5	0.9	0.58
C9E	Pit260	0.735	0	60	40	5	5	0.9	0.58
C6E2	Pit249	0.294	0	60	40	5	5	0.9	0.58
C6A	Pit255	0.783	0	60	40	5	5	0.9	0.58
C9D	Pit245	0.565	0	60	40	5	5	0.9	0.58
C9C	Pit240	0.685	0	60	40	5	5	0.9	0.58
C9A	Pit233	0.474	0	60	40	5	5	0.9	0.58
C8E	Pit1043	0.338	0	60	40	5	5	0.9	0.58
C8B	Pit223	0.297	0	60	40	5	5	0.9	0.58
C7B	Pit218	0.281	0	60	40	5	5	0.9	0.58
C7C	Pit210	0.278	0	60	40	5	5	0.9	0.58
C10H	Pit125	0.306	0	60	40	5	5	0.9	0.58
C10I	N1622	0.829	0	5	95	5	5	0.9	0.58
C8A	Pit224	0.33	0	60	40	5	5	0.9	0.58
C8D	Pit219	0.433	0	60	40	5	5	0.9	0.58
C9B	Pit196	0.294	0	60	40	5	5	0.9	0.58
C7J	Pit168	0.267	0	60	40	5	5	0.9	0.58
C10G	Pit121	0.321	0	60	40	5	5	0.9	0.58
C7H	Pit194	0.283	0	60	40	5	5	0.9	0.58
C7E	Pit192	0.381	0	60	40	5	5	0.9	0.58
C7G	Pit189	0.28	0	60	40	5	5	0.9	0.58
C7F	Pit199	0.185	0	60	40	5	5	0.9	0.58
C10A	Pit202	0.192	0	60	40	5	5	0.9	0.58
C10E	Pit187	0.562	0	60	40	5	5	0.9	0.58

C6B	Pit184	0.527	0	60	40	5	5	0.9	0.58
C8F	Pit179	0.287	0	60	40	5	5	0.9	0.58
C7D	Pit176	0.379	0	60	40	5	5	0.9	0.58
C7I	Pit175	0.269	0	60	40	5	5	0.9	0.58
C2B	Pit165	0.605	0	60	40	5	5	0.9	0.58
C2A	Pit162	0.101	0	60	40	5	5	0.9	0.58
C2F	Pit135	0.289	0	60	40	5	5	0.9	0.58
C2H	Pit132	0.111	0	60	40	5	5	0.9	0.58
C3M	Pit102	0.112	0	60	40	5	5	0.9	0.58
C3L	Pit98	0.341	0	60	40	5	5	0.9	0.58
C2D	Pit158	0.315	0	60	40	5	5	0.9	0.58
C2E	Pit145	0.314	0	60	40	5	5	0.9	0.58
C2C	Pit146	0.284	0	60	40	5	5	0.9	0.58
C2G	Pit141	0.324	0	60	40	5	5	0.9	0.58
C2I	Pit136	0.076	0	60	40	5	5	0.9	0.58
C3B	Pit122	0.341	0	60	40	5	5	0.9	0.58
C10D	Pit117	0.269	0	60	40	5	5	0.9	0.58
EC6	Pit99	1.499	0	60	40	5	5	0.9	0.58
C3A	Pit87	0.492	0	60	40	5	5	0.9	0.58
C3G	Pit82	0.311	0	60	40	5	5	0.9	0.58
C4E	Pit58	0.395	0	60	40	5	5	0.9	0.58
C4B	Pit54	0.459	0	60	40	5	5	0.9	0.58
C4A	Pit52	0.509	0	60	40	5	5	0.9	0.58
C4C	Pit45	0.514	0	60	40	5	5	0.9	0.58
C4D	Pit38	0.363	0	60	40	5	5	0.9	0.58
C4F	Pit36	0.234	0	60	40	5	5	0.9	0.58
EC13N	Pit35	0.2398	0	60	40	5	5	0.9	0.58
C4G	Pit26	0.65	0	60	40	5	5	0.9	0.58
C11C	Pit20	0.297	0	60	40	5	5	0.9	0.58
C5G	Pit16	0.343	0	60	40	5	5	0.9	0.58
EC14N	Pit15	0.0049	0	60	40	5	5	0.9	0.58
C11B	Pit6	0.6615	0	60	40	5	5	0.9	0.58
C11A	Pit235	0.5605	0	60	40	5	5	0.9	0.58
EC12N	Pit13	0.025	0	60	40	5	5	0.9	0.58
EC4N	Pit8	1.2133	0	60	40	5	5	0.9	0.58
EC8	Pit4	0.6663	0	10	90	5	5	0.9	0.58
C3D	HW-BSN3	0.976	0	5	95	5	5	0.9	0.58
C3I	N807	0.283	0	60	40	5	5	0.9	0.58
EC5(EC14E	N1049	4.2051	0	0	100	5	10	0.9	0.58
C11D	Pit21	0.698	0	60	40	5	5	0.9	0.58
C6E1	Pit996	0.102	0	60	40	5	5	0.9	0.58
EC7	N1071	0.738	0	60	40	5	5	0.9	0.58
C5E	Pit1000	0.456	0	60	40	5	5	0.9	0.58
C5A	Pit1028	0.27	0	60	40	5	5	0.9	0.58
C5B	Pit1024	0.198	0	60	40	5	5	0.9	0.58
C8C	Pit1037	0.558	0	60	40	5	5	0.9	0.58
C7A	Pit1055	0.342	0	60	40	5	5	0.9	0.58

C10B	Pit1083	0.573	0	60	40	5	5	0.9	0.58										
C10F	Pit114	0.47	0	60	40	5	5	0.9	0.58										
EC13E	OUT	2.2763	0	0	100	5	10	0.9	0.58										
C3J	BSN4	0.349	0	60	40	5	5	0.9	0.58										
EC1	Pit1098	0.451	0	60	40	5	5	0.9	0.58										
EC2	Pit297	0.786	0	60	40	5	5	0.9	0.58										
C1E	Pit298	0.224	0	60	40	5	5	0.9	0.58										
EX1	N1449	15.56	0	0	100	5	10	0.9	0.58										
C1C	Pit1305	0.202	0	60	40	5	5	0.9	0.58										
EX2	N1456	8.0428	0	0	100	5	10	0.9	0.58										
EC5W	N1458	1.1021	0	5	95	5	10	0.9	0.58										
EC4W	N1461	20.095	0	1	99	5	10	0.9	0.58										
CAT3(+17)	N1465	35.049	0	0	100	5	15	0.9	0.58										
C3K	BIO2A	0.273	0	60	40	5	5	0.9	0.58										
C10C	HW45	1.547	0	90	10	5	5	0.9	0.58										
PIPE DETAILS																			
Name	From	To	Length	U/S IL	D/S IL	Slope	Type	Dia	I.D.	Rough	Pipe Is	No. Pipes	Chg From	At Chg	Chg	Rl	Chg	RL	etc
			(m)	(m)	(m)	(%)		(mm)	(mm)						(m)	(m)	(m)	(m)	(m)
Pipe412	Pit317	Pit302	16.796	40.877	40.777	0.6	Concrete, u	100	100	0.013	New	1	Pit302	0					
Pipe16	Pit302	Pit314	25.059	39.992	39.867	0.5	Concrete, u	750	750	0.013	New	1	Pit314	0					
P818	Pit314	N1053	11.3	38.851	38.5	3.11	Concrete, u	900	900	0.013	NewFixed	1	N1053	0					
Pipe11	Pit311	Pit312	10.588	40.63	40.455	1.65	Concrete, u	525	525	0.013	New	1	Pit312	0					
Pipe14	Pit312	Pit313	25.712	40.128	39.999	0.5	Concrete, u	900	900	0.013	New	1	Pit313	0					
Pipe15	Pit313	Pit314	62.63	39.855	39.532	0.52	Concrete, u	900	900	0.013	New	1	Pit314	0					
Pipe5	Pit309	Pit308	17.184	41.169	41.083	0.5	Concrete, u	300	300	0.013	New	1	Pit308	0					
Pipe19	Pit308	Pit299	52.396	40.769	40.507	0.5	Concrete, u	675	675	0.013	New	1	Pit299	0					
Pipe18	Pit299	Pit300	27.072	40.477	40.342	0.5	Concrete, u	750	750	0.013	New	1	Pit300	0					
Pipe17	Pit300	Pit302	57.89	40.312	40.022	0.5	Concrete, u	750	750	0.013	New	1	Pit302	0					
Pipe4	Pit307	Pit306	19.026	41.99	41.69	1.58	Concrete, u	375	375	0.013	New	1	Pit306	0					
Pipe20	Pit306	Pit308	67.907	41.364	40.855	0.75	Concrete, u	600	600	0.013	New	1	Pit308	0					
Pipe2	Pit303	Pit305	24.317	42.069	41.869	0.82	Concrete, u	300	300	0.013	New	1	Pit305	0					
Pipe8	Pit305	Pit306	47.141	41.63	41.394	0.5	Concrete, u	525	525	0.013	New	1	Pit306	0					
Pipe6	Pit301	Pit300	17.231	41.044	40.958	0.5	Concrete, u	225	225	0.013	New	1	Pit300	0					
Pipe10	Pit295	Pit296	10.982	40.83	40.73	0.91	Concrete, u	525	525	0.013	New	1	Pit296	0					
Pipe13	Pit296	Pit312	72.59	40.569	40.206	0.5	Concrete, u	675	675	0.013	New	1	Pit312	0					
Pipe171	Pit293	Pit290	13.641	53.777	53.709	0.5	Concrete, u	100	100	0.013	New	1	Pit290	0					
Pipe160	Pit290	Pit291	52.308	52.815	50.245	4.91	Concrete, u	1050	1070	0.013	New	1	Pit291	0					
Pipe162	Pit291	Pit1035	40.6	50.215	47.845	5.84	Concrete, u	1050	1070	0.013	New	1	Pit1035	0					
Pipe919	Pit1035	Pit185	6.9	47.815	47.745	1.01	Concrete, u	1050	1070	0.013	New	1	Pit185	0					
Pipe914	Pit185	Pit1032	9.3	47.715	47.545	1.83	Concrete, u	1050	1070	0.013	New	1	Pit1032	0					
Pipe163	Pit1032	Pit49	71.878	47.515	46.845	0.93	Concrete, u	1050	1070	0.013	New	1	Pit49	0					
Pipe164	Pit49	Pit1309	24.2	46.815	46.694	0.5	Box culvert	1.8W x 0.6H		0.012	Existing	1	Pit1309	0					
P1314	Pit1309	Pit48	47.5	46.614	46.376	0.5	Box culvert	1.8W x 0.6H		0.012	Existing	1	Pit48	0					
Pipe72	Pit48	Pit72	52.577	46.347	43.1	6.17	Box culvert	1.8W x 0.6H		0.012	Existing	1	Pit72	0					
Pipe73	Pit72	Pit73	12.948	43.06	43	0.46	Box culvert	1.8W x 0.6H		0.012	Existing	1	Pit73	0					
Pipe74	Pit73	Pit74	20	43	42.9	0.5	Box culvert	1.8W x 0.6H		0.012	Existing	1	Pit74	0					

Pipe75	Pit74	Pit64	36	42.89	42.7	0.53	Box culvert	2.4W x 0.6H		0.012	Existing	1	Pit64	0										
P60150	Pit64	N66678	13.365	42.65	42.6	0.37	Box culvert	2.4W x 0.6H		0.012	NewFixed	1	N66678	0										
Pipe170	Pit292	Pit291	14.075	51.577	51.277	2.13	Concrete, u	100	100	0.013	New	1	Pit291	0										
Pipe198	Pit285	Pit253	13.768	56.369	56.3	0.5	Concrete, u	300	300	0.013	New	1	Pit253	0										
Pipe197	Pit253	Pit251	21.853	55.778	55.669	0.5	Concrete, u	450	450	0.013	New	1	Pit251	0										
Pipe154	Pit251	Pit283	51.422	54.493	54.236	0.5	Concrete, u	900	900	0.013	New	1	Pit283	0										
Pipe156	Pit283	Pit286	73.9	54.206	53.836	0.5	Concrete, u	900	900	0.013	New	1	Pit286	0										
Pipe158	Pit286	Pit288	14.719	53.806	53.733	0.5	Concrete, u	900	900	0.013	New	1	Pit288	0										
P403	Pit288	Pit289	12.281	53.703	53.641	0.5	Concrete, u	1050	1070	0.013	New	1	Pit289	0										
Pipe159	Pit289	Pit290	54.818	53.611	52.845	1.4	Concrete, u	1050	1070	0.013	New	1	Pit290	0										
Pipe172	Pit284	Pit283	15.113	56.277	56.201	0.5	Concrete, u	100	100	0.013	New	1	Pit283	0										
Pipe165	Pit279	Pit280	12.953	53.127	53.027	0.77	Concrete, u	100	100	0.013	New	1	Pit280	0										
Pipe166	Pit280	Pit281	18.3	52.819	52.728	0.5	Concrete, u	300	300	0.013	New	1	Pit281	0										
Pipe168	Pit281	Pit291	63.8	52.425	50.755	2.62	Concrete, u	600	600	0.013	New	1	Pit291	0										
Pipe388	Pit268	Pit269	12.827	56.244	56.144	0.78	Concrete, u	225	225	0.013	New	1	Pit269	0										
Pipe389	Pit269	Pit270	11.068	56.114	55.844	2.44	Concrete, u	225	225	0.013	New	1	Pit270	0										
Pipe390	Pit270	Pit271	11.117	55.69	55.59	0.9	Concrete, u	375	375	0.013	New	1	Pit271	0										
Pipe391	Pit271	Pit272	12.302	55.56	55.39	1.38	Concrete, u	375	375	0.013	New	1	Pit272	0										
Pipe392	Pit272	Pit273	15.539	55.36	55.09	1.74	Concrete, u	375	375	0.013	New	1	Pit273	0										
Pipe393	Pit273	Pit274	16.336	55.06	54.978	0.5	Concrete, u	375	375	0.013	New	1	Pit274	0										
Pipe394	Pit274	Pit275	21.808	54.908	54.758	0.69	Concrete, u	450	450	0.013	New	1	Pit275	0										
Pipe204	Pit275	Pit276	7.892	54.68	54.63	0.63	Concrete, u	525	525	0.013	New	1	Pit276	0										
Pipe226	Pit276	Pit278	35.444	54.411	52.63	5.02	Concrete, u	525	525	0.013	New	1	Pit278	0										
Pipe169	Pit278	Pit281	12.932	52.555	52.455	0.77	Concrete, u	600	600	0.013	New	1	Pit281	0										
Pipe201	Pit260	Pit259	11.45	59.669	59.612	0.5	Concrete, u	300	300	0.013	New	1	Pit259	0										
Pipe373	Pit259	Pit258	17.034	59.582	59.497	0.5	Concrete, u	300	300	0.013	New	1	Pit258	0										
Pipe374	Pit258	Pit257	17.892	59.467	58.99	2.66	Concrete, u	375	375	0.013	New	1	Pit257	0										
Pipe375	Pit257	Pit256	18.799	58.96	58.49	2.5	Concrete, u	375	375	0.013	New	1	Pit256	0										
Pipe227	Pit256	Pit261	21.854	58.46	58.09	1.69	Concrete, u	375	375	0.013	New	1	Pit261	0										
Pipe377	Pit261	Pit262	12.066	58.06	57.69	3.07	Concrete, u	375	375	0.013	New	1	Pit262	0										
Pipe378	Pit262	Pit263	9.769	57.66	57.49	1.74	Concrete, u	375	375	0.013	New	1	Pit263	0										
Pipe379	Pit263	Pit264	10.418	57.46	57.19	2.59	Concrete, u	375	375	0.013	New	1	Pit264	0										
Pipe380	Pit264	Pit265	10.611	57.16	56.89	2.54	Concrete, u	375	375	0.013	New	1	Pit265	0										
Pipe381	Pit265	Pit266	10.95	56.86	56.74	1.1	Concrete, u	375	375	0.013	New	1	Pit266	0										
Pipe382	Pit266	Pit267	11.417	56.71	56.59	1.05	Concrete, u	375	375	0.013	New	1	Pit267	0										
Pipe383	Pit267	Pit249	24.129	56.56	56.09	1.95	Concrete, u	375	375	0.013	New	1	Pit249	0										
Pipe152	Pit249	Pit250	25.378	54.797	54.67	0.5	Concrete, u	825	825	0.013	New	1	Pit250	0										
Pipe153	Pit250	Pit251	23.448	54.64	54.523	0.5	Concrete, u	825	825	0.013	New	1	Pit251	0										
Pipe195	Pit255	Pit254	12.532	56.358	56.295	0.5	Concrete, u	450	450	0.013	New	1	Pit254	0										
Pipe196	Pit254	Pit253	91.489	56.265	55.808	0.5	Concrete, u	450	450	0.013	New	1	Pit253	0										
Pipe173	Pit252	Pit250	11.543	56.394	56.336	0.5	Concrete, u	225	225	0.013	New	1	Pit250	0										
Pipe144	Pit247	Pit246	12.015	57.044	56.984	0.5	Concrete, u	225	225	0.013	New	1	Pit246	0										
Pipe149	Pit246	Pit248	17.218	56.86	55.99	5.05	Concrete, u	375	375	0.013	New	1	Pit248	0										
Pipe151	Pit248	Pit249	29.36	54.974	54.827	0.5	Concrete, u	750	750	0.013	New	1	Pit249	0										
Pipe142	Pit245	Pit244	12.728	59.79	59.69	0.79	Concrete, u	375	375	0.013	New	1	Pit244	0										
Pipe143	Pit244	Pit246	79.645	59.66	56.89	3.48	Concrete, u	375	375	0.013	New	1	Pit246	0										
Pipe140	Pit242	Pit243	29.602	62.277	62.077	0.68	Concrete, u	100	100	0.013	New	1	Pit243	0										

Pipe141	Pit243	Pit244	59.377	62.047	59.977	3.49	Concrete, u	100	100	0.013	New	1	Pit244	0					
Pipe145	Pit241	Pit240	9.112	59.277	59.231	0.5	Concrete, u	100	100	0.013	New	1	Pit240	0					
Pipe146	Pit240	Pit239	70.196	59.201	56.069	4.46	Concrete, u	300	300	0.013	New	1	Pit239	0					
Pipe147	Pit239	Pit237	22.934	55.696	55.33	1.59	Concrete, u	525	525	0.013	New	1	Pit237	0					
Pipe148	Pit237	Pit248	59.234	55.3	55.004	0.5	Concrete, u	525	525	0.013	New	1	Pit248	0					
Pipe150	Pit238	Pit239	10.281	55.777	55.726	0.5	Concrete, u	100	100	0.013	New	1	Pit239	0					
Pipe111	Pit233	Pit232	45.2	59.069	57.569	3.32	Concrete, u	300	300	0.013	New	1	Pit232	0					
P60005	Pit232	Pit220	19.716	57.539	55.269	11.51	Concrete, u	300	300	0.013	New	1	Pit220	0					
Pipe139	Pit220	Pit1043	65.2	55.19	52.59	3.99	Concrete, u	375	375	0.013	New	1	Pit1043	0					
P927	Pit1043	Pit221	33.8	52.318	51.53	2.33	Concrete, u	525	525	0.013	New	1	Pit221	0					
Pipe122	Pit221	Pit223	34.183	51.5	50.83	1.96	Concrete, u	525	525	0.013	New	1	Pit223	0					
Pipe123	Pit223	Pit222	19.248	50.8	50.43	1.92	Concrete, u	525	525	0.013	New	1	Pit222	0					
Pipe124	Pit222	Pit217	25.743	50.355	49.855	1.94	Concrete, u	600	600	0.013	New	1	Pit217	0					
Pipe125	Pit217	Pit218	50.593	49.769	49.169	1.19	Concrete, u	675	675	0.013	New	1	Pit218	0					
Pipe126	Pit218	Pit209	23.607	49.139	48.869	1.14	Concrete, u	675	675	0.013	New	1	Pit209	0					
Pipe127	Pit209	Pit210	47.934	48.715	48.475	0.5	Concrete, u	825	825	0.013	New	1	Pit210	0					
Pipe128	Pit210	Pit211	22.547	48.445	47.715	3.24	Concrete, u	825	825	0.013	New	1	Pit211	0					
Pipe129	Pit211	Pit212	32.7	47.685	46.415	3.88	Concrete, u	825	825	0.013	New	1	Pit212	0					
Pipe130	Pit212	Pit216	49.5	46.385	46.138	0.5	Concrete, u	825	825	0.013	New	2	Pit216	0					
Pipe60078	Pit216	Pit57587	17.3	46.108	46.015	0.53	Concrete, u	825	825	0.013	New	2	Pit57587	0					
Pipe1140	Pit57587	Pit57586	33.7	45.985	45.515	1.39	Concrete, u	825	825	0.013	New	2	Pit57586	0					
Pipe60079	Pit57586	Pit57588	39.8	45.485	45.286	0.5	Concrete, u	825	825	0.013	New	2	Pit57588	0					
Pipe60080	Pit57588	Pit111	28.5	45.256	45.015	0.85	Concrete, u	825	825	0.013	New	2	Pit111	0					
Pipe59962	Pit111	Pit151	30.6	44.985	44.9	0.28	Box culvert	1.8W x 0.6H		0.012	Existing	1	Pit151	0					
P25711	Pit151	Pit24717	18.45	44.9	44.86	0.22	Box culvert	2.4W x 0.6H		0.012	Existing	1	Pit24717	0					
Pipe307	Pit24717	Pit125	55.4	44.86	44.7	0.29	Box culvert	2.4W x 0.6H		0.012	Existing	1	Pit125	0					
Pipe40	Pit125	N1622	12.035	44.68	44.6	0.66	Box culvert	2.4W x 0.6H		0.012	Existing	1	N1622	0					
Pipe117	Pit225	Pit226	8.66	58.077	57.777	3.46	Concrete, u	100	100	0.013	New	1	Pit226	0					
Pipe118	Pit226	Pit227	68.857	57.747	54.477	4.75	Concrete, u	100	100	0.013	New	1	Pit227	0					
Pipe119	Pit227	Pit228	15.502	54.447	54.077	2.39	Concrete, u	100	100	0.013	New	1	Pit228	0					
Pipe120	Pit228	Pit224	38.941	54.047	52.277	4.55	Concrete, u	100	100	0.013	New	1	Pit224	0					
Pipe121	Pit224	Pit221	22.335	52.069	51.769	1.34	Concrete, u	300	300	0.013	New	1	Pit221	0					
Pipe138	Pit219	Pit220	13.482	55.569	55.269	2.23	Concrete, u	300	300	0.013	New	1	Pit220	0					
Pipe110	Pit196	Pit229	22.286	62.369	62.069	1.35	Concrete, u	300	300	0.013	New	1	Pit229	0					
Pipe109	Pit229	Pit230	38.279	62.039	59.669	6.19	Concrete, u	300	300	0.013	New	1	Pit230	0					
Pipe108	Pit230	Pit234	7.73	59.639	59.069	7.37	Concrete, u	300	300	0.013	New	1	Pit234	0					
Pipe107	Pit234	Pit177	42.97	59.039	57.369	3.89	Concrete, u	300	300	0.013	New	1	Pit177	0					
Pipe106	Pit177	Pit178	28.126	57.339	55.869	5.23	Concrete, u	300	300	0.013	New	1	Pit178	0					
Pipe104	Pit178	Pit169	38.221	55.839	54.069	4.63	Concrete, u	300	300	0.013	New	1	Pit169	0					
Pipe362	Pit169	Pit171	13.718	54.039	53.569	3.43	Concrete, u	300	300	0.013	New	1	Pit171	0					
Pipe103	Pit171	Pit168	29.074	53.49	51.99	5.16	Concrete, u	375	375	0.013	New	1	Pit168	0					
Pipe101	Pit168	Pit167	45.433	51.96	49.79	4.78	Concrete, u	375	375	0.013	New	1	Pit167	0					
Pipe99	Pit167	Pit123	38.8	49.76	47	7.11	Concrete, u	375	375	0.013	New	1	Pit123	0					
Pipe98	Pit123	Pit57623	60.7	46.9	46.7	0.33	Concrete, u	600	600	0.013	New	1	Pit57623	0					
P60186	Pit57623	Pit118	33.5	46.6	46.26	1.01	Concrete, u	600	600	0.012	New	1	Pit118	0					
Pipe87	Pit118	Pit119	22.6	46.2	45.9	1.33	Concrete, u	600	600	0.012	New	2	Pit119	0					
Pipe91	Pit119	Pit121	27.3	45.85	45.7	0.55	Concrete, u	600	600	0.012	New	2	Pit121	0					

Pipe85	Pit121	Pit151	52.5	45.6	45	1.14	Concrete, u	600	600	0.013	New	2	Pit151	0					
Pipe136	Pit194	Pit193	13.686	54.744	54.644	0.73	Concrete, u	225	225	0.013	New	1	Pit193	0					
Pipe137	Pit193	Pit1057	62.9	54.614	51.244	5.36	Concrete, u	225	225	0.013	New	1	Pit1057	0					
P954	Pit1057	Pit217	36.2	51.139	50.169	2.68	Concrete, u	300	300	0.013	New	1	Pit217	0					
Pipe134	Pit192	Pit191	14.7	51.169	50.969	1.36	Concrete, u	300	300	0.013	New	1	Pit191	0					
Pipe135	Pit191	Pit1070	32.1	50.939	49.569	4.27	Concrete, u	300	300	0.013	New	1	Pit1070	0					
P977	Pit1070	Pit209	33.2	49.408	49.108	0.9	Concrete, u	450	450	0.013	New	1	Pit209	0					
Pipe217	Pit189	Pit188	10.199	51.444	50.944	4.9	Concrete, u	225	225	0.013	New	1	Pit188	0					
Pipe218	Pit188	Pit190	11.514	50.914	50.344	4.95	Concrete, u	225	225	0.013	New	1	Pit190	0					
Pipe344	Pit190	Pit198	11.879	50.314	50.244	0.59	Concrete, u	225	225	0.013	New	1	Pit198	0					
Pipe345	Pit198	Pit199	18.019	50.169	50.069	0.55	Concrete, u	300	300	0.013	New	1	Pit199	0					
Pipe346	Pit199	Pit200	15.801	50.039	49.96	0.5	Concrete, u	300	300	0.013	New	1	Pit200	0					
Pipe347	Pit200	Pit201	17.783	49.93	49.569	2.03	Concrete, u	300	300	0.013	New	1	Pit201	0					
Pipe236	Pit201	Pit202	13.488	49.539	49.069	3.48	Concrete, u	300	300	0.013	New	1	Pit202	0					
Pipe132	Pit202	Pit203	14.627	49.039	48.569	3.21	Concrete, u	300	300	0.013	New	1	Pit203	0					
Pipe133	Pit203	Pit216	32.148	48.539	46.869	5.19	Concrete, u	300	300	0.013	New	1	Pit216	0					
Pipe89	Pit187	Pit186	14.231	51.269	51.198	0.5	Concrete, u	300	300	0.013	New	1	Pit186	0					
Pipe90	Pit186	Pit118	69.9	51.168	48.669	3.57	Concrete, u	300	300	0.013	New	1	Pit118	0					
Pipe202	Pit184	Pit183	10.2	55.544	55.444	0.98	Concrete, u	225	225	0.013	New	1	Pit183	0					
P397	Pit183	Pit277	18.709	55.369	55.269	0.53	Concrete, u	300	300	0.013	New	1	Pit277	0					
Pipe203	Pit277	Pit276	31.73	55.239	54.869	1.17	Concrete, u	300	300	0.013	New	1	Pit276	0					
Pipe115	Pit182	Pit177	23.512	58.224	57.524	2.98	Concrete, u	150	150	0.013	New	1	Pit177	0					
Pipe361	Pit179	Pit180	10.921	57.669	57.569	0.92	Concrete, u	300	300	0.013	New	1	Pit180	0					
Pipe360	Pit180	Pit181	14.1	57.539	57.369	1.21	Concrete, u	300	300	0.013	New	1	Pit181	0					
Pipe214	Pit181	Pit1052	35.3	57.339	56.169	3.31	Concrete, u	300	300	0.013	New	1	Pit1052	0					
Pipe945	Pit1052	Pit178	39.7	56.139	55.869	0.68	Concrete, u	300	300	0.013	New	1	Pit178	0					
Pipe215	Pit176	Pit1063	14	54.244	53.544	5	Concrete, u	225	225	0.013	New	1	Pit1063	0					
P964	Pit1063	Pit1065	14.1	53.514	52.744	5.46	Concrete, u	225	225	0.013	New	1	Pit1065	0					
P965	Pit1065	Pit1066	15.6	52.714	51.944	4.94	Concrete, u	225	225	0.013	New	1	Pit1066	0					
P968	Pit1066	Pit1067	15.1	51.914	51.244	4.44	Concrete, u	225	225	0.013	New	1	Pit1067	0					
P970	Pit1067	Pit1068	15.3	51.214	50.444	5.03	Concrete, u	225	225	0.013	New	1	Pit1068	0					
P972	Pit1068	Pit1069	32	50.369	49.569	2.5	Concrete, u	300	300	0.013	New	1	Pit1069	0					
P980	Pit1069	Pit1070	14.655	49.539	49.466	0.5	Concrete, u	300	300	0.013	New	1	Pit1070	0					
Pipe365	Pit175	Pit174	17.103	54.944	54.844	0.58	Concrete, u	225	225	0.013	New	1	Pit174	0					
Pipe364	Pit174	Pit173	18.334	54.814	54.444	2.02	Concrete, u	225	225	0.013	New	1	Pit173	0					
Pipe363	Pit173	Pit172	10.208	54.414	54.044	3.62	Concrete, u	225	225	0.013	New	1	Pit172	0					
Pipe216	Pit172	Pit171	15.492	54.014	53.644	2.39	Concrete, u	225	225	0.013	New	1	Pit171	0					
Pipe116	Pit170	Pit169	18.05	54.377	54.277	0.55	Concrete, u	100	100	0.013	New	1	Pit169	0					
Pipe100	Pit166	Pit167	18.133	50.177	50.077	0.55	Concrete, u	100	100	0.013	New	1	Pit167	0					
Pipe23	Pit165	Pit164	16.502	45.29	45.19	0.61	Concrete, u	375	375	0.013	New	1	Pit164	0					
Pipe24	Pit164	Pit304	106.8	45.16	42.19	2.78	Concrete, u	375	375	0.013	New	1	Pit304	0					
Pipe3	Pit304	Pit305	12.115	42.16	41.79	3.05	Concrete, u	375	375	0.013	New	1	Pit305	0					
Pipe25	Pit162	Pit163	13.979	47.244	46.944	2.15	Concrete, u	225	225	0.013	New	1	Pit163	0					
Pipe26	Pit163	Pit161	11.515	46.914	46.644	2.34	Concrete, u	225	225	0.013	New	1	Pit161	0					
Pipe28	Pit161	Pit148	64.735	46.614	44.644	3.04	Concrete, u	225	225	0.013	New	1	Pit148	0					
Pipe35	Pit148	Pit135	52.838	44.378	43.808	1.08	Concrete, u	450	450	0.013	New	1	Pit135	0					
Pipe37	Pit135	Pit132	18.442	43.73	43.43	1.63	Concrete, u	525	525	0.013	New	1	Pit132	0					

Pipe39	Pit132	Pit102	36.4	43.269	43.069	0.55	Concrete, u	675	675	0.013	New	1	Pit102	0						
Pipe44	Pit102	Pit98	18.1	42.98	42.89	0.5	Concrete, u	675	675	0.013	New	1	Pit98	0						
Pipe46	Pit98	BIO2B	20.6	42.5	42.2	1.46	Concrete, u	1200	1200	0.013	NewFixed	1	BIO2B	0						
Pipe328	Pit158	Pit157	6.577	45.944	45.911	0.5	Concrete, u	225	225	0.013	New	1	Pit157	0						
Pipe327	Pit157	Pit156	12.587	45.881	45.818	0.5	Concrete, u	225	225	0.013	New	1	Pit156	0						
Pipe221	Pit156	Pit155	12.383	45.788	45.726	0.5	Concrete, u	225	225	0.013	New	1	Pit155	0						
Pipe326	Pit155	Pit154	11.162	45.696	45.64	0.5	Concrete, u	225	225	0.013	New	1	Pit154	0						
Pipe222	Pit154	Pit153	6.868	45.61	45.576	0.5	Concrete, u	225	225	0.013	New	1	Pit153	0						
Pipe329	Pit153	Pit152	12.797	45.546	45.344	1.58	Concrete, u	225	225	0.013	New	1	Pit152	0						
Pipe333	Pit152	Pit145	13.427	45.314	45.244	0.52	Concrete, u	225	225	0.013	New	1	Pit145	0						
Pipe32	Pit145	Pit146	25.467	45.169	44.869	1.18	Concrete, u	300	300	0.013	New	1	Pit146	0						
Pipe33	Pit146	Pit147	13.288	44.708	44.608	0.75	Concrete, u	450	450	0.013	New	1	Pit147	0						
Pipe34	Pit147	Pit148	8.384	44.578	44.408	2.03	Concrete, u	450	450	0.013	New	1	Pit148	0						
Pipe323	Pit144	Pit143	9.201	45.577	45.377	2.17	Concrete, u	100	100	0.013	New	1	Pit143	0						
Pipe322	Pit143	Pit142	20.583	45.347	45.177	0.83	Concrete, u	100	100	0.013	New	1	Pit142	0						
Pipe321	Pit142	Pit141	13.435	45.147	45.08	0.5	Concrete, u	100	100	0.013	New	1	Pit141	0						
Pipe320	Pit141	Pit140	11.503	44.994	44.936	0.5	Concrete, u	225	225	0.013	New	1	Pit140	0						
Pipe219	Pit140	Pit139	10.08	44.906	44.844	0.62	Concrete, u	225	225	0.013	New	1	Pit139	0						
Pipe318	Pit139	Pit138	6.753	44.769	44.669	1.48	Concrete, u	300	300	0.013	New	1	Pit138	0						
Pipe317	Pit138	Pit137	12.287	44.639	44.569	0.57	Concrete, u	300	300	0.013	New	1	Pit137	0						
Pipe220	Pit137	Pit136	14.131	44.539	44.468	0.5	Concrete, u	300	300	0.013	New	1	Pit136	0						
Pipe1	Pit136	Pit135	33.069	44.438	43.969	1.42	Concrete, u	300	300	0.013	New	1	Pit135	0						
Pipe93	Pit122	Pit103	22.748	47.144	45.144	8.79	Concrete, u	225	225	0.012	New	1	Pit103	0						
Pipe43	Pit103	N1629	15.6	44.76	44.6	1.03	Concrete, u	300	300	0.013	NewFixed	1	N1629	0						
Pipe88	Pit117	Pit118	20.2	49.269	48.669	2.97	Concrete, u	300	300	0.013	New	1	Pit118	0						
Pipe45	Pit101	Pit98	12.248	44.277	43.577	5.72	Concrete, u	100	100	0.013	New	1	Pit98	0						
Pipe49	Pit99	Pit760	84.4	41.208	40.786	0.5	Concrete, u	450	450	0.013	New	1	Pit760	0						
Pipe755	Pit760	N805	18.16	40.6	40.55	0.28	Concrete, u	600	600	0.013	Existing	2	N805	0	0	41.1	9	41.2	18.16	41.1
Pipe94	Pit87	Pit86	18.444	45.312	44.955	1.93	Concrete, u	600	600	0.012	New	1	Pit86	0						
Pipe95	Pit86	Pit85	13.432	44.5	43.65	6.33	Concrete, u	600	600	0.012	New	1	Pit85	0						
Pipe96	Pit85	Pit84	15.6	43.6	43.5	0.64	Concrete, u	600	600	0.013	New	1	Pit84	0						
Pipe750	Pit84	Pit73	66.3	43.43	43.1	0.5	Concrete, u	675	675	0.012	New	1	Pit73	0						
Pipe287	Pit82	Pit81	10.03	47.644	47.244	3.99	Concrete, u	225	225	0.013	New	1	Pit81	0						
Pipe288	Pit81	Pit80	10.48	47.214	46.744	4.48	Concrete, u	225	225	0.013	New	1	Pit80	0						
Pipe289	Pit80	Pit79	10.067	46.714	46.244	4.67	Concrete, u	225	225	0.013	New	1	Pit79	0						
Pipe290	Pit79	Pit78	9.53	46.214	45.844	3.88	Concrete, u	225	225	0.013	New	1	Pit78	0						
Pipe209	Pit78	Pit75	40.1	45.514	45.444	0.17	Concrete, u	225	225	0.013	New	1	Pit75	0						
Pipe58	Pit75	Pit63	10.6	44.26	44.24	0.19	Box culvert	2.4W x 0.6H		0.012	Existing	1	Pit63	0						
P766	Pit63	N998	7.2	44.237	44.2	0.51	Concrete, u	1500	1524	0.013	NewFixed	1	N998	0						
P60168	Pit77	Pit57610	39.9	45	44.1	2.26	Concrete, u	225	225	0.013	New	1	Pit57610	0						
Pipe292	Pit57610	Pit64	27.6	44	42.86	4.13	Concrete, u	225	225	0.013	New	1	Pit64	0						
Pipe262	Pit59	Pit58	8.375	47.977	47.935	0.5	Concrete, u	100	100	0.013	New	1	Pit58	0						
Pipe56	Pit58	Pit57	31.214	47.525	45.755	5.67	Concrete, u	600	600	0.013	New	1	Pit57	0						
Pipe57	Pit57	Pit75	66.3	45.669	44.669	1.51	Concrete, u	675	675	0.013	New	1	Pit75	0						
Pipe189	Pit53	Pit54	12.374	52.777	52.715	0.5	Concrete, u	100	100	0.013	New	1	Pit54	0						
Pipe190	Pit54	Pit50	50.022	52.54	50.144	4.79	Concrete, u	225	225	0.013	New	1	Pit50	0						
Pipe192	Pit50	Pit51	22.987	49.885	49.608	1.2	Concrete, u	450	450	0.013	New	1	Pit51	0						

Pipe193	Pit51	Pit49	33.515	49.578	47.508	6.18	Concrete, u	450	450	0.013	New	1	Pit49	0					
Pipe194	Pit52	Pit50	15.029	49.99	49.915	0.5	Concrete, u	375	375	0.013	New	1	Pit50	0					
Pipe67	Pit45	Pit44	12.883	52.39	52.29	0.78	Concrete, u	375	375	0.013	New	1	Pit44	0					
Pipe68	Pit44	Pit46	56.053	52.26	49.59	4.76	Concrete, u	375	375	0.013	New	1	Pit46	0					
Pipe70	Pit46	Pit47	18.801	49.56	48.99	3.03	Concrete, u	375	375	0.013	New	1	Pit47	0					
Pipe71	Pit47	Pit48	29.676	48.96	47.39	5.29	Concrete, u	375	375	0.013	New	1	Pit48	0					
Pipe255	Pit38	Pit39	14.852	53.144	52.144	6.73	Concrete, u	225	225	0.013	New	1	Pit39	0					
Pipe256	Pit39	Pit40	14.175	52.114	51.444	4.73	Concrete, u	225	225	0.013	New	1	Pit40	0					
Pipe257	Pit40	Pit41	14.822	51.414	50.544	5.87	Concrete, u	225	225	0.013	New	1	Pit41	0					
Pipe258	Pit41	Pit42	13.196	50.514	49.844	5.08	Concrete, u	225	225	0.013	New	1	Pit42	0					
Pipe259	Pit42	Pit43	17.726	49.814	48.844	5.47	Concrete, u	225	225	0.013	New	1	Pit43	0					
Pipe208	Pit43	Pit56	15.2	48.814	48.144	4.41	Concrete, u	225	225	0.013	New	1	Pit56	0					
Pipe832	Pit56	Pit55	5.3	48.114	47.844	5.09	Concrete, u	225	225	0.013	New	1	Pit55	0					
Pipe231	Pit55	Pit57	36.249	47.769	46.069	4.69	Concrete, u	300	300	0.013	New	1	Pit57	0					
Pipe206	Pit36	Pit37	9.68	54.644	54.344	3.1	Concrete, u	225	225	0.013	New	1	Pit37	0					
P866	Pit37	Pit998	34.5	54.269	54.097	0.5	Concrete, u	300	300	0.013	New	1	Pit998	0					
Pipe54	Pit998	Pit58	79.8	53.825	47.555	7.86	Concrete, u	600	600	0.013	New	1	Pit58	0					
Pipe60	Pit35	Pit34	18.546	56.644	56.244	2.16	Concrete, u	225	225	0.013	New	1	Pit34	0					
Pipe61	Pit34	Pit30	36.811	56.214	56.03	0.5	Concrete, u	225	225	0.013	New	1	Pit30	0					
Pipe62	Pit30	Pit29	29.721	55.853	55.408	1.5	Concrete, u	450	450	0.013	New	1	Pit29	0					
Pipe53	Pit29	Pit28	10.846	55.33	55.276	0.5	Concrete, u	525	525	0.013	New	1	Pit28	0					
P863	Pit28	Pit998	37.5	54.67	53.855	2.17	Concrete, u	600	600	0.013	New	1	Pit998	0					
Pipe66	Pit27	Pit26	12.707	55.769	55.705	0.5	Concrete, u	300	300	0.013	New	1	Pit26	0					
Pipe65	Pit26	Pit28	83.206	55.341	54.925	0.5	Concrete, u	600	600	0.013	New	1	Pit28	0					
Pipe63	Pit25	Pit24	13.26	55.977	55.911	0.5	Concrete, u	100	100	0.013	New	1	Pit24	0					
Pipe64	Pit24	Pit26	75.568	55.76	55.382	0.5	Concrete, u	375	375	0.013	New	1	Pit26	0					
Pipe244	Pit20	Pit19	19.63	58.744	58.644	0.51	Concrete, u	225	225	0.013	New	1	Pit19	0					
Pipe243	Pit19	Pit18	18.783	58.614	58.52	0.5	Concrete, u	225	225	0.013	New	1	Pit18	0					
Pipe242	Pit18	Pit17	18.456	58.49	58.398	0.5	Concrete, u	300	300	0.013	New	1	Pit17	0					
Pipe228	Pit17	Pit16	6.755	58.368	58.334	0.5	Concrete, u	300	300	0.013	New	1	Pit16	0					
Pipe229	Pit16	Pit23	35.531	58.304	56.269	5.73	Concrete, u	300	300	0.013	New	1	Pit23	0					
Pipe230	Pit23	Pit24	22.039	56.19	55.79	1.81	Concrete, u	375	375	0.013	New	1	Pit24	0					
Pipe183	Pit15	Pit14	15.973	64.777	61.477	20.66	Concrete, u	100	100	0.013	New	1	Pit14	0					
Pipe182	Pit14	Pit12	84.942	61.447	59.777	1.97	Concrete, u	100	100	0.013	New	1	Pit12	0					
Pipe181	Pit12	Pit9	30.765	59.747	59.277	1.53	Concrete, u	100	100	0.013	New	1	Pit9	0					
Pipe180	Pit9	Pit6	92.333	59.247	56.777	2.68	Concrete, u	100	100	0.013	New	1	Pit6	0					
Pipe179	Pit6	Pit235	100.421	56.059	54.208	1.84	Concrete, u	450	450	0.013	New	1	Pit235	0					
Pipe736	Pit235	N664	11.626	53.302	53.158	1.24	Concrete, u	900	900	0.013	New	1	N664	0					
Pipe184	Pit13	Pit12	15.271	61.177	59.777	9.17	Concrete, u	100	100	0.013	New	1	Pit12	0					
Pipe185	Pit11	Pit10	14.189	59.477	59.406	0.5	Concrete, u	100	100	0.013	New	1	Pit10	0					
Pipe186	Pit10	Pit9	11.03	59.376	59.277	0.9	Concrete, u	100	100	0.013	New	1	Pit9	0					
Pipe187	Pit8	Pit6	16.343	56.49	56.408	0.5	Concrete, u	375	375	0.013	New	1	Pit6	0					
Pipe239	Pit1	N2	1000	99.277	94.277	0.5	Concrete, u	100	100	0.013	New	1	N2	0					
Pipe735	HW-BSN5	Pit5	17.3	51.5	51.32	1.04	Concrete, u	375	375	0.013	NewFixed	1	Pit5	0					
Pipe175	Pit5	Pit4	66.977	51.29	50.955	0.5	Concrete, u	375	375	0.013	New	1	Pit4	0					
Pipe176	Pit4	Pit3	34.886	50.925	50.751	0.5	Concrete, u	375	375	0.013	New	1	Pit3	0					
Pipe734	Pit3	N659	14.5	50.02	49.59	2.97	Concrete, u	750	750	0.013	New	1	N659	0					

P744	Pit635	Pit235	17.316	53.869	53.782	0.5	Concrete, u	300	300	0.013	New	1	Pit235	0						
Pipe80	HW-BSN3	Pit84	21.6	44.03	43.8	1.06	Concrete, u	450	450	0.013	NewFixed	1	Pit84	0						
Pipe245	Pit21	Pit22	20	58.569	58.369	1	Concrete, u	300	300	0.013	New	1	Pit22	0						
Pipe246	Pit22	Pit33	17.6	58.339	57.769	3.24	Concrete, u	300	300	0.013	New	1	Pit33	0						
Pipe250	Pit33	Pit32	18.499	57.739	57.369	2	Concrete, u	300	300	0.013	New	1	Pit32	0						
Pipe249	Pit32	Pit31	17.809	57.339	56.769	3.2	Concrete, u	300	300	0.013	New	1	Pit31	0						
Pipe205	Pit31	Pit30	23.782	56.739	56.62	0.5	Concrete, u	300	300	0.013	New	1	Pit30	0						
Pipe856	Pit996	Pit994	18.1	55.894	55.444	2.49	Concrete, u	225	225	0.013	New	1	Pit994	0						
Pipe852	Pit994	N1064	9	55.414	55.044	4.11	Concrete, u	225	225	0.013	New	1	N1064	0						
P895	Pit1000	Pit1001	14.8	55.644	54.644	6.76	Concrete, u	225	225	0.013	New	1	Pit1001	0						
Pipe872	Pit1001	Pit1009	13.6	54.614	53.844	5.66	Concrete, u	225	225	0.013	New	1	Pit1009	0						
P875	Pit1009	Pit1010	13.4	53.814	53.344	3.51	Concrete, u	225	225	0.013	New	1	Pit1010	0						
P876	Pit1010	Pit1011	13.8	53.314	52.644	4.86	Concrete, u	225	225	0.013	New	1	Pit1011	0						
P877	Pit1011	Pit1012	11.7	52.569	51.769	6.84	Concrete, u	300	300	0.013	New	1	Pit1012	0						
P878	Pit1012	Pit1013	11.2	51.739	51.269	4.2	Concrete, u	300	300	0.013	New	1	Pit1013	0						
P879	Pit1013	Pit1014	17.1	51.239	50.369	5.09	Concrete, u	300	300	0.013	New	1	Pit1014	0						
Pipe900	Pit1014	Pit1022	15.9	50.339	50.169	1.07	Concrete, u	300	300	0.013	New	1	Pit1022	0						
Pipe899	Pit1022	Pit51	41.5	50.09	49.69	0.96	Concrete, u	375	375	0.013	New	1	Pit51	0						
Pipe907	Pit1028	Pit1024	24.5	51.169	51.046	0.5	Concrete, u	300	300	0.013	New	1	Pit1024	0						
Pipe904	Pit1024	Pit185	35.9	51.016	48.569	6.82	Concrete, u	300	300	0.013	New	1	Pit185	0						
Pipe932	Pit1037	Pit1038	17.8	58.269	57.369	5.06	Concrete, u	300	300	0.013	New	1	Pit1038	0						
Pipe933	Pit1038	Pit1039	21.4	57.339	56.369	4.53	Concrete, u	300	300	0.013	New	1	Pit1039	0						
Pipe934	Pit1039	Pit1040	23.4	56.339	55.269	4.57	Concrete, u	300	300	0.013	New	1	Pit1040	0						
Pipe935	Pit1040	Pit1041	23.9	55.239	54.169	4.48	Concrete, u	300	300	0.013	New	1	Pit1041	0						
Pipe936	Pit1041	Pit1042	29.5	54.139	52.969	3.97	Concrete, u	300	300	0.013	New	1	Pit1042	0						
P925	Pit1042	Pit1043	13.5	52.939	52.669	2	Concrete, u	300	300	0.013	New	1	Pit1043	0						
P952	Pit1055	Pit1057	13.9	51.569	51.169	2.88	Concrete, u	300	300	0.013	New	1	Pit1057	0						
P1151	Pit1083	Pit114	14.2	48.077	47.277	5.63	Concrete, u	100	100	0.013	New	1	Pit114	0						
Pipe223	Pit114	Pit108	17	47.144	46.444	4.12	Concrete, u	225	225	0.013	New	1	Pit108	0						
Pipe302	Pit108	Pit109	21.4	46.369	45.869	2.34	Concrete, u	300	300	0.013	New	1	Pit109	0						
Pipe313	Pit109	Pit110	10.156	45.839	45.669	1.67	Concrete, u	300	300	0.013	New	1	Pit110	0						
Pipe311	Pit110	Pit111	9.963	45.59	45.49	1	Concrete, u	375	375	0.013	New	1	Pit111	0						
Pipe769	HW6	N1014	19.598	38.3	38.2	0.51	Concrete, u	450	450	0.013	NewFixed	1	N1014	0						
Pipe1067	HW9	Pit35783	42.6	46.067	45.902	0.39	Concrete, u	450	450	0.012	NewFixed	2	Pit35783	0						
P37225	Pit35783	Pit1b	25.1	44.1	43.9	0.8	Box culvert	1.2W x 0.6H		0.012	NewFixed	1	Pit1b	0						
P37246	Pit35783	N50029	7.1	45.902	45.87	0.45	Concrete, u	450	450	0.012	New	2	N50029	0						
Pipe1068	Pit1b	Pit1094	195	43.9	41.5	1.23	Box culvert	1.2W x 0.6H		0.012	NewFixed	1	Pit1094	0						
Pipe1070	Pit1094	Pit1090	89	41.5	41.2	0.34	Box culvert	1.2W x 0.6H		0.012	NewFixed	1	Pit1090	0						
Pipe754	Pit1090	Pit1315	74.9	41.1	40.72	0.51	Box culvert	1.2W x 0.6H		0.012	NewFixed	1	Pit1315	0						
P1390	Pit1315	Pit760	11.2	40.72	40.6	1.07	Box culvert	2.7W x 0.6H		0.012	NewFixed	4	Pit760	0						
P1097	Pit1098	Pit297	64.962	42.09	41.765	0.5	Concrete, u	375	375	0.013	New	1	Pit297	0						
Pipe9	Pit297	Pit298	11.318	41.735	41.655	0.71	Concrete, u	600	600	0.013	New	1	Pit298	0						
Pipe12	Pit298	Pit296	64.962	41.625	40.655	1.49	Concrete, u	600	600	0.013	New	1	Pit296	0						
P1231	Pit1305	Pit306	19.026	42.344	41.844	2.63	Concrete, u	225	225	0.013	New	1	Pit306	0						
P1234	HW20	Pit3	17.3	50.2	50.05	0.87	Concrete, u	750	750	0.013	NewFixed	1	Pit3	0						
P1461	HWBSN4a	Pit760	15.2	43.25	40.6	17.43	Concrete, u	750	750	0.013	NewFixed	2	Pit760	0						
P1471	HWBSN4b	Pit760	15.2	42.4	40.6	11.84	Concrete, u	450	450	0.013	NewFixed	1	Pit760	0						

Pipe27776	BSN3	N30841	10.1	43	42.4	5.94	Concrete, u	1050	1070	0.013	NewFixed	2	N30841	0					
Pipe1498	HWBSN3	N28574	8.4	42.15	42.1	0.6	Box culvert	2.1W x 0.6H		0.012	Existing	4	N28574	0					
P25691	HW10	N28560	18.4	43.8	43.7	0.54	Box culvert	2.4W x 0.6H		0.012	NewFixed	2	N28560	0					
P25725	HW13	Pit1315	18	40.9	40.8	0.56	Box culvert	2.1W x 0.6H		0.012	Existing	1	Pit1315	0					
P1003	Pit25375	Pit1080	22.5	47.477	47.077	1.78	Concrete, u	100	100	0.013	New	1	Pit1080	0					
P992	Pit1080	Pit35783	59.5	47.047	46.75	0.5	Concrete, u	100	100	0.013	New	1	Pit35783	0					
P36538	HW126	Pit1315	18	40.9	40.8	0.56	Box culvert	2.1W x 0.6H		0.012	Existing	4	Pit1315	0					
P25707	HW45	N28567	21.9	44.5	44.4	0.46	Concrete, u	450	450	0.012	NewFixed	2	N28567	0					

DETAILS of SERVICES CROSSING PIPES

Pipe	Chg	Bottom	Height of S	Chg	Bottom	Height of S	Chg	Bottom	Height of S	etc
	(m)	Elev (m)	(m)	(m)	Elev (m)	(m)	(m)	Elev (m)	(m)	etc
Pipe1070	19.1	42	0.5							

CHANNEL DETAILS

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

OVERFLOW ROUTE DETAILS

Name	From	To	Travel Time	Spill Level	Crest Length	Weir Coeff. C	Cross Section	Safe Depth Major Stor	SafeDepth Minor Stor	Safe DxV	Bed Slope	D/S Area Contributing	id	U/S IL	D/S IL	Length (m)
			(min)	(m)	(m)			(m)	(m)	(sq.m/sec)	(%)	%				
OF968	Pit317	Pit314	0.613333				Half Access	0.3	0.15	0.4	0.54	0	26562071	41.6	41.4	36.8
OF976	Pit302	Pit314	0.455				Half Access	0.3	0.15	0.4	0.37	0	26562079	41.5	41.4	27.3
OF983	Pit314	N1053	0.22				SWALE 10M	0.3	0.3	0.6	10.61	0	26562086	41.4	40	13.2
OF234	N1053	BSN1	0.236667				SWALE 10M	0.3	0.3	0.6	0.7	0	29733	38.5	38.4	14.2
OF885	Pit311	Pit313	0.568333				Half Access	0.3	0.15	0.4	0.59	0	26561986	41.8	41.6	34.1
OF896	Pit312	Pit302	1.14				Half Access	0.3	0.15	0.4	0.29	0	26561997	41.7	41.5	68.4
OF902	Pit313	Pit314	1.05667				Half Access	0.3	0.15	0.4	0.32	0	26562003	41.6	41.4	63.4
OF923	Pit309	Pit301	1.39167				Half Access	0.3	0.15	0.4	0.24	0	26562024	42.1	41.9	83.5
OF929	Pit308	Pit299	0.885				Half Access	0.3	0.15	0.4	0.19	0	26562030	42.1	42	53.1
OF954	Pit299	Pit300	0.475				Half Access	0.3	0.15	0.4	0.35	0	26562057	42	41.9	28.5
OF960	Pit300	Pit302	0.958333				Half Access	0.3	0.15	0.4	0.7	0	26562063	41.9	41.5	57.5
OF918	Pit307	Pit309	1.185				Half Access	0.3	0.15	0.4	1.27	0	26562019	43	42.1	71.1
OF914	Pit306	Pit308	1.14333				Half Access	0.3	0.15	0.4	0.87	0	26562015	42.7	42.1	68.6
OF942	Pit303	Pit305	0.456667				Half Access	0.3	0.15	0.4	0.73	0	26562045	43	42.8	27.4
OF936	Pit305	Pit306	0.82				Half Access	0.3	0.15	0.4	0.2	0	26562039	42.8	42.7	49.2
OF965	Pit301	Pit317	0.958333				Half Access	0.3	0.15	0.4	0.52	0	26562068	41.9	41.6	57.5
OF874	Pit295	Pit311	1.17667				Half Access	0.3	0.15	0.4	0.28	0	26561975	42	41.8	70.6
OF880	Pit296	Pit312	1.255				Half Access	0.3	0.15	0.4	0.27	0	26561981	41.9	41.7	75.3
OF2317	Pit293	Pit292	0.805				Half Access	0.2	0.2	0.6	4.55	0	52497448	54.5	52.3	48.3
OF1342	Pit290	Pit291	0.8967				Half Access	0.3	0.15	0.4	4.83	0	48391275	54.6	52	53.8
OF1346	Pit291	Pit1035	0.69				Half Access	0.3	0.15	0.4	5.71	0	48391279	52	49.6	42
OF1362	Pit1035	Pit1032	0.2133				Half Access	0.3	0.15	0.4	2.34	0	48391295	49.6	49.3	12.8
OF1370	Pit185	Pit1032	0.1817				Half Access	0.3	0.15	0.4	1.83	0	48391303	49.5	49.3	10.9
OF437	Pit1032	Pit49	1.18167				Half Access	0.3	0.15	0.4	0.99	0	297066	49.3	48.6	70.9
OF417	Pit49	Pit1309	0.395				Half Access	0.3	0.15	0.4	0.42	0	297046	48.6	48.5	23.7

OF2705	Pit1309	Pit48	0.84667			Half Access	0.2	0.2	0.6	0.2	0	2.04E+08	48.5	48.4	50.8		
OF1171	Pit48	Pit72	0.893333			Half Access	0.3	0.15	0.4	6.81	0	47307018	48.4	44.75	53.6		
OF1179	Pit72	Pit73	0.238333			Half Access	0.3	0.15	0.4	0.35	0	47307026	44.75	44.7	14.3		
OF1186	Pit73	Pit74	0.34			Half Access	0.3	0.15	0.4	0.98	0	47307033	44.7	44.5	20.4		
OF1192	Pit74	Pit64	0.5			Half Access	0.3	0.15	0.4	1.1	0	47307039	44.5	44.1	36.3		
OF68582	Pit64	N66678	0.28833			Overflow a	0.05	0	0.6	10.12	0	2.1E+08	44.3	42.6	16.8		
OF68563	N66678	BSN4	0.846667			Spillway 70	1	1	0.6	0.2	0	2.1E+08	42.6	42.5	49.6		
OF1353	Pit292	Pit1014	0.5467			Half Access	0.3	0.15	0.4	3.05	0	48391286	52.3	51.3	32.8		
OF1589	Pit285	Pit252	0.22833			Half Access	0.3	0.15	0.4	0.36	0	48391535	57.3	57.25	13.7		
OF1582	Pit253	Pit251	0.4033			Half Access	0.3	0.15	0.4	0.21	0	48391528	57.3	57.25	24.2		
OF1577	Pit251	Pit250	0.4016			Half Access	0.3	0.15	0.4	0.21	0	48391523	57.25	57.2	24.1		
OF2293	Pit283	Pit251	0.88167			Half Access	0.2	0.2	0.6	0.28	0	52497424	57.4	57.25	52.9		
OF2298	Pit286	Pit283	1.21			Half Access	0.2	0.2	0.6	0.55	0	52497429	57.8	57.4	72.6		
OF2311	Pit288	Pit289	0.5967			Half Access	0.2	0.2	0.6	1.12	0	52497442	57.4	57.2	17.8		
OF1336	Pit289	Pit290	0.9433			Half Access	0.3	0.15	0.4	4.59	0	48391269	57.2	54.6	56.6		
OF2306	Pit284	Pit279	1.6483			Half Access	0.2	0.2	0.6	3.19	0	52497437	57	53.85	98.9		
OF1695	Pit279	Pit278	0.375			Half Access	0.3	0.15	0.4	0.22	0	48937609	53.85	53.8	22.5		
OF1688	Pit280	Pit281	0.3117			Half Access	0.3	0.15	0.4	0.27	0	48937601	53.75	53.7	18.7		
OF1683	Pit281	Pit291	1.075			Swale with	0.45	0.3	1	2.64	0	48937596	53.7	52	64.5		
OF1607	Pit268	Pit269	0.2466			Swale with	0.45	0.3	1	0.68	0	48937519	57.1	57	14.8		
OF1615	Pit269	Pit270	0.20166			Swale with	0.45	0.3	1	2.46	0	48937528	57	56.7	12.2		
OF1616	Pit270	Pit271	0.2217			Swale with	0.45	0.3	1	0.74	0	48937529	56.7	56.6	13.6		
OF1617	Pit271	Pit272	0.2367			Swale with	0.45	0.3	1	1.41	0	48937530	56.6	56.4	14.2		
OF1618	Pit272	Pit273	0.2783			Swale with	0.45	0.3	1	1.8	0	48937531	56.4	56.1	16.7		
OF1619	Pit273	Pit274	0.3067			Swale with	0.45	0.3	1	0.54	0	48937532	56.1	56	18.4		
OF1620	Pit274	Pit275	0.385			Swale with	0.45	0.3	1	0.65	0	48937533	56	55.85	23.1		
OF1621	Pit275	Pit276	0.15			Swale with	0.45	0.3	1	0.56	0	48937534	55.85	55.8	9		
OF1677	Pit276	Pit278	0.58167			Swale with	0.45	0.3	1	5.73	0	48937590	55.8	53.8	34.9		
OF1701	Pit278	Pit281	0.375			Half Access	0.3	0.15	0.4	0.76	0	48937616	53.8	53.7	13.2		
OF1491	Pit260	Pit259	0.203			Swale with	0.45	0.3	1	0.41	0	48391426	60.6	60.55	12.2		
OF1490	Pit259	Pit258	0.293			Swale with	0.45	0.3	1	0.28	0	48391425	60.55	60.5	17.6		
OF1489	Pit258	Pit257	0.3133			Swale with	0.45	0.3	1	2.66	0	48391424	60.5	60	18.8		
OF1488	Pit257	Pit256	0.3133			Swale with	0.45	0.3	1	2.66	0	48391423	60	59.5	18.8		
OF1487	Pit256	Pit261	0.37167			Swale with	0.45	0.3	1	1.79	0	48391422	59.5	59.1	22.3		
OF1486	Pit261	Pit262	0.2167			Swale with	0.45	0.3	1	3.08	0	48391421	59.1	58.7	13		
OF1485	Pit262	Pit263	0.18167			Swale with	0.45	0.3	1	1.83	0	48391420	58.7	58.5	10.9		
OF1484	Pit263	Pit264	0.2017			Swale with	0.45	0.3	1	2.48	0	48391419	58.5	58.2	12.1		
OF1483	Pit264	Pit265	0.1967			Swale with	0.45	0.3	1	2.54	0	48391418	58.2	57.9	11.8		
OF1482	Pit265	Pit266	0.1933			Swale with	0.45	0.3	1	1.29	0	48391417	57.9	57.75	11.6		
OF1476	Pit266	Pit267	0.3767			Swale with	0.45	0.3	1	0.66	0	48391411	57.75	57.6	22.6		
OF1544	Pit267	Pit249	0.44			Half Access	0.3	0.15	0.4	2.27	0	48391479	57.6	57	26.4		
OF1429	Pit249	Pit248	0.52			Half Access	0.3	0.15	0.4	0.32	0	48391364	57.1	57	31.2		
OF1563	Pit250	Pit249	0.46			Half Access	0.3	0.15	0.4	0.36	0	48391504	57.2	57.1	27.6		
OF1601	Pit255	Pit285	1.533			Half Access	0.3	0.15	0.4	0.16	0	48391549	57.45	57.3	92		
OF1594	Pit254	Pit253	1.5517			Half Access	0.2	0.2	0.6	0.16	0	48391540	57.45	57.3	93.1		
OF1555	Pit252	Pit250	0.2583			Half Access	0.3	0.15	0.4	0.32	0	48391493	57.25	57.2	15.5		
OF1461	Pit247	Pit237	0.9583			Half Access	0.3	0.15	0.4	2.43	0	48391396	57.9	56.5	57.5		

OF2510	Pit246	Pit248	0.3467			Half Access	0.2	0.2	0.6	4.33	0	1.21E+08	57.9	57	20.8			
OF1423	Pit248	Pit237	0.99			Half Access	0.3	0.15	0.4	0.84	0	48391358	57	56.5	59.4			
OF1442	Pit245	Pit247	1.3283			Half Access	0.3	0.15	0.4	3.64	0	48391377	60.8	57.9	79.7			
OF1450	Pit244	Pit246	1.327			Half Access	0.3	0.15	0.4	3.52	0	48391385	60.7	57.9	79.6			
OF1435	Pit242	Pit243	0.4967			Half Access	0.3	0.15	0.4	0.67	0	48391370	63	62.8	29.8			
OF1455	Pit243	Pit244	1.0167			Half Access	0.3	0.15	0.4	3.44	0	48391390	62.8	60.7	61			
OF1390	Pit241	Pit238	1.225			Half Access	0.3	0.15	0.4	4.76	0	48391323	60	56.5	73.5			
OF1398	Pit240	Pit239	1.1833			Half Access	0.3	0.15	0.4	4.51	0	48391331	60.2	57	71			
OF1469	Pit239	N1270	0.4233			Half Access	0.3	0.15	0.4	3.94	0	48391404	57	56	25.4			
OF1417	Pit237	N1270	0.4267			Half Access	0.3	0.15	0.4	1.95	0	48391352	56.5	56	25.6			
OF1408	Pit238	N1270	0.295			Half Access	0.3	0.15	0.4	2.82	0	48391342	56.5	56	17.7			
OF1056	Pit233	Pit232	0.776667			Half Access	0.3	0.15	0.4	3.22	0	39817677	60	58.5	46.6			
OF1062	Pit232	Pit219	0.901667			Half Access	0.3	0.15	0.4	3.7	0	39817683	58.5	56.5	54.1			
OF1080	Pit220	Pit1043	1.10167			Half Access	0.3	0.15	0.4	3.93	0	39817702	56.2	53.6	66.1			
OF1086	Pit1043	Pit221	0.606667			Half Access	0.3	0.15	0.4	2.47	0	39817708	53.6	52.7	36.4			
OF1772	Pit221	Pit223	0.61166			Half Access	0.3	0.15	0.4	1.89	0	50031938	52.7	52	37			
OF1776	Pit223	Pit222	0.35			Half Access	0.3	0.15	0.4	1.9	0	50031942	52	51.6	21			
OF1783	Pit222	Pit217	0.47			Half Access	0.3	0.15	0.4	1.77	0	50031949	51.6	51.1	28.2			
OF1784	Pit217	Pit218	0.865			Half Access	0.3	0.15	0.4	1.16	0	50031950	51.1	50.5	51.9			
OF1785	Pit218	Pit209	0.4233			Half Access	0.3	0.15	0.4	1.18	0	50031951	50.5	50.2	25.4			
OF1786	Pit209	Pit210	0.8283			Half Access	0.2	0.2	0.6	0.4	0	50031952	50.2	50	49.7			
OF1787	Pit210	Pit211	0.4017			Half Access	0.3	0.15	0.4	3.32	0	50031953	50	49.2	24.1			
OF1788	Pit211	Pit212	0.56			Half Access	0.3	0.15	0.4	3.87	0	50031954	49.2	47.9	33.6			
OF2139	Pit212	Pit216	0.25			Half Minor	0.3	0.3	0.6	1.39	0	51855224	47.9	47.2	50.2			
OF29346	Pit216	Pit57587	3			Half Minor	0.3	0.3	0.6	1.52	0	2.08E+08	47.8	47.5	19.8			
OF68488	Pit57587	Pit57586	3			Half Minor	0.3	0.3	0.6	1.44	0	2.1E+08	47.5	47	34.8			
OF68493	Pit57586	Pit57588	3			Half Minor	0.3	0.3	0.6	0.25	0	2.1E+08	47	46.9	39.6			
OF68498	Pit57588	Pit111	3			Half Minor	0.3	0.3	0.6	1.39	0	2.1E+08	46.9	46.5	28.8			
OF68327	Pit111	Pit151	0.1783			Swale with	0.45	0.3	1	1.29	0	2.1E+08	46.5	46.1	31			
OF30334	Pit151	HW10	0.321667			Half Access	0.2	0.2	0.6	11.03	0	2.08E+08	46.1	44.5	14.5			
OF30206	Pit24717	N28560	0.321667			Half Access	0.2	0.2	0.6	11.72	0	2.08E+08	46	44.3	14.5			
OF30391	Pit125	BSN3	0.311667			Half Access	0.2	0.2	0.6	6.7	0	2.08E+08	46.1	43	46.3			
OF3140	N1622	BIO3B	0.195			20 m grass	0.6	0.3	0.6	0.85	0	2.07E+08	44.6	44.5	11.7			
OF1707	Pit225	Pit227	1.06			Half Access	0.3	0.15	0.4	4.96	0	50031872	58.8	55.2	72.6			
OF1749	Pit226	Pit227	1.1817			Half Access	0.3	0.15	0.4	4.65	0	50031915	58.5	55.2	70.9			
OF1754	Pit227	Pit228	0.2967			Half Access	0.3	0.15	0.4	2.25	0	50031920	55.2	54.8	17.8			
OF1761	Pit228	Pit224	0.6833			Half Access	0.3	0.15	0.4	4.39	0	50031927	54.8	53	41			
OF1767	Pit224	Pit221	0.4133			Half Access	0.3	0.15	0.4	1.2	0	50031933	53	52.7	25.1			
OF1069	Pit219	Pit1042	1.06			Half Access	0.3	0.15	0.4	4.09	0	39817690	56.5	53.9	63.6			
OF1030	Pit196	Pit182	1.35833			Half Access	0.3	0.15	0.4	5.28	0	39817650	63.3	59	81.5			
OF1043	Pit229	Pit230	0.656667			Half Access	0.3	0.15	0.4	6.09	0	39817663	63	60.6	39.4			
OF1050	Pit230	Pit234	0.178333			Half Access	0.3	0.15	0.4	5.61	0	39817671	60.6	60	10.7			
OF1036	Pit234	Pit177	0.691667			Half Access	0.3	0.15	0.4	4.1	0	39817656	60	58.3	41.5			
OF1018	Pit177	Pit178	0.486667			Half Access	0.3	0.15	0.4	5.14	0	39817638	58.3	56.8	29.2			
OF1012	Pit178	Pit169	0.665			Half Access	0.3	0.15	0.4	4.51	0	39817632	56.8	55	39.9			
OF1005	Pit169	Pit171	0.301667			Half Access	0.3	0.15	0.4	2.76	0	39817625	55	54.5	18.1			
OF565	Pit171	Pit168	0.536667			Half Access	0.3	0.15	0.4	4.66	0	6795892	54.5	53	32.2			

OF559	Pit168	Pit167	0.801667			Half Access	0.3	0.15	0.4	4.57	0	6796886	53	50.8	48.1		
OF553	Pit167	Pit123	1.21833			Half Access	0.3	0.15	0.4	6.88	0	6796880	50.8	48	40.7		
OF2159	Pit123	Pit85	0.27166			Half Access	0.2	0.2	0.6	4.24	0	51855244	48	45	70.7		
OF68652	Pit57623	Pit118	0.2683			Half Minor	0.2	0.2	0.6	1.91	0	2.1E+08	50.3	49.6	36.6		
OF2205	Pit118	Pit119	0.2683			Half Minor	0.2	0.2	0.6	3.7	0	51856481	49.6	48.7	24.3		
OF2214	Pit119	Pit121	0.5717			Half Minor	0.2	0.2	0.6	2.85	0	51856490	48.7	47.9	28.1		
OF2256	Pit121	Pit151	1.7817			Half Access	0.2	0.2	0.6	3.34	0	51856532	47.9	46.1	53.9		
OF2008	Pit194	Pit1055	1.0267			Half Access	0.3	0.15	0.4	4.87	0	51226215	55.5	52.5	61.6		
OF2048	Pit193	Pit1057	1.045			Half Access	0.3	0.15	0.4	5.42	0	51226255	55.5	52.1	62.7		
OF2052	Pit1057	Pit217	0.61167			Half Access	0.3	0.15	0.4	2.72	0	51226259	52.1	51.1	36.7		
OF2021	Pit192	Pit1069	0.5283			Half Access	0.3	0.15	0.4	5.05	0	51226228	52.1	50.5	31.7		
OF2032	Pit191	Pit1070	0.53167			Half Access	0.3	0.15	0.4	4.39	0	51226239	51.9	50.5	31.9		
OF2038	Pit1070	Pit209	0.53167			Half Access	0.3	0.15	0.4	0.94	0	51226245	50.5	50.2	31.9		
OF1914	Pit189	Pit188	0.1933			Swale with	0.45	0.3	1	4.31	0	50032092	52.3	51.8	11.6		
OF1907	Pit188	Pit190	0.20833			Swale with	0.45	0.3	1	4.8	0	50032085	51.8	51.2	12.5		
OF1920	Pit190	Pit198	0.21167			Swale with	0.45	0.3	1	0.79	0	50032098	51.2	51.1	12.7		
OF1927	Pit198	Pit199	0.3083			Swale with	0.45	0.3	1	0.54	0	50032105	51.1	51	18.5		
OF1933	Pit199	Pit216	0.27167			Half Minor	0.2	0.2	0.6	4.82	0	50032111	51	47.2	78.8		
OF1938	Pit200	Pit201	0.31			Swale with	0.45	0.3	1	3.76	0	50032116	51.2	50.5	18.6		
OF1947	Pit201	Pit202	0.2433			Swale with	0.45	0.3	1	3.42	0	50032125	50.5	50	14.6		
OF1993	Pit202	Pit203	0.625			Half Access	0.3	0.15	0.4	3.31	0	51226200	50	49.5	15.1		
OF2003	Pit203	Pit216	0.555			Half Access	0.3	0.15	0.4	4.68	0	51226210	49.5	47.8	36.3		
OF2057	Pit187	Pit117	1.18167			Half Access	0.3	0.15	0.4	2.82	0	51226264	52.2	50.2	70.9		
OF2065	Pit186	Pit118	1.18167			Half Access	0.3	0.15	0.4	4.78	0	51226272	52.3	48.9	71.2		
OF1628	Pit184	Pit183	0.2733			Swale with	0.45	0.3	1	0.61	0	48937541	56.4	56.3	16.4		
OF1627	Pit183	Pit277	0.38			Swale with	0.45	0.3	1	0.44	0	48937540	56.3	56.2	22.8		
OF1622	Pit277	Pit276	0.585			Swale with	0.45	0.3	1	1.14	0	48937535	56.2	55.8	35.1		
OF1024	Pit182	Pit170	1.34333			Half Access	0.3	0.15	0.4	4.84	0	39817644	59	55.1	80.6		
OF1817	Pit179	Pit180	0.2067			Swale with	0.45	0.3	1	0.81	0	50031983	58.6	58.5	12.4		
OF1824	Pit180	Pit181	0.2483			Swale with	0.45	0.3	1	1.34	0	50031990	58.5	58.3	14.9		
OF1825	Pit181	Pit1052	0.633			Swale with	0.45	0.3	1	0.53	0	50031991	58.3	58.1	38		
OF1837	Pit1052	Pit178	0.7			Half Access	0.3	0.15	0.4	0.71	0	50032003	57.1	56.8	42		
OF1872	Pit176	Pit1063	0.2667			Swale with	0.45	0.3	1	4.37	0	50032050	55.1	54.4	16		
OF1878	Pit1063	Pit1065	0.275			Swale with	0.45	0.3	1	4.85	0	50032056	54.4	53.6	16.5		
OF1879	Pit1065	Pit1066	0.28167			Swale with	0.45	0.3	1	4.73	0	50032057	53.6	52.8	16.9		
OF1880	Pit1066	Pit1067	0.265			Swale with	0.45	0.3	1	4.4	0	50032058	52.8	52.1	15.9		
OF1881	Pit1067	Pit1068	0.285			Swale with	0.45	0.3	1	4.68	0	50032059	52.1	51.3	17.1		
OF1882	Pit1068	Pit1069	0.5583			Swale with	0.45	0.3	1	2.39	0	50032060	51.3	50.5	33.5		
OF2028	Pit1069	Pit209	0.63166			Half Access	0.3	0.15	0.4	0.79	0	51226235	50.5	50.2	37.9		
OF1859	Pit175	Pit174	0.31			Swale with	0.45	0.3	1	0.54	0	50032026	55.8	55.7	18.6		
OF1858	Pit174	Pit173	0.325			Swale with	0.45	0.3	1	2.05	0	50032025	55.7	55.3	19.5		
OF1857	Pit173	Pit172	0.1883			Swale with	0.45	0.3	1	3.54	0	50032024	55.3	54.9	11.3		
OF1847	Pit172	Pit171	0.2817			Swale with	0.45	0.3	1	2.33	0	50032013	54.9	54.5	17.2		
OF999	Pit170	Pit166	1.40833			Half Access	0.3	0.15	0.4	4.97	0	39817619	55.1	50.9	84.5		
OF991	Pit166	Pit84	1.80667			Half Minor	0.2	0.2	0.6	5.41	0	39817611	50.9	45	109		
OF714	Pit165	Pit164	0.305			Half Access	0.3	0.15	0.4	0.55	0	26560592	46.3	46.2	18.3		
OF721	Pit164	Pit304	1.83167			Half Access	0.3	0.15	0.4	2.73	0	26560599	46.2	43.2	109.9		

OF948	Pit304	Pit305	0.235				Half Access	0.3	0.15	0.4	2.84	0	26562051	43.2	42.8	14.1		
OF700	Pit162	Pit163	0.251667				Half Access	0.3	0.15	0.4	1.99	0	26560578	48.1	47.8	15.1		
OF708	Pit163	Pit161	0.206667				Half Access	0.3	0.15	0.4	2.42	0	26560586	47.8	47.5	12.4		
OF683	Pit161	Pit148	1.08167				Half Access	0.3	0.15	0.4	3.08	0	26560560	47.5	45.5	64.9		
OF677	Pit148	Pit135	0.895				Half Access	0.3	0.15	0.4	1.12	0	26560554	45.5	44.9	53.7		
OF671	Pit135	Pit132	0.311667				Half Access	0.3	0.15	0.4	1.6	0	26560548	44.9	44.6	18.7		
OF665	Pit132	Pit102	0.6317				Half Access	0.3	0.15	0.4	0.54	0	26560542	44.6	44.4	37		
OF612	Pit102	Pit98	0.225				Half Access	0.3	0.15	0.4	0.53	0	26560476	44.4	44.3	19		
OF582	Pit98	BIO2B	0.631667				Half Access	0.3	0.15	0.4	1.58	0	26560446	44.3	43.7	37.9		
OF2666	BIO2B	Basin873	0.5	42.5	20	1.7	20 m grass	0.6	0.3	0.6	4.12	0	2.04E+08	42.5	41	36.4		
OF768	Pit158	N1231	0.525				Swale with	0.45	0.3	1	1.9	0	26560652	46.8	46.2	31.5		
OF762	Pit157	Pit158	0.125				Swale with	0.45	0.3	1	0.67	0	26560646	46.85	46.8	7.5		
OF757	Pit156	Pit157	0.223333				Swale with	0.45	0.3	1	0.37	0	26560641	46.9	46.85	13.4		
OF748	Pit155	Pit156	0.216667				Swale with	0.45	0.3	1	0.38	0	26560632	46.95	46.9	13		
OF745	Pit154	Pit155	0.205				Swale with	0.45	0.3	1	0.41	0	26560630	47	46.95	12.3		
OF788	Pit153	Pit152	0.211667				Swale with	0.45	0.3	1	3.94	0	26560675	46.7	46.2	12.7		
OF798	Pit152	Pit145	0.238333				Swale with	0.45	0.3	1	0.7	0	26560685	46.2	46.1	14.3		
OF782	Pit145	Pit146	0.44				Half Access	0.3	0.15	0.4	1.14	0	26560669	46.1	45.8	26.4		
OF2286	Pit146	Pit148	0.31				Half Access	0.2	0.2	0.6	1.61	0	52497417	45.8	45.5	18.6		
OF2279	Pit147	Pit148	0.18167				Half Access	0.2	0.2	0.6	1.83	0	52497410	45.7	45.5	10.9		
OF728	Pit144	Pit136	1.79667				Half Access	0.3	0.15	0.4	0.83	0	26560606	46.3	45.4	107.8		
OF844	Pit143	Pit142	0.325				Swale with	0.45	0.3	1	1.03	0	26560746	46.1	45.9	19.5		
OF837	Pit142	Pit141	0.223333				Swale with	0.45	0.3	1	0.37	0	26560739	45.9	45.85	13.4		
OF831	Pit141	Pit140	0.2				Swale with	0.45	0.3	1	0.42	0	26560733	45.85	45.8	12		
OF825	Pit140	Pit139	0.188333				Swale with	0.45	0.3	1	0.88	0	26560727	45.8	45.7	11.3		
OF814	Pit139	Pit138	0.143333				Swale with	0.45	0.3	1	1.16	0	26560716	45.7	45.6	8.6		
OF813	Pit138	Pit137	0.228333				Swale with	0.45	0.3	1	0.73	0	26560715	45.6	45.5	13.7		
OF806	Pit137	Pit136	0.273333				Swale with	0.45	0.3	1	0.61	0	26560708	45.5	45.4	16.4		
OF852	Pit136	Pit135	0.588333				Half Access	0.3	0.15	0.4	1.42	0	26560754	45.4	44.9	35.3		
OF2224	Pit122	Pit24717	0.4233				Half Minor	0.2	0.2	0.6	3.18	0	51856500	48	46	62.9		
OF2322	Pit103	BSN3	0.73				Half Access	0.2	0.2	0.6	3.87	0	53133641	45	43	51.7		
OF3176	N1629	BIO3A	0.1833				20 m grass	0.6	0.3	0.6	0.91	0	2.07E+08	44.6	44.5	11		
OF2196	Pit117	Pit118	0.51833				Half Minor	0.2	0.2	0.6	2.38	0	51856472	50.2	49.6	25.2		
OF606	Pit101	Pit98	0.23				Half Access	0.3	0.15	0.4	5.07	0	26560470	45	44.3	13.8		
OF492	Pit99	Pit760	1.5				Half Access	0.3	0.15	0.4	0.35	0	6796818	42.3	42	85.6		
OF512	Pit760	N805	0.301667				Aulds Road	0.6	0.3	0.6	5.52	0	6796838	42	41	18.1		
OF15	N805	N1049	0.215				Ripley Natu	1	0.6	0.6	12.79	0	1906	40.55	38.9	12.9		
OF2229	Pit87	Pit86	0.3267				Half Minor	0.2	0.2	0.6	2.97	0	51856505	46.8	46.2	20.2		
OF2240	Pit86	Pit85	0.285				Half Minor	0.2	0.2	0.6	6.67	0	51856516	46.2	45	18		
OF538	Pit85	Pit1090	0.3				Half Access	0.3	0.15	0.4	0.6	0	6796865	45	44.2	133.2		
OF68386	Pit84	Pit73	1.80667				Half Minor	0.2	0.2	0.6	0.44	0	2.1E+08	45	44.7	68.1		
OF1104	Pit82	Pit81	0.195				Swale with	0.45	0.3	1	3.42	0	46223593	48.5	48.1	11.7		
OF1113	Pit81	Pit80	0.216667				Swale with	0.45	0.3	1	3.85	0	46223602	48.1	47.6	13		
OF1118	Pit80	Pit79	0.21				Swale with	0.45	0.3	1	3.97	0	46223607	47.6	47.1	12.6		
OF1125	Pit79	Pit78	0.218333				Swale with	0.45	0.3	1	3.05	0	46223614	47.1	46.7	13.1		
OF1129	Pit78	Pit77	0.21				Swale with	0.45	0.3	1	7	0	46223618	46.7	46	10		
OF2444	Pit63	N66678	0.16				Half Access	0.2	0.2	0.6	8.48	0	67685693	45.9	42.6	38.9		

OF187	N998	BIO2A	0.28			SWALE 10M	0.3	0.3	0.6	0.7	0	29021	44.2	44	28.5		
OF1131	Pit77	Pit57610	0.17			Swale with	0.45	0.3	1	2.53	0	46223620	46	45	39.6		
OF2273	Pit57610	Pit64	0.28833			Half Access	0.2	0.2	0.6	3.27	0	52497404	45	44.1	27.5		
OF1257	Pit59	Pit63	1.845			Half Access	0.3	0.15	0.4	2.53	0	47851329	48.7	45.9	110.7		
OF485	Pit58	Pit57	0.533333			Half Access	0.3	0.15	0.4	5.62	0	6796811	48.8	47	32		
OF480	Pit57	Pit75	1.4			Half Access	0.3	0.15	0.4	1.03	0	6796806	47	46.3	67.9		
OF390	Pit53	Pit52	0.88			Half Access	0.3	0.15	0.4	4.73	0	297019	53.5	51	52.8		
OF396	Pit54	Pit50	0.861667			Half Access	0.3	0.15	0.4	4.84	0	297025	53.5	51	51.7		
OF410	Pit50	Pit51	0.375			Half Access	0.3	0.15	0.4	1.33	0	297039	51	50.7	22.5		
OF423	Pit51	Pit47	1.21167			Half Access	0.3	0.15	0.4	0.96	0	297052	50.7	50	72.7		
OF404	Pit52	Pit51	0.398333			Half Access	0.3	0.15	0.4	1.26	0	297033	51	50.7	23.9		
OF445	Pit45	Pit47	1.23333			Half Access	0.3	0.15	0.4	4.59	0	297074	53.4	50	74		
OF451	Pit44	Pit46	0.96			Half Access	0.3	0.15	0.4	4.69	0	297080	53.3	50.6	57.6		
OF1250	Pit46	Pit47	0.3417			Half Access	0.3	0.15	0.4	2.93	0	47851322	50.6	50	20.5		
OF1164	Pit47	Pit48	0.531667			Half Access	0.3	0.15	0.4	5.02	0	47307011	50	48.4	31.9		
OF1198	Pit38	Pit39	0.25			Swale with	0.45	0.3	1	6.67	0	47307045	54	53	15		
OF1205	Pit39	Pit40	0.248333			Swale with	0.45	0.3	1	4.7	0	47307052	53	52.3	14.9		
OF1206	Pit40	Pit41	0.26			Swale with	0.45	0.3	1	5.77	0	47307053	52.3	51.4	15.6		
OF1207	Pit41	Pit42	0.243333			Swale with	0.45	0.3	1	4.79	0	47307054	51.4	50.7	14.6		
OF1223	Pit42	Pit43	0.308333			Swale with	0.45	0.3	1	5.41	0	47307070	50.7	49.7	18.5		
OF1230	Pit43	Pit56	0.286667			Swale with	0.45	0.3	1	4.07	0	47307077	49.7	49	17.2		
OF1236	Pit56	Pit55	0.105			Swale with	0.45	0.3	1	4.76	0	47307083	49	48.7	6.3		
OF1237	Pit55	Pit57	0.611667			Swale with	0.45	0.3	1	4.63	0	47307084	48.7	47	36.7		
OF1265	Pit36	Pit37	0.1667			Swale with	0.45	0.3	1	3	0	47851337	55.5	55.2	10		
OF1277	Pit37	Pit998	0.595			Swale with	0.45	0.3	1	0.28	0	47851349	55.2	55.1	35.7		
OF470	Pit998	Pit58	1.30167			Half Access	0.3	0.15	0.4	8.07	0	6796796	55.1	48.8	78.1		
OF303	Pit35	N1071	1.49667			Half Access	0.3	0.15	0.4	8.13	0	296932	57.5	50.2	89.8		
OF311	Pit34	N1071	1.275			Half Access	0.3	0.15	0.4	9.02	0	296940	57.1	50.2	76.5		
OF356	Pit30	Pit29	0.52			Swale with	0.45	0.3	1	3.53	0	296985	57.6	56.5	31.2		
OF2437	Pit29	Pit59	1.90167			Half Access	0.2	0.2	0.6	6.84	0	60728419	56.5	48.7	114.1		
OF464	Pit28	Pit998	0.615			Half Access	0.3	0.15	0.4	4.61	0	6796790	56.8	55.1	36.9		
OF441	Pit27	Pit45	1.17833			Half Access	0.3	0.15	0.4	4.67	0	297070	56.7	53.4	70.7		
OF457	Pit26	Pit27	0.251667			Half Access	0.3	0.15	0.4	0.66	0	6796783	56.8	56.7	15.1		
OF381	Pit25	Pit53	1.05			Half Access	0.3	0.15	0.4	5.08	0	297010	56.7	53.5	63		
OF362	Pit24	Pit25	0.275			Half Access	0.3	0.15	0.4	0.61	0	296991	56.8	56.7	16.5		
OF140	Pit20	Pit19	0.34			Swale with	0.45	0.3	1	0.49	0	3168	59.6	59.5	20.4		
OF141	Pit19	Pit18	0.323333			Swale with	0.45	0.3	1	0.26	0	3169	59.5	59.45	19.4		
OF142	Pit18	Pit17	0.31			Swale with	0.45	0.3	1	0.27	0	3170	59.45	59.4	18.6		
OF143	Pit17	Pit16	0.118333			Swale with	0.45	0.3	1	1.41	0	3171	59.4	59.3	7.1		
OF144	Pit16	Pit23	0.615			Swale with	0.45	0.3	1	5.69	0	3172	59.3	57.2	36.9		
OF1285	Pit23	Pit24	0.39			Half Access	0.3	0.15	0.4	1.71	0	47851358	57.2	56.8	23.4		
OF85	Pit15	Pit13	1.38167			Half Access	0.3	0.15	0.4	4.34	0	2743	65.5	61.9	82.9		
OF317	Pit14	Pit12	1.43833			Half Access	0.3	0.15	0.4	1.97	0	296946	62.2	60.5	86.3		
OF104	Pit12	Pit11	0.285			Half Access	0.3	0.15	0.4	1.75	0	2763	60.5	60.2	17.1		
OF99	Pit9	Pit6	1.55333			Half Access	0.3	0.15	0.4	2.68	0	2757	60	57.5	93.2		
OF75	Pit6	Pit235	1.685			Half Access	0.3	0.15	0.4	2.18	0	2733	57.5	55.3	101.1		
OF57	Pit235	N664	0.225			Half Access	0.3	0.15	0.4	2.22	0	2714	55.3	55	13.5		

OF213	N664	BIO5	0.16				SWALE 10N	0.3	0.3	0.6	1.08	0	29053	53	52.9	9.3		
OF81	Pit13	Pit8	2.00333				Half Access	0.3	0.15	0.4	3.66	0	2739	61.9	57.5	120.2		
OF111	Pit11	Pit23	1.42167				Half Access	0.3	0.15	0.4	3.52	0	2769	60.2	57.2	85.3		
OF123	Pit10	Pit286	1.08667				Half Access	0.3	0.15	0.4	3.83	0	2781	60.3	57.8	65.2		
OF69	Pit8	Pit635	1.67833				Half Access	0.3	0.15	0.4	2.68	0	2727	57.5	54.8	100.7		
OF29	HW-BSN5	Pit5	0.296667	55	10	1.7	Half Access	0.3	0.15	0.4	2.72	0	2320	55	54.5	18.4		
OF38	Pit5	Pit4	1.13167				Half Access	0.3	0.15	0.4	2.21	0	2694	54.5	53	67.9		
OF5	Pit4	Pit3	0.593333				Half Access	0.3	0.15	0.4	2.81	0	1862	53	52	35.6		
OF9	Pit3	N659	0.29				SWALE 10N	0.3	0.3	0.6	5.75	0	1865	52	51	17.4		
OF44	Pit635	Pit5	0.573333				Half Access	0.3	0.15	0.4	0.87	0	2700	54.8	54.5	34.4		
OF20	HW-BSN3	Pit72	0.3933	46	20	1.7	Half Access	0.3	0.15	0.4	2.34	0	2160	46.5	44.75	74.7		
OF191	N807	BIO2A	0.3				SWALE 10N	0.3	0.3	0.6	0.73	0	29027	44.3	44	41.3		
OF323	Pit21	Pit22	0.303333				Swale with	0.45	0.3	1	1.1	0	296952	59.5	59.3	18.2		
OF330	Pit22	Pit33	0.348333				Swale with	0.45	0.3	1	2.87	0	296959	59.3	58.7	20.9		
OF331	Pit33	Pit32	0.32				Swale with	0.45	0.3	1	2.08	0	296960	58.7	58.3	19.2		
OF332	Pit32	Pit31	0.326667				Swale with	0.45	0.3	1	3.06	0	296961	58.3	57.7	19.6		
OF333	Pit31	Pit30	0.385				Swale with	0.45	0.3	1	0.43	0	296962	57.7	57.6	23.1		
OF132	Pit996	Pit994	0.315				Half Access	0.3	0.15	0.4	2.38	0	2827	56.75	56.3	18.9		
OF129	Pit994	N1064	0.151667				Half Access	0.3	0.15	0.4	4.4	0	2821	56.3	55.9	9.1		
OF216	N1064	BSN5	0.245				SWALE 10N	0.3	0.3	0.6	23.4	0	29056	55.04	51.6	14.7		
OF1291	Pit1000	Pit1001	0.2733				Swale with	0.45	0.3	1	6.1	0	47851364	56.5	55.5	16.4		
OF1297	Pit1001	Pit1009	0.27				Swale with	0.45	0.3	1	4.94	0	47851370	55.5	54.7	16.2		
OF1298	Pit1009	Pit1010	0.2683				Swale with	0.45	0.3	1	3.11	0	47851371	54.7	54.2	16.1		
OF1299	Pit1010	Pit1011	0.2417				Swale with	0.45	0.3	1	-7.59	0	47851372	52.4	53.5	14.5		
OF1300	Pit1011	Pit1012	0.22167				Swale with	0.45	0.3	1	6.02	0	47851373	53.5	52.7	13.3		
OF1301	Pit1012	Pit1013	0.2283				Swale with	0.45	0.3	1	3.65	0	47851374	52.7	52.2	13.7		
OF1302	Pit1013	Pit1014	0.3017				Swale with	0.45	0.3	1	4.97	0	47851375	52.2	51.3	18.1		
OF1303	Pit1014	Pit1022	0.2867				Half Access	0.3	0.15	0.4	1.16	0	47851376	51.3	51.1	17.2		
OF430	Pit1022	Pit51	0.728333				Half Access	0.3	0.15	0.4	0.92	0	297059	51.1	50.7	43.7		
OF1376	Pit1028	Pit1024	0.4				Swale with	0.45	0.3	1	0.42	0	48391309	52.1	52	24		
OF1377	Pit1024	Pit185	0.6167				Swale with	0.45	0.3	1	6.76	0	48391310	52	49.5	37		
OF1716	Pit1037	Pit1038	0.3033				Swale with	0.45	0.3	1	4.95	0	50031882	59.2	58.3	18.2		
OF1722	Pit1038	Pit1039	0.375				Swale with	0.45	0.3	1	4.44	0	50031888	58.3	57.3	22.5		
OF1728	Pit1039	Pit1040	0.42				Swale with	0.45	0.3	1	4.37	0	50031894	57.3	56.2	25.2		
OF1729	Pit1040	Pit1041	0.3867				Swale with	0.45	0.3	1	4.74	0	50031895	56.2	55.1	23.2		
OF1730	Pit1041	Pit1042	0.5117				Swale with	0.45	0.3	1	3.91	0	50031896	55.1	53.9	30.7		
OF1074	Pit1042	Pit221	0.698333				Half Access	0.3	0.15	0.4	2.86	0	39817696	53.9	52.7	41.9		
OF2014	Pit1055	Pit222	0.74167				Half Access	0.3	0.15	0.4	2.02	0	51226221	52.5	51.6	44.5		
OF2109	Pit1083	Pit114	0.705				Swale with	0.45	0.3	1	5.3	0	51855172	48.8	48	15.1		
OF2431	Pit114	Pit108	0.29167				Swale with	0.45	0.3	1	4.46	0	53133753	48	47.3	15.7		
OF2419	Pit108	Pit109	0.39				Swale with	0.45	0.3	1	2.48	0	53133741	47.3	46.8	20.2		
OF2410	Pit109	Pit110	0.1783				Swale with	0.45	0.3	1	1.52	0	53133732	46.8	46.6	13.2		
OF68305	Pit110	Pit111	0.1783				Swale with	0.45	0.3	1	0.58	0	2.1E+08	46.6	46.5	17.1		
OF3042	BSN4	HWBSN4b	0.17	43	20	1.7	20 m grass	0.6	0.3	0.6	0.51	0	2.06E+08	42.5	42.4	19.7		
OF3022	BSN4	HWBSN4a	0.17	43	20	1.7	20 m grass	0.6	0.3	0.6	0.51	0	2.06E+08	43.35	43.25	19.6		
OF210	BSN5	HW-BSN5	0.228333	53.1	10	1.7	SWALE 10N	0.3	0.3	0.6	0.73	0	29050	51.6	51.5	13.7		
OF249	HW6	N1014	0.373333	40.2	20	1.7	SWALE 10N	0.3	0.3	0.6	0.89	0	37890	40.2	40	22.4		

OF235	BSN1	HW6	0.305	38.4	10	1.7	SWALE 10N	0.3	0.3	0.6	0.55	0		29734	38.4	38.3	18.3		
OF257	HW9	Pit25375	1.47667	48.5	50	1.7	Ripley Roa	0.25	0.25	0.6	0.56	0		40369	48.5	48	88.6		
OF51804	Pit35783	N50029	0.1				Half Minor	0.3	0.3	0.6	19.64	0		2.09E+08	47.5	45.87	8.3		
OF518	Pit1090	Pit1315	1.265				Half Access	0.3	0.15	0.4	1.71	0		6796844	44.2	42.9	75.9		
OF2995	Pit1315	Pit760	0.503333				Half Access	0.2	0.2	0.6	2.77	0		2.05E+08	42.9	42	32.5		
OF858	Pit1098	Pit297	1.075				Half Access	0.3	0.15	0.4	0.16	0		26561955	43.1	43	64.5		
OF866	Pit297	Pit295	1.09333				Half Access	0.3	0.15	0.4	1.52	0		26561965	43	42	65.6		
OF869	Pit298	Pit296	1.09				Half Access	0.3	0.15	0.4	1.53	0		26561968	42.9	41.9	65.4		
OF774	N1231	Pit145	0.665				Half Access	0.3	0.15	0.4	0.25	0		26560660	46.2	46.1	39.9		
OF1403	N1270	Pit4	1.20167				Half Access	0.3	0.15	0.4	4.16	0		48391336	56	53	72.1		
OF2517	N1446	HW9	1				10 m roadv	0.3	0.15	0.6	0.71	0		1.89E+08	46.5	46.07	60.3		
OF2520	N1449	N1451	1.78				R03-250	0.3	0.3	0.6	3.16	0		1.89E+08	50.35	46.97	106.8		
OF2530	N1451	N1446	0.9267				R02-925	0.3	0.3	0.6	0.85	0		1.89E+08	46.97	46.5	55.6		
OF2609	Pit1305	Pit306	0.72				Half Access	0.2	0.2	0.6	1.15	0		2.03E+08	43.2	42.7	43.3		
OF2560	N1456	N1446	6				10 m roadv	0.3	0.15	0.6	2.87	0		2.03E+08	57	46.5	365.3		
OF2557	N1458	N1459	1				10 m roadv	0.3	0.15	0.6	2.99	0		2.03E+08	55.5	54	50.2		
OF2618	N1459	Pit25375	5.5				10 m roadv	0.3	0.15	0.6	1.7	0		2.04E+08	54	48.3	335.3		
OF2565	N1461	HW20	3				Ripley Natu	1	0.6	0.6	1.55	0		2.03E+08	53	50.2	180.6		
OF2574	HW20	Pit3	0.32	52.3	20	1.7	Overflow a	0.05	0	0.6	1.55	0		2.03E+08	52.3	52	19.3		
OF2582	N1465	N1461	13				Ripley Natu	1	0.6	0.6	1.64	0		2.03E+08	65	53	731.8		
OF2815	BIO2A	BSN4	0.846667	44.3	20	1.7	Spillway 70	1	1	0.6	3.62	0		2.04E+08	44.3	43	35.9		
OF2859	BIO5	BSN5	0.16	53.2	10	1.7	SWALE 10N	0.3	0.3	0.6	17.39	0		2.05E+08	53.2	51.6	9.2		
OF245	HWBSN4a	Pit760	0.17	44.5	20	1.7	20 m grass	0.6	0.3	0.6	12.5	0		36694	44	42	16		
OF3047	HWBSN4b	Pit760	0.17	44.5	20	1.7	20 m grass	0.6	0.3	0.6	12.66	0		2.06E+08	44	42	15.8		
OF32652	BSN3	N30841	0.3416	44	20	1.7	20 m grass	0.6	0.3	0.6	7.8	0		2.08E+08	44	42.4	20.5		
OF3147	N30841	HWBSN3	0.375				20 m grass	0.6	0.3	0.6	1.47	0		2.07E+08	42.4	42.15	17		
OF3142	BIO3B	BSN3	0.6733	44.8	20	1.7	20 m grass	0.6	0.3	0.6	0.25	0		2.07E+08	43.1	43	40.4		
OF3163	HWBSN3	Pit1090	0.3416	44	20	1.7	20 m grass	0.6	0.3	0.6	3.9	0		2.07E+08	44	43.2	20.5		
OF30286	N28574	HW126	1.1				20 m grass	0.6	0.3	0.6	1.73	0		2.08E+08	42.1	40.9	69.2		
OF3181	BIO3A	BSN3	1.085	44.8	20	1.7	20 m grass	0.6	0.3	0.6	0.15	0		2.07E+08	43.1	43	65.1		
OF633	HW10	N28560	0.321667	45.2	15	1.7	Overflow a	0.05	0	0.6	8.9	0		26560499	46	44.3	19.1		
OF30205	N28560	HWBSN3	2				Full Neighb	0.8	0.6	0.6	0.93	0		2.08E+08	43.3	42.15	123		
OF30268	Basin873	HW13	0.17	41	20	1.7	20 m grass	0.6	0.3	0.6	0.51	0		2.08E+08	41	40.9	19.7		
OF30281	HW13	Pit1315	0.32	43	15	1.7	Overflow a	0.05	0	0.6	0.51	0		2.08E+08	43	42.9	19.5		
OF153	Pit25375	Pit212	0.3967				Half Minor	0.3	0.3	0.6	1.68	0		13516	48.3	47.9	23.8		
OF2094	Pit1080	Pit35783	1				Half Minor	0.3	0.3	0.6	0.33	0		51855157	47.8	47.6	60.2		
OF42414	HW126	Pit1315	0.32	43	15	1.7	Overflow a	0.05	0	0.6	0.51	0		2.08E+08	43	42.9	19.5		
OF30181	HW45	N28567	0.321667	46.2	15	1.7	Overflow a	0.05	0	0.6	7.66	0		2.08E+08	46.2	44.4	23.5		
OF30187	N28567	HW10	1				Full Neighb	0.8	0.6	0.6	1.05	0		2.08E+08	44.4	43.8	57		
OF51797	N50029	HW45	1				Full Neighb	0.8	0.6	0.6	4.52	0		2.09E+08	45.87	44.5	30.3		
Name	From	To	Length	Spill	Crest	Weir	Cross	Safe Depth	SafeDepth	Safe	Bed	D/S Area		id	U/S IL	D/S IL			
			(m)	Level	Length	Coeff. C	Section	Major Stor	Minor Stor	DxV	Slope	Contributing			(m)	(m)			
				(m)	(m)			(m)	(m)	(sq.m/sec)	(%)	%							
OF240	N2	OUT	1902.5				Ripley Natu	1	0.6	0.6	3.01	0		30387	94.277	37	1902.5		
OF3082	N659	OUT	827.1				Ripley Natu	1	0.6	0.6	1.46	0		2.06E+08	49.07	37	827.1		
OF166	N1049	OUT	317.3				Ripley Natu	1	0.6	0.6	0.6	0		27813	38.9	37	317.3		

OF3086	N1071	OUT	195.7				Ripley Natu	1	0.6	0.6	6.75	0		2.06E+08	50.2	37	195.7			
OF576	OUT	END	107.9				Ripley Natu	1	0.6	0.6	0.93	0		19971753	37	36	107.9			
OF3094	N1014	OUT	913				Ripley Natu	1	0.6	0.6	0.13	0		2.06E+08	38.2	37	913			

DRAINS results prepared 18 March, 2011 from Version 2011.06

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
Pit317	43.69		0.036		-2.09	0.023	Outlet System
Pit302	40.64		0.007		0.86	0	None
Pit314	40.41		0.029		0.99	0.018	Inlet Capacity
N1053	40.09		0.001				
Pit311	41.49		0.334		0.31	0.189	Inlet Capacity
Pit312	40.91		0.066		0.79	0.015	Inlet Capacity
Pit313	40.76		0.102		0.84	0.053	Inlet Capacity
Pit309	41.6		0.032		0.5	0.003	Inlet Capacity
Pit308	41.44		0.065		0.66	0.015	Inlet Capacity
Pit299	41.1		0.053		0.9	0.01	Inlet Capacity
Pit300	40.95		0.004		0.95	0	None
Pit307	42.53		0.124		0.47	0.054	Inlet Capacity
Pit306	42		0.056		0.7	0.018	Inlet Capacity
Pit303	42.73		0.073		0.27	0.02	Inlet Capacity
Pit305	42.23		0.011		0.57	0	None
Pit301	42.52		0.088		-0.62	0.049	Outlet System
Pit295	41.67		0.252		0.33	0.118	Inlet Capacity
Pit296	41.32		0.034		0.58	0.003	Inlet Capacity
Pit293	53.78		0		0.72	0	None
Pit290	53.28		0.077		1.32	0.034	Inlet Capacity
Pit291	50.89		0.019		1.11	0.003	Inlet Capacity
Pit1035	48.62		0.037		0.98	0	None
Pit185	48.51		0.051		0.99	0.014	Inlet Capacity
Pit1032	48.27		0.006		1.03	0	None
Pit49	47.52		0.112		1.08	0.041	Inlet Capacity
Pit1309	47.33		0.021		1.17	0.001	Inlet Capacity
Pit48	46.93		0.001		1.47	0	None
Pit72	44.08		0		0.67	0	None
Pit73	43.92		0		0.78	0	None
Pit74	43.72		0.075		0.78	0.025	Inlet Capacity
Pit64	43.44	44.12	0.013	0.2	0.66	0	Inlet Capacity
N66678	43.42		0				
Pit292	51.58		0		0.72	0	None
Pit285	56.63		0.024		0.67	0.002	Inlet Capacity
Pit253	56.18		0		1.12	0	None
Pit251	55.14		0.014		2.11	0	None
Pit283	54.87		0.087		2.53	0.025	Inlet Capacity
Pit286	54.53		0		3.27	0	None
Pit288	54.29		0		3.11	0	None
Pit289	54.2		0		3	0	None
Pit284	56.28		0		0.72	0	None

Pit279	53.4		0	0.45	0	None
Pit280	53.42		0.068	0.33	0.016	Inlet Capacity
Pit281	52.89		0.008	0.81	0	None
Pit268	57.28		0.039	-0.18	0.037	Outlet System
Pit269	57.05		0.003	-0.05	0.017	Outlet System
Pit270	56.92		0.158	-0.22	0.167	Outlet System
Pit271	56.67		0.033	-0.07	0.079	Outlet System
Pit272	56.32		0.003	0.08	0.013	Inlet Capacity
Pit273	55.76		0	0.34	0	Inlet Capacity
Pit274	55.31		0	0.69	0	None
Pit275	55.1		0	0.75	0	None
Pit276	55.03		0	0.77	0	None
Pit278	53.13		0	0.67	0	None
Pit260	60.83		0.133	-0.23	0.142	Outlet System
Pit259	60.59		0.057	-0.04	0.031	Outlet System
Pit258	59.85		0.004	0.65	0.003	Inlet Capacity
Pit257	59.31		0	0.69	0	None
Pit256	58.81		0	0.69	0	None
Pit261	58.36		0	0.74	0	None
Pit262	57.98		0	0.72	0	None
Pit263	57.76		0	0.74	0	None
Pit264	57.47		0	0.73	0	None
Pit265	57.22		0	0.68	0	None
Pit266	57.07		0	0.68	0	None
Pit267	56.87		0	0.73	0	None
Pit249	55.46		0.053	1.64	0.009	Inlet Capacity
Pit250	55.2		0	2	0	None
Pit255	56.98		0.142	0.47	0.042	Inlet Capacity
Pit254	56.68		0	0.77	0	None
Pit252	56.46		0	0.79	0	None
Pit247	57.5		0.031	0.4	0.009	Inlet Capacity
Pit246	57.12		0	0.78	0	None
Pit248	55.64		0.004	1.36	0	None
Pit245	60.15		0.102	0.65	0.052	Inlet Capacity
Pit244	59.94		0	0.76	0	None
Pit242	62.28		0	0.72	0	None
Pit243	62.05		0	0.75	0	None
Pit241	59.7		0	0.3	0	None
Pit240	59.7		0.124	0.5	0.071	Inlet Capacity
Pit239	56.09		0.043	0.91	0.018	Inlet Capacity
Pit237	55.74		0.002	0.76	0	None
Pit238	56.11		0	0.39	0	None
Pit233	59.45		0.086	0.55	0.042	Inlet Capacity
Pit232	57.87		0.021	0.63	0.005	Inlet Capacity
Pit220	55.67		0	0.53	0	None
Pit1043	52.97		0.061	0.63	0.023	Inlet Capacity
Pit221	52.2		0.018	0.5	0.005	Inlet Capacity

Pit223	51.37		0.054		0.63	0.02	Inlet Capacity
Pit222	50.9		0.019		0.7	0.006	Inlet Capacity
Pit217	50.43		0		0.67	0	None
Pit218	49.8		0.051		0.7	0.012	Inlet Capacity
Pit209	49.48		0.005		0.72	0	None
Pit210	48.92		0.05		1.08	0.016	Inlet Capacity
Pit211	48.03		0.007		1.17	0	None
Pit212	47		0		0.9	0.051	Inlet Capacity
Pit216	46.68	47.8	0.051	0	1.12	0	Inlet Capacity
Pit57587	46.54		0		0.96	0	None
Pit57586	46.24		0		0.76	0	None
Pit57588	46.08		0		0.82	0	None
Pit111	45.95		0		0.55	0	None
Pit151	45.96		0.013		0.14	0	None
Pit24717	45.73		0.014		0.27	0	None
Pit125	45.49		0.055		0.61	0.024	Inlet Capacity
N1622	45.62		0.116				
Pit225	58.08		0		0.72	0	None
Pit226	57.75		0		0.75	0	None
Pit227	54.45		0		0.75	0	None
Pit228	54.05		0		0.75	0	None
Pit224	52.44		0.06		0.56	0.018	Inlet Capacity
Pit219	56.09		0.078		0.41	0.035	Inlet Capacity
Pit196	62.7		0.053		0.6	0.018	Inlet Capacity
Pit229	62.25		0		0.75	0	None
Pit230	59.77		0		0.83	0	None
Pit234	59.29		0		0.71	0	None
Pit177	57.53		0		0.77	0	None
Pit178	56.11		0		0.69	0	None
Pit169	54.36		0		0.64	0	None
Pit171	53.9		0		0.6	0	None
Pit168	52.48		0.048		0.52	0.015	Inlet Capacity
Pit167	50.15		0.006		0.65	0	None
Pit123	47.36		0		0.64	0	None
Pit57623	47.14		0		3.16	0	None
Pit118	46.66		0.016		2.94	0.003	Inlet Capacity
Pit119	46.23		0		2.47	0	None
Pit121	46.07		0.058		1.83	0.021	Inlet Capacity
Pit194	55.24		0.051		0.36	0.018	Inlet Capacity
Pit193	54.88		0		0.62	0	None
Pit1057	51.59		0		0.51	0	None
Pit192	51.6		0.069		0.5	0.029	Inlet Capacity
Pit191	51.18		0		0.72	0	None
Pit1070	49.83		0		0.67	0	None
Pit189	52.11		0.051		0.19	0.016	Inlet Capacity
Pit188	51.54		0.009		0.26	0.001	Inlet Capacity
Pit190	50.99		0		0.21	0	None

Pit198	50.59	0	0.51	0	None
Pit199	50.48	0.033	0.52	0.021	Inlet Capacity
Pit200	50.26	0	0.94	0	None
Pit201	49.76	0	0.74	0	None
Pit202	49.44	0.035	0.56	0.006	Inlet Capacity
Pit203	49.07	0.002	0.43	0	None
Pit187	51.72	0.102	0.48	0.053	Inlet Capacity
Pit186	51.45	0	0.85	0	None
Pit184	56.7	0.095	-0.3	0.095	Outlet System
Pit183	56.32	0.048	-0.02	0.014	Outlet System
Pit277	55.85	0.003	0.35	0.001	Inlet Capacity
Pit182	58.56	0.011	0.44	0	None
Pit179	58.22	0.052	0.38	0.004	Inlet Capacity
Pit180	57.81	0.002	0.69	0	None
Pit181	57.61	0	0.69	0	None
Pit1052	56.54	0	0.56	0	None
Pit176	55.13	0.069	-0.03	0.034	Outlet System
Pit1063	54.15	0.014	0.25	0.005	Inlet Capacity
Pit1065	53.15	0.001	0.45	0	Inlet Capacity
Pit1066	52.27	0	0.53	0	None
Pit1067	51.39	0	0.71	0	None
Pit1068	50.69	0	0.61	0	None
Pit1069	50.15	0.016	0.35	0	None
Pit175	55.92	0.049	-0.12	0.042	Outlet System
Pit174	55.48	0.004	0.22	0.004	Inlet Capacity
Pit173	54.77	0	0.53	0	Inlet Capacity
Pit172	54.33	0	0.57	0	None
Pit170	54.38	0	0.72	0	None
Pit166	50.18	0	0.72	0	None
Pit165	45.95	0.109	0.35	0.042	Inlet Capacity
Pit164	45.59	0.022	0.61	0.004	Inlet Capacity
Pit304	42.44	0	0.76	0	None
Pit162	47.47	0.018	0.63	0	Inlet Capacity
Pit163	47.05	0	0.75	0	None
Pit161	46.8	0	0.7	0	None
Pit148	44.87	0.01	0.63	0	None
Pit135	44.27	0.054	0.63	0.019	Inlet Capacity
Pit132	43.99	0.027	0.61	0.004	Inlet Capacity
Pit102	43.79	0.02	0.61	0.001	Inlet Capacity
Pit98	43.01	0.062	1.29	0.022	Inlet Capacity
Pit158	46.85	0.056	-0.05	0.031	Outlet System
Pit157	46.68	0	0.17	0	None
Pit156	46.56	0	0.34	0	None
Pit155	46.44	0	0.51	0	None
Pit154	46.33	0	0.67	0	None
Pit153	46.13	0	0.57	0	None
Pit152	46.01	0	0.19	0	None

Pit145	45.89	0.063	0.21	0.029	Inlet Capacity
Pit146	45.23	0.064	0.57	0.023	Inlet Capacity
Pit147	44.99	0	0.71	0	None
Pit144	45.94	0	0.36	0	None
Pit143	45.93	0	0.17	0	None
Pit142	45.95	0	-0.05	0	Outlet System
Pit141	45.91	0.057	-0.06	0.023	Outlet System
Pit140	45.5	0.005	0.3	0.001	Inlet Capacity
Pit139	45.14	0	0.56	0	None
Pit138	44.98	0	0.62	0	None
Pit137	44.89	0	0.61	0	None
Pit136	44.79	0.014	0.61	0.004	Inlet Capacity
Pit122	47.31	0.062	0.69	0.023	Inlet Capacity
Pit103	45.25	0	0.75	0	None
N1629	45.25	0			
Pit117	49.61	0.078	0.59	0.038	Inlet Capacity
Pit101	44.28	0	0.72	0	None
Pit99	42.54	0.271	-0.24	0.144	Outlet System
Pit760	42.63	0.09	-0.63	0.418	Outlet System
N805	40.72	0.227			
Pit87	45.54	0.089	1.26	0.045	Inlet Capacity
Pit86	44.69	0.023	1.51	0.006	Inlet Capacity
Pit85	44.2	0	0.8	0	None
Pit84	44.12	0	0.88	0	None
Pit82	48.52	0.056	-0.02	0.024	Outlet System
Pit81	47.79	0.01	0.31	0.002	Inlet Capacity
Pit80	47.26	0	0.34	0	None
Pit79	46.88	0	0.22	0	None
Pit78	46.58	0	0.12	0	None
Pit75	44.72	0	1.58		None
Pit63	44.67	0	1.23	0	None
N998	44.38	0			
Pit77	45	0	1	0	None
Pit57610	44	0	1	0	None
Pit59	47.98	0	0.72	0	None
Pit58	47.98	0.071	0.82	0.033	Inlet Capacity
Pit57	46.26	0.017	0.74	0.001	Inlet Capacity
Pit53	53.35	0	0.15	0	None
Pit54	53.29	0.083	0.21	0.039	Inlet Capacity
Pit50	50.34	0.022	0.66	0.004	Inlet Capacity
Pit51	50.12	0.019	0.58	0.002	Inlet Capacity
Pit52	50.49	0.092	0.51	0.039	Inlet Capacity
Pit45	52.73	0.093	0.67	0.047	Inlet Capacity
Pit44	52.48	0	0.82	0	None
Pit46	49.8	0	0.8	0	None
Pit47	49.26	0.026	0.74	0.006	Inlet Capacity
Pit38	54	0.066	0	0.027	Outlet System

Pit39	52.79	0.016	0.21	0.003	Inlet Capacity
Pit40	51.84	0.001	0.46	0	None
Pit41	50.87	0	0.53	0	None
Pit42	50.12	0	0.58	0	None
Pit43	48.99	0	0.71	0	None
Pit56	48.38	0	0.62	0	None
Pit55	48.16	0	0.54	0	None
Pit36	55.3	0.042	0.2	0.004	Inlet Capacity
Pit37	54.49	0.002	0.71	0	None
Pit998	54.22	0	0.88	0	None
Pit35	57.08	0.043	0.42	0.014	Inlet Capacity
Pit34	56.6	0	0.5	0	None
Pit30	56.25	0	1.35	0	None
Pit29	55.74	0	0.76	0	None
Pit28	55.32	0	1.48	0	None
Pit27	56.05	0.027	0.65	0.009	Inlet Capacity
Pit26	55.81	0.118	0.99	0.051	Inlet Capacity
Pit25	56.33	0	0.37	0	None
Pit24	56.31	0	0.49	0	None
Pit20	59.82	0.054	-0.22	0.046	Outlet System
Pit19	59.53	0.005	-0.03	0.007	Outlet System
Pit18	58.99	0	0.46	0	None
Pit17	58.89	0	0.51	0	None
Pit16	58.82	0.062	0.48	0.02	Inlet Capacity
Pit23	56.66	0.011	0.54	0	None
Pit15	64.82	0.001	0.68	0	None
Pit14	61.51	0	0.69	0	None
Pit12	59.91	0	0.59	0	None
Pit9	59.42	0	0.58	0	None
Pit6	56.95	0.12	0.55	0.066	Inlet Capacity
Pit235	53.92	0.136	1.38	0.086	Inlet Capacity
N664	53.34	0.048			
Pit13	61.28	0.005	0.62	0	None
Pit11	59.48	0	0.72	0	None
Pit10	59.42	0	0.88	0	None
Pit8	57.22	0.219	0.28	0.156	Inlet Capacity
Pit1	99.28	0	0.72		None
N2	94.28	0			
HW-BSN5	51.77	0.105	3.23	0	None
Pit5	51.54	0.019	2.96	0.005	Inlet Capacity
Pit4	51.41	0.096	1.59	0.044	Inlet Capacity
Pit3	51.28	0.025	0.72	0.006	Inlet Capacity
N659	49.27	0			
Pit635	54.6	0.097	0.2	0.044	Inlet Capacity
HW-BSN3	44.54	0.136	1.46	0	None
N807	44.38	0.051			
N1049	39.22	2.309			

Pit21	59.66		0.126	-0.16	0.119	Outlet System	
Pit22	59.33		0.034	-0.03	0.043	Outlet System	
Pit33	58.75		0.004	-0.05	0.015	Outlet System	
Pit32	58.13		0	0.17	0.001	Inlet Capacity	
Pit31	57.5		0	0.2	0	None	
Pit996	56.12		0.018	0.63	0	None	
Pit994	55.58		0	0.72	0	None	
N1064	55.05		0				
N1071	50.25		0.138				
Pit1000	56.53		0.082	-0.03	0.058	Outlet System	
Pit1001	55.55		0.021	-0.05	0.027	Outlet System	
Pit1009	54.66		0.002	0.04	0.002	Inlet Capacity	
Pit1010	53.61		0	0.59	0	None	
Pit1011	52.8		0	0.7	0	None	
Pit1012	51.97		0	0.73	0	None	
Pit1013	51.45		0	0.75	0	None	
Pit1014	50.64		0	0.66	0	None	
Pit1022	50.43		0	0.67	0	None	
Pit1028	51.8		0.049	0.3	0.001	Inlet Capacity	
Pit1024	51.44		0.036	0.56	0	None	
Pit1037	58.9		0.101	0.3	0.02	Inlet Capacity	
Pit1038	57.68		0.012	0.62	0	None	
Pit1039	56.62		0	0.68	0	None	
Pit1040	55.48		0	0.72	0	None	
Pit1041	54.67		0	0.43	0	None	
Pit1042	53.6		0.02	0.3	0.003	Inlet Capacity	
Pit1055	51.99		0.071	0.51	0.032	Inlet Capacity	
Pit1083	48.08		0.104	0.72	0.147	Inlet Capacity	
Pit114	48.08		0.188	-0.08	0.181	Outlet System	
Pit108	47.4		0.086	-0.1	0.113	Outlet System	
Pit109	46.79		0.017	0.01	0.023	Inlet Capacity	
Pit110	46.11		0.001	0.49	0.001	Inlet Capacity	
OUT	37.33		3.641				
HW6	39.93		0.634	0.27	0	None	
N1014	38.41		0				
HW9	47.04		2.115	1.46	0.048	Headwall height/system capacity	
Pit35783	46.75	47.5	0	0	0.75	0	None
Pit1b	45.67		0		0.83		None
Pit1094	43.77		0		0.17		None
Pit1090	43.03		0		1.17	0	None
Pit1315	42.63		0		1.37	0	None
Pit1098	42.82		0.082		0.28	0.017	Inlet Capacity
Pit297	42.27		0.149		0.73	0.089	Inlet Capacity
Pit298	42.02		0.041		0.88	0.01	Inlet Capacity
N1231	46.28		0.009				
N1270	56.05		0.006				
N1446	47.04		2.474				

N1449	50.61		1.715				
N1451	47.2		1.682				
Pit1305	42.56		0.037		0.64	0.007	Inlet Capacity
N1456	57.2		0.886				
N1458	55.6		0.123				
N1459	54.11		0.122				
N1461	53.33		4.848				
HW20	52.03		3.832		0.27	0	None
N1465	65.33		3.345				
HWBSN4a	43.39		0.13		1.11	0	None
HWBSN4b	43.34		0.993		1.16	0	None
N30841	42.79		4.891				
HWBSN3	42.73		5.974		1.27	0	None
N28574	42.65		0				
HW10	43.93		0.28		1.27	0	None
N28560	43.42		0				
HW13	42.62		0.6		0.38	0	None
Pit25375	55.03	48.4	0.12	4.1	-6.83	0	Outlet System
Pit1080	47.89		0		-0.09	0	Outlet System
HW126	42.66		3.183		0.34	0	None
HW45	44.86		0.315		1.34	0	None
N28567	44.52		0				
N50029	45.95		0				

SUB-CATCHMENT DETAILS						
Name	Max	Impervious	Pervious	Impervious	Pervious	Due to Storm
	Flow Q	Max Q	Max Q	Tc	Tc	
	(cu.m/s)	(cu.m/s)	(cu.m/s)	(min)	(min)	
EC4	0.399	0.279	0.12	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C1I	0.094	0.066	0.028	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C1F	0.086	0.06	0.026	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C1H	0.071	0.049	0.021	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C1B	0.178	0.166	0.012	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C1D	0.076	0.053	0.023	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C1A	0.104	0.073	0.031	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C1J	0.126	0.088	0.038	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
EC3	0.29	0.203	0.087	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C1G	0.045	0.032	0.014	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C5D	0.11	0.077	0.033	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C3E	0.053	0.037	0.016	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C3C	0.072	0.051	0.022	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C3F	0.16	0.112	0.048	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C3H	0.107	0.075	0.032	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C5F	0.124	0.087	0.037	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C5C	0.097	0.068	0.029	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C6D	0.056	0.039	0.017	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C6C	0.226	0.158	0.068	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3

C9E	0.19	0.133	0.057	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C6E2	0.076	0.053	0.023	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C6A	0.203	0.142	0.061	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C9D	0.146	0.102	0.044	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C9C	0.177	0.124	0.053	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C9A	0.123	0.086	0.037	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C8E	0.087	0.061	0.026	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C8B	0.077	0.054	0.023	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C7B	0.073	0.051	0.022	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C7C	0.072	0.05	0.022	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C10H	0.079	0.055	0.024	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C10I	0.166	0.013	0.153	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C8A	0.085	0.06	0.026	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C8D	0.112	0.078	0.034	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C9B	0.076	0.053	0.023	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C7J	0.069	0.048	0.021	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C10G	0.083	0.058	0.025	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C7H	0.073	0.051	0.022	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C7E	0.099	0.069	0.03	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C7G	0.072	0.051	0.022	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C7F	0.048	0.033	0.014	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C10A	0.05	0.035	0.015	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C10E	0.145	0.102	0.044	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C6B	0.136	0.095	0.041	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C8F	0.074	0.052	0.022	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C7D	0.098	0.069	0.029	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C7I	0.07	0.049	0.021	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C2B	0.157	0.11	0.047	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C2A	0.026	0.018	0.008	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C2F	0.075	0.052	0.022	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C2H	0.029	0.02	0.009	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C3M	0.029	0.02	0.009	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C3L	0.088	0.062	0.027	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C2D	0.082	0.057	0.025	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C2E	0.081	0.057	0.024	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C2C	0.074	0.051	0.022	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C2G	0.084	0.059	0.025	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C2I	0.02	0.014	0.006	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C3B	0.088	0.062	0.027	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C10D	0.07	0.049	0.021	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
EC6	0.388	0.271	0.117	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C3A	0.127	0.089	0.038	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C3G	0.08	0.056	0.024	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C4E	0.102	0.072	0.031	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C4B	0.119	0.083	0.036	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C4A	0.132	0.092	0.04	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C4C	0.133	0.093	0.04	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3

C4D	0.094	0.066	0.028	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C4F	0.061	0.042	0.018	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
EC13N	0.062	0.043	0.019	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C4G	0.168	0.118	0.051	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C11C	0.077	0.054	0.023	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C5G	0.089	0.062	0.027	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
EC14N	0.001	0.001	0	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C11B	0.171	0.12	0.051	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C11A	0.145	0.101	0.044	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
EC12N	0.006	0.005	0.002	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
EC4N	0.314	0.22	0.094	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
EC8	0.137	0.02	0.117	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C3D	0.195	0.015	0.18	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C3I	0.073	0.051	0.022	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
EC5(EC14E	0.673	0	0.673	5	10	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
C11D	0.181	0.126	0.054	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C6E1	0.026	0.018	0.008	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
EC7	0.191	0.134	0.057	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C5E	0.118	0.083	0.035	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C5A	0.07	0.049	0.021	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C5B	0.051	0.036	0.015	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C8C	0.144	0.101	0.043	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C7A	0.089	0.062	0.027	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C10B	0.148	0.104	0.045	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C10F	0.122	0.085	0.037	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
EC13E	0.364	0	0.364	5	10	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
C3J	0.09	0.063	0.027	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
EC1	0.117	0.082	0.035	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
EC2	0.203	0.142	0.061	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C1E	0.058	0.041	0.017	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
EX1	2.489	0	2.489	5	10	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
C1C	0.052	0.037	0.016	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
EX2	1.286	0	1.286	5	10	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
EC5W	0.179	0.016	0.167	5	10	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
EC4W	3.223	0.059	3.182	5	10	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
CAT3(+17)	4.71	0	4.71	5	15	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
C3K	0.071	0.049	0.021	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C10C	0.45	0.42	0.03	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3

Outflow Volumes for Total Catchment (25.2 impervious + 104 pervious = 129 total ha)

Storm	Total Rainf	Total Runo	Impervious	Pervious Runoff
	cu.m	cu.m (Runc	cu.m (Runc	cu.m (Runoff %)
AR&R 2 ye	15275.71	8343.12 (5	2284.28 (7	6058.83 (49.3%)
AR&R 2 ye	23666.6	12925.98 (	3539.04 (7	9386.93 (49.3%)
AR&R 2 ye	34424.15	18801.40 (	5147.68 (7	13653.72 (49.3%)
AR&R 2 ye	50345.31	27497.02 (	7528.52 (7	19968.50 (49.3%)

AR&R 2 ye	63899.83	34899.34 (	9555.42 (7	25343.92 (49.3%)	
PIPE DETAILS					
Name	Max Q	Max V	Max U/S	Max D/S	Due to Storm
	(cu.m/s)	(m/s)	HGL (m)	HGL (m)	
Pipe412	0.007	1	41.192	40.863	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe16	0.73	2.12	40.538	40.412	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
P818	1.697	2.67	40.104	40.09	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe11	0.289	1.72	41.009	40.905	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe14	0.877	1.68	40.815	40.756	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe15	0.997	1.92	40.54	40.412	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe5	0.049	0.7	41.482	41.441	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe19	0.581	1.82	41.332	41.096	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe18	0.646	1.77	41.054	40.953	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe17	0.707	1.93	40.89	40.638	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe4	0.119	2.02	42.186	41.996	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe20	0.455	1.99	41.817	41.441	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe2	0.081	1.14	42.391	42.234	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe8	0.254	1.19	42.138	41.996	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe6	0.054	1.5	41.404	41.15	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe10	0.238	1.1	41.382	41.315	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe13	0.534	1.6	41.164	40.905	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe171	0	0	53.777	53.709	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe160	0.913	5.03	53.089	50.894	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe162	1.367	6	50.537	48.615	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe919	1.414	2.17	48.543	48.514	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe914	1.568	2.88	48.34	48.269	AR&R 2 year, 10 minutes storm, average 110 mm/h, Zone 3
Pipe163	1.671	3.09	48.136	47.517	AR&R 2 year, 10 minutes storm, average 110 mm/h, Zone 3
Pipe164	2.121	2.02	47.399	47.332	AR&R 2 year, 10 minutes storm, average 110 mm/h, Zone 3
P1314	2.414	2.44	47.164	46.945	AR&R 2 year, 10 minutes storm, average 110 mm/h, Zone 3
Pipe72	2.679	6.43	46.578	44.079	AR&R 2 year, 10 minutes storm, average 110 mm/h, Zone 3
Pipe73	2.476	2.29	44.001	43.924	AR&R 2 year, 10 minutes storm, average 110 mm/h, Zone 3
Pipe74	2.389	2.21	43.826	43.718	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe75	2.579	1.96	43.437	43.436	AR&R 2 year, 10 minutes storm, average 110 mm/h, Zone 3
P60150	2.589	1.8	43.435	43.422	AR&R 2 year, 10 minutes storm, average 110 mm/h, Zone 3
Pipe170	0	0	51.577	51.277	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe198	0.038	1.08	56.526	56.45	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe197	0.187	1.63	56.102	55.973	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe154	0.753	1.88	55.035	54.866	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe156	0.838	1.97	54.776	54.528	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe158	0.842	2.05	54.36	54.294	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
P403	0.847	1.88	54.238	54.196	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe159	0.85	3.13	53.977	53.275	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe172	0	0	56.277	56.201	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe165	0.003	0.4	53.375	53.417	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe166	0.078	1.42	53.07	52.945	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe168	0.477	3.48	52.718	51.048	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3

Pipe388	0.042	1.05	57.105	57.048	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe389	0.064	1.61	57.029	56.919	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe390	0.168	1.52	56.708	56.667	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe391	0.215	1.94	56.469	56.325	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe392	0.252	2.28	56.082	55.761	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe393	0.264	2.45	55.703	55.33	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe394	0.265	1.94	55.299	55.119	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe204	0.265	1.57	55.063	55.025	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe226	0.39	4.22	54.643	53.128	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe169	0.392	1.9	52.967	52.889	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe201	0.101	1.43	60.623	60.587	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe373	0.157	2.22	60.281	59.851	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe374	0.18	2.74	59.683	59.309	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe375	0.184	2.68	59.183	58.814	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe227	0.187	2.28	58.721	58.355	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe377	0.188	2.92	58.272	57.978	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe378	0.19	2.3	57.922	57.757	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe379	0.191	2.67	57.692	57.471	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe380	0.192	2.38	57.417	57.224	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe381	0.191	1.86	57.189	57.07	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe382	0.189	1.9	57.038	56.907	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe383	0.189	2.45	56.81	56.338	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe152	0.535	1.64	55.282	55.205	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe153	0.543	1.42	55.195	55.144	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe195	0.153	1.12	56.717	56.68	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe196	0.153	1.37	56.564	56.176	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe173	0.002	0.47	56.429	56.368	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe144	0.042	1.3	57.257	57.156	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe149	0.134	3.23	57.011	56.141	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe151	0.299	0.93	55.487	55.464	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe142	0.09	1.32	60.013	59.942	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe143	0.092	2.53	59.796	57.122	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe140	0	0	62.277	62.077	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe141	0	0	62.047	59.977	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe145	0.003	0.35	59.679	59.698	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe146	0.102	2.89	59.351	56.218	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe147	0.153	2.15	55.886	55.739	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe148	0.161	0.88	55.716	55.638	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe150	0.002	0.28	56.097	56.091	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe111	0.079	2.42	59.21	57.867	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
P60005	0.114	4.01	57.666	55.669	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe139	0.189	3.23	55.386	52.972	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
P927	0.417	3.21	52.622	52.202	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe122	0.514	3.02	51.885	51.369	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe123	0.569	3.01	51.228	50.904	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe124	0.612	3.11	50.748	50.426	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe125	0.738	2.72	50.247	49.799	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3

Pipe126	0.795	2.58	49.681	49.481	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe127	0.992	2.37	49.355	49.078	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe128	1.036	4.57	48.81	48.078	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe129	1.045	4.89	48.032	46.995	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe130	1.079	1.67	46.866	46.676	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe60078	1.192	1.76	46.607	46.539	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe1140	1.188	2.63	46.347	46.241	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe60079	1.204	1.32	46.141	46.082	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe60080	1.362	1.35	45.995	45.953	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe59962	1.549	1.43	45.948	45.961	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
P25711	2.372	1.65	45.717	45.734	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe307	2.346	1.63	45.565	45.488	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe40	3.572	2.48	45.437	45.624	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe117	0	0	58.077	57.777	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe118	0	0	57.747	54.477	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe119	0	0	54.447	54.077	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe120	0	0	54.047	52.439	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe121	0.065	1.13	52.298	52.202	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe138	0.073	1.7	55.745	55.669	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe110	0.057	1.59	62.52	62.251	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe109	0.057	2.79	62.138	59.771	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe108	0.057	2.97	59.734	59.289	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe107	0.057	2.36	59.152	57.526	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe106	0.074	2.82	57.458	56.106	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe104	0.148	3.19	56.026	54.363	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe362	0.148	2.77	54.25	53.904	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe103	0.216	3.68	53.687	52.475	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe101	0.261	3.73	52.187	50.152	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe99	0.272	4.39	49.965	47.36	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe98	0.271	1.32	47.308	47.137	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
P60186	0.275	2.24	46.869	46.659	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe87	0.446	2.35	46.422	46.227	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe91	0.451	1.53	46.16	46.067	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe85	0.598	1.48	46.003	45.961	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe136	0.053	1.33	55.07	54.881	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe137	0.054	2.64	54.729	51.586	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
P954	0.122	2.47	51.337	50.426	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe134	0.069	1.63	51.342	51.182	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe135	0.069	2.56	51.06	49.83	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
P977	0.185	1.77	49.688	49.481	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe217	0.052	1.32	51.681	51.543	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe218	0.064	1.61	51.225	50.991	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe344	0.065	1.63	50.839	50.593	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe345	0.065	0.92	50.563	50.482	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe346	0.088	1.25	50.394	50.263	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe347	0.088	2.07	50.104	49.762	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe236	0.088	2.54	49.687	49.44	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3

Pipe132	0.126	1.95	49.296	49.075	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe133	0.13	3.25	48.705	47.035	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe89	0.089	1.38	51.58	51.455	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe90	0.089	2.57	51.316	48.817	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe202	0.075	1.88	56.398	56.318	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
P397	0.113	1.6	56.099	55.854	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe203	0.123	1.86	55.655	55.135	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe115	0.018	1.59	58.314	57.614	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe361	0.07	1.29	57.886	57.813	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe360	0.075	1.53	57.735	57.605	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe214	0.075	2.39	57.476	56.536	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe945	0.075	1.27	56.373	56.106	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe215	0.069	2.07	54.418	54.152	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
P964	0.09	2.69	53.69	53.154	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
P965	0.093	2.73	52.894	52.27	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
P968	0.093	2.71	52.096	51.426	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
P970	0.093	2.88	51.385	50.693	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
P972	0.094	2.27	50.539	50.145	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
P980	0.119	1.69	50.045	49.83	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe365	0.054	1.37	55.61	55.481	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe364	0.069	1.73	55.194	54.766	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe363	0.072	2.21	54.585	54.332	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe216	0.072	1.9	54.218	53.904	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe116	0	0	54.377	54.363	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe100	0	0	50.177	50.152	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe23	0.113	1.04	45.651	45.589	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe24	0.153	2.67	45.353	42.444	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe3	0.156	2.7	42.354	42.234	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe25	0.025	1.54	47.341	47.054	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe26	0.025	1.6	47.008	46.798	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe28	0.026	1.76	46.703	44.868	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe35	0.219	1.99	44.672	44.274	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe37	0.353	2.08	44.113	43.991	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe39	0.388	1.17	43.859	43.79	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe44	0.412	1.83	43.39	43.297	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe46	0.466	2.64	42.756	42.569	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe328	0.048	1.22	46.723	46.682	AR&R 2 year, 10 minutes storm, average 110 mm/h, Zone 3
Pipe327	0.047	1.18	46.67	46.561	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe221	0.044	1.1	46.549	46.442	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe326	0.045	1.14	46.43	46.333	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe222	0.047	1.18	46.19	46.13	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe329	0.05	1.25	46.118	46.009	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe333	0.054	1.35	45.999	45.894	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe32	0.111	1.57	45.534	45.228	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe33	0.175	1.37	45.046	44.994	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe34	0.176	1.46	44.898	44.868	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe323	0.002	0.28	45.931	45.926	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3

Pipe322	0.005	0.59	45.925	45.947	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe321	0.008	1.05	45.946	45.912	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe320	0.056	1.4	45.624	45.497	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe219	0.067	1.69	45.364	45.138	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe318	0.068	1.11	45.013	44.982	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe317	0.068	0.96	44.949	44.888	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe220	0.068	0.97	44.864	44.794	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe1	0.081	1.77	44.624	44.274	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe93	0.063	3.5	47.249	45.251	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe43	0.094	1.33	45.179	45.247	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe88	0.078	2.32	49.414	48.814	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe45	0	0	44.277	43.577	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe49	0.23	1.45	42.617	42.635	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe755	2.231	16.92	41.837	40.72	AR&R 2 year, 45 minutes storm, average 52 mm/h, Zone 3
Pipe94	0.082	2.02	45.433	45.076	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe95	0.121	3.44	44.609	44.201	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe96	0.206	0.73	44.197	44.116	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe750	0.496	1.39	44.11	43.924	AR&R 2 year, 10 minutes storm, average 110 mm/h, Zone 3
Pipe287	0.059	1.47	47.936	47.787	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe288	0.071	1.79	47.495	47.255	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe289	0.07	1.76	47.102	46.876	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe290	0.067	1.69	46.788	46.579	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe209	0.066	1.73	46.521	45.65	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe58	0.759	0.75	44.681	44.674	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
P766	0.756	6.36	44.626	44.378	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
P60168	0	0	45	44.1	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe292	0	0	44	43.436	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe262	0	0	47.98	47.98	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe56	0.578	4.87	47.787	46.264	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe57	0.69	3.05	46.077	45.079	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe189	0.005	0.57	53.267	53.293	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe190	0.075	2.72	52.687	50.345	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe192	0.198	1.55	50.223	50.124	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe193	0.33	4.37	49.794	47.724	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe194	0.088	0.8	50.381	50.345	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe67	0.084	1.43	52.589	52.488	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe68	0.085	2.77	52.38	49.805	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe70	0.084	2.36	49.695	49.261	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe71	0.126	3.23	49.104	47.534	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe255	0.066	3.02	53.265	52.794	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe256	0.088	2.29	52.323	51.842	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe257	0.091	3.06	51.571	50.873	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe258	0.091	2.88	50.681	50.122	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe259	0.092	2.98	49.978	49.007	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe208	0.092	2.7	48.994	48.38	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe832	0.092	2.68	48.296	48.156	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe231	0.092	2.87	47.908	46.264	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3

Pipe206	0.056	2.15	54.785	54.486	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
P866	0.058	1.25	54.479	54.284	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe54	0.519	5.33	54.051	47.98	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe60	0.047	1.68	56.793	56.596	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe61	0.044	1.1	56.584	56.25	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe62	0.194	2.25	56.093	55.745	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe53	0.194	1.54	55.63	55.572	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
P863	0.47	3.23	54.977	54.224	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe66	0.041	1.1	55.933	55.861	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe65	0.278	1.62	55.692	55.315	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe63	0.002	0.31	56.317	56.312	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe64	0.145	1.31	56.135	55.808	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe244	0.049	1.24	59.612	59.533	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe243	0.065	1.64	59.349	58.985	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe242	0.07	0.99	58.98	58.885	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe228	0.072	1.01	58.851	58.816	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe229	0.131	3.37	58.465	56.658	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe230	0.145	1.68	56.465	56.312	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe183	0.001	1.22	64.795	61.506	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe182	0.001	0.65	61.476	59.912	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe181	0.007	0.88	59.842	59.418	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe180	0.007	1.2	59.317	56.952	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe179	0.253	2.59	56.325	54.474	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe736	0.471	2.58	53.648	53.454	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe184	0.006	1.89	61.222	59.912	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe185	0	0	59.477	59.421	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe186	0.001	0.25	59.421	59.418	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe187	0.148	1.34	57.067	56.952	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe239	0	0	99.277	94.277	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe735	0.062	1.44	51.655	51.543	AR&R 2 year, 1.5 hours storm, average 33 mm/h, Zone 3
Pipe175	0.061	0.95	51.501	51.415	AR&R 2 year, 1.5 hours storm, average 33 mm/h, Zone 3
Pipe176	0.127	1.15	51.336	51.28	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe734	1.453	4.77	50.508	50.078	AR&R 2 year, 1.5 hours storm, average 33 mm/h, Zone 3
P744	0.107	1.69	54.395	54.035	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe80	0.194	1.95	44.3	44.116	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe245	0.1	1.41	59.408	59.334	AR&R 2 year, 45 minutes storm, average 52 mm/h, Zone 3
Pipe246	0.131	1.86	59.03	58.75	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe250	0.145	2.06	58.522	58.13	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe249	0.152	2.16	57.936	57.497	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe205	0.153	2.22	57.038	56.902	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe856	0.026	1.65	55.989	55.584	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe852	0.026	1.98	55.497	55.127	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
P895	0.069	1.88	55.839	55.552	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe872	0.095	2.38	55.147	54.659	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
P875	0.105	2.65	54.312	53.608	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
P876	0.106	2.69	53.533	52.869	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
P877	0.106	3.42	52.705	51.965	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3

P878	0.106	2.85	51.895	51.45	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
P879	0.106	3.06	51.387	50.642	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe900	0.106	1.6	50.607	50.435	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe899	0.108	1.54	50.317	50.124	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe907	0.067	0.95	51.559	51.441	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe904	0.115	3.49	51.159	48.711	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe932	0.124	3.18	58.432	57.68	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe933	0.144	3.15	57.524	56.619	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe934	0.145	3.16	56.524	55.484	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe935	0.145	3.14	55.425	54.675	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe936	0.142	2.88	54.337	53.6	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
P925	0.174	2.47	53.407	52.972	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
P952	0.071	2.24	51.707	51.586	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
P1151	0	0	48.077	48.075	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe223	0.106	2.66	48.002	47.396	AR&R 2 year, 1.5 hours storm, average 33 mm/h, Zone 3
Pipe302	0.169	2.4	47.249	46.788	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe313	0.231	3.27	46.679	46.112	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe311	0.253	2.29	46.076	45.953	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe769	0.495	6.96	39.054	38.406	AR&R 2 year, 45 minutes storm, average 52 mm/h, Zone 3
Pipe1067	2.525	2.3	46.686	46.752	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
P37225	2.452	3.41	45.995	45.675	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
P37246	1.024	18	46.258	45.945	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe1068	2.145	2.98	45.584	43.774	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe1070	1.992	2.77	43.756	43.025	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe754	1.973	2.74	42.966	42.633	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
P1390	2.562	0.4	42.631	42.635	AR&R 2 year, 45 minutes storm, average 52 mm/h, Zone 3
P1097	0.092	0.84	42.452	42.273	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
Pipe9	0.208	1.35	42.056	42.02	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
Pipe12	0.252	2.39	41.865	41.315	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
P1231	0.043	1.91	42.469	41.996	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
P1234	1.385	3.13	51.547	51.28	AR&R 2 year, 1.5 hours storm, average 33 mm/h, Zone 3
P1461	0.056	2.39	43.297	42.635	AR&R 2 year, 1.5 hours storm, average 33 mm/h, Zone 3
P1471	0.351	2.21	42.921	42.635	AR&R 2 year, 1.5 hours storm, average 33 mm/h, Zone 3
Pipe27776	5.27	8.79	43.727	42.793	AR&R 2 year, 1.5 hours storm, average 33 mm/h, Zone 3
Pipe1498	4.706	1.02	42.719	42.651	AR&R 2 year, 45 minutes storm, average 52 mm/h, Zone 3
P25691	0.399	1.07	43.89	43.778	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
P25725	0.9	0.71	42.62	42.633	AR&R 2 year, 45 minutes storm, average 52 mm/h, Zone 3
P1003	0.007	0.94	48.313	47.888	AR&R 2 year, 45 minutes storm, average 52 mm/h, Zone 3
P992	0.007	0.96	47.828	46.832	AR&R 2 year, 1.5 hours storm, average 33 mm/h, Zone 3
P36538	3.012	0.6	42.654	42.633	AR&R 2 year, 45 minutes storm, average 52 mm/h, Zone 3
P25707	0.406	3.71	44.726	44.518	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
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
OF968	0.023	0.023	0.28	0.079	0.03	2.23	0.51	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF976	0	0	0.231	0	0	0	0	
OF983	0.018	0.018	6.478	0.09	0	10.72	0.3	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF234	1.465	1.465	3.908	1.687	0.09	23.5	0.06	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF885	0.189	0.189	0.292	0.133	0.11	3.51	0.82	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF896	0.015	0.015	0.205	0.069	0.03	1.89	0.47	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF902	0.053	0.053	0.215	0.097	0.05	2.88	0.59	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF923	0.003	0.003	0.186	0.092	0.01	2.7	0.13	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF929	0.015	0.015	0.166	0.071	0.02	1.97	0.37	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF954	0.01	0.01	0.225	0.063	0.02	1.67	0.43	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF960	0	0	0.318	0	0	0	0	
OF918	0.054	0.054	0.429	0.081	0.06	2.3	0.77	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF914	0.018	0.018	0.355	0.071	0.03	1.95	0.47	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF942	0.02	0.02	0.325	0.073	0.03	2.02	0.49	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF936	0	0	0.17	0	0	0	0	
OF965	0.049	0.049	0.274	0.092	0.05	2.7	0.58	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF874	0.118	0.118	0.201	0.133	0.07	3.51	0.54	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF880	0.003	0.003	0.198	0.069	0.01	1.87	0.18	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF2317	0	0	1.542	0	0	0	0	
OF1342	0.034	0.034	0.78	0.056	0.06	1.43	1.13	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1346	0.003	0.003	0.768	0.029	0.02	0.47	0.8	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF1362	0	0	0.582	0	0	0	0	
OF1370	0.014	0.014	0.515	0.057	0.03	1.47	0.64	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF437	0	0	0.379	0	0	0	0	
OF417	0.041	0.041	0.247	0.09	0.04	2.62	0.56	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF2705	0.001	0.001	0.375	0.037	0	0.75	0	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF1171	0	0	0.717	0	0	0	0	
OF1179	0	0	0.225	0	0	0	0	
OF1186	0	0	0.377	0	0	0	0	
OF1192	0.025	0.025	0.399	0.071	0.04	1.97	0.6	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF68582	0	0	0	0	0	0	0	
OF68563	3.47	3.47	37.03	0.922	0.06	66.15	0.07	AR&R 2 year, 1.5 hours storm, average 33 mm/h, Zone 3
OF1353	0	0	0.665	0	0	0	0	
OF1589	0.002	0.002	0.228	0.036	0.01	0.72	0.34	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF1582	0	0	0.174	0	0	0	0	
OF1577	0	0	0.174	0	0	0	0	
OF2293	0.025	0.025	0.444	0.08	0.03	2.27	0.51	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF2298	0	0	0.622	0	0	0	0	
OF2311	0	0	0.887	0	0	0	0	
OF1336	0	0	0.797	0	0	0	0	
OF2306	0	0	1.498	0	0	0	0	
OF1695	0	0	0.178	0	0	0	0	
OF1688	0.016	0.016	0.198	0.072	0.03	1.98	0.47	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1683	0	0	0.539	0	0	0	0	
OF1607	0.037	0.037	0.274	0.144	0.08	1.15	0.74	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1615	0.017	0.017	0.521	0.243	0.05	1.94	0.62	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3

OF1616	0.167	0.167	0.286	0.244	0.2	1.95	1	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF1617	0.079	0.079	0.394	0.17	0.13	1.36	0.86	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF1618	0.013	0.013	0.445	0.089	0.04	0.71	0.6	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF1619	0	0	0.244	0	0	0	0	
OF1620	0	0	0.268	0	0	0	0	
OF1621	0	0	0.248	0	0	0	0	
OF1677	0	0	0.795	0	0	0	0	
OF1701	0	0	0.332	0	0	0	0	
OF1491	0.142	0.142	0.213	0.244	0.19	1.96	0.97	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1490	0.031	0.031	0.176	0.153	0.07	1.22	0.71	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1489	0.003	0.003	0.541	0.05	0.02	0.4	0.45	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1488	0	0	0.541	0	0	0	0	
OF1487	0	0	0.444	0	0	0	0	
OF1486	0	0	0.583	0	0	0	0	
OF1485	0	0	0.449	0	0	0	0	
OF1484	0	0	0.523	0	0	0	0	
OF1483	0	0	0.529	0	0	0	0	
OF1482	0	0	0.377	0	0	0	0	
OF1476	0	0	0.27	0	0	0	0	
OF1544	0	0	0.573	0	0	0	0	
OF1429	0.009	0.009	0.215	0.063	0.02	1.67	0.42	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1563	0	0	0.228	0	0	0	0	
OF1601	0.042	0.042	0.152	0.103	0.04	3.09	0.57	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF1594	0	0	0.335	0	0	0	0	
OF1555	0	0	0.215	0	0	0	0	
OF1461	0.009	0.009	0.593	0.041	0.03	0.9	0.65	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF2510	0	0	1.571	0	0	0	0	
OF1423	0	0	0.349	0	0	0	0	
OF1442	0.052	0.052	0.726	0.067	0.07	1.82	1.12	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1450	0	0	0.714	0	0	0	0	
OF1435	0	0	0.311	0	0	0	0	
OF1455	0	0	0.706	0	0	0	0	
OF1390	0	0	0.774	0	0	0	0	
OF1398	0.071	0.071	0.79	0.071	0.09	1.95	1.33	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1469	0.018	0.018	0.755	0.048	0.04	1.13	0.89	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1417	0	0	0.531	0	0	0	0	
OF1408	0	0	0.639	0	0	0	0	
OF1056	0.042	0.042	0.683	0.069	0.06	1.88	1	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1062	0.005	0.005	0.732	0.058	0.02	1.49	0.61	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF1080	0	0	0.754	0	0	0	0	
OF1086	0.023	0.023	0.598	0.062	0.04	1.63	0.8	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF1772	0.005	0.005	0.523	0.057	0.02	1.44	0.54	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF1776	0.02	0.02	0.524	0.057	0.04	1.46	0.69	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1783	0.006	0.006	0.506	0.045	0.02	1.03	0.53	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1784	0	0	0.41	0	0	0	0	
OF1785	0.012	0.012	0.413	0.059	0.03	1.52	0.52	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1786	0	0	0.53	0	0	0	0	

OF1787	0.016	0.016	0.693	0.055	0.04	1.4	0.83	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1788	0	0	0.749	0	0	0	0	
OF2139	0.051	0.051	3.009	0.6	0.01	20.65	1.#J	AR&R 2 year, 1.5 hours storm, average 33 mm/h, Zone 3
OF29346	0	0	2.939	0	0	0	0	
OF68488	0	0	2.995	0	0	0	0	
OF68493	0	0	1.467	0	0	0	0	
OF68498	0	0	3.009	0	0	0	0	
OF68327	0	0	0.377	0	0	0	0	
OF30334	0	0	1.15	0	0	0	0	
OF30206	0	0	1.186	0	0	0	0	
OF30391	0.024	0.024	1.341	1.374	0.05	53.05	0.93	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF3140	22.829	22.829	10.11	1.024	0.97	28.19	1.14	AR&R 2 year, 45 minutes storm, average 52 mm/h, Zone 3
OF1707	0	0	0.79	0	0	0	0	
OF1749	0	0	0.802	0	0	0	0	
OF1754	0	0	0.571	0	0	0	0	
OF1761	0	0	0.797	0	0	0	0	
OF1767	0.018	0.018	0.417	0.064	0.03	1.69	0.57	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF1069	0.035	0.035	0.769	0.058	0.06	1.51	1.06	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1030	0.018	0.018	0.777	0.046	0.05	1.06	1	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1043	0	0	0.754	0	0	0	0	
OF1050	0	0	0.762	0	0	0	0	
OF1036	0	0	0.77	0	0	0	0	
OF1018	0	0	0.766	0	0	0	0	
OF1012	0	0	0.79	0	0	0	0	
OF1005	0	0	0.632	0	0	0	0	
OF565	0	0	0.803	0	0	0	0	
OF559	0.015	0.015	0.795	0.053	0.04	1.3	0.91	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF553	0	0	0.721	0	0	0	0	
OF2159	0	0	1.555	0	0	0	0	
OF68652	0	0	1.202	0	0	0	0	
OF2205	0.003	0.003	1.673	0.033	0.02	0.61	0.67	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF2214	0	0	1.468	0	0	0	0	
OF2256	0.021	0.021	1.532	0.051	0.04	1.26	0.87	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF2008	0.018	0.018	0.783	0.066	0.04	1.76	0.97	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF2048	0	0	0.787	0	0	0	0	
OF2052	0	0	0.628	0	0	0	0	
OF2021	0.029	0.029	0.797	0.063	0.06	1.67	1.09	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF2032	0	0	0.797	0	0	0	0	
OF2038	0	0	0.369	0	0	0	0	
OF1914	0.016	0.016	0.689	0.08	0.05	0.64	0.74	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1907	0.001	0.001	0.727	0.032	0.01	0.25	0.41	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1920	0	0	0.295	0	0	0	0	
OF1927	0	0	0.244	0	0	0	0	
OF1933	0.021	0.021	1.91	0.6	0.05	24.51	1	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1938	0	0	0.644	0	0	0	0	
OF1947	0	0	0.614	0	0	0	0	
OF1993	0.006	0.006	0.692	0.042	0.02	0.92	0.66	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3

OF2003	0	0	0.804	0	0	0	0	
OF2057	0.053	0.053	0.639	0.07	0.07	1.92	0.99	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF2065	0	0	0.776	0	0	0	0	
OF1628	0.095	0.095	0.259	0.206	0.15	1.65	0.89	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1627	0.014	0.014	0.22	0.111	0.05	0.89	0.61	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF1622	0.001	0.001	0.354	0.031	0	0.25	0	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF1024	0	0	0.78	0	0	0	0	
OF1817	0.004	0.004	0.299	0.066	0.02	0.53	0.47	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1824	0	0	0.384	0	0	0	0	
OF1825	0	0	0.242	0	0	0	0	
OF1837	0	0	0.321	0	0	0	0	
OF1872	0.034	0.034	0.694	0.106	0.09	0.85	0.9	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1878	0.005	0.005	0.731	0.052	0.03	0.41	0.57	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1879	0	0	0.722	0	0	0	0	
OF1880	0	0	0.696	0	0	0	0	
OF1881	0	0	0.718	0	0	0	0	
OF1882	0	0	0.513	0	0	0	0	
OF2028	0	0	0.338	0	0	0	0	
OF1859	0.042	0.042	0.244	0.156	0.09	1.25	0.76	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1858	0.004	0.004	0.475	0.059	0.02	0.47	0.48	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1857	0	0	0.625	0	0	0	0	
OF1847	0	0	0.507	0	0	0	0	
OF999	0	0	0.791	0	0	0	0	
OF991	0	0	1.968	0	0	0	0	
OF714	0.042	0.042	0.282	0.088	0.05	2.54	0.57	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF721	0.004	0.004	0.629	0.035	0.02	0.69	0.61	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF948	0	0	0.641	0	0	0	0	
OF700	0	0	0.537	0	0	0	0	
OF708	0	0	0.592	0	0	0	0	
OF683	0	0	0.668	0	0	0	0	
OF677	0	0	0.403	0	0	0	0	
OF671	0.019	0.019	0.481	0.058	0.04	1.49	0.63	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF665	0.004	0.004	0.28	0.042	0.01	0.92	0.36	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF612	0.001	0.001	0.277	0.057	0.01	1.45	0.25	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF582	0.022	0.022	0.478	0.057	0.04	1.47	0.66	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF2666	0.306	0.306	12.415	1.543	0.02	32.34	0.35	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF768	0.031	0.031	0.458	0.114	0.07	0.92	0.71	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF762	0	0	0.272	0	0	0	0	
OF757	0	0	0.202	0	0	0	0	
OF748	0	0	0.205	0	0	0	0	
OF745	0	0	0.213	0	0	0	0	
OF788	0	0	0.659	0	0	0	0	
OF798	0	0	0.278	0	0	0	0	
OF782	0.029	0.029	0.406	0.068	0.04	1.83	0.63	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF2286	0.023	0.023	1.064	0.068	0.04	1.85	0.67	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF2279	0	0	1.134	0	0	0	0	
OF728	0	0	0.347	0	0	0	0	

OF844	0	0	0.337	0	0	0	0	
OF837	0	0	0.202	0	0	0	0	
OF831	0.023	0.023	0.215	0.131	0.06	1.05	0.67	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF825	0.001	0.001	0.311	0.043	0.01	0.34	0.38	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF814	0	0	0.358	0	0	0	0	
OF813	0	0	0.284	0	0	0	0	
OF806	0	0	0.259	0	0	0	0	
OF852	0.004	0.004	0.453	0.057	0.02	1.47	0.46	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF2224	0.023	0.023	1.551	0.053	0.05	1.33	0.86	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF2322	0	0	1.616	0	0	0	0	
OF3176	8.901	8.901	10.461	0.647	0.4	25.18	0.69	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF2196	0.038	0.038	1.342	0.071	0.06	1.94	0.88	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF606	0	0	0.799	0	0	0	0	
OF492	0.144	0.144	0.225	0.133	0.09	3.51	0.74	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF512	0.418	0.418	16.35	0.04	0.05	17.77	1.16	AR&R 2 year, 45 minutes storm, average 52 mm/h, Zone 3
OF15	2.648	2.648	15.543	0.319	0.15	37.66	0.89	AR&R 2 year, 45 minutes storm, average 52 mm/h, Zone 3
OF2229	0.045	0.045	1.499	0.071	0.06	1.94	1	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF2240	0.006	0.006	1.836	0.037	0.03	0.75	0.94	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF538	0	0	0.295	0	0	0	0	
OF68386	0	0	0.577	0	0	0	0	
OF1104	0.024	0.024	0.614	0.098	0.07	0.78	0.76	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1113	0.002	0.002	0.651	0.042	0.02	0.34	0.45	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1118	0	0	0.661	0	0	0	0	
OF1125	0	0	0.58	0	0	0	0	
OF1129	0	0	0.878	0	0	0	0	
OF2444	0	0	1.283	0	0	0	0	
OF187	0.749	0.749	3.908	0.375	0.07	13	0.39	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1131	0	0	0.528	0	0	0	0	
OF2273	0	0	1.516	0	0	0	0	
OF1257	0	0	0.605	0	0	0	0	
OF485	0.033	0.033	0.762	0.061	0.06	1.6	1.2	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF480	0.001	0.001	0.386	0.029	0	0.46	0	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF390	0	0	0.809	0	0	0	0	
OF396	0.039	0.039	0.78	0.059	0.07	1.51	1.19	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF410	0.004	0.004	0.439	0.036	0.02	0.7	0.45	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF423	0.002	0.002	0.373	0.039	0.01	0.82	0.24	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF404	0.039	0.039	0.427	0.078	0.05	2.2	0.71	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF445	0.047	0.047	0.797	0.062	0.07	1.64	1.21	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF451	0	0	0.805	0	0	0	0	
OF1250	0	0	0.651	0	0	0	0	
OF1164	0.006	0.006	0.795	0.039	0.03	0.83	0.79	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF1198	0.027	0.027	0.857	0.09	0.08	0.72	1.01	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1205	0.003	0.003	0.72	0.045	0.02	0.36	0.51	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1206	0	0	0.797	0	0	0	0	
OF1207	0	0	0.727	0	0	0	0	
OF1223	0	0	0.772	0	0	0	0	
OF1230	0	0	0.67	0	0	0	0	

OF1236	0	0	0.724	0	0	0	0	
OF1237	0	0	0.714	0	0	0	0	
OF1265	0.004	0.004	0.575	0.056	0.02	0.45	0.48	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1277	0	0	0.176	0	0	0	0	
OF470	0	0	0.698	0	0	0	0	
OF303	0.014	0.014	0.7	0.054	0.04	1.34	1.1	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF311	0	0	0.695	0	0	0	0	
OF356	0	0	0.624	0	0	0	0	
OF2437	0	0	1.355	0	0	0	0	
OF464	0	0	0.798	0	0	0	0	
OF441	0.009	0.009	0.803	0.061	0.03	1.62	0.73	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF457	0.051	0.051	0.309	0.089	0.05	2.6	0.59	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF381	0	0	0.762	0	0	0	0	
OF362	0	0	0.297	0	0	0	0	
OF140	0.046	0.046	0.232	0.162	0.09	1.3	0.77	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF141	0.007	0.007	0.169	0.091	0.03	0.73	0.53	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF142	0	0	0.173	0	0	0	0	
OF143	0	0	0.394	0	0	0	0	
OF144	0.02	0.02	0.792	0.091	0.07	0.73	0.88	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1285	0	0	0.498	0	0	0	0	
OF85	0	0	0.793	0	0	0	0	
OF317	0	0	0.534	0	0	0	0	
OF104	0	0	0.503	0	0	0	0	
OF99	0	0	0.623	0	0	0	0	
OF75	0.066	0.066	0.562	0.082	0.07	2.35	0.93	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF57	0.086	0.086	0.567	0.083	0.09	2.37	1.05	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF213	0.538	0.538	4.855	0.439	0.05	13.51	0.14	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF81	0	0	0.728	0	0	0	0	
OF111	0	0	0.714	0	0	0	0	
OF123	0	0	0.745	0	0	0	0	
OF69	0.156	0.156	0.623	0.099	0.13	2.94	1.29	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF240	0	0	20.262	0	0	0	0	
OF29	0	0	0.628	0	0	0	0	
OF38	0.005	0.005	0.566	0.077	0.02	2.17	0.5	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF5	0.044	0.044	0.638	0.078	0.06	2.19	0.98	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF9	0.006	0.006	6.556	0.004	0	10.03	0.18	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF3082	1.446	1.446	16.804	0.332	0.08	38.66	0.38	AR&R 2 year, 1.5 hours storm, average 33 mm/h, Zone 3
OF44	0.044	0.044	0.355	0.085	0.05	2.46	0.62	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF20	0	0	0.582	0	0	0	0	
OF191	0.082	0.082	3.991	0.375	0.01	13	0.1	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF166	2.626	2.626	10.772	0.332	0.11	38.66	0.34	AR&R 2 year, 45 minutes storm, average 52 mm/h, Zone 3
OF323	0.119	0.119	0.348	0.205	0.17	1.64	0.93	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF330	0.043	0.043	0.562	0.123	0.09	0.98	0.83	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF331	0.015	0.015	0.479	0.091	0.05	0.72	0.62	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF332	0.001	0.001	0.581	0.031	0	0.25	0	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF333	0	0	0.218	0	0	0	0	
OF132	0	0	0.587	0	0	0	0	

OF129	0	0	0.798	0	0	0	0	
OF216	0.025	0.025	6.332	1.531	0	22.25	0.37	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF3086	0.119	0.119	17.495	0.332	0.02	38.66	0.34	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF1291	0.058	0.058	0.82	0.118	0.13	0.94	1.19	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1297	0.027	0.027	0.738	0.095	0.08	0.76	0.9	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1298	0.002	0.002	0.585	0.045	0.02	0.36	0.42	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1299	0	0	0	0	0	0	0	
OF1300	0	0	0.815	0	0	0	0	
OF1301	0	0	0.634	0	0	0	0	
OF1302	0	0	0.74	0	0	0	0	
OF1303	0	0	0.41	0	0	0	0	
OF430	0	0	0.365	0	0	0	0	
OF1376	0.001	0.001	0.215	0.048	0.01	0.38	0.37	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF1377	0	0	0.863	0	0	0	0	
OF1716	0.02	0.02	0.739	0.092	0.06	0.74	0.84	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1722	0	0	0.7	0	0	0	0	
OF1728	0	0	0.694	0	0	0	0	
OF1729	0	0	0.723	0	0	0	0	
OF1730	0	0	0.656	0	0	0	0	
OF1074	0.003	0.003	0.643	0.035	0.02	0.67	0.59	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF2014	0.032	0.032	0.541	0.066	0.05	1.78	0.79	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF2109	0.147	0.147	0.764	0.182	0.23	1.45	1.4	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF2431	0.181	0.181	0.701	0.182	0.25	1.46	1.39	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF2419	0.113	0.113	0.523	0.178	0.17	1.43	0.99	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF2410	0.023	0.023	0.409	0.109	0.06	0.87	0.67	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF68305	0.001	0.001	0.253	0.042	0	0.34	0	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF576	3.606	3.606	13.411	0.339	0.14	39.15	0.44	AR&R 2 year, 45 minutes storm, average 52 mm/h, Zone 3
OF3042	0.993	0.993	7.831	0.943	0.04	27.55	0.05	AR&R 2 year, 1.5 hours storm, average 33 mm/h, Zone 3
OF3022	0.13	0.13	7.831	0.137	0.01	21.1	0.16	AR&R 2 year, 1.5 hours storm, average 33 mm/h, Zone 3
OF210	0.105	0.105	3.991	0.275	0.01	12.2	0.06	AR&R 2 year, 1.5 hours storm, average 33 mm/h, Zone 3
OF249	0	0	4.407	0	0	0	0	
OF3094	0.353	0.353	5.014	0.332	0.02	38.66	0.09	AR&R 2 year, 1.5 hours storm, average 33 mm/h, Zone 3
OF235	0.658	0.658	3.464	1.628	0.04	23.03	0.03	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF257	0.048	0.048	22.512	0.396	0	117.99	1.#J	AR&R 2 year, 45 minutes storm, average 52 mm/h, Zone 3
OF51804	0	0	1.138	0	0	0	0	
OF518	0	0	0.498	0	0	0	0	
OF2995	0	0	1.395	0	0	0	0	
OF858	0.017	0.017	0.152	0.089	0.02	2.58	0.24	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF866	0.089	0.089	0.469	0.126	0.08	3.5	0.91	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF869	0.01	0.01	0.471	0.047	0.02	1.1	0.53	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF774	0.029	0.029	0.19	0.084	0.04	2.42	0.53	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF1403	0.017	0.017	0.776	0.077	0.04	2.17	0.92	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF2517	2.545	2.545	0.221	0.968	0.36	10.1	0.67	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF2520	2.447	2.447	3.703	0.268	0.26	31	1.01	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF2530	2.301	2.301	8.572	0.543	0.07	80.55	0.32	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF2609	0.007	0.007	0.899	0.06	0.02	1.58	0.46	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF2560	1.277	1.277	0.443	0.543	0.47	10.1	2.34	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3

OF2557	0.178	0.178	0.453	0.111	0.18	2.84	1.76	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF2618	0.175	0.175	0.341	0.119	0.15	3.11	1.39	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF2565	4.367	4.367	17.314	1.83	0.18	92.57	0.54	AR&R 2 year, 45 minutes storm, average 52 mm/h, Zone 3
OF2574	0	0	0	0	0	0	0	
OF2582	4.448	4.448	17.809	0.328	0.18	38.38	0.55	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF2815	0.464	0.464	36.933	0.422	0.01	62.81	0.48	AR&R 2 year, 1.5 hours storm, average 33 mm/h, Zone 3
OF2859	0.497	0.497	6.403	1.531	0.05	22.25	1.22	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF245	0	0	12.248	0	0	0	0	
OF3047	0	0	12.326	0	0	0	0	
OF32652	4.891	4.891	12.321	0.393	0.24	23.15	2.32	AR&R 2 year, 1.5 hours storm, average 33 mm/h, Zone 3
OF3147	8.058	8.058	12.688	0.584	0.37	24.67	0.95	AR&R 2 year, 45 minutes storm, average 52 mm/h, Zone 3
OF3142	56.216	56.216	5.483	1.452	2.21	31.62	1.61	AR&R 2 year, 45 minutes storm, average 52 mm/h, Zone 3
OF3163	0	0	12.531	0	0	0	0	
OF30286	5.366	5.366	12.664	1.762	0.24	34.1	0.44	AR&R 2 year, 45 minutes storm, average 52 mm/h, Zone 3
OF3181	50.829	50.829	4.247	1.587	1.99	32.69	1.45	AR&R 2 year, 45 minutes storm, average 52 mm/h, Zone 3
OF633	0	0	0	0	0	0	0	
OF30205	0.398	0.398	4.902	0.584	0.07	16.61	0.58	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF30268	0.878	0.878	7.831	1.722	0.03	33.77	0.02	AR&R 2 year, 45 minutes storm, average 52 mm/h, Zone 3
OF30281	0	0	0	0	0	0	0	
OF153	0	0	2.878	0	0	0	0	
OF2094	0	0	1.685	0	0	0	0	
OF42414	0	0	0	0	0	0	0	
OF30181	0	0	0	0	0	0	0	
OF30187	0.4	0.4	4.851	0.134	0.07	7.25	0.6	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF51797	0.336	0.336	4.182	0.364	0.07	10.01	0.89	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3

DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level
BIO2B	42.57	0	0.306	0	0.306
BSN4	43.42	0	1.123	0	1.123
BSN5	53.13	0	0.105	0	0.105
BSN1	40.09	0	0.658	0	0.658
BIO2A	44.37	0	0.464	0	0.464
BIO5	53.34	0	0.497	0	0.497
BSN3	44.42	0	10.162	5.27	4.891
BIO3B	45.51	0	56.216	0	56.216
BIO3A	45.11	0	50.829	0	50.829
Basin873	42.54	0	0.878	0	0.878

CONTINUITY CHECK for AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3

Node	Inflow (cu.m)	Outflow (cu.m)	Storage Ch (cu.m)	Difference %
Pit317	26.27	16.74	0	36.3
Pit302	556.32	555	0	0.2
Pit314	1372.45	1373.27	0	-0.1

N1053	1373.28	1375.23	0	-0.1
Pit311	334.46	333.48	0	0.3
Pit312	710.43	711.66	0	-0.2
Pit313	807.63	806.51	0	0.1
Pit309	28.41	28.59	0	-0.6
Pit308	440.69	440.28	0	0.1
Pit299	487.91	488.82	0	-0.2
Pit300	544.05	542.89	0	0.2
Pit307	120.21	120.21	0	0
Pit306	355.28	354.88	0	0.1
Pit303	70.34	70.31	0	0.1
Pit305	176.22	176.6	0	-0.2
Pit301	86.44	81.5	0	5.7
Pit295	247	246.9	0	0
Pit296	416.89	416.83	0	0
Pit293	0	0	0	0
Pit290	687.01	686.8	0	0
Pit291	1041.99	1042.42	0	0
Pit1035	1078.12	1078.09	0	0
Pit185	1208.9	1208.77	0	0
Pit1032	1208.77	1208.17	0	0
Pit49	1564.89	1565.86	0	-0.1
Pit1309	1565.86	1570.76	0	-0.3
Pit48	1663.33	1656.95	0	0.4
Pit72	1656.95	1657.73	0	0
Pit73	1875.89	1875.62	0	0
Pit74	1947.89	1938.74	0	0.5
Pit64	1938.74	1920.77	0	0.9
N66678	1920.77	1216.37	0	36.7
Pit292	0	0	0	0
Pit285	24.24	23.98	0	1
Pit253	136.5	136.43	0	0.1
Pit251	542.69	542.27	0	0.1
Pit283	626.43	626.36	0	0
Pit286	613.57	614.09	0	-0.1
Pit288	614.09	613.68	0	0.1
Pit289	613.68	612.81	0	0.1
Pit284	0	0	0	0
Pit279	0	0.01	0	0
Pit280	65.63	65.6	0	0
Pit281	355.94	355.18	0	0.2
Pit268	38.15	40.3	0	-5.6
Pit269	40.3	40.34	0	-0.1
Pit270	193.46	193.4	0	0
Pit271	193.4	193.41	0	0
Pit272	193.41	193.27	0	0.1
Pit273	193.27	193.35	0	0

Pit274	193.35	193.33	0	0
Pit275	193.33	193.33	0	0
Pit276	289.65	289.77	0	0
Pit278	289.77	290.34	0	-0.2
Pit260	128.62	128.7	0	-0.1
Pit259	128.69	129.04	0	-0.3
Pit258	129.04	129.04	0	0
Pit257	129.04	129.03	0	0
Pit256	129.03	129.09	0	0
Pit261	129.09	129.01	0	0.1
Pit262	129.01	129.06	0	0
Pit263	129.06	128.98	0	0.1
Pit264	128.98	128.93	0	0
Pit265	128.93	128.89	0	0
Pit266	128.89	128.83	0	0
Pit267	128.83	128.84	0	0
Pit249	396.48	396.93	0	-0.1
Pit250	393.99	393.47	0	0.1
Pit255	137.01	137.52	0	-0.4
Pit254	113.29	113.08	0	0.2
Pit252	0.56	0.56	0	0
Pit247	28.02	28.03	0	0
Pit246	96.25	96.24	0	0
Pit248	216.1	216.2	0	0
Pit245	98.87	99.04	0	-0.2
Pit244	71.02	70.87	0	0.2
Pit242	0	0	0	0
Pit243	0	0	0	0
Pit241	0	0.01	0	0
Pit240	119.88	119.85	0	0
Pit239	119.86	119.9	0	0
Pit237	116.37	116.36	0	0
Pit238	0	0.01	0	0
Pit233	82.94	83.06	0	-0.1
Pit232	83.06	83.06	0	0
Pit220	140.47	140.36	0	0.1
Pit1043	314.71	314.94	0	-0.1
Pit221	373.36	373.57	0	-0.1
Pit223	425.55	425.28	0	0.1
Pit222	438.54	438.94	0	-0.1
Pit217	534.98	534.46	0	0.1
Pit218	583.63	584.21	0	-0.1
Pit209	717.11	716.64	0	0.1
Pit210	765.29	764.8	0	0.1
Pit211	764.8	764.98	0	0
Pit212	764.98	766.93	0	-0.3
Pit216	881.88	869.56	0	1.4

Pit57587	869.56	868.32	0	0.1
Pit57586	868.32	868.18	0	0
Pit57588	868.18	869.05	0	-0.1
Pit111	1051.8	1050.63	0	0.1
Pit151	1451.31	1450.35	0	0.1
Pit24717	1461.81	1462.11	0	0
Pit125	1515.66	1552.25	0	-2.4
N1622	1653.75	2305.66	0	-39.4
Pit225	0	0	0	0
Pit226	0	0	0	0
Pit227	0	0	0	0
Pit228	0	0	0	0
Pit224	57.75	57.7	0	0.1
Pit219	76.93	76.9	0	0
Pit196	51.45	51.62	0	-0.3
Pit229	42.69	42.52	0	0.4
Pit230	42.52	42.54	0	0
Pit234	42.54	42.61	0	-0.2
Pit177	51.5	51.46	0	0.1
Pit178	101.71	101.71	0	0
Pit169	101.71	101.76	0	0
Pit171	151.71	151.74	0	0
Pit168	198.46	198.51	0	0
Pit167	198.51	198.46	0	0
Pit123	198.46	198.31	0	0.1
Pit57623	198.31	198.78	0	-0.2
Pit118	344.14	343.67	0	0.1
Pit119	343.67	342.72	0	0.3
Pit121	398.89	400.69	0	-0.5
Pit194	49.52	49.61	0	-0.2
Pit193	41.28	41.19	0	0.2
Pit1057	96.08	96.05	0	0
Pit192	66.67	66.74	0	-0.1
Pit191	53.34	53.22	0	0.2
Pit1070	133.22	132.91	0	0.2
Pit189	49	48.99	0	0
Pit188	48.99	48.98	0	0
Pit190	48.98	48.97	0	0
Pit198	48.97	49.06	0	-0.2
Pit199	81.43	81.6	0	-0.2
Pit200	70.06	69.86	0	0.3
Pit201	69.86	69.9	0	-0.1
Pit202	103.5	103.48	0	0
Pit203	103.48	103.41	0	0.1
Pit187	98.34	98.61	0	-0.3
Pit186	70.97	70.72	0	0.3
Pit184	92.22	96.19	0	-4.3

Pit183	96.19	96.55	0	-0.4
Pit277	96.54	96.33	0	0.2
Pit182	8.94	8.89	0	0.5
Pit179	50.22	50.26	0	-0.1
Pit180	50.26	50.29	0	-0.1
Pit181	50.29	50.2	0	0.2
Pit1052	50.2	50.25	0	-0.1
Pit176	66.32	66.3	0	0
Pit1063	66.3	66.31	0	0
Pit1065	66.31	66.32	0	0
Pit1066	66.32	66.27	0	0.1
Pit1067	66.27	66.33	0	-0.1
Pit1068	66.33	66.29	0	0.1
Pit1069	79.69	80	0	-0.4
Pit175	47.07	50.12	0	-6.5
Pit174	50.12	50.05	0	0.1
Pit173	50.05	50.02	0	0.1
Pit172	50.02	49.95	0	0.1
Pit170	0	0	0	0
Pit166	0	0	0	0
Pit165	105.87	106.16	0	-0.3
Pit164	106.16	105.88	0	0.3
Pit304	105.88	105.91	0	0
Pit162	17.67	17.67	0	0
Pit163	17.67	17.69	0	-0.2
Pit161	17.69	17.67	0	0.2
Pit148	179.29	179.24	0	0
Pit135	299.89	300.05	0	-0.1
Pit132	319.47	319.86	0	-0.1
Pit102	339.46	338.7	0	0.2
Pit98	398.37	398.73	0	-0.1
BIO2B	398.73	275.16	98.64	6.3
Pit158	52.01	54.06	0	-3.9
Pit157	40.06	40.01	0	0.1
Pit156	43.12	43.18	0	-0.1
Pit155	43.18	43.33	0	-0.3
Pit154	43.33	43.29	0	0.1
Pit153	43.29	43.29	0	0
Pit152	43.29	43.54	0	-0.6
Pit145	112.22	112.17	0	0
Pit146	161.87	161.68	0	0.1
Pit147	151.5	151.45	0	0
Pit144	0	0.01	0	0
Pit143	0.01	0.03	0	-137.1
Pit142	0.03	0.11	0	-220.2
Pit141	56.81	56.81	0	0
Pit140	56.81	56.73	0	0.1

Pit139	56.73	56.74	0	0
Pit138	56.74	56.82	0	-0.1
Pit137	56.82	56.94	0	-0.2
Pit136	70.24	70.08	0	0.2
Pit122	59.67	59.67	0	0
Pit103	48.2	49.4	0	-2.5
N1629	49.4	79	0	-59.9
Pit117	74.72	74.64	0	0.1
Pit101	0	0	0	0
Pit99	262.31	262.67	0	-0.1
Pit760	7431.56	7382.69	0	0.7
N805	7382.7	7375.16	0	0.1
Pit87	86.09	86.06	0	0
Pit86	86.06	86.11	0	-0.1
Pit85	86.12	86.36	0	-0.3
Pit84	218.13	218.16	0	0
Pit82	54.42	54.4	0	0
Pit81	54.41	54.42	0	0
Pit80	54.42	54.42	0	0
Pit79	54.42	54.36	0	0.1
Pit78	54.36	54.47	0	-0.2
Pit75	612.43	612.04	0	0.1
Pit63	612.04	612.3	0	0
N998	612.3	607.64	0	0.8
Pit77	0	0	0	0
Pit57610	0	0	0	0
Pit59	0	0	0	0
Pit58	494.56	494.92	0	-0.1
Pit57	558.29	557.96	0	0.1
Pit53	0	0.01	0	0
Pit54	80.33	80.29	0	0
Pit50	151.54	151.52	0	0
Pit51	249.71	249.06	0	0.3
Pit52	89.07	89.07	0	0
Pit45	92.11	92.09	0	0
Pit44	67.01	66.94	0	0.1
Pit46	66.94	66.98	0	-0.1
Pit47	92.71	92.58	0	0.1
Pit38	63.52	63.5	0	0
Pit39	63.5	63.51	0	0
Pit40	63.51	63.51	0	0
Pit41	63.51	63.52	0	0
Pit42	63.52	63.47	0	0.1
Pit43	63.47	63.52	0	-0.1
Pit56	63.52	63.51	0	0
Pit55	63.51	63.37	0	0.2
Pit36	40.95	40.92	0	0.1

Pit37	40.92	40.99	0	-0.2
Pit998	426.46	425.45	0	0.2
Pit35	41.96	41.9	0	0.1
Pit34	36.08	36.03	0	0.1
Pit30	158.23	158.5	0	-0.2
Pit29	158.5	158.31	0	0.1
Pit28	384.65	385.46	0	-0.2
Pit27	24.31	24.34	0	-0.1
Pit26	250.74	250.64	0	0
Pit25	0	0	0	0
Pit24	114.7	114.82	0	-0.1
Pit20	51.97	54.88	0	-5.6
Pit19	54.88	54.82	0	0.1
Pit18	54.82	55.08	0	-0.5
Pit17	55.08	54.88	0	0.4
Pit16	114.9	114.9	0	0
Pit23	114.9	114.7	0	0.2
Pit15	0.86	0.86	0	-0.5
Pit14	0.86	0.86	0	0.1
Pit12	5.23	5.32	0	-1.7
Pit9	5.32	5.26	0	1.2
Pit6	243.48	243.5	0	0
Pit235	413.02	412.38	0	0.2
N664	412.38	412.84	0	-0.1
Pit13	4.37	4.37	0	0
Pit11	0	0	0	0
Pit10	0	0	0	0
Pit8	212.31	212.42	0	-0.1
Pit1	0	0	0	0
N2	0	0	0	0
HW-BSN5	0	0	0	0
Pit5	18.57	18.57	0	0
Pit4	117.17	116.85	0	0.3
Pit3	5754.56	5748.71	0	0.1
N659	5748.72	4118.86	0	28.4
Pit635	89.96	90.01	0	0
HW-BSN3	131.85	131.77	0	0.1
N807	49.52	49.71	0	-0.4
N1049	7928	7285.58	0	8.1
Pit21	122.14	122.26	0	-0.1
Pit22	122.25	122.21	0	0
Pit33	122.21	122.25	0	0
Pit32	122.25	122.04	0	0.2
Pit31	122.04	122.2	0	-0.1
Pit996	17.85	17.88	0	-0.1
Pit994	17.88	17.84	0	0.2
N1064	17.84	18.01	0	-1

N1071	134.96	130.06	0	3.6
Pit1000	79.79	79.78	0	0
Pit1001	79.78	79.8	0	0
Pit1009	79.8	79.73	0	0.1
Pit1010	79.73	79.72	0	0
Pit1011	79.72	79.76	0	-0.1
Pit1012	79.76	79.76	0	0
Pit1013	79.76	79.76	0	0
Pit1014	79.76	79.81	0	-0.1
Pit1022	79.81	80.38	0	-0.7
Pit1028	47.25	47.47	0	-0.5
Pit1024	82.12	81.83	0	0.4
Pit1037	97.64	97.63	0	0
Pit1038	97.63	97.68	0	-0.1
Pit1039	97.68	97.64	0	0
Pit1040	97.64	97.64	0	0
Pit1041	97.64	97.65	0	0
Pit1042	115.97	115.92	0	0
Pit1055	68.18	68.16	0	0
Pit1083	100.27	100.21	0	0.1
Pit114	182.46	182.52	0	0
Pit108	182.52	182.59	0	0
Pit109	182.59	182.44	0	0.1
Pit110	182.44	182.76	0	-0.2
OUT	11905.87	7934.3	0	33.4
BSN4	1480.43	905.75	591.54	-1.1
BSN5	308.07	0	559.7	-81.7
HW6	1367.22	1354.61	0	0.9
N1014	1354.61	72.11	0	94.7
BSN1	1375.23	1367.22	0.56	0.5
HW9	3091.13	3088.36	0	0.1
Pit35783	3117.62	3114.18	0	0.1
Pit1b	3061.35	3059.69	0	0.1
Pit1094	3059.69	3057.5	0	0.1
Pit1090	3057.31	3054.36	0	0.1
Pit1315	6335.12	6286.07	0	0.8
Pit1098	78.92	78.98	0	-0.1
Pit297	216.52	216.39	0	0.1
Pit298	204.75	204.51	0	0.1
END	7934.3	7934.3	0	0
N1231	14	13.73	0	1.9
N1270	6.18	6.17	0	0
N1446	3107.7	3091.13	0	0.5
N1449	2045.62	2045.86	0	0
N1451	2045.86	2051.93	0	-0.3
Pit1305	35.35	35.26	0	0.2
N1456	1057.36	1055.77	0	0.2

N1458	148.89	148.83	0	0
N1459	148.83	146.77	0	1.4
N1461	7089.64	6439.72	0	9.2
HW20	6439.72	5637.79	0	12.5
N1465	4607.78	4433.24	0	3.8
BIO2A	705.13	434.4	212.61	8.2
BIO5	412.84	383.04	8.56	5.1
HWBSN4a	0	0	0	0
HWBSN4b	905.75	882.87	0	2.5
BSN3	2900.57	2918.88	14.86	-1.1
N30841	2918.88	2912.98	0	0.2
BIO3B	2305.66	2437.1	20.28	-6.6
HWBSN3	3265.22	3257.73	0	0.2
N28574	3257.73	3253.36	0	0.1
BIO3A	79	463.32	-104.42	-354.3
HW10	354.35	353.67	0	0.2
N28560	353.68	352.25	0	0.4
Basin873	175.4	81.21	27.15	38.2
HW13	81.21	51.59	0	36.5
Pit25375	146.77	30.45	0	79.3
Pit1080	30.45	29.19	0	4.1
HW126	3253.36	3229.15	0	0.7
HW45	356.78	355.07	0	0.5
N28567	355.07	354.35	0	0.2
N50029	52.83	52.41	0	0.8

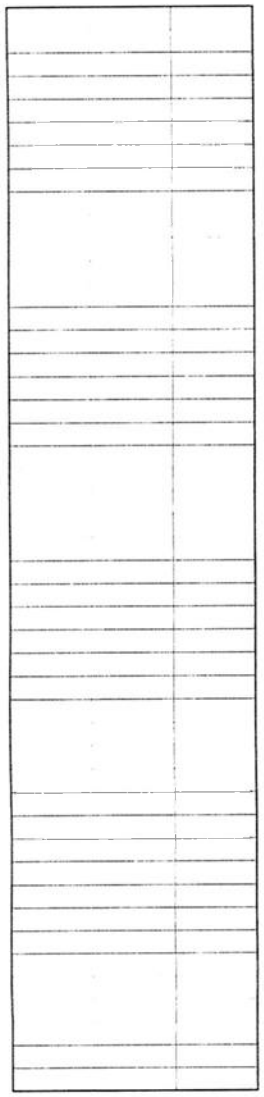
Run Log for 5874 AREA1 run at 13:34:25 on 18/3/2011

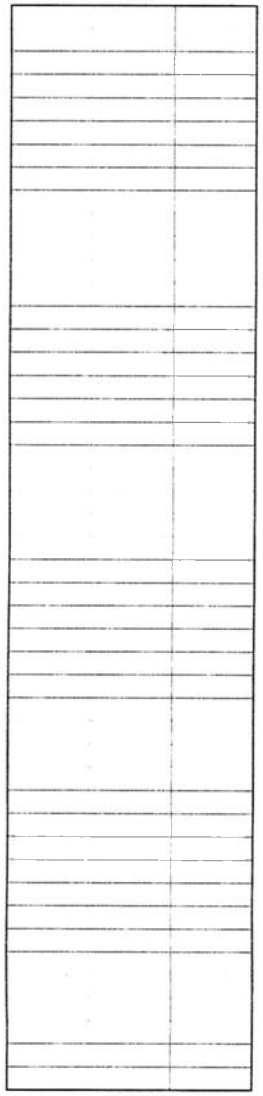
Upwelling occurred at Pit25375, Pit760, Pit20, Pit99, Pit175, Pit184, Pit268, Pit301, Pit317
Freeboard was inadequate at more than 20 pits.

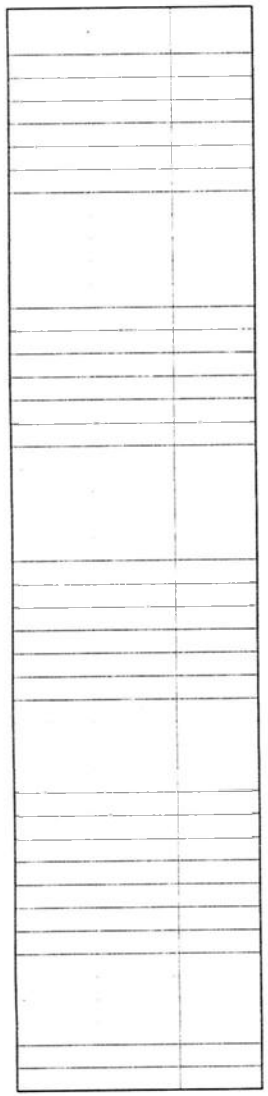
To see more detailed results select the Edit/Copy Results to Spreadsheet menu item, and paste them into a spreadsheet.
The maximum flow exceeded the safe value in the following overflow routes: OF3181, OF3142, OF3140, OF2560, OF2517

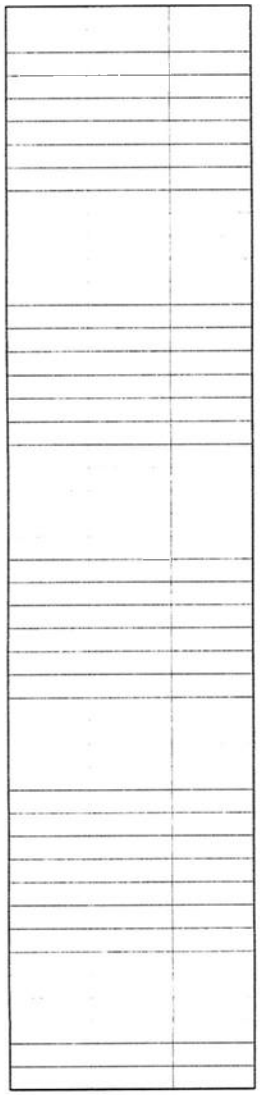
The following detention basins have little effect (less than 2%) in reducing peak discharge: Basin873, BIO3A, BIO3B You might consider upsizing these, or removing them from the model.

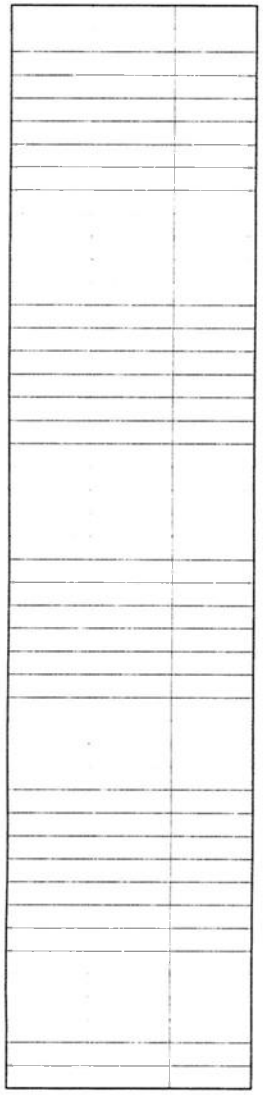
Numerical damping was applied to: P60150, P37246, P36538, Pipe27776, P25725, P25711, P25707, P25691, Pipe1498, P1471, P1461, P1390, P818, P766, Pipe755, P744, Pipe736, Pipe58, Pipe43, Pipe40, Pipe307, Pipe323, Pipe130, Pipe145

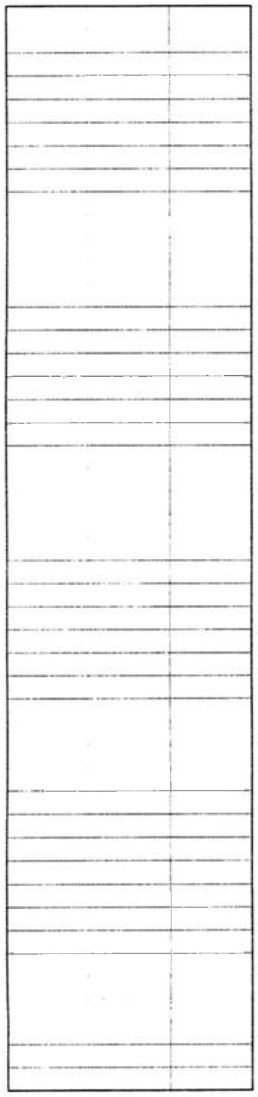


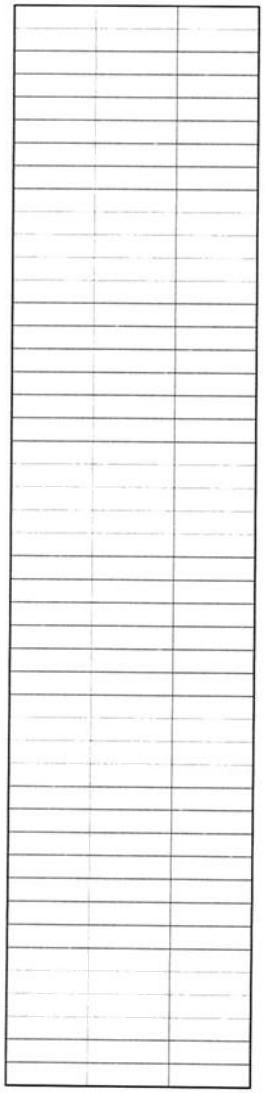












Results of a simplified bottom up HGL analysis.
This provides a simple analysis that can be checked manually. It is useful where Council insists on a manual check on HGLs.
The HGLs shown here may be different to the more accurate values normally calculated by Drains because it is assumed here that the maximum flows and HGLs throughout the system occur at the same time. In fact, in different parts of the system, they may occur during different storms, or even at different times within the one storm. Also, pipes are assumed to be flowing full (even when the more accurate analysis in DRAINS shows they are not).

SUB-CATCHMENT DETAILS

Name	Max Flow Q (cu.m/s)	Impervious Max Q (cu.m/s)	Pervious Max Q (cu.m/s)	Impervious Tc (min)	Pervious Tc (min)	Due to Storm
EC4	0.399	0.279	0.12	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C1I	0.094	0.066	0.028	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C1F	0.086	0.06	0.026	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C1H	0.071	0.049	0.021	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C1B	0.178	0.166	0.012	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C1D	0.076	0.053	0.023	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C1A	0.104	0.073	0.031	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C1J	0.126	0.088	0.038	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
EC3	0.29	0.203	0.087	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C1G	0.045	0.032	0.014	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C5D	0.11	0.077	0.033	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C3E	0.053	0.037	0.016	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C3C	0.072	0.051	0.022	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C3F	0.16	0.112	0.048	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C3H	0.107	0.075	0.032	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C5F	0.124	0.087	0.037	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C5C	0.097	0.068	0.029	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C6D	0.056	0.039	0.017	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C6C	0.226	0.158	0.068	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C9E	0.19	0.133	0.057	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C6E2	0.076	0.053	0.023	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C6A	0.203	0.142	0.061	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C9D	0.146	0.102	0.044	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C9C	0.177	0.124	0.053	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C9A	0.123	0.086	0.037	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C8E	0.087	0.061	0.026	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C8B	0.077	0.054	0.023	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C7B	0.073	0.051	0.022	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C7C	0.072	0.05	0.022	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C10H	0.079	0.055	0.024	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C10I	0.166	0.013	0.153	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C8A	0.085	0.06	0.026	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C8D	0.112	0.078	0.034	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C9B	0.076	0.053	0.023	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
C7J	0.069	0.048	0.021	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3

C10G	0.083	0.058	0.025	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
C7H	0.073	0.051	0.022	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
C7E	0.099	0.069	0.03	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
C7G	0.072	0.051	0.022	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
C7F	0.048	0.033	0.014	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
C10A	0.05	0.035	0.015	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
C10E	0.145	0.102	0.044	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
C6B	0.136	0.095	0.041	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
C8F	0.074	0.052	0.022	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
C7D	0.098	0.069	0.029	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
C7I	0.07	0.049	0.021	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
C2B	0.157	0.11	0.047	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
C2A	0.026	0.018	0.008	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
C2F	0.075	0.052	0.022	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
C2H	0.029	0.02	0.009	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
C3M	0.029	0.02	0.009	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
C3L	0.088	0.062	0.027	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
C2D	0.082	0.057	0.025	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
C2E	0.081	0.057	0.024	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
C2C	0.074	0.051	0.022	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
C2G	0.084	0.059	0.025	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
C2I	0.02	0.014	0.006	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
C3B	0.088	0.062	0.027	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
C10D	0.07	0.049	0.021	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
EC6	0.388	0.271	0.117	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
C3A	0.127	0.089	0.038	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
C3G	0.08	0.056	0.024	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
C4E	0.102	0.072	0.031	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
C4B	0.119	0.083	0.036	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
C4A	0.132	0.092	0.04	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
C4C	0.133	0.093	0.04	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
C4D	0.094	0.066	0.028	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
C4F	0.061	0.042	0.018	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
EC13N	0.062	0.043	0.019	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
C4G	0.168	0.118	0.051	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
C11C	0.077	0.054	0.023	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
C5G	0.089	0.062	0.027	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
EC14N	0.001	0.001	0	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
C11B	0.171	0.12	0.051	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
C11A	0.145	0.101	0.044	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
EC12N	0.006	0.005	0.002	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
EC4N	0.314	0.22	0.094	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
EC8	0.137	0.02	0.117	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
C3D	0.195	0.015	0.18	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
C3I	0.073	0.051	0.022	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						
EC5(EC14E	0.673	0	0.673	5	10	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3						
C11D	0.181	0.126	0.054	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3						

C6E1	0.026	0.018	0.008	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3												
EC7	0.191	0.134	0.057	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3												
C5E	0.118	0.083	0.035	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3												
C5A	0.07	0.049	0.021	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3												
C5B	0.051	0.036	0.015	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3												
C8C	0.144	0.101	0.043	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3												
C7A	0.089	0.062	0.027	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3												
C10B	0.148	0.104	0.045	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3												
C10F	0.122	0.085	0.037	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3												
EC13E	0.364	0	0.364	5	10	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3												
C3J	0.09	0.063	0.027	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3												
EC1	0.117	0.082	0.035	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3												
EC2	0.203	0.142	0.061	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3												
C1E	0.058	0.041	0.017	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3												
EX1	2.489	0	2.489	5	10	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3												
C1C	0.052	0.037	0.016	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3												
EX2	1.286	0	1.286	5	10	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3												
EC5W	0.179	0.016	0.167	5	10	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3												
EC4W	3.223	0.059	3.182	5	10	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3												
CAT3(+17)	4.71	0	4.71	5	15	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3												
C3K	0.071	0.049	0.021	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3												
C10C	0.45	0.42	0.03	5	5	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3												
PIPE DETAILS													PIT & NODE DETAILS					
Pipe	Flow	Length	U/S IL	D/S IL	Slope	Int. Dia	Rough	Nom.Capac	V	D/S HGL	Friction	U/S HGL	Node	Headloss	Shock Loss	HGL	Free-	Overflow
	(cu.m/s)	(m)	(m)	(m)	(%)	(mm)	(mm)	(cu.m/s)	(m/sec)	(m)	Loss (m)	(m)		Coeff (Ku)	(m)	(m)	board	(cu.m/s)
													N50029			45.945		
													N28567			44.518		
													HW45			44.708		
													N805			40.72		
Pipe755	2.231	18.16	40.6	40.55	0.28	600	0.013	0.644	16.9	41.15	0.05	41.2	Pit760	1	0.794	41.994	0.01	0.418
P1390	2.562	11.2	40.72	40.6	1.07	0	0.012	26.501	0.4	41.994	0.002	41.996	Pit1315	1.8	0.021	42.017	1.98	0
													HW126			42.036		
Pipe754	1.973	74.9	41.1	40.72	0.51	0	0.012	1.599	2.7	42.017	0.693	42.709	Pit1090	1.8	0.826	43.535	0.67	0
Pipe1070	1.992	89	41.5	41.2	0.34	0	0.012	1.303	2.8	43.535	0.839	44.374	Pit1094	0.7	0.327	44.701	-0.76	
Pipe1068	2.145	195	43.9	41.5	1.23	0	0.012	2.49	3	44.701	2.132	46.833	Pit1b	1.5	0.813	47.646	-1.15	
P37225	2.452	25.1	44.1	43.9	0.8	0	0.012	2.004	3.4	47.646	0.358	48.005	Pit35783	1.5	1.062	49.067	-1.57	0
P992	0.007	59.5	47.047	46.75	0.5	100	0.013	0.004	1	49.067	0.998	50.065	Pit1080	1.2	0.044	50.11	-2.31	0
P1003	0.007	22.5	47.477	47.077	1.78	100	0.013	0.007	0.9	50.11	0.455	50.565	Pit25375	1.2	0.054	50.618	-2.42	0
													HW13			42.044		
													Basin873			42.542		
													N28560			43.421		
													HW10			43.878		
													BIO3A			45.108		
													N28574			42.651		

												HWBSN3			42.432		
												BIO3B			45.507		
												N30841			42.793		
												BSN3			43.456		
												HWBSN4b			42.711		
												HWBSN4a			43.279		
												BIO5			53.339		
												BIO2A			44.375		
												N1465			65.328		
												N659			49.27		
Pipe734	1.453	14.5	50.02	49.59	2.97	750	0.013	1.917	4.8	50.078	0.43	50.508	Pit3	1.4	0.773	51.281	0.72	0.006
													HW20			51.799		
													N1461			53.325		
													N1459			54.111		
													N1458			55.602		
													N1456			57.2		
													N1053			40.09		
P818	1.697	11.3	38.851	38.5	3.11	900	0.013	3.192	2.7	40.09	0.099	40.19	Pit314	1.9	0.69	40.88	0.52	0.018
Pipe16	0.73	25.059	39.992	39.867	0.5	750	0.013	0.787	2.1	40.88	0.108	40.987	Pit302	0.6	0.083	41.071	0.43	0
Pipe17	0.707	57.89	40.312	40.022	0.5	750	0.013	0.787	1.9	41.071	0.233	41.304	Pit300	0.4	0.052	41.356	0.54	0
Pipe18	0.646	27.072	40.477	40.342	0.5	750	0.013	0.787	1.8	41.356	0.091	41.447	Pit299	0.3	0.033	41.48	0.52	0.01
Pipe19	0.581	52.396	40.769	40.507	0.5	675	0.013	0.594	1.8	41.48	0.25	41.73	Pit308	0.8	0.107	41.838	0.26	0.015
Pipe20	0.455	67.907	41.364	40.855	0.75	600	0.013	0.532	2	41.838	0.373	42.211	Pit306	1.3	0.172	42.382	0.32	0.018
P1231	0.043	19.026	42.344	41.844	2.63	225	0.013	0.073	1.9	42.382	0.176	42.559	Pit1305	1.3	0.078	42.637	0.56	0.007
													N1451			47.201		
													N1449			50.61		
													N1446			47.043		
													N1270			56.045		
													N1231			46.284		
Pipe15	0.997	62.63	39.855	39.532	0.52	900	0.013	1.301	1.9	40.88	0.19	41.069	Pit313	2	0.25	41.32	0.28	0.053
Pipe14	0.877	25.712	40.128	39.999	0.5	900	0.013	1.28	1.7	41.32	0.06	41.38	Pit312	0.8	0.078	41.458	0.24	0.015
Pipe13	0.534	72.59	40.569	40.206	0.5	675	0.013	0.594	1.6	41.458	0.293	41.75	Pit296	1.3	0.148	41.898	0	0.003
Pipe12	0.252	64.962	41.625	40.655	1.49	600	0.013	0.75	2.4	41.898	0.11	42.008	Pit298	1.8	0.073	42.081	0.82	0.01
Pipe9	0.208	11.318	41.735	41.655	0.71	600	0.013	0.517	1.4	42.081	-0.081	42	Pit297	7.2	0.198	42.198	0.8	0.089
P1097	0.092	64.962	42.09	41.765	0.5	375	0.013	0.124	0.8	42.198	0.18	42.377	Pit1098	4.9	0.174	42.551	0.55	0.017
													HW9			49.174		
													BSN1			40.087		
													N1014			38.406		
													HW6			38.997		
													BSN5			53.131		
													BSN4			43.422		
													OUT			37.332		
													N1622			45.624		
Pipe40	3.572	12.035	44.68	44.6	0.66	0	0.012	4.487	2.5	45.624	0.072	45.695	Pit125	2	0.886	46.581	-0.48	0.024
Pipe307	2.346	55.4	44.86	44.7	0.29	0	0.012	2.958	1.6	46.581	0.142	46.723	Pit24717	4.1	0.783	47.506	-1.5	0
P25711	2.372	18.45	44.9	44.86	0.22	0	0.012	2.563	1.6	47.506	0.048	47.554	Pit151	4.1	0.801	48.355	-2.25	0
Pipe59962	1.549	30.6	44.985	44.9	0.28	0	0.012	2.003	1.4	48.355	0.066	48.421	Pit111	0.2	0.027	48.448	-1.95	0

Pipe311	0.253	9.963	45.59	45.49	1	375	0.013	0.176	2.3	48.448	0.207	48.656	Pit110	0.2	0.053	48.709	-2.11	0.001
Pipe313	0.231	10.156	45.839	45.669	1.67	300	0.013	0.125	3.3	48.709	0.58	49.289	Pit109	0.2	0.109	49.399	-2.6	0.023
Pipe302	0.169	21.4	46.369	45.869	2.34	300	0.013	0.148	2.4	49.399	0.656	50.055	Pit108	0.7	0.205	50.26	-2.96	0.113
Pipe223	0.106	17	47.144	46.444	4.12	225	0.013	0.091	2.7	50.26	0.94	51.2	Pit114	0.3	0.108	51.308	-3.31	0.181
P1151	0	14.2	48.077	47.277	5.63	100	0.013	0.012	0	51.308	0	51.308	Pit1083	0.7	0	51.308	-2.51	0.147
Pipe60080	1.362	28.5	45.256	45.015	0.85	825	0.013	2.64	1.3	48.448	0.064	48.512	Pit57588	1.5	0.124	48.637	-1.74	0
Pipe60079	1.204	39.8	45.485	45.286	0.5	825	0.013	2.03	1.3	48.637	0.07	48.707	Pit57586	1.5	0.097	48.804	-1.8	0
Pipe1140	1.188	33.7	45.985	45.515	1.39	825	0.013	3.39	2.6	48.804	0.058	48.861	Pit57587	1.5	0.094	48.956	-1.45	0
Pipe60078	1.192	17.3	46.108	46.015	0.53	825	0.013	2.099	1.8	48.956	0.03	48.986	Pit216	0.6	0.038	49.024	-1.22	0
Pipe130	1.079	49.5	46.385	46.138	0.5	825	0.013	2.03	1.7	49.024	0.07	49.094	Pit212	1.3	0.068	49.161	-1.26	0.051
Pipe129	1.045	32.7	47.685	46.415	3.88	825	0.013	2.829	4.9	49.161	0.173	49.334	Pit211	0	0	49.334	-0.13	0
Pipe128	1.036	22.547	48.445	47.715	3.24	825	0.013	2.583	4.6	49.334	0.117	49.452	Pit210	0.2	0.038	49.49	0.51	0.016
Pipe127	0.992	47.934	48.715	48.475	0.5	825	0.013	1.015	2.4	49.49	0.229	49.719	Pit209	0.6	0.105	49.824	0.38	0
Pipe126	0.795	23.607	49.139	48.869	1.14	675	0.013	0.899	2.6	49.824	0.211	50.035	Pit218	0.5	0.126	50.161	0.34	0.012
Pipe125	0.738	50.593	49.769	49.169	1.19	675	0.013	0.915	2.7	50.161	0.39	50.551	Pit217	0.8	0.174	50.725	0.38	0
P954	0.122	36.2	51.139	50.169	2.68	300	0.013	0.158	2.5	50.725	0.612	51.337	Pit1057	1.5	0.23	51.567	0.53	0
P952	0.071	13.9	51.569	51.169	2.88	300	0.013	0.164	2.2	51.567	0.14	51.707	Pit1055	5.3	0.273	51.98	0.52	0.032
Pipe124	0.612	25.743	50.355	49.855	1.94	600	0.013	0.856	3.1	50.725	0.256	50.981	Pit222	0.6	0.143	51.124	0.48	0.006
Pipe123	0.569	19.248	50.8	50.43	1.92	525	0.013	0.596	3	51.124	0.337	51.461	Pit223	0.4	0.141	51.602	0.4	0.02
Pipe122	0.514	34.183	51.5	50.83	1.96	525	0.013	0.602	3	51.602	0.488	52.09	Pit221	1.1	0.316	52.407	0.29	0.005
P927	0.417	33.8	52.318	51.53	2.33	525	0.013	0.657	3.2	52.407	0.318	52.725	Pit1043	1.8	0.341	53.066	0.53	0.023
P925	0.174	13.5	52.939	52.669	2	300	0.013	0.137	2.5	53.066	0.439	53.505	Pit1042	0.6	0.186	53.691	0.21	0.003
Pipe936	0.142	29.5	54.139	52.969	3.97	300	0.013	0.193	2.9	53.691	0.641	54.332	Pit1041	1.5	0.311	54.643	0.46	0
Pipe935	0.145	23.9	55.239	54.169	4.48	300	0.013	0.205	3.1	54.643	0.781	55.424	Pit1040	0.2	0.043	55.466	0.73	0
Pipe934	0.145	23.4	56.339	55.269	4.57	300	0.013	0.207	3.2	55.466	1.056	56.522	Pit1039	0.4	0.085	56.607	0.69	0
Pipe933	0.144	21.4	57.339	56.369	4.53	300	0.013	0.206	3.1	56.607	0.915	57.522	Pit1038	0.7	0.149	57.671	0.63	0
Pipe932	0.124	17.8	58.269	57.369	5.06	300	0.013	0.217	3.2	57.671	0.759	58.43	Pit1037	2.8	0.442	58.872	0.33	0.02
													N66678			43.422		
P60150	2.589	13.365	42.65	42.6	0.37	0	0.012	3.366	1.8	43.422	0.042	43.464	Pit64	2.1	0.488	43.952	0.15	0
Pipe75	2.579	36	42.89	42.7	0.53	0	0.012	3.998	2	43.952	0.111	44.063	Pit74	2.6	0.6	44.663	-0.16	0.025
Pipe74	2.389	20	43	42.9	0.5	0	0.012	2.687	2.2	44.663	0.103	44.766	Pit73	0.7	0.228	44.994	-0.29	0
Pipe73	2.476	12.948	43.06	43	0.46	0	0.012	2.587	2.3	44.994	0.072	45.066	Pit72	0.7	0.245	45.31	-0.56	0
Pipe72	2.679	52.577	46.347	43.1	6.17	0	0.012	9.443	6.4	45.31	1.261	46.571	Pit48	0.9	0.368	46.94	1.46	0
P1314	2.414	47.5	46.614	46.376	0.5	0	0.012	2.687	2.4	46.94	0.164	47.104	Pit1309	0.8	0.266	47.37	1.13	0.001
Pipe164	2.121	24.2	46.815	46.694	0.5	0	0.012	2.687	2	47.37	0.098	47.468	Pit49	0.8	0.205	47.673	0.93	0.041
Pipe163	1.671	71.878	47.515	46.845	0.93	1070	0.013	2.772	3.1	47.673	0.432	48.105	Pit1032	0.3	0.053	48.158	1.14	0
Pipe914	1.568	9.3	47.715	47.545	1.83	1070	0.013	3.882	2.9	48.158	0.03	48.188	Pit185	0.8	0.124	48.312	1.19	0.014
Pipe904	0.115	35.9	51.016	48.569	6.82	300	0.013	0.252	3.5	48.711	2.447	51.159	Pit1024	1.9	0.258	51.417	0.58	0
Pipe907	0.067	24.5	51.169	51.046	0.5	300	0.013	0.068	0.9	51.417	0.117	51.535	Pit1028	3.9	0.178	51.713	0.39	0.001
Pipe193	0.33	33.515	49.578	47.508	6.18	450	0.013	0.709	4.4	47.724	2.07	49.794	Pit51	1.5	0.329	50.123	0.58	0.002
Pipe899	0.108	41.5	50.09	49.69	0.96	375	0.013	0.172	1.5	50.123	0.18	50.302	Pit1022	2.1	0.102	50.404	0.7	0
Pipe900	0.106	15.9	50.339	50.169	1.07	300	0.013	0.1	1.6	50.469	0.17	50.639	Pit1014	0.3	0.035	50.674	0.63	0
P879	0.106	17.1	51.239	50.369	5.09	300	0.013	0.218	3.1	50.674	0.713	51.387	Pit1013	0.3	0.034	51.421	0.78	0
P878	0.106	11.2	51.739	51.269	4.2	300	0.013	0.198	2.8	51.424	0.47	51.894	Pit1012	0.4	0.046	51.94	0.76	0
P877	0.106	11.7	52.569	51.769	6.84	300	0.013	0.253	3.4	51.94	0.764	52.704	Pit1011	0.5	0.057	52.762	0.74	0
P876	0.106	13.8	53.314	52.644	4.86	225	0.013	0.099	2.7	52.869	0.67	53.539	Pit1010	0	0	53.539	0.66	0
P875	0.105	13.4	53.814	53.344	3.51	225	0.013	0.084	2.7	53.569	0.47	54.039	Pit1009	0.9	0.323	54.362	0.34	0.002

Pipe872	0.095	13.6	54.614	53.844	5.66	225	0.013	0.107	2.4	54.362	0.604	54.966	Pit1001	1.6	0.462	55.429	0.07	0.027
P895	0.069	14.8	55.644	54.644	6.76	225	0.013	0.117	1.9	55.429	0.349	55.777	Pit1000	4.9	0.751	56.529	-0.03	0.058
													N1071			50.254		
													N1064			55.047		
Pipe852	0.026	9	55.414	55.044	4.11	225	0.013	0.091	2	55.128	0.37	55.498	Pit994	2.4	0.054	55.551	0.75	0
Pipe856	0.026	18.1	55.894	55.444	2.49	225	0.013	0.071	1.6	55.551	0.438	55.989	Pit996	5	0.111	56.1	0.65	0
													N998			44.378		
P766	0.756	7.2	44.237	44.2	0.51	1524	0.013	5.286	6.4	44.57	0.037	44.607	Pit63	0.3	0.003	44.61	1.29	0
Pipe58	0.759	10.6	44.26	44.24	0.19	0	0.012	2.39	0.8	44.61	-0.101	44.509	Pit75	1.6	0.032	44.541	1.76	
Pipe57	0.69	66.3	45.669	44.669	1.51	675	0.013	1.032	3.1	45.068	1	46.068	Pit57	0.7	0.133	46.201	0.8	0.001
Pipe56	0.578	31.214	47.525	45.755	5.67	600	0.013	1.462	4.9	46.201	1.587	47.787	Pit58	0.6	0.128	47.915	0.89	0.033
Pipe54	0.519	79.8	53.825	47.555	7.86	600	0.013	1.721	5.3	47.915	6.138	54.054	Pit998	0.5	0.086	54.139	0.96	0
P863	0.47	37.5	54.67	53.855	2.17	600	0.013	0.905	3.2	54.161	0.815	54.976	Pit28	2.4	0.338	55.314	1.49	0
Pipe53	0.194	10.846	55.33	55.276	0.5	525	0.013	0.304	1.5	55.577	0.054	55.631	Pit29	2	0.082	55.714	0.79	0
Pipe62	0.194	29.721	55.853	55.408	1.5	450	0.013	0.349	2.3	55.714	0.377	56.091	Pit30	1.8	0.137	56.227	1.37	0
Pipe205	0.153	23.782	56.739	56.62	0.5	300	0.013	0.068	2.2	56.92	0.119	57.039	Pit31	0	0	57.039	0.66	0
Pipe249	0.152	17.809	57.339	56.769	3.2	300	0.013	0.173	2.2	57.039	0.521	57.56	Pit32	0.8	0.19	57.749	0.55	0.001
Pipe250	0.145	18.499	57.739	57.369	2	300	0.013	0.137	2.1	57.749	0.418	58.167	Pit33	1.1	0.237	58.404	0.3	0.015
Pipe246	0.131	17.6	58.339	57.769	3.24	300	0.013	0.174	1.9	58.404	0.325	58.729	Pit22	1.9	0.335	59.064	0.24	0.043
Pipe245	0.1	20	58.569	58.369	1	300	0.013	0.097	1.4	59.064	0.213	59.276	Pit21	5.9	0.6	59.876	-0.38	0.119
													N1049			39.219		
													N807			44.376		
Pipe750	0.496	66.3	43.43	43.1	0.5	675	0.012	0.642	1.4	44.994	0.197	45.191	Pit84	0.2	0.02	45.211	-0.21	0
													HW-BSN3			45.349		
													N664			53.34		
Pipe736	0.471	11.626	53.302	53.158	1.24	900	0.013	2.015	2.6	53.452	0.144	53.596	Pit235	5.2	0.145	53.741	1.56	0.086
P744	0.107	17.316	53.869	53.782	0.5	300	0.013	0.068	1.7	54.082	0.087	54.169	Pit635	1.5	0.176	54.345	0.46	0.044
Pipe176	0.127	34.886	50.925	50.751	0.5	375	0.013	0.124	1.2	51.281	0.184	51.465	Pit4	2.7	0.183	51.648	1.35	0.044
Pipe175	0.061	66.977	51.29	50.955	0.5	375	0.013	0.124	0.9	51.648	0.08	51.728	Pit5	1.2	0.018	51.746	2.75	0.005
													HW-BSN5			51.776		
													N2			94.277		
Pipe239	0	1000	99.277	94.277	0.5	100	0.013	0.004	0	94.277	5	99.277	Pit1	1.5	0	99.277	0.72	
Pipe179	0.253	100.421	56.059	54.208	1.84	450	0.013	0.387	2.6	54.47	1.851	56.321	Pit6	4.3	0.557	56.878	0.62	0.066
Pipe187	0.148	16.343	56.49	56.408	0.5	375	0.013	0.124	1.3	56.878	0.117	56.995	Pit8	1.5	0.138	57.132	0.37	0.156
Pipe180	0.007	92.333	59.247	56.777	2.68	100	0.013	0.008	1.2	56.878	2.44	59.317	Pit9	1.5	0.062	59.379	0.62	0
Pipe186	0.001	11.03	59.376	59.277	0.9	100	0.013	0.005	0.3	59.379	0.024	59.404	Pit10	1.5	0.001	59.404	0.9	0
Pipe185	0	14.189	59.477	59.406	0.5	100	0.013	0.004	0	59.406	0.071	59.477	Pit11	1.5	0	59.477	0.72	0
Pipe181	0.007	30.765	59.747	59.277	1.53	100	0.013	0.006	0.9	59.379	0.533	59.912	Pit12	1.5	0.057	59.97	0.53	0
Pipe184	0.006	15.271	61.177	59.777	9.17	100	0.013	0.016	1.9	59.97	1.252	61.222	Pit13	1.5	0.051	61.272	0.63	0
Pipe182	0.001	84.942	61.447	59.777	1.97	100	0.013	0.007	0.7	59.97	1.504	61.474	Pit14	1.5	0.002	61.476	0.72	0
Pipe183	0.001	15.973	64.777	61.477	20.66	100	0.013	0.023	1.2	61.491	3.3	64.791	Pit15	1.5	0.002	64.793	0.71	0
Pipe65	0.278	83.206	55.341	54.925	0.5	600	0.013	0.434	1.6	55.314	0.372	55.686	Pit26	1.5	0.074	55.76	1.04	0.051
Pipe64	0.145	75.568	55.76	55.382	0.5	375	0.013	0.124	1.3	55.76	0.514	56.274	Pit24	0	0	56.274	0.53	0
Pipe230	0.145	22.039	56.19	55.79	1.81	375	0.013	0.236	1.7	56.274	0.151	56.425	Pit23	2.1	0.185	56.611	0.59	0
Pipe229	0.131	35.531	58.304	56.269	5.73	300	0.013	0.231	3.4	56.611	1.853	58.464	Pit16	2	0.349	58.813	0.49	0.02
Pipe228	0.072	6.755	58.368	58.334	0.5	300	0.013	0.068	1	58.813	0.037	58.85	Pit17	0.7	0.037	58.887	0.51	0
Pipe242	0.07	18.456	58.49	58.398	0.5	300	0.013	0.068	1	58.887	0.096	58.983	Pit18	0.1	0.005	58.988	0.46	0

Pipe243	0.065	18.783	58.614	58.52	0.5	225	0.013	0.032	1.6	58.988	0.394	59.382	Pit19	1.4	0.191	59.573	-0.07	0.007
Pipe244	0.049	19.63	58.744	58.644	0.51	225	0.013	0.032	1.2	59.573	0.236	59.809	Pit20	3.5	0.274	60.083	-0.48	0.046
Pipe63	0.002	13.26	55.977	55.911	0.5	100	0.013	0.004	0.3	56.274	0.03	56.304	Pit25	2.2	0.011	56.315	0.39	0
Pipe66	0.041	12.707	55.769	55.705	0.5	300	0.013	0.068	1.1	55.87	0.064	55.934	Pit27	5.2	0.089	56.022	0.68	0.009
Pipe61	0.044	36.811	56.214	56.03	0.5	225	0.013	0.032	1.1	56.255	0.184	56.439	Pit34	0.2	0.012	56.451	0.65	0
Pipe60	0.047	18.546	56.644	56.244	2.16	225	0.013	0.066	1.7	56.451	0.332	56.783	Pit35	3.7	0.265	57.048	0.45	0.014
P866	0.058	34.5	54.269	54.097	0.5	300	0.013	0.068	1.3	54.311	0.173	54.483	Pit37	0.1	0.003	54.487	0.71	0
Pipe206	0.056	9.68	54.644	54.344	3.1	225	0.013	0.079	2.1	54.487	0.296	54.783	Pit36	4.6	0.472	55.255	0.25	0.004
Pipe231	0.092	36.249	47.769	46.069	4.69	300	0.013	0.209	2.9	46.208	1.7	47.908	Pit55	2	0.174	48.082	0.62	0
Pipe832	0.092	5.3	48.114	47.844	5.09	225	0.013	0.101	2.7	48.082	0.223	48.306	Pit56	0.3	0.082	48.388	0.61	0
Pipe208	0.092	15.2	48.814	48.144	4.41	225	0.013	0.094	2.7	48.388	0.639	49.027	Pit43	0	0	49.027	0.67	0
Pipe259	0.092	17.726	49.814	48.844	5.47	225	0.013	0.105	3	49.027	0.952	49.979	Pit42	0.5	0.137	50.116	0.59	0
Pipe258	0.091	13.196	50.514	49.844	5.08	225	0.013	0.101	2.9	50.116	0.567	50.683	Pit41	0.7	0.189	50.872	0.53	0
Pipe257	0.091	14.822	51.414	50.544	5.87	225	0.013	0.109	3.1	50.872	0.701	51.573	Pit40	1	0.267	51.84	0.46	0
Pipe256	0.088	14.175	52.114	51.444	4.73	225	0.013	0.098	2.3	51.84	0.549	52.389	Pit39	1.6	0.403	52.792	0.21	0.003
Pipe255	0.066	14.852	53.144	52.144	6.73	225	0.013	0.116	3	52.792	0.472	53.264	Pit38	5.2	0.729	53.993	0.01	0.027
Pipe71	0.126	29.676	48.96	47.39	5.29	375	0.013	0.403	3.2	47.535	1.57	49.105	Pit47	1.6	0.107	49.212	0.79	0.006
Pipe70	0.084	18.801	49.56	48.99	3.03	375	0.013	0.305	2.4	49.212	0.483	49.695	Pit46	1.7	0.051	49.746	0.85	0
Pipe68	0.085	56.053	52.26	49.59	4.76	375	0.013	0.383	2.8	49.746	2.633	52.379	Pit44	1.1	0.033	52.412	0.89	0
Pipe67	0.084	12.883	52.39	52.29	0.78	375	0.013	0.154	1.4	52.486	0.1	52.586	Pit45	3.8	0.113	52.699	0.7	0.047
Pipe192	0.198	22.987	49.885	49.608	1.2	450	0.013	0.313	1.5	50.123	0.111	50.234	Pit50	1.5	0.119	50.353	0.65	0.004
Pipe194	0.088	15.029	49.99	49.915	0.5	375	0.013	0.124	0.8	50.353	0.038	50.391	Pit52	3.2	0.104	50.496	0.51	0.039
Pipe190	0.075	50.022	52.54	50.144	4.79	225	0.013	0.098	2.7	50.353	2.334	52.687	Pit54	3	0.547	53.234	0.27	0.039
Pipe189	0.005	12.374	52.777	52.715	0.5	100	0.013	0.004	0.6	53.234	0.095	53.328	Pit53	2.1	0.035	53.364	0.14	0
Pipe262	0	8.375	47.977	47.935	0.5	100	0.013	0.004	0	47.935	0.042	47.977	Pit59	2.9	0	47.977	0.72	0
Pipe292	0	27.6	44	42.86	4.13	225	0.013	0.091	0	43.952	0.048	44	Pit57610	0	0	44	1	0
P60168	0	39.9	45	44.1	2.26	225	0.013	0.067	0	44.1	0.9	45	Pit77	0.3	0	45	1	0
Pipe209	0.066	40.1	45.514	45.444	0.17	225	0.013	0.019	1.7	45.669	0.07	45.739	Pit78	0.4	0.057	45.796	0.91	0
Pipe290	0.067	9.53	46.214	45.844	3.88	225	0.013	0.088	1.7	45.991	0.37	46.361	Pit79	0.6	0.088	46.448	0.65	0
Pipe289	0.07	10.067	46.714	46.244	4.67	225	0.013	0.097	1.8	46.448	0.406	46.854	Pit80	1	0.158	47.012	0.59	0
Pipe288	0.071	10.48	47.214	46.744	4.48	225	0.013	0.095	1.8	47.012	0.347	47.359	Pit81	1.8	0.296	47.655	0.45	0.002
Pipe287	0.059	10.03	47.644	47.244	3.99	225	0.013	0.09	1.5	47.655	0.171	47.825	Pit82	5.7	0.63	48.456	0.05	0.024
Pipe96	0.206	15.6	43.6	43.5	0.64	600	0.013	0.492	0.7	45.211	0.017	45.228	Pit85	0.7	0.019	45.247	-0.25	0
Pipe95	0.121	13.432	44.5	43.65	6.33	600	0.012	1.673	3.4	45.247	0.004	45.252	Pit86	0.7	0.007	45.258	0.94	0.006
Pipe94	0.082	18.444	45.312	44.955	1.93	600	0.012	0.925	2	45.258	0.166	45.424	Pit87	2.6	0.011	45.435	1.37	0.045
Pipe49	0.23	84.4	41.208	40.786	0.5	450	0.013	0.202	1.4	41.994	0.551	42.545	Pit99	3.2	0.342	42.888	-0.59	0.144
													BIO2B			42.569		
Pipe46	0.466	20.6	42.5	42.2	1.46	1200	0.013	4.705	2.6	42.569	0.17	42.739	Pit98	4.7	0.041	42.78	1.52	0.022
Pipe45	0	12.248	44.277	43.577	5.72	100	0.013	0.012	0	43.577	0.7	44.277	Pit101	1.2	0	44.277	0.72	0
Pipe85	0.598	52.5	45.6	45	1.14	600	0.013	1.313	1.5	48.355	0.125	48.479	Pit121	1.5	0.086	48.565	-0.66	0.021
Pipe91	0.451	27.3	45.85	45.7	0.55	600	0.012	0.986	1.5	48.565	0.031	48.596	Pit119	0.9	0.029	48.625	0.08	0
Pipe87	0.446	22.6	46.2	45.9	1.33	600	0.012	1.533	2.4	48.625	0.025	48.651	Pit118	5	0.159	48.81	0.79	0.003
Pipe88	0.078	20.2	49.269	48.669	2.97	300	0.013	0.167	2.3	48.814	0.6	49.414	Pit117	2.9	0.182	49.596	0.6	0.038
													N1629			45.247		
Pipe43	0.094	15.6	44.76	44.6	1.03	300	0.013	0.098	1.3	45.247	0.148	45.395	Pit103	0.7	0.063	45.458	0.54	0
Pipe93	0.063	22.748	47.144	45.144	8.79	225	0.012	0.144	3.5	45.458	1.79	47.248	Pit122	0.3	0.039	47.287	0.71	0.023
Pipe44	0.412	18.1	42.98	42.89	0.5	675	0.013	0.594	1.8	43.299	0.09	43.39	Pit102	5.9	0.4	43.789	0.61	0.001

Pipe39	0.388	36.4	43.269	43.069	0.55	675	0.013	0.623	1.2	43.789	0.077	43.867	Pit132	2.2	0.132	43.998	0.6	0.004
Pipe37	0.353	18.442	43.73	43.43	1.63	525	0.013	0.548	2.1	43.998	0.124	44.122	Pit135	1.2	0.163	44.285	0.62	0.019
Pipe1	0.081	33.069	44.438	43.969	1.42	300	0.013	0.115	1.8	44.285	0.338	44.623	Pit136	2.5	0.169	44.791	0.61	0.004
Pipe220	0.068	14.131	44.539	44.468	0.5	300	0.013	0.068	1	44.791	0.071	44.862	Pit137	0.5	0.024	44.886	0.61	0
Pipe317	0.068	12.287	44.639	44.569	0.57	300	0.013	0.073	1	44.886	0.061	44.947	Pit138	0.7	0.033	44.98	0.62	0
Pipe318	0.068	6.753	44.769	44.669	1.48	300	0.013	0.118	1.1	44.98	0.034	45.014	Pit139	2.6	0.123	45.137	0.56	0
Pipe219	0.067	10.08	44.906	44.844	0.62	225	0.013	0.035	1.7	45.137	0.227	45.364	Pit140	0.9	0.132	45.495	0.31	0.001
Pipe320	0.056	11.503	44.994	44.936	0.5	225	0.013	0.032	1.4	45.495	0.177	45.673	Pit141	3.9	0.391	46.064	-0.21	0.023
Pipe321	0.008	13.435	45.147	45.08	0.5	100	0.013	0.004	1	46.064	0.34	46.404	Pit142	0.2	0.011	46.415	-0.51	0
Pipe322	0.005	20.583	45.347	45.177	0.83	100	0.013	0.005	0.6	46.415	0.163	46.578	Pit143	0.2	0.003	46.581	-0.48	0
Pipe323	0.002	9.201	45.577	45.377	2.17	100	0.013	0.008	0.3	46.581	0.016	46.598	Pit144	1.5	0.006	46.604	-0.3	0
Pipe35	0.219	52.838	44.378	43.808	1.08	450	0.013	0.296	2	44.285	0.38	44.665	Pit148	1.9	0.184	44.848	0.65	0
Pipe34	0.176	8.384	44.578	44.408	2.03	450	0.013	0.406	1.5	44.848	-0.063	44.785	Pit147	1.5	0.094	44.879	0.82	0
Pipe33	0.175	13.288	44.708	44.608	0.75	450	0.013	0.247	1.4	44.885	0.1	44.985	Pit146	3	0.185	45.17	0.63	0.023
Pipe32	0.111	25.467	45.169	44.869	1.18	300	0.013	0.105	1.6	45.17	0.335	45.505	Pit145	3.1	0.389	45.894	0.21	0.029
Pipe333	0.054	13.427	45.314	45.244	0.52	225	0.013	0.032	1.3	45.894	0.191	46.085	Pit152	0.2	0.019	46.104	0.1	0
Pipe329	0.05	12.797	45.546	45.344	1.58	225	0.013	0.056	1.2	46.104	0.157	46.261	Pit153	0.2	0.016	46.276	0.42	0
Pipe222	0.047	6.868	45.61	45.576	0.5	225	0.013	0.032	1.2	46.276	0.075	46.352	Pit154	2.5	0.179	46.531	0.47	0
Pipe326	0.045	11.162	45.696	45.64	0.5	225	0.013	0.032	1.1	46.531	0.114	46.645	Pit155	0.2	0.013	46.658	0.29	0
Pipe221	0.044	12.383	45.788	45.726	0.5	225	0.013	0.032	1.1	46.658	0.118	46.776	Pit156	0.2	0.012	46.788	0.11	0
Pipe327	0.047	12.587	45.881	45.818	0.5	225	0.013	0.032	1.2	46.788	0.138	46.926	Pit157	0.2	0.014	46.941	-0.09	0
Pipe328	0.048	6.577	45.944	45.911	0.5	225	0.013	0.032	1.2	46.941	0.076	47.017	Pit158	3.3	0.25	47.267	-0.47	0.031
Pipe28	0.026	64.735	46.614	44.644	3.04	225	0.013	0.078	1.8	44.848	1.855	46.704	Pit161	2.7	0.058	46.762	0.74	0
Pipe26	0.025	11.515	46.914	46.644	2.34	225	0.013	0.069	1.6	46.762	0.247	47.009	Pit163	0.9	0.019	47.027	0.77	0
Pipe25	0.025	13.979	47.244	46.944	2.15	225	0.013	0.066	1.5	47.041	0.3	47.341	Pit162	5.9	0.121	47.462	0.64	0
Pipe8	0.254	47.141	41.63	41.394	0.5	525	0.013	0.304	1.2	42.382	0.165	42.547	Pit305	1.5	0.106	42.653	0.15	0
Pipe3	0.156	12.115	42.16	41.79	3.05	375	0.013	0.306	2.7	42.653	0.096	42.749	Pit304	0.6	0.061	42.81	0.39	0
Pipe24	0.153	106.8	45.16	42.19	2.78	375	0.013	0.292	2.7	42.81	2.542	45.352	Pit164	2	0.195	45.547	0.65	0.004
Pipe23	0.113	16.502	45.29	45.19	0.61	375	0.013	0.136	1	45.547	0.006	45.553	Pit165	4.8	0.258	45.811	0.49	0.042
P60186	0.275	33.5	46.6	46.26	1.01	600	0.012	0.67	2.2	48.81	0.057	48.867	Pit57623	5	0.241	49.108	1.19	0
Pipe98	0.271	60.7	46.9	46.7	0.33	600	0.013	0.352	1.3	49.108	0.118	49.226	Pit123	0.7	0.033	49.259	-1.26	0
Pipe99	0.272	38.8	49.76	47	7.11	375	0.013	0.468	4.4	49.259	0.935	50.194	Pit167	0.6	0.186	50.379	0.42	0
Pipe100	0	18.133	50.177	50.077	0.55	100	0.013	0.004	0	50.379	0	50.379	Pit166	5.9	0	50.379	0.52	0
Pipe101	0.261	45.433	51.96	49.79	4.78	375	0.013	0.383	3.7	50.379	1.805	52.185	Pit168	1	0.285	52.47	0.53	0.015
Pipe103	0.216	29.074	53.49	51.99	5.16	375	0.013	0.398	3.7	52.47	1.215	53.685	Pit171	1.1	0.215	53.9	0.6	0
Pipe362	0.148	13.718	54.039	53.569	3.43	300	0.013	0.179	2.8	53.9	0.348	54.248	Pit169	0.5	0.111	54.36	0.64	0
Pipe116	0	18.05	54.377	54.277	0.55	100	0.013	0.004	0	54.36	0.017	54.377	Pit170	5.9	0	54.377	0.72	0
Pipe216	0.072	15.492	54.014	53.644	2.39	225	0.013	0.069	1.9	53.9	0.4	54.3	Pit172	0.7	0.117	54.417	0.48	0
Pipe363	0.072	10.208	54.414	54.044	3.62	225	0.013	0.085	2.2	54.417	0.26	54.677	Pit173	1.1	0.182	54.86	0.44	0
Pipe364	0.069	18.334	54.814	54.444	2.02	225	0.013	0.064	1.7	54.86	0.431	55.291	Pit174	1.8	0.275	55.566	0.14	0.004
Pipe365	0.054	17.103	54.944	54.844	0.58	225	0.013	0.034	1.4	55.566	0.251	55.817	Pit175	5.6	0.535	56.353	-0.55	0.042
P977	0.185	33.2	49.408	49.108	0.9	450	0.013	0.271	1.8	49.824	0.139	49.963	Pit1070	1.8	0.124	50.087	0.41	0
P980	0.119	14.655	49.539	49.466	0.5	300	0.013	0.068	1.7	50.087	0.224	50.311	Pit1069	0.7	0.102	50.413	0.09	0
P972	0.094	32	50.369	49.569	2.5	300	0.013	0.153	2.3	50.413	0.3	50.713	Pit1068	1.7	0.152	50.865	0.44	0
P970	0.093	15.3	51.214	50.444	5.03	225	0.013	0.101	2.9	50.865	0.663	51.528	Pit1067	0	0	51.528	0.57	0
P968	0.093	15.1	51.914	51.244	4.44	225	0.013	0.095	2.7	51.528	0.654	52.182	Pit1066	0.6	0.169	52.351	0.45	0
P965	0.093	15.6	52.714	51.944	4.94	225	0.013	0.1	2.7	52.351	0.67	53.022	Pit1065	0.9	0.252	53.274	0.33	0

P964	0.09	14.1	53.514	52.744	5.46	225	0.013	0.105	2.7	53.274	0.561	53.835	Pit1063	1.7	0.44	54.275	0.13	0.005
Pipe215	0.069	14	54.244	53.544	5	225	0.013	0.1	2.1	54.275	0.326	54.602	Pit176	5	0.758	55.359	-0.26	0.034
Pipe104	0.148	38.221	55.839	54.069	4.63	300	0.013	0.208	3.2	54.36	1.665	56.025	Pit178	0.3	0.067	56.092	0.71	0
Pipe945	0.075	39.7	56.139	55.869	0.68	300	0.013	0.08	1.3	56.103	0.27	56.373	Pit1052	2.3	0.132	56.505	0.6	0
Pipe214	0.075	35.3	57.339	56.169	3.31	300	0.013	0.176	2.4	56.505	0.971	57.476	Pit181	1.8	0.104	57.58	0.72	0
Pipe360	0.075	14.1	57.539	57.369	1.21	300	0.013	0.106	1.5	57.58	0.143	57.723	Pit180	1.2	0.069	57.792	0.71	0
Pipe361	0.07	10.921	57.669	57.569	0.92	300	0.013	0.093	1.3	57.792	0.073	57.865	Pit179	5.9	0.299	58.163	0.44	0.004
Pipe106	0.074	28.126	57.339	55.869	5.23	300	0.013	0.221	2.8	56.092	1.367	57.459	Pit177	0.5	0.028	57.487	0.81	0
Pipe115	0.018	23.512	58.224	57.524	2.98	150	0.013	0.026	1.6	57.613	0.7	58.313	Pit182	3.7	0.186	58.499	0.5	0
Pipe919	1.414	6.9	47.815	47.745	1.01	1070	0.013	2.892	2.2	48.312	0.03	48.343	Pit1035	0.4	0.05	48.393	1.21	0
Pipe162	1.367	40.6	50.215	47.845	5.84	1070	0.013	6.938	6	48.393	2.14	50.533	Pit291	1.3	0.153	50.686	1.31	0.003
Pipe168	0.477	63.8	52.425	50.755	2.62	600	0.013	0.993	3.5	51.048	1.67	52.718	Pit281	0.8	0.116	52.834	0.87	0
Pipe169	0.392	12.932	52.555	52.455	0.77	600	0.013	0.54	1.9	52.834	0.098	52.932	Pit278	1.6	0.157	53.089	0.71	0
Pipe226	0.39	35.444	54.411	52.63	5.02	525	0.013	0.964	4.2	53.089	1.554	54.643	Pit276	2.3	0.38	55.023	0.78	0
Pipe203	0.123	31.73	55.239	54.869	1.17	300	0.013	0.104	1.9	55.169	0.37	55.539	Pit277	1.2	0.186	55.725	0.48	0.001
P397	0.113	18.709	55.369	55.269	0.53	300	0.013	0.071	1.6	55.725	0.256	55.981	Pit183	1.7	0.222	56.204	0.1	0.014
Pipe202	0.075	10.2	55.544	55.444	0.98	225	0.013	0.044	1.9	56.204	0.283	56.486	Pit184	3.2	0.577	57.063	-0.66	0.095
Pipe90	0.089	69.9	51.168	48.669	3.57	300	0.013	0.183	2.6	48.817	2.499	51.316	Pit186	1.5	0.123	51.438	0.86	0
Pipe89	0.089	14.231	51.269	51.198	0.5	300	0.013	0.068	1.4	51.498	0.071	51.569	Pit187	1.5	0.12	51.689	0.51	0.053
Pipe133	0.13	32.148	48.539	46.869	5.19	300	0.013	0.22	3.2	49.024	0.581	49.605	Pit203	2.1	0.362	49.967	-0.47	0
Pipe132	0.126	14.627	49.039	48.569	3.21	300	0.013	0.173	1.9	49.967	0.247	50.214	Pit202	0.9	0.145	50.36	-0.36	0.006
Pipe236	0.088	13.488	49.539	49.069	3.48	300	0.013	0.18	2.5	50.36	0.112	50.472	Pit201	0.6	0.048	50.519	-0.02	0
Pipe347	0.088	17.783	49.93	49.569	2.03	300	0.013	0.138	2.1	50.519	0.148	50.667	Pit200	2	0.159	50.826	0.38	0
Pipe346	0.088	15.801	50.039	49.96	0.5	300	0.013	0.068	1.2	50.826	0.131	50.957	Pit199	1.1	0.087	51.044	-0.04	0.021
Pipe345	0.065	18.019	50.169	50.069	0.55	300	0.013	0.072	0.9	51.044	0.081	51.125	Pit198	0.7	0.03	51.156	-0.05	0
Pipe344	0.065	11.879	50.314	50.244	0.59	225	0.013	0.034	1.6	51.156	0.247	51.402	Pit190	1.1	0.149	51.551	-0.35	0
Pipe218	0.064	11.514	50.914	50.344	4.95	225	0.013	0.1	1.6	51.551	0.235	51.786	Pit188	2.2	0.292	52.078	-0.28	0.001
Pipe217	0.052	10.199	51.444	50.944	4.9	225	0.013	0.099	1.3	52.078	0.139	52.217	Pit189	3.1	0.275	52.493	-0.19	0.016
Pipe135	0.069	32.1	50.939	49.569	4.27	300	0.013	0.2	2.6	50.087	0.974	51.061	Pit191	1.8	0.087	51.147	0.75	0
Pipe134	0.069	14.7	51.169	50.969	1.36	300	0.013	0.113	1.6	51.147	0.188	51.335	Pit192	5	0.24	51.575	0.53	0.029
Pipe137	0.054	62.9	54.614	51.244	5.36	225	0.013	0.104	2.6	51.567	3.161	54.729	Pit193	1.4	0.131	54.859	0.64	0
Pipe136	0.053	13.686	54.744	54.644	0.73	225	0.013	0.038	1.3	54.869	0.1	54.969	Pit194	1.3	0.117	55.086	0.51	0.018
Pipe107	0.057	42.97	59.039	57.369	3.89	300	0.013	0.191	2.4	57.487	1.666	59.153	Pit234	2.8	0.094	59.247	0.75	0
Pipe108	0.057	7.73	59.639	59.069	7.37	300	0.013	0.263	3	59.247	0.486	59.733	Pit230	0.2	0.007	59.74	0.86	0
Pipe109	0.057	38.279	62.039	59.669	6.19	300	0.013	0.241	2.8	59.768	2.37	62.138	Pit229	1.8	0.06	62.198	0.8	0
Pipe110	0.057	22.286	62.369	62.069	1.35	300	0.013	0.112	1.6	62.22	0.3	62.52	Pit196	4.8	0.157	62.677	0.62	0.018
Pipe139	0.189	65.2	55.19	52.59	3.99	375	0.013	0.35	3.2	53.066	2.319	55.385	Pit220	1.8	0.268	55.652	0.55	0
Pipe138	0.073	13.482	55.569	55.269	2.23	300	0.013	0.144	1.7	55.652	0.078	55.73	Pit219	4.8	0.264	55.994	0.51	0.035
Pipe121	0.065	22.335	52.069	51.769	1.34	300	0.013	0.112	1.1	52.407	0.102	52.509	Pit224	3.2	0.14	52.649	0.35	0.018
Pipe120	0	38.941	54.047	52.277	4.55	100	0.013	0.011	0	52.649	1.398	54.047	Pit228	1.5	0	54.047	0.75	0
Pipe119	0	15.502	54.447	54.077	2.39	100	0.013	0.008	0	54.077	0.37	54.447	Pit227	1.5	0	54.447	0.75	0
Pipe118	0	68.857	57.747	54.477	4.75	100	0.013	0.011	0	54.477	3.27	57.747	Pit226	1.5	0	57.747	0.75	0
Pipe117	0	8.66	58.077	57.777	3.46	100	0.013	0.01	0	57.777	0.3	58.077	Pit225	1.5	0	58.077	0.72	0
P60005	0.114	19.716	57.539	55.269	11.51	300	0.013	0.328	4	55.652	2.009	57.661	Pit232	1.5	0.199	57.86	0.64	0.005
Pipe111	0.079	45.2	59.069	57.569	3.32	300	0.013	0.176	2.4	57.86	1.35	59.21	Pit233	3.3	0.21	59.419	0.58	0.042
Pipe160	0.913	52.308	52.815	50.245	4.91	1070	0.013	6.365	5	50.686	2.389	53.075	Pit290	0.6	0.032	53.107	1.49	0.034
Pipe159	0.85	54.818	53.611	52.845	1.4	1070	0.013	3.395	3.1	53.209	0.766	53.975	Pit289	1.5	0.068	54.044	3.16	0

P403	0.847	12.281	53.703	53.641	0.5	1070	0.013	2.03	1.9	54.123	0.061	54.184	Pit288	0.4	0.018	54.203	3.2	0
Pipe158	0.842	14.719	53.806	53.733	0.5	900	0.013	1.28	2.1	54.259	0.074	54.333	Pit286	1.4	0.125	54.458	3.34	0
Pipe156	0.838	73.9	54.206	53.836	0.5	900	0.013	1.28	2	54.458	0.272	54.73	Pit283	0.6	0.053	54.783	2.62	0.025
Pipe154	0.753	51.422	54.493	54.236	0.5	900	0.013	1.28	1.9	54.783	0.199	54.983	Pit251	0.9	0.064	55.047	2.2	0
Pipe153	0.543	23.448	54.64	54.523	0.5	825	0.013	1.015	1.4	55.047	0.02	55.067	Pit250	0.1	0.005	55.072	2.13	0
Pipe152	0.535	25.378	54.797	54.67	0.5	825	0.013	1.015	1.6	55.094	0.127	55.221	Pit249	2.6	0.133	55.354	1.75	0.009
Pipe151	0.299	29.36	54.974	54.827	0.5	750	0.013	0.787	0.9	55.354	-0.059	55.295	Pit248	5.8	0.135	55.43	1.57	0
Pipe148	0.161	59.234	55.3	55.004	0.5	525	0.013	0.304	0.9	55.43	0.14	55.57	Pit237	0.6	0.017	55.587	0.91	0
Pipe147	0.153	22.934	55.696	55.33	1.59	525	0.013	0.543	2.2	55.587	0.3	55.887	Pit239	5	0.127	56.014	0.99	0.018
Pipe150	0.002	10.281	55.777	55.726	0.5	100	0.013	0.004	0.3	56.014	0.018	56.032	Pit238	2.1	0.008	56.04	0.46	0
Pipe146	0.102	70.196	59.201	56.069	4.46	300	0.013	0.204	2.9	56.218	3.132	59.351	Pit240	2.9	0.305	59.656	0.54	0.071
Pipe145	0.003	9.112	59.277	59.231	0.5	100	0.013	0.004	0.4	59.656	0.026	59.682	Pit241	1.5	0.009	59.692	0.31	0
Pipe149	0.134	17.218	56.86	55.99	5.05	375	0.013	0.394	3.2	56.142	0.87	57.012	Pit246	0.8	0.06	57.072	0.83	0
Pipe143	0.092	79.645	59.66	56.89	3.48	375	0.013	0.327	2.5	57.072	2.725	59.797	Pit244	2.3	0.081	59.877	0.82	0
Pipe141	0	59.377	62.047	59.977	3.49	100	0.013	0.01	0	59.977	2.07	62.047	Pit243	1.5	0	62.047	0.75	0
Pipe140	0	29.602	62.277	62.077	0.68	100	0.013	0.004	0	62.077	0.2	62.277	Pit242	1.5	0	62.277	0.72	0
Pipe142	0.09	12.728	59.79	59.69	0.79	375	0.013	0.155	1.3	59.893	0.1	59.993	Pit245	3.6	0.123	60.116	0.69	0.052
Pipe144	0.042	12.015	57.044	56.984	0.5	225	0.013	0.032	1.3	57.209	0.06	57.269	Pit247	3.2	0.186	57.455	0.45	0.009
Pipe173	0.002	11.543	56.394	56.336	0.5	225	0.013	0.032	0.5	56.369	0.058	56.426	Pit252	5.9	0.001	56.427	0.82	0
Pipe197	0.187	21.853	55.778	55.669	0.5	450	0.013	0.202	1.6	56.014	0.109	56.124	Pit253	0.9	0.063	56.187	1.11	0
Pipe196	0.153	91.489	56.265	55.808	0.5	450	0.013	0.202	1.4	56.187	0.372	56.559	Pit254	1.5	0.071	56.63	0.82	0
Pipe195	0.153	12.532	56.358	56.295	0.5	450	0.013	0.202	1.1	56.63	0.021	56.651	Pit255	5.2	0.245	56.896	0.55	0.042
Pipe383	0.189	24.129	56.56	56.09	1.95	375	0.013	0.245	2.4	56.338	0.47	56.808	Pit267	0.2	0.03	56.838	0.76	0
Pipe382	0.189	11.417	56.71	56.59	1.05	375	0.013	0.18	1.9	56.965	0.12	57.085	Pit266	0.2	0.03	57.115	0.64	0
Pipe381	0.191	10.95	56.86	56.74	1.1	375	0.013	0.184	1.9	57.115	0.12	57.235	Pit265	0.2	0.03	57.265	0.64	0
Pipe380	0.192	10.611	57.16	56.89	2.54	375	0.013	0.28	2.4	57.265	0.127	57.393	Pit264	0.2	0.031	57.424	0.78	0
Pipe379	0.191	10.418	57.46	57.19	2.59	375	0.013	0.282	2.7	57.424	0.26	57.684	Pit263	0.3	0.046	57.73	0.77	0
Pipe378	0.19	9.769	57.66	57.49	1.74	375	0.013	0.231	2.3	57.75	0.17	57.92	Pit262	0.3	0.045	57.965	0.74	0
Pipe377	0.188	12.066	58.06	57.69	3.07	375	0.013	0.307	2.9	57.965	0.304	58.269	Pit261	0.4	0.059	58.328	0.77	0
Pipe227	0.187	21.854	58.46	58.09	1.69	375	0.013	0.228	2.3	58.35	0.37	58.72	Pit256	0.6	0.087	58.807	0.69	0
Pipe375	0.184	18.799	58.96	58.49	2.5	375	0.013	0.277	2.7	58.807	0.373	59.181	Pit257	0.8	0.113	59.294	0.71	0
Pipe374	0.18	17.892	59.467	58.99	2.66	375	0.013	0.286	2.7	59.294	0.386	59.68	Pit258	1.2	0.163	59.843	0.66	0.003
Pipe373	0.157	17.034	59.582	59.497	0.5	300	0.013	0.068	2.2	59.843	0.448	60.291	Pit259	1.2	0.301	60.592	-0.04	0.031
Pipe201	0.101	11.45	59.669	59.612	0.5	300	0.013	0.068	1.4	60.592	0.125	60.718	Pit260	4.9	0.512	61.23	-0.63	0.142
Pipe204	0.265	7.892	54.68	54.63	0.63	525	0.013	0.342	1.6	55.023	0.005	55.028	Pit275	0.4	0.031	55.059	0.79	0
Pipe394	0.265	21.808	54.908	54.758	0.69	450	0.013	0.236	1.9	55.208	0.15	55.358	Pit274	0.1	0.014	55.372	0.63	0
Pipe393	0.264	16.336	55.06	54.978	0.5	375	0.013	0.124	2.5	55.372	0.37	55.743	Pit273	0.2	0.058	55.801	0.3	0
Pipe392	0.252	15.539	55.36	55.09	1.74	375	0.013	0.231	2.3	55.801	0.321	56.122	Pit272	0.9	0.239	56.361	0.04	0.013
Pipe391	0.215	12.302	55.56	55.39	1.38	375	0.013	0.206	1.9	56.361	0.185	56.546	Pit271	1.3	0.251	56.796	-0.2	0.079
Pipe390	0.168	11.117	55.69	55.59	0.9	375	0.013	0.166	1.5	56.796	0.102	56.899	Pit270	4.2	0.498	57.396	-0.7	0.167
Pipe389	0.064	11.068	56.114	55.844	2.44	225	0.013	0.07	1.6	57.396	0.225	57.621	Pit269	0.3	0.04	57.661	-0.66	0.017
Pipe388	0.042	12.827	56.244	56.144	0.78	225	0.013	0.04	1	57.661	0.11	57.771	Pit268	2.4	0.134	57.906	-0.8	0.037
Pipe166	0.078	18.3	52.819	52.728	0.5	300	0.013	0.068	1.4	53.028	0.091	53.119	Pit280	4.6	0.285	53.404	0.35	0.016
Pipe165	0.003	12.953	53.127	53.027	0.77	100	0.013	0.005	0.4	53.404	0.047	53.451	Pit279	1.5	0.012	53.463	0.39	0
Pipe172	0	15.113	56.277	56.201	0.5	100	0.013	0.004	0	56.201	0.076	56.277	Pit284	1.5	0	56.277	0.72	0
Pipe198	0.038	13.768	56.369	56.3	0.5	300	0.013	0.068	1.1	56.459	0.069	56.528	Pit285	5.4	0.08	56.608	0.69	0.002
Pipe170	0	14.075	51.577	51.277	2.13	100	0.013	0.008	0	51.277	0.3	51.577	Pit292	1.5	0	51.577	0.72	0

Pipe171	0	13.641	53.777	53.709	0.5	100	0.013	0.004	0	53.709	0.068	53.777	Pit293	1.5	0	53.777	0.72	0
Pipe10	0.238	10.982	40.83	40.73	0.91	525	0.013	0.41	1.1	41.898	0.034	41.932	Pit295	4.6	0.285	42.216	-0.22	0.118
Pipe6	0.054	17.231	41.044	40.958	0.5	225	0.013	0.032	1.5	41.356	0.25	41.607	Pit301	5.9	0.558	42.164	-0.26	0.049
Pipe2	0.081	24.317	42.069	41.869	0.82	300	0.013	0.088	1.1	42.653	0.169	42.822	Pit303	4.3	0.286	43.108	-0.11	0.02
Pipe4	0.119	19.026	41.99	41.69	1.58	375	0.013	0.22	2	42.382	0.087	42.469	Pit307	5.6	0.329	42.798	0.2	0.054
Pipe5	0.049	17.184	41.169	41.083	0.5	300	0.013	0.068	0.7	41.838	0.045	41.882	Pit309	4.6	0.115	41.997	0.1	0.003
Pipe11	0.289	10.588	40.63	40.455	1.65	525	0.013	0.553	1.7	41.458	0.048	41.506	Pit311	5.1	0.463	41.969	-0.17	0.189
Pipe412	0.007	16.796	40.877	40.777	0.6	100	0.013	0.004	1	41.071	0.325	41.395	Pit317	5.9	0.252	41.647	-0.05	0.023

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
OF968	0.023	0.023	0.28	0.069	0.03	1.87	0.45	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF976	0	0	0.231	0	0	0	0	
OF983	0.018	0.018	6.478	0.005	0	10.04	0.33	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF234	1.465	1.465	3.908	0.168	0.14	11.35	0.81	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF885	0.189	0.189	0.292	0.13	0.11	3.51	0.82	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF896	0.015	0.015	0.205	0.067	0.02	1.8	0.32	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF902	0.053	0.053	0.215	0.097	0.04	2.86	0.45	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF923	0.003	0.003	0.186	0.042	0.01	0.94	0.2	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF929	0.015	0.015	0.166	0.07	0.02	1.93	0.27	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF954	0.01	0.01	0.225	0.056	0.02	1.44	0.3	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF960	0	0	0.318	0	0	0	0	
OF918	0.054	0.054	0.429	0.078	0.06	2.2	0.77	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF914	0.018	0.018	0.355	0.059	0.03	1.54	0.51	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF942	0.02	0.02	0.325	0.063	0.03	1.67	0.48	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF936	0	0	0.17	0	0	0	0	
OF965	0.049	0.049	0.274	0.087	0.05	2.53	0.52	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF874	0.118	0.118	0.201	0.126	0.07	3.5	0.55	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF880	0.003	0.003	0.198	0.042	0.01	0.94	0.22	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF2317	0	0	1.542	0	0	0	0	
OF1342	0.034	0.034	0.78	0.056	0.06	1.4	1.13	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1346	0.003	0.003	0.768	0.023	0.02	0.3	0.8	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF1362	0	0	0.582	0	0	0	0	
OF1370	0.014	0.014	0.515	0.049	0.03	1.17	0.64	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF437	0	0	0.379	0	0	0	0	
OF417	0.041	0.041	0.247	0.085	0.04	2.46	0.46	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF2705	0.001	0.001	0.375	0.029	0	0.48	0.16	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF1171	0	0	0.717	0	0	0	0	
OF1179	0	0	0.225	0	0	0	0	
OF1186	0	0	0.377	0	0	0	0	
OF1192	0.025	0.025	0.399	0.063	0.04	1.67	0.6	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF68582	0	0	0	0	0	0	0	
OF68563	3.47	3.47	37.03	0.127	0.06	60.85	0.45	AR&R 2 year, 1.5 hours storm, average 33 mm/h, Zone 3
OF1353	0	0	0.665	0	0	0	0	
OF1589	0.002	0.002	0.228	0.033	0.01	0.61	0.22	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3

OF1582	0	0	0.174	0	0	0	0	
OF1577	0	0	0.174	0	0	0	0	
OF2293	0.025	0.025	0.444	0.078	0.03	2.2	0.35	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF2298	0	0	0.622	0	0	0	0	
OF2311	0	0	0.887	0	0	0	0	
OF1336	0	0	0.797	0	0	0	0	
OF2306	0	0	1.498	0	0	0	0	
OF1695	0	0	0.178	0	0	0	0	
OF1688	0.016	0.016	0.198	0.068	0.02	1.83	0.31	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1683	0	0	0.539	0	0	0	0	
OF1607	0.037	0.037	0.274	0.142	0.07	1.14	0.46	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1615	0.017	0.017	0.521	0.084	0.05	0.68	0.61	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF1616	0.167	0.167	0.286	0.246	0.17	1.96	0.69	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF1617	0.079	0.079	0.394	0.165	0.12	1.32	0.73	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF1618	0.013	0.013	0.445	0.08	0.04	0.64	0.52	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF1619	0	0	0.244	0	0	0	0	
OF1620	0	0	0.268	0	0	0	0	
OF1621	0	0	0.248	0	0	0	0	
OF1677	0	0	0.795	0	0	0	0	
OF1701	0	0	0.332	0	0	0	0	
OF1491	0.142	0.142	0.213	0.257	0.14	2.06	0.53	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1490	0.031	0.031	0.176	0.157	0.05	1.25	0.32	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1489	0.003	0.003	0.541	0.043	0.02	0.35	0.41	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1488	0	0	0.541	0	0	0	0	
OF1487	0	0	0.444	0	0	0	0	
OF1486	0	0	0.583	0	0	0	0	
OF1485	0	0	0.449	0	0	0	0	
OF1484	0	0	0.523	0	0	0	0	
OF1483	0	0	0.529	0	0	0	0	
OF1482	0	0	0.377	0	0	0	0	
OF1476	0	0	0.27	0	0	0	0	
OF1544	0	0	0.573	0	0	0	0	
OF1429	0.009	0.009	0.215	0.056	0.02	1.4	0.3	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1563	0	0	0.228	0	0	0	0	
OF1601	0.042	0.042	0.152	0.1	0.03	2.99	0.32	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF1594	0	0	0.335	0	0	0	0	
OF1555	0	0	0.215	0	0	0	0	
OF1461	0.009	0.009	0.593	0.041	0.03	0.88	0.65	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF2510	0	0	1.571	0	0	0	0	
OF1423	0	0	0.349	0	0	0	0	
OF1442	0.052	0.052	0.726	0.066	0.07	1.77	1.12	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1450	0	0	0.714	0	0	0	0	
OF1435	0	0	0.311	0	0	0	0	
OF1455	0	0	0.706	0	0	0	0	
OF1390	0	0	0.774	0	0	0	0	
OF1398	0.071	0.071	0.79	0.07	0.09	1.9	1.33	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1469	0.018	0.018	0.755	0.047	0.04	1.11	0.89	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3

OF1417	0	0	0.531	0	0	0	0	
OF1408	0	0	0.639	0	0	0	0	
OF1056	0.042	0.042	0.683	0.063	0.06	1.67	1	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1062	0.005	0.005	0.732	0.033	0.02	0.61	0.68	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF1080	0	0	0.754	0	0	0	0	
OF1086	0.023	0.023	0.598	0.055	0.04	1.37	0.8	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF1772	0.005	0.005	0.523	0.036	0.02	0.71	0.51	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF1776	0.02	0.02	0.524	0.055	0.04	1.37	0.69	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1783	0.006	0.006	0.506	0.038	0.02	0.78	0.53	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1784	0	0	0.41	0	0	0	0	
OF1785	0.012	0.012	0.413	0.05	0.03	1.21	0.52	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1786	0	0	0.53	0	0	0	0	
OF1787	0.016	0.016	0.693	0.046	0.04	1.07	0.83	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1788	0	0	0.749	0	0	0	0	
OF2139	0.051	0.051	3.009	0.075	0.06	2.1	0.78	AR&R 2 year, 1.5 hours storm, average 33 mm/h, Zone 3
OF29346	0	0	2.939	0	0	0	0	
OF68488	0	0	2.995	0	0	0	0	
OF68493	0	0	1.467	0	0	0	0	
OF68498	0	0	3.009	0	0	0	0	
OF68327	0	0	0.377	0	0	0	0	
OF30334	0	0	1.15	0	0	0	0	
OF30206	0	0	1.186	0	0	0	0	
OF30391	0.024	0.024	1.341	0.048	0.06	1.14	1.16	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF3140	22.829	22.829	10.11	0.485	1.04	23.88	2.15	AR&R 2 year, 45 minutes storm, average 52 mm/h, Zone 3
OF1707	0	0	0.79	0	0	0	0	
OF1749	0	0	0.802	0	0	0	0	
OF1754	0	0	0.571	0	0	0	0	
OF1761	0	0	0.797	0	0	0	0	
OF1767	0.018	0.018	0.417	0.056	0.03	1.44	0.57	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF1069	0.035	0.035	0.769	0.057	0.06	1.47	1.06	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1030	0.018	0.018	0.777	0.045	0.05	1.04	1	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1043	0	0	0.754	0	0	0	0	
OF1050	0	0	0.762	0	0	0	0	
OF1036	0	0	0.77	0	0	0	0	
OF1018	0	0	0.766	0	0	0	0	
OF1012	0	0	0.79	0	0	0	0	
OF1005	0	0	0.632	0	0	0	0	
OF565	0	0	0.803	0	0	0	0	
OF559	0.015	0.015	0.795	0.044	0.04	1.01	0.91	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF553	0	0	0.721	0	0	0	0	
OF2159	0	0	1.555	0	0	0	0	
OF68652	0	0	1.202	0	0	0	0	
OF2205	0.003	0.003	1.673	0.028	0.02	0.41	0.67	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF2214	0	0	1.468	0	0	0	0	
OF2256	0.021	0.021	1.532	0.051	0.04	1.24	0.87	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF2008	0.018	0.018	0.783	0.045	0.04	1.04	0.98	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF2048	0	0	0.787	0	0	0	0	

OF2052	0	0	0.628	0	0	0	0	
OF2021	0.029	0.029	0.797	0.053	0.06	1.31	1.09	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF2032	0	0	0.797	0	0	0	0	
OF2038	0	0	0.369	0	0	0	0	
OF1914	0.016	0.016	0.689	0.073	0.05	0.58	0.74	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1907	0.001	0.001	0.727	0.027	0.01	0.21	0.41	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1920	0	0	0.295	0	0	0	0	
OF1927	0	0	0.244	0	0	0	0	
OF1933	0.021	0.021	1.91	0.048	0.05	1.14	0.99	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1938	0	0	0.644	0	0	0	0	
OF1947	0	0	0.614	0	0	0	0	
OF1993	0.006	0.006	0.692	0.036	0.02	0.71	0.66	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF2003	0	0	0.804	0	0	0	0	
OF2057	0.053	0.053	0.639	0.069	0.07	1.87	1.02	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF2065	0	0	0.776	0	0	0	0	
OF1628	0.095	0.095	0.259	0.206	0.12	1.64	0.56	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1627	0.014	0.014	0.22	0.107	0.03	0.86	0.31	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF1622	0.001	0.001	0.354	0.026	0	0.21	0.19	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF1024	0	0	0.78	0	0	0	0	
OF1817	0.004	0.004	0.299	0.059	0.02	0.47	0.28	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1824	0	0	0.384	0	0	0	0	
OF1825	0	0	0.242	0	0	0	0	
OF1837	0	0	0.321	0	0	0	0	
OF1872	0.034	0.034	0.694	0.097	0.09	0.78	0.9	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1878	0.005	0.005	0.731	0.045	0.03	0.36	0.57	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1879	0	0	0.722	0	0	0	0	
OF1880	0	0	0.696	0	0	0	0	
OF1881	0	0	0.718	0	0	0	0	
OF1882	0	0	0.513	0	0	0	0	
OF2028	0	0	0.338	0	0	0	0	
OF1859	0.042	0.042	0.244	0.155	0.07	1.24	0.43	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1858	0.004	0.004	0.475	0.051	0.02	0.41	0.41	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1857	0	0	0.625	0	0	0	0	
OF1847	0	0	0.507	0	0	0	0	
OF999	0	0	0.791	0	0	0	0	
OF991	0	0	1.968	0	0	0	0	
OF714	0.042	0.042	0.282	0.083	0.04	2.36	0.52	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF721	0.004	0.004	0.629	0.031	0.02	0.55	0.61	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF948	0	0	0.641	0	0	0	0	
OF700	0	0	0.537	0	0	0	0	
OF708	0	0	0.592	0	0	0	0	
OF683	0	0	0.668	0	0	0	0	
OF677	0	0	0.403	0	0	0	0	
OF671	0.019	0.019	0.481	0.056	0.04	1.4	0.63	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF665	0.004	0.004	0.28	0.039	0.01	0.81	0.3	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF612	0.001	0.001	0.277	0.028	0.01	0.41	0.26	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF582	0.022	0.022	0.478	0.057	0.04	1.47	0.66	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3

OF2666	0.306	0.306	12.415	0.023	0.02	20.18	0.66	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF768	0.031	0.031	0.458	0.109	0.07	0.87	0.65	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF762	0	0	0.272	0	0	0	0	
OF757	0	0	0.202	0	0	0	0	
OF748	0	0	0.205	0	0	0	0	
OF745	0	0	0.213	0	0	0	0	
OF788	0	0	0.659	0	0	0	0	
OF798	0	0	0.278	0	0	0	0	
OF782	0.029	0.029	0.406	0.066	0.04	1.77	0.62	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF2286	0.023	0.023	1.064	0.058	0.04	1.5	0.67	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF2279	0	0	1.134	0	0	0	0	
OF728	0	0	0.347	0	0	0	0	
OF844	0	0	0.337	0	0	0	0	
OF837	0	0	0.202	0	0	0	0	
OF831	0.023	0.023	0.215	0.13	0.05	1.04	0.35	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF825	0.001	0.001	0.311	0.039	0.01	0.31	0.21	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF814	0	0	0.358	0	0	0	0	
OF813	0	0	0.284	0	0	0	0	
OF806	0	0	0.259	0	0	0	0	
OF852	0.004	0.004	0.453	0.034	0.01	0.64	0.44	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF2224	0.023	0.023	1.551	0.053	0.05	1.3	0.86	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF2322	0	0	1.616	0	0	0	0	
OF3176	8.901	8.901	10.461	0.273	0.42	22.18	1.55	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF2196	0.038	0.038	1.342	0.064	0.06	1.7	0.88	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF606	0	0	0.799	0	0	0	0	
OF492	0.144	0.144	0.225	0.129	0.08	3.5	0.63	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF512	0.418	0.418	16.35	0.04	0.05	17.74	1.16	AR&R 2 year, 45 minutes storm, average 52 mm/h, Zone 3
OF15	2.648	2.648	15.543	0.161	0.16	26.9	0.97	AR&R 2 year, 45 minutes storm, average 52 mm/h, Zone 3
OF2229	0.045	0.045	1.499	0.065	0.06	1.73	1	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF2240	0.006	0.006	1.836	0.03	0.03	0.51	0.94	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF538	0	0	0.295	0	0	0	0	
OF68386	0	0	0.577	0	0	0	0	
OF1104	0.024	0.024	0.614	0.089	0.07	0.71	0.76	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1113	0.002	0.002	0.651	0.037	0.02	0.29	0.45	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1118	0	0	0.661	0	0	0	0	
OF1125	0	0	0.58	0	0	0	0	
OF1129	0	0	0.878	0	0	0	0	
OF2444	0	0	1.283	0	0	0	0	
OF187	0.749	0.749	3.908	0.113	0.07	10.9	0.64	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1131	0	0	0.528	0	0	0	0	
OF2273	0	0	1.516	0	0	0	0	
OF1257	0	0	0.605	0	0	0	0	
OF485	0.033	0.033	0.762	0.054	0.06	1.34	1.2	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF480	0.001	0.001	0.386	0.02	0.01	0.26	0.32	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF390	0	0	0.809	0	0	0	0	
OF396	0.039	0.039	0.78	0.057	0.07	1.47	1.19	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF410	0.004	0.004	0.439	0.035	0.01	0.68	0.41	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3

OF423	0.002	0.002	0.373	0.031	0.01	0.55	0.34	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF404	0.039	0.039	0.427	0.07	0.05	1.93	0.71	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF445	0.047	0.047	0.797	0.061	0.07	1.6	1.22	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF451	0	0	0.805	0	0	0	0	
OF1250	0	0	0.651	0	0	0	0	
OF1164	0.006	0.006	0.795	0.033	0.03	0.61	0.79	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF1198	0.027	0.027	0.857	0.083	0.08	0.66	1.01	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1205	0.003	0.003	0.72	0.04	0.02	0.32	0.51	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1206	0	0	0.797	0	0	0	0	
OF1207	0	0	0.727	0	0	0	0	
OF1223	0	0	0.772	0	0	0	0	
OF1230	0	0	0.67	0	0	0	0	
OF1236	0	0	0.724	0	0	0	0	
OF1237	0	0	0.714	0	0	0	0	
OF1265	0.004	0.004	0.575	0.047	0.02	0.38	0.46	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1277	0	0	0.176	0	0	0	0	
OF470	0	0	0.698	0	0	0	0	
OF303	0.014	0.014	0.7	0.039	0.05	0.81	1.16	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF311	0	0	0.695	0	0	0	0	
OF356	0	0	0.624	0	0	0	0	
OF2437	0	0	1.355	0	0	0	0	
OF464	0	0	0.798	0	0	0	0	
OF441	0.009	0.009	0.803	0.037	0.03	0.74	0.84	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF457	0.051	0.051	0.309	0.084	0.05	2.43	0.59	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF381	0	0	0.762	0	0	0	0	
OF362	0	0	0.297	0	0	0	0	
OF140	0.046	0.046	0.232	0.163	0.07	1.3	0.43	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF141	0.007	0.007	0.169	0.091	0.02	0.73	0.21	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF142	0	0	0.173	0	0	0	0	
OF143	0	0	0.394	0	0	0	0	
OF144	0.02	0.02	0.792	0.075	0.07	0.6	0.88	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1285	0	0	0.498	0	0	0	0	
OF85	0	0	0.793	0	0	0	0	
OF317	0	0	0.534	0	0	0	0	
OF104	0	0	0.503	0	0	0	0	
OF99	0	0	0.623	0	0	0	0	
OF75	0.066	0.066	0.562	0.076	0.07	2.13	0.98	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF57	0.086	0.086	0.567	0.083	0.09	2.36	1.05	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF213	0.538	0.538	4.855	0.082	0.05	10.65	0.64	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF81	0	0	0.728	0	0	0	0	
OF111	0	0	0.714	0	0	0	0	
OF123	0	0	0.745	0	0	0	0	
OF69	0.156	0.156	0.623	0.098	0.13	2.89	1.29	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF240	0	0	20.262	0	0	0	0	
OF29	0	0	0.628	0	0	0	0	
OF38	0.005	0.005	0.566	0.036	0.02	0.71	0.55	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF5	0.044	0.044	0.638	0.065	0.06	1.73	0.98	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3

OF9	0.006	0.006	6.556	0.003	0	10.03	0.17	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF3082	1.446	1.446	16.804	0.197	0.08	28.73	0.39	AR&R 2 year, 1.5 hours storm, average 33 mm/h, Zone 3
OF44	0.044	0.044	0.355	0.078	0.05	2.2	0.62	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF20	0	0	0.582	0	0	0	0	
OF191	0.082	0.082	3.991	0.03	0.01	10.24	0.27	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF166	2.626	2.626	10.772	0.319	0.11	37.67	0.34	AR&R 2 year, 45 minutes storm, average 52 mm/h, Zone 3
OF323	0.119	0.119	0.348	0.201	0.15	1.61	0.74	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF330	0.043	0.043	0.562	0.114	0.09	0.91	0.83	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF331	0.015	0.015	0.479	0.082	0.05	0.65	0.55	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF332	0.001	0.001	0.581	0.026	0.01	0.21	0.32	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF333	0	0	0.218	0	0	0	0	
OF132	0	0	0.587	0	0	0	0	
OF129	0	0	0.798	0	0	0	0	
OF216	0.025	0.025	6.332	0.005	0	10.04	0.46	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF3086	0.119	0.119	17.495	0.057	0.02	13.58	0.31	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF1291	0.058	0.058	0.82	0.111	0.13	0.89	1.19	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1297	0.027	0.027	0.738	0.086	0.08	0.69	0.9	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1298	0.002	0.002	0.585	0.038	0.02	0.3	0.42	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1299	0	0	0	0	0	0	0	
OF1300	0	0	0.815	0	0	0	0	
OF1301	0	0	0.634	0	0	0	0	
OF1302	0	0	0.74	0	0	0	0	
OF1303	0	0	0.41	0	0	0	0	
OF430	0	0	0.365	0	0	0	0	
OF1376	0.001	0.001	0.215	0.042	0.01	0.34	0.16	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF1377	0	0	0.863	0	0	0	0	
OF1716	0.02	0.02	0.739	0.077	0.06	0.61	0.84	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF1722	0	0	0.7	0	0	0	0	
OF1728	0	0	0.694	0	0	0	0	
OF1729	0	0	0.723	0	0	0	0	
OF1730	0	0	0.656	0	0	0	0	
OF1074	0.003	0.003	0.643	0.028	0.02	0.45	0.59	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF2014	0.032	0.032	0.541	0.062	0.05	1.64	0.79	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF2109	0.147	0.147	0.764	0.162	0.23	1.29	1.41	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF2431	0.181	0.181	0.701	0.18	0.25	1.44	1.39	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF2419	0.113	0.113	0.523	0.168	0.17	1.35	0.99	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF2410	0.023	0.023	0.409	0.102	0.06	0.82	0.55	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF68305	0.001	0.001	0.253	0.038	0.01	0.3	0.17	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF576	3.606	3.606	13.411	0.334	0.14	38.77	0.43	AR&R 2 year, 45 minutes storm, average 52 mm/h, Zone 3
OF3042	0.993	0.993	7.831	0.087	0.05	20.7	0.56	AR&R 2 year, 1.5 hours storm, average 33 mm/h, Zone 3
OF3022	0.13	0.13	7.831	0.026	0.01	20.21	0.25	AR&R 2 year, 1.5 hours storm, average 33 mm/h, Zone 3
OF210	0.105	0.105	3.991	0.035	0.01	10.28	0.3	AR&R 2 year, 1.5 hours storm, average 33 mm/h, Zone 3
OF249	0	0	4.407	0	0	0	0	
OF3094	0.353	0.353	5.014	0.18	0.02	27.88	0.11	AR&R 2 year, 1.5 hours storm, average 33 mm/h, Zone 3
OF235	0.658	0.658	3.464	0.113	0.06	10.9	0.56	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF257	0.048	0.048	22.512	0.015	0	21.55	0.23	AR&R 2 year, 45 minutes storm, average 52 mm/h, Zone 3
OF51804	0	0	1.138	0	0	0	0	

OF518	0	0	0.498	0	0	0	0	
OF2995	0	0	1.395	0	0	0	0	
OF858	0.017	0.017	0.152	0.076	0.02	2.13	0.26	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF866	0.089	0.089	0.469	0.089	0.08	2.59	0.91	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF869	0.01	0.01	0.471	0.045	0.02	1.04	0.54	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF774	0.029	0.029	0.19	0.083	0.03	2.36	0.36	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF1403	0.017	0.017	0.776	0.045	0.04	1.04	0.93	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF2517	2.545	2.545	0.221	0.321	0.52	9.89	1.63	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF2520	2.447	2.447	3.703	0.271	0.24	31.48	0.88	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF2530	2.301	2.301	8.572	0.155	0.09	34.68	0.55	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF2609	0.007	0.007	0.899	0.042	0.02	0.94	0.45	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3
OF2560	1.277	1.277	0.443	0.21	0.44	7.09	2.08	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF2557	0.178	0.178	0.453	0.109	0.16	2.79	1.47	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF2618	0.175	0.175	0.341	0.119	0.14	3.11	1.17	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF2565	4.367	4.367	17.314	0.323	0.18	38.02	0.55	AR&R 2 year, 45 minutes storm, average 52 mm/h, Zone 3
OF2574	0	0	0	0	0	0	0	
OF2582	4.448	4.448	17.809	0.322	0.18	37.95	0.56	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF2815	0.464	0.464	36.933	0.016	0.01	60.1	0.49	AR&R 2 year, 1.5 hours storm, average 33 mm/h, Zone 3
OF2859	0.497	0.497	6.403	0.034	0.05	10.27	1.45	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF245	0	0	12.248	0	0	0	0	
OF3047	0	0	12.326	0	0	0	0	
OF32652	4.891	4.891	12.321	0.101	0.24	20.81	2.37	AR&R 2 year, 1.5 hours storm, average 33 mm/h, Zone 3
OF3147	8.058	8.058	12.688	0.223	0.39	21.79	1.73	AR&R 2 year, 45 minutes storm, average 52 mm/h, Zone 3
OF3142	56.216	56.216	5.483	1.164	2.28	29.31	1.96	AR&R 2 year, 45 minutes storm, average 52 mm/h, Zone 3
OF3163	0	0	12.531	0	0	0	0	
OF30286	5.366	5.366	12.664	0.166	0.26	21.33	1.56	AR&R 2 year, 45 minutes storm, average 52 mm/h, Zone 3
OF3181	50.829	50.829	4.247	1.27	2.03	30.16	1.6	AR&R 2 year, 45 minutes storm, average 52 mm/h, Zone 3
OF633	0	0	0	0	0	0	0	
OF30205	0.398	0.398	4.902	0.122	0.07	7.1	0.58	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF30268	0.878	0.878	7.831	0.082	0.04	20.65	0.53	AR&R 2 year, 45 minutes storm, average 52 mm/h, Zone 3
OF30281	0	0	0	0	0	0	0	
OF153	0	0	2.878	0	0	0	0	
OF2094	0	0	1.685	0	0	0	0	
OF42414	0	0	0	0	0	0	0	
OF30181	0	0	0	0	0	0	0	
OF30187	0.4	0.4	4.851	0.118	0.07	7.05	0.6	AR&R 2 year, 20 minutes storm, average 80 mm/h, Zone 3
OF51797	0.336	0.336	4.182	0.075	0.07	6.54	0.91	AR&R 2 year, 5 minutes storm, average 142 mm/h, Zone 3

DRAINS results prepared 18 March, 2011 from Version 2011.06

PIT / NODE DETAILS — Version 8

Name	Max HGL	Max Pond HGL	Max Surface Flow Arrival (cu.m/s)	Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint
Pit317	48.03		0.364		-6.43	0.501	Outlet System
Pit302	41.78		0.644		-0.28	1.051	Outlet System
Pit314	41.56		1.731		-0.16	2.599	Outlet System
N1053	41.07		1.977				
Pit311	42.64		1.374		-0.84	1.278	Outlet System
Pit312	41.93		0.416		-0.23	0.61	Outlet System
Pit313	41.88		1.11		-0.28	0.916	Outlet System
Pit309	42.6		0.254		-0.5	0.335	Outlet System
Pit308	42.41		0.515		-0.31	0.759	Outlet System
Pit299	42.21		0.645		-0.21	0.692	Outlet System
Pit300	42.09		0.407		-0.19	0.607	Outlet System
Pit307	43.49		0.353		-0.49	0.365	Outlet System
Pit306	42.88		0.473		-0.18	0.601	Outlet System
Pit303	43.51		0.21		-0.51	0.234	Outlet System
Pit305	43.03		0.229		-0.23	0.464	Outlet System
Pit301	43.23		0.457		-1.33	0.575	Outlet System
Pit295	42.56		0.867		-0.56	0.795	Outlet System
Pit296	42.17		0.127		-0.27	0.357	Outlet System
Pit293	53.78		0		0.72	0	None
Pit290	53.5		0.222		1.1	0.173	Inlet Capacity
Pit291	51.46		0.13		0.54	0.281	Inlet Capacity
Pit1035	49.84		0.136		-0.24	0.842	Outlet System
Pit185	49.64		0.184		-0.14	0.373	Outlet System
Pit1032	49.27		0.12		0.03	0.865	Inlet Capacity
Pit49	48.42		0.343		0.18	0.896	Inlet Capacity
Pit1309	48.04		0.125		0.46	0.533	Inlet Capacity
Pit48	47.2		0.179		1.2	0.857	Inlet Capacity
Pit72	45.39		0.075		-0.64	1.394	Outlet System
Pit73	45.15		0.709		-0.45	1.52	Outlet System
Pit74	44.77		1.145		-0.27	1.278	Outlet System
Pit64	44.47	44.54	0.905	4.3	-0.37	0.927	Outlet System
NS6678	44.42		0.711				
Pit292	51.58		0		0.72	0	None
Pit285	57.53		0.19		-0.23	0.239	Outlet System
Pit253	56.64		0		0.66	0	None
Pit251	56.26		0.074		0.99	0.025	Inlet Capacity
Pit283	55.78		0.252		1.62	0.136	Inlet Capacity
Pit286	55.07		0		2.73	0	None
Pit288	54.57		0		2.83	0	None
Pit289	54.47		0		2.73	0	None
Pit284	56.28		0		0.72	0	None

Pit279	55.37	0	-1.52	0.058	Outlet System
Pit280	53.95	0.196	-0.2	0.213	Outlet System
Pit281	53.55	0.239	0.15	0.332	Inlet Capacity
Pit268	57.78	0.114	-0.68	0.142	Outlet System
Pit269	57.18	0.083	-0.18	0.137	Outlet System
Pit270	57.11	0.528	-0.41	0.768	Outlet System
Pit271	56.97	0.484	-0.37	0.699	Outlet System
Pit272	56.76	0.418	-0.36	0.676	Outlet System
Pit273	56.51	0.394	-0.41	0.652	Outlet System
Pit274	56.35	0.359	-0.35	0.513	Outlet System
Pit275	56.09	0.269	-0.24	0.397	Outlet System
Pit276	55.93	0.31	-0.13	0.502	Outlet System
Pit278	54.01	0.144	-0.21	0.518	Outlet System
Pit260	61.24	0.384	-0.64	0.535	Outlet System
Pit259	60.9	0.353	-0.35	0.451	Outlet System
Pit258	60.66	0.268	-0.16	0.346	Outlet System
Pit257	60.24	0.157	-0.24	0.312	Outlet System
Pit256	59.77	0.118	-0.27	0.317	Outlet System
Pit261	59.32	0.106	-0.22	0.275	Outlet System
Pit262	58.97	0.07	-0.27	0.293	Outlet System
Pit263	58.73	0.07	-0.23	0.265	Outlet System
Pit264	58.43	0.045	-0.23	0.261	Outlet System
Pit265	58.2	0.027	-0.3	0.291	Outlet System
Pit266	58.01	0.013	-0.26	0.226	Outlet System
Pit267	57.69	0	-0.09	0.162	Outlet System
Pit249	56.79	0.154	0.31	0.149	Inlet Capacity
Pit250	56.38	0.039	0.82	0.036	Inlet Capacity
Pit255	57.63	0.409	-0.18	0.359	Outlet System
Pit254	57.17	0	0.28	0	None
Pit252	57.97	0.082	-0.72	0.145	Outlet System
Pit247	58.23	0.148	0.33	0.155	Outlet System
Pit246	57.36	0	0.54	0	None
Pit248	56.94	0.035	0.06	0.048	Inlet Capacity
Pit245	60.89	0.295	-0.09	0.254	Outlet System
Pit244	60.22	0	0.48	0	None
Pit242	62.28	0	0.72	0	None
Pit243	62.05	0	0.75	0	None
Pit241	60.33	0	-0.33	0.003	Outlet System
Pit240	60.31	0.358	-0.11	0.366	Outlet System
Pit239	57.12	0.192	-0.12	0.289	Outlet System
Pit237	56.91	0.082	-0.41	0.378	Outlet System
Pit238	57.16	0.002	-0.66	0.006	Outlet System
Pit233	60.12	0.248	-0.12	0.232	Outlet System
Pit232	58.57	0.118	-0.07	0.132	Outlet System
Pit220	56.23	0	-0.03	0.005	Outlet System
Pit1043	53.71	0.177	-0.11	0.207	Outlet System
Pit221	52.9	0.538	-0.2	1.011	Outlet System

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Pit198	51.31	0.098	-0.21	0.12	Outlet System
Pit199	51.1	0.158	-0.1	0.24	Outlet System
Pit200	50.78	0	0.42	0	None
Pit201	50.32	0	0.18	0	None
Pit202	50.08	0.1	-0.08	0.109	Outlet System
Pit203	49.57	0.058	-0.07	0.079	Outlet System
Pit187	52.33	0.294	-0.13	0.299	Outlet System
Pit186	51.69	0	0.61	0	None
Pit184	57.78	0.276	-1.38	0.355	Outlet System
Pit183	56.61	0.237	-0.31	0.294	Outlet System
Pit277	56.45	0.196	-0.25	0.246	Outlet System
Pit182	59.31	0.059	-0.31	0.064	Outlet System
Pit179	59.12	0.15	-0.52	0.147	Outlet System
Pit180	58.65	0.106	-0.15	0.064	Outlet System
Pit181	58.38	0.031	-0.08	0.011	Outlet System
Pit1052	57.35	0	-0.25	0.06	Outlet System
Pit176	55.32	0.198	-0.22	0.246	Outlet System
Pit1063	54.59	0.143	-0.19	0.218	Outlet System
Pit1065	53.79	0.117	-0.19	0.21	Outlet System
Pit1066	52.99	0.109	-0.19	0.206	Outlet System
Pit1067	52.28	0.107	-0.18	0.189	Outlet System
Pit1068	51.5	0.091	-0.2	0.162	Outlet System
Pit1069	50.72	0.151	-0.22	0.348	Outlet System
Pit175	56.3	0.141	-0.5	0.162	Outlet System
Pit174	55.88	0.117	-0.18	0.131	Outlet System
Pit173	55.46	0.087	-0.16	0.118	Outlet System
Pit172	55.08	0.071	-0.18	0.112	Outlet System
Pit170	55.94	0.026	-0.84	0.042	Outlet System
Pit166	51.61	0.016	-0.71	0.016	Outlet System
Pit165	46.54	0.316	-0.24	0.348	Outlet System
Pit164	46.16	0.187	0.04	0.176	Inlet Capacity
Pit304	43.33	0.075	-0.13	0.194	Outlet System
Pit162	48.22	0.053	-0.12	0.048	Outlet System
Pit163	47.77	0.007	0.03	0.005	Inlet Capacity
Pit161	47.4	0	0.1	0	None
Pit148	45.66	0.302	-0.16	0.471	Outlet System
Pit135	45.09	0.522	-0.19	0.83	Outlet System
Pit132	44.83	0.55	-0.23	0.869	Outlet System
Pit102	44.59	0.508	-0.19	0.669	Outlet System
Pit98	43.81	0.468	0.49	0.581	Inlet Capacity
Pit158	47.22	0.136	-0.42	0.168	Outlet System
Pit157	46.97	0	-0.12	0	Outlet System
Pit156	46.92	0	-0.02	0	Outlet System
Pit155	46.8	0	0.15	0	None
Pit154	46.68	0	0.32	0	None
Pit153	46.45	0	0.25	0	None
Pit152	46.32	0	-0.12	0.012	Outlet System

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Pit39	53.19	0.128	-0.19	0.208	Outlet System
Pit40	52.47	0.112	-0.17	0.19	Outlet System
Pit41	51.58	0.096	-0.18	0.191	Outlet System
Pit42	50.87	0.097	-0.17	0.181	Outlet System
Pit43	49.89	0.089	-0.19	0.179	Outlet System
Pit56	49.18	0.086	-0.18	0.169	Outlet System
Pit55	48.76	0.062	-0.06	0.098	Outlet System
Pit36	56.46	0.122	-0.96	0.106	Outlet System
Pit37	54.94	0.058	0.26	0.004	Inlet Capacity
Pit998	54.41	0.001	0.69	0	None
Pit35	58.02	0.125	-0.52	0.134	Outlet System
Pit34	57.38	0	-0.28	0.034	Outlet System
Pit30	57.39	0.166	0.21	0.116	Inlet Capacity
Pit29	56.54	0.048	-0.04	0.039	Outlet System
Pit28	56.09	0	0.71	0	None
Pit27	56.86	0.142	-0.16	0.176	Outlet System
Pit26	56.62	0.34	0.18	0.255	Inlet Capacity
Pit25	57.55	0.163	-0.85	0.314	Outlet System
Pit24	56.98	0.152	-0.18	0.313	Outlet System
Pit20	60.23	0.155	-0.63	0.189	Outlet System
Pit19	59.78	0.126	-0.28	0.17	Outlet System
Pit18	59.67	0.109	-0.22	0.124	Outlet System
Pit17	59.56	0.071	-0.16	0.094	Outlet System
Pit16	59.41	0.216	-0.11	0.25	Outlet System
Pit23	57.35	0.12	-0.15	0.283	Outlet System
Pit15	64.85	0.003	0.65	0	None
Pit14	61.55	0	0.65	0	None
Pit12	60.68	0	-0.18	0.005	Outlet System
Pit9	59.98	0	0.02	0	None
Pit6	57.36	0.346	0.14	0.301	Inlet Capacity
Pit235	54.43	0.466	0.87	0.451	Inlet Capacity
N664	54.21	0.263			
Pit13	62.18	0.013	-0.28	0.001	Outlet System
Pit11	60.17	0.004	0.03	0	None
Pit10	60.03	0	0.27	0	None
Pit8	58.01	0.635	-0.51	0.774	Outlet System
Pit1	99.28	0	0.72		None
N2	94.28	0			
HW-BSN5	54.05	0.679	0.95	0	None
Pit5	54.62	0.343	-0.12	0.397	Outlet System
Pit4	53.21	0.607	-0.21	1.155	Outlet System
Pit3	52.34	9.829	-0.34	9.49	Outlet System
N659	49.58	9.456			
Pit635	55.4	0.478	-0.6	0.573	Outlet System
HW-BSN3	46.38	0.413	-0.38	0	None
N807	44.48	0.148			
N1049	39.37	6.127			

Pit21	59.9		0.365	-0.4	0.434	Outlet System	
Pit22	59.54		0.307	-0.24	0.362	Outlet System	
Pit33	58.97		0.239	-0.27	0.364	Outlet System	
Pit32	58.54		0.242	-0.24	0.341	Outlet System	
Pit31	58.03		0.215	-0.33	0.309	Outlet System	
Pit996	56.84		0.053	-0.09	0.032	Outlet System	
Pit994	56.05		0	0.25	0	None	
N1064	55.05		0				
N1071	50.3		0.459				
Pit1000	56.72		0.238	-0.22	0.293	Outlet System	
Pit1001	55.71		0.174	-0.21	0.273	Outlet System	
Pit1009	54.95		0.157	-0.25	0.26	Outlet System	
Pit1010	54.23		0.15	-0.03	0.189	Outlet System	
Pit1011	53.52		0.076	-0.02	0.095	Outlet System	
Pit1012	52.87		0.021	-0.17	0.108	Outlet System	
Pit1013	52.34		0.01	-0.14	0.097	Outlet System	
Pit1014	51.58		0.005	-0.28	0.152	Outlet System	
Pit1022	51.22		0.053	-0.12	0.151	Outlet System	
Pit1028	52.72		0.141	-0.62	0.123	Outlet System	
Pit1024	52.11		0.181	-0.11	0.099	Outlet System	
Pit1037	59.43		0.292	-0.23	0.307	Outlet System	
Pit1038	58.5		0.155	-0.2	0.257	Outlet System	
Pit1039	57.5		0.106	-0.2	0.242	Outlet System	
Pit1040	56.4		0.093	-0.2	0.235	Outlet System	
Pit1041	55.37		0.093	-0.27	0.262	Outlet System	
Pit1042	54.09		0.301	-0.19	0.612	Outlet System	
Pit1055	52.77		0.252	-0.27	0.296	Outlet System	
Pit1083	48.34		0.3	0.46	0.447	Inlet Capacity	
Pit114	48.3		0.544	-0.3	0.726	Outlet System	
Pit108	47.63		0.457	-0.33	0.681	Outlet System	
Pit109	47.15		0.412	-0.35	0.614	Outlet System	
Pit110	46.85		0.373	-0.25	0.485	Outlet System	
OUT	37.64		18.275				
HW6	40.61		2.971	-0.41	2.497	Headwall height/system capacity	
N1014	38.64		2.354				
HW9	47.71		5.199	0.79	0.204	Headwall height/system capacity	
Pit35783	46.85	47.5	0	0	0.65	0	None
Pit1b	46.62		0		-0.12		Outlet System
Pit1094	45.06		0		-1.12		Outlet System
Pit1090	44.4		0.107		-0.2	0.036	Outlet System
Pit1315	44.14		1.122		-0.14	1.922	Outlet System
Pit1098	43.55		0.236		-0.45	0.249	Outlet System
Pit297	43.11		0.543		-0.11	0.553	Outlet System
Pit298	42.63		0.117		0.27	0.069	Inlet Capacity
N1231	46.35		0.118				
N1270	56.14		0.214				
N1446	47.71		6.584				

N1449	50.71		5.395				
N1451	47.71		5.347				
Pit1305	43.32		0.106		-0.12	0.094	Outlet System
N1456	57.28		2.789				
N1458	55.65		0.385				
N1459	54.17		0.384				
N1461	53.61		16.519				
HW20	52.99		13.072		-0.69	9.887	Headwall height/system capacity
N1465	65.56		10.604				
HWBSN4a	44.24		1.833		0.26	0	None
HWBSN4b	44.35		1.624		0.15	0	None
N30841	44.28		18.413				
HWBSN3	44.34		23.905		-0.34	0.089	Headwall height/system capacity
N28574	44.19		0				
HW10	44.44		4.224		0.76	0	None
N28560	44.25		0.561				
HW13	44.05		1.732		-1.05	0.094	Headwall height/system capacity
Pit25375	50.38	48.42	0.371	4.3	-2.18	0.084	Outlet System
Pit1080	47.88		0		-0.08	0	Outlet System
HW126	44.2		11.293		-1.2	1.091	Headwall height/system capacity
HW45	45.75		3.5		0.45	0	None
N28567	44.78		0				
N50029	46.12		0				

SUB-CATCHMENT DETAILS

Name	Max Flow Q	Impervious Max Q	Pervious Max Q	Impervious Tc	Pervious Tc	Due to Storm
	(cu.m/s)	(cu.m/s)	(cu.m/s)	(min)	(min)	
EC4	1.21	0.826	0.383	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C1I	0.286	0.195	0.091	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C1F	0.262	0.179	0.083	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C1H	0.214	0.147	0.068	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C1B	0.53	0.492	0.038	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C1D	0.232	0.158	0.073	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C1A	0.316	0.216	0.1	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C1J	0.383	0.261	0.121	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
EC3	0.881	0.602	0.279	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C1G	0.137	0.093	0.043	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C5D	0.333	0.228	0.106	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C3E	0.16	0.109	0.051	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C3C	0.22	0.15	0.07	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C3F	0.486	0.332	0.154	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C3H	0.324	0.222	0.103	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C5F	0.378	0.258	0.12	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C5C	0.295	0.201	0.093	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C6D	0.171	0.117	0.054	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C6C	0.687	0.47	0.218	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3

C9E	0.577	0.394	0.183	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C6E2	0.231	0.158	0.073	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C6A	0.615	0.42	0.195	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C9D	0.444	0.303	0.141	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C9C	0.538	0.368	0.171	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C9A	0.372	0.254	0.118	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C8E	0.266	0.181	0.084	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C8B	0.233	0.159	0.074	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C7B	0.221	0.151	0.07	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C7C	0.218	0.149	0.069	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C10H	0.24	0.164	0.076	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C10I	0.527	0.037	0.49	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C8A	0.259	0.177	0.082	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C8D	0.34	0.232	0.108	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C9B	0.231	0.158	0.073	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C7J	0.21	0.143	0.066	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C10G	0.252	0.172	0.08	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C7H	0.222	0.152	0.07	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C7E	0.299	0.204	0.095	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C7G	0.22	0.15	0.07	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C7F	0.145	0.099	0.046	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C10A	0.151	0.103	0.048	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C10E	0.442	0.302	0.14	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C6B	0.414	0.283	0.131	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C8F	0.225	0.154	0.071	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C7D	0.298	0.203	0.094	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C7I	0.211	0.144	0.067	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C2B	0.475	0.325	0.151	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C2A	0.079	0.054	0.025	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C2F	0.227	0.155	0.072	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C2H	0.087	0.06	0.028	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C3M	0.088	0.06	0.028	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C3L	0.268	0.183	0.085	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C2D	0.247	0.169	0.078	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C2E	0.247	0.169	0.078	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C2C	0.223	0.152	0.071	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C2G	0.255	0.174	0.081	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C2I	0.06	0.041	0.019	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C3B	0.268	0.183	0.085	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C10D	0.211	0.144	0.067	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
EC6	1.178	0.804	0.373	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C3A	0.387	0.264	0.123	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C3G	0.244	0.167	0.077	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C4E	0.31	0.212	0.098	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C4B	0.361	0.246	0.114	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C4A	0.4	0.273	0.127	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								
C4C	0.404	0.276	0.128	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3								

C4D	0.285	0.195	0.09	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C4F	0.184	0.126	0.058	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
EC13N	0.188	0.129	0.06	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C4G	0.511	0.349	0.162	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C11C	0.233	0.159	0.074	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C5G	0.269	0.184	0.085	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
EC14N	0.004	0.003	0.001	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C11B	0.52	0.355	0.165	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C11A	0.44	0.301	0.14	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
EC12N	0.02	0.013	0.006	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
EC4N	0.953	0.651	0.302	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
EC8	0.433	0.06	0.373	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C3D	0.621	0.044	0.577	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C3I	0.222	0.152	0.07	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
EC5(EC14E	2.14	0	2.14	5	10	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
C11D	0.548	0.375	0.174	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C6E1	0.08	0.055	0.025	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
EC7	0.58	0.396	0.184	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C5E	0.358	0.245	0.114	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C5A	0.212	0.145	0.067	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C5B	0.156	0.106	0.049	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C8C	0.438	0.299	0.139	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C7A	0.269	0.184	0.085	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C10B	0.45	0.308	0.143	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C10F	0.369	0.252	0.117	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
EC13E	1.158	0	1.158	5	10	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
C3J	0.274	0.187	0.087	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
EC1	0.354	0.242	0.112	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
EC2	0.618	0.422	0.196	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C1E	0.176	0.12	0.056	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
EX1	7.918	0	7.918	5	10	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
C1C	0.159	0.108	0.05	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
EX2	4.093	0	4.093	5	10	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
EC5W	0.567	0.046	0.533	5	10	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
EC4W	10.249	0.168	10.123	5	10	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
CAT3(+17)	15.287	0	15.287	5	15	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
C3K	0.214	0.147	0.068	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C10C	1.342	1.245	0.096	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3

Outflow Volumes for Total Catchment (25.2 impervious + 104 pervious = 129 total ha)

Storm	Total Rainf	Total Runo	Impervious	Pervious Runoff
	cu m	cu m (Run	cu.m (Run	cu.m (Runoff %)
AR&R 100	34639.3	26167.20 (	6771.05 (1	19396.15 (69.6%)
AR&R 100	54218.03	40957.78 (	10598.15 (	30359.63 (69.6%)
AR&R 100	80896.74	61111.12 (	15813.04 (	45298.09 (69.6%)
AR&R 100	121990.6	92154.03 (	23845.81 (	68308.23 (69.6%)

AR&R 100	156845	118479.76	30658.73	87821.02 (69.6%)	
PIPE DETAILS					
Name	Max Q	Max V	Max U/S	Max D/S	Due to Storm
	(cu.m/s)	(m/s)	HGL (m)	HGL (m)	
Pipe412	0.009	1.19	41.824	41.781	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe16	0.959	2.17	41.679	41.563	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
P818	2.309	3.63	41.182	41.074	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe11	0.336	1.55	42	41.928	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
Pipe14	0.986	1.55	41.896	41.876	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe15	1.278	2.01	41.689	41.563	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe5	0.068	0.96	42.403	42.41	AR&R 100 year, 10 minutes storm, average 252 mm/h, Zone 3
Pipe19	0.688	1.92	42.346	42.212	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe18	0.824	1.87	42.179	42.087	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe17	0.89	2.01	42.03	41.781	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe4	0.15	1.36	42.949	42.877	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe20	0.511	1.81	42.725	42.41	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
Pipe2	0.086	1.21	43.073	43.031	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
Pipe8	0.274	1.27	42.968	42.877	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe6	0.059	1.49	42.105	42.087	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe10	0.278	1.29	42.245	42.168	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe13	0.588	1.64	42.087	41.928	AR&R 100 year, 10 minutes storm, average 252 mm/h, Zone 3
Pipe171	0	0	53.777	53.709	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe160	1.818	5.98	53.212	51.461	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe162	2.993	7.43	50.706	49.843	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe919	2.668	2.97	49.693	49.644	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe914	2.837	3.16	49.335	49.266	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe163	2.924	3.25	49.115	48.421	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe164	3.757	3.48	48.345	48.038	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
P1314	4.129	3.82	47.912	47.204	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe72	4.835	8.06	46.68	45.387	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe73	4.233	3.92	45.35	45.148	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe74	4.373	4.05	45.101	44.773	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe75	4.832	3.36	44.603	44.473	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
P60150	5.255	3.65	44.444	44.417	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe170	0	0	51.577	51.461	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe198	0.113	1.59	56.806	56.644	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe197	0.321	2.02	56.485	56.259	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe154	1.339	2.1	56.058	55.779	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe156	1.534	2.41	55.601	55.071	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe158	1.534	2.49	54.656	54.571	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
P403	1.534	2.07	54.524	54.47	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe159	1.534	3.55	54.13	53.498	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe172	0	0	56.277	56.201	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe165	0.008	1.05	53.972	53.947	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe166	0.114	1.62	53.653	53.549	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe168	1.059	3.78	53.007	51.461	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3

Pipe388	0.041	1.02	57.234	57.184	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
Pipe389	0.074	1.87	57.171	57.115	AR&R 100 year, 10 minutes storm, average 252 mm/h, Zone 3
Pipe390	0.168	1.52	56.991	56.967	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe391	0.216	1.95	56.842	56.764	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe392	0.257	2.33	56.65	56.515	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
Pipe393	0.317	2.87	56.489	56.346	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe394	0.393	2.47	56.327	56.086	AR&R 100 year, 10 minutes storm, average 252 mm/h, Zone 3
Pipe204	0.453	2.09	56.009	55.934	AR&R 100 year, 10 minutes storm, average 252 mm/h, Zone 3
Pipe226	0.662	3.66	54.819	54.008	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe169	0.724	2.56	53.666	53.549	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe201	0.107	1.51	60.913	60.902	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe373	0.164	2.32	60.799	60.658	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
Pipe374	0.224	2.03	60.461	60.241	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
Pipe375	0.261	2.37	60.072	59.769	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe227	0.271	2.45	59.65	59.321	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe377	0.284	2.57	59.214	58.966	AR&R 100 year, 10 minutes storm, average 252 mm/h, Zone 3
Pipe378	0.297	2.69	58.899	58.73	AR&R 100 year, 10 minutes storm, average 252 mm/h, Zone 3
Pipe379	0.304	2.75	58.648	58.435	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe380	0.309	2.8	58.388	58.197	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe381	0.311	2.81	58.162	58.014	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe382	0.317	2.87	57.955	57.695	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe383	0.349	3.16	57.607	56.791	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe152	0.838	1.57	56.465	56.38	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe153	0.964	1.8	56.363	56.259	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe195	0.222	1.4	57.226	57.169	AR&R 100 year, 10 minutes storm, average 252 mm/h, Zone 3
Pipe196	0.213	1.34	57.055	56.644	AR&R 100 year, 10 minutes storm, average 252 mm/h, Zone 3
Pipe173	0.056	1.54	56.714	56.531	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
Pipe144	0.068	1.7	57.517	57.358	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
Pipe149	0.241	2.35	57.188	56.937	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe151	0.431	0.98	56.811	56.791	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
Pipe142	0.184	1.67	60.36	60.217	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe143	0.186	3.05	59.863	57.358	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe140	0	0	62.277	62.077	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe141	0	0	62.047	60.217	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe145	0.006	0.81	60.262	60.311	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe146	0.17	3.25	59.41	57.119	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe147	0.26	1.2	56.945	56.908	AR&R 100 year, 10 minutes storm, average 252 mm/h, Zone 3
Pipe148	0.238	1.1	56.935	56.937	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
Pipe150	0.01	1.31	57.088	57.119	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe111	0.142	2.01	59.444	58.571	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
P60005	0.233	4.69	57.738	56.234	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe139	0.3	2.83	55.534	53.706	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
P927	0.468	2.16	53.289	52.901	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe122	0.572	2.64	52.676	52.201	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
Pipe123	0.644	2.98	52.085	51.81	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
Pipe124	0.723	2.56	51.637	51.335	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
Pipe125	0.933	2.61	51.154	50.761	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3

Pipe126	1.057	2.95	50.59	50.307	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe127	1.626	3.04	50.065	49.549	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe128	1.9	3.55	49.428	49.057	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe129	2.155	4.03	48.507	48.348	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe130	1.889	1.77	48.183	47.979	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe60078	2.178	2.04	47.854	47.757	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe1140	1.962	1.83	47.512	47.364	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
Pipe60079	1.925	1.8	47.184	47.056	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe60080	2.184	2.04	46.758	46.605	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe59962	2.727	2.53	46.597	46.425	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
P25711	3.404	2.36	46.275	46.24	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe307	3.69	2.56	46.099	45.992	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe40	4.891	3.4	45.78	46.047	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe117	0	0	58.077	57.777	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe118	0	0	57.747	54.477	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe119	0	0	54.447	54.077	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe120	0	0	54.047	53.113	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe121	0.093	1.32	52.988	52.901	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
Pipe138	0.113	1.6	56.308	56.234	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe110	0.113	1.59	62.72	62.417	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe109	0.113	3.35	62.183	59.832	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe108	0.113	3.57	59.776	59.569	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe107	0.113	2.81	59.205	57.643	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe106	0.141	2.77	57.542	56.891	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe104	0.203	2.88	56.768	55.139	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
Pipe362	0.225	3.18	54.991	54.569	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe103	0.337	3.05	54.091	53.113	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe101	0.386	3.5	52.618	50.883	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe99	0.43	3.9	50.431	48.173	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe98	0.456	1.61	48.133	47.987	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
P60186	0.494	1.75	47.697	47.624	AR&R 100 year, 10 minutes storm, average 252 mm/h, Zone 3
Pipe87	0.765	1.35	47.183	47.112	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
Pipe91	0.842	1.49	47.013	46.906	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe85	0.985	1.74	46.698	46.425	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe136	0.073	1.83	55.352	55.004	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
Pipe137	0.073	2.83	54.753	52.172	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
P954	0.152	2.14	51.918	51.335	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe134	0.111	1.58	51.524	51.33	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
Pipe135	0.111	2.81	51.104	50.558	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
P977	0.244	1.53	50.44	50.307	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe217	0.057	1.44	52.124	51.976	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe218	0.068	1.7	51.698	51.49	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
Pipe344	0.072	1.81	51.421	51.309	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
Pipe345	0.089	1.26	51.252	51.099	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe346	0.112	1.58	50.969	50.775	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe347	0.129	1.82	50.536	50.316	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe236	0.138	1.96	50.245	50.08	AR&R 100 year, 10 minutes storm, average 252 mm/h, Zone 3

Pipe132	0.163	2.31	49.89	49.569	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
Pipe133	0.194	2.74	48.946	47.979	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe89	0.141	1.99	51.971	51.685	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
Pipe90	0.141	2.85	51.365	48.866	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
Pipe202	0.073	1.84	56.653	56.613	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
P397	0.114	1.61	56.538	56.454	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
Pipe203	0.145	2.05	56.308	55.934	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
Pipe115	0.028	1.63	58.449	57.666	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe361	0.096	1.36	58.675	58.647	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
Pipe360	0.122	1.72	58.521	58.379	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe214	0.134	1.9	58.025	57.348	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
Pipe945	0.102	1.44	57.182	56.891	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
Pipe215	0.068	1.72	54.787	54.587	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
P964	0.092	2.31	54.227	53.789	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
P965	0.101	2.53	53.565	52.993	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
P968	0.103	2.6	52.841	52.28	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
P970	0.111	2.79	51.439	51.498	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
P972	0.127	1.8	51.226	50.723	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
P980	0.158	2.23	50.671	50.558	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe365	0.054	1.37	55.932	55.878	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
Pipe364	0.069	1.74	55.712	55.458	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
Pipe363	0.081	2.03	55.301	55.083	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
Pipe216	0.091	2.3	54.964	54.569	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
Pipe116	0.009	1.11	55.149	55.139	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe100	0.008	1.07	50.899	50.883	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe23	0.167	1.52	46.221	46.162	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe24	0.254	2.47	45.49	43.328	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe3	0.224	2.02	43.207	43.031	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe25	0.051	1.29	47.865	47.766	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe26	0.065	1.63	47.641	47.405	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe28	0.064	1.62	46.954	45.658	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe35	0.27	1.7	45.441	45.086	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe37	0.473	2.18	44.94	44.831	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe39	0.532	1.49	44.684	44.588	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe44	0.671	1.88	43.806	43.81	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe46	0.971	0.86	43.802	43.801	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe328	0.05	1.25	46.969	46.966	AR&R 100 year, 10 minutes storm, average 252 mm/h, Zone 3
Pipe327	0.052	1.32	46.962	46.925	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe221	0.046	1.15	46.912	46.796	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe326	0.047	1.17	46.784	46.676	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe222	0.054	1.35	46.513	46.448	AR&R 100 year, 10 minutes storm, average 252 mm/h, Zone 3
Pipe329	0.065	1.64	46.436	46.317	AR&R 100 year, 10 minutes storm, average 252 mm/h, Zone 3
Pipe333	0.08	2.01	46.311	46.298	AR&R 100 year, 10 minutes storm, average 252 mm/h, Zone 3
Pipe32	0.121	1.71	46.083	45.945	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe33	0.186	1.17	45.79	45.748	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
Pipe34	0.196	1.23	45.682	45.658	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe323	0.002	0.32	46.14	46.132	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3

Pipe322	0.005	0.68	46.131	46.128	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe321	0.011	1.38	46.127	46.13	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe320	0.057	1.43	46.07	46.047	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
Pipe219	0.072	1.81	46.002	45.932	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
Pipe318	0.082	1.15	45.856	45.835	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
Pipe317	0.083	1.17	45.796	45.726	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
Pipe220	0.099	1.4	45.677	45.532	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe1	0.118	1.67	45.339	45.086	AR&R 100 year, 10 minutes storm, average 252 mm/h, Zone 3
Pipe93	0.135	4.12	47.316	45.695	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe43	0.151	2.14	45.49	45.48	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe88	0.162	2.69	49.508	48.908	AR&R 100 year, 10 minutes storm, average 252 mm/h, Zone 3
Pipe45	0	0	44.277	43.81	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe49	0.282	1.77	44.087	44.141	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe755	2.979	13.99	42.722	40.791	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
Pipe94	0.176	2.5	45.49	45.295	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe95	0.273	0.96	45.27	45.253	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe96	0.291	1.03	45.249	45.246	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe750	0.786	2.2	45.236	45.148	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe287	0.056	1.41	48.36	48.28	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe288	0.073	1.83	48.009	47.778	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe289	0.078	1.97	47.581	47.296	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe290	0.08	2.02	47.162	46.865	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe209	0.075	1.94	46.784	45.656	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe58	1.356	0.97	44.84	44.829	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
P766	1.358	5.81	44.764	44.483	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
P60168	0.08	2	45.988	45.067	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe292	0.095	2.39	44.479	44.473	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe262	0.008	1.08	48.501	48.417	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe56	1.041	4.39	47.994	47.124	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
Pipe57	1.22	3.48	46.708	45.31	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe189	0.012	1.5	53.623	53.609	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe190	0.093	2.33	52.867	51.094	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
Pipe192	0.254	1.59	50.972	50.86	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
Pipe193	0.567	4.89	49.886	48.421	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe194	0.115	1.04	51.114	51.094	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe67	0.205	1.87	52.83	52.655	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe68	0.205	3.52	52.456	50.636	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe70	0.199	1.8	50.365	50.134	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe71	0.366	4.13	49.24	47.67	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe255	0.066	1.67	53.472	53.19	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
Pipe256	0.093	2.33	52.878	52.473	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
Pipe257	0.101	2.54	52.194	51.584	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
Pipe258	0.105	2.65	51.396	50.874	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
Pipe259	0.108	2.72	50.715	49.886	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
Pipe208	0.117	2.95	49.036	49.176	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe832	0.148	3.71	49.062	48.763	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe231	0.176	2.49	48.187	47.124	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3

Pipe206	0.075	1.88	55.058	54.94	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
P866	0.117	1.66	54.918	54.408	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
Pipe54	0.908	6.17	54.135	48.417	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
Pipe60	0.054	1.36	57.467	57.378	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe61	0.061	1.53	57.381	57.387	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe62	0.338	2.12	56.953	56.535	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe53	0.407	1.88	56.187	56.095	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
P863	0.802	3.59	55.112	54.408	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe66	0.092	1.31	56.648	56.616	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe65	0.406	1.44	56.456	56.095	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe63	0.009	1.12	56.969	56.976	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe64	0.202	1.83	56.135	56.616	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe244	0.049	1.23	59.811	59.777	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
Pipe243	0.07	1.75	59.741	59.67	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe242	0.107	1.51	59.665	59.564	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe228	0.13	1.84	59.489	59.414	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe229	0.194	2.74	58.679	57.353	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
Pipe230	0.18	1.63	57.145	56.976	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
Pipe183	0.004	1.69	64.81	61.551	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe182	0.004	0.91	61.501	60.681	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe181	0.009	1.14	60.58	59.976	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
Pipe180	0.009	1.17	59.821	57.363	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
Pipe179	0.33	2.73	56.379	54.528	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe736	0.691	1.09	54.346	54.212	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe184	0.013	1.65	61.511	60.681	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe185	0.004	0.51	60.11	60.032	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
Pipe186	0.004	0.53	60.014	59.976	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe187	0.187	1.69	57.462	57.363	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe239	0	0	99.277	94.277	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe735	0.184	1.66	54.615	54.619	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
Pipe175	0.204	1.84	54.093	53.21	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe176	0.303	2.75	52.673	52.342	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe734	2.008	4.55	50.813	50.34	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
P744	0.135	1.91	54.634	54.435	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
Pipe80	0.602	3.79	46.044	45.246	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe245	0.099	1.4	59.607	59.543	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
Pipe246	0.129	1.83	59.25	58.974	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
Pipe250	0.145	2.05	58.815	58.545	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe249	0.161	2.28	58.387	58.033	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
Pipe205	0.201	2.85	57.039	57.387	AR&R 100 year, 10 minutes storm, average 252 mm/h, Zone 3
Pipe856	0.063	1.58	56.293	56.047	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe852	0.078	2.57	55.574	55.204	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
P895	0.069	1.74	56.002	55.706	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
Pipe872	0.095	2.38	55.37	54.952	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
P875	0.107	2.68	54.72	54.23	AR&R 100 year, 10 minutes storm, average 252 mm/h, Zone 3
P876	0.14	3.52	53.538	53.523	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
P877	0.194	2.74	53.331	52.865	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3

P878	0.181	2.56	52.732	52.343	AR&R 100 year, 10 minutes storm, average 252 mm/h, Zone 3
P879	0.19	2.68	52.233	51.583	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe900	0.165	2.33	51.527	51.217	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe899	0.208	1.89	51.076	50.86	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe907	0.097	1.37	52.178	52.113	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe904	0.21	3.63	51.245	49.644	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe932	0.161	2.27	58.85	58.505	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
Pipe933	0.201	2.85	58.26	57.503	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe934	0.195	2.77	57.345	56.399	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
Pipe935	0.194	2.74	56.321	55.373	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe936	0.168	2.37	54.947	54.091	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
P925	0.22	3.12	53.976	53.706	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
P952	0.094	1.33	52.258	52.172	AR&R 100 year, 10 minutes storm, average 252 mm/h, Zone 3
P1151	0.003	0.43	48.303	48.3	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe223	0.105	2.64	48.222	47.631	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
Pipe302	0.168	2.38	47.511	47.148	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
Pipe313	0.232	3.28	47.096	46.851	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
Pipe311	0.44	3.98	46.799	46.605	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe769	0.616	3.9	39.542	38.639	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe1067	5.263	3.02	47.089	46.853	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
P37225	2.82	3.92	46.828	46.619	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
P37246	3.359	10.6	46.613	46.115	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
Pipe1068	2.487	3.45	46.592	45.061	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe1070	1.978	2.75	45.054	44.404	AR&R 100 year, 10 minutes storm, average 252 mm/h, Zone 3
Pipe754	1.97	2.74	44.396	44.141	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
P1390	2.926	0.45	44.139	44.141	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
P1097	0.124	1.12	43.158	43.111	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe9	0.322	1.14	42.657	42.63	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
Pipe12	0.409	1.45	42.437	42.168	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
P1231	0.061	1.53	43.14	42.677	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
P1234	1.634	3.7	52.653	52.342	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
P1461	1.812	2.05	44.185	44.141	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
P1471	0.46	2.89	44.291	44.141	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
Pipe27776	6.563	3.65	44.742	44.285	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
Pipe1498	12.799	2.54	44.294	44.19	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
P25691	4.136	1.84	44.268	44.247	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
P25725	1.662	1.32	44.08	44.141	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
P1003	0.007	0.91	48.269	47.884	AR&R 100 year, 10 minutes storm, average 252 mm/h, Zone 3
P992	0.007	0.86	47.836	46.853	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
P36538	5.639	1.12	44.178	44.141	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
P25707	3.684	6.25	45.255	44.784	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
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
OF968	0.501	0.501	1.716	0.192	0.2	5.62	1.08	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF976	1.051	1.051	1.421	0.283	0.31	9.28	1.3	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF983	2.599	2.599	6.478	1.074	0.25	18.59	2.31	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF234	3.727	3.727	3.908	2.672	0.18	31.38	0.07	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF885	1.278	1.278	1.777	0.428	0.28	15.08	0.89	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF896	0.61	0.61	1.258	0.283	0.19	9.27	0.84	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF902	0.916	0.916	1.321	0.309	0.27	10.33	1.13	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF923	0.335	0.335	1.144	0.201	0.13	5.96	0.71	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF929	0.759	0.759	1.018	0.303	0.23	10.08	1.01	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF954	0.692	0.692	1.382	0.228	0.22	7.05	1	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF960	0.607	0.607	1.648	0.283	0.24	9.27	1.24	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF918	0.365	0.365	1.23	0.186	0.19	5.38	1.3	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF914	0.601	0.601	1.478	0.303	0.24	10.09	1.35	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF942	0.234	0.234	1.614	0.213	0.13	6.47	0.95	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF936	0.464	0.464	1.045	0.214	0.18	6.49	0.93	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF965	0.575	0.575	1.684	0.201	0.21	5.96	1.09	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF874	0.795	0.795	1.236	0.491	0.12	17.62	0.27	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF880	0.357	0.357	1.214	0.227	0.14	7.02	0.75	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF2317	0	0	1.542	0	0	0	0	
OF1342	0.173	0.173	0.78	0.104	0.15	3.11	1.64	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1346	0.281	0.281	0.768	0.174	0.21	4.9	2	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1362	0.842	0.842	0.96	0.204	0.36	6.09	2.05	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1370	0.373	0.373	1.072	0.204	0.2	6.09	1.52	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF437	0.865	0.865	1.402	0.242	0.31	7.62	1.52	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF417	0.896	0.896	1.514	0.242	0.26	7.64	1.11	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF2705	0.533	0.533	0.375	0.23	0.19	7.15	0.96	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1171	0.857	0.857	0.717	0.514	0.45	18.56	3.12	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1179	1.394	1.394	1.382	0.515	0.2	18.58	0.44	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1186	1.52	1.52	1.395	0.442	0.26	15.64	0.69	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1192	1.278	1.278	1.339	0.437	0.22	15.44	0.58	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF68582	0.927	0.927	0.916	1.817	0.08	121.02	0.64	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF68563	4.133	4.133	37.03	1.917	0.06	72.78	0.03	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1353	0	0	0.876	0	0	0	0	
OF1589	0.239	0.239	1.401	0.152	0.12	4.02	0.86	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1582	0	0	1.07	0	0	0	0	
OF1577	0.025	0.025	1.07	0.084	0.03	2.43	0.32	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF2293	0.136	0.136	0.444	0.134	0.09	3.51	0.73	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF2298	0	0	0.622	0	0	0	0	
OF2311	0	0	0.887	0	0	0	0	
OF1336	0	0	0.797	0	0	0	0	
OF2306	0	0	1.498	0	0	0	0	
OF1695	0.058	0.058	1.096	0.187	0.03	5.4	0.17	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1688	0.213	0.213	1.214	0.25	0.08	7.95	0.36	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1683	0.332	0.332	1.59	0.251	0.33	2.01	1.32	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1607	0.142	0.142	0.807	0.227	0.19	1.82	0.97	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1615	0.137	0.137	1.535	0.416	0.19	3.33	1.04	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3

OF1616	0.768	0.768	0.842	0.416	0.51	3.33	1.36	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1617	0.699	0.699	1.162	0.371	0.48	2.97	1.33	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1618	0.676	0.676	1.313	0.415	0.48	3.32	1.36	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1619	0.652	0.652	0.719	0.415	0.44	3.32	1.17	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1620	0.513	0.513	0.789	0.373	0.4	2.99	1.23	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1621	0.397	0.397	0.732	0.323	0.34	2.58	1.19	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1677	0.502	0.502	1.545	0.267	0.5	2.14	1.97	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1701	0.518	0.518	1.578	0.25	0.2	7.95	1.09	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1491	0.535	0.535	0.627	0.396	0.37	3.17	1.01	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1490	0.451	0.451	0.518	0.365	0.37	2.92	1.22	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1489	0.346	0.346	1.596	0.255	0.34	2.04	1.35	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1488	0.312	0.312	1.596	0.267	0.32	2.14	1.31	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1487	0.317	0.317	1.31	0.268	0.3	2.14	1.14	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1486	0.275	0.275	1.718	0.255	0.3	2.04	1.34	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1485	0.293	0.293	1.324	0.256	0.29	2.04	1.12	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1484	0.265	0.265	1.541	0.233	0.28	1.87	1.22	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1483	0.261	0.261	1.56	0.273	0.28	2.18	1.23	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1482	0.291	0.291	1.112	0.28	0.27	2.24	0.98	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1476	0.226	0.226	0.795	0.281	0.25	2.25	1.06	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1544	0.162	0.162	0.979	0.234	0.13	7.28	1.24	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1429	0.149	0.149	1.321	0.134	0.09	3.51	0.75	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1563	0.036	0.036	1.401	0.134	0.04	3.51	0.42	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1601	0.359	0.359	0.934	0.208	0.16	6.25	0.9	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1594	0	0	0.335	0	0	0	0	
OF1555	0.145	0.145	1.321	0.133	0.09	3.51	0.74	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1461	0.155	0.155	0.944	0.134	0.12	3.51	1.14	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF2510	0	0	1.571	0	0	0	0	
OF1423	0.048	0.048	1.519	0.134	0.05	3.51	0.6	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1442	0.254	0.254	0.847	0.11	0.18	3.32	1.63	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1450	0	0	0.868	0	0	0	0	
OF1435	0	0	1.68	0	0	0	0	
OF1455	0	0	0.858	0	0	0	0	
OF1390	0.003	0.003	0.774	0.034	0.02	0.66	0.55	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1398	0.366	0.366	0.79	0.118	0.23	3.48	1.99	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1469	0.289	0.289	0.844	0.141	0.2	3.57	1.76	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1417	0.378	0.378	1.038	0.141	0.21	3.57	1.55	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1408	0.006	0.006	0.91	0.141	0.02	3.57	0.66	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1056	0.232	0.232	0.865	0.112	0.16	3.39	1.52	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1062	0.132	0.132	0.854	0.116	0.12	3.48	1.39	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1080	0.005	0.005	0.843	0.108	0.02	3.25	0.57	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1086	0.207	0.207	0.952	0.19	0.15	5.53	1.36	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1772	1.011	1.011	1.055	0.201	0.39	5.99	2.05	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1776	1.176	1.176	1.058	0.212	0.43	6.44	2.11	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1783	1.303	1.303	1.087	0.233	0.44	7.25	2.09	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1784	1.317	1.317	1.306	0.266	0.4	8.59	1.72	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1785	1.251	1.251	1.284	0.353	0.32	12.07	1.21	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1786	1.108	1.108	0.53	0.353	0.33	12.08	1.37	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3

OF1787	0.918	0.918	0.878	0.17	0.41	4.73	2.5	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1788	0.625	0.625	0.837	0.267	0.33	8.61	2.32	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF2139	0.958	0.958	3.009	0.955	0.2	34.83	0.75	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF29346	0.73	0.73	2.939	0.194	0.26	7.68	1.5	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF68488	0.971	0.971	2.995	0.281	0.31	9.58	1.58	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF68493	1.24	1.24	1.467	0.281	0.28	9.58	1.08	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF68498	0.748	0.748	3.009	0.401	0.26	12.68	1.46	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF68327	0.747	0.747	1.112	0.402	0.5	3.21	1.35	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF30334	1.671	1.671	1.15	0.169	0.75	4.7	4.55	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF30206	0.813	0.813	1.186	0.134	0.47	3.51	3.65	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF30391	0.117	0.117	1.341	1.874	0.13	73.15	1.6	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF3140	36.889	36.889	12.846	1.446	1.49	31.57	1.26	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
OF1707	0	0	0.79	0	0	0	0	
OF1749	0	0	0.802	0	0	0	0	
OF1754	0	0	0.975	0	0	0	0	
OF1761	0	0	0.816	0	0	0	0	
OF1767	0.193	0.193	1.261	0.19	0.12	5.53	1.03	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1069	0.33	0.33	0.823	0.147	0.21	3.81	1.86	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1030	0.114	0.114	0.777	0.08	0.12	2.28	1.56	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1043	0	0	0.754	0	0	0	0	
OF1050	0	0	0.762	0	0	0	0	
OF1036	0	0	0.824	0	0	0	0	
OF1018	0	0	0.766	0	0	0	0	
OF1012	0.076	0.076	0.79	0.087	0.1	2.52	1.34	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
OF1005	0.105	0.105	0.935	0.087	0.1	2.53	1.19	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
OF565	0.121	0.121	0.803	0.113	0.12	3.43	1.51	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF559	0.288	0.288	0.795	0.113	0.2	3.43	1.85	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF553	0.204	0.204	0.721	0.114	0.18	3.47	1.99	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF2159	0.329	0.329	1.555	0.184	0.21	5.27	1.87	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF68652	0	0	1.202	0	0	0	0	
OF2205	0.176	0.176	1.673	0.101	0.15	3	1.53	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF2214	0.071	0.071	1.468	0.093	0.08	2.73	1.1	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF2256	0.151	0.151	1.532	0.169	0.13	4.68	1.38	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF2008	0.144	0.144	0.783	0.124	0.13	3.49	1.47	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF2048	0	0	0.787	0	0	0	0	
OF2052	0.019	0.019	0.928	0.233	0.04	7.25	0.8	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
OF2021	0.184	0.184	0.797	0.151	0.16	3.97	1.72	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF2032	0	0	0.816	0	0	0	0	
OF2038	0.015	0.015	1.433	0.353	0.03	12.07	0.5	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1914	0.163	0.163	1.692	0.176	0.23	1.41	1.34	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1907	0.155	0.155	1.631	0.24	0.23	1.92	1.37	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1920	0.168	0.168	0.87	0.24	0.18	1.92	0.8	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1927	0.12	0.12	0.719	0.23	0.17	1.84	0.94	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1933	0.24	0.24	1.91	0.955	0.18	38.74	1.82	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1938	0	0	1.725	0	0	0	0	
OF1947	0	0	1.791	0	0	0	0	
OF1993	0.109	0.109	0.877	0.086	0.11	2.47	1.31	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3

QF2003	0.079	0.079	0.804	0.355	0.09	12.14	1.09	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
QF2057	0.299	0.299	0.91	0.132	0.19	3.51	1.58	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
QF2065	0	0	0.776	0	0	0	0	
QF1628	0.355	0.355	0.764	0.334	0.28	2.67	0.88	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
QF1627	0.294	0.294	0.649	0.319	0.28	2.55	1.07	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
QF1622	0.246	0.246	1.045	0.267	0.23	2.13	0.89	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
QF1024	0.064	0.064	0.78	0.07	0.09	1.9	1.32	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
QF1817	0.147	0.147	0.881	0.228	0.19	1.83	0.97	AR&R 100 year, 10 minutes storm, average 252 mm/h, Zone 3
QF1824	0.064	0.064	1.133	0.166	0.12	1.32	0.83	AR&R 100 year, 10 minutes storm, average 252 mm/h, Zone 3
QF1825	0.011	0.011	0.713	0.098	0.04	0.79	0.58	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
QF1837	0.06	0.06	1.626	0.092	0.06	2.69	0.62	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
QF1872	0.246	0.246	1.666	0.205	0.3	1.64	1.48	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
QF1878	0.218	0.218	1.601	0.191	0.29	1.53	1.5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
QF1879	0.21	0.21	1.619	0.191	0.28	1.53	1.47	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
QF1880	0.206	0.206	1.672	0.192	0.27	1.53	1.43	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
QF1881	0.189	0.189	1.647	0.202	0.26	1.62	1.43	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
QF1882	0.162	0.162	1.513	0.202	0.21	1.62	1.07	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
QF2028	0.348	0.348	1.54	0.353	0.17	12.07	1.13	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
QF1859	0.162	0.162	0.719	0.248	0.2	1.99	0.99	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
QF1858	0.131	0.131	1.401	0.188	0.18	1.5	0.96	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
QF1857	0.118	0.118	1.785	0.183	0.18	1.46	1.14	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
QF1847	0.112	0.112	1.494	0.183	0.16	1.46	0.96	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
QF999	0.042	0.042	0.791	0.065	0.07	1.72	1.18	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
QF991	0.016	0.016	1.968	0.161	0.03	5.92	0.62	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
QF714	0.348	0.348	1.732	0.162	0.16	4.41	1	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
QF721	0.176	0.176	0.93	0.103	0.13	3.08	1.3	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
QF948	0.194	0.194	0.913	0.213	0.15	6.47	1.4	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
QF700	0.048	0.048	1.048	0.077	0.06	2.17	0.87	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
QF708	0.005	0.005	0.976	0.041	0.02	0.89	0.56	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
QF683	0	0	0.88	0	0	0	0	
QF677	0.471	0.471	1.317	0.182	0.22	5.23	1.4	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
QF671	0.83	0.83	1.132	0.233	0.34	7.24	1.85	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
QF665	0.869	0.869	1.716	0.233	0.27	7.24	1.19	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
QF612	0.669	0.669	1.7	0.208	0.23	6.24	1.13	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
QF582	0.581	0.581	1.125	0.162	0.27	4.41	1.69	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
QF2666	1.278	1.278	12.415	2.866	0.05	42.93	0.04	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
QF768	0.168	0.168	1.349	0.216	0.21	1.73	1	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
QF762	0	0	0.801	0	0	0	0	
QF757	0	0	0.595	0	0	0	0	
QF748	0	0	0.603	0	0	0	0	
QF745	0	0	0.627	0	0	0	0	
QF788	0	0	1.728	0	0	0	0	
QF798	0.012	0.012	0.819	0.144	0.03	1.15	0.35	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
QF782	0.354	0.354	1.295	0.149	0.18	3.89	1.28	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
QF2286	0.474	0.474	1.064	0.159	0.24	4.27	1.59	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
QF2279	0.012	0.012	1.134	0.159	0.03	4.27	0.61	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
QF728	0	0	1.51	0	0	0	0	

OF844	0.001	0.001	0.993	0.232	0	1.85	0	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF837	0.008	0.008	0.595	0.28	0.01	2.24	0.04	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF831	0.215	0.215	0.634	0.28	0.22	2.24	0.87	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF825	0.196	0.196	0.918	0.248	0.21	1.99	0.9	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF814	0.181	0.181	1.054	0.239	0.19	1.91	0.83	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF813	0.158	0.158	0.836	0.239	0.17	1.91	0.73	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF806	0.132	0.132	0.764	0.233	0.18	1.86	0.95	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF852	0.198	0.198	1.197	0.182	0.13	5.23	1.09	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF2224	0.128	0.128	1.551	0.134	0.12	4.19	1.28	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF2322	0.012	0.012	1.616	1.874	0	73.15	1.#J	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
OF3176	13.115	13.115	12.838	0.88	0.57	27.04	0.79	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
OF2196	0.331	0.331	1.342	0.132	0.19	4.1	1.51	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF606	0	0	0.799	0	0	0	0	
OF492	0.812	0.812	1.382	0.261	0.24	8.38	1.02	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF512	2.848	2.848	16.35	0.081	0.16	30.15	2.03	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
OF15	5.821	5.821	15.543	0.468	0.28	48.74	1.15	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
OF2229	0.209	0.209	1.499	0.112	0.15	3.39	1.46	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF2240	0.094	0.094	1.836	0.184	0.11	7.59	1.56	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF538	0.518	0.518	1.757	0.184	0.21	5.3	1.14	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF68386	0.262	0.262	0.577	0.441	0.11	18.12	0.68	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1104	0.205	0.205	1.791	0.2	0.26	1.6	1.3	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1113	0.177	0.177	1.746	0.185	0.24	1.48	1.31	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1118	0.166	0.166	1.697	0.188	0.23	1.5	1.3	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1125	0.157	0.157	1.709	0.187	0.21	1.5	1.16	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1129	0.158	0.158	1.432	0.163	0.25	1.3	1.54	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF2444	0	0	1.283	0	0	0	0	
OF187	1.333	1.333	3.908	0.482	0.17	13.86	0.42	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1131	0.075	0.075	1.557	0.16	0.13	1.28	0.9	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF2273	0.062	0.062	1.516	0.437	0.08	15.44	1.12	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1257	0.014	0.014	0.963	0.051	0.03	1.26	0.71	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF485	0.158	0.158	0.762	0.124	0.15	3.49	1.73	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF480	0.212	0.212	1.362	0.125	0.13	3.49	1.03	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF390	0.265	0.265	0.809	0.169	0.19	4.69	1.84	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF396	0.274	0.274	0.78	0.107	0.2	3.23	1.85	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF410	0.15	0.15	1.225	0.179	0.11	5.08	0.99	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF423	0.608	0.608	1.414	0.179	0.25	5.1	1.41	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF404	0.567	0.567	1.259	0.179	0.25	5.08	1.48	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF445	0.355	0.355	0.797	0.143	0.23	3.64	1.95	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF451	0	0	0.805	0	0	0	0	
OF1250	0.006	0.006	0.893	0.143	0.02	3.64	0.67	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1164	0.73	0.73	0.795	0.143	0.38	3.64	2.68	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1198	0.224	0.224	1.472	0.191	0.31	1.53	1.7	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1205	0.208	0.208	1.613	0.191	0.28	1.52	1.47	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1206	0.19	0.19	1.551	0.183	0.27	1.46	1.55	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1207	0.191	0.191	1.629	0.183	0.26	1.46	1.44	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1223	0.181	0.181	1.576	0.184	0.26	1.47	1.49	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1230	0.179	0.179	1.719	0.185	0.24	1.48	1.34	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3

OF1236	0.169	0.169	1.624	0.177	0.24	1.41	1.39	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1237	0.098	0.098	1.639	0.151	0.17	1.21	1.21	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1265	0.106	0.106	1.695	0.171	0.17	1.37	1.05	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
OF1277	0.004	0.004	0.518	0.078	0.02	0.63	0.46	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
OF470	0	0	0.698	0	0	0	0	
OF303	0.134	0.134	0.7	0.103	0.14	3.07	1.8	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF311	0.034	0.034	0.695	0.103	0.07	3.07	1.44	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF356	0.116	0.116	1.782	0.181	0.18	1.45	1.14	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF2437	0.039	0.039	1.355	0.056	0.07	1.42	1.34	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF464	0	0	0.798	0	0	0	0	
OF441	0.176	0.176	0.803	0.116	0.15	3.48	1.65	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF457	0.255	0.255	1.702	0.141	0.13	3.56	0.96	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF381	0.314	0.314	0.762	0.11	0.22	3.33	1.98	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF362	0.313	0.313	1.772	0.153	0.15	4.05	1	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF140	0.189	0.189	0.685	0.278	0.17	2.22	0.82	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF141	0.17	0.17	0.499	0.278	0.18	2.22	0.74	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF142	0.124	0.124	0.509	0.24	0.17	1.92	0.94	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF143	0.094	0.094	1.162	0.209	0.13	1.67	0.73	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF144	0.25	0.25	1.54	0.21	0.32	1.68	1.65	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1285	0.283	0.283	1.102	0.152	0.17	4.02	1.33	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF85	0	0	0.811	0	0	0	0	
OF317	0	0	1.043	0	0	0	0	
OF104	0.005	0.005	1.081	0.043	0.02	0.96	0.51	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
OF99	0	0	0.921	0	0	0	0	
OF75	0.301	0.301	0.993	0.139	0.18	3.52	1.44	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF57	0.451	0.451	1.002	0.139	0.24	3.52	1.74	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF213	1.117	1.117	4.855	1.31	0.08	20.48	0.06	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF81	0.001	0.001	0.849	0.167	0.01	4.62	0.31	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF111	0	0	0.868	0	0	0	0	
OF123	0	0	0.832	0	0	0	0	
OF69	0.774	0.774	0.921	0.185	0.35	5.33	2.07	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF240	0	0	20.262	0	0	0	0	
OF29	0	0	0.928	0	0	0	0	
OF38	0.397	0.397	1	0.211	0.22	6.36	1.58	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF5	1.155	1.155	0.909	0.278	0.4	9.05	1.88	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF9	9.49	9.49	6.556	0.278	0.86	12.22	3.15	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
OF3082	11.295	11.295	22.78	0.641	0.35	57.16	0.7	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
OF44	0.573	0.573	1.478	0.185	0.24	5.32	1.34	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF20	0	0	0.96	0	0	0	0	
OF191	0.248	0.248	3.991	0.482	0.02	13.86	0.13	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF166	5.979	5.979	26.285	0.641	0.2	57.16	0.42	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
OF323	0.434	0.434	1.027	0.326	0.36	2.61	1.21	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF330	0.362	0.362	1.658	0.273	0.36	2.18	1.4	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF331	0.364	0.364	1.412	0.273	0.34	2.18	1.24	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF332	0.341	0.341	1.712	0.335	0.35	2.68	1.41	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF333	0.309	0.309	0.642	0.336	0.3	2.68	1.13	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF132	0.032	0.032	0.968	0.072	0.05	1.99	0.87	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3

OF129	0	0	0.817	0	0	0	0	
OF216	0.077	0.077	6.332	2.526	0.01	30.21	0.58	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF3086	0.627	0.627	17.359	0.641	0.05	57.16	0.5	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1291	0.293	0.293	1.518	0.207	0.36	1.65	1.76	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1297	0.273	0.273	1.616	0.252	0.33	2.01	1.6	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1298	0.26	0.26	1.726	0.252	0.29	2.01	1.33	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1299	0.189	0.189	0	1.241	0.22	9.93	1.03	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1300	0.095	0.095	1.508	0.155	0.18	1.24	1.33	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1301	0.108	0.108	1.774	0.156	0.17	1.25	1.12	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1302	0.097	0.097	1.621	0.145	0.17	1.16	1.24	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1303	0.152	0.152	1.306	0.114	0.1	3.47	0.92	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF430	0.151	0.151	1.451	0.179	0.1	5.08	0.86	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1376	0.123	0.123	0.634	0.237	0.17	1.89	0.94	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1377	0.099	0.099	1.444	0.138	0.18	1.11	1.37	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1716	0.307	0.307	1.618	0.217	0.36	1.74	1.65	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1722	0.257	0.257	1.642	0.207	0.31	1.65	1.52	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1728	0.242	0.242	1.666	0.204	0.3	1.63	1.49	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1729	0.235	0.235	1.62	0.225	0.3	1.8	1.52	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1730	0.262	0.262	1.722	0.225	0.31	1.8	1.45	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1074	0.612	0.612	0.917	0.19	0.31	5.53	2.1	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF2014	0.296	0.296	1.022	0.212	0.18	6.44	1.43	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF2109	0.447	0.447	1.56	0.304	0.45	2.43	1.85	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF2431	0.726	0.726	1.645	0.332	0.6	2.65	1.96	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF2419	0.681	0.681	1.541	0.349	0.51	2.79	1.55	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF2410	0.614	0.614	1.207	0.363	0.44	2.9	1.26	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF68305	0.485	0.485	0.745	0.401	0.33	3.21	0.92	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF576	15.574	15.574	24.504	0.641	0.43	57.16	0.66	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
OF3042	2.241	2.241	12.972	1.946	0.08	35.57	0.04	AR&R 100 year, 10 minutes storm, average 252 mm/h, Zone 3
OF3022	1.833	1.833	12.972	0.989	0.08	27.91	0.09	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
OF210	0.748	0.748	3.991	2.546	0.04	30.37	0.02	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
OF249	2.497	2.497	4.407	0.211	0.23	11.69	1.29	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF3094	1.475	1.475	15.706	0.641	0.05	57.16	0.12	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
OF235	3.126	3.126	3.464	2.309	0.17	28.47	0.08	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF257	0.204	0.204	22.512	0.42	0	122.52	1.89	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF51804	0	0	1.138	0	0	0	0	
OF518	0.036	0.036	1.102	1.1	0.04	42.07	0.44	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
OF2995	1.922	1.922	1.395	0.31	0.61	10.35	2.68	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
OF858	0.249	0.249	0.934	0.187	0.12	5.41	0.73	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF866	0.553	0.553	1.137	0.492	0.26	17.64	1.61	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF869	0.069	0.069	1.14	0.187	0.07	5.41	0.83	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF774	0.169	0.169	1.168	0.145	0.09	3.74	0.81	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1403	0.646	0.646	0.83	0.211	0.34	6.36	2.41	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF2517	5.457	5.457	2.072	1.639	0.63	10.1	0.52	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF2520	7.854	7.854	3.703	0.743	0.46	111.32	1.26	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF2530	5.019	5.019	8.572	1.209	0.08	175.76	0.11	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF2609	0.094	0.094	0.899	0.181	0.08	5.19	0.84	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF2560	4.085	4.085	1.619	1.209	0.96	10.1	3.38	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3

OF2557	0.566	0.566	1.653	0.167	0.32	5.26	2.12	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF2618	0.557	0.557	1.915	0.179	0.27	5.95	1.62	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF2565	15.217	15.217	22.574	2.791	0.43	125.26	0.7	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
OF2574	9.887	9.887	0.359	0.278	0.58	28.66	2.56	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
OF2582	14.488	14.488	22.314	0.609	0.43	55.79	0.77	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF2815	1.46	1.46	36.933	1.417	0.02	69.45	0.21	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
OF2859	1.087	1.087	6.403	2.526	0.08	30.21	0.09	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF245	0	0	12.248	0	0	0	0	
OF3047	0	0	12.326	0	0	0	0	
OF32652	18.413	18.413	12.321	1.885	0.85	35.08	2.05	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
OF3147	30.772	30.772	12.688	2.186	1.12	37.49	0.59	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF3142	94.247	94.247	13.26	1.947	3.43	35.58	1.83	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
OF3163	0.089	0.089	12.531	1.082	0	28.66	0.02	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF30286	12.425	12.425	12.664	3.295	0.44	46.36	0.21	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF3181	74.803	74.803	13.373	1.969	2.72	35.75	1.45	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
OF633	0	0	0.859	0	0	0	0	
OF30205	6.698	6.698	4.926	2.186	0.39	35.5	0.41	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
OF30268	1.732	1.732	12.972	3.147	0.05	45.17	0.02	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
OF30281	0.094	0.094	0.206	1.1	0	77.99	0	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
OF153	0.084	0.084	2.878	0.267	0.07	9.56	0.81	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
OF2094	0	0	1.685	0	0	0	0	
OF42414	1.091	1.091	0.206	1.1	0.03	77.99	0.03	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
OF30181	0	0	0.797	0	0	0	0	
OF30187	3.698	3.698	4.826	0.636	0.48	20.77	1.25	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
OFS1797	3.359	3.359	4.215	1.25	0.5	35.5	2.02	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3

DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level
BIO2B	43.8	480.3	1.278	0	1.278
BSN4	44.42	4211.9	4.074	0	4.074
BSN5	54.13	631.4	0.748	0	0.748
BSN1	41.07	668.1	3.126	0	3.126
BIO2A	44.48	752.3	1.46	0	1.46
BIO5	54.21	367	1.087	0	1.087
BSN3	44.95	1777	24.976	6.563	18.413
BIO3B	45.85	602.3	94.247	0	94.247
BIO3A	45.29	483.4	74.803	0	74.803
Basin873	43.87	3668.6	1.732	0	1.732

CONTINUITY CHECK for AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3

Node	Inflow (cu.m)	Outflow (cu.m)	Storage Ch (cu.m)	Difference %
Pit317	352.9	279.03	0	20.9
Pit302	1626.47	1621.13	0	0.3
Pit314	3888.25	3886.99	0	0

N1053	3887	3892.48	0	-0.1
Pit311	1490.65	1338.51	0	10.2
Pit312	1163.86	1268.83	0	-9
Pit313	1991.23	1993.01	0	-0.1
Pit309	221.51	209.71	0	5.3
Pit308	1056.99	1104.04	0	-4.5
Pit299	1254.33	1253.88	0	0
Pit300	1282.97	1283.51	0	0
Pit307	371.25	343.89	0	7.4
Pit306	908.7	909.01	0	0
Pit303	221.29	187.36	0	15.3
Pit305	518.29	516.9	0	0.3
Pit301	462.68	382	0	17.4
Pit295	929.84	874.27	0	6
Pit296	765.97	790.68	0	-3.2
Pit293	0	0	0	0
Pit290	1747.56	1801.11	0	-3.1
Pit291	2855.33	2855.95	0	0
Pit1035	2968.24	2968.24	0	0
Pit185	3002.77	3003.89	0	0
Pit1032	3358.32	3358.43	0	0
Pit49	4209.81	4300.78	0	-2.2
Pit1309	4300.78	4319.26	0	-0.4
Pit48	4921.94	4900.03	0	0.4
Pit72	4900.04	4893.38	0	0.1
Pit73	5515.16	5496.67	0	0.3
Pit74	5724.01	5694.79	0	0.5
Pit64	5773.73	5719.8	0	0.9
N66678	5719.82	4268.22	0	25.4
Pit292	0	0	0	0
Pit285	205.2	196.73	0	4.1
Pit253	323.97	323.94	0	0
Pit251	1391.86	1391.61	0	0
Pit283	1579.36	1646.12	0	-4.2
Pit286	1568.61	1569.38	0	0
Pit288	1569.38	1568.97	0	0
Pit289	1568.97	1568.01	0	0.1
Pit284	0	0	0	0
Pit279	0	-0.39	0	0
Pit280	207.39	207.3	0	0
Pit281	1054.87	1054.2	0	0.1
Pit268	120	121.11	0	-0.9
Pit269	121.11	121.19	0	-0.1
Pit270	466.04	604.14	0	-29.6
Pit271	604.14	603.71	0	0.1
Pit272	603.7	595.56	0	1.3
Pit273	595.55	590.83	0	0.8

Pit274	590.82	590.86	0	0
Pit275	590.87	591.05	0	0
Pit276	848.18	848.52	0	0
Pit278	847.17	847.56	0	0
Pit260	404.59	385.73	0	4.7
Pit259	385.73	386.72	0	-0.3
Pit258	386.71	386.61	0	0
Pit257	386.61	386.83	0	-0.1
Pit256	386.82	387.02	0	-0.1
Pit261	387.02	387.12	0	0
Pit262	387.11	387.31	0	0
Pit263	387.31	387.4	0	0
Pit264	387.4	387.42	0	0
Pit265	387.43	387.48	0	0
Pit266	387.48	387.46	0	0
Pit267	387.46	388.34	0	-0.2
Pit249	937.14	972.23	0	-3.7
Pit250	1001.01	999.86	0	0.1
Pit255	431.01	431.81	0	-0.2
Pit254	226.62	226.56	0	0
Pit252	99.32	77.34	0	22.1
Pit247	151.12	138.26	0	8.5
Pit246	221.39	221.15	0	0.1
Pit248	424	424.26	0	-0.1
Pit245	311.01	311.19	0	-0.1
Pit244	160.08	159.9	0	0.1
Pit242	0	0	0	0
Pit243	0	0	0	0
Pit241	0	0.03	0	0
Pit240	376.14	376.07	0	0
Pit239	373.98	370.8	0	0.9
Pit237	326.48	326.48	0	0
Pit238	0.96	0.88	0	8
Pit233	260.92	261.05	0	-0.1
Pit232	261.05	261.17	0	0
Pit220	310.17	310.03	0	0
Pit1043	625.56	676.93	0	-8.2
Pit221	1158.75	1158.76	0	0
Pit223	1277.55	1324.02	0	-3.6
Pit222	1476.33	1475.91	0	0
Pit217	1637.1	1636.9	0	0
Pit218	1745.7	1792.28	0	-2.7
Pit209	2211.55	2211.35	0	0
Pit210	2364.38	2362.46	0	0.1
Pit211	2362.46	2366.21	0	-0.2
Pit212	2366.21	2360.14	0	0.3
Pit216	2724.68	2687.42	0	1.4

Pit57587	2687.42	2685.62	0	0.1
Pit57586	2685.62	2687.76	0	-0.1
Pit57588	2687.76	2682.41	0	0.2
Pit111	3258.09	3258.79	0	0
Pit151	4312.24	4312.04	0	0
Pit24717	3444.11	3448.16	0	-0.1
Pit125	3426.89	3515.77	0	-2.6
N1622	3819.46	6042.51	0	-58.2
Pit225	0	0	0	0
Pit226	0	0	0	0
Pit227	0	0	0	0
Pit228	0	0	0	0
Pit224	181.65	182.16	0	-0.3
Pit219	283.92	264.79	0	6.7
Pit196	161.84	162.01	0	-0.1
Pit229	102	101.85	0	0.1
Pit230	101.85	101.89	0	0
Pit234	101.89	101.95	0	-0.1
Pit177	129.65	129.55	0	0.1
Pit178	262.62	261.87	0	0.3
Pit169	262.7	262.67	0	0
Pit171	405.25	404.98	0	0.1
Pit168	519.74	552.32	0	-6.3
Pit167	553.9	553.96	0	0
Pit123	553.96	554.18	0	0
Pit57623	418.85	419.88	0	-0.2
Pit118	877.76	876.93	0	0.1
Pit119	876.93	876.21	0	0.1
Pit121	1052.91	1053.46	0	-0.1
Pit194	155.78	148.43	0	4.7
Pit193	72.12	71.91	0	0.3
Pit1057	161.81	161.19	0	0.4
Pit192	209.73	210.22	0	-0.2
Pit191	115.11	114.89	0	0.2
Pit1070	252.97	251.85	0	0.4
Pit189	154.13	154.42	0	-0.2
Pit188	154.41	154.6	0	-0.1
Pit190	154.59	154.66	0	0
Pit198	154.66	154.77	0	-0.1
Pit199	256.6	256.94	0	-0.1
Pit200	131.06	130.92	0	0.1
Pit201	130.92	130.87	0	0
Pit202	236.56	236.62	0	0
Pit203	236.62	238.66	0	-0.9
Pit187	309.36	310.17	0	-0.3
Pit186	148.44	148.12	0	0.2
Pit184	290.09	256.51	0	11.6

Pit183	256.51	257.33	0	-0.3
Pit277	257.33	257.15	0	0.1
Pit182	60.01	52.93	0	11.8
Pit179	157.98	131.71	0	16.6
Pit180	131.71	131.99	0	-0.2
Pit181	131.99	131.83	0	0.1
Pit1052	131.83	133.07	0	-0.9
Pit176	208.63	209.08	0	-0.2
Pit1063	209.07	209.13	0	0
Pit1065	209.13	209.4	0	-0.1
Pit1066	209.39	208.14	0	0.6
Pit1067	208.13	208.55	0	-0.2
Pit1068	208.55	208.56	0	0
Pit1069	303.67	305.47	0	-0.6
Pit175	148.07	142.39	0	3.8
Pit174	142.39	142.26	0	0.1
Pit173	142.26	142.3	0	0
Pit172	142.29	142.59	0	-0.2
Pit170	25.23	13.08	0	48.1
Pit166	12.25	7.07	0	42.3
Pit165	333.03	331.11	0	0.6
Pit164	331.11	330.61	0	0.2
Pit304	330.61	330.93	0	-0.1
Pit162	55.6	55.41	0	0.3
Pit163	55.41	55.43	0	0
Pit161	55.43	55.47	0	-0.1
Pit148	523.52	524.66	0	-0.2
Pit135	904.94	894.92	0	1.1
Pit132	956.02	958.2	0	-0.2
Pit102	1019.86	1018.47	0	0.1
Pit98	1206.18	1200.81	0	0.4
BIO28	1200.81	244.22	3580.11	-218.5
Pit158	144.11	125.2	0	13.1
Pit157	19.68	19.69	0	0
Pit156	48.97	49	0	0
Pit155	56.6	56.76	0	-0.3
Pit154	56.76	56.77	0	0
Pit153	56.77	56.79	0	0
Pit152	56.79	56.87	0	-0.1
Pit145	327.18	312.06	0	4.6
Pit146	468.39	468.2	0	0
Pit147	218.06	217.92	0	0.1
Pit144	0	0.01	0	0
Pit143	0.01	0.02	0	-91.8
Pit142	0.02	0.12	0	-440.4
Pit141	178.47	178.82	0	-0.2
Pit140	178.82	178.87	0	0

Pit139	178.87	178.96	0	0
Pit138	178.96	179.11	0	-0.1
Pit137	179.11	179.41	0	-0.2
Pit136	221.24	221.19	0	0
Pit122	187.71	187.67	0	0
Pit103	113.48	113.61	0	-0.1
N1629	113.61	139.61	0	-22.9
Pit117	309.8	309.78	0	0
Pit101	0	0	0	0
Pit99	825.15	799.82	0	3.1
Pit760	18631.86	18396.2	0	1.3
N805	18396.23	18355.74	0	0.2
Pit87	270.83	270.49	0	0.1
Pit86	270.49	271.2	0	-0.3
Pit85	406.53	408.42	0	-0.5
Pit84	619.72	621.78	0	-0.3
Pit82	171.19	171.69	0	-0.3
Pit81	171.68	171.71	0	0
Pit80	171.7	171.82	0	-0.1
Pit79	171.82	169.94	0	1.1
Pit78	169.94	170.09	0	-0.1
Pit75	1444.45	1395.09	0	3.4
Pit63	1397.7	1397.99	0	0
N998	1397.99	1392.7	0	0.4
Pit77	76.04	75.84	0	0.3
Pit57610	75.84	78.97	0	-4.1
Pit59	10.11	5.57	0	44.9
Pit58	1150.19	1150.75	0	0
Pit57	1350.63	1350.41	0	0
Pit53	145.57	121.81	0	16.3
Pit54	254.84	255.18	0	-0.1
Pit50	333.46	333.66	0	-0.1
Pit51	843.18	843.29	0	0
Pit52	399.82	374.94	0	6.2
Pit45	358.6	358.58	0	0
Pit44	172.33	172.12	0	0.1
Pit46	172.12	172.16	0	0
Pit47	602.94	602.72	0	0
Pit38	199.82	199.86	0	0
Pit39	199.85	199.93	0	0
Pit40	199.93	200.04	0	-0.1
Pit41	200.04	200.1	0	0
Pit42	200.1	200.07	0	0
Pit43	200.07	200.07	0	0
Pit56	200.06	200.1	0	0
Pit55	200.09	199.88	0	0.1
Pit36	128.81	95.11	0	26.2

Pit37	95.11	94.52	0	0.6
Pit998	930.71	929.82	0	0.1
Pit35	132	119.25	0	9.7
Pit34	50.08	50.17	0	-0.2
Pit30	383.89	384.39	0	-0.1
Pit29	384.39	384.18	0	0.1
Pit28	834.97	836.18	0	-0.1
Pit27	143.52	137.22	0	4.4
Pit26	604.34	604.41	0	0
Pit25	145.79	144.74	0	0.7
Pit24	330.48	330.78	0	-0.1
Pit20	163.49	141.65	0	13.4
Pit19	141.64	142.07	0	-0.3
Pit18	142.07	142.46	0	-0.3
Pit17	142.46	142.28	0	0.1
Pit16	331.09	331.2	0	0
Pit23	331.2	331.31	0	0
Pit15	2.7	2.72	0	-0.7
Pit14	2.72	2.69	0	0.9
Pit12	14.48	14.43	0	0.3
Pit9	14.45	14.63	0	-1.3
Pit6	561.9	561.65	0	0
Pit235	1014.49	1012.47	0	0.2
N664	1012.47	1012.25	0	0
Pit13	13.76	12.28	0	10.8
Pit11	2.73	2.74	0	-0.3
Pit10	2.74	2.75	0	-0.4
Pit8	668.37	646.86	0	3.2
Pit1	0	0	0	0
N2	0	0	0	0
HW-BSN5	527.53	519.94	0	1.4
Pit5	803.76	802.91	0	0.1
Pit4	1425.43	1417.24	0	0.6
Pit3	18572.56	18535.46	0	0.2
N659	18535.49	16318.39	0	12
Pit635	463.72	428.12	0	7.7
HW-BSN3	434.99	432.8	0	0.5
N807	155.78	156.2	0	-0.3
N1049	20189.84	18633.98	0	7.7
Pit21	384.22	344.34	0	10.4
Pit22	344.33	345.21	0	-0.3
Pit33	345.21	345.01	0	0.1
Pit32	345.01	344.77	0	0.1
Pit31	344.77	344.86	0	0
Pit996	56.15	57.02	0	-1.6
Pit994	57.02	56.96	0	0.1
N1064	56.96	57.63	0	-1.2

N1071	486.56	481.14	0	1.1
Pit1000	251.01	251.59	0	-0.2
Pit1001	251.59	251.74	0	-0.1
Pit1009	251.73	248.59	0	1.2
Pit1010	248.59	213.64	0	14.1
Pit1011	213.63	213.78	0	-0.1
Pit1012	213.77	213.92	0	-0.1
Pit1013	213.91	213.81	0	0
Pit1014	213.81	214.37	0	-0.3
Pit1022	214.37	212.87	0	0.7
Pit1028	148.63	126.67	0	14.8
Pit1024	235.66	234.84	0	0.3
Pit1037	307.16	308.71	0	-0.5
Pit1038	308.71	308.94	0	-0.1
Pit1039	308.94	309.53	0	-0.2
Pit1040	309.53	309.49	0	0
Pit1041	309.49	309.36	0	0
Pit1042	479.58	480	0	-0.1
Pit1055	264.58	242.2	0	8.5
Pit1083	315.42	315.34	0	0
Pit114	574.05	573.96	0	0
Pit108	573.95	574.77	0	-0.1
Pit109	574.76	574.98	0	0
Pit110	574.97	575.73	0	-0.1
OUT	38448.18	30152.58	0	21.6
BSN4	5648.94	4360.58	1493.02	-3.6
BSN5	939.14	527.53	503.99	-9.8
HW6	3858.88	3837.03	0	0.6
N1014	3837.03	2021.89	0	47.3
BSN1	3892.48	3858.88	4.27	0.8
HW9	10285.91	10248.22	0	0.4
Pit35783	10319.17	10369.15	0	-0.5
Pit1b	5667.38	5665.17	0	0
Pit1094	5665.17	5534.15	0	2.3
Pit1090	4629.7	5427.75	0	-17.2
Pit1315	14202.53	13710.46	0	3.5
Pit1098	248.26	219.86	0	11.4
Pit297	652.53	652.35	0	0
Pit298	432.31	462.59	0	-7
END	30152.58	30152.58	0	0
N1231	97.92	97.46	0	0.5
N1270	319.13	319.21	0	0
N1446	10307.39	10285.91	0	0.2
N1449	6786.64	6790.15	0	-0.1
N1451	6790.15	6801.2	0	-0.2
Pit1305	111.19	107.06	0	3.7
N1456	3507.95	3506.19	0	0

N1458	491.19	491.06	0	0!
N1459	491.06	489.43	0	0.3
N1461	23924.38	23151.13	0	3.2
HW20	23151.13	17155.31	0	25.9
N1465	15286.99	15121.46	0	1.1
BIO2A	1699.18	1423.15	237.47	2.3
BIO5	1012.25	975.1	74.15	-3.7
HWBSN4a	2169.82	2145.07	0	1.1
HWBSN4b	2190.77	1976.53	0	9.8
BSN3	8308.22	8356.04	43.55	-1.1
N30841	8356.05	8268.07	0	1.1!
BIO3B	6042.51	7936.76	3.69	-31.4
HWBSN3	15050.52	14388.78	0	4.4
N28574	15520.05	14870.92	0	4.2
BIO3A	139.61	325.97	-190.75	3.1
HW10	6581.33	6581.27	0	0
N28560	6770.97	6782.44	0	-0.2
Basin873	143.84	-4104.68	6370.92	-1475.5
HW13	-4104.68	-4624.16	0	0
Pit25375	454.48	38.17	0	91.6
Pit1080	38.17	36.06	0	5.5
HW126	14870.92	13399.13	0	9.9
HW45	5640.1	5640.05	0	0
N28567	5640.05	5639.22	0	0
N50029	4701.76	4700.12	0	0

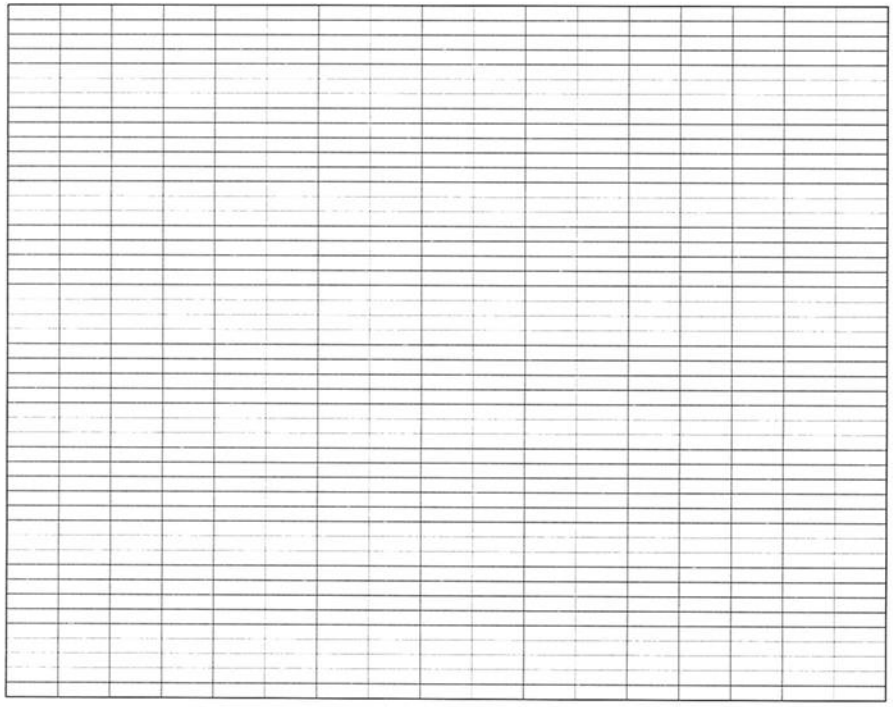
Run Log for 5874 AREA1 run at 13:34:25 on 18/3/2011

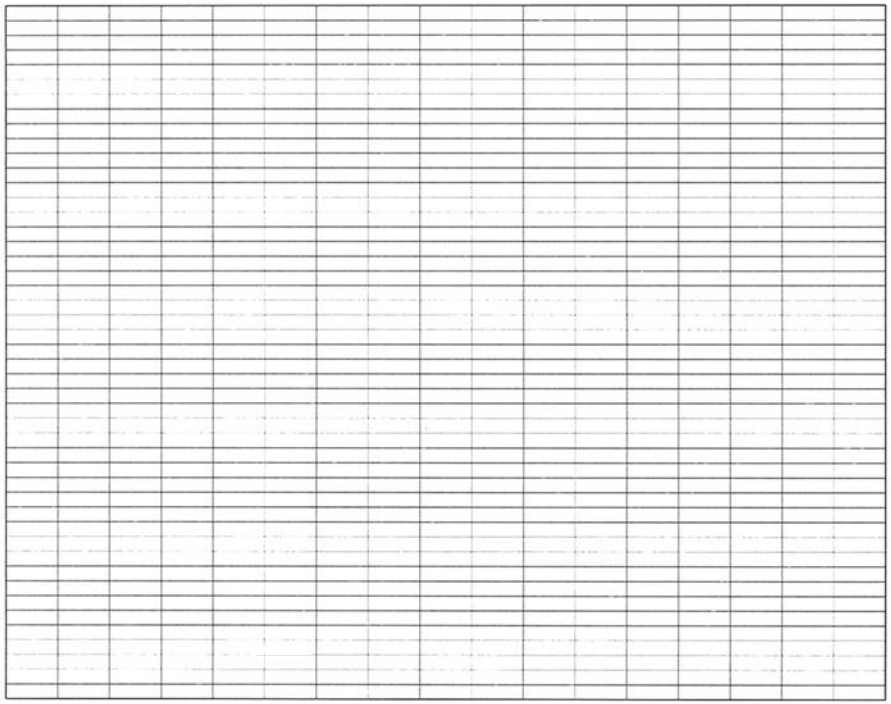
Upwelling occurred at more than 20 pits.
Freeboard was inadequate at more than 20 pits.

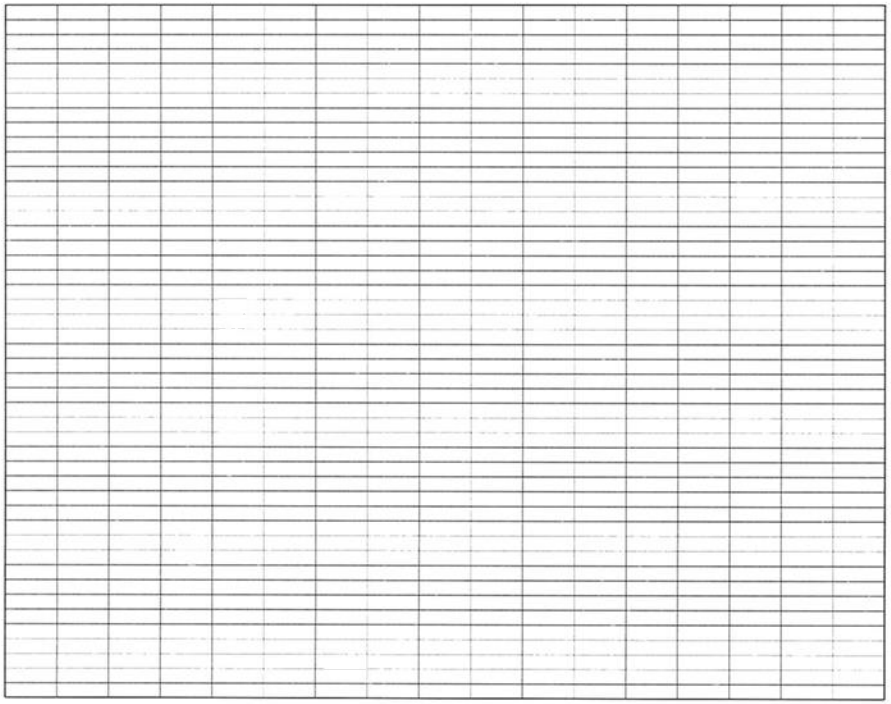
To see more detailed results select the Edit/Copy Results to Spreadsheet menu item, and paste them into a spreadsheet.
The maximum flow exceeded the safe value in the following overflow routes: OF68582, OF3176, OF42414, OF32652, OF30334, OF30205, OF3181, OF3147, OF3142, OF3140, OF2995, OF2705, OF2574, OF2560, OF2520, OF2517, OF1786, (

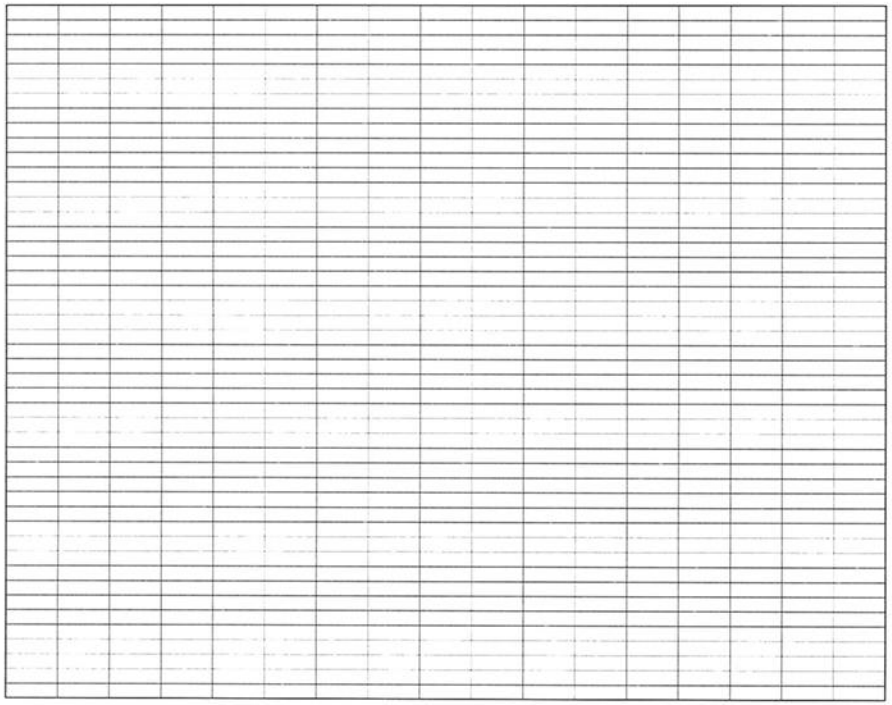
The following detention basins have little effect (less than 2%) in reducing peak discharge: Basin873, BIO3A, BIO3B You might consider upsizing these, or removing them from the model.

Numerical damping was applied to: P60150, P37246, P36538, Pipe27776, P25725, P25711, P25707, P25691, Pipe1498, P1471, P1461, P1390, P818, P766, Pipe755, P744, Pipe736, Pipe58, Pipe43, Pipe40, Pipe307, Pipe323, Pipe130, Pipe1









Results of a simplified bottom up HGL analysis.
This provides a simple analysis that can be checked manually. It is useful where Council insists on a manual check on HGLs.
The HGLs shown here may be different to the more accurate values normally calculated by Drains because it is assumed here that the maximum flows and HGLs throughout the system occur at the same time. In fact, in different parts of the system, they may occur during different storms, or even at different times within the one storm. Also, pipes are assumed to be flowing full (even when the more accurate analysis in DRAINS shows they are not).

SUB-CATCHMENT DETAILS

Name	Max Flow Q (cu.m/s)	Impervious Max Q (cu.m/s)	Pervious Max Q (cu.m/s)	Impervious Tc (min)	Pervious Tc (min)	Due to Storm
EC4	1.21	0.826	0.383	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C1I	0.286	0.195	0.091	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C1F	0.262	0.179	0.083	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C1H	0.214	0.147	0.068	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C1B	0.53	0.492	0.038	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C1D	0.232	0.158	0.073	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C1A	0.316	0.216	0.1	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C1J	0.383	0.261	0.121	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
EC3	0.881	0.602	0.279	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C1G	0.137	0.093	0.043	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C5D	0.333	0.228	0.106	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C3E	0.16	0.109	0.051	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C3C	0.22	0.15	0.07	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C3F	0.486	0.332	0.154	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C3H	0.324	0.222	0.103	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C5F	0.378	0.258	0.12	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C5C	0.295	0.201	0.093	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C6D	0.171	0.117	0.054	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C6C	0.687	0.47	0.218	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C9E	0.577	0.394	0.183	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C6E2	0.231	0.158	0.073	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C6A	0.615	0.42	0.195	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C9D	0.444	0.303	0.141	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C9C	0.538	0.368	0.171	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C9A	0.372	0.254	0.118	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C8E	0.266	0.181	0.084	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C8B	0.233	0.159	0.074	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C7B	0.221	0.151	0.07	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C7C	0.218	0.149	0.069	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C10H	0.24	0.164	0.076	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C10I	0.527	0.037	0.49	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C8A	0.259	0.177	0.082	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C8D	0.34	0.232	0.108	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C9B	0.231	0.158	0.073	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
C7J	0.21	0.143	0.066	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3

C10G	0.252	0.172	0.08	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
C7H	0.222	0.152	0.07	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
C7E	0.299	0.204	0.095	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
C7G	0.22	0.15	0.07	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
C7F	0.145	0.099	0.046	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
C10A	0.151	0.103	0.048	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
C10E	0.442	0.302	0.14	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
C6B	0.414	0.283	0.131	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
C8F	0.225	0.154	0.071	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
C7D	0.298	0.203	0.094	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
C7I	0.211	0.144	0.067	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
C2B	0.475	0.325	0.151	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
C2A	0.079	0.054	0.025	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
C2F	0.227	0.155	0.072	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
C2H	0.087	0.06	0.028	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
C3M	0.088	0.06	0.028	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
C3L	0.268	0.183	0.085	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
C2D	0.247	0.169	0.078	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
C2E	0.247	0.169	0.078	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
C2C	0.223	0.152	0.071	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
C2G	0.255	0.174	0.081	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
C2I	0.06	0.041	0.019	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
C3B	0.268	0.183	0.085	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
C10D	0.211	0.144	0.067	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
EC6	1.178	0.804	0.373	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
C3A	0.387	0.264	0.123	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
C3G	0.244	0.167	0.077	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
C4E	0.31	0.212	0.098	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
C4B	0.361	0.246	0.114	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
C4A	0.4	0.273	0.127	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
C4C	0.404	0.276	0.128	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
C4D	0.285	0.195	0.09	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
C4F	0.184	0.126	0.058	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
EC13N	0.188	0.129	0.06	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
C4G	0.511	0.349	0.162	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
C11C	0.233	0.159	0.074	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
C5G	0.269	0.184	0.085	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
EC14N	0.004	0.003	0.001	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
C11B	0.52	0.355	0.165	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
C11A	0.44	0.301	0.14	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
EC12N	0.02	0.013	0.006	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
EC4N	0.953	0.651	0.302	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
EC8	0.433	0.06	0.373	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
C3D	0.621	0.044	0.577	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
C3I	0.222	0.152	0.07	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							
EC5(EC14E	2.14	0	2.14	5	10	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3							
C11D	0.548	0.375	0.174	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3							

C6E1	0.08	0.055	0.025	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3											
EC7	0.58	0.396	0.184	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3											
C5E	0.358	0.245	0.114	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3											
C5A	0.212	0.145	0.067	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3											
C5B	0.156	0.106	0.049	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3											
C8C	0.438	0.299	0.139	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3											
C7A	0.269	0.184	0.085	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3											
C10B	0.45	0.308	0.143	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3											
C10F	0.369	0.252	0.117	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3											
EC13E	1.158	0	1.158	5	10	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3											
C3J	0.274	0.187	0.087	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3											
EC1	0.354	0.242	0.112	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3											
EC2	0.618	0.422	0.196	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3											
C1E	0.176	0.12	0.056	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3											
EX1	7.918	0	7.918	5	10	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3											
C1C	0.159	0.108	0.05	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3											
EX2	4.093	0	4.093	5	10	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3											
EC5W	0.567	0.046	0.533	5	10	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3											
EC4W	10.249	0.168	10.123	5	10	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3											
CAT3(+17)	15.287	0	15.287	5	15	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3											
C3K	0.214	0.147	0.068	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3											
C10C	1.342	1.245	0.096	5	5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3											
PIPE DETAILS												PIT & NODE DETAILS					
Pipe	Flow	Length	U/S IL	D/S IL	Slope	Int. Dia	Rough	Nom.Capac	V	D/S HGL	Friction	U/S HGL	Node	Headloss	Shock Loss	HGL	Free-	Overflow
	(cu.m/s)	(m)	(m)	(m)	(%)	(mm)	(mm)	(cu.m/s)	(m/sec)	(m)	Loss (m)	(m)		Coeff (Ku)	(m)	(m)	board	(cu.m/s)
													N50029			46.115		
													N28567			44.784		
													HW45			45.357		
													N805			40.791		
Pipe755	2.979	18.16	40.6	40.55	0.28	600	0.013	0.644	14	41.15	0.05	41.2	Pit760	1	1.416	42.616	-0.61	2.848
P1390	2.926	11.2	40.72	40.6	1.07	0	0.012	26.501	0.5	42.616	0.002	42.618	Pit1315	1.8	0.027	42.645	1.36	1.922
													HW126			42.711		
Pipe754	1.97	74.9	41.1	40.72	0.51	0	0.012	1.599	2.7	42.645	0.691	43.336	Pit1090	1.8	0.823	44.159	0.04	0.036
Pipe1070	1.978	89	41.5	41.2	0.34	0	0.012	1.303	2.7	44.159	0.827	44.986	Pit1094	0.7	0.323	45.309	-1.37	
Pipe1068	2.487	195	43.9	41.5	1.23	0	0.012	2.49	3.5	45.309	2.865	48.173	Pit1b	1.5	1.093	49.266	-2.77	
P37225	2.82	25.1	44.1	43.9	0.8	0	0.012	2.004	3.9	49.266	0.474	49.74	Pit35783	1.5	1.405	51.146	-3.64	0
P992	0.007	59.5	47.047	46.75	0.5	100	0.013	0.004	0.9	51.146	1.007	52.153	Pit1080	1.2	0.045	52.198	-4.4	0
P1003	0.007	22.5	47.477	47.077	1.78	100	0.013	0.007	0.9	52.198	0.432	52.63	Pit25375	1.2	0.051	52.681	-4.48	0.084
													HW13			42.737		
													Basin873			43.866		
													N28560			44.247		
													HW10			44.215		
													BIO3A			45.287		
													N28574			44.19		

												HWBSN3			44.467		
												BIO3B			45.851		
												N30841			44.285		
												BSN3			44.416		
												HWBSN4b			43.226		
												HWBSN4a			43.578		
												BIO5			54.211		
												BIO2A			44.482		
												N1465			65.558		
												N659			49.576		
Pipe734	2.008	14.5	50.02	49.59	2.97	750	0.013	1.917	4.5	50.34	0.43	50.77	Pit3	1.4	1.476	52.246	-0.25	9.49
													HW20			52.968		
													N1461			53.609		
													N1459			54.167		
													N1458			55.651		
													N1456			57.284		
													N1053			41.074		
P818	2.309	11.3	38.851	38.5	3.11	900	0.013	3.192	3.6	41.074	0.184	41.258	Pit314	1.9	1.277	42.535	-1.13	2.599
Pipe16	0.959	25.059	39.992	39.867	0.5	750	0.013	0.787	2.2	42.535	0.186	42.721	Pit302	0.6	0.144	42.865	-1.36	1.051
Pipe17	0.89	57.89	40.312	40.022	0.5	750	0.013	0.787	2	42.865	0.37	43.235	Pit300	0.4	0.083	43.318	-1.42	0.607
Pipe18	0.824	27.072	40.477	40.342	0.5	750	0.013	0.787	1.9	43.318	0.148	43.467	Pit299	0.3	0.053	43.52	-1.52	0.692
Pipe19	0.688	52.396	40.769	40.507	0.5	675	0.013	0.594	1.9	43.52	0.351	43.871	Pit308	0.8	0.151	44.021	-1.92	0.759
Pipe20	0.511	67.907	41.364	40.855	0.75	600	0.013	0.532	1.8	44.021	0.47	44.492	Pit306	1.3	0.217	44.708	-2.01	0.601
P1231	0.061	19.026	42.344	41.844	2.63	225	0.013	0.073	1.5	44.708	0.351	45.059	Pit1305	1.3	0.156	45.215	-2.01	0.094
													N1451			47.711		
													N1449			50.713		
													N1446			47.709		
													N1270			56.141		
													N1231			46.345		
Pipe15	1.278	62.63	39.855	39.532	0.52	900	0.013	1.301	2	42.535	0.312	42.847	Pit313	2	0.412	43.259	-1.66	0.916
Pipe14	0.986	25.712	40.128	39.999	0.5	900	0.013	1.28	1.5	43.259	0.076	43.335	Pit312	0.8	0.098	43.433	-1.73	0.61
Pipe13	0.588	72.59	40.569	40.206	0.5	675	0.013	0.594	1.6	43.433	0.355	43.789	Pit296	1.3	0.179	43.968	-2.07	0.357
Pipe12	0.409	64.962	41.625	40.655	1.49	600	0.013	0.75	1.4	43.968	0.288	44.256	Pit298	1.8	0.192	44.448	-1.55	0.069
Pipe9	0.322	11.318	41.735	41.655	0.71	600	0.013	0.517	1.1	44.448	0.031	44.479	Pit297	7.2	0.476	44.955	-1.95	0.553
P1097	0.124	64.962	42.09	41.765	0.5	375	0.013	0.124	1.1	44.955	0.326	45.281	Pit1098	4.9	0.316	45.597	-2.5	0.249
													HW9			51.609		
													BSN1			41.072		
													N1014			38.639		
													HW6			39.133		
													BSN5			54.126		
													BSN4			44.417		
													OUT			37.641		
													N1622			46.046		
Pipe40	4.891	12.035	44.68	44.6	0.66	0	0.012	4.487	3.4	46.046	0.134	46.18	Pit125	2	1.66	47.841	-1.74	0.117
Pipe307	3.69	55.4	44.86	44.7	0.29	0	0.012	2.958	2.6	47.841	0.351	48.192	Pit24717	4.1	1.937	50.129	-4.13	0.813
P25711	3.404	18.45	44.9	44.86	0.22	0	0.012	2.563	2.4	50.129	0.1	50.229	Pit151	4.1	1.649	51.878	-5.78	1.671
Pipe59962	2.727	30.6	44.985	44.9	0.28	0	0.012	2.003	2.5	51.878	0.205	52.083	Pit111	0.2	0.085	52.168	-5.67	0.747

Pipe311	0.44	9.963	45.59	45.49	1	375	0.013	0.176	4	52.168	0.626	52.794	Pit110	0.2	0.162	52.956	-6.35	0.485
Pipe313	0.232	10.156	45.839	45.669	1.67	300	0.013	0.125	3.3	52.956	0.585	53.54	Pit109	0.2	0.11	53.65	-6.85	0.614
Pipe302	0.168	21.4	46.369	45.869	2.34	300	0.013	0.148	2.4	53.65	0.646	54.296	Pit108	0.7	0.202	54.498	-7.2	0.681
Pipe223	0.105	17	47.144	46.444	4.12	225	0.013	0.091	2.6	54.498	0.931	55.429	Pit114	0.3	0.107	55.536	-7.53	0.726
P1151	0.003	14.2	48.077	47.277	5.63	100	0.013	0.012	0.4	55.536	0.061	55.597	Pit1083	0.7	0.007	55.604	-6.8	0.447
Pipe60080	2.184	28.5	45.256	45.015	0.85	825	0.013	2.64	2	52.168	0.165	52.333	Pit57588	1.5	0.319	52.652	-5.75	0.748
Pipe60079	1.925	39.8	45.485	45.286	0.5	825	0.013	2.03	1.8	52.652	0.179	52.831	Pit57586	1.5	0.248	53.079	-6.08	1.24
Pipe1140	1.962	33.7	45.985	45.515	1.39	825	0.013	3.39	1.8	53.079	0.157	53.236	Pit57587	1.5	0.258	53.494	-5.99	0.971
Pipe60078	2.178	17.3	46.108	46.015	0.53	825	0.013	2.099	2	53.494	0.1	53.594	Pit216	0.6	0.127	53.721	-5.92	0.73
Pipe130	1.889	49.5	46.385	46.138	0.5	825	0.013	2.03	1.8	53.721	0.214	53.935	Pit212	1.3	0.207	54.142	-6.24	0.958
Pipe129	2.155	32.7	47.685	46.415	3.88	825	0.013	2.829	4	54.142	0.737	54.879	Pit211	0	0	54.879	-5.68	0.625
Pipe128	1.9	22.547	48.445	47.715	3.24	825	0.013	2.583	3.6	54.879	0.395	55.274	Pit210	0.2	0.129	55.403	-5.4	0.918
Pipe127	1.626	47.934	48.715	48.475	0.5	825	0.013	1.015	3	55.403	0.615	56.018	Pit209	0.6	0.283	56.301	-6.1	1.108
Pipe126	1.057	23.607	49.139	48.869	1.14	675	0.013	0.899	3	56.301	0.374	56.675	Pit218	0.5	0.223	56.897	-6.4	1.251
Pipe125	0.933	50.593	49.769	49.169	1.19	675	0.013	0.915	2.6	56.897	0.624	57.521	Pit217	0.8	0.278	57.799	-6.7	1.317
P954	0.152	36.2	51.139	50.169	2.68	300	0.013	0.158	2.1	57.799	0.889	58.687	Pit1057	1.5	0.352	59.039	-6.94	0.019
P952	0.094	13.9	51.569	51.169	2.88	300	0.013	0.164	1.3	59.039	0.131	59.17	Pit1055	5.3	0.477	59.647	-7.15	0.296
Pipe124	0.723	25.743	50.355	49.855	1.94	600	0.013	0.856	2.6	57.799	0.357	58.155	Pit222	0.6	0.2	58.355	-6.75	1.303
Pipe123	0.644	19.248	50.8	50.43	1.92	525	0.013	0.596	3	58.355	0.432	58.787	Pit223	0.4	0.181	58.967	-6.97	1.176
Pipe122	0.572	34.183	51.5	50.83	1.96	525	0.013	0.602	2.6	58.967	0.604	59.571	Pit221	1.1	0.391	59.963	-7.26	1.011
P927	0.468	33.8	52.318	51.53	2.33	525	0.013	0.657	2.2	59.963	0.4	60.363	Pit1043	1.8	0.429	60.791	-7.19	0.207
P925	0.22	13.5	52.939	52.669	2	300	0.013	0.137	3.1	60.791	0.702	61.493	Pit1042	0.6	0.298	61.791	-7.89	0.612
Pipe936	0.168	29.5	54.139	52.969	3.97	300	0.013	0.193	2.4	61.791	0.888	62.679	Pit1041	1.5	0.431	63.11	-8.01	0.262
Pipe935	0.194	23.9	55.239	54.169	4.48	300	0.013	0.205	2.7	63.11	0.961	64.071	Pit1040	0.2	0.077	64.148	-7.95	0.235
Pipe934	0.195	23.4	56.339	55.269	4.57	300	0.013	0.207	2.8	64.148	0.956	65.104	Pit1039	0.4	0.156	65.26	-7.96	0.242
Pipe933	0.201	21.4	57.339	56.369	4.53	300	0.013	0.206	2.8	65.26	0.928	66.189	Pit1038	0.7	0.29	66.478	-8.18	0.257
Pipe932	0.161	17.8	58.269	57.369	5.06	300	0.013	0.217	2.3	66.478	0.491	66.969	Pit1037	2.8	0.737	67.707	-8.51	0.307
													N66678			44.417		
P60150	5.255	13.365	42.65	42.6	0.37	0	0.012	3.366	3.6	44.417	0.172	44.589	Pit64	2.1	2.013	46.602	-2.5	0.927
Pipe75	4.832	36	42.89	42.7	0.53	0	0.012	3.998	3.4	46.602	0.391	46.993	Pit74	2.6	2.107	49.1	-4.6	1.278
Pipe74	4.373	20	43	42.9	0.5	0	0.012	2.687	4	49.1	0.345	49.445	Pit73	0.7	0.763	50.208	-5.51	1.52
Pipe73	4.233	12.948	43.06	43	0.46	0	0.012	2.587	3.9	50.208	0.209	50.418	Pit72	0.7	0.715	51.132	-6.38	1.394
Pipe72	4.835	52.577	46.347	43.1	6.17	0	0.012	9.443	8.1	51.132	1.109	52.241	Pit48	0.9	1.199	53.44	-5.04	0.857
P1314	4.129	47.5	46.614	46.376	0.5	0	0.012	2.687	3.8	53.44	0.731	54.171	Pit1309	0.8	0.777	54.948	-6.45	0.533
Pipe164	3.757	24.2	46.815	46.694	0.5	0	0.012	2.687	3.5	54.948	0.308	55.256	Pit49	0.8	0.643	55.9	-7.3	0.896
Pipe163	2.924	71.878	47.515	46.845	0.93	1070	0.013	2.772	3.3	55.9	0.745	56.645	Pit1032	0.3	0.162	56.807	-7.51	0.865
Pipe914	2.837	9.3	47.715	47.545	1.83	1070	0.013	3.882	3.2	56.807	0.091	56.898	Pit185	0.8	0.406	57.304	-7.8	0.373
Pipe904	0.21	35.9	51.016	48.569	6.82	300	0.013	0.252	3.6	57.304	1.687	58.991	Pit1024	1.9	0.852	59.844	-7.84	0.099
Pipe907	0.097	24.5	51.169	51.046	0.5	300	0.013	0.068	1.4	59.844	0.245	60.088	Pit1028	3.9	0.372	60.46	-8.36	0.123
Pipe193	0.567	33.515	49.578	47.508	6.18	450	0.013	0.709	4.9	55.9	1.325	57.225	Pit51	1.5	0.972	58.197	-7.5	0.608
Pipe899	0.208	41.5	50.09	49.69	0.96	375	0.013	0.172	1.9	58.197	0.585	58.783	Pit1022	2.1	0.381	59.163	-8.06	0.151
Pipe900	0.165	15.9	50.339	50.169	1.07	300	0.013	0.1	2.3	59.163	0.462	59.626	Pit1014	0.3	0.083	59.709	-8.41	0.152
P879	0.19	17.1	51.239	50.369	5.09	300	0.013	0.218	2.7	59.709	0.657	60.366	Pit1013	0.3	0.11	60.476	-8.28	0.097
P878	0.181	11.2	51.739	51.269	4.2	300	0.013	0.198	2.6	60.476	0.393	60.869	Pit1012	0.4	0.134	61.003	-8.3	0.108
P877	0.194	11.7	52.569	51.769	6.84	300	0.013	0.253	2.7	61.003	0.469	61.472	Pit1011	0.5	0.191	61.664	-8.16	0.095
P876	0.14	13.8	53.314	52.644	4.86	225	0.013	0.099	3.5	61.664	1.339	63.003	Pit1010	0	0	63.003	-8.8	0.189
P875	0.107	13.4	53.814	53.344	3.51	225	0.013	0.084	2.7	63.003	0.756	63.759	Pit1009	0.9	0.33	64.089	-9.39	0.26

Pipe872	0.095	13.6	54.614	53.844	5.66	225	0.013	0.107	2.4	64.089	0.604	64.693	Pit1001	1.6	0.462	65.155	-9.65	0.273
P895	0.069	14.8	55.644	54.644	6.76	225	0.013	0.117	1.7	65.155	0.349	65.504	Pit1000	4.9	0.753	66.257	-9.76	0.293
													N1071			50.303		
													N1064			55.053		
Pipe852	0.078	9	55.414	55.044	4.11	225	0.013	0.091	2.6	55.206	0.37	55.576	Pit994	2.4	0.469	56.045	0.26	0
Pipe856	0.063	18.1	55.894	55.444	2.49	225	0.013	0.071	1.6	56.045	0.354	56.399	Pit996	5	0.637	57.036	-0.28	0.032
													N998			44.483		
P766	1.358	7.2	44.237	44.2	0.51	1524	0.013	5.286	5.8	44.727	0.037	44.764	Pit63	0.3	0.008	44.772	1.13	0
Pipe58	1.356	10.6	44.26	44.24	0.19	0	0.012	2.39	1	44.772	-0.148	44.624	Pit75	1.6	0.102	44.727	1.57	
Pipe57	1.22	66.3	45.669	44.669	1.51	675	0.013	1.032	3.5	45.344	1	46.344	Pit57	0.7	0.415	46.759	0.24	0.212
Pipe56	1.041	31.214	47.525	45.755	5.67	600	0.013	1.462	4.4	46.759	1.137	47.896	Pit58	0.6	0.415	48.311	0.49	0.158
Pipe54	0.908	79.8	53.825	47.555	7.86	600	0.013	1.721	6.2	48.311	5.823	54.133	Pit998	0.5	0.263	54.397	0.7	0
P863	0.802	37.5	54.67	53.855	2.17	600	0.013	0.905	3.6	54.397	0.718	55.114	Pit28	2.4	0.985	56.099	0.7	0
Pipe53	0.407	10.846	55.33	55.276	0.5	525	0.013	0.304	1.9	56.099	0.097	56.196	Pit29	2	0.36	56.556	-0.05	0.039
Pipe62	0.338	29.721	55.853	55.408	1.5	450	0.013	0.349	2.1	56.556	0.417	56.973	Pit30	1.8	0.414	57.388	0.21	0.116
Pipe205	0.201	23.782	56.739	56.62	0.5	300	0.013	0.068	2.8	57.388	1.03	58.418	Pit31	0	0	58.418	-0.72	0.309
Pipe249	0.161	17.809	57.339	56.769	3.2	300	0.013	0.173	2.3	58.418	0.493	58.912	Pit32	0.8	0.212	59.123	-0.82	0.341
Pipe250	0.145	18.499	57.739	57.369	2	300	0.013	0.137	2.1	59.123	0.417	59.54	Pit33	1.1	0.237	59.777	-1.08	0.364
Pipe246	0.129	17.6	58.339	57.769	3.24	300	0.013	0.174	1.8	59.777	0.314	60.091	Pit22	1.9	0.323	60.414	-1.11	0.362
Pipe245	0.099	20	58.569	58.369	1	300	0.013	0.097	1.4	60.414	0.211	60.625	Pit21	5.9	0.593	61.218	-1.72	0.434
													N1049			39.368		
													N807			44.483		
Pipe750	0.786	66.3	43.43	43.1	0.5	675	0.012	0.642	2.2	50.208	0.494	50.702	Pit84	0.2	0.049	50.752	-5.75	0.262
													HW-BSN3			52.082		
													N664			54.212		
Pipe736	0.691	11.626	53.302	53.158	1.24	900	0.013	2.015	1.1	54.212	0.017	54.229	Pit235	5.2	0.313	54.542	0.76	0.451
P744	0.135	17.316	53.869	53.782	0.5	300	0.013	0.068	1.9	54.542	0.339	54.881	Pit635	1.5	0.28	55.162	-0.36	0.573
Pipe176	0.303	34.886	50.925	50.751	0.5	375	0.013	0.124	2.7	52.246	1.045	53.291	Pit4	2.7	1.04	54.331	-1.33	1.155
Pipe175	0.204	66.977	51.29	50.955	0.5	375	0.013	0.124	1.8	54.331	0.905	55.236	Pit5	1.2	0.208	55.444	-0.94	0.397
													HW-BSN5			55.704		
													N2			94.277		
Pipe239	0	1000	99.277	94.277	0.5	100	0.013	0.004	0	94.277	5	99.277	Pit1	1.5	0	99.277	0.72	
Pipe179	0.33	100.421	56.059	54.208	1.84	450	0.013	0.387	2.7	54.542	1.84	56.382	Pit6	4.3	0.945	57.327	0.17	0.301
Pipe187	0.187	16.343	56.49	56.408	0.5	375	0.013	0.124	1.7	57.327	0.185	57.512	Pit8	1.5	0.218	57.73	-0.23	0.774
Pipe180	0.009	92.333	59.247	56.777	2.68	100	0.013	0.008	1.2	57.327	2.934	60.261	Pit9	1.5	0.105	60.366	-0.37	0
Pipe186	0.004	11.03	59.376	59.277	0.9	100	0.013	0.005	0.5	60.366	0.07	60.437	Pit10	1.5	0.021	60.458	-0.16	0
Pipe185	0.004	14.189	59.477	59.406	0.5	100	0.013	0.004	0.5	60.458	0.086	60.544	Pit11	1.5	0.02	60.564	-0.36	0
Pipe181	0.009	30.765	59.747	59.277	1.53	100	0.013	0.006	1.1	60.366	0.921	61.287	Pit12	1.5	0.099	61.386	-0.89	0.005
Pipe184	0.013	15.271	61.177	59.777	9.17	100	0.013	0.016	1.7	61.386	0.964	62.35	Pit13	1.5	0.209	62.559	-0.66	0.001
Pipe182	0.004	84.942	61.447	59.777	1.97	100	0.013	0.007	0.9	61.386	0.488	61.874	Pit14	1.5	0.019	61.893	0.31	0
Pipe183	0.004	15.973	64.777	61.477	20.66	100	0.013	0.023	1.7	61.893	2.91	64.803	Pit15	1.5	0.017	64.82	0.68	0
Pipe65	0.406	83.206	55.341	54.925	0.5	600	0.013	0.434	1.4	56.099	0.364	56.462	Pit26	1.5	0.158	56.62	0.18	0.255
Pipe64	0.202	75.568	55.76	55.382	0.5	375	0.013	0.124	1.8	56.62	1.005	57.625	Pit24	0	0	57.625	-0.82	0.313
Pipe230	0.18	22.039	56.19	55.79	1.81	375	0.013	0.236	1.6	57.625	0.233	57.858	Pit23	2.1	0.285	58.143	-0.94	0.283
Pipe229	0.194	35.531	58.304	56.269	5.73	300	0.013	0.231	2.7	58.143	1.427	59.57	Pit16	2	0.767	60.337	-1.04	0.25
Pipe228	0.13	6.755	58.368	58.334	0.5	300	0.013	0.068	1.8	60.337	0.123	60.46	Pit17	0.7	0.122	60.581	-1.18	0.094
Pipe242	0.107	18.456	58.49	58.398	0.5	300	0.013	0.068	1.5	60.581	0.224	60.806	Pit18	0.1	0.012	60.817	-1.37	0.124

Pipe243	0.07	18.783	58.614	58.52	0.5	225	0.013	0.032	1.8	60.817	0.451	61.269	Pit19	1.4	0.219	61.487	-1.99	0.17
Pipe244	0.049	19.63	58.744	58.644	0.51	225	0.013	0.032	1.2	61.487	0.233	61.72	Pit20	3.5	0.27	61.991	-2.39	0.189
Pipe63	0.009	13.26	55.977	55.911	0.5	100	0.013	0.004	1.1	57.625	0.384	58.009	Pit25	2.2	0.14	58.149	-1.45	0.314
Pipe66	0.092	12.707	55.769	55.705	0.5	300	0.013	0.068	1.3	56.62	0.116	56.736	Pit27	5.2	0.454	57.19	-0.49	0.176
Pipe61	0.061	36.811	56.214	56.03	0.5	225	0.013	0.032	1.5	57.388	0.672	58.06	Pit34	0.2	0.024	58.084	-0.98	0.034
Pipe60	0.054	18.546	56.644	56.244	2.16	225	0.013	0.066	1.4	58.084	0.269	58.353	Pit35	3.7	0.35	58.703	-1.2	0.134
P866	0.117	34.5	54.269	54.097	0.5	300	0.013	0.068	1.7	54.397	0.507	54.903	Pit37	0.1	0.014	54.917	0.28	0.004
Pipe206	0.075	9.68	54.644	54.344	3.1	225	0.013	0.079	1.9	54.917	0.269	55.186	Pit36	4.6	0.832	56.018	-0.52	0.106
Pipe231	0.176	36.249	47.769	46.069	4.69	300	0.013	0.209	2.5	46.759	1.222	47.982	Pit55	2	0.634	48.615	0.09	0.098
Pipe832	0.148	5.3	48.114	47.844	5.09	225	0.013	0.101	3.7	48.615	0.572	49.188	Pit56	0.3	0.211	49.398	-0.4	0.169
Pipe208	0.117	15.2	48.814	48.144	4.41	225	0.013	0.094	2.9	49.398	1.031	50.429	Pit43	0	0	50.429	-0.73	0.179
Pipe259	0.108	17.726	49.814	48.844	5.47	225	0.013	0.105	2.7	50.429	1.026	51.455	Pit42	0.5	0.188	51.643	-0.94	0.181
Pipe258	0.105	13.196	50.514	49.844	5.08	225	0.013	0.101	2.7	51.643	0.728	52.371	Pit41	0.7	0.251	52.623	-1.22	0.191
Pipe257	0.101	14.822	51.414	50.544	5.87	225	0.013	0.109	2.5	52.623	0.748	53.37	Pit40	1	0.328	53.698	-1.4	0.19
Pipe256	0.093	14.175	52.114	51.444	4.73	225	0.013	0.098	2.3	53.698	0.602	54.3	Pit39	1.6	0.442	54.742	-1.74	0.208
Pipe255	0.066	14.852	53.144	52.144	6.73	225	0.013	0.116	1.7	54.742	0.326	55.068	Pit38	5.2	0.741	55.809	-1.81	0.224
Pipe71	0.366	29.676	48.96	47.39	5.29	375	0.013	0.403	4.1	53.44	1.29	54.731	Pit47	1.6	0.894	55.625	-5.62	0.73
Pipe70	0.199	18.801	49.56	48.99	3.03	375	0.013	0.305	1.8	55.625	0.242	55.867	Pit46	1.7	0.281	56.148	-5.55	0.006
Pipe68	0.205	56.053	52.26	49.59	4.76	375	0.013	0.383	3.5	56.148	0.768	56.916	Pit44	1.1	0.194	57.11	-3.81	0
Pipe67	0.205	12.883	52.39	52.29	0.78	375	0.013	0.154	1.9	57.11	0.176	57.287	Pit45	3.8	0.668	57.955	-4.55	0.355
Pipe192	0.254	22.987	49.885	49.608	1.2	450	0.013	0.313	1.6	58.197	0.182	58.379	Pit50	1.5	0.194	58.573	-7.57	0.15
Pipe194	0.115	15.029	49.99	49.915	0.5	375	0.013	0.124	1	58.573	0.065	58.638	Pit52	3.2	0.178	58.817	-7.82	0.567
Pipe190	0.093	50.022	52.54	50.144	4.79	225	0.013	0.098	2.3	58.573	2.129	60.703	Pit54	3	0.831	61.534	-8.03	0.274
Pipe189	0.012	12.374	52.777	52.715	0.5	100	0.013	0.004	1.5	61.534	0.643	62.177	Pit53	2.1	0.241	62.418	-8.92	0.265
Pipe262	0.008	8.375	47.977	47.935	0.5	100	0.013	0.004	1.1	48.311	0.224	48.535	Pit59	2.9	0.171	48.706	0	0.014
Pipe292	0.095	27.6	44	42.86	4.13	225	0.013	0.091	2.4	46.602	1.232	47.835	Pit57610	0	0	47.835	-2.83	0.062
P60168	0.08	39.9	45	44.1	2.26	225	0.013	0.067	2	47.835	1.257	49.092	Pit77	0.3	0.062	49.153	-3.15	0.075
Pipe209	0.075	40.1	45.514	45.444	0.17	225	0.013	0.019	1.9	45.669	0.07	45.739	Pit78	0.4	0.074	45.813	0.89	0.158
Pipe290	0.08	9.53	46.214	45.844	3.88	225	0.013	0.088	2	46.014	0.37	46.384	Pit79	0.6	0.124	46.508	0.59	0.157
Pipe289	0.078	10.067	46.714	46.244	4.67	225	0.013	0.097	2	46.508	0.36	46.868	Pit80	1	0.199	47.067	0.53	0.166
Pipe288	0.073	10.48	47.214	46.744	4.48	225	0.013	0.095	1.8	47.067	0.294	47.362	Pit81	1.8	0.308	47.67	0.43	0.177
Pipe287	0.056	10.03	47.644	47.244	3.99	225	0.013	0.09	1.4	47.67	0.156	47.826	Pit82	5.7	0.578	48.404	0.1	0.205
Pipe96	0.291	15.6	43.6	43.5	0.64	600	0.013	0.492	1	50.752	0.035	50.787	Pit85	0.7	0.038	50.824	-5.82	0.518
Pipe95	0.273	13.432	44.5	43.65	6.33	600	0.012	1.673	1	50.824	0.023	50.847	Pit86	0.7	0.033	50.88	-4.68	0.094
Pipe94	0.176	18.444	45.312	44.955	1.93	600	0.012	0.925	2.5	50.88	0.013	50.893	Pit87	2.6	0.052	50.945	-4.14	0.209
Pipe49	0.282	84.4	41.208	40.786	0.5	450	0.013	0.202	1.8	42.616	0.824	43.44	Pit99	3.2	0.512	43.952	-1.65	0.812
													BIO2B			43.801		
Pipe46	0.971	20.6	42.5	42.2	1.46	1200	0.013	4.705	0.9	43.801	0.013	43.814	Pit98	4.7	0.177	43.991	0.31	0.581
Pipe45	0	12.248	44.277	43.577	5.72	100	0.013	0.012	0	43.991	0.286	44.277	Pit101	1.2	0	44.277	0.72	0
Pipe85	0.985	52.5	45.6	45	1.14	600	0.013	1.313	1.7	51.878	0.338	52.215	Pit121	1.5	0.232	52.447	-4.55	0.151
Pipe91	0.842	27.3	45.85	45.7	0.55	600	0.012	0.986	1.5	52.447	0.109	52.557	Pit119	0.9	0.102	52.659	-3.96	0.071
Pipe87	0.765	22.6	46.2	45.9	1.33	600	0.012	1.533	1.4	52.659	0.075	52.733	Pit118	5	0.467	53.2	-3.6	0.176
Pipe88	0.162	20.2	49.269	48.669	2.97	300	0.013	0.167	2.7	53.2	0.569	53.769	Pit117	2.9	0.779	54.548	-4.35	0.331
													N1629			45.48		
Pipe43	0.151	15.6	44.76	44.6	1.03	300	0.013	0.098	2.1	45.48	0.382	45.862	Pit103	0.7	0.164	46.025	-0.02	0.012
Pipe93	0.135	22.748	47.144	45.144	8.79	225	0.012	0.144	4.1	46.025	1.745	47.77	Pit122	0.3	0.176	47.945	0.06	0.128
Pipe44	0.671	18.1	42.98	42.89	0.5	675	0.013	0.594	1.9	43.991	0.116	44.106	Pit102	5.9	1.06	45.166	-0.77	0.669

Pipe39	0.532	36.4	43.269	43.069	0.55	675	0.013	0.623	1.5	45.166	0.146	45.312	Pit132	2.2	0.248	45.56	-0.96	0.869
Pipe37	0.473	18.442	43.73	43.43	1.63	525	0.013	0.548	2.2	45.56	0.223	45.783	Pit135	1.2	0.292	46.075	-1.17	0.83
Pipe1	0.118	33.069	44.438	43.969	1.42	300	0.013	0.115	1.7	46.075	0.491	46.566	Pit136	2.5	0.355	46.921	-1.52	0.198
Pipe220	0.099	14.131	44.539	44.468	0.5	300	0.013	0.068	1.4	46.921	0.149	47.07	Pit137	0.5	0.05	47.12	-1.62	0.132
Pipe317	0.083	12.287	44.639	44.569	0.57	300	0.013	0.073	1.2	47.12	0.089	47.21	Pit138	0.7	0.049	47.258	-1.66	0.158
Pipe318	0.082	6.753	44.769	44.669	1.48	300	0.013	0.118	1.2	47.258	0.048	47.306	Pit139	2.6	0.177	47.483	-1.78	0.181
Pipe219	0.072	10.08	44.906	44.844	0.62	225	0.013	0.035	1.8	47.483	0.26	47.743	Pit140	0.9	0.151	47.894	-2.09	0.196
Pipe320	0.057	11.503	44.994	44.936	0.5	225	0.013	0.032	1.4	47.894	0.185	48.079	Pit141	3.9	0.407	48.486	-2.64	0.215
Pipe321	0.011	13.435	45.147	45.08	0.5	100	0.013	0.004	1.4	48.486	0.592	49.078	Pit142	0.2	0.019	49.097	-3.2	0.008
Pipe322	0.005	20.583	45.347	45.177	0.83	100	0.013	0.005	0.7	49.097	0.221	49.318	Pit143	0.2	0.005	49.323	-3.22	0.001
Pipe323	0.002	9.201	45.577	45.377	2.17	100	0.013	0.008	0.3	49.323	0.021	49.344	Pit144	1.5	0.008	49.352	-3.05	0
Pipe35	0.27	52.838	44.378	43.808	1.08	450	0.013	0.296	1.7	46.075	0.475	46.549	Pit148	1.9	0.28	46.829	-1.33	0.471
Pipe34	0.196	8.384	44.578	44.408	2.03	450	0.013	0.406	1.2	46.829	0.04	46.869	Pit147	1.5	0.116	46.985	-1.28	0.012
Pipe33	0.186	13.288	44.708	44.608	0.75	450	0.013	0.247	1.2	46.985	0.056	47.041	Pit146	3	0.209	47.25	-1.45	0.474
Pipe32	0.121	25.467	45.169	44.869	1.18	300	0.013	0.105	1.7	47.25	0.397	47.647	Pit145	3.1	0.462	48.109	-2.01	0.354
Pipe333	0.08	13.427	45.314	45.244	0.52	225	0.013	0.032	2	48.109	0.424	48.533	Pit152	0.2	0.041	48.574	-2.37	0.012
Pipe329	0.065	12.797	45.546	45.344	1.58	225	0.013	0.056	1.6	48.574	0.269	48.843	Pit153	0.2	0.027	48.871	-2.17	0
Pipe222	0.054	6.868	45.61	45.576	0.5	225	0.013	0.032	1.4	48.871	0.099	48.97	Pit154	2.5	0.234	49.203	-2.2	0
Pipe326	0.047	11.162	45.696	45.64	0.5	225	0.013	0.032	1.2	49.203	0.12	49.324	Pit155	0.2	0.014	49.338	-2.39	0
Pipe221	0.046	12.383	45.788	45.726	0.5	225	0.013	0.032	1.2	49.338	0.128	49.466	Pit156	0.2	0.013	49.48	-2.58	0
Pipe327	0.052	12.587	45.881	45.818	0.5	225	0.013	0.032	1.3	49.48	0.172	49.651	Pit157	0.2	0.018	49.669	-2.82	0
Pipe328	0.05	6.577	45.944	45.911	0.5	225	0.013	0.032	1.2	49.669	0.081	49.75	Pit158	3.3	0.263	50.013	-3.21	0.168
Pipe28	0.064	64.735	46.614	44.644	3.04	225	0.013	0.078	1.6	46.829	1.327	48.156	Pit161	2.7	0.36	48.516	-1.02	0
Pipe26	0.065	11.515	46.914	46.644	2.34	225	0.013	0.069	1.6	48.516	0.239	48.755	Pit163	0.9	0.121	48.877	-1.08	0.005
Pipe25	0.051	13.979	47.244	46.944	2.15	225	0.013	0.066	1.3	48.877	0.181	49.058	Pit162	5.9	0.498	49.556	-1.45	0.048
Pipe8	0.274	47.141	41.63	41.394	0.5	525	0.013	0.304	1.3	44.708	0.191	44.9	Pit305	1.5	0.123	45.022	-2.22	0.464
Pipe3	0.224	12.115	42.16	41.79	3.05	375	0.013	0.306	2	45.022	0.197	45.219	Pit304	0.6	0.125	45.345	-2.14	0.194
Pipe24	0.254	106.8	45.16	42.19	2.78	375	0.013	0.292	2.5	45.345	2.25	47.595	Pit164	2	0.542	48.137	-1.94	0.176
Pipe23	0.167	16.502	45.29	45.19	0.61	375	0.013	0.136	1.5	48.137	0.15	48.287	Pit165	4.8	0.562	48.849	-2.55	0.348
P60186	0.494	33.5	46.6	46.26	1.01	600	0.012	0.67	1.7	53.2	0.185	53.385	Pit57623	5	0.778	54.163	-3.86	0
Pipe98	0.456	60.7	46.9	46.7	0.33	600	0.013	0.352	1.6	54.163	0.335	54.498	Pit123	0.7	0.093	54.591	-6.59	0.329
Pipe99	0.43	38.8	49.76	47	7.11	375	0.013	0.468	3.9	54.591	2.339	56.93	Pit167	0.6	0.465	57.395	-6.59	0.204
Pipe100	0.008	18.133	50.177	50.077	0.55	100	0.013	0.004	1.1	57.395	0.479	57.874	Pit166	5.9	0.344	58.218	-7.32	0.016
Pipe101	0.386	45.433	51.96	49.79	4.78	375	0.013	0.383	3.5	57.395	2.203	59.598	Pit168	1	0.623	60.222	-7.22	0.288
Pipe103	0.337	29.074	53.49	51.99	5.16	375	0.013	0.398	3	60.222	1.073	61.295	Pit171	1.1	0.522	61.816	-7.32	0.121
Pipe362	0.225	13.718	54.039	53.569	3.43	300	0.013	0.179	3.2	61.816	0.741	62.558	Pit169	0.5	0.258	62.815	-7.81	0.105
Pipe116	0.009	18.05	54.377	54.277	0.55	100	0.013	0.004	1.1	62.815	0.519	63.334	Pit170	5.9	0.374	63.708	-8.61	0.042
Pipe216	0.091	15.492	54.014	53.644	2.39	225	0.013	0.069	2.3	61.816	0.643	62.459	Pit172	0.7	0.189	62.648	-7.75	0.112
Pipe363	0.081	10.208	54.414	54.044	3.62	225	0.013	0.085	2	62.648	0.328	62.976	Pit173	1.1	0.23	63.207	-7.91	0.118
Pipe364	0.069	18.334	54.814	54.444	2.02	225	0.013	0.064	1.7	63.207	0.434	63.641	Pit174	1.8	0.277	63.918	-8.22	0.131
Pipe365	0.054	17.103	54.944	54.844	0.58	225	0.013	0.034	1.4	63.918	0.251	64.17	Pit175	5.6	0.536	64.706	-8.9	0.162
P977	0.244	33.2	49.408	49.108	0.9	450	0.013	0.271	1.5	56.301	0.243	56.544	Pit1070	1.8	0.216	56.76	-6.26	0.015
P980	0.158	14.655	49.539	49.466	0.5	300	0.013	0.068	2.2	56.76	0.391	57.151	Pit1069	0.7	0.178	57.329	-6.83	0.348
P972	0.127	32	50.369	49.569	2.5	300	0.013	0.153	1.8	57.329	0.554	57.883	Pit1068	1.7	0.281	58.164	-6.86	0.162
P970	0.111	15.3	51.214	50.444	5.03	225	0.013	0.101	2.8	58.164	0.932	59.096	Pit1067	0	0	59.096	-7	0.189
P968	0.103	15.1	51.914	51.244	4.44	225	0.013	0.095	2.6	59.096	0.799	59.895	Pit1066	0.6	0.207	60.102	-7.3	0.206
P965	0.101	15.6	52.714	51.944	4.94	225	0.013	0.1	2.5	60.102	0.784	60.885	Pit1065	0.9	0.294	61.18	-7.58	0.21

P964	0.092	14.1	53.514	52.744	5.46	225	0.013	0.105	2.3	61.18	0.589	61.769	Pit1063	1.7	0.462	62.231	-7.83	0.218
Pipe215	0.068	14	54.244	53.544	5	225	0.013	0.1	1.7	62.231	0.325	62.555	Pit176	5	0.754	63.31	-8.21	0.246
Pipe104	0.203	38.221	55.839	54.069	4.63	300	0.013	0.208	2.9	62.815	1.691	64.506	Pit178	0.3	0.127	64.633	-7.83	0.076
Pipe945	0.102	39.7	56.139	55.869	0.68	300	0.013	0.08	1.4	64.633	0.439	65.072	Pit1052	2.3	0.243	65.315	-8.21	0.06
Pipe214	0.134	35.3	57.339	56.169	3.31	300	0.013	0.176	1.9	65.315	0.682	65.997	Pit181	1.8	0.332	66.33	-8.03	0.011
Pipe360	0.122	14.1	57.539	57.369	1.21	300	0.013	0.106	1.7	66.33	0.223	66.553	Pit180	1.2	0.181	66.734	-8.23	0.064
Pipe361	0.096	10.921	57.669	57.569	0.92	300	0.013	0.093	1.4	66.734	0.108	66.842	Pit179	5.9	0.557	67.399	-8.8	0.147
Pipe106	0.141	28.126	57.339	55.869	5.23	300	0.013	0.221	2.8	64.633	0.598	65.231	Pit177	0.5	0.101	65.332	-7.03	0
Pipe115	0.028	23.512	58.224	57.524	2.98	150	0.013	0.026	1.6	65.332	0.81	66.143	Pit182	3.7	0.483	66.626	-7.62	0.064
Pipe919	2.668	6.9	47.815	47.745	1.01	1070	0.013	2.892	3	57.304	0.06	57.364	Pit1035	0.4	0.18	57.543	-7.94	0.842
Pipe162	2.993	40.6	50.215	47.845	5.84	1070	0.013	6.938	7.4	57.543	0.441	57.984	Pit291	1.3	0.735	58.719	-6.72	0.281
Pipe168	1.059	63.8	52.425	50.755	2.62	600	0.013	0.993	3.8	58.719	1.896	60.616	Pit281	0.8	0.572	61.188	-7.49	0.332
Pipe169	0.724	12.932	52.555	52.455	0.77	600	0.013	0.54	2.6	61.188	0.18	61.368	Pit278	1.6	0.536	61.904	-8.1	0.518
Pipe226	0.662	35.444	54.411	52.63	5.02	525	0.013	0.964	3.7	61.904	0.84	62.743	Pit276	2.3	1.097	63.84	-8.04	0.502
Pipe203	0.145	31.73	55.239	54.869	1.17	300	0.013	0.104	2	63.84	0.71	64.551	Pit277	1.2	0.257	64.807	-8.61	0.246
P397	0.114	18.709	55.369	55.269	0.53	300	0.013	0.071	1.6	64.807	0.259	65.067	Pit183	1.7	0.225	65.292	-8.99	0.294
Pipe202	0.073	10.2	55.544	55.444	0.98	225	0.013	0.044	1.8	65.292	0.272	65.563	Pit184	3.2	0.554	66.118	-9.72	0.355
Pipe90	0.141	69.9	51.168	48.669	3.57	300	0.013	0.183	2.9	53.2	1.48	54.68	Pit186	1.5	0.303	54.983	-2.68	0
Pipe89	0.141	14.231	51.269	51.198	0.5	300	0.013	0.068	2	54.983	0.301	55.284	Pit187	1.5	0.303	55.587	-3.39	0.299
Pipe133	0.194	32.148	48.539	46.869	5.19	300	0.013	0.22	2.7	53.721	1.288	55.008	Pit203	2.1	0.803	55.811	-6.31	0.079
Pipe132	0.163	14.627	49.039	48.569	3.21	300	0.013	0.173	2.3	55.811	0.417	56.229	Pit202	0.9	0.245	56.474	-6.47	0.109
Pipe236	0.138	13.488	49.539	49.069	3.48	300	0.013	0.18	2	56.474	0.276	56.75	Pit201	0.6	0.117	56.867	-6.37	0
Pipe347	0.129	17.783	49.93	49.569	2.03	300	0.013	0.138	1.8	56.867	0.314	57.181	Pit200	2	0.338	57.519	-6.32	0
Pipe346	0.112	15.801	50.039	49.96	0.5	300	0.013	0.068	1.6	57.519	0.212	57.731	Pit199	1.1	0.141	57.872	-6.87	0.24
Pipe345	0.089	18.019	50.169	50.069	0.55	300	0.013	0.072	1.3	57.872	0.153	58.025	Pit198	0.7	0.057	58.082	-6.98	0.12
Pipe344	0.072	11.879	50.314	50.244	0.59	225	0.013	0.034	1.8	58.082	0.306	58.388	Pit190	1.1	0.184	58.572	-7.37	0.168
Pipe218	0.068	11.514	50.914	50.344	4.95	225	0.013	0.1	1.7	58.572	0.261	58.833	Pit188	2.2	0.325	59.158	-7.36	0.155
Pipe217	0.057	10.199	51.444	50.944	4.9	225	0.013	0.099	1.4	59.158	0.165	59.323	Pit189	3.1	0.327	59.65	-7.35	0.163
Pipe135	0.111	32.1	50.939	49.569	4.27	300	0.013	0.2	2.8	56.76	0.427	57.186	Pit191	1.8	0.228	57.415	-5.51	0
Pipe134	0.111	14.7	51.169	50.969	1.36	300	0.013	0.113	1.6	57.415	0.195	57.61	Pit192	5	0.633	58.243	-6.14	0.184
Pipe137	0.073	62.9	54.614	51.244	5.36	225	0.013	0.104	2.8	59.039	1.656	60.695	Pit193	1.4	0.24	60.935	-5.43	0
Pipe136	0.073	13.686	54.744	54.644	0.73	225	0.013	0.038	1.8	60.935	0.36	61.295	Pit194	1.3	0.223	61.518	-5.92	0.144
Pipe107	0.113	42.97	59.039	57.369	3.89	300	0.013	0.191	2.8	65.332	0.584	65.917	Pit234	2.8	0.364	66.28	-6.28	0
Pipe108	0.113	7.73	59.639	59.069	7.37	300	0.013	0.263	3.6	66.28	0.105	66.385	Pit230	0.2	0.026	66.411	-5.81	0
Pipe109	0.113	38.279	62.039	59.669	6.19	300	0.013	0.241	3.3	66.411	0.52	66.932	Pit229	1.8	0.234	67.165	-4.16	0
Pipe110	0.113	22.286	62.369	62.069	1.35	300	0.013	0.112	1.6	67.165	0.303	67.468	Pit196	4.8	0.623	68.091	-4.79	0.114
Pipe139	0.3	65.2	55.19	52.59	3.99	375	0.013	0.35	2.8	60.791	1.907	62.698	Pit220	1.8	0.677	63.375	-7.17	0.005
Pipe138	0.113	13.482	55.569	55.269	2.23	300	0.013	0.144	1.6	63.375	0.184	63.559	Pit219	4.8	0.624	64.183	-7.68	0.33
Pipe121	0.093	22.335	52.069	51.769	1.34	300	0.013	0.112	1.3	59.963	0.209	60.171	Pit224	3.2	0.286	60.457	-7.46	0.193
Pipe120	0	38.941	54.047	52.277	4.55	100	0.013	0.011	0	60.457	0	60.457	Pit228	1.5	0	60.457	-5.66	0
Pipe119	0	15.502	54.447	54.077	2.39	100	0.013	0.008	0	60.457	0	60.457	Pit227	1.5	0	60.457	-5.26	0
Pipe118	0	68.857	57.747	54.477	4.75	100	0.013	0.011	0	60.457	0	60.457	Pit226	1.5	0	60.457	-1.96	0
Pipe117	0	8.66	58.077	57.777	3.46	100	0.013	0.01	0	60.457	0	60.457	Pit225	1.5	0	60.457	-1.66	0
P60005	0.233	19.716	57.539	55.269	11.51	300	0.013	0.328	4.7	63.375	1.144	64.519	Pit232	1.5	0.831	65.35	-6.85	0.132
Pipe111	0.142	45.2	59.069	57.569	3.32	300	0.013	0.176	2	65.35	0.971	66.321	Pit233	3.3	0.677	66.998	-7	0.232
Pipe160	1.818	52.308	52.815	50.245	4.91	1070	0.013	6.365	6	58.719	0.21	58.929	Pit290	0.6	0.125	59.054	-4.45	0.173
Pipe159	1.534	54.818	53.611	52.845	1.4	1070	0.013	3.395	3.6	59.054	0.157	59.211	Pit289	1.5	0.223	59.433	-2.23	0

P403	1.534	12.281	53.703	53.641	0.5	1070	0.013	2.03	2.1	59.433	0.035	59.468	Pit288	0.4	0.059	59.528	-2.13	0
Pipe158	1.534	14.719	53.806	53.733	0.5	900	0.013	1.28	2.5	59.528	0.106	59.634	Pit286	1.4	0.415	60.049	-2.25	0
Pipe156	1.534	73.9	54.206	53.836	0.5	900	0.013	1.28	2.4	60.049	0.53	60.579	Pit283	0.6	0.178	60.757	-3.36	0.136
Pipe154	1.339	51.422	54.493	54.236	0.5	900	0.013	1.28	2.1	60.757	0.281	61.039	Pit251	0.9	0.203	61.242	-3.99	0.025
Pipe153	0.964	23.448	54.64	54.523	0.5	825	0.013	1.015	1.8	61.242	0.106	61.348	Pit250	0.1	0.017	61.364	-4.16	0.036
Pipe152	0.838	25.378	54.797	54.67	0.5	825	0.013	1.015	1.6	61.364	0.086	61.451	Pit249	2.6	0.326	61.777	-4.68	0.149
Pipe151	0.431	29.36	54.974	54.827	0.5	750	0.013	0.787	1	61.777	0.044	61.821	Pit248	5.8	0.282	62.102	-5.1	0.048
Pipe148	0.238	59.234	55.3	55.004	0.5	525	0.013	0.304	1.1	62.102	0.181	62.284	Pit237	0.6	0.037	62.321	-5.82	0.378
Pipe147	0.26	22.934	55.696	55.33	1.59	525	0.013	0.543	1.2	62.321	0.084	62.404	Pit239	5	0.368	62.772	-5.77	0.289
Pipe150	0.01	10.281	55.777	55.726	0.5	100	0.013	0.004	1.3	62.772	0.41	63.183	Pit238	2.1	0.185	63.368	-6.87	0.006
Pipe146	0.17	70.196	59.201	56.069	4.46	300	0.013	0.204	3.2	62.772	2.173	64.945	Pit240	2.9	0.857	65.802	-5.6	0.366
Pipe145	0.006	9.112	59.277	59.231	0.5	100	0.013	0.004	0.8	65.802	0.139	65.941	Pit241	1.5	0.05	65.991	-5.99	0.003
Pipe149	0.241	17.218	56.86	55.99	5.05	375	0.013	0.394	2.3	62.102	0.324	62.427	Pit246	0.8	0.194	62.62	-4.72	0
Pipe143	0.186	79.645	59.66	56.89	3.48	375	0.013	0.327	3.1	62.62	0.899	63.519	Pit244	2.3	0.334	63.853	-3.15	0
Pipe141	0	59.377	62.047	59.977	3.49	100	0.013	0.01	0	63.853	0	63.853	Pit243	1.5	0	63.853	-1.05	0
Pipe140	0	29.602	62.277	62.077	0.68	100	0.013	0.004	0	63.853	0	63.853	Pit242	1.5	0	63.853	-0.85	0
Pipe142	0.184	12.728	59.79	59.69	0.79	375	0.013	0.155	1.7	63.853	0.14	63.994	Pit245	3.6	0.51	64.504	-3.7	0.254
Pipe144	0.068	12.015	57.044	56.984	0.5	225	0.013	0.032	1.7	62.62	0.273	62.893	Pit247	3.2	0.473	63.366	-5.46	0.155
Pipe173	0.056	11.543	56.394	56.336	0.5	225	0.013	0.032	1.5	61.364	0.181	61.545	Pit252	5.9	0.601	62.146	-4.9	0.145
Pipe197	0.321	21.853	55.778	55.669	0.5	450	0.013	0.202	2	61.242	0.276	61.518	Pit253	0.9	0.186	61.705	-4.4	0
Pipe196	0.213	91.489	56.265	55.808	0.5	450	0.013	0.202	1.3	61.705	0.509	62.214	Pit254	1.5	0.137	62.35	-4.9	0
Pipe195	0.222	12.532	56.358	56.295	0.5	450	0.013	0.202	1.4	62.35	0.076	62.426	Pit255	5.2	0.518	62.944	-5.49	0.359
Pipe383	0.349	24.129	56.56	56.09	1.95	375	0.013	0.245	3.2	61.777	0.957	62.733	Pit267	0.2	0.102	62.835	-5.23	0.162
Pipe382	0.317	11.417	56.71	56.59	1.05	375	0.013	0.18	2.9	62.835	0.373	63.208	Pit266	0.2	0.084	63.292	-5.54	0.226
Pipe381	0.311	10.95	56.86	56.74	1.1	375	0.013	0.184	2.8	63.292	0.344	63.636	Pit265	0.2	0.081	63.717	-5.82	0.291
Pipe380	0.309	10.611	57.16	56.89	2.54	375	0.013	0.28	2.8	63.717	0.33	64.047	Pit264	0.2	0.08	64.126	-5.93	0.261
Pipe379	0.304	10.418	57.46	57.19	2.59	375	0.013	0.282	2.7	64.126	0.313	64.439	Pit263	0.3	0.116	64.555	-6.05	0.265
Pipe378	0.297	9.769	57.66	57.49	1.74	375	0.013	0.231	2.7	64.555	0.28	64.835	Pit262	0.3	0.111	64.945	-6.24	0.293
Pipe377	0.284	12.066	58.06	57.69	3.07	375	0.013	0.307	2.6	64.945	0.316	65.262	Pit261	0.4	0.135	65.397	-6.3	0.275
Pipe227	0.271	21.854	58.46	58.09	1.69	375	0.013	0.228	2.4	65.397	0.52	65.917	Pit256	0.6	0.184	66.101	-6.6	0.317
Pipe375	0.261	18.799	58.96	58.49	2.5	375	0.013	0.277	2.4	66.101	0.418	66.519	Pit257	0.8	0.229	66.747	-6.75	0.312
Pipe374	0.224	17.892	59.467	58.99	2.66	375	0.013	0.286	2	66.747	0.293	67.04	Pit258	1.2	0.253	67.293	-6.79	0.346
Pipe373	0.164	17.034	59.582	59.497	0.5	300	0.013	0.068	2.3	67.293	0.491	67.783	Pit259	1.2	0.33	68.114	-7.56	0.451
Pipe201	0.107	11.45	59.669	59.612	0.5	300	0.013	0.068	1.5	68.114	0.14	68.253	Pit260	4.9	0.571	68.825	-8.22	0.535
Pipe204	0.453	7.892	54.68	54.63	0.63	525	0.013	0.342	2.1	63.84	0.087	63.927	Pit275	0.4	0.089	64.017	-8.17	0.397
Pipe394	0.393	21.808	54.908	54.758	0.69	450	0.013	0.236	2.5	64.017	0.414	64.431	Pit274	0.1	0.031	64.462	-8.46	0.513
Pipe393	0.317	16.336	55.06	54.978	0.5	375	0.013	0.124	2.9	64.462	0.533	64.994	Pit273	0.2	0.084	65.078	-8.98	0.652
Pipe392	0.257	15.539	55.36	55.09	1.74	375	0.013	0.231	2.3	65.078	0.334	65.412	Pit272	0.9	0.249	65.661	-9.26	0.676
Pipe391	0.216	12.302	55.56	55.39	1.38	375	0.013	0.206	2	65.661	0.186	65.847	Pit271	1.3	0.253	66.1	-9.5	0.699
Pipe390	0.168	11.117	55.69	55.59	0.9	375	0.013	0.166	1.5	66.1	0.102	66.202	Pit270	4.2	0.494	66.696	-10	0.768
Pipe389	0.074	11.068	56.114	55.844	2.44	225	0.013	0.07	1.9	66.696	0.302	66.999	Pit269	0.3	0.053	67.052	-10.05	0.137
Pipe388	0.041	12.827	56.244	56.144	0.78	225	0.013	0.04	1	67.052	0.105	67.156	Pit268	2.4	0.127	67.284	-10.18	0.142
Pipe166	0.114	18.3	52.819	52.728	0.5	300	0.013	0.068	1.6	61.188	0.256	61.444	Pit280	4.6	0.615	62.058	-8.31	0.213
Pipe165	0.008	12.953	53.127	53.027	0.77	100	0.013	0.005	1	62.058	0.33	62.389	Pit279	1.5	0.084	62.473	-8.62	0.058
Pipe172	0	15.113	56.277	56.201	0.5	100	0.013	0.004	0	60.757	0	60.757	Pit284	1.5	0	60.757	-3.76	0
Pipe198	0.113	13.768	56.369	56.3	0.5	300	0.013	0.068	1.6	61.705	0.187	61.892	Pit285	5.4	0.7	62.592	-5.29	0.239
Pipe170	0	14.075	51.577	51.277	2.13	100	0.013	0.008	0	58.719	0	58.719	Pit292	1.5	0	58.719	-6.42	0

Pipe171	0	13.641	53.777	53.709	0.5	100	0.013	0.004	0	59.054	0	59.054	Pit293	1.5	0	59.054	-4.55	0
Pipe10	0.278	10.982	40.83	40.73	0.91	525	0.013	0.41	1.3	43.968	0.046	44.014	Pit295	4.6	0.388	44.402	-2.4	0.795
Pipe6	0.059	17.231	41.044	40.958	0.5	225	0.013	0.032	1.5	43.318	0.299	43.617	Pit301	5.9	0.665	44.282	-2.38	0.575
Pipe2	0.086	24.317	42.069	41.869	0.82	300	0.013	0.088	1.2	45.022	0.192	45.214	Pit303	4.3	0.324	45.538	-2.54	0.234
Pipe4	0.15	19.026	41.99	41.69	1.58	375	0.013	0.22	1.4	44.708	0.14	44.848	Pit307	5.6	0.528	45.376	-2.38	0.365
Pipe5	0.068	17.184	41.169	41.083	0.5	300	0.013	0.068	1	44.021	0.085	44.106	Pit309	4.6	0.216	44.323	-2.22	0.335
Pipe11	0.336	10.588	40.63	40.455	1.65	525	0.013	0.553	1.5	43.433	0.064	43.498	Pit311	5.1	0.625	44.123	-2.32	1.278
Pipe412	0.009	16.796	40.877	40.777	0.6	100	0.013	0.004	1.2	42.865	0.546	43.411	Pit317	5.9	0.423	43.834	-2.23	0.501

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
OF968	0.501	0.501	1.716	0.185	0.2	5.34	1.08	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF976	1.051	1.051	1.421	0.239	0.31	7.5	1.3	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF983	2.599	2.599	6.478	0.106	0.25	10.85	2.35	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF234	3.727	3.727	3.908	0.291	0.33	12.33	1.15	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF885	1.278	1.278	1.777	0.239	0.38	7.5	1.58	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF896	0.61	0.61	1.258	0.224	0.19	6.92	0.87	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF902	0.916	0.916	1.321	0.239	0.27	7.5	1.13	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF923	0.335	0.335	1.144	0.185	0.13	5.34	0.72	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF929	0.759	0.759	1.018	0.239	0.22	7.5	0.94	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF954	0.692	0.692	1.382	0.227	0.22	7.03	0.96	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF960	0.607	0.607	1.648	0.189	0.24	5.49	1.25	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF918	0.365	0.365	1.23	0.142	0.19	3.62	1.34	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF914	0.601	0.601	1.478	0.182	0.25	5.19	1.35	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF942	0.234	0.234	1.614	0.135	0.13	3.51	0.95	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF936	0.464	0.464	1.045	0.217	0.15	6.62	0.71	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF965	0.575	0.575	1.684	0.196	0.21	5.79	1.09	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF874	0.795	0.795	1.236	0.239	0.23	7.5	0.98	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF880	0.357	0.357	1.214	0.185	0.14	5.34	0.77	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF2317	0	0	1.542	0	0	0	0	
OF1342	0.173	0.173	0.78	0.092	0.15	2.69	1.65	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1346	0.281	0.281	0.768	0.104	0.21	3.12	2.01	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1362	0.842	0.842	0.96	0.171	0.37	4.78	2.14	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1370	0.373	0.373	1.072	0.135	0.2	3.51	1.52	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF437	0.865	0.865	1.402	0.203	0.31	6.05	1.53	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF417	0.896	0.896	1.514	0.239	0.26	7.5	1.11	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF2705	0.533	0.533	0.375	0.229	0.17	7.1	0.72	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1171	0.857	0.857	0.717	0.143	0.45	3.66	3.11	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1179	1.394	1.394	1.382	0.239	0.41	7.5	1.72	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1186	1.52	1.52	1.395	0.239	0.45	7.5	1.88	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1192	1.278	1.278	1.339	0.231	0.39	7.18	1.7	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF68582	0.927	0.927	0.916	0.05	0.12	11.68	2.38	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF68563	4.133	4.133	37.03	0.142	0.07	60.94	0.48	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1353	0	0	0.876	0	0	0	0	
OF1589	0.239	0.239	1.401	0.153	0.12	4.03	0.77	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3

OF1582	0	0	1.07	0	0	0	0	
OF1577	0.025	0.025	1.07	0.081	0.03	2.3	0.32	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF2293	0.136	0.136	0.444	0.132	0.08	3.51	0.58	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF2298	0	0	0.622	0	0	0	0	
OF2311	0	0	0.887	0	0	0	0	
OF1336	0	0	0.797	0	0	0	0	
OF2306	0	0	1.498	0	0	0	0	
OF1695	0.058	0.058	1.096	0.106	0.04	3.19	0.4	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1688	0.213	0.213	1.214	0.154	0.1	4.07	0.67	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1683	0.332	0.332	1.59	0.25	0.33	2	1.32	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1607	0.142	0.142	0.807	0.234	0.15	1.87	0.65	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1615	0.137	0.137	1.535	0.182	0.19	1.46	1.03	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1616	0.768	0.768	0.842	0.435	0.44	3.48	1.01	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1617	0.699	0.699	1.162	0.372	0.47	2.97	1.27	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1618	0.676	0.676	1.313	0.351	0.48	2.81	1.37	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1619	0.652	0.652	0.719	0.434	0.38	3.47	0.87	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1620	0.513	0.513	0.789	0.383	0.33	3.07	0.87	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1621	0.397	0.397	0.732	0.358	0.28	2.86	0.78	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1677	0.502	0.502	1.545	0.252	0.5	2.02	1.97	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1701	0.518	0.518	1.578	0.176	0.22	4.97	1.24	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1491	0.535	0.535	0.627	0.424	0.32	3.39	0.74	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1490	0.451	0.451	0.518	0.427	0.26	3.42	0.62	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1489	0.346	0.346	1.596	0.253	0.34	2.03	1.35	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1488	0.312	0.312	1.596	0.244	0.32	1.95	1.31	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1487	0.317	0.317	1.31	0.264	0.3	2.11	1.14	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1486	0.275	0.275	1.718	0.226	0.3	1.81	1.35	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1485	0.293	0.293	1.324	0.255	0.29	2.04	1.12	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1484	0.265	0.265	1.541	0.233	0.28	1.86	1.22	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1483	0.261	0.261	1.56	0.23	0.28	1.84	1.23	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1482	0.291	0.291	1.112	0.272	0.27	2.18	0.98	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1476	0.226	0.226	0.795	0.281	0.2	2.25	0.72	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1544	0.162	0.162	0.979	0.101	0.12	3.02	1.23	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1429	0.149	0.149	1.321	0.133	0.08	3.51	0.62	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1563	0.036	0.036	1.401	0.084	0.04	2.43	0.42	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1601	0.359	0.359	0.934	0.206	0.13	6.17	0.62	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1594	0	0	0.335	0	0	0	0	
OF1555	0.145	0.145	1.321	0.132	0.08	3.51	0.61	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1461	0.155	0.155	0.944	0.098	0.12	2.92	1.26	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF2510	0	0	1.571	0	0	0	0	
OF1423	0.048	0.048	1.519	0.081	0.05	2.3	0.63	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1442	0.254	0.254	0.847	0.109	0.18	3.29	1.63	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1450	0	0	0.868	0	0	0	0	
OF1435	0	0	1.68	0	0	0	0	
OF1455	0	0	0.858	0	0	0	0	
OF1390	0.003	0.003	0.774	0.024	0.02	0.31	0.76	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1398	0.366	0.366	0.79	0.117	0.23	3.48	1.99	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1469	0.289	0.289	0.844	0.112	0.2	3.39	1.76	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3

OF1417	0.378	0.378	1.038	0.134	0.21	3.51	1.56	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1408	0.006	0.006	0.91	0.035	0.02	0.68	0.65	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1056	0.232	0.232	0.865	0.108	0.16	3.25	1.52	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1062	0.132	0.132	0.854	0.087	0.12	2.53	1.42	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1080	0.005	0.005	0.843	0.031	0.02	0.55	0.69	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1086	0.207	0.207	0.952	0.108	0.15	3.25	1.36	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1772	1.011	1.011	1.055	0.19	0.39	5.53	2.06	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1776	1.176	1.176	1.058	0.201	0.43	5.98	2.12	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1783	1.303	1.303	1.087	0.212	0.44	6.43	2.09	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1784	1.317	1.317	1.306	0.232	0.4	7.21	1.74	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1785	1.251	1.251	1.284	0.226	0.39	6.99	1.74	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1786	1.108	1.108	0.53	0.239	0.33	7.5	1.37	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1787	0.918	0.918	0.878	0.166	0.41	4.55	2.5	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1788	0.625	0.625	0.837	0.141	0.33	3.58	2.32	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF2139	0.958	0.958	3.009	0.194	0.3	7.69	1.57	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF29346	0.73	0.73	2.939	0.177	0.26	7.02	1.49	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF68488	0.971	0.971	2.995	0.194	0.31	7.69	1.59	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF68493	1.24	1.24	1.467	0.282	0.25	9.58	0.88	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF68498	0.748	0.748	3.009	0.181	0.26	7.17	1.45	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF68327	0.747	0.747	1.112	0.387	0.48	3.1	1.25	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF30334	1.671	1.671	1.15	0.166	0.75	4.55	4.55	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF30206	0.813	0.813	1.186	0.128	0.47	3.5	3.65	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF30391	0.117	0.117	1.341	0.077	0.13	2.16	1.7	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF3140	36.889	36.889	12.846	0.642	1.63	25.14	2.55	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
OF1707	0	0	0.79	0	0	0	0	
OF1749	0	0	0.802	0	0	0	0	
OF1754	0	0	0.975	0	0	0	0	
OF1761	0	0	0.816	0	0	0	0	
OF1767	0.193	0.193	1.261	0.118	0.12	3.48	1.03	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1069	0.33	0.33	0.823	0.115	0.21	3.48	1.86	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1030	0.114	0.114	0.777	0.079	0.12	2.23	1.56	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1043	0	0	0.754	0	0	0	0	
OF1050	0	0	0.762	0	0	0	0	
OF1036	0	0	0.824	0	0	0	0	
OF1018	0	0	0.766	0	0	0	0	
OF1012	0.076	0.076	0.79	0.071	0.1	1.97	1.33	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
OF1005	0.105	0.105	0.935	0.085	0.1	2.46	1.19	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
OF565	0.121	0.121	0.803	0.082	0.12	2.33	1.53	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF559	0.288	0.288	0.795	0.109	0.2	3.29	1.85	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF553	0.204	0.204	0.721	0.091	0.18	2.66	1.99	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF2159	0.329	0.329	1.555	0.115	0.21	3.48	1.85	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF68652	0	0	1.202	0	0	0	0	
OF2205	0.176	0.176	1.673	0.096	0.15	2.82	1.53	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF2214	0.071	0.071	1.468	0.075	0.08	2.1	1.1	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF2256	0.151	0.151	1.532	0.093	0.13	2.73	1.4	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF2008	0.144	0.144	0.783	0.086	0.14	2.49	1.59	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF2048	0	0	0.787	0	0	0	0	

OF2052	0.019	0.019	0.928	0.051	0.04	1.24	0.77	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
OF2021	0.184	0.184	0.797	0.093	0.16	2.73	1.71	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF2032	0	0	0.816	0	0	0	0	
OF2038	0.015	0.015	1.433	0.056	0.03	1.4	0.49	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1914	0.163	0.163	1.692	0.174	0.23	1.39	1.34	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1907	0.155	0.155	1.631	0.168	0.23	1.35	1.37	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1920	0.168	0.168	0.87	0.243	0.17	1.94	0.71	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1927	0.12	0.12	0.719	0.23	0.13	1.84	0.57	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1933	0.24	0.24	1.91	0.101	0.18	3.02	1.82	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1938	0	0	1.725	0	0	0	0	
OF1947	0	0	1.791	0	0	0	0	
OF1993	0.109	0.109	0.877	0.084	0.11	2.4	1.31	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF2003	0.079	0.079	0.804	0.071	0.1	1.97	1.38	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF2057	0.299	0.299	0.91	0.118	0.19	3.48	1.6	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF2065	0	0	0.776	0	0	0	0	
OF1628	0.355	0.355	0.764	0.337	0.26	2.7	0.78	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1627	0.294	0.294	0.649	0.334	0.22	2.68	0.66	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1622	0.246	0.246	1.045	0.261	0.24	2.09	0.9	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1024	0.064	0.064	0.78	0.067	0.09	1.8	1.32	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1817	0.147	0.147	0.881	0.23	0.16	1.84	0.69	AR&R 100 year, 10 minutes storm, average 252 mm/h, Zone 3
OF1824	0.064	0.064	1.133	0.153	0.1	1.22	0.69	AR&R 100 year, 10 minutes storm, average 252 mm/h, Zone 3
OF1825	0.011	0.011	0.713	0.094	0.03	0.75	0.31	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
OF1837	0.06	0.06	1.626	0.089	0.06	2.59	0.62	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
OF1872	0.246	0.246	1.666	0.204	0.3	1.63	1.48	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1878	0.218	0.218	1.601	0.191	0.29	1.53	1.5	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1879	0.21	0.21	1.619	0.189	0.28	1.51	1.47	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1880	0.206	0.206	1.672	0.19	0.27	1.52	1.43	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1881	0.189	0.189	1.647	0.182	0.26	1.46	1.42	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1882	0.162	0.162	1.513	0.195	0.21	1.56	1.07	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF2028	0.348	0.348	1.54	0.152	0.17	3.99	1.13	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1859	0.162	0.162	0.719	0.257	0.16	2.06	0.61	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1858	0.131	0.131	1.401	0.185	0.18	1.48	0.96	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1857	0.118	0.118	1.785	0.161	0.18	1.28	1.14	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1847	0.112	0.112	1.494	0.17	0.16	1.36	0.96	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF999	0.042	0.042	0.791	0.059	0.07	1.54	1.18	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF991	0.016	0.016	1.968	0.043	0.04	0.97	1.02	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF714	0.348	0.348	1.732	0.161	0.16	4.37	1	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF721	0.176	0.176	0.93	0.1	0.14	2.99	1.36	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF948	0.194	0.194	0.913	0.103	0.15	3.09	1.41	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF700	0.048	0.048	1.048	0.07	0.06	1.93	0.87	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF708	0.005	0.005	0.976	0.035	0.02	0.68	0.56	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF683	0	0	0.88	0	0	0	0	
OF677	0.471	0.471	1.317	0.158	0.22	4.25	1.41	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF671	0.83	0.83	1.132	0.182	0.34	5.23	1.85	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF665	0.869	0.869	1.716	0.228	0.27	7.07	1.19	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF612	0.669	0.669	1.7	0.208	0.23	6.24	1.13	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF582	0.581	0.581	1.125	0.16	0.27	4.33	1.69	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3

OF2666	1.278	1.278	12.415	0.054	0.06	20.43	1.17	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF768	0.168	0.168	1.349	0.207	0.2	1.65	0.99	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF762	0	0	0.801	0	0	0	0	
OF757	0	0	0.595	0	0	0	0	
OF748	0	0	0.603	0	0	0	0	
OF745	0	0	0.627	0	0	0	0	
OF788	0	0	1.728	0	0	0	0	
OF798	0.012	0.012	0.819	0.091	0.03	0.73	0.35	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF782	0.354	0.354	1.295	0.143	0.18	3.66	1.28	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF2286	0.474	0.474	1.064	0.149	0.24	3.88	1.6	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF2279	0.012	0.012	1.134	0.046	0.03	1.07	0.61	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF728	0	0	1.51	0	0	0	0	
OF844	0.001	0.001	0.993	0.033	0.01	0.26	0.21	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF837	0.008	0.008	0.595	0.09	0.02	0.72	0.25	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF831	0.215	0.215	0.634	0.299	0.18	2.39	0.6	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF825	0.196	0.196	0.918	0.252	0.19	2.02	0.77	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF814	0.181	0.181	1.054	0.232	0.19	1.86	0.84	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF813	0.158	0.158	0.836	0.241	0.16	1.93	0.68	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF806	0.132	0.132	0.764	0.233	0.14	1.86	0.61	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF852	0.198	0.198	1.197	0.116	0.13	3.48	1.09	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF2224	0.128	0.128	1.551	0.089	0.12	2.59	1.32	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF2322	0.012	0.012	1.616	0.042	0.04	0.91	0.84	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
OF3176	13.115	13.115	12.838	0.343	0.61	22.75	1.79	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
OF2196	0.331	0.331	1.342	0.126	0.19	3.91	1.51	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF606	0	0	0.799	0	0	0	0	
OF492	0.812	0.812	1.382	0.239	0.24	7.5	1	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF512	2.848	2.848	16.35	0.081	0.16	30.09	2.03	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
OF15	5.821	5.821	15.543	0.227	0.29	30.87	1.26	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
OF2229	0.209	0.209	1.499	0.105	0.15	3.15	1.46	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF2240	0.094	0.094	1.836	0.071	0.12	1.96	1.64	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF538	0.518	0.518	1.757	0.183	0.21	5.27	1.14	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF68386	0.262	0.262	0.577	0.155	0.12	5.52	0.75	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1104	0.205	0.205	1.791	0.199	0.26	1.59	1.3	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1113	0.177	0.177	1.746	0.184	0.24	1.47	1.31	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1118	0.166	0.166	1.697	0.178	0.23	1.43	1.31	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1125	0.157	0.157	1.709	0.184	0.21	1.47	1.16	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1129	0.158	0.158	1.432	0.158	0.25	1.26	1.59	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF2444	0	0	1.283	0	0	0	0	
OF187	1.333	1.333	3.908	0.16	0.13	11.28	0.78	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1131	0.075	0.075	1.557	0.145	0.13	1.16	0.9	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF2273	0.062	0.062	1.516	0.07	0.08	1.93	1.11	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1257	0.014	0.014	0.963	0.047	0.03	1.11	0.71	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF485	0.158	0.158	0.762	0.087	0.15	2.53	1.71	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF480	0.212	0.212	1.362	0.124	0.13	3.49	1.03	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF390	0.265	0.265	0.809	0.105	0.19	3.15	1.85	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF396	0.274	0.274	0.78	0.106	0.2	3.19	1.87	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF410	0.15	0.15	1.225	0.108	0.11	3.25	0.99	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3

OF423	0.608	0.608	1.414	0.179	0.25	5.08	1.41	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF404	0.567	0.567	1.259	0.166	0.26	4.55	1.54	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF445	0.355	0.355	0.797	0.116	0.23	3.48	1.96	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF451	0	0	0.805	0	0	0	0	
OF1250	0.006	0.006	0.893	0.035	0.02	0.68	0.66	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1164	0.73	0.73	0.795	0.142	0.38	3.62	2.68	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1198	0.224	0.224	1.472	0.181	0.31	1.45	1.7	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1205	0.208	0.208	1.613	0.188	0.28	1.5	1.47	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1206	0.19	0.19	1.551	0.175	0.27	1.4	1.55	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1207	0.191	0.191	1.629	0.182	0.26	1.46	1.44	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1223	0.181	0.181	1.576	0.174	0.26	1.39	1.49	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1230	0.179	0.179	1.719	0.183	0.24	1.46	1.34	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1236	0.169	0.169	1.624	0.174	0.24	1.39	1.39	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1237	0.098	0.098	1.639	0.142	0.17	1.14	1.21	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1265	0.106	0.106	1.695	0.159	0.17	1.27	1.05	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
OF1277	0.004	0.004	0.518	0.07	0.01	0.56	0.18	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
OF470	0	0	0.698	0	0	0	0	
OF303	0.134	0.134	0.7	0.078	0.15	2.2	1.89	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF311	0.034	0.034	0.695	0.051	0.07	1.24	1.41	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF356	0.116	0.116	1.782	0.16	0.18	1.28	1.14	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF2437	0.039	0.039	1.355	0.055	0.07	1.37	1.34	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF464	0	0	0.798	0	0	0	0	
OF441	0.176	0.176	0.803	0.093	0.15	2.73	1.64	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF457	0.255	0.255	1.702	0.14	0.13	3.54	0.96	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF381	0.314	0.314	0.762	0.11	0.22	3.32	1.98	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF362	0.313	0.313	1.772	0.153	0.15	4.03	1	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF140	0.189	0.189	0.685	0.278	0.17	2.22	0.61	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF141	0.17	0.17	0.499	0.3	0.14	2.4	0.47	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF142	0.124	0.124	0.509	0.265	0.12	2.12	0.44	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF143	0.094	0.094	1.162	0.175	0.13	1.4	0.76	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF144	0.25	0.25	1.54	0.195	0.32	1.56	1.65	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1285	0.283	0.283	1.102	0.126	0.17	3.5	1.33	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF85	0	0	0.811	0	0	0	0	
OF317	0	0	1.043	0	0	0	0	
OF104	0.005	0.005	1.081	0.037	0.02	0.74	0.51	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
OF99	0	0	0.921	0	0	0	0	
OF75	0.301	0.301	0.993	0.123	0.18	3.49	1.48	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF57	0.451	0.451	1.002	0.139	0.24	3.52	1.74	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF213	1.117	1.117	4.855	0.126	0.11	11.01	0.84	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF81	0.001	0.001	0.849	0.018	0.01	0.24	0.59	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF111	0	0	0.868	0	0	0	0	
OF123	0	0	0.832	0	0	0	0	
OF69	0.774	0.774	0.921	0.162	0.36	4.4	2.2	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF240	0	0	20.262	0	0	0	0	
OF29	0	0	0.928	0	0	0	0	
OF38	0.397	0.397	1	0.134	0.22	3.51	1.64	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF5	1.155	1.155	0.909	0.185	0.46	5.34	2.49	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3

OF9	9.49	9.49	6.556	0.272	0.86	12.18	3.15	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
OF3082	11.295	11.295	22.78	0.507	0.35	51.41	0.7	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
OF44	0.573	0.573	1.478	0.178	0.24	5.04	1.34	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF20	0	0	0.96	0	0	0	0	
OF191	0.248	0.248	3.991	0.058	0.02	10.46	0.42	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF166	5.979	5.979	26.285	0.465	0.2	48.54	0.42	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
OF323	0.434	0.434	1.027	0.326	0.33	2.6	1.02	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF330	0.362	0.362	1.658	0.254	0.36	2.03	1.4	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF331	0.364	0.364	1.412	0.271	0.34	2.17	1.24	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF332	0.341	0.341	1.712	0.246	0.35	1.96	1.41	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF333	0.309	0.309	0.642	0.342	0.23	2.74	0.66	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF132	0.032	0.032	0.968	0.06	0.05	1.57	0.87	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF129	0	0	0.817	0	0	0	0	
OF216	0.077	0.077	6.332	0.01	0.01	10.08	0.75	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF3086	0.627	0.627	17.359	0.106	0.05	24.12	0.47	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1291	0.293	0.293	1.518	0.204	0.36	1.63	1.77	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1297	0.273	0.273	1.616	0.207	0.33	1.65	1.6	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1298	0.26	0.26	1.726	0.221	0.29	1.77	1.33	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1299	0.189	0.189	0	0.5	0.09	4	0.19	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1300	0.095	0.095	1.508	0.134	0.18	1.07	1.32	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1301	0.108	0.108	1.774	0.155	0.17	1.24	1.12	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1302	0.097	0.097	1.621	0.14	0.17	1.12	1.24	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1303	0.152	0.152	1.306	0.111	0.1	3.35	0.94	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF430	0.151	0.151	1.451	0.114	0.1	3.47	0.87	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1376	0.123	0.123	0.634	0.243	0.13	1.94	0.52	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1377	0.099	0.099	1.444	0.133	0.19	1.07	1.39	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF1716	0.307	0.307	1.618	0.215	0.36	1.72	1.65	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1722	0.257	0.257	1.642	0.206	0.31	1.64	1.52	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1728	0.242	0.242	1.666	0.202	0.3	1.61	1.49	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1729	0.235	0.235	1.62	0.197	0.3	1.57	1.52	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1730	0.262	0.262	1.722	0.212	0.31	1.7	1.45	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1074	0.612	0.612	0.917	0.147	0.31	3.81	2.11	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF2014	0.296	0.296	1.022	0.124	0.18	3.49	1.43	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF2109	0.447	0.447	1.56	0.246	0.45	1.96	1.85	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF2431	0.726	0.726	1.645	0.304	0.6	2.43	1.96	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF2419	0.681	0.681	1.541	0.331	0.51	2.65	1.55	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF2410	0.614	0.614	1.207	0.349	0.44	2.79	1.26	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF68305	0.485	0.485	0.745	0.383	0.32	3.07	0.82	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF576	15.574	15.574	24.504	0.641	0.43	57.15	0.66	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
OF3042	2.241	2.241	12.972	0.142	0.11	21.14	0.77	AR&R 100 year, 10 minutes storm, average 252 mm/h, Zone 3
OF3022	1.833	1.833	12.972	0.126	0.09	21.01	0.71	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
OF210	0.748	0.748	3.991	0.112	0.07	10.89	0.64	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
OF249	2.497	2.497	4.407	0.215	0.23	11.72	1.07	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF3094	1.475	1.475	15.706	0.347	0.06	39.8	0.17	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
OF235	3.126	3.126	3.464	0.283	0.28	12.26	0.99	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF257	0.204	0.204	22.512	0.029	0.01	30.07	0.36	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF51804	0	0	1.138	0	0	0	0	

OF518	0.036	0.036	1.102	0.066	0.05	1.77	0.76	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
OF2995	1.922	1.922	1.395	0.226	0.61	6.99	2.68	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
OF858	0.249	0.249	0.934	0.179	0.1	5.08	0.58	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF866	0.553	0.553	1.137	0.159	0.26	4.29	1.63	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF869	0.069	0.069	1.14	0.082	0.07	2.33	0.87	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF774	0.169	0.169	1.168	0.144	0.09	3.69	0.61	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF1403	0.646	0.646	0.83	0.141	0.34	3.58	2.4	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF2517	5.457	5.457	2.072	0.417	0.9	10.1	2.15	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF2520	7.854	7.854	3.703	0.368	0.45	44.75	1.22	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF2530	5.019	5.019	8.572	0.232	0.16	46.13	0.69	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF2609	0.094	0.094	0.899	0.095	0.08	2.79	0.83	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF2560	4.085	4.085	1.619	0.298	0.91	9.3	3.05	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF2557	0.566	0.566	1.653	0.164	0.28	5.06	1.73	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF2618	0.557	0.557	1.915	0.179	0.24	5.95	1.36	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF2565	15.217	15.217	22.574	0.567	0.45	54	0.79	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
OF2574	9.887	9.887	0.359	0.229	0.58	25.76	2.53	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
OF2582	14.488	14.488	22.314	0.549	0.43	53.2	0.79	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF2815	1.46	1.46	36.933	0.032	0.02	60.21	0.76	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
OF2859	1.087	1.087	6.403	0.054	0.11	10.43	1.96	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF245	0	0	12.248	0	0	0	0	
OF3047	0	0	12.326	0	0	0	0	
OF32652	18.413	18.413	12.321	0.222	0.88	21.78	3.97	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
OF3147	30.772	30.772	12.688	0.493	1.4	23.94	2.84	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF3142	94.247	94.247	13.26	1.555	3.59	32.44	2.31	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
OF3163	0.089	0.089	12.531	0.011	0	20.09	0.4	AR&R 100 year, 5 minutes storm, average 322 mm/h, Zone 3
OF30286	12.425	12.425	12.664	0.275	0.59	22.2	2.14	AR&R 100 year, 20 minutes storm, average 188 mm/h, Zone 3
OF3181	74.803	74.803	13.373	1.577	2.84	32.61	1.8	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
OF633	0	0	0.859	0	0	0	0	
OF30205	6.698	6.698	4.926	0.533	0.77	12.61	1.45	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
OF30268	1.732	1.732	12.972	0.123	0.08	20.98	0.69	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
OF30281	0.094	0.094	0.206	0.035	0.01	10.21	0.41	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
OF153	0.084	0.084	2.878	0.086	0.08	2.48	0.94	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
OF2094	0	0	1.685	0	0	0	0	
OF42414	1.091	1.091	0.206	0.109	0.1	17.54	0.88	AR&R 100 year, 1.5 hours storm, average 81 mm/h, Zone 3
OF30181	0	0	0.797	0	0	0	0	
OF30187	3.698	3.698	4.826	0.379	0.48	10.19	1.27	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3
OF51797	3.359	3.359	4.215	0.246	0.5	8.59	2.02	AR&R 100 year, 45 minutes storm, average 126 mm/h, Zone 3

Appendix 4
Frequent flow Management Calculation

A roof eaves gutter is generally sized for a 1 in 20 year event, therefore the house drainage system must cater for a similar flow. Flows from a typical 200 sqm home roof are tabulated below for 5 minute duration storms:

Design Storm Volumes									
ARI year	0.25	0.50	1	2	5	10	20	50	100
Intensity mm/hr	66	99	110	142	182	207	241	286	322
Peak Flow l/s	3.7	5.0	6.1	7.9	10.1	11.5	13.4	15.9	17.9
Volume l	555	750	915	1185	1515	1725	2010	2385 (375 l spilled)	2685 (675 l spilled)

Roof spillage falls to the ground where it mixes with pavement and garden surface flows and enters the roadway or for lots on the low side of the road it enters the inter-allotment drainage system.

For Ripley the expected Average Annual rainfall of 846mm corresponds to a volume which can be captured of 169,200 litres for a 200m^2 roof. A typical house has to have the following connected to the harvest tank in accordance with QDC:

Item	**Flow Rate Each (Ref: GCCC)**	**Qty (assuming 3 EP/house)**	**Volume/use**	**Annual Volume**
Toilet cisterns	6 l/min	usually 2 off assuming ensuite and main bathroom/WC	6 l @ 4 per EP	26,280
Washing machine cold water taps	9 l/min	1 off	90 l @ 10 min	28,080
External taps	9 l/min	usually 2 off	135 l @ 15 min	14,040
				68,400

Annualised savings from the configuration target 70 kl per year required by QDC which equates to 190 l/day.

On average, 100,800 l of rainwater overflows from the rainwater tank annually. If the minimum required roof area of 100 sq m is connected then the loss is only 16,200 l with a 5000l storage tank. The overflow from the tank would also be connected to the house drainage system.

Conservatively, assuming the tank is full 50% of the time over a year, then the ability of a house to reuse a portion of the rainfall depth can be calculated as follows:

- Roof Area = 200 sqm
- Driveway Area = 30 sqm
- Rainfall depth to be captured = 15 mm/day (the Frequent Flow Management design objective)
- Rainfall Volume to be reused or treated = 15 mm x 230 sqm =3450 l
- Tank Volume = 5000 l
- Portion of roof connected = 50%
- Connected Roof Area = 100 sqm
- Volume collected from roof = 15 mm/day x 100 sqm = 1500 l
- Less First Flush = 20 l (discharged to downstream treatment)
- Volume collected by Tank = 1500 l – 20 l = 1480 l
- Average available storage = 50% x 5000 l = 2500 l
- Average daily usage = 70,000 l /365 = 190 l
- Available volume after 24 hrs = 2500+190-1480 = 1210 l
- Non-compliant and on average more water (approximately 740 l) would need to pass to the street for subsequent treatment in the street garden 25% of the time.

At a meeting with ICC on 22 March 2010, ICC advised that it would be difficult to amend the Part 12 Planning Legislation to incorporate larger tanks than that specified in the QDC, and the QDC regulated 5000 L does not achieve the Frequent Flow Management outcome for Ripley rainfall averages, the provision of bioretention basins in the residential areas provide sufficient storage to supplement that required to achieve the requested frequent flow management objectives of the SEQ Implementation Guidelines No 7.

- The bioretention area required would nominally be about 1.25 % of the residential catchment area and with a detention storage of 300 mm in depth for a 450 sqm lot with a road frontage area of 150 sqm the available storage in the bioretention is 0.3 x 1.25/100 x (450 +150) = 2.25 cum.
- Volume collected from road pavement and balance of roof = 15 mm/day x (15 m x 3.5 m) +130 sqm = 2738 L.

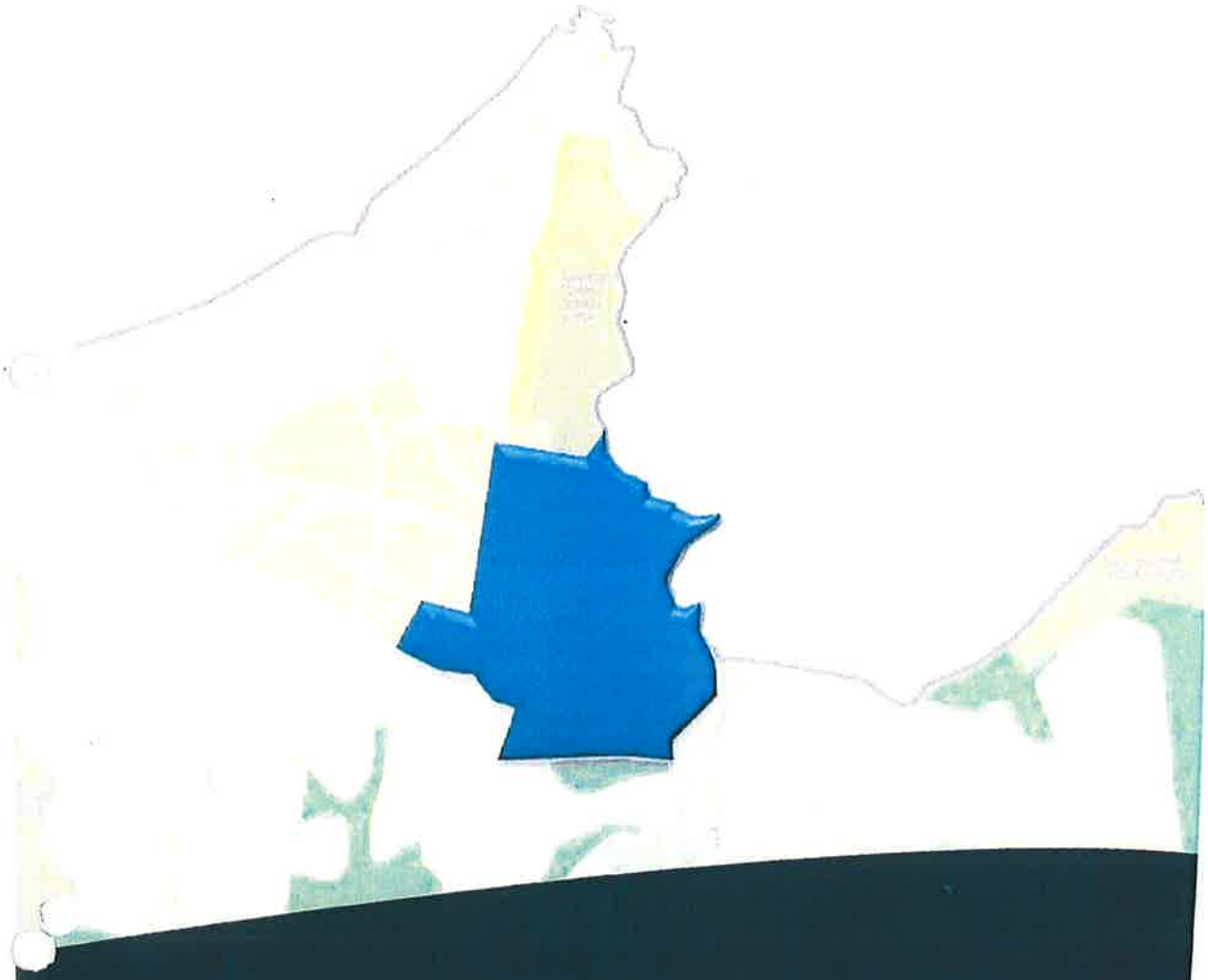
The bioretention basin would be empty within a few hours therefore based on this calculation there would be 1210 + 2250 - 2738 = 722 L available volume after 24 hours.

Therefore the Frequent Flow Management storage requirement is achieved.

Appendix 5
Integrated Water Management Report by Cardno Limited

5270

Cardno
Shaping the Future



Ripley Valley: Urban Core (UC)

Neighbourhood Master Plan

Water Cycle Management - Water Budget

Report No: 790065-025-UC-003

Prepared for Sekisui Housing Development Services Pty Ltd (SHDS)

17 September 2010

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Ripley Valley: Urban Core (UC)

Neighbourhood Master Plan Water Cycle Management - Water Budget

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EXECUTIVE SUMMARY

The Integrated Water Management Plan for the Secondary Urban Centre East will comprise three components:

- water quality management;
- flooding and drainage management; and
- water cycle management.

This report considers the management of the water cycle.

A key component of the management of the water cycle for the Urban Core in Ripley Valley is the minimisation of the demand for potable water. In addition to minimising the impact of development on the reliability of Queensland's major water storages, the use of alternate water sources has the potential to minimise the impact of development upon Ripley Valley and downstream areas.

In particular, the collection and reuse of stormwater runoff has the potential to offset to some degree the impact of development upon the frequency and magnitude of runoff to Bundamba Creek. This will assist in satisfying the frequent flow management criterion in the *Implementation Guideline No 7, Water Sensitive Urban Design: Design Objectives for Urban Stormwater Management (South East Queensland Regional Plan 2009 – 2031)* (November 2009) and achieving the minimum water savings targets identified in the *Queensland Development Code*.

Demand for Water

A review was completed on the demands for water within the Urban Core development and the quality of water required for each identified demand. Water will be required to meet the demands for water on each lot (urban and commercial) and for the irrigation of open space areas.

Table E1 details the overall demand for water for the Urban Core development. The table also shows the demand for potable (water of a standard suitable for drinking) and non-potable water.

The demands presented in the table assume that there will be a full adoption of water saving devices (AAA rated shower heads and taps, etc) and appliances (water efficient washing machines and dishwashers) across the Urban Core, including the commercial areas.

Table E 1 Overall Water Demand

Demand Type	Demand	Water Usage	Daily Demand Within Urban Core								
			Suburban (T3/OU)	General Urban (T4/LD)	Urban Centre (MD/T5)	High Density Urban (HD)	Industry	Offices	Retail / Public Buildings	Public Open Space	Total
		(L/EP/d)	(kL/d)	(kL/d)	(kL/d)	(kL/d)	(kL/d)	(kL/d)	(kL/d)	(kL/d)	(kL/d)
Urban Lot Usage											
Potable Demands	Indoor- kitchen	15.6	89.6	147.9	13.5	27.7					284.2
	Indoor-laundry (25%)	7.8	44.8	74.0	6.7	13.9					142.1
	Indoor-bathroom	75.6	434.1	716.9	65.2	134.4					1377.5
Non-Potable Demands	Indoor- Laundry (75%)	23.4	134.4	221.9	20.2	41.6					426.4
	Indoor- Toilet	25.2	144.7	239.0	21.7	44.8					459.2
	Outdoor-Irrigation	varies	501.2	505.7	20.7	7.1					1034.8
Total Lot Usage			1348.8	1905.4	148.0	269.5					*3724.2*
Average Lot Usage (L/EP/day)			234.9	200.9	166.4-175.5	150.9					
Commercial Areas											
Total Potable Demand		varies					32.8	146.0	87.5		266.3
Total Non-Potable Demand		varies					49.1	218.9	131.3		399.4
Total Demand							81.9	364.9	218.9		*665.6*
Open Space											
Open Space Usage		varies								1846.6	*1846.6*
Totals											
Total Potable Demand											*2070.0*
Total Non-Potable Demand											*4166.0*
Total Demand											***6236.0***

Note: EP represents Equivalent Persons for the purpose of water demand calculations.
EP calculations and irrigation requirements for lot types are shown in Table 5.

Options to Satisfy Demand

The Southern Regional Water Pipeline will be the bulk supply source of potable water to Ripley Valley. Water will be required to supply the potable water demand and that part of the non-potable demand which cannot be satisfied by the use of alternate water sources.

With respect to the non-potable demands of the Urban Core, it is expected that it will not be possible to supply recycled water from the Bundamba sewage treatment plant to individual lots. It is therefore proposed to use rainwater tanks to collect runoff from roof areas for non-potable reuse.

Water balance modelling based on the rainwater tank requirements mandated in the *Queensland Development Code* indicated that rainwater tanks will supply, on average across the lot types to be provided in the Urban Core, approximately 50% of the non-potable lot based demand.

While the use of rainwater tanks will allow for the collection of runoff from roof areas, such schemes do not collect runoff from ground areas. To allow for the collection and reuse of runoff from ground areas, the potential to use a stormwater harvesting scheme to provide irrigation water for open space areas was investigated.

The quantity of runoff available for a stormwater harvesting scheme is less certain than for roofwater collection. The amount of roof area draining to rainwater tanks on each lot together with variations in tank size and the rate of usage of collected water affect the amount of runoff that occurs from each lot. Similarly, the type and size of water quality improvement devices adopted for the development will impact on the volume of water available for harvesting. To allow for this potential variation, the water balance analysis considered different runoff estimates.

When modelling the potential to adopt a stormwater harvesting scheme, consideration was given to both underground storages and open water storages.

Due to the relatively large area to be irrigated (144.3 hectares), modelling determined that the use of harvested stormwater as the primary means of irrigating all open space areas would have only a limited reliability. For this case, recycled water would be required periodically when harvested stormwater is unavailable. Such a system would produce a highly variable demand for recycled water, with none being required when rainfall occurs regularly, and recycled water being used to supply the full irrigation demand during dry periods. To improve the reliability of supply of harvested stormwater and to provide a more stable demand for recycled water, a second case was considered.

For the second case, it was assumed that the irrigation requirements for the first and second tier ovals and detention basin areas (the priority irrigation areas, refer Table 4) would be met by the use of harvested stormwater, with recycled water used to supply the irrigation requirements for other open space areas. Recycled water would be used to supplement the harvested stormwater supply for priority areas if required.

The water balance modelling indicated that an underground storage of a total volume of 10ML combined with an open water storage of up to 47 ML (waterbodies with a combined area of 3 hectares) would provide a means to supply part of the non-potable demand for irrigation water for open space areas from harvested stormwater without exceeding the economic limit of performance for either storage type:

The analysis indicated that the storage volumes nominated above could provide slightly greater than 60% of the overall demand for irrigation water in the case of harvested stormwater being used to irrigate all open space areas. Allowing recycled water to also be used would increase the reliability of using stormwater to irrigate the remaining open space areas to in excess of 80% reliability.

Given the improvement in reliability achieved by allowing supplementation of irrigation with recycled water, it is considered that the optimal outcome for the irrigation of open space areas is to use harvested stormwater to irrigate the first and second tier ovals, bio-retention and detention basin areas, with recycled water to irrigate the remaining area.

Summary of Findings

The total water demand for the Urban Core is 6,236 kL/day. Based on the consideration of available options for the supply of water to the Urban Core and the results of water balance modelling, the following approach is considered to be optimal to meet the demand.

- Water saving fixtures and appliances to be adopted to minimise the lot based demand for water.
- Rainwater tanks to be provided to each lot in accordance with the requirements of the *Queensland Development Code* to collect roof runoff for non-potable reuse. Potable water will need to be used to provide supplemental water when the rainwater tanks are empty. As much roof area as possible should be directed towards the rainwater tanks.
- Use of harvested stormwater to irrigate priority open space areas (i.e. first and second tier ovals and detention basin areas). Recycled water would be used to supplement the supply and provide water when the stormwater storage is empty.
- Use of recycled water to irrigate remaining open space areas.
- Bore water should be used to top up the lake when required.

The summary of results for the Urban Core is shown in Table E2 below. For this scenario it was assumed that Scenario 3b (refer Table 12) was adopted. This included 100% of roof area draining towards tanks and the use of recycled water.

Table E 2 Summary of Water Demand and Supply with Recycled Water, Entire Urban Core

Use	Total Demand (kL/d)	Supply of Water to Meet Demand			
		Potable Water (kL/d)	Non-Potable Water Sources		
			Stormwater (kL/d)	Recycled Water (kL/d)	Total (kL/d)
Urban Lots- Potable water (kitchen, bathroom etc)	1803.9	1803.9			
Urban Lots- Non-Potable water (toilets, irrigation and laundry)	1920.3	579.9	1340.4		1340.4
Commercial Lots – Potable water (kitchen, bathroom etc.)	266.3	266.3			
Commercial Lots – Non-Potable water (toilets, irrigation, laundry, air conditioning etc.)	399.4	218.5	180.9		180.9
Open Space- 1st and 2nd tier ovals and detention basins	509.4		432.5	76.9	509.4
Open Space- Other Areas	1337.2			1337.2	1337.2
Total	**6236**	**2868.6**	**1953.8**	**1414.1**	**3367.9**
Percentage of Total Demand		**46.0%**	**31.3%**	**22.7%**	**54.0%**

- *Note: Figures are long term average demand and supply figures*

Based on the results presented above, it can be concluded that it will be possible to supply over half of the overall water demand of the Urban Core by alternate water supplies. Approximately a third of the overall water demand can be met by stormwater reuse (roofwater tanks and stormwater harvesting), with approximately 20% of the overall demand met by recycled water.

It is important to note that the approach outlined above would be subject to detailed design and cost benefit analysis to derive an overall optimal outcome. It may prove to be more practicable to adopt an alternate overall storage size to achieve the most sustainable outcome both environmentally and economically. Further, it will be necessary to ensure that the adopted system does not have an adverse impact on the frequent flow regime of Bundamba Creek by capturing too great a proportion of the runoff produced by small events.

1 INTRODUCTION

The Integrated Water Management Plan for the Urban Core will comprise three components:

- water quality management;
- flooding and drainage management; and
- water cycle management.

The first two components are dealt with in a separate report. This report considers the management of the water cycle.

A key component of the management of the water cycle for the Urban Core in Ripley Valley is the minimisation of the demand for potable water. In addition to minimising the impact of development on the reliability of Queensland's major water storages, the use of alternate water sources has the potential to minimise the impact of development upon Ripley Valley and downstream watercourses.

In particular, the collection and reuse of stormwater runoff has the potential to offset to some degree the impact of development upon the frequency and magnitude of runoff to Bundamba Creek. This will assist in satisfying the frequent flow management criterion in the *Implementation Guideline No 7, Water Sensitive Urban Design, Objectives for Urban Stormwater Management (SEQ Regional Plan 2005 – 2026)* and achieving the minimum water savings targets identified in the *Queensland Development Code*.

A water budget has been prepared for the entire Urban Core development area. The budget has considered both demands and available options for the supply of water, including alternate water sources.

The demand for water has been calculated for each of the various lot types expected within the Urban Core and the demand for irrigation water for open space areas.

Consideration was then given to the ability to use alternate water sources and, in particular, stormwater runoff to meet the non-potable demands of the site.

2 WATER SOURCES

2.1 General

A number of sources of water are potentially available to the Urban Core area. This section of the report describes the water sources and the constraints and opportunities associated with their use.

2.2 Potable and Recycled Water

The Southern Regional Water Pipeline will be the bulk supply source of potable water to Ripley Valley. The Southern Regional Water Pipeline involves the construction of a pipeline from Mt Crosby to Helensvale via Swanbank, North Beaudesert and Logan. The pipeline will supply water from Brisbane City Council's Mt Crosby Water Treatment Plant to key growth areas in South East Queensland. It will also allow transfer of water through the region.

The opportunity also potentially exists to access recycled water from the Western Corridor Recycled Water Scheme. The Western Corridor scheme collects wastewater from a number of wastewater treatment plants in Brisbane and Ipswich and, following further treatment at Advanced Water Treatment Plants (including one at Bundamba), distributes recycled water for appropriate uses.

At present, Council policy prohibits the use of Class A and Class B recycled water for residential use. Class A+ recycled water may be used for internal non-potable use (i.e. only where drinking standard water is not required).

As described in Section 2.5, rainfall can be harvested for reuse. Depending on a number of issues and the availability of recycled water to the Urban Core, runoff could be temporarily stored and then pumped to the sewerage reticulation system in off peak periods. Runoff that has passed through the sewage treatment plant could then be returned as recycled water for irrigation. While a potential option, issues such as the quality of runoff water (in terms of heavy metals and other contaminants not typically encountered in domestic sewage) and the cost of treatment and delivery to the site would need to be considered in detail. Previous limited investigations in relation to this concept have suggested that it would be difficult to implement in practice. Consequently, the option was not considered further for this investigation.

2.3 Water Mining

The potential exists to extract sewage from the sewerage reticulation system and use it for irrigation following treatment.

However, such a scheme is not considered to be viable at this point for a number of reasons. Firstly, during the initial stages of the development there will only be a relatively small flow in the sewerage reticulation system. Taking flow out of the system may reduce the flow in the system to an unsatisfactory level given maximum residence times in pipes for sewage.

Secondly, any extracted water would reduce the water being directed to the western corridor. It is considered that the economies of scale achieved by the treatment of a large volume of effluent via the western corridor make the construction of a small treatment plant not cost effective given that recycled water can be supplied to the area.

2.4 Groundwater

Preliminary consultation with the Department of Environment and Resource Management (formerly the Department of Natural Resources and Mines) in 2006 in relation to the availability of groundwater for use within the Urban Core had indicated that the quality and potential yield from the existing groundwater source are too poor to provide a viable alternate water source. However, the potential exists for the use of groundwater to top up open water bodies when required. The amount of groundwater that would be required on average per year will be investigated in this report. For the analysis it was assumed that the maximum daily pump rate would be 200kL/day.

2.5 Rainfall

In recent years, there has been an increased focus on the use of runoff at a local scale as a resource to minimise the demand for potable water. To date, this has most commonly taken the form of rainwater tanks to collect runoff from roof areas. The collected water has been used for outdoor irrigation and increasingly for indoor non-potable uses such as toilet flushing and cold water supplies for washing machines. The use of rainwater tanks is one means by which the water savings targets mandated in the *Queensland Development Code MP4-2 Water Savings Targets* can be achieved.

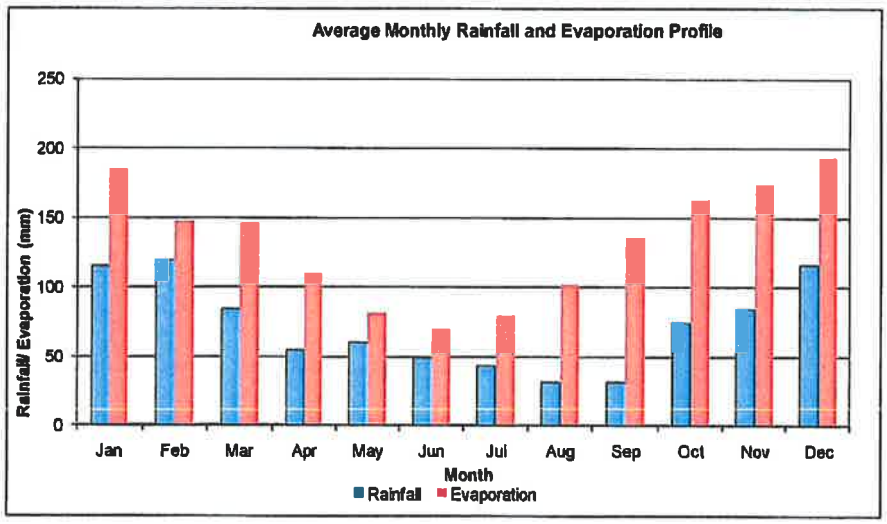
In addition to lot scale rainwater tanks, there is a move towards the use of larger scale stormwater harvesting schemes. Under such schemes, the runoff from an entire catchment (including ground and roof areas) is available for collection, treatment and reuse. While the collected stormwater is typically used for the irrigation of open spaces, if treated to a sufficiently high standard it can also be used for internal non-potable uses (i.e. uses not requiring water of a drinking quality standard).

The collection and reuse of runoff also offers the potential to offset to some degree (depending on the scale of reuse scheme that can be practically achieved) the impact of development upon both the frequency and magnitude of runoff.

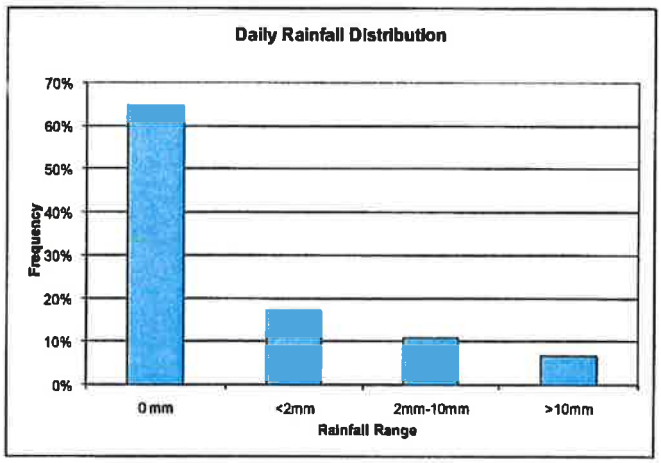
When considering the potential to collect rainfall, due consideration needs to be given to the climatic conditions in Ripley Valley. The annual rainfall in Ripley Valley is lower than at sites in close proximity to the coast. This reduces the volume of runoff available for capture and the viability of stormwater harvesting compared to catchments adjacent to the coast.

Based on SILO rainfall data supplied by the Department of Environment and Resource Management, the average annual rainfall in Ripley Valley is 864 mm. The distribution of this rainfall is shown on the following graphs. In comparison, the average annual rainfall in Brisbane (Bureau of Meteorology Station 040214) is a third greater at 1,155 mm.

Further, the estimated annual evaporation in Ripley Valley is 1,590 mm. In comparison, the average annual evaporation in Brisbane is 1,577 mm. The evaporation in Ripley Valley is therefore almost identical to that of Brisbane, with a total rainfall that is only 75% of that occurring in Brisbane. The volume of runoff available for harvesting will therefore be less than a comparable system closer to the coast would deliver.



In addition to the above, the generally dry nature of the area needs to be considered. The following graph indicates the distribution of daily rainfall. On over 60% of days no rainfall occurs, with 10 mm or more of rainfall only occurring less than seven percent of the time.



3 DEMAND FOR WATER

3.1 General

Associated with the development of the Urban Core will be a demand for water to service lots, commercial areas and public open space areas. The following sections detail the likely demands for water internally within houses, commercial areas and externally for irrigation.

3.2 Internal Residential Demands

The overall demand for water for internal use is reducing due to a greater awareness in the community of the need to minimise water use and the adoption of water saving devices (such as water efficient shower roses and washing machines) within houses.

The current average day demand applied by Ipswich City Council when determining the potable water requirements for a site is 320 Litres per equivalent person (EP), with an additional unaccounted for water demand of 50L/EP/d. The uses to which this water is considered to apply for residential properties are listed in Table 1.

Table 1 also lists the predicted demands presented in the Water by Design publication *Draft Stormwater Harvesting Guidelines* (December 2009) for the following scenarios:

- *Standard Residential:* Conventional dwellings without any water saving fixtures or appliances;
- *Some Water Saving Devices:* Conventional dwellings with some water saving devices (approximately 30% penetration of water efficient devices);
- *Most Water Saving Devices:* Dwellings with substantial installation of water saving devices (approximately 50 – 70% penetration of water efficient devices); and
- *Full Water Saving Devices:* Dwellings with full use of all water saving devices.

Table 1 Daily Water Demand for Properties (per Person)

Use	Current Council Guidelines			Stormwater Harvesting Guidelines							
	Total Usage	Internal Use	Demand	Standard Residential		Some Water Saving Devices		Most Water Saving Devices		Full Water Saving Devices	
	(%)	(%)	(L/d)	Prop. (%)	Demand (L/d)	Prop. (%)	Demand (L/d)	Prop. (%)	Demand (L/d)	Prop. (%)	Demand (L/d)
Internal Uses											
Kitchen	11	18	35	8	15	9	15	10	14	11	13
Laundry	15	25	48	27	50	26	43	24	35	21	26
Bathroom	19	32	61	44	82	45	76	48	69	51	63
Toilet	15	25	48	21	38	20	33	18	26	17	21
SubTotal	***60***	***100***	***192***	***100***	***185***	***100***	***167***	***100***	***144***	***100***	***123***
External Use											
Outdoor	40	-	128								
Total	***100***	-	***320***								

Note: Those uses where substitution with non-potable water can be achieved are shaded.
Figures for stormwater harvesting derived from the Water by Design publication Draft Stormwater Harvesting Guidelines, *(December 2009, p14-15).*

With reference to Table 1, the overall internal usage rate nominated in the *Stormwater Harvesting Guidelines* for standard residential areas is consistent with the current demand rate adopted by Council. However, it can be noted that the demands adopted for each internal use vary to some degree, with Council's adopted usage rate for kitchens being significantly higher than that presented in the guidelines, and Council's adopted usage rate for bathrooms being significantly lower than the value nominated in the stormwater harvesting guidelines.

The *Stormwater Harvesting Guidelines* present the estimated internal demands for water depending on the usage of water saving fixtures (AAA rated shower and tap heads, dual flush toilets) and appliances (e.g. washing machines, dishwashers). When considering the likely adoption rate for a greenfield site such as the Urban Core, as water saving devices are now commonly available, it was considered reasonable to adopt the demand rates presented for full water saving devices in place. As recommended in *Stormwater Harvesting Guidelines* (p14), a 20% planning factor was applied to the nominated internal usage rates to allow for some variation in usage from the lower bound estimates presented in the guidelines. The use of a 20% planning factor also provided demand figures that agreed reasonably well with current Queensland Water Commission water demand estimates.

As noted above, Council currently assumes an average daily demand of 320 L/EP/day (plus an unaccounted 50 L/EP/day for water demand). The latest water targets published by the Queensland Water Commission, based on the adoption of permanent water conservation measures, target a residential usage of approximately 230 L/EP/d. Therefore, with the establishment of Urban Utilities, a reduced design standard of service could be applicable from 1 July 2010.

Of the uses nominated in Table 1, the potable water requirements for certain uses can be substituted with a non-potable alternate water source. An alternate water source can be used to supply the requirements for outdoor use, toilet flushing, and the majority of laundry uses.

The requirements for outdoor use are detailed in Section 3.3. For the investigation, it was assumed that potentially all of the requirement for toilet flushing water could be met by an alternate water source. In accordance with the findings of the Heathwood/ Brazil Development Study (CSIRO, 2002), as reported in the Water by Design publication *Draft Stormwater Harvesting Guidelines* (December 2009, p27), it was assumed that cold water laundry requirements (i.e. that part of the laundry use that can be substituted by non-potable water) represent 75% of the total water requirement for laundry.

The investigation assumed that an alternate, non-potable, water source would be used to supply the water requirements for the uses nominated above. In the event of the alternate water source not being available, recourse to potable water would be required. In the event of significant drought conditions, it could be necessary to preclude outdoor use of potable water and restrict the internal usage of potable water.

Based on the savings in water demand listed in Table 1 above, and an estimated population of around 18,000 people (in the Urban Core and external catchments) the amount of water saved by implementing water efficient devices would be around 1100kL/day. Therefore the use of water efficient devices is an important first measure in reducing the water demand.

3.3 External Demands

3.3.1 Types of Demand

Water will be required for outdoor use on each lot and for the irrigation of open space areas. The anticipated demand for water for these uses was quantified, as summarised below.

As the irrigation requirements for commercial areas were more variable, the irrigation requirements were included in the standard commercial non-potable water demand. The irrigation of commercial road landscape areas was calculated separately.

3.3.2 External Use- Lots

With reference to Table 1, the current average day demand applied by Ipswich City Council includes an allowance of 128 Litres per equivalent person per day. This represents 40% of the overall total water usage for each person. While such a relatively high usage rate may have been applicable historically to traditional subdivisions, the increased lot densities applicable to modern developments such as the Urban Core will result in smaller areas requiring irrigation. Further, increased awareness in relation to the need to conserve water and the increased use of drought tolerant natural species will also tend to reduce the requirement for water for external use.

The Water by Design *Draft Stormwater Harvesting Guidelines* (December 2009, p17) suggests that an average irrigation rate of between 1.5 mm and 2 mm per day be used depending on the site being considered, noting that the lower rate could apply to most private gardens. The lower rate would equate to an irrigation rate of 10.5 mm per week, which is consistent with the 10 mm per week irrigation rate adopted for low importance public open space areas (refer Section 3.4). Given this, an average irrigation requirement of 10 mm per week (i.e. 520 mm per year) was adopted for irrigation within lots.

In accordance with the recommendations of the Water by Design *MUSIC Modelling Guidelines for South East Queensland* (December 2009, p25), it was assumed that 75% of the pervious area on each lot would be irrigated.

The amount of pervious area present on each lot will be dependent on the size of lot. For the range of lot sizes that are expected to occur within the Urban Core, the expected pervious area of each lot was calculated (after removing roof and assumed paved areas). The adopted demands for lot irrigation for each lot type within the Urban Core were then determined and are listed in Table 2.

Table 2 Lot Irrigation Demands

Lot Type	Assumed Density of Lots (Lots/ha)	Approximate Lot Size (m^2)	Pervious Area per Lot (m^2)	Irrigation Demand (per Lot)	
				Daily (L)	Annual (kL/a)
T5	35	200.0	65.0	69.6	25.4
T4	22.5	311.1	124.4	133.3	48.7
T3	15	500.0	203.7	218.2	79.6
Low Density (LD)	22.5	311.1	124.4	133.3	48.7
Med Density (MD)	40	175.0	43.8	46.9	17.1
High Density (HD)	125	56.0	5.6	6.0	2.2
Other Urban (OU)	15	500.0	203.7	218.2	79.6

It can be noted that there will be an additional small water usage associated with outdoor activities such as car washing and wash down of areas. Given that such activities occur relatively infrequently (in annual terms) and a planning allowance was applied to indoor use (refer Section 3.2), an additional allowance for other outdoor use was not considered necessary.

It is recognised that the demand for water will vary throughout the year depending on seasonal conditions and rainfall. To provide an acceptable distribution of irrigation demand for each month of the year, the irrigation demand was factored according to the crop factors nominated for Amberley (Table 3-13, *Draft Stormwater Harvesting Guidelines*, December 2009). The percentage of the annual irrigation demand allocated to each month is listed in Table 3.

Table 3 Irrigation Demand

Month	Average Irrigation Requirement (mm/week)	Percentage of Annual Irrigation (%)
January	22	13
February	17	10
March	15	9
April	11	6
May	7	4
June	6	3.5
July	6	3.5
August	9	5
September	15	9
October	19	11
November	22	13
December	22	13

Note: Values quoted for Amberley

The allocation of irrigation relative to the occurrence of rainfall is discussed in Section 4.

3.3.3 External Use- Open Space Areas

Associated with the Urban Core will be a number of open space, road landscaping (including proposed bio-retention pods) and general landscape areas for which irrigation will be required. Table 4 lists the areas requiring irrigation and the irrigation requirements for each area. Depending on the area to be irrigated, an application rate of between 260 mm per year (natural areas) and 1,300 mm per year (first tier sports ovals) will be required, with a more typical application rate of 520 mm per year for general landscape areas.

Available options for the provision of water include recycled water and stormwater harvesting. The ability to use stormwater is dependent upon the occurrence of rainfall and the type and size of storage provided to harvest stormwater. Depending on the area serviced, during dry periods there will be times where stormwater will not be available and recourse to recycled water will be necessary to meet the irrigation requirements of open space areas.

The first priorities in this regard for irrigation are the first and second tier ovals and the detention basin areas. Based on the analysis of the potential to harvest stormwater (refer Section 4), to maximise overall reliability it would be preferable to irrigate the first and second tier ovals and the detention basin areas with recycled water to maximise the availability of harvested stormwater for remaining areas.

Table 4 also lists the irrigation requirements for a scenario where water restrictions are applied to open space areas. A water restriction scenario was investigated as part of the water balance investigation for the Urban Core to quantify the benefit achieved by reducing the demand for water during periods of low rainfall (refer Section 4). Under such a scenario, the average application rate would reduce to 387 mm per year.

Table 4 Open Space Areas and Irrigation Areas

Landscape Area	Total Area (ha)	Normal Conditions		With Water Restrictions		Irrigation Efficiency (%)
		Application Rate (mm/week)	Av Daily demand (kL/day)	Application Rate (mm/week)	Av Daily demand (kL/day)	
Natural Areas						
50 metres Revegetation Buffer	32.38	5	208.16	0	0.00	90
Open Space Areas						
Formal Sporting areas (1st tier ovals)	2.00	25	64.29	20	51.43	90
Recreational Open Space (2nd tier ovals)	21.22	15	409.24	10	272.83	90
Bio-retention Basins	0.53	5	3.41	5	3.41	90
Detention Basins	5.06	5	32.53	5	32.53	90
General Landscape Areas						
Garden Beds (Native)	9.50	10	122.14	10	122.14	90
Turf Areas	9.50	15	183.21	10	122.14	90
Subdivision and Road Landscapes						
Urban Road Landscape	30.65	10	394.07	5	197.03	90
Commercial Road Landscape	2.39	10	30.76	5	15.38	90
Main Road Landscape	24.44	10	314.23	5	157.11	90
Pocket Parks within Developments	6.58	10	84.60	5	42.30	90
Totals						
Total to Priority Irrigation Areas			*509.46*		*360.19*	
Total To Remaining Irrigation Areas			*1337.17*		*656.11*	
Total Demand (kL/day)			**1846.64**		**1016.31**	

3.4 Commercial Water Demands

3.4.1 Types of Demand

Water will be required for a range of uses, dependant on the type of commercial area. The potential non potable water uses include air conditioning cooling water, toilet flushing, laundry uses and irrigation. For the analysis it was assumed that best available water saving devices would be adopted throughout the development.

3.4.2 Office Buildings

The water demands for typical office building were taken from the NABERS water use benchmarks for commercial office buildings (DEH, 2006). The table below shows the expected water use for different cities in Australia. The main reason for the differences is the variable water use demands of the air-conditioning systems. For 5 star office buildings in Brisbane the average water use rate is 0.35 kL/m^2/year.

Table 5 NABERS Office Building Water Demands (kL/m^2/year)

	Sydney	Melbourne	Canberra	Adelaide	Brisbane	Perth
1 star	1.73	1.03	0.99	1.08	2.53	1.41
2 stars	1.39	0.86	0.83	0.9	1.99	1.14
2.5 stars	1.21	0.77	0.75	0.8	1.72	1.01
3 stars	1.04	0.69	0.67	0.71	1.44	0.88
3.5 stars	0.87	0.6	0.59	0.62	1.17	0.75
4 stars	0.7	0.53	0.51	0.53	0.9	0.61
4.5 stars	0.52	0.43	0.43	0.44	0.62	0.48
5 stars	0.35	0.35	0.35	0.35	0.35	0.35

To determine the average water use it was assumed that the office buildings covered 70% of the site area (inclusive of public roads) and consisted of an average of four storeys. This was equivalent to 28000m^2 gross floor area (GFA) per hectare. The breakdown of water use between potable and non-potable water uses was taken from Sydney Water and DNRW typical water uses. Approximately 60% of the water demand was assumed to be non-potable.

The resultant water usage for office buildings is shown in Table 6.

3.4.3 Retail / Public Buildings

The typical water usage rates for retail areas and public buildings were taken from Table A of DNRW's *Planning Guidelines for Water Supply and Sewerage* (2005). The average water use ranges from 300 to 800L/100m^2/day. As full water saving devices will be adopted the water use was assumed to be 300L/100m^2/day. Approximately 60% of the water demand was assumed to be non-potable.

It was assumed that 50% of the site area (inclusive of public roads) consisted of retail space, and that it was only one storey in height, to give an equivalent of 5000m^2 GFA per hectare. Approximately half of the proposed retail buildings will have green rooves. For the water budget it was assumed that these areas would not drain to rainwater tanks. The irrigation requirements for the green rooves were assumed to be included in the standard water use for retail and public buildings as they will only account for approximately 10% of the demand, and irrigation requirements are already included in the water supply guidelines.

The resultant water usage for retail and public buildings is shown in Table 6.

3.4.4 Industry

The typical water usage rates for industrial areas were taken from Table A of DNRW's *Planning Guidelines for Water Supply and Sewerage* (2005). The average water use ranges from 10 to 35kL/ha/day. As full water saving devices will be adopted the water use was assumed to be 10kL/ha/day. Approximately 60% of the water demand was assumed to be non-potable. The actual water demands for industrial areas will be dependent on the type of industry involved.

It was assumed that 70% of the site area (inclusive of public roads) consisted of industrial space (including hardstand areas), and that it was only one storey in height, to give an equivalent of 7000m^2 GFA per hectare.

The resultant water usage for retail and public buildings is shown in Table 6.

3.4.5 Resultant Commercial Water Uses

Table 6 below shows the resultant water demands for commercial areas. The low demand option was adopted for the water budget, as it is expected that all buildings will adopt high water efficiency into their design. However, sensitivity analyses were conducted, to determine the likely efficiency rates if medium water uses were adopted.

Table 6 Commercial Water Demands

Land Use	Daily Water Demand (kL/ha/day)					
	Full Water Saving Devices / Low Demand			Some Water Saving Devices / Medium Demand		
	Potable Demand	Non-potable Demand	Total Demand	Potable Demand	Non-potable Demand	Total Demand
Industry	2.80	4.20	7.00	6.30	9.45	15.75
Office	10.72	16.08	26.80	27.60	41.40	69.00
Retail/ Public Space	6.00	9.00	15.00	11.00	16.50	27.50

The total commercial water demand for the Urban Core area if full water saving devices are implemented will be around 666kL/day. If only some water devices are used the commercial water demand will increase to around 1525kL/day. Therefore the adoption of water efficient devices is highly recommended as it will reduce the water demand of the Urban Core area by around 859kL/day.

4 WATER BUDGET

4.1 Philosophy

As noted in Section 2, it is desirable to collect and reuse stormwater runoff to both minimise the demand for potable water and to offset to some degree the impact of development upon the frequency and magnitude of runoff from the Urban Core area.

The reuse of stormwater runoff is considered to be preferable to the other means available for achieving water savings, namely greywater systems and alternate water supplies. In the case of greywater treatment systems (collecting waste water generated from the bath, shower, washbasin and laundry), concerns in relation to the relatively onerous treatment requirements for greywater and the fact that the density of lots is not conducive to the widespread application of lot-based greywater treatment systems make the use of such systems less attractive than rainwater collection systems.

There is also the issue that should another prolonged drought occur, it may be necessary to implement the Western Corridor recycled water scheme, where a seven stage process is used to provide water of a potable standard from Sewage Treatment Plant outflows. Under such a scenario, it would be preferable to maximise the flow delivered to regional Sewage Treatment Plants in order to maximise the treated potable water subsequently pumped to Wivenhoe Dam. The use of greywater systems would reduce the volume of water available for treatment to provide potable water.

To provide an alternate water supply, recycled water could be reticulated to each lot. However, current Council policy prohibits the use of Class A and Class B recycled water for residential use. Class A+ water may be used for toilet flushing and outdoor washdown (except for car washing) and watering. Further, it is considered that the supply of non-potable water via captured rainwater will be more cost effective than the dual pipe reticulation system otherwise required to deliver water to individual lots. Consequently, it is considered that the potential for the use of recycled water is limited to providing a source of water for the irrigation of open space areas. It can be noted that this use of water is currently permitted by Council.

Given the above, it was concluded that the capture and reuse of stormwater runoff offers the best potential to reduce the demand for non-potable water throughout the Urban Core and to provide part of the irrigation water necessary for open space areas (playing fields, general landscape areas, road landscapes and natural areas).

When determining the optimal configuration of the rainfall collection system, consideration was focussed on the highest and best use for collected water. For this reason, rainwater tanks are proposed on each lot and for commercial areas to collect roofwater runoff for non-potable reuse (both internal and external). This avoids the need for a costly dual pipe reticulation system to deliver water collected from a regional stormwater harvesting scheme to each lot. Further, the treatment requirements for water drawn from roofwater tanks are less onerous than those applicable to runoff harvested from paved areas or other ground surfaces.

There is also the benefit that the presence of water tanks on each lot promotes water conservation. Each property owner is aware of their usage of collected runoff and thereby encouraged to minimise both the usage of water overall and the usage of collected runoff to minimise the requirement for potable water to meet the demand for non-potable water.

Finally, as rainwater tanks are sealed, losses due to infiltration and evaporation (which significantly affect the viability of open storages) are largely eliminated, thereby maximising the reuse of captured runoff.

The potential benefit obtained from the use of rainwater tanks is described in Section 4.2.

While the adoption of rainwater tanks is considered to be the optimal approach in the case of the Urban Core, such an approach would not provide for the irrigation of public spaces and would not provide an opportunity for the capture of runoff from the majority (i.e. non roof areas) of the catchment.

Consideration was therefore given to the potential to implement a stormwater harvesting scheme to provide irrigation water for public spaces. The results of the analysis undertaken in this regard are presented in Section 4.3. The investigation first focussed on the ability to use harvested stormwater to irrigate open space and the requirement for recycled water to supplement the harvested water during dry periods. Given the need to ensure that the priority irrigation areas (first and second tier ovals, bio-retention and detention basins) receive sufficient irrigation to maintain them in a high quality state and given the need to irrigate a relatively large area, consideration was then given to the use of harvested stormwater on priority irrigation areas and recycled water for the irrigation of other areas. By reducing the area to be irrigated using harvested stormwater, this latter arrangement would maximise the reliability of the stormwater supply for a given storage volume and minimise the need for supplemental recycled water.

4.2 Rainwater Tanks

As noted in Section 4.1, it is proposed to adopt rainwater tanks on each lot to allow the capture of roof water runoff to provide an alternate source of water to supply the demand for non-potable uses at a lot scale. With reference to Section 3.2 and Section 3.3.2, suitable uses for captured runoff include internal uses such as toilet flushing and laundry, and external uses such as yard irrigation.

Part MP4.2 of the *Queensland Development Code* (QDC) requires that, if water savings targets are to be met by rainwater tanks, a 5 kL rainwater tank be installed on each single detached house and a 3 kL rainwater tank on non-detached houses (town houses, terrace houses). No minimum tank size is given for high density residential areas such as units or apartments. Part MP4.2 of the QDC also requires that any tank be connected to the lesser of 100 m^2 of roof area or half the roof catchment area.

For commercial areas 1.5L rainwater tank storage should be provided for each "required pedestal", i.e. 50% of the pedestals. As this will be quite variable in the different commercial areas, no standard minimum could be applied. Therefore the most efficient tank size was calculated for each commerical use and set as the minimum. However, if a commerical building requires more pedestals it may have to increase its rainwater tank storage accordingly to meet the requirements of the QDC.

It is considered that the requirements of the code provide a minimum set of design criteria for the consideration of the effectiveness of rainwater tanks. In the future, depending on the increase in yield achieved, the code could be rewritten, Council guidelines issued, or developers could voluntarily adopt the requirement for a greater proportion of the roof area to drain to larger tanks.

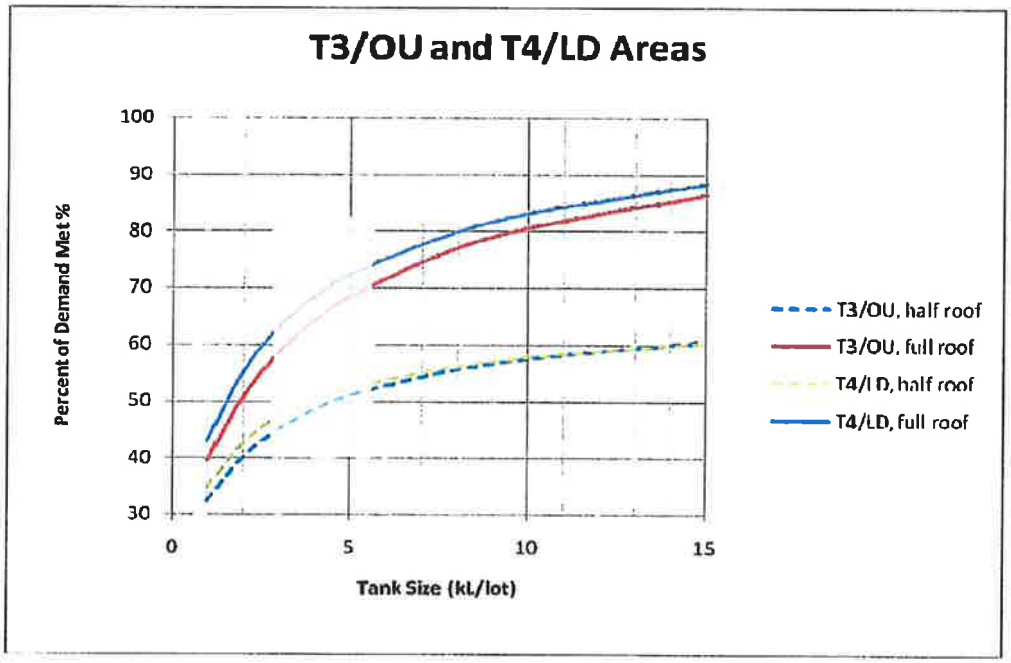
For the analysis, the provision of rainwater tanks generally in accordance with the current requirements of the QDC was assumed. As a sensitivity analysis, the improvement in yield afforded by the drainage of a greater proportion of roof area to larger tanks was considered.

4.2.1 Optimal Rainwater Tank Sizes

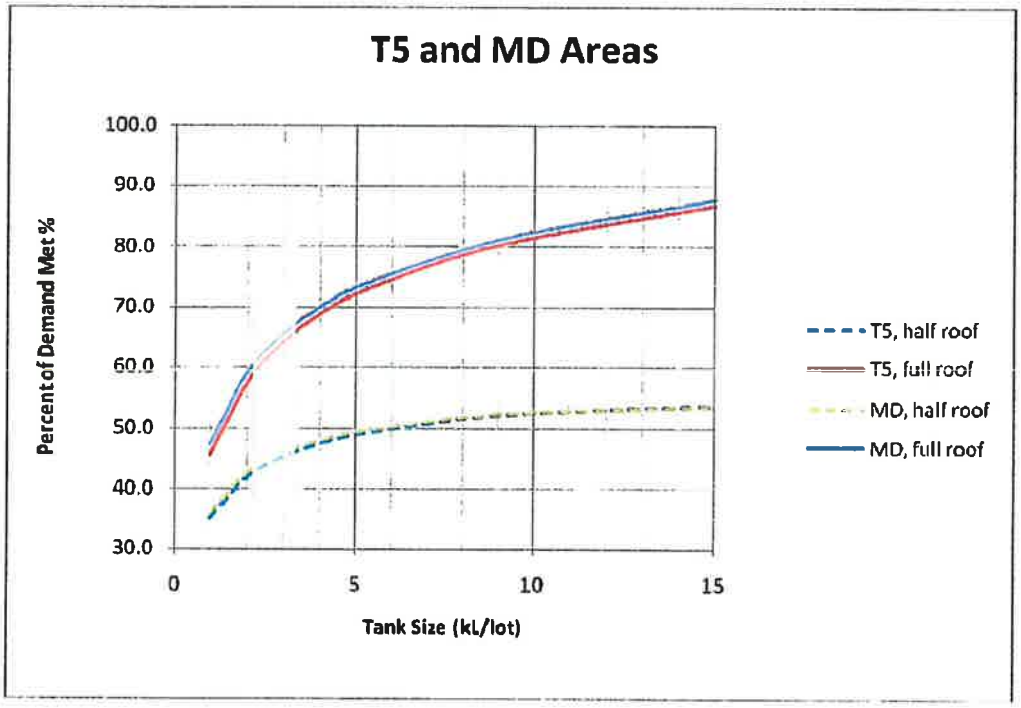
Urban Areas

The limit of economic efficiency was calculated for the rainwater tanks required for urban areas. There are three main types of urban areas; low density (including T3 and T4 areas), medium density (including T5 areas) and high density for which the optimal tank size is different due to different roof areas, different average number of people per lot and irrigation demands. The graphs are shown below for each urban type. Two scenarios that either drained the entire roof area or half of the roof area were tested. As shown in the below graphs, if you increase the roof area draining to the tank, you'll significantly improve its efficiency. The most efficient tank sizes are shaded in grey. Due to the limits in available roof area, once you start increasing the tank size past a certain limit you'll only get negligible improvements in performance. Therefore it is not economically efficient to increase the size of the tank further.

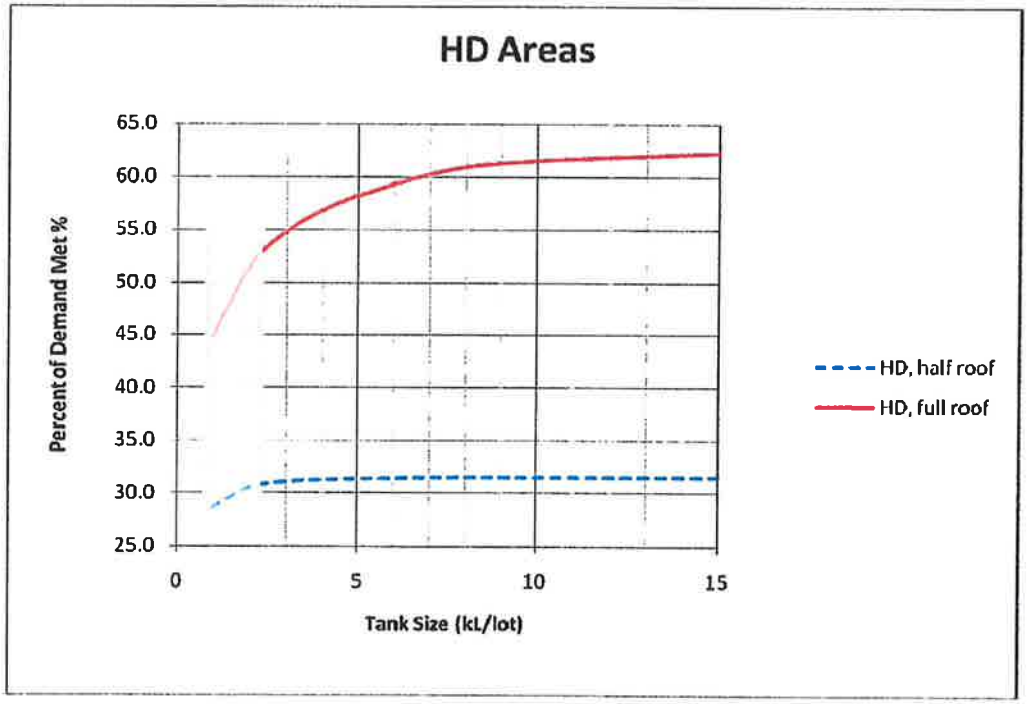
Graph 1 Optimal Tank Size for Low Density Urban Areas



Graph 2 Optimal Tank Size for Medium Density Urban Areas



Graph 3 Optimal Tank Size for High Density Urban Areas



Based on the requirements of the QDC and the analysis above the optimal tank sizes are:

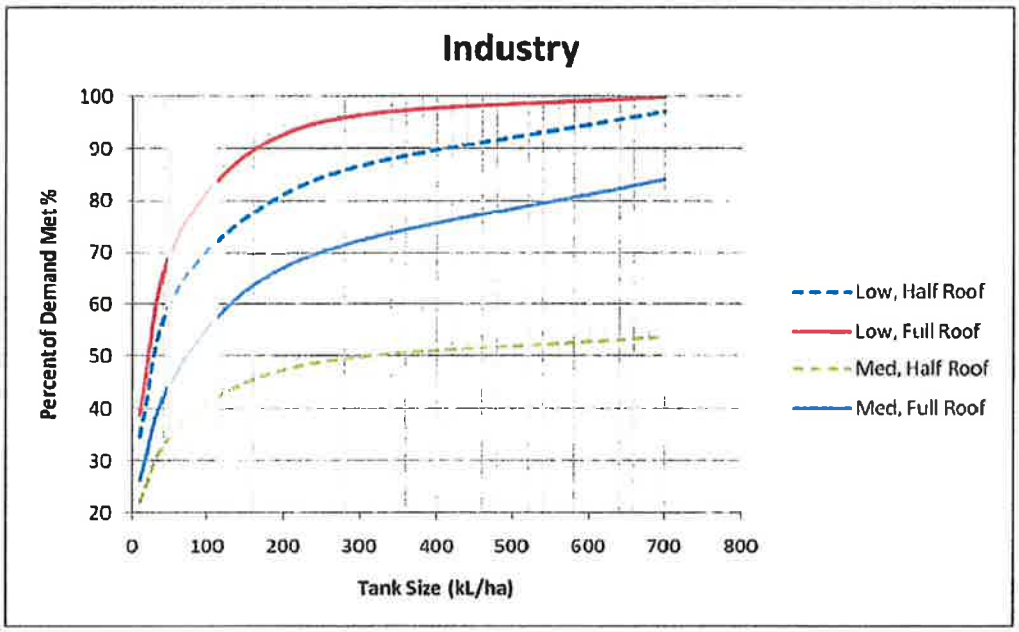
- 5kL per lot for low density areas (T3, T4 and LD);
- 3kL per lot for medium density areas (T5 and MD);
- 1.5kL per lot for high density areas.

For the purposes of the investigation it was assumed that half the roof area will drain to the tank. However, it is recommended that the roof drainage be designed to direct as much roof area as possible to the rainwater tanks. Increasing the roof area draining towards the tank provides a more cost effective improvement in the efficiency than increasing the tank size. Although this will reduce the amount of runoff directed to downstream storage tanks, further analysis has shown that better overall catchment efficiency can be achieved if more roof area is directed to rainwater tanks.

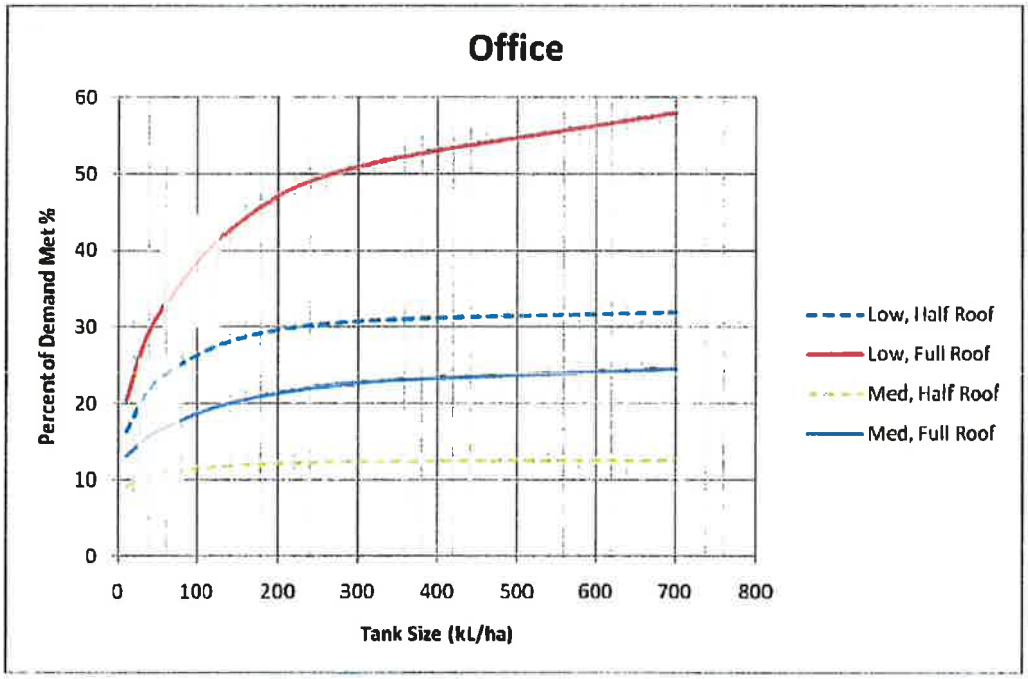
Commercial Areas

The following graphs show the efficiency limits of the rainwater tanks for different commercial areas. The grey areas highlight the most cost effective tank sizes. Low and Med refer to the different water use demands. Two scenarios that either drained the entire roof area or half of the roof area were tested.

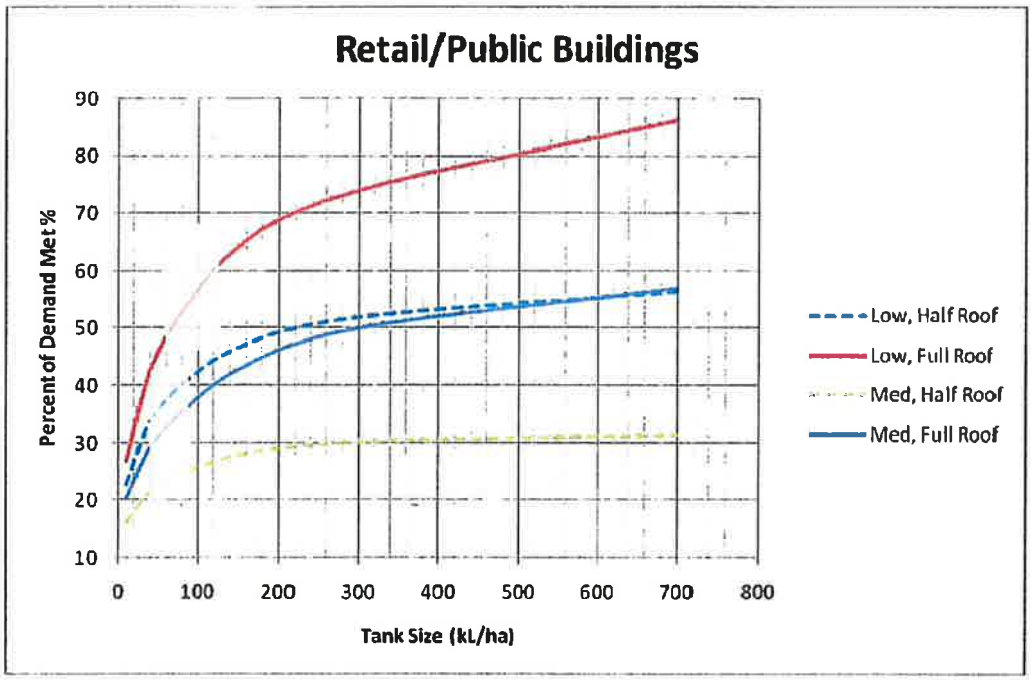
Graph 4 Optimal Tank Sizes for Industrial Areas



Graph 5 Optimal Tank Sizes for Office Buildings



Graph 6 Optimal Tank Sizes for Retail/Public Buildings



The optimal rainwater tank sizes for commercial areas are:

- 100kL/ha for industrial areas;
- 60kL/ha for office buildings; and
- 60kL/ha for retail/public buildings.

These calculations have considered a typical roof coverage and gross floor area (GFA) per hectare, and have included allowances for roads and carparks etc. As this will be quite variable, the size of the required rainwater tank based on total GFA is as follows:

- 20L/m^2 GFA for industrial areas;
- 2.1L/m^2 GFA for office buildings; and
- 12L/m^2 GFA for retail/public buildings.

As the results of the above analysis demonstrate, rainwater tanks will be able to provide more of the commercial non potable water demand if water efficient measure and low water demands are adopted.

4.3 Stormwater Harvesting

4.3.1 Introduction

Water balance modelling was undertaken using GoldSim, which is a Monte Carlo modelling tool used for complex dynamic systems such as water balances. For the analysis a range of runoff scenarios and storage options were considered.

The water balance was run using historical rainfall and evaporation data for the 56 year period from January 1950 to December 2006. A daily time step was used.

Detailed modelling was undertaken using MUSIC to determine the runoff that would occur from the Urban Core areas. A description of the methodology used to derive the daily runoff is provided in Appendix A.

The Urban Core area was divided into four catchments for the analysis, as the ability to harvest and re-use stormwater will be dependent on the catchment size and the proposed uses within that catchment.

A mix of underground storage tanks and open water bodies will be analysed, to determine which provide the most efficient means of stormwater harvesting.

Several scenarios will be modelled looking at the impact of using a mix of recycled and harvested water, and the impact of drought and water restrictions.

4.3.2 Catchments

The Urban Core area was divided into four catchments based on the proposed catchment delineation (refer *Conceptual Stormwater Management Plan*). The catchment area plan is shown in the image below.

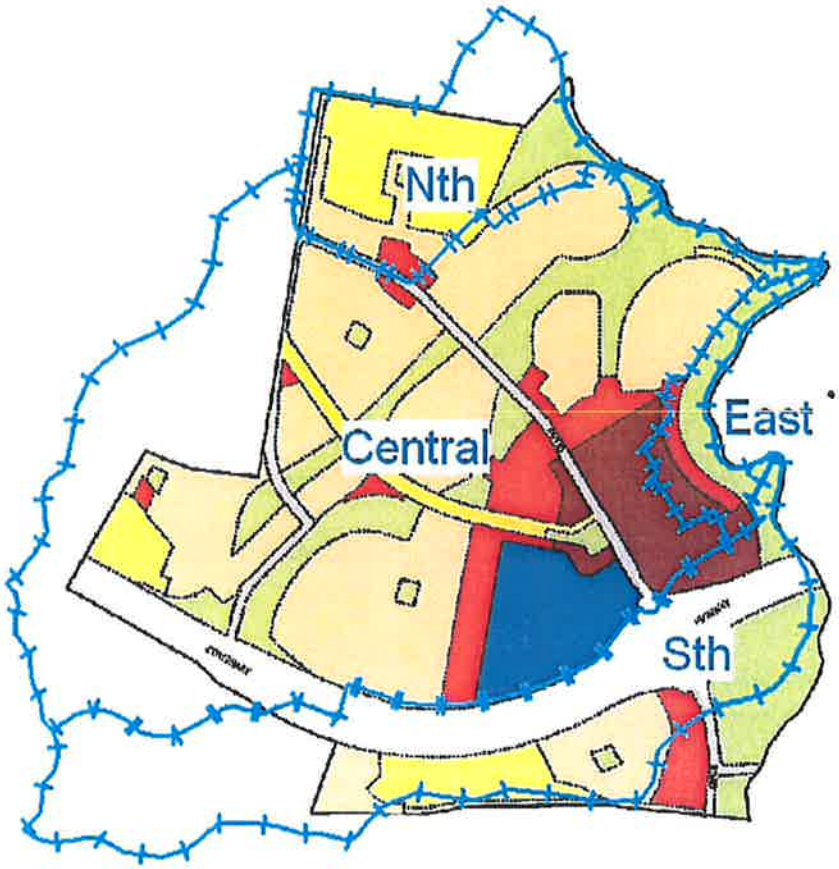


Image 1 Urban Core Catchment Areas

The catchment breakdown into land use types is shown below in Table 7.

Table 7 Catchment Areas

Land Use	Catchment Area (ha)			
	North	Central	East	South
Suburban (T3/OU)	23.88	79.61	0.00	49.67
General Urban (T4/LD)	18.35	134.11	0.40	15.73
Urban Centre (MD/T5)	1.48	6.33	0.00	1.51
High Density Urban (HD)	0.00	7.85	1.63	0.00
Industry	0.00	11.70	0.00	0.00
Offices	0.00	13.59	0.00	0.00
Retail/Public Buildings	0.00	9.26	5.33	0.00
Major Roads	3.27	25.29	0.00	32.54
Parkland	8.61	53.22	9.14	16.22
Total	55.59	340.96	16.50	115.67

For the calculation of runoff (refer Appendix A), the catchment areas were slightly reduced, as only the areas able to drain to the likely water storage locations were included.

4.3.3 Underground Storages

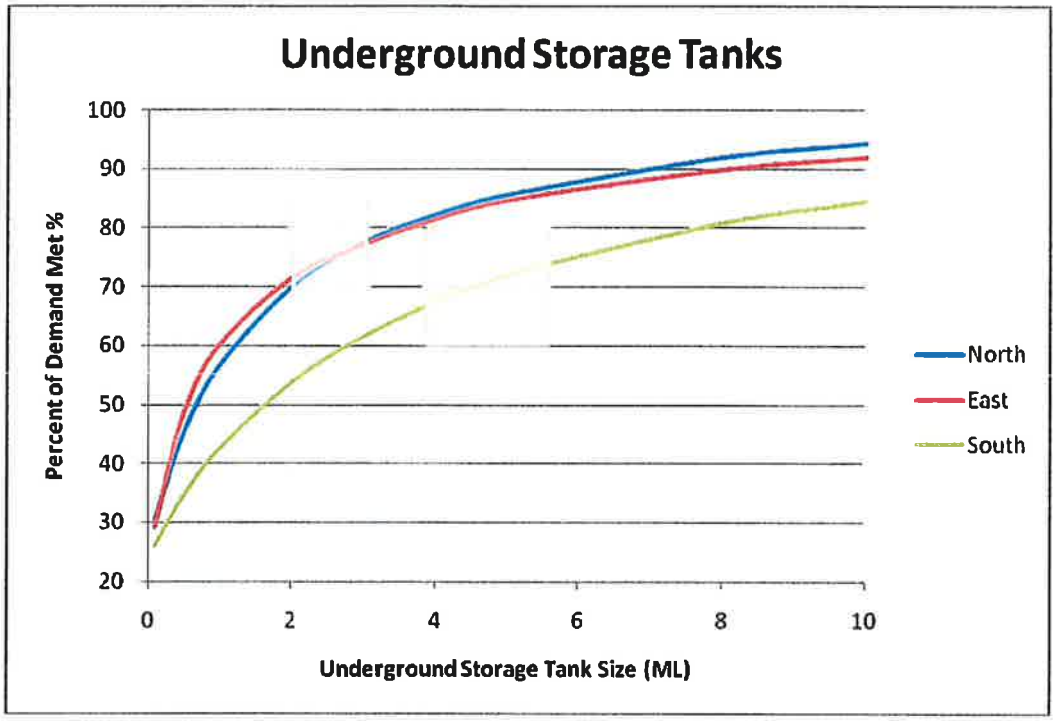
Although the most expensive form of storage to provide, underground storages have the advantage that evaporation and infiltration losses are largely eliminated, together with the safety and water quality issues associated with the use of open water bodies.

The north, east and southern catchments may require an underground storage tank to provide for the irrigation requirements. The central catchment will use an underground storage tank, an open lake or a combination of the two. The optimal underground tanks sizes were determined for the north, east and southern catchments, and are shown in Graph 7. It was assumed that 75% of the roof area drained to the rainwater tanks, with the remainder draining to the underground storage tanks. Overflows from the rainwater tanks would also be directed towards the underground storage tanks. It was also assumed that only 75% of ground runoff could be directed to the underground tanks. This value was used to take into account local losses in runoff such as ponding and the evapotranspiration losses in the proposed treatment devices. The optimal tanks sizes for urban and commercial areas were adopted. Normal irrigation (without recycled water) was assumed.

The optimal tank size was therefore concluded to be:

- 3ML for the northern and eastern catchments; and
- 4ML for the southern catchment.

Graph 7 Optimal Size for Underground Storage Tanks



4.4 Lake Analysis

It is proposed to have a lake, located in the central catchment area that will be used for irrigation. The lake may also be combined with an underground storage tank to provide additional water for lake top up when required.

Open water bodies are the most cost effective means of storing stormwater runoff. However, the water stored in open water bodies is significantly impacted by evaporation and infiltration.

For the analysis, the pan evaporation data for Ripley was used.

To account for infiltration, it was assumed that any waterbody would be lined with a heavy clay to minimise infiltration. For a soil to be considered as impermeable, the United States Department of the Interior Bureau of Reclamation publication Design of Small Dams (1977) suggests a permeability of less than 1 foot per year (p138), or 0.3 m/y. Such a permeability is equivalent to an infiltration rate of 0.82 mm per day. This value was adopted for the purposes of modelling.

Although complete impermeability could be achieved by the use of a plastic liner, the additional cost of such a solution was considered to not be cost effective given the size of waterbody potentially required.

As noted above, associated with open waterbodies are potential safety and aesthetic risks. To minimise the safety risk, the analysis considered that a bench would be provided at a relatively shallow depth around any waterbody.

The stage-volume relationships for the open waterbody areas considered were calculated based on the assumption of a vertical wall to a depth of 0.3 metres on the waterbody edge, followed by a 5 metre wide bench at a gentle slope of 1 in 10 and a final bank slope to the bed of the waterbody of 1 in 3. The level of the bed of the waterbody was varied until an overall average depth of the order of 1.5 metres was obtained (the maximum depth was 1.67m). It is considered that this depth minimises the potential for water quality issues to arise.

Water quality in open waterbodies is also a significant issue. Depending on the residence time available within an open water body, it may be necessary to recirculate water stored in the waterbody through a wetland to maintain its quality during periods of low rainfall. Such a scheme would increase the impact of evaporation and seepage on the volume of water stored in the waterbody as evaporation and seepage would occur from both the waterbody and the surface of the recirculation wetland. Potential additional losses due to a recirculation system were included in the analysis. This was done by assuming a wetland size equivalent to 20% of the lake area.

For the analyses, waterbodies ranging in area from 0.5 hectares (7.4 ML storage) to 15 hectares (245 ML storage) were considered. Underground water storages ranging from 0.1ML to 50ML were also analysed.

4.4.1 Optimal Irrigation Efficiency

To determine the most efficient combination of lake and underground storage a typical scenario was run for the central catchment, which included the following assumptions:

- 75% of roof area drains to rainwater tanks;
- Optimal urban and commercial tank sizes were adopted (refer Section 4.2);
- 75% of ground runoff can be drained to the underground storage tanks (medium runoff scenario);
- Overflow from the underground storage tanks will be directed towards the lake;
- Normal irrigation demands, with no use of recycled water;
- A recirculation wetland equal to 20% of the lake area is required;
- Lake will be topped up from underground storage (if water available) if the depth falls below 70% (i.e.1.17m AHD), at a maximum pumping rate of 200kL/day;
- Irrigation from the lake will cease if the depth falls below 70%; and
- No bore water is available for top up.

The results of the analysis are shown in Table 8 below. As this table demonstrates, the efficiency decreases once the size of the lake gets too large due to evaporation and seepage losses. For a 3 hectare lake, having an additional storage tank only provides noticeable benefit once the storage tank size gets above 5ML. However, the storage tanks impact on the average lake levels.

Table 8 Irrigation Efficiency with Combination of Lake and Underground Storages

		Underground Storage Size (ML)									
		0.1	0.2	0.5	1	2	5	10	20	30	50
Lake Area (ha)	0.5	40.1	40.4	41.3	42.8	45.9	52.8	61.9	72.7	79.2	86.1
	0.75	43.6	43.9	45.5	46.0	48.7	55.7	62.3	73.0	78.9	85.9
	1	47.1	47.1	48.0	48.9	51.3	56.8	64.7	73.4	79.1	85.7
	1.5	51.8	52.0	52.9	53.8	55.3	59.9	66.0	74.3	79.0	85.5
	2	55.0	55.6	56.1	57.0	58.4	62.6	67.4	74.5	79.2	85.3
	3	59.8	59.9	60.4	61.1	62.2	65.1	69.2	75.4	79.5	85.0
	5	63.2	63.5	63.9	64.3	65.0	67.3	71.2	76.1	79.7	84.5
	10	61.5	61.7	62.2	62.7	63.6	65.9	69.2	74.3	77.9	83.5
	15	54.4	54.5	55.4	56.1	58.1	60.1	64.2	72.2	76.9	82.8

4.4.2 Average Water Levels

The functional and aesthetic viability of an open water body will depend highly upon the average water levels. Therefore an analysis to determine the optimal lake size was run. For the analysis the same assumptions as in Section 4.41 were made. However, a scenario was also run where recycled water was also available, and so the amount of irrigation required from the lake was significantly reduced. To be conservative it was assumed that no bore water was available for top up as the amount available is not yet known. The ability to top up the lake with bore water will ensure that the lake water levels do not fall too dramatically during drought periods. No underground storage tanks were assumed.

The results of the analysis are shown below in Table 9. As the results show, with normal irrigation, smaller lake sizes have a lower average water level as there is less storage volume available to provide for the irrigation requirements. The lake level quickly drops to the level at which irrigation is shut off. The lower evaporation and seepage losses ensure that the minimum lake levels aren't as low as for larger lakes. Once the lake size gets above 5 hectares, the average water level and the percentage of irrigation demand provided start to decrease. This is because the evaporation and seepage losses are now large enough to impact on the results. The optimal lake sizes with normal irrigation are therefore between 3 and 5 hectares.

With recycled water supplementing the irrigation requirements the average lake water levels are increased as the amount of water being extracted from the lake is reduced. Similar to the results with normal irrigation, smaller lakes result is lower average water levels, and the average water level starts to drop again once the lake size gets above 5 hectares. The optimal lake sizes with recycled water are therefore between 3 and 5 hectares. Given the higher average lake levels, it is recommended that recycled water should be used to supplement the irrigation requirements.

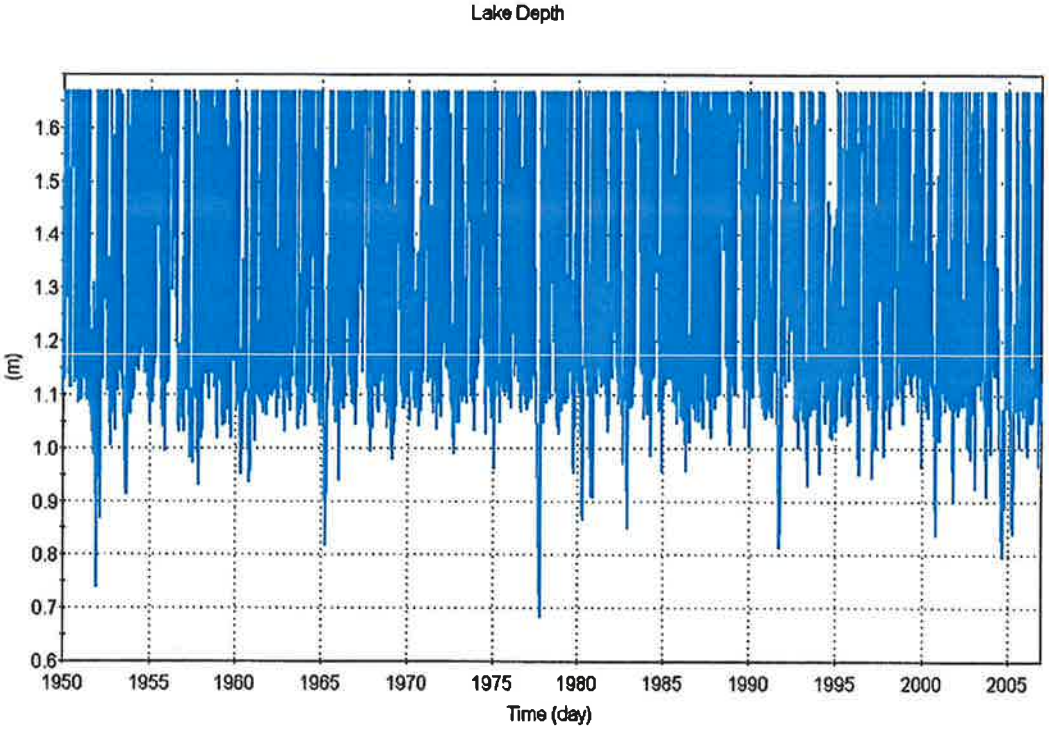
Table 9 Average Lake Water Levels

	Lake Size (ha)				
	1	2	3	5	10
Normal Irrigation					
Average Depth (m)	1.25	1.29	1.30	1.31	1.28
Minimum Depth (m)	0.75	0.72	0.68	0.62	0.55
Maximum Depth (m)	1.67	1.67	1.67	1.67	1.67
% Time Depth Above 1.37m AHD	29.9	35.5	38.0	39.5	37.3
% Irrigation Demand Met	44.2	53.0	58.0	62.1	60.0
With Recycled Water					
Average Depth (m)	1.39	1.44	1.46	1.48	1.45
Minimum Depth (m)	0.79	0.81	0.76	0.71	0.68
Maximum Depth (m)	1.67	1.67	1.67	1.67	1.67
% Time Depth Above 1.37m AHD	54.9	65.4	70.4	74.4	69.8
% Irrigation Demand Met (excluding recycled water)	72.0	82.7	86.9	89.6	86.3

It should be noted that if lake irrigation was shut off at a higher depth (currently at 1.17m AHD) the average lake water levels would increase. However, the amount of the irrigation demand provided by the lakes would be reduced.

The lake level over time for a 3 hectare lake, assuming normal irrigation, is shown in Graph 8.

Graph 8 Lake Water Level Over Time: 3ha Lake, Normal Irrigation



Further analysis was conducted to determine the impact of bore water top up and underground storage tanks on average and minimum lake water levels. The following assumptions were made:

- Bore water top up available at a maximum rate of 200kL/day;
- Lake topped up if level fell below 70%;
- Lake size was 3 hectares; and
- Underground storage tank size was 10ML.

The results of the analysis are shown in Table 10. As these results show the impact of having the additional underground storage is that the average lake depths are increased and the percentage of irrigation demand met is increased. The reasons for this are that water is being extracted from the underground storage instead of the lake, and the overall storage capacity is increased. However, the minimum depths reached in the lake are reduced. This is because runoff is first directed to the underground storage tank, and so less runoff reaches the lake. Having bore water available for lake top up ensures that the minimum lake depth reached is significantly increased. The percentage of irrigation demand supplied by the lake is also increased. The impact of using recycled water is that the average lake level is increased. Adding an underground storage tank will further increase the average water level and the amount of irrigation demand supplied. However, given that the irrigation efficiency of the lake alone is very high, the added cost of the underground storage tank may not be viable. The minimum lake level reached is also higher than with normal irrigation.

Based on these results it is recommended that recycled water be used if it is available and cost effective. If normal irrigation only is possible then it is recommended that bore water be used to top up the lake. Adding an underground storage tank will also improve the lake average water level. However, the high costs of an underground storage tank may preclude this option. Although not analysed here, measures such as reducing the irrigation rates during drought periods will also help ensure that the lake level is maintained at a higher level.

Table 10 Impact of Underground Storages, Recycled Water and Bore Water Topup on Lake Water Levels

	Normal Irrigation		Normal Irrigation With Bore Water Top Up		With Recycled Water	
	0ML Under-ground Storage	10ML Under-ground Storage	0ML Under-ground Storage	10ML Under-ground Storage	0ML Under-ground Storage	10ML Under-ground Storage
Average Depth (m)	1.30	1.31	1.33	1.37	1.46	1.53
Minimum Depth (m)	0.68	0.30	1.07	1.04	0.76	0.64
Maximum Depth (m)	1.67	1.67	1.67	1.67	1.67	1.67
% Time Depth Above 1.37m AHD	38.0	45.8	40.1	48.4	70.4	84.9
% Irrigation Demand Met	58.0	69.1	63.5	71.1	86.9	95.1

4.5 Overall Water Balance

For the analysis, it was assumed that runoff from the majority of the Urban Core area could be captured for reuse. Image 1 shows the extent of the catchment area considered. It can be noted that it was assumed that it would not be possible to capture runoff from the open space areas adjacent to Bundamba Creek as such areas would most likely drain directly to the creek rather than a storage area. To account for local losses due to water treatment devices that will be located throughout the catchment a multiplication factor was added to the ground runoff so that only 75% could reach the downstream storages.

Due to the relatively large area to be irrigated, modelling determined that the use of harvested stormwater as the primary means of irrigating all open space areas would have only a limited reliability. For this case, recycled water would be required periodically when harvested stormwater is unavailable. Such a system would produce a highly variable demand for recycled water, with none being required when rainfall occurs regularly, and recycled water being used to supply the full irrigation demand during dry periods. To improve the reliability of supply of harvested stormwater and to provide a more stable demand for recycled water, an additional case was considered.

For this case it was assumed that the irrigation requirements for the first and second tier ovals and detention basin areas (the priority irrigation areas, refer Table 4) would be met by the use of recycled water, with harvested stormwater used to supply the irrigation requirements for other open space areas. Recycled water would be used to supplement the harvested stormwater supply for these areas.

Scenarios were also run to look at the impact of having bore water lake top up available and the impact of implementing drought restrictions. The results of the analysis are shown in Tables 11 and 12.

Table 11 Urban Core Water Balance Results

	Scenario 1a- Normal Irrigation, 50% Roof	*Scenario 1b- Normal Irrigation, 100% Roof*	*Scenario 1c- Normal Irrigation, 50% Roof,10ML Central Tank, Bore Water*	*Scenario 2a- Normal Irrigation, 50% Roof, Bore Water Topup*	*Scenario 2b- Normal Irrigation, 100% Roof, Bore Water Topup*
INPUTS					
Roof Area (%)	50	100	50	50	100
Irrigation Option	Normal	Normal	Normal	Normal	Normal
Ground Runoff to Tank (%)	75	75	75	75	75
Climate Change Multiplier (%)	100	100	100	100	100
Drought Urban Non-potable Water Restrictions	No	No	No	No	No
Bore Water Available	No	No	Yes	Yes	Yes
Maximum Pumping Rate to Lake (kL/day)	-	-	200	200	200
North Underground Tank Size (ML)	3	3	3	3	3
East Underground Tank Size (ML)	3	3	3	3	3
Central Underground Tank Size (ML)	0	0	10	0	0
South Underground Tank Size (ML)	4	4	4	4	4
Urban Tank Sizes (LD/MD/HD) (kL/lot)	5,3,1.5	5,3,1.5	5,3,1.5	5,3,1.5	5,3,1.5
Commercial Tank Sizes (Ind/Off/Ret) (kL/ha)	100,60,60	100,60,60	100,60,60	100,60,60	100,60,60
Lake Area (ha)	3	3	3	3	3
RESULTS					
% of total non-potable water supplied (including recycled water)	55.2	62.1	59.3	56.6	64.0
% of total non-potable water supplied (excluding recycled water)	55.2	62.1	59.3	56.6	64.0
% of urban non-potable demand met	50.5	69.8	50.5	50.5	69.8
% of commercial non-potable demand met	32.5	45.3	32.5	32.5	45.3
% of irrigation demand met	64.9	57.6	74.2	68.2	62.0
% of total water (potable and non-potable) supplied by stormwater	36.9	41.4	39.6	37.8	42.7
% of total water (potable and non-potable) supplied by stormwater and recycled water	36.9	41.4	39.6	37.8	42.7
Annual non-potable water supplied (ML/yr)	839.1	943.6	901.6	861.2	973.2
Annual non-potable water shortfall (ML/yr)	681.4	577	619	659.3	547.4
Annual bore water required (ML/yr)	0	0	18.4	32.2	39.5
Annual recycled water (RW) required (ML/yr)	0	0	0	0	0
Average number of days underground tanks empty per year	15.4	22.1	28.8	15.3	22.3
Annual discharge to creek (ML/yr)	1305.6	1232.1	1261.3	1315.6	1241.8
AVRC (after storages)	0.311	0.293	0.300	0.313	0.296

Table 12 Urban Core Water Balance Results

	Scenario 3a-Mix of Recycled and Stormwater Irrigation, 50% Roof	*Scenario 3b-Mix of Recycled and Stormwater Irrigation, 100% Roof*	*Scenario 4-Mix of Recycled and Stormwater Irrigation, 50% Roof, No UG tanks*	*Scenario 5-Drought Conditions with Water Restrictions, Bore Water TopUp*
INPUTS				
Roof Area (%)	50	100	50	50
Irrigation Option	Recycled water and Stormwater	Recycled water and Stormwater	Recycled water and Stormwater	Drought
Ground Runoff to Tank (%)	75	75	75	75
Climate Change Multiplier (%)	100	100	100	60
Drought Urban Non-potable Water Restrictions	No	No	No	Yes, 50%
Bore Water Available	No	No	No	Yes
Maximum Pumping Rate to Lake (kL/day)	-	-	-	200
North Underground Tank Size (ML)	3	3	0	3
East Underground Tank Size (ML)	3	3	0	3
Central Underground Tank Size (ML)	0	0	0	0
South Underground Tank Size (ML)	4	4	0	4
Urban Tank Sizes (LD/MD/HD) (kL/lot)	5,3,1.5	5,3,1.5	5,3,1.5	5,3,1.5
Commercial Tank Sizes (Ind/Off/Ret) (kL/ha)	100,60,60	100,60,60	100,60,60	100,60,60
Lake Area (ha)	3	3	3	3
RESULTS				
% of total non-potable water supplied (including recycled water)	70.7	80.8	70.7	59.9
% of total non-potable water supplied (excluding recycled water)	55.0	69.1	53.7	59.9
% of urban non-potable demand met	50.5	69.8	50.5	63.4
% of commercial non-potable demand met	32.5	45.3	32.5	22.8
% of irrigation demand met	100.0	100.0	100.0	71.1
% of total water (potable and non-potable) supplied by stormwater	25.0	31.3	24.3	32
% of total water (potable and non-potable) supplied by stormwater and recycled water	47.2	54.0	48.2	32.0
Annual non-potable water supplied by stormwater (ML/yr)	568.2	713.3	554.4	519.1
Annual non-potable water shortfall (ML/yr)	445.0	291.1	445.0	348.0
Annual bore water required (ML/yr)	0	0	0	0
Annual recycled water (RW) required (ML/yr)	507.3	516.1	521.1	0
Average number of days underground tanks empty per year	0	0	0	2.9
Annual discharge to creek (ML/yr)	1575.8	1461.4	1589.8	734.1
AVRC (after storages)	0.375	0.348	0.378	0.175

The following conclusions can be made from the above results:

- As much roof area as possible should be directed to rainwater tanks, as it improves the overall water efficiency even though the amount of water available for irrigation is reduced.
- The commercial areas have the least efficient rate of stormwater re-use due to their relatively high water demands.

- Adding a 10ML underground storage tank to the central catchment improves the overall efficiency by around 4%. The overall efficiency is better improved by directing more roof area to the tanks.
- The harvesting of stormwater reduces the amount of flow discharged to the creek, and so better replicates existing flow patterns.
- Stormwater alone can generally provide around 40% of the total water demand for the Urban Core area, and around 60% of the non-potable water demand.
- If recycled water is also used, stormwater and recycled water can account for around 50% of the total water demand for the Urban Core area, and around 70 to 80% of the non-potable water demand
- If recycled water is used, the benefit provided by having the underground storage tanks is reduced, and they are not considered necessary, unless required for temporary storage of recycled water.
- If drought conditions occur (60% of average annual rainfall), then with irrigation restrictions and urban non-potable water restrictions in place the provision of adequate non-potable water supplies can still be maintained (refer Scenario 5).
- If bore water is required for lake top up then on average less than 40ML will be needed each year.

In summary the proposed optimal storages are:

- 5kL per lot for low density urban areas (T3, T4 and LD);
- 3kL per lot for medium density urban areas (T5 and MD);
- 1.5kL per lot for high density urban areas;
- 20L/m^2 GFA (100kL/ha) for industrial areas (or minimum prescribed by QDC);
- 2.1L/m^2 GFA (60kL/ha)for office buildings (or minimum prescribed by QDC);
- 12L/m^2 GFA for (60kL/ha) retail/public buildings (or minimum prescribed by QDC);
- 3ML underground storage for the northern catchment;
- 3ML underground storage for the eastern catchment;
- 4ML underground storage for the southern catchment; and
- 3 hectare (47ML) lake (with recirculation wetland) for the central catchment.

4.6 Frequency of Flow/Environmental Flows

Associated with all development is the introduction of impervious surfaces (roof areas, roads etc). Compared to an undeveloped catchment, the impervious areas created by development increase both the amount of runoff from a catchment and the frequency with which it occurs.

The potential impacts of development are such that *Implementation Guideline No 7, Water Sensitive Urban Design: Design Objectives for Urban Stormwater Management (South East Queensland Regional Plan 2009 – 2031)* (November 2009) includes a frequent flow management requirement *'to protect in-stream ecosystems from the effects of more frequent runoff by capturing the initial runoff from impervious areas'* (p7).

Given the desire to minimise the impact of development by ameliorating the increase in runoff from developed catchments, the capture and reuse of stormwater runoff is attractive, offering benefits beyond those obtained by reducing the demand for potable water. The adoption of a rainwater and stormwater harvesting system therefore offers the ability to satisfy a considerable proportion of the requirement for reducing the frequency of runoff.

It can be noted that the implementation guideline also includes a waterway stability management criterion *'to reduce exacerbated in-stream erosion downstream of urban areas by controlling the magnitude and duration of sediment-transporting flows'* (p7). In practice, this is typically achieved by the use of detention basins or similar measures to temporarily store runoff and attenuate peak flow rates to match those predicted prior to development. Depending on the amount of water stored in the harvesting system prior to the commencement of a flood, a harvesting system will also provide some reduction in peak flow rate and contributing to satisfying the waterway stability criterion.

Based on MUSIC modelling (refer Appendix A), the predicted annual average runoff from the catchment prior to any development (assuming the catchment was in a forested state rather than its current state) is 588 ML per year. This is equivalent to an annual volumetric runoff coefficient (AVRC) of 0.13, or 13%. In comparison, the runoff from the developed catchment (prior to the consideration of rainwater tanks, losses due to water quality treatment, and harvesting), is of the order of 2410ML per year (AVRC equal to 0.533).

The adoption of rainwater tanks and stormwater harvesting will reduce the annual volume of runoff from the catchment and thereby offset to some degree the impact of development. With reference to the results in Tables 11 and 12 the developed case AVRC can be reduced to around 0.30. The analysis also shows that increasing the roof water directed towards tanks will reduced the AVRC. The use of recycled water to supplement the irrigation demands increases the AVRC to around 0.35.

Although the annual average flow to the creek with the storage in place is greater than that predicted for the undeveloped catchment, the majority of the increased runoff is associated with larger events that would be less relevant to the low flow regime of the creek.

As part of detailed design therefore, attention will need to be paid to whether there is a need to allow the discharge of harvested water to maintain a flow frequency that more closely approximates that occurring prior to development or the need to adopt a smaller storage volume to otherwise minimise impacts.

5 CONCLUSION

A key component of the management of the water cycle for the Urban Core in Ripley Valley is the minimisation of the demand for potable water. In addition to minimising the impact of development on the reliability of Queensland's major water storages, the use of alternate water sources has the potential to minimise the impact of development upon Ripley Valley and downstream areas.

In particular, the collection and reuse of stormwater runoff has the potential to offset to some degree the impact of development upon the frequency and magnitude of runoff to Bundamba Creek. This will assist in satisfying the frequent flow management criterion in the *Implementation Guideline No 7, Water Sensitive Urban Design: Design Objectives for Urban Stormwater Management (South East Queensland Regional Plan 2009 – 2031)* (November 2009) and achieving the minimum water savings targets identified in the *Queensland Development Code*.

A water balance has been completed for the Urban Core to determine the demand for water and the ability to substitute alternate water sources for demands historically supplied by a reticulated potable water system.

Demand for Water

A review was completed of the demands for water within the Urban Core and the quality of water required for each identified demand.

Table E1 details the overall demand for water for the Urban Core. The table also shows the demand for potable (water of a standard suitable for drinking) and non-potable water. Uses requiring potable water include kitchens and bathrooms, while uses to which non-potable water is suitable include toilet flushing, laundry, and outdoor use.

The demands presented in Table E1 assume that there will be a full adoption of water saving devices (AAA rated shower heads and taps, etc) and appliances (water efficient washing machines, water efficient air conditioners and dishwashers etc.) across the Urban Core, including the commercial areas. The adoption of water efficient devices will save approximately 1100kL per day in urban areas and 860kL per day in commercial areas (a total saving of approximately 715ML per year).

In addition to the water requirements for individual lots, water will be required to irrigate the open space areas within the Urban Core.

Options to Satisfy Demand

The Southern Regional Water Pipeline will be the bulk supply source of potable water to Ripley Valley. Water will be required to supply the potable (drinking standard) water demand and that part of the non-potable demand which cannot be satisfied by the use of alternate water sources.

With respect to the non-potable demands of the Urban Core, it is expected that it will not be possible to supply recycled water from the Bundamba sewage treatment plant to individual lots. It is therefore proposed to use rainwater tanks to collect runoff from roof areas for non-potable reuse.

Water balance modelling based on the rainwater tank requirements mandated in the QDC indicated that rainwater tanks will supply, on average across the lot types to be provided in the Urban Core approximately 51%of the non-potable lot based demand for urban areas, and 33% of the demand for commercial areas. If the roof area draining to the tanks is increased to 100% the percentage of demand met will increase to 70% in urban areas and 45% in commercial areas. The modelling also determined that the mandated rainwater tank size matched the economic limit of performance for rainwater tanks as per the method presented in the Queensland Water Commission publication *Stormwater Infrastructure Options to Achieve Multiple Water Cycle Outcomes* (August 2009, p36). For high density urban and commercial areas the most efficient rainwater tank sizes were calculated, as the QDC only advises rainwater tank sizes based on the number of pedestals provided in commercial areas. The optimal rainwater tank sizes were calculated as:

- 5kL per lot for low density urban areas (T3, T4 and LD);
- 3kL per lot for medium density urban areas (T5 and MD);
- 1.5kL per lot for high density urban areas;
- 20L/m^2 GFA (100kL/ha) for industrial areas (or minimum prescribed by QDC);
- 2.1L/m^2 GFA (60kL/ha)for office buildings (or minimum prescribed by QDC);
- 12L/m^2 GFA for (60kL/ha) retail/public buildings (or minimum prescribed by QDC).

While the use of rainwater tanks will allow for the collection of runoff from roof areas, such schemes do not collect runoff from ground areas. To allow for the collection and reuse of runoff from ground areas the potential to use a stormwater harvesting scheme to provide irrigation water for open space areas was investigated.

The quantity of runoff available for a stormwater harvesting scheme is less certain than for roofwater collection. The amount of roof area draining to rainwater tanks on each lot together with variations in tank size and the rate of usage of collected water affect the amount of runoff that occurs from each lot. Similarly, the type and size of water quality improvement devices adopted for the development will impact on the volume of water available for harvesting. To allow for this potential variation a multiplication factor of 75% was added to the ground runoff. It was assumed that overflow from the rainwater tanks would also drain to the underground storage tanks.

When modelling the potential to adopt a stormwater harvesting scheme, consideration was given to both underground storages and open water storages.

Due to the relatively large area to be irrigated, modelling determined that the use of harvested stormwater as the primary means of irrigating all open space areas would have only a limited reliability. For this case, recycled water would be required periodically when harvested stormwater is unavailable. Such a system would produce a highly variable demand for recycled water, with none being required when rainfall occurs regularly, and recycled water being used to supply the full irrigation demand during dry periods. To improve the reliability of supply of harvested stormwater and to provide a more stable demand for recycled water, a second case was considered.

For the recycled water case it was assumed that the irrigation requirements for the first and second tier ovals and detention basin areas (the priority irrigation areas, refer Table 4) would be met by the use of recycled water, with harvested stormwater used to supply the irrigation requirements for other open space areas. Recycled water would be used to supplement the harvested stormwater supply for these areas.

For the underground storage tanks and open water body (located in the central catchment) the optimal storage sizes were found to be:

- 3ML underground storage for the northern catchment;
- 3ML underground storage for the eastern catchment;
- 4ML underground storage for the southern catchment; and

- 3 hectare (47ML) lake (with recirculation wetland) for the central catchment.

It should be noted that smaller underground storage sizes could be adopted if recycled water is used.

Given the improvement in reliability achieved by allowing the priority open space areas to be irrigated with recycled water, it is considered that the optimal outcome for the irrigation of open space areas is to use recycled water to irrigate the first and second tier ovals and detention basin areas, with harvested stormwater used to irrigate the remaining area. Recycled water would need to be supplied to these latter areas when stormwater is not available.

Summary of Findings

The total water demand for the Urban Core is 6,236 kL/day. Of this total, a minimum of 2,070 kL/day of potable water is required. Alternate water supplies, namely recycled water and harvested stormwater, can be used to meet at least a portion of the remaining demand.

Based on the consideration of available options for the supply of water to the Urban Core and the results of water balance modelling, the following approach is considered to be optimal.

- Water saving fixtures and appliances to be adopted to minimise the lot based demand for water.
- Rainwater tanks to be provided to each lot in accordance with the requirements of the *Queensland Development Code* to collect roof runoff for non-potable reuse. Potable water will need to be used to provide supplemental water when the rainwater tanks are empty. As much roof area as possible should be directed towards the rainwater tanks.
- Use of harvested stormwater water to irrigate priority open space areas (i.e. first and second tier ovals and detention basin areas). Recycled water would be used to supplement the supply and provide water when the stormwater storage is empty.
- Use of recycled water to irrigate remaining open space areas.
- Bore water should be used to top up the lake when required.

The summary of results is shown below. For this scenario it was assumed that Scenario 3b (refer Table 12) was adopted. This included 100% of roof area draining towards tanks and the use of recycled water.

Table 13 Summary of Water Demand and Supply with Recycled Water, Entire Urban Core

Use	Total Demand (kL/d)	Supply of Water to Meet Demand			
		Potable Water (kL/d)	Non-Potable Water Sources		
			Stormwater (kL/d)	Recycled Water (kL/d)	Total (kL/d)
Urban Lots- Potable water (kitchen, bathroom etc)	1803.9	1803.9			
Urban Lots- Non-Potable water (toilets, irrigation and laundry)	1920.3	579.9	1340.4		1340.4
Commercial Lots – Potable water (kitchen, bathroom etc.)	266.3	266.3			
Commercial Lots – Non-Potable water (toilets, irrigation, laundry, air conditioning etc.)	399.4	218.5	180.9		180.9
Open Space- 1st and 2nd tier ovals and detention basins	509.4		432.5	76.9	509.4
Open Space- Other Areas	1337.2			1337.2	1337.2
Total	**6236**	**2868.6**	**1953.8**	**1414.1**	**3367.9**
Percentage of Total Demand		**46.0**	**31.3**	**22.7**	**54.0**

- *Note: Figures are long term average demand and supply figures*

Based on the results presented in Table 13, it can be concluded that it will be possible to supply over half of the overall water demand of the Urban Core by alternate water supplies. Approximately a third of the overall water demand can be met by stormwater reuse (roofwater tanks and stormwater harvesting), with approximately 20% of the overall demand met by recycled water.

It is important to note that the approach outlined above would be subject to detailed design and cost benefit analysis to derive an overall optimal outcome. Further, it will be necessary to ensure that the adopted system does not have an adverse impact on the frequent flow regime of Bundamba Creek by capturing too great a proportion of the runoff produced by small events.

If recycled water is not used the resultant water uses will be as shown below (refer Scenario 3b) in Table 14. For this scenario it was assumed that 100% of the roof area could be drained towards the tanks. It should be noted that for this scenario more frequent top up of the lake will be required to sustain it at a reasonable level. As the results of Table 14 show, if recycled water is not used more potable water will be required to meet the demand.

Table 14 Summary of Water Demand and Supply with Normal Irrigation, Entire Urban Core

Use	Total Demand (kL/d)	Supply of Water to Meet Demand			
		Potable Water (kL/d)	Non-Potable Water Sources		
			Stormwater (kL/d)	Recycled Water (kL/d)	Total (kL/d)
Urban Lots- Potable water (kitchen, bathroom etc)	1803.9	1803.9			0.0
Urban Lots- Non-Potable water (toilets, irrigation and laundry)	1920.3	579.9	1340.4		1340.4
Commercial Lots – Potable water (kitchen, bathroom etc.)	266.3	266.3			0.0
Commercial Lots – Non-Potable water (toilets, irrigation, laundry, air conditioning etc.)	399.4	218.5	180.9		180.9
Open Space- 1st and 2nd tier ovals and detention basins	509.4	216.0	293.4		293.4
Open Space- Other Areas	1337.2	567.0	770.2		770.2
Total	**6236**	**3651.6**	**2584.9**	**0.0**	**2584.9**
Percentage of Total Demand		**58.6**	**41.4**	**0.0**	**41.4**

- *Note: Figures are long term average demand and supply figures*

APPENDIX A

Derivation of Catchment Runoff

APPENDIX A- DERIVATION OF CATCHMENT RUNOFF

A1 INTRODUCTION

The expected runoff from each of the catchments of the Urban Core was estimated using the Cooperative Research Centre for Catchment Hydrology Model for Urban Stormwater Improvement Conceptualisation (MUSIC). Version 3.01 of the software was used for the analysis.

The model was selected due to the availability of calibrated rainfall runoff parameters for a range of land uses. The calibrated parameters were derived for gauged catchments in the Brisbane area. Given the relatively close proximity of Brisbane to Ripley Valley, it was considered that the parameters were suitable for use at Ripley.

MUSIC is typically used for the assessment of overall water quality in urban areas. When such modelling is completed, there is a tendency to set model parameters so as to over-estimate runoff and therefore be conservative when assessing requirements for stormwater treatment. When considering options for the collection and reuse of runoff, to be conservative it is necessary to adopt the opposite approach and determine the minimum runoff that could potentially occur.

When calculating the runoff that will occur from the developed catchments, GoldSim modelling has been completed using a methodology that will account for this overestimation by applying a multiplication factor to the runoff of 75 percent.

A2 MODEL SETUP

A2.1 General

This section of the report describes the parameters adopted for the MUSIC model of the site and the setup of the MUSIC model to represent the major catchments (north, east, central and south – refer Figure 1) of the Urban Core.

A2.2 Rainfall and Runoff Parameters

Daily rainfall data supplied by the Department of Environment and Resource Management for the period to from January 1950 to May 2007 was used for the analysis. The data represents a composite of data recorded at stations close to Ripley Valley (selected location -27.70 degrees Latitude and 152.80 degrees Longitude).

Appropriate runoff parameters were adopted in accordance with Table 3.7 of the MUSIC Modelling Guidelines for South East Queensland (Draft, December 2009). The values applicable to the various land uses expected within the Urban Core are listed in Table A1.

Table A 1 Adopted MUSIC Runoff Generation Parameters

Parameter	Urban Residential	Commercial	Industrial	Forested
Field Capacity (mm)	200	80	80	80
Infiltration Capacity Coefficient a	211	243	313	200
Infiltration Capacity Exponent b	5.0	0.6	5.7	1.0
Rainfall Threshold (mm)	1	1	1	1
Soil Capacity (mm)	500	18	95	120
Initial Storage (%)	10	10	10	10
Daily Recharge Rate (%)	28	0	33	25
Daily Baseflow Rate (%)	27	31	16	3
Initial Depth (mm)	50	50	50	50

The runoff generation parameters listed in Table A1 were applied to the various land uses within each catchment as follows:

- urban residential: Urban Residential;
- office buildings: Commercial;
- retail/public buildings: Commercial;
- industrial: Industrial; and
- open space, environmental areas: Forested.

A2.3 Catchment Areas and Land Uses Within Catchments

The proposed land uses within each catchment were calculated based on the Superlot Structure Plan and the Ripley Structure Plan for that part of the catchments outside the boundary of the Urban Core. Catchment areas were defined based on existing contour information and the preliminary catchment delineation provided in the *Conceptual Stormwater Management Plan*. The catchment boundaries defined for the area are shown on Image 1. It can be noted that the area adopted for the calculation of catchment runoff does not include certain areas adjacent to Bundamba Creek as it is considered that runoff from the areas in question would be too difficult to capture for reuse.

The areas and land uses defined within each catchment are listed in Table A2.

Table A 2 Land Uses Within Catchments

Area Classification	Catchment Area (ha)			
	North	Central	East	South
Suburban (T3/OU)	23.88	79.61	0.00	49.67
General Urban (T4/LD)	18.35	134.11	0.40	15.73
Urban Centre (T5)	1.48	2.71	0.00	1.51
Urban Centre (MD)	0.00	3.62	0.00	0.00
High Density Urban (HD)	0.00	7.85	1.63	0.00
Industry	0.00	11.70	0.00	0.00
Offices	0.00	13.59	0.00	0.00
Retail/Public Buildings	0.00	9.26	5.33	0.00
Major Roads	3.27	25.29	0.00	32.54
Parkland	2.87	43.9	0.00	1.62
Total	**49.85**	**331.64**	**7.36**	**101.07**

Note: Refer to Image 1for catchment plan.

A2.4 Model Schematisation and Calibration

As part of the overall management of the water cycle for Ripley Valley, rainwater tanks will be used to collect roofwater runoff for reuse. To model the roof area draining towards the tanks the entire roof was split from the remainder of the catchment. In the GoldSim water balance modelling the percentage roof area draining towards the tank can be set, and the remainder of the runoff will drain directly to underground drainage. This will enable the sensitivity of the amount of roof area connected to the tanks to be tested without having to alter the inflow data used in GoldSim.

Each land use was subdivided into roof and ground areas, based on the standard land use splits provided in Table 3.5 of the MUSIC modelling guidelines. To simplify the modelling the road reserve and ground areas were combined. The green roof areas proposed in the retail areas were included with the remainder of the ground runoff.

The catchment areas and the adopted percentage impervious are shown below in Table A3.

Table A 3 MUSIC Model Areas

Area Classification	Area Split	North		Central		East		South	
		Area (ha)	% Imp	Area (ha)	% Imp	Area (ha)	% Imp	Area (ha)	% Imp
Suburban (T3/OU)	Total Roof Area	7.76	100.0	25.87	100.0	0.00	0.0	16.14	100.0
	Road/Ground combined	16.12	26.0	53.74	26.0	0.00	0.0	33.53	26.0
General Urban (T4/LD)	Total Roof Area	6.42	100.0	46.94	100.0	0.14	100.0	5.51	100.0
	Road/Ground combined	11.93	38.5	87.17	38.5	0.26	38.5	10.22	38.5
Urban Centre (T5)	Total Roof Area	0.52	100.0	0.95	100.0			0.53	100.0
	Road/Ground combined	0.96	46.5	1.76	46.5	0.00		0.98	46.5
Urban Centre (MD)	Total Roof Area			1.27	100.0				
	Road/Ground combined	0.00		2.35	54.6	0.00		0.00	
High Density Urban (HD)	Total Roof Area			2.75	100.0	0.57	100.0		
	Road/Ground combined	0.00		5.10	84.6	1.06	84.6	0.00	
Industry	Total Roof Area			5.85	100.0				
	Road/Ground combined	0.00		5.85	80.0	0.00		0.00	
Offices	Total Roof Area			6.80	100.0				
	Road/Ground combined	0.00		6.80	80.0	0.00		0.00	
Retail/Public Buildings	Total Roof Area			2.32	100.0	1.33	100.0		
	Road/Ground combined	0.00		6.95	53.6	4.00	53.6	0.00	
Roads	Road (ha)	3.27	60.0	25.29	60.0	0.00	60.0	32.54	60.0
Parkland	Park (ha)	2.87	0.0	43.90	0.0	0.00	0.0	1.62	0.0

The MUSIC model layouts for all four catchments are shown in the following images.

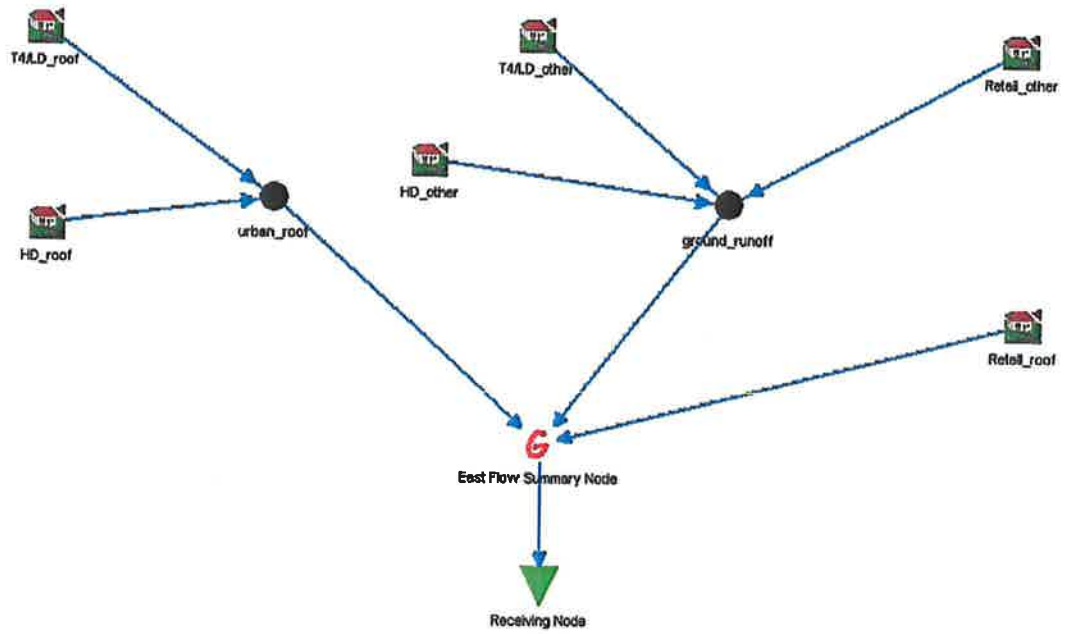


Image A 3 **East Catchment MUSIC Model Setup**

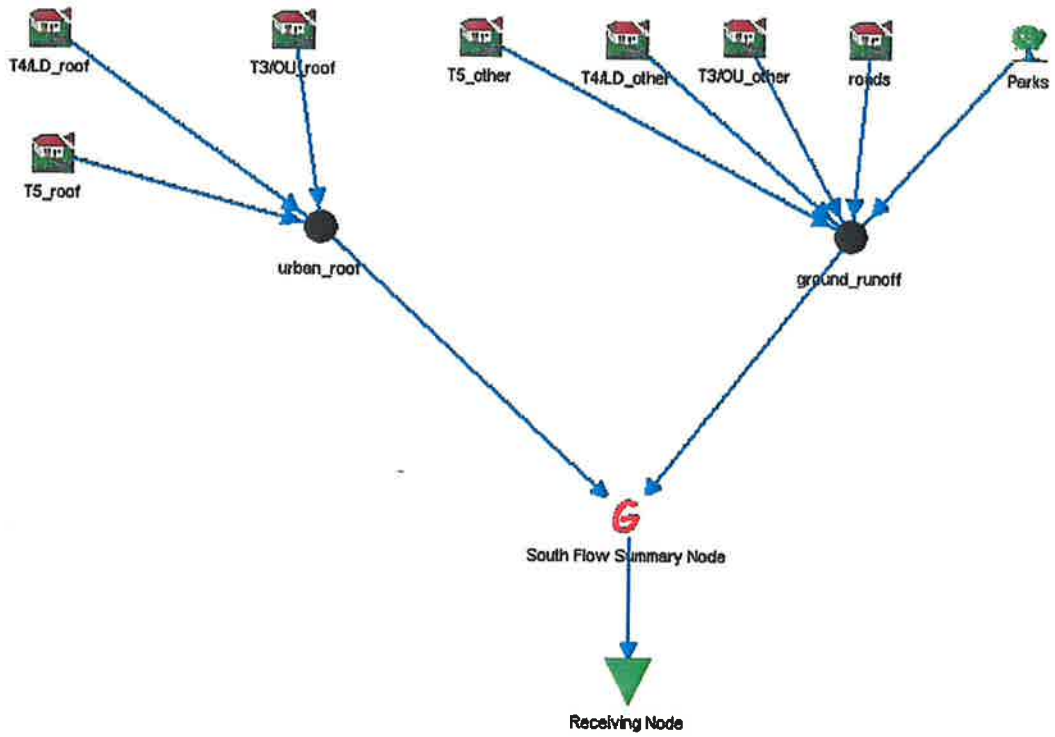


Image A 4 **South Catchment MUSIC Model Setup**

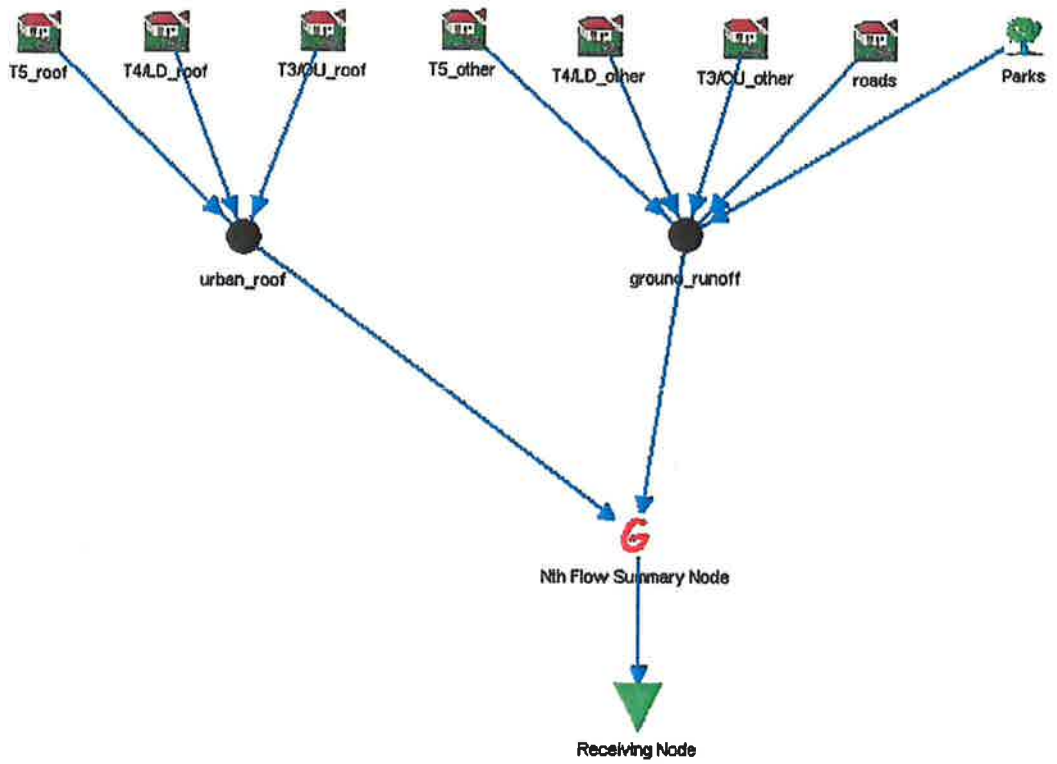


Image A 1 **North Catchment MUSIC Model Setup**

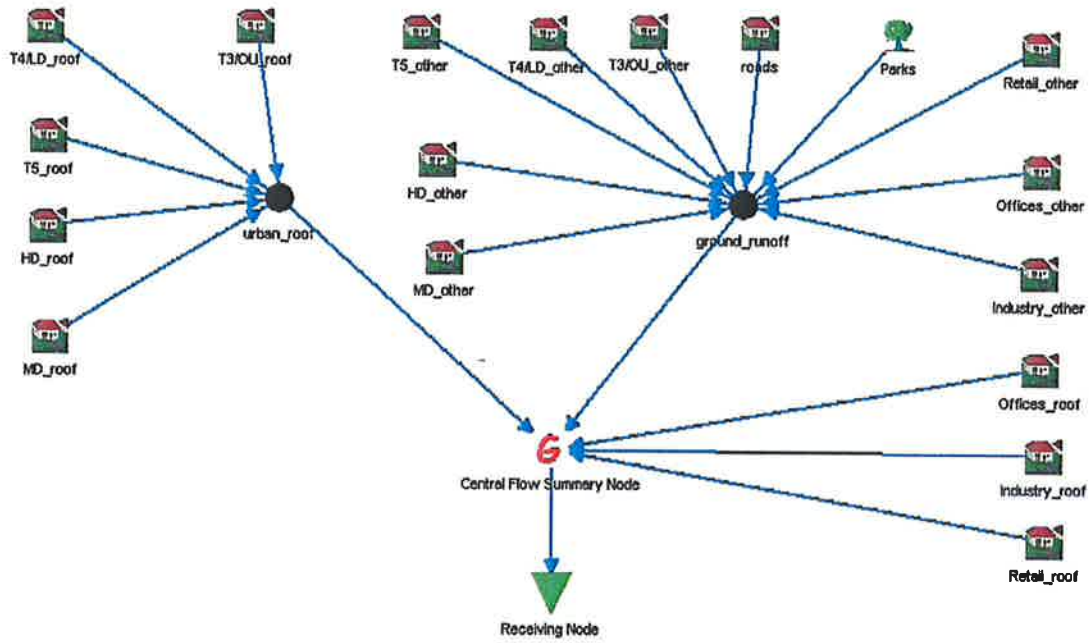


Image A 2 **Central Catchment MUSIC Model Setup**