
Report

KLIP ROAD CEMETERY EXTENSION

STORMWATER MANAGEMENT PLAN

Prepared for:



Prepared by:

Graeme McGill
consulting

Tel: 021 976 0386

Mobile: 082 550 9108

graeme@mcgillconsulting.co.za

Report No.: MC428-01

Revision: 0

Date: 2024-04-18

CONTENTS

KLIP ROAD CEMETERY EXTENSION –STORMWATER MANAGEMENT PLAN.....	4
EXECUTIVE SUMMARY	4
KLIP ROAD CEMETERY EXTENSION –STORMWATER MANAGEMENT PLAN.....	6
1. EXISTING AND PROPOSED DEVELOPMENT	6
2. APPLICABLE CONDITIONS.....	8
2.1 MANAGEMENT OF URBAN STORMWATER IMPACTS POLICY.....	8
2.2 FLOODPLAIN AND RIVER CORRIDOR MANAGEMENT POLICY	9
3. PRE-DEVELOPMENT ANALYSIS	9
3.1 STORM RUNOFF MODEL	9
3.1.1 METHODOLOGY	9
3.1.2 STORM RAINFALL.....	9
3.2 EXISTING SITE CONDITIONS AND STORMWATER INFRASTRUCTURE	10
3.2.1 EXISTING SITE CONDITIONS.....	10
3.2.2 EXISTING STORMWATER INFRASTRUCTURE AT THE DEVELOPMENT SITE	11
3.2.3 ADJACENT CATCHMENT RUN-ON	12
3.3 PRE-DEVELOPMENT RUNOFF PEAKS.....	12
4. POST-DEVELOPMENT STORMWATER MANAGEMENT – QUANTITY AND RATE OF RUNOFF.....	14
4.1 REQUIREMENTS.....	14
4.2 RUNOFF ANALYSIS	14
4.2.1 PROPOSED ON-SITE STORMWATER CONFIGURATION	14
4.3 MODEL LAYOUT AND PARAMETERS.....	15
4.4 SWALE OUTLET STRUCTURES AND SITE OUTFALL.....	18
4.5 EMERGENCY OVERLAND ESCAPE ROUTES	18
4.6 VEGETATED SWALES PERFORMANCE.....	18
4.7 POST-DEVELOPMENT RUNOFF PEAKS	22
4.8 REQUIRED STORMWATER INFRASTRUCTURE.....	24
5. POST-DEVELOPMENT STORMWATER MANAGEMENT - QUALITY TREATMENT	25
6. MAINTENANCE OF THE STORMWATER SYSTEM.....	26
6.1 SCOPE OF MAINTENANCE	26
6.2 RESPONSIBILITY FOR MAINTENANCE	26

7. SEDIMENT, LITTER AND DEBRIS CONTROL: OPERATIONS AND SERVICES	26
8. DETAILED DESIGN NOTES	26
9. ADJACENT CATCHMENT RUN-ON.....	26
10. PHASING	27
11. CONCLUSIONS	28
11.1 PROPOSED DEVELOPMENT	28
11.2 APPLICABLE CONDITIONS	28
11.3 EXISTING CONDITIONS	28
11.4 RUNOFF PEAK ATTENUATION	28
11.5 RUNOFF WATER QUALITY TREATMENT	28
11.6 OPERATION AND MAINTENANCE	28
REFERENCES	29
ANNEXURE A: PRE-DEVELOPMENT RUNOFF	30
1:0.5 YEAR	32
1:1 YEAR	35
1:2 YEAR	38
1:5 YEAR	41
1:10 YEAR	45
1:20 YEAR	48
1:50 YEAR	51
1:100 YEAR	55
ANNEXURE B: POST-DEVELOPMENT RUNOFF	59
1:0.5 YEAR	61
1:1 YEAR	65
1:2 YEAR	69
1:5 YEAR	73
1:10 YEAR	77
1:20 YEAR	81
1:50 YEAR	85
1:100 YEAR	89
ANNEXURE C: OPERATION AND MAINTENANCE MANUAL	93

DRAWINGS

DRAWING NUMBER	DRAWING TITLE	REVISION
MC428-C400	EXISTING CONDITIONS PART 1 (ERVEN: RE/75567 AND 75569)	A
MC428-C401	EXISTING CONDITIONS PART 2 (ERVEN: 75569, 75570, AND 75571)	A
MC428-C402	EXISTING CONDITIONS PART 3 (ERVEN: 75569, 75570, AND 75571)	A
MC428-C403	STORMWATER MANAGEMENT PLAN PART 1 (ERVEN: RE/75567 AND 75569)	A
MC428-C404	STORMWATER MANAGEMENT PLAN PART 2 (ERVEN: 75569, 75570, AND 75571)	A
MC428-C405	STORMWATER MANAGEMENT PLAN PART 3 (ERVEN: 75569, 75570, AND 75571)	A
MC428-C420	STORMWATER INFRASTRUCTURE DETAILS	A

KLIP ROAD CEMETERY EXTENSION – STORMWATER MANAGEMENT PLAN

EXECUTIVE SUMMARY

It is proposed to extend the Klip Road Cemetery on erven 75568, RE/75563, RE/75566, 77939, 75569, and partially on 75570 onto the adjacent erven RE/75567, the rest of 75570, RE/75570, 75571, and extensions of 75569 (total area for extension: 10.586 ha). Since the existing cemetery and Victoria Road separate these erven, the cemetery extensions are divided into four separate sections.

There are no detailed site development plans at this stage, therefore for this stormwater management plan (SMP) it has been assumed that a certain amount of surface hardening will take place.

The proposed SMP has been formulated to meet the objectives of the City of Cape Town stormwater policy “Management of Urban Stormwater Impacts”. Two of the four sections will act under existing cemetery conditions with no additional stormwater infrastructure, whereas the other two larger sections will implement vegetated swales to attenuate the runoff. A total of three swales are proposed with volumes of 168.78m³, 194.06m³, and 682.36m³ which will release pre-development peak flows into an existing stormwater service, and into a proposed stormwater system. The proposed stormwater connection will be constructed to cross the (M5) Prince George Drive to Princess Vlei.

TABLE 1: DRAWING SUMMARY

DRAWING NUMBER	DESCRIPTION
MC428-C400	Existing conditions of erven RE/75567, 77939, 75568, 75569, and RE/75563 showing the existing Klip Road Cemetery.
MC428-C401	Existing conditions of erven 75568, 75569, 7557, and 75571 showing the existing Klip Road Cemetery.
MC428-C402	Existing conditions of erven 75571, (M5) Prince George Drive, and Princess Vlei.
MC428-C403	Proposed cemetery extensions and vegetated swales along the northern boundary of the existing Klip Road Cemetery.
MC428-C404	Proposed cemetery extensions on the western and southern borders of the existing Klip Road Cemetery.

MC428-C405	Proposed cemetery extensions onto erf 75571 with a vegetated swale along the western border with a proposed stormwater pipe crossing the (M5) Prince George Drive.
------------	--

KLIP ROAD CEMETERY EXTENSION – STORMWATER MANAGEMENT PLAN

1. EXISTING AND PROPOSED DEVELOPMENT

The existing Klip Road cemetery is located on erven 75568, RE/75563, RE/75566, 77939, 75569, and partially on 75570. It is proposed to extend the cemetery onto the adjacent erven 75562, RE/75567, remaining area of 75569 and 75570, RE/75570, 75571, and extensions of 75569 (refer to Figure 1).

Erf 75569 in the suburb of Parkwood mainly consists of the existing Klip Road Cemetery but includes open spaces which are located to the west of the existing cemetery and across Victoria Road to the south-west. Erf 75571 can be described as undeveloped although there are some structures such as houses located on the erf.

Erf 75570 and RE/75567 are labelled as open spaces with hard surfaces, since these erven have paved parking areas covering 36% and 29% of the erf area, respectively. Some existing graves and fencing of Klip Cemetery are existing on erf 75570 thus only a certain area of the erf will be used for extension of Klip Road Cemetery.

There are no detailed site development plans at this stage. Therefore, for the purpose of preparing this stormwater management plan conservative assumptions of hardening of surfaces due to the construction of paved access roads have been made.

2. APPLICABLE CONDITIONS

2.1 MANAGEMENT OF URBAN STORMWATER IMPACTS POLICY

The goal of the City of Cape Town's Management of Urban Stormwater Impacts Policy (City of Cape Town, 2009a) is to implement Sustainable Drainage Systems (SuDS). These systems attempt to maintain or mimic the natural flow systems as well as prevent the wash-off of urban pollutants to receiving waters.

The stormwater policy objectives to be satisfied in the stormwater management plan are listed in Table 1.

In this case the site is undeveloped and is thus deemed to be a Greenfield Development.

TABLE 1: STORMWATER POLICY OBJECTIVES TO BE SATISFIED IN THE STORMWATER MANAGEMENT PLAN WITH RELEVANT PORTIONS MARKED IN RED				
ANNEXURE: INTERIM CRITERIA FOR ACHIEVING SUSTAINABLE URBAN DRAINAGE SYSTEM OBJECTIVES IN VARIOUS DEVELOPMENT SCENARIOS				
SUDS OBJECTIVES	Greenfield Developments and Brownfield and Existing Development Sites located in catchments of sensitive receiving water systems	Brownfield and Existing Development Sites > 50 000 m ²	Brownfield and Existing Development Sites 4000 m ² – 50 000 m ² and Total impervious area (exist & new) > 15% of site	Brownfield and Existing Development Sites < 4000 m ² and Total impervious area (exist and new) > 600m ²
IMPROVE QUALITY OF RUNOFF Remove pollutants through combination of reducing and/or disconnecting impervious areas, and the use of BMPs which infiltrate or capture and treat stormwater runoff	Pollutant removal target: Reduction of post-development annual stormwater pollutant load discharged from dev. site: SS & TP - reduce to undeveloped catchment levels, or SS - 80% reduction TP - 45% reduction whichever requires higher level of treatment	Pollutant removal target: On-site reduction of post-development annual stormwater pollutant load discharged from development site: SS - 80% reduction TP - 45% reduction	Pollutant removal target: Combination of on-site and regional off-site measures to achieve target reductions: SS - 80% reduction TP - 45% reduction	On-site stormwater treatment not required but encouraged where practicable. Regional off-site treatment measures to achieve target reductions: SS - 80% reduction TP - 45% reduction
	Design storm event for water quality treatment: 1/2-year RI, 24 h storm			
All developments are required to trap litter, oil, grease at source				
CONTROL QUANTITY AND RATE OF RUNOFF	Protect the stability of downstream channels	24 hour extended detention of the 1-year RI, 24h storm event	24 hour extended detention of the 1-year RI, 24h storm event	On-site runoff control measures not required but encouraged where practicable Regional off-site runoff control measures to be provided to achieve requirements as for development sites > 50 000m ²
	Protect downstream properties from fairly frequent nuisance floods	Up to 10-year RI peak flow reduced to pre-development level	Up to 10-year RI peak flow reduced to pre-development level	
	Protect floodplain developments and floodplains from adverse impacts of extreme floods	Up to 50-year RI peak flow reduced to existing development levels. Evaluate the effects of the 100-year RI storm event on the stormwater management system, adjacent property, and downstream facilities and property. Manage the impacts through detention controls and / or floodplain management	Up to 50-year RI peak flow reduced to existing development levels. Evaluate the effects of the 100-year RI storm event on the stormwater management system, adjacent property, and downstream facilities and property. Manage the impacts through detention controls and / or floodplain management	
Developments adjacent to floodplains must adhere to the requirements of the Floodplain and River Corridor Management Policy				
ENCOURAGE NATURAL GROUNDWATER RECHARGE	Where appropriate, site specific requirements to be considered in consultation with Council			

2.2 FLOODPLAIN AND RIVER CORRIDOR MANAGEMENT POLICY

The goal of this policy (City of Cape Town, 2009b) is balancing flood risk, ecological and socio-economic considerations in developments near watercourses and wetlands.

The policy provides guidelines for various permeable land uses.

In this case the proposed cemetery extension lies outside of any floodplain. Therefore, the policy need not be applied in this case.

3. PRE-DEVELOPMENT ANALYSIS

3.1 STORM RUNOFF MODEL

3.1.1 METHODOLOGY

The pre-development and post-development runoffs were calculated using the PCSWMM package using the EPA SWMM hydrology method.

SWMM is a dynamic hydrology-hydraulic-water quality simulation model. It is used for single event or long-term (continuous) simulation of runoff quantity and quality from primarily urban areas. The runoff component operates on a collection of sub-catchment areas that receive precipitation and generate runoff and pollutant loads. The routing portion transports this runoff through a system of pipes, channels, storage/treatment devices, pumps, and regulators.

SWMM tracks the quantity and quality of runoff made within each sub catchment. It tracks the flow rate, flow depth, and quality of water in each pipe and channel during a simulation period made up of multiple time steps. SWMM 5.1 used for the development can also model the hydrologic performance of specific types of low impact development (LID) controls. The LID controls that the user can choose include the following: Permeable pavement, Vegetative swales, Infiltration trenches.

3.1.2 STORM RAINFALL

The City of Cape Town commissioned the University of Kwa-Zulu Natal to investigate the likely effect of climate change on storm intensities in the Western Cape. The recommendation from this investigation was that an increase of approximately 15% over the existing IDF curves be allowed for. This was accepted by the City and a set of point storm rainfall depths has been prepared for a one minute by one-minute grid covering the Western Cape.

The point rainfall figures applicable to the development site have been extracted from the Western Cape design rainfall database. The development site is located near the grid point 34°2'S 18°29'E. The rainfall figures used for the design is given in Table 2.

TABLE 2: FINAL SELECTED GRID POINT STORM RAINFALL DEPTHS FOR THE DEVELOPMENT SITE EXTRACTED FROM THE CITY OF CAPE TOWN DESIGN GRID INCORPORATING A CLIMATE CHANGE FACTOR

RI (yr)	POINT STORM RAINFALL DEPTHS (mm) FOR EVENT DURATIONS (minutes) OF:							
	10	30	60	120	240	360	720	1440
0.5	3.8	6.6	9.4	13.2	17.1	19.9	26.0	33.8
1	6.1	10.5	14.8	20.9	27.1	31.6	41.2	53.6
2	8.5	14.6	20.6	29.0	37.7	43.9	57.3	74.5
5	11.4	19.7	27.6	38.9	50.6	59.0	76.8	99.9
10	13.6	23.2	32.8	46.0	59.9	69.9	91.0	118.5
20	15.8	27.0	38.1	53.6	69.7	81.3	105.8	137.8
50	18.9	32.4	45.5	64.1	83.4	97.3	126.6	164.9
100	21.4	36.8	51.6	72.7	94.6	110.4	143.6	187.0
NOTES: 1. These data is the storm depths from grid point 34°2'S 18°29'E. 2. The 1:0.5 year and 1:1 year return period rainfall depths have been extrapolated.								

3.2 EXISTING SITE CONDITIONS AND STORMWATER INFRASTRUCTURE

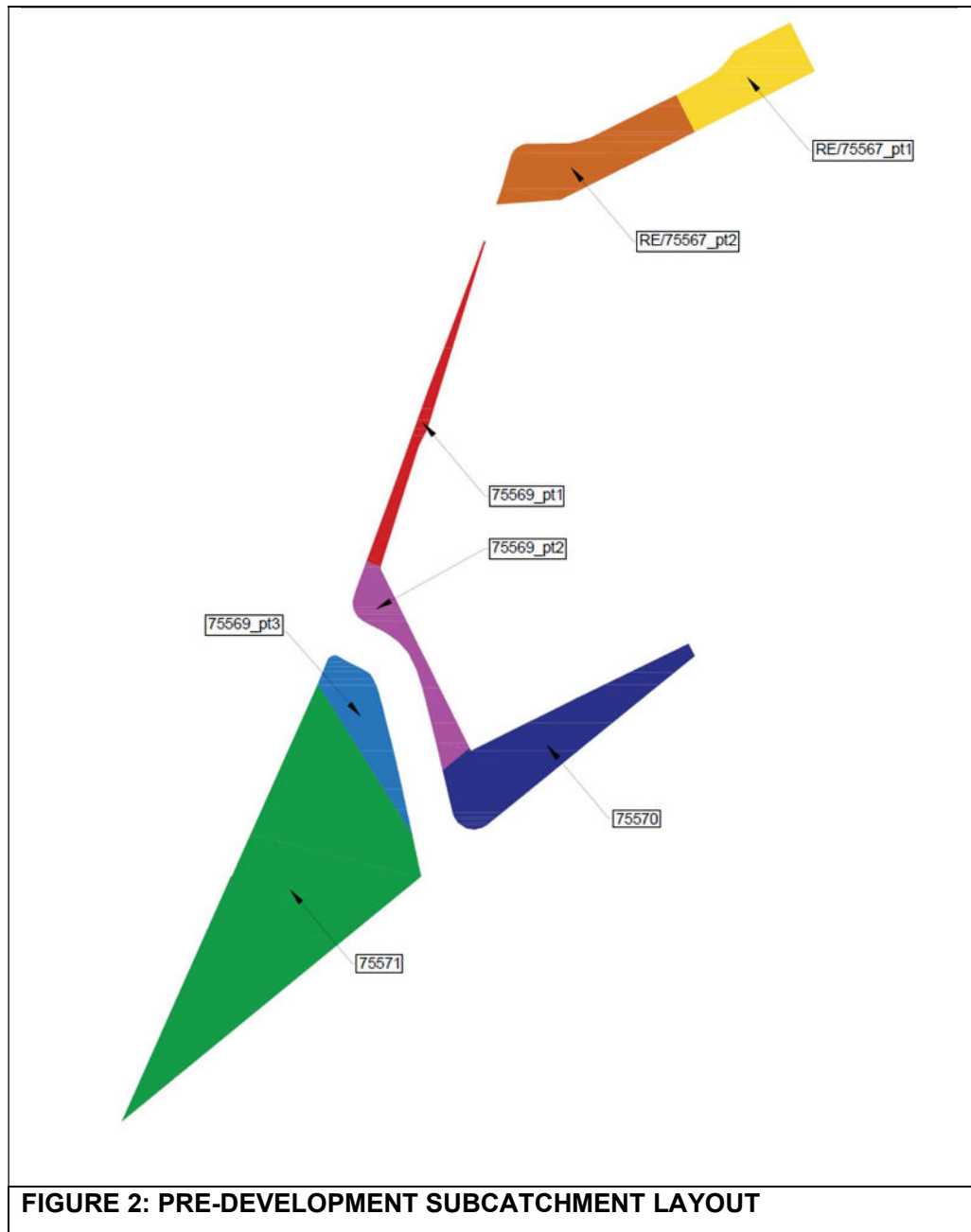
3.2.1 EXISTING SITE CONDITIONS

The Klip Road cemetery is to be extended onto multiple erven as shown in Figure 1. Erven 75569 and 75571 are mainly open grasslands whereas erven 75562, RE/75567, and 75570 are undeveloped with paved areas. The following drawing numbers are followed by descriptions on the existing conditions of the before mentioned erven.

MC428-C400: An existing paved parking space is located on the western boundary of erven 75562 and RE/75567. Erf RE/75567 can be divided into two subcatchments labelled RE/75567_pt1 and RE/75567_pt2 with slopes 1.25% and 0.14% respectively. The extension of the Klip Road cemetery will extend past erf RE/75567, onto erf 75562 up until the edge of road of the (M5) Prince George Drive drop off.

MC428-C401: Erf 75569 can be divided into three subcatchments, 75569_pt1, 75569_pt2, and 75569_pt3 each having natural slopes of 0.80%, 3.25%, and 0.82% respectively, sloping towards the (M5) Prince George Drive and Victoria Road. Some existing services such as watermains and underground cables are on subcatchments 75569_pt1 and 75569_pt2 and erf 75570. Erf 75570 has an existing paved parking area to the west which was used as a local netball court. This erf has a natural slope of 0.82% sloping towards Victoria Road.

MC428-C402: Erf 75571 has a natural slope of 0.63% sloping towards the (M5) Prince George Drive. It also has some structures located to the southwest corner where residents still reside. Abandoned structures are also found northeast of the residency.



3.2.2 EXISTING STORMWATER INFRASTRUCTURE AT THE DEVELOPMENT SITE

Existing stormwater infrastructure is found on erf RE/75567 consisting of a 900mm diameter stormwater pipe extending from Purple Road, across Prince George Drive to the canal feeding into Princess Vlei, which is located to the southwest of the site location. Existing manholes on this stormwater pipe are located on erf RE/75567 (Refer to MC428-C400).

The (M5) Prince George Drive and Victoria Road intercept any stormwater that would run-on to erf RE/75567. Erf RE/75567 previously drained towards the residential area road prism located to the northeast of Klip Road cemetery. Klip Road and Victoria Road guides stormwater towards Princess Vlei, preventing any run-on to erf 75571 and subcatchment 75569_pt3.

3.2.3 ADJACENT CATCHMENT RUN-ON

As mentioned in the section above, the (M5) Prince George Drive, Victoria Road, and Klip Road intercept any stormwater run-on for erven RE/75567, 75569_pt3, and 75571.

The subcatchments labelled 75569_pt1 and 75569_pt2 will be incorporated as part of the existing cemetery and therefore no change to the existing storm runoff is anticipated.

3.3 PRE-DEVELOPMENT RUNOFF PEAKS

The pre-development runoff peaks have been calculated using the PCSWMM modelling method. The PCSWMM pre-development model layout is shown in Figure 2 and Annexure A. The pre-development parameters and CN values are shown in Table 3.

The total development site pre-development peak runoff flows for all sections are given in Table 4.

TABLE 3: PRE-DEVELOPMENT SSA MODEL PARAMETERS

Sub-Catchment	Area (ha)	Width (m)	% Slope	n- Imperv	n- Perv	D-store Imp	D-store Perv	% Zero Imp	SOIL	Infil CN
RE/75567-pt1	0.614	44	1.25%	0.020	0.15	2	8	0	B	61
RE/75567-pt2	0.701	40	0.14%	0.020	0.15	2	8	0	B	84
75569-pt1	0.261	8	0.80%	0.020	0.15	2	8	0	B	61
75569-pt2	0.427	111	3.25%	0.020	0.15	2	8	0	B	61
75569-pt3	0.470	26	0.56%	0.020	0.15	2	8	0	B	61
75570	1.086	178	0.82%	0.020	0.15	2	8	0	B	84
75571	3.621	228	0.63%	0.020	0.15	2	8	0	B	69

Notes:

- 1). "Width" is a SSA catchment parameter computed as Area/Longest Collector.
- 3). Parameter % Imperv was set to 54%, 36%, and 3% for RE/75567_pt2, 75570, and 75571 respectively.

4). Infiltration is controlled by the SCS runoff factor CN, which was set to 61 – representative of the current greenfield condition.

TABLE 4: PEAK PRE-DEVELOPMENT RUNOFF SUMMARY

SUB CATCHMENT	Q_{PEAK} (l/s)							
	0.5y	1y	2y	5y	10y	20y	50y	100y
RE/75567_pt1 & RE/75567_pt2	0.005	0.015	0.030	0.051	0.069	0.089	0.119	0.146
75569_pt1 & 75569_pt2	0.000	0.001	0.004	0.022	0.037	0.052	0.074	0.093
75570	0.024	0.049	0.093	0.141	0.176	0.213	0.267	0.311
75571 & 75569_pt3	0.000	0.001	0.020	0.051	0.084	0.126	0.194	0.256

4. POST-DEVELOPMENT STORMWATER MANAGEMENT – QUANTITY AND RATE OF RUNOFF

4.1 REQUIREMENTS

In Section 2 the conditions for the greenfield development, which are to be applied to quantity and rate of runoff, are contained in the City of Cape Town stormwater policies for which it is necessary to:

- Provide 24-hr extended detention for the 1:0.5 year 24-hour duration storm.
- Provide post-development attenuation to pre-development peaks for storm events ranging from 1:5-year to the 1:50-year storm events.
- Provide controlled discharge of the 1:100-year storm event so as to not cause downstream damage.

4.2 RUNOFF ANALYSIS

4.2.1 PROPOSED ON-SITE STORMWATER CONFIGURATION

The development site will be divided into four separate sections. As shown in Figure 2, the development has seven pre-development subcatchments, RE/75567_pt1, RE/75567_pt2, 75569_pt1, 75569_pt2, 75569_pt3, 75570, and 75571 respectively.

Section one consists of subcatchment RE/75567_pt1 and RE/75567_pt2, which will be attenuated via a vegetated swale along the southeastern border of section one. The vegetated swale will discharge into the existing 900mm diameter stormwater pipe at two different locations (refer to drawing MC428-C403). The first location will be an existing stormwater manhole located on RE/75567_pt2, discharging the runoff from subcatchment RE/75567_pt2 into the existing stormwater system. The second location will be a new stormwater manhole connecting on the existing 900mm diameter stormwater pipe on RE/75567_pt1.

Section two consists of 75569_pt1 and 75569_pt2. These two portions are relatively small and will only allow for slight extension of the existing cemetery fence line. It can be assumed that no roads will be constructed on these two portions due to the lack of space and an access road already exist on the existing cemetery fence line, allowing access to the extensions. This extension of the existing cemetery was seen as a minimal impact on the existing conditions, therefore 75569_pt1 and 75569_pt2 will be modelled as part of the existing conditions and not as a separate cemetery extension.

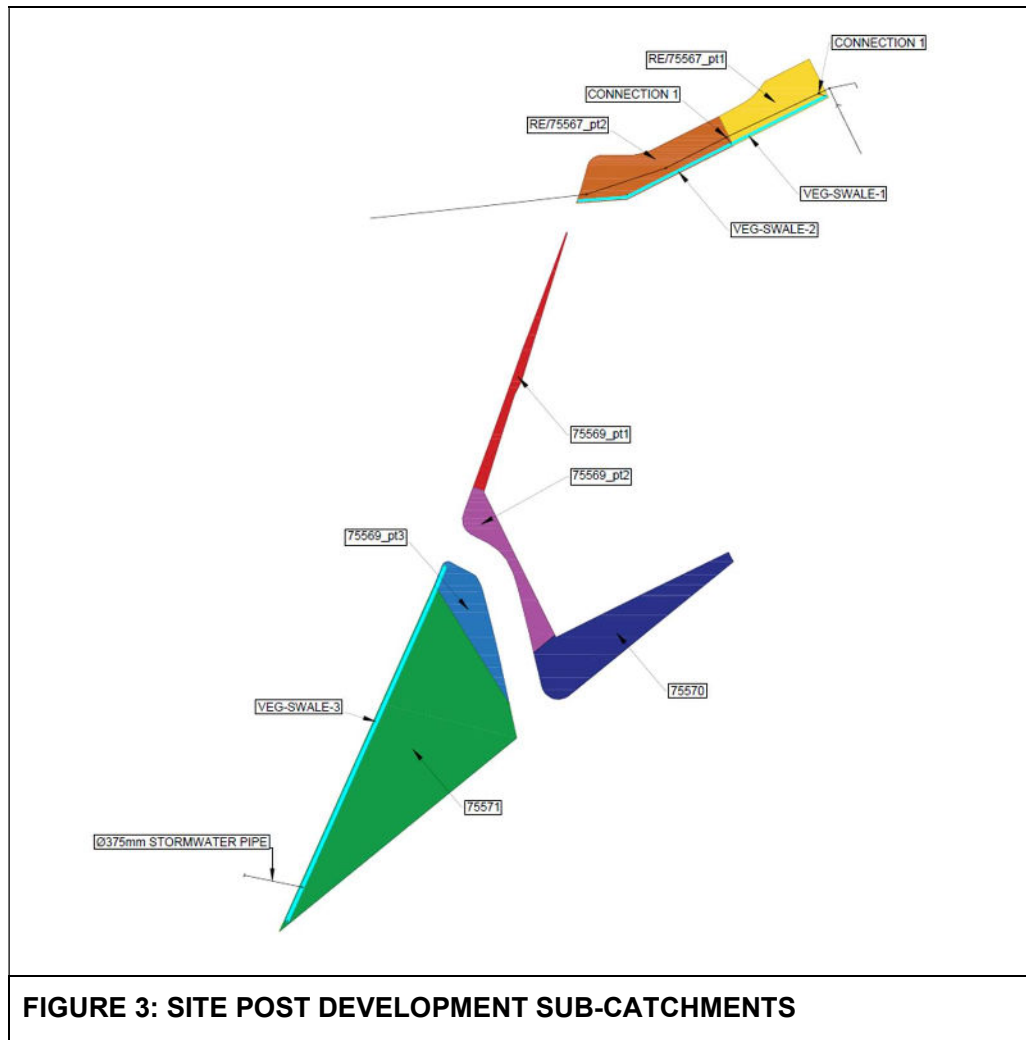
Section three consist of the remainder of erf 75570. This erf contains a lot of hardened surfaces and will produce runoff, but by removing the hardened surfaces, the conditions of the site will be improved significantly. A CN value of 84 was determined for the existing conditions, which is much higher than the CN value of 69 allocated to the post developed conditions. Therefore, by improving the conditions on site, attenuation of the section will be improved as well, thus satisfying the greenfield development policy conditions stated in section 4.1 above.

Section four consists of 75569_pt3 and 75571. Some high spots are located across erf 75571, thus it would be recommended that the erf 75571 should be graded. This erf naturally drains towards a low point on the southwestern border. A vegetated swale will be placed along the western order of the erf, sloping towards the low point. Previously any runoff from the erf was collected by the (M5) Prince George Drive, and since there are no existing stormwater services, it is proposed to bore a stormwater pipe under the (M5) Prince George Drive allowing the attenuated stormwater from the vegetated swale to discharge into Princess Vlei located to the west of Prince George Drive.

Refer to drawings MG428-C403, MC428-C404, MC48-C405, and MC428-C420 for details regarding the vegetated swales and other stormwater infrastructure.

4.3 MODEL LAYOUT AND PARAMETERS

The PCSWMM model layout shown in Annexure B corresponds to the post-development scenario. A summary of the parameters used to model the post-development scenario is shown in Table 5. The model consists of 7 post development sub-catchments as shown in Figure 3 below.



The vegetated swales labelled “VEG-SWALE-1”, “VEG-SWALE-2”, and “VEG-SWALE-3” are located on erven RE/75567_pt1, RE/75567_pt2, and 75571 as shown in Figure 3. VEG-SWALE-1 and VEG-SWALE-2 both are 0.5m deep with a base width of 1m, and side slopes of 1:2. VEG-SWALE-1 and VEG-SWALE-2 have areas of 506.14 m², and 582.18 m² respectively.

VEG-SWALE-3 has an area of 2047.08 m² and is 0.5m deep with a base width of 1.5m and a side slope of 1:3. All swales are Grassblock lined. The post-development subcatchment properties of the PCSWMM model is shown in Table 5 below.

TABLE 5: POST-DEVELOPMENT SUBCATCHMENT PARAMETERS

SUB-CATCHMENT	AREA (ha)	WIDTH (m)	% SLOPE	n- IMPERV	n- PERV	D- STORE IMP	D- STORE PERV	% ZERO IMP	SOIL	LAND USE	INFIL CN
RE/75567-Pt1	0.614	44	1.25%	0.02	0.15	2	8	0	B	CEMETERY	69
RE/75567-Pt2	0.701	40	0.14%	0.02	0.15	2	8	0	B	CEMETERY	69
75569-Pt1	0.261	8	0.80%	0.02	0.15	2	8	0	B	CEMETERY	69
75569-Pt2	0.427	111	3.25%	0.02	0.15	2	8	0	B	CEMETERY	69
75570	1.086	178	0.82%	0.02	0.15	2	8	0	B	CEMETERY	69
75571 & 75569_pt3	4.092	228	0.63%	0.02	0.15	2	8	0	B	CEMETERY	69
Notes: "WIDTH" is a PCSWMM catchment parameter computed as Area/Longest Collector The %imperv parameter was set to "0". The vegetated swales are modelled as small areas within the respective subcatchments with CN values of 61.											

4.4 SWALE OUTLET STRUCTURES AND SITE OUTFALL

The vegetated swales have each an outlet connecting to either an existing stormwater system, or the proposed (M5) Prince George Drive crossing. VEG-SWALE-1 and VEG-SWALE-2 have a single orifice of 110mm diameter outlet connecting to the existing 900mm diameter stormwater system via existing and proposed stormwater manholes (refer to drawing MC428-C403)

VEG-SWALE-3 has a single orifice with dimensions shown in Table 8. It is proposed that a 375mm stormwater pipe crosses the (M5) Prince George Drive to be discharged into Princess Vlei.

The orifices and spillway have been sized to achieve the required attenuation to pre-development peaks or less and to minimise the peak water levels in the swales.

The performance of the vegetated swales under a range of storm conditions is summarised in Tables 6, 7 and 8.

4.5 EMERGENCY OVERLAND ESCAPE ROUTES

In the event that the outlet structures and outlet pipes of the vegetated swales become blocked, the vegetated swales will safely discharge the attenuated flow to Cherise Road and the (M5) Prince George Drive.

4.6 VEGETATED SWALES PERFORMANCE

The attenuation performances of the vegetated swales are set out in detail in Table 6, 7, and 8.

These figures show that the post-development runoff will not exceed the pre-development peak flows (section 4.7)

TABLE 6: VEGETATED-SWALE 1 ATTENUATION PERFORMANCE								
PEAKS FOR VARIOUS RECURRENCE INTERVALS								
RECURRENCE INTERVAL (1: _year)	0.5	1	2	5	10	20	50	100
INFLOW (l/s)	0.000	0.001	0.005	0.015	0.027	0.040	0.058	0.075
VOLUME (m3)	0	7	18	42	67	105	159	169
WATER SURFACE AREA (m2)	169	196	229	290	344	412	493	506
WATER DEPTH (m)	0.00	0.04	0.09	0.18	0.26	0.36	0.48	0.50
WATER SURFACE ELEVATION (RLm)	11.50	11.54	11.59	11.68	11.76	11.86	11.98	12.00
OUTFLOW (l/s)	0.000	0.001	0.004	0.009	0.012	0.014	0.016	0.017

POND, ORIFICE, AND SPILLWAY SUMMARY			
OUTLET TYPE	SWALE	ORIFICE1	SPILLWAY
INVERT LEVEL (RLm)	11.50	11.50	12.00
DIA / HEIGHT (m)		0.11	0.5
WIDTH (m)		0.00	3
COEFFICIENT		0.60	1.45

TABLE 7: VEGETATED-SWALE 2 ATTENUATION PERFORMANCE								
PEAKS FOR VARIOUS RECURRENCE INTERVALS								
RECURRENCE INTERVAL (1: _year)	0.5	1	2	5	10	20	50	100
INFLOW (l/s)	0.000	0.001	0.003	0.008	0.014	0.020	0.030	0.039
VOLUME (m3)	0	9	16	32	51	85	140	194
WATER SURFACE AREA (m2)	194	225	248	295	342	411	505	582
WATER DEPTH (m)	0.00	0.04	0.07	0.13	0.19	0.28	0.40	0.50
WATER SURFACE ELEVATION (RLm)	12.50	12.54	12.57	12.63	12.69	12.78	12.90	13.00
OUTFLOW (l/s)	0.000	0.001	0.003	0.007	0.009	0.012	0.015	0.017

POND, ORIFICE, AND SPILLWAY SUMMARY			
OUTLET TYPE	SWALE	ORIFICE1	SPILLWAY
INVERT LEVEL (RLm)	12.50	12.50	13.00
DIA / HEIGHT (m)		0.11	0.5
WIDTH (m)		0.00	3
COEFFICIENT		0.60	1.45

TABLE 8: VEGETATED-SWALE 3 ATTENUATION PERFORMANCE								
PEAKS FOR VARIOUS RECURRENCE INTERVALS								
RECURRENCE INTERVAL (1: _year)	0.5	1	2	5	10	20	50	100
INFLOW (l/s)	0.000	0.008	0.030	0.080	0.130	0.200	0.306	0.398
VOLUME (m3)	0	46	92	204	285	375	583	682
WATER SURFACE AREA (m2)	682	846	983	1256	1419	1583	1911	2047
WATER DEPTH (m)	0.00	0.06	0.11	0.21	0.27	0.33	0.45	0.50
WATER SURFACE ELEVATION (RLm)	9.50	9.56	9.61	9.71	9.77	9.83	9.95	10.00
OUTFLOW (l/s)	0.000	0.008	0.025	0.062	0.096	0.136	0.174	0.189

POND, ORIFICE, AND SPILLWAY SUMMARY			
OUTLET TYPE	SWALE	ORIFICE1	SPILLWAY
INVERT LEVEL (RLm)	8.50	8.50	10.00
DIA / HEIGHT (m)		0.30	0.5
WIDTH (m)		0.40	4.5
COEFFICIENT		0.60	1.45

4.7 POST-DEVELOPMENT RUNOFF PEAKS

The resulting peak pre- and post-development flows for the development are listed in Table 9, 10, and 11. The post-development peaks represent the attenuated peak discharge from the 4 relevant catchments.

TABLE 9: PEAK FLOW SUMMARY PRE- AND -POST DEVELOPMENT FOR VEGETATED SWALE 1

	FLOW PEAKS (l/s) FOR RECURRANCE INTERVAL, YEARS							
	1:0.5y	1:1y	1:2y	1:5y	1:10y	1:20y	1:50y	1:100y
PRE-DEVELOPMENT	0.000	0.020	0.030	0.050	0.070	0.090	0.130	0.150
POST-DEVELOPMENT	0.000	0.001	0.004	0.009	0.012	0.014	0.016	0.017

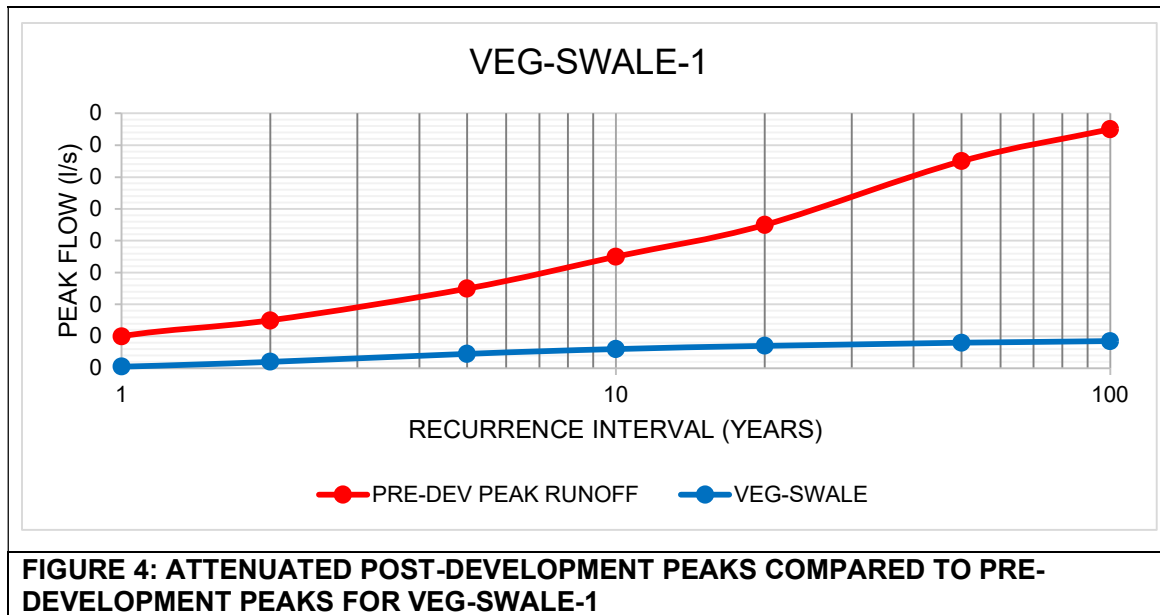


FIGURE 4: ATTENUATED POST-DEVELOPMENT PEAKS COMPARED TO PRE-DEVELOPMENT PEAKS FOR VEG-SWALE-1

TABLE 10: PEAK FLOW SUMMARY PRE- AND -POST DEVELOPMENT FOR VEGETATED SWALE 2

	FLOW PEAKS (l/s) FOR RECURRANCE INTERVAL, YEARS							
	1:0.5y	1:1y	1:2y	1:5y	1:10y	1:20y	1:50y	1:100y
PRE-DEVELOPMENT	0.010	0.030	0.040	0.070	0.090	0.110	0.130	0.160
POST-DEVELOPMENT	0.000	0.001	0.003	0.007	0.009	0.012	0.015	0.017

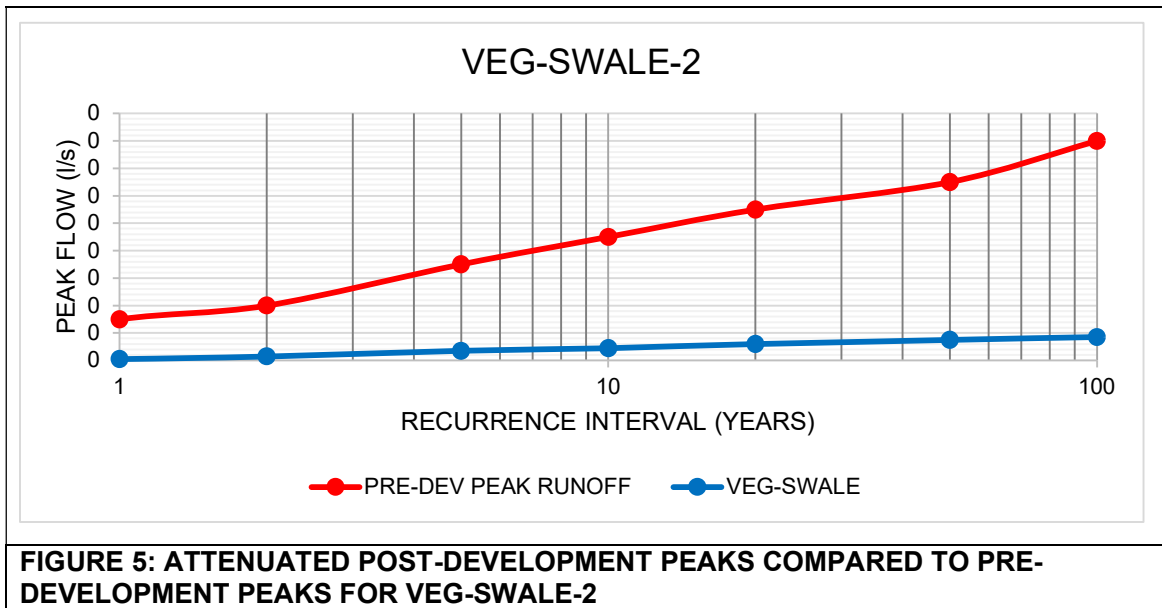
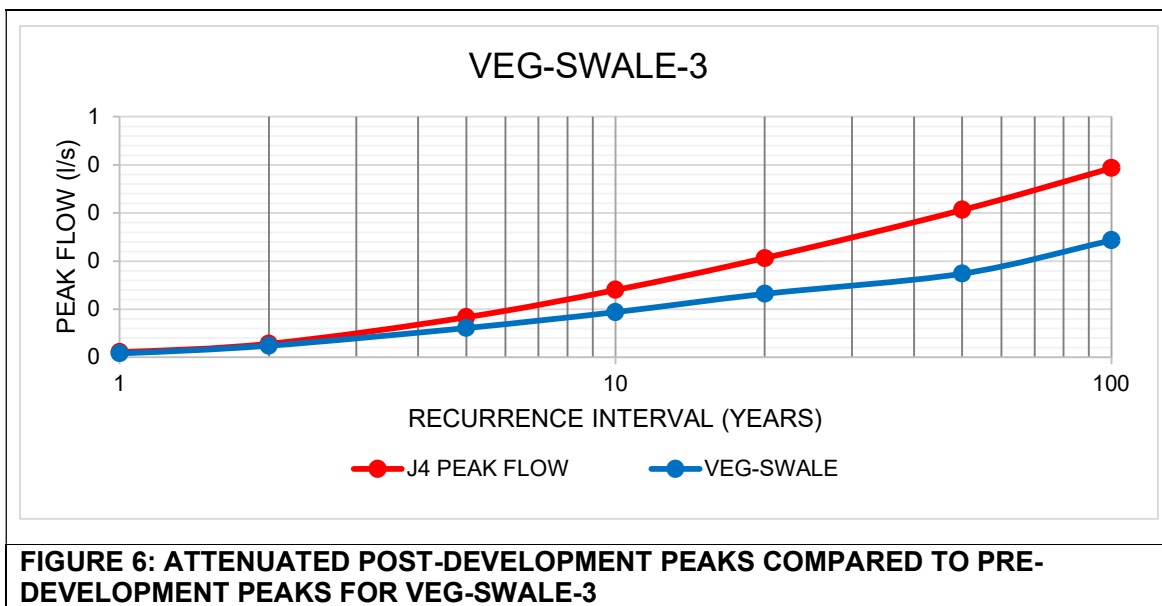


TABLE 11: PEAK FLOW SUMMARY PRE- AND -POST DEVELOPMENT FOR VEGETATED SWALE 3

	FLOW PEAKS (l/s) FOR RECCURANCE INTERVAL, YEARS							
	1:0.5y	1:1y	1:2y	1:5y	1:10y	1:20y	1:50y	1:100y
PRE-DEVELOPMENT	0.007	0.011	0.028	0.083	0.140	0.206	0.306	0.393
POST-DEVELOPMENT	0.000	0.008	0.024	0.061	0.094	0.132	0.174	0.243



The attenuation of post-development peak flows is compared with the pre-development peak flows in Figure 4, 5, and 6 above. The post development peak flows were found to be less than the pre-development peak flows for all the recurrence intervals for subcatchments RE/75567-Pt1, RE/75567-Pt2, 75569-Pt3, and 75571.

4.8 REQUIRED STORMWATER INFRASTRUCTURE

It is proposed that a manhole is constructed on the existing stormwater line in erf 75567. This manhole will connect VEG-SWALE-1 to the existing 900mm diameter stormwater pipe.

Similarly, a 375mm diameter pipe will be connected to the existing stormwater manhole on erf 75567 (see drawings MC428-C403 and MC428-C420).

Another stormwater connection is proposed to be constructed which will cross the (M5) Prince George Drive to Princess Vlei. This connection will discharge the attenuated runoff from VEG-SWALE-3 to Princess Vlei via a 375mm diameter pipe (see drawing MC428-C405).

5. POST-DEVELOPMENT STORMWATER MANAGEMENT - QUALITY TREATMENT

In order to design the quality treatment component of the stormwater system according to SuDS principles the following standards have been applied:

- The 24h duration 1:0.5-year storm Water Quality Volume (WQv) is to be treated.
- Suspended solids (SS): 80% reduction
- Total phosphorous concentration (TP): 45% reduction

It was however found from the model simulation that there will be zero runoff for the 24 hour 1:0.5-year storm for all the catchments. For this reason, as well as the low-impact nature of the development, it is deemed that no special additional measures are required to improve runoff water quality.

6. MAINTENANCE OF THE STORMWATER SYSTEM

6.1 SCOPE OF MAINTENANCE

The ongoing sustainability of the stormwater system is linked to the effective maintenance of all its components. These include the attenuation vegetated swales, the outlet structures, manholes, pipes, spillways, and channels.

6.2 RESPONSIBILITY FOR MAINTENANCE

The registered owners of the property (City of Cape Town) will be solely responsible for the stormwater management, operation and maintenance of each stormwater component proposed in this stormwater management plan. The owners will be required to ensure that the stormwater system is in good repair, in a healthy state and regularly serviced as described in this section of the report. Records should be kept of these maintenance activities.

A maintenance schedule is included as Annexure C. This should be used as a checklist and for record purposes.

7. SEDIMENT, LITTER AND DEBRIS CONTROL: OPERATIONS AND SERVICES

Addressing sediment, litter, and debris control during construction for the development of this size requires that the construction work, operational activities and transportation activities work in unison to achieve a successful reduction in all three pollutant types.

8. DETAILED DESIGN NOTES

The following points are to be taken note of during the detailed design phase:

1. All dimensions and components given in this stormwater management plan are conceptual only and not for construction purposes.
2. The design engineer must design all load bearing and retaining structures.
3. The vegetated swale areas are not final. If alterations to shapes are required, it must be ensured that the total proposed volumes are achieved.

9. ADJACENT CATCHMENT RUN-ON

There is no adjacent catchment run-on.

10. PHASING

Phasing of the extension of the Klip Road Cemetery on erven 75568, RE/75563, RE/75566, 77939, 75569, and partially on 75570 should not be a factor in stormwater management. The proposed stormwater management system should be fully implemented when each extension is undertaken.

11. CONCLUSIONS

11.1 PROPOSED DEVELOPMENT

The proposed development is to be located on erven 75562, RE/75567, remaining area of 75569 and 75570, RE/75570, 75571, and extensions of 75569, which is located north, west, and south of the existing Klip Road cemetery (erven 75568, RE/75563, RE/75566, 77939, 75569, and partially on 75570).

The site is to be developed as an extension of the existing cemetery.

11.2 APPLICABLE CONDITIONS

The sustainable drainage systems (SuDS) methodology as required by the City of Cape Town stormwater policies, has been applied to the sub-catchments of the development site. The objectives include attenuation of peak runoff and water quality treatment. The objectives to be met by this stormwater management plan are listed in section 5.1.

11.3 EXISTING CONDITIONS

The site is divided into four sections which are mostly undeveloped with some existing paved parking areas or housing. Existing services such as water mains, sewage and electrical services are found on site.

11.4 RUNOFF PEAK ATTENUATION

Estimates of the pre-development runoff have been computed for a range of recurrence intervals.

The permitted peak outflow from the site is limited to these of the pre-development peaks.

The runoff for the different sections are to be attenuated by using vegetated swales and is to be discharged into the existing stormwater system via a proposed manhole located on erf RE/75567_pt1, and the proposed stormwater connection crossing (M5) Prince George Drive. The attenuation objectives are achieved as is summarised in Section 4.7.

11.5 RUNOFF WATER QUALITY TREATMENT

The runoff water quality objective (80% reduction of TSS and 45% reduction in TP for the WQv) is achieved with the use of in-situ material in the vegetated swales. The runoff water quality objectives are achieved as summarised in section 5.

11.6 OPERATION AND MAINTENANCE

Maintenance forms an integral part of the sustainability of the stormwater management plan. A plan is presented in Section 6 and Annexure C. The

implementation of the plan will be the responsibility of the owners of the property viz. the City of Cape Town as described in section 6.

REFERENCES

ATLANTA REGIONAL COMMISSION, 2016: Georgia Stormwater Management Manual, Vol. 2 Technical Handbook, 2016 edition.

CITY OF CAPE TOWN 2009a: *Management of Urban Stormwater Impacts Policy*, Roads and Stormwater Department, Catchment, Stormwater and River Management Branch, Ver 1.1 Approved by Council 27 May 2009 C 58/05/09.

CITY OF CAPE TOWN 2009b: *Floodplain and River Corridor Management Policy*, Roads and Stormwater Department, Catchment, Stormwater and River Management Branch, Ver 2.1 Approved by Council 27 May 2009 C 58/05/09.

ANNEXURE A: PRE-DEVELOPMENT RUNOFF

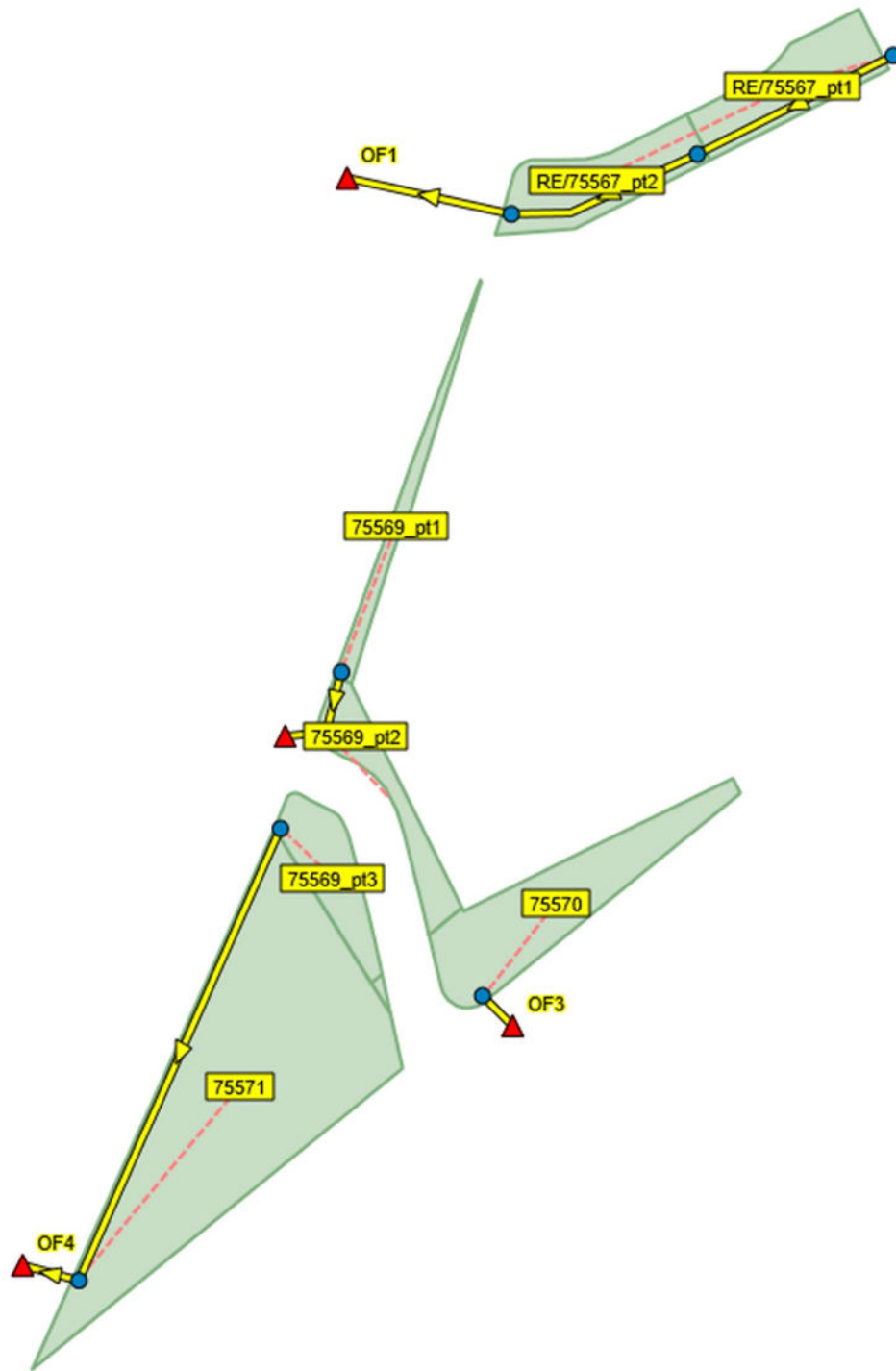


FIGURE B1: PCSWMM PRE-DEVELOPMENT MODEL LAYOUT

1:0.5 YEAR

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
75569_pt1	33.71	0.00	0.00	27.91	0.00	0.00	0.00	0.00	0.00	0.000
75569_pt2	33.71	0.00	0.00	27.91	0.00	0.00	0.00	0.00	0.00	0.000
75569_pt3	33.71	0.00	0.00	27.91	0.00	0.00	0.00	0.00	0.00	0.000
75570	33.71	0.00	0.00	12.71	11.36	3.24	14.61	0.16	0.02	0.433
75571	33.71	0.00	0.00	25.24	0.95	0.00	0.95	0.03	0.01	0.028
RE/75567_pt1	33.71	20.93	0.00	27.91	0.00	16.39	16.39	0.10	0.00	0.300
RE/75567_pt2	33.71	0.00	0.00	9.14	16.67	1.70	18.37	0.13	0.01	0.545

Node Depth Summary

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
EXSWMH1	JUNCTION	0.03	0.09	8.56	0 13:25	0.09
EXSWMH2	JUNCTION	0.02	0.07	8.54	0 13:05	0.07
EXSWMH4	JUNCTION	0.03	0.08	8.46	0 13:54	0.08
J1	JUNCTION	0.00	0.00	11.00	0 00:00	0.00
J2	JUNCTION	0.02	0.07	11.57	0 12:10	0.07
J3	JUNCTION	0.00	0.00	10.50	0 00:00	0.00
J4	JUNCTION	0.00	0.01	9.51	0 18:13	0.01
J5	JUNCTION	0.00	0.00	11.50	0 00:00	0.00
OF1	OUTFALL	0.01	0.04	8.25	0 13:54	0.04
OF2	OUTFALL	0.00	0.00	10.50	0 00:00	0.00
OF3	OUTFALL	0.02	0.07	10.81	0 12:10	0.07
OF4	OUTFALL	0.00	0.00	7.50	0 18:13	0.00

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
EXSWMH1	JUNCTION	0.005	0.005	0 13:20	0.1	0.1	0.922
EXSWMH2	JUNCTION	0.000	0.005	0 13:26	0	0.0995	1.316
EXSWMH4	JUNCTION	0.000	0.005	0 13:12	0	0.0982	3.565
J1	JUNCTION	0.000	0.000	0 00:00	0	0	0.000 ltr
J2	JUNCTION	0.024	0.024	0 12:10	0.158	0.158	0.016
J3	JUNCTION	0.000	0.000	0 00:00	0	0	0.000 ltr
J4	JUNCTION	0.007	0.007	0 12:10	0.0344	0.0344	221.008
J5	JUNCTION	0.000	0.000	0 00:00	0	0	0.000 ltr
OF1	OUTFALL	0.000	0.005	0 13:54	0	0.0948	0.000
OF2	OUTFALL	0.000	0.000	0 00:00	0	0	0.000 ltr
OF3	OUTFALL	0.000	0.024	0 12:10	0	0.158	0.000
OF4	OUTFALL	0.000	0.000	0 18:13	0	0.0107	0.000

Node Surcharge Summary

No nodes were surcharged.

Node Flooding Summary

No nodes were flooded.

Outfall Loading Summary

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
OF1	46.97	0.002	0.005	0.095

OF2	0.00	0.000	0.000	0.000
OF3	85.48	0.002	0.024	0.158
OF4	61.12	0.000	0.000	0.011

System	48.39	0.005	0.024	0.264

Link Flow Summary

Link	Type	Maximum Flow CMS	Time of Max Occurrence days hr:min	Maximum Veloc m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	0.005	0 13:26	0.16	0.04	0.09
C2	CONDUIT	0.005	0 13:12	0.22	0.01	0.09
C3	CONDUIT	0.005	0 13:54	0.25	0.01	0.07
C4	CONDUIT	0.000	0 00:00	0.00	0.00	0.00
C5	CONDUIT	0.024	0 12:10	1.68	0.05	0.15
C6	CONDUIT	0.000	0 00:00	0.00	0.00	0.01
C7	CONDUIT	0.000	0 18:13	0.52	0.00	0.01
C8	CONDUIT	0.000	0 00:00	0.00	0.00	0.00

Flow Classification Summary

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class								
		Up Dry		Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C1	1.00	0.51	0.00	0.00	0.49	0.00	0.00	0.00	0.00	0.00
C2	1.00	0.51	0.00	0.00	0.49	0.00	0.00	0.00	0.45	0.00
C3	1.00	0.51	0.00	0.00	0.49	0.00	0.00	0.00	0.00	0.00
C4	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C5	1.00	0.14	0.00	0.00	0.00	0.86	0.00	0.00	0.60	0.00
C6	1.00	0.14	0.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C7	1.00	0.14	0.00	0.00	0.04	0.82	0.00	0.00	0.00	0.00
C8	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

1:1 YEAR

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
75569_pt1	53.47	0.00	0.00	40.23	0.00	2.50	2.50	0.01	0.00	0.047
75569_pt2	53.47	0.00	0.00	40.23	0.00	4.74	4.74	0.02	0.00	0.089
75569_pt3	53.47	0.00	0.00	40.23	0.00	2.97	2.97	0.01	0.00	0.056
75570	53.47	0.00	0.00	16.26	18.47	12.15	30.62	0.33	0.05	0.573
75571	53.47	0.00	0.00	35.32	1.54	6.49	8.03	0.29	0.01	0.150
RE/75567_pt1	53.47	39.85	0.00	40.23	0.00	41.79	41.79	0.26	0.02	0.448
RE/75567_pt2	53.47	0.00	0.00	11.68	27.21	7.77	34.98	0.25	0.03	0.654

Node Depth Summary

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
EXSWMH1	JUNCTION	0.05	0.16	8.63	0 12:46	0.16
EXSWMH2	JUNCTION	0.04	0.12	8.59	0 12:52	0.12
EXSWMH4	JUNCTION	0.05	0.14	8.52	0 13:04	0.14
J1	JUNCTION	0.00	0.01	11.01	0 16:50	0.01
J2	JUNCTION	0.02	0.09	11.59	0 12:10	0.09
J3	JUNCTION	0.00	0.00	10.50	0 23:49	0.00
J4	JUNCTION	0.01	0.03	9.53	0 21:23	0.03
J5	JUNCTION	0.00	0.01	11.51	0 23:31	0.01
OF1	OUTFALL	0.02	0.07	8.28	0 13:05	0.07
OF2	OUTFALL	0.00	0.01	10.51	0 16:50	0.01
OF3	OUTFALL	0.02	0.09	10.84	0 12:10	0.09
OF4	OUTFALL	0.01	0.03	7.53	0 21:23	0.03

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
EXSWMH1	JUNCTION	0.016	0.016	0 12:40	0.256	0.256	0.546
EXSWMH2	JUNCTION	0.000	0.016	0 12:46	0	0.255	0.780
EXSWMH4	JUNCTION	0.000	0.016	0 12:52	0	0.253	1.812
J1	JUNCTION	0.001	0.001	0 16:30	0.0202	0.0266	0.127
J2	JUNCTION	0.049	0.049	0 12:10	0.332	0.332	0.012
J3	JUNCTION	0.001	0.001	0 21:50	0.0139	0.0139	164.418
J4	JUNCTION	0.011	0.011	0 12:10	0.29	0.295	63.934
J5	JUNCTION	0.000	0.000	0 23:30	0.00647	0.00647	0.281
OF1	OUTFALL	0.000	0.015	0 13:05	0	0.248	0.000
OF2	OUTFALL	0.000	0.001	0 16:50	0	0.0266	0.000
OF3	OUTFALL	0.000	0.049	0 12:10	0	0.332	0.000
OF4	OUTFALL	0.000	0.006	0 21:23	0	0.18	0.000

Node Surcharge Summary

No nodes were surcharged.

Node Flooding Summary

No nodes were flooded.

Outfall Loading Summary

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
OF1	50.91	0.006	0.015	0.248
OF2	40.83	0.001	0.001	0.027
OF3	90.46	0.004	0.049	0.332

OF4	71.71	0.003	0.006	0.180

System	63.48	0.014	0.051	0.787

Link Flow Summary

Link	Type	Maximum Flow CMS	Time of Max Occurrence days hr:min	Maximum Veloc m/sec	Max/ Full Flow	Max/ Full Depth

C1	CONDUIT	0.016	0 12:46	0.26	0.14	0.16
C2	CONDUIT	0.016	0 12:52	0.30	0.04	0.15
C3	CONDUIT	0.015	0 13:05	0.37	0.04	0.12
C4	CONDUIT	0.001	0 16:50	0.62	0.00	0.01
C5	CONDUIT	0.049	0 12:10	2.07	0.10	0.21
C6	CONDUIT	0.000	0 23:49	0.00	0.00	0.03
C7	CONDUIT	0.006	0 21:23	0.99	0.00	0.04
C8	CONDUIT	0.000	0 23:31	0.19	0.00	0.01

Flow Classification Summary

Conduit	Adjusted /Actual Length	----- Fraction of Time in Flow Class -----								
		Up Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl

C1	1.00	0.45	0.00	0.00	0.55	0.00	0.00	0.00	0.00	0.00
C2	1.00	0.45	0.00	0.00	0.55	0.00	0.00	0.00	0.47	0.00
C3	1.00	0.46	0.00	0.00	0.54	0.00	0.00	0.00	0.00	0.00
C4	1.00	0.59	0.00	0.00	0.00	0.41	0.00	0.00	0.00	0.00
C5	1.00	0.09	0.00	0.00	0.00	0.91	0.00	0.00	0.54	0.00
C6	1.00	0.09	0.54	0.00	0.37	0.00	0.00	0.00	0.37	0.00
C7	1.00	0.09	0.00	0.00	0.03	0.88	0.00	0.00	0.32	0.00
C8	1.00	0.59	0.00	0.00	0.41	0.00	0.00	0.00	0.41	0.00

1:2 YEAR

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
75569_pt1	74.33	0.00	0.00	50.99	0.00	11.12	11.12	0.03	0.00	0.150
75569_pt2	74.33	0.00	0.00	50.99	0.00	14.68	14.68	0.06	0.00	0.197
75569_pt3	74.33	0.00	0.00	50.99	0.00	12.06	12.06	0.06	0.00	0.162
75570	74.33	0.00	0.00	18.76	25.98	22.80	48.78	0.53	0.09	0.656
75571	74.33	0.00	0.00	43.66	2.17	17.60	19.77	0.72	0.03	0.266
RE/75567_pt1	74.33	61.01	0.00	50.99	0.00	72.17	72.17	0.44	0.03	0.533
RE/75567_pt2	74.33	0.00	0.00	13.48	38.35	15.18	53.54	0.38	0.04	0.720

Node Depth Summary

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
EXSWMH1	JUNCTION	0.07	0.21	8.68	0 12:37	0.21
EXSWMH2	JUNCTION	0.05	0.17	8.63	0 12:41	0.17
EXSWMH4	JUNCTION	0.06	0.19	8.57	0 12:49	0.19
J1	JUNCTION	0.01	0.03	11.03	0 12:50	0.03
J2	JUNCTION	0.03	0.13	11.63	0 12:10	0.13
J3	JUNCTION	0.00	0.00	10.50	0 18:58	0.00
J4	JUNCTION	0.02	0.05	9.55	0 15:53	0.05
J5	JUNCTION	0.01	0.01	11.51	0 15:40	0.01
OF1	OUTFALL	0.03	0.10	8.31	0 12:50	0.10
OF2	OUTFALL	0.01	0.03	10.53	0 12:50	0.03
OF3	OUTFALL	0.03	0.13	10.87	0 12:10	0.13
OF4	OUTFALL	0.02	0.05	7.55	0 15:53	0.05

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
EXSWMH1	JUNCTION	0.031	0.031	0 12:30	0.443	0.443	0.407
EXSWMH2	JUNCTION	0.000	0.031	0 12:35	0	0.441	0.638
EXSWMH4	JUNCTION	0.000	0.031	0 12:41	0	0.438	1.195
J1	JUNCTION	0.004	0.004	0 12:40	0.0626	0.0914	0.056
J2	JUNCTION	0.093	0.093	0 12:10	0.529	0.529	0.011
J3	JUNCTION	0.002	0.002	0 14:40	0.0565	0.0565	39.760
J4	JUNCTION	0.028	0.028	0 13:10	0.715	0.755	24.916
J5	JUNCTION	0.001	0.001	0 15:40	0.0289	0.0289	0.152
OF1	OUTFALL	0.000	0.030	0 12:50	0	0.433	0.000
OF2	OUTFALL	0.000	0.004	0 12:50	0	0.0914	0.000
OF3	OUTFALL	0.000	0.093	0 12:10	0	0.529	0.000
OF4	OUTFALL	0.000	0.020	0 15:53	0	0.604	0.000

Node Surcharge Summary

No nodes were surcharged.

Node Flooding Summary

No nodes were flooded.

Outfall Loading Summary

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
OF1	57.77	0.009	0.030	0.433
OF2	49.27	0.002	0.004	0.091
OF3	93.11	0.007	0.093	0.529

OF4	78.20	0.009	0.020	0.604

System	69.59	0.027	0.104	1.658

Link Flow Summary

Link	Type	Maximum Flow CMS	Time of Max Occurrence days hr:min	Maximum Veloc m/sec	Max/ Full Flow	Max/ Full Depth

C1	CONDUIT	0.031	0 12:35	0.33	0.28	0.22
C2	CONDUIT	0.031	0 12:41	0.36	0.08	0.21
C3	CONDUIT	0.030	0 12:50	0.47	0.07	0.17
C4	CONDUIT	0.004	0 12:50	0.79	0.00	0.03
C5	CONDUIT	0.093	0 12:10	2.48	0.18	0.29
C6	CONDUIT	0.001	0 18:58	0.00	0.00	0.06
C7	CONDUIT	0.020	0 15:53	1.39	0.01	0.06
C8	CONDUIT	0.001	0 15:40	0.29	0.00	0.02

Flow Classification Summary

Conduit	Adjusted /Actual Length	----- Fraction of Time in Flow Class -----								
		Up Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl

C1	1.00	0.38	0.00	0.00	0.62	0.00	0.00	0.00	0.00	0.00
C2	1.00	0.38	0.00	0.00	0.62	0.00	0.00	0.00	0.52	0.00
C3	1.00	0.38	0.00	0.00	0.62	0.00	0.00	0.00	0.00	0.00
C4	1.00	0.51	0.00	0.00	0.00	0.49	0.00	0.00	0.03	0.00
C5	1.00	0.07	0.00	0.00	0.00	0.93	0.00	0.00	0.50	0.00
C6	1.00	0.07	0.45	0.00	0.48	0.00	0.00	0.00	0.48	0.00
C7	1.00	0.07	0.00	0.00	0.02	0.91	0.00	0.00	0.38	0.00
C8	1.00	0.51	0.00	0.00	0.49	0.00	0.00	0.00	0.49	0.00

1:5 YEAR

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
75569_pt1	99.66	0.00	0.00	61.76	0.00	24.45	24.45	0.06	0.00	0.245
75569_pt2	99.66	0.00	0.00	61.76	0.00	29.08	29.08	0.12	0.02	0.292
75569_pt3	99.66	0.00	0.00	61.76	0.00	25.70	25.70	0.12	0.01	0.258
75570	99.66	0.00	0.00	20.84	35.09	36.74	71.84	0.78	0.14	0.721
75571	99.66	0.00	0.00	51.60	2.93	33.44	36.37	1.32	0.08	0.365
RE/75567_pt1	99.66	87.60	0.00	61.76	0.00	112.43	112.43	0.69	0.05	0.600
RE/75567_pt2	99.66	0.00	0.00	14.98	51.92	24.95	76.87	0.54	0.07	0.771

Node Depth Summary

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
EXSWMH1	JUNCTION	0.09	0.27	8.74	0 12:30	0.27
EXSWMH2	JUNCTION	0.07	0.22	8.69	0 12:35	0.22
EXSWMH4	JUNCTION	0.08	0.24	8.62	0 12:40	0.24
J1	JUNCTION	0.01	0.06	11.06	0 12:10	0.05
J2	JUNCTION	0.04	0.16	11.66	0 12:10	0.16
J3	JUNCTION	0.00	0.01	10.51	0 15:39	0.01
J4	JUNCTION	0.03	0.08	9.58	0 14:03	0.08
J5	JUNCTION	0.01	0.02	11.52	0 13:20	0.02
OF1	OUTFALL	0.04	0.13	8.34	0 12:41	0.13
OF2	OUTFALL	0.01	0.06	10.56	0 12:10	0.06
OF3	OUTFALL	0.04	0.16	10.90	0 12:10	0.16
OF4	OUTFALL	0.03	0.08	7.58	0 14:03	0.08

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
EXSWMH1	JUNCTION	0.053	0.053	0 12:25	0.69	0.69	0.322
EXSWMH2	JUNCTION	0.000	0.053	0 12:27	0	0.687	0.523
EXSWMH4	JUNCTION	0.000	0.052	0 12:33	0	0.684	0.969
J1	JUNCTION	0.021	0.022	0 12:10	0.124	0.188	0.036
J2	JUNCTION	0.141	0.141	0 12:10	0.779	0.779	0.011
J3	JUNCTION	0.005	0.005	0 13:00	0.121	0.121	21.050
J4	JUNCTION	0.083	0.083	0 12:10	1.32	1.41	14.617
J5	JUNCTION	0.002	0.002	0 13:20	0.0637	0.0637	0.118
OF1	OUTFALL	0.000	0.051	0 12:41	0	0.677	0.000
OF2	OUTFALL	0.000	0.022	0 12:10	0	0.188	0.000
OF3	OUTFALL	0.000	0.141	0 12:10	0	0.779	0.000
OF4	OUTFALL	0.000	0.051	0 14:03	0	1.23	0.000

Node Surcharge Summary

No nodes were surcharged.

Node Flooding Summary

No nodes were flooded.

Outfall Loading Summary

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
OF1	64.52	0.012	0.051	0.677
OF2	50.61	0.004	0.022	0.188
OF3	94.65	0.010	0.141	0.779

OF4	83.03	0.017	0.051	1.234

System	73.20	0.044	0.186	2.878

Link Flow Summary

Link	Type	Maximum Flow CMS	Time of Max Occurrence days hr:min	Maximum Veloc m/sec	Max/ Full Flow	Max/ Full Depth

C1	CONDUIT	0.053	0 12:27	0.40	0.48	0.28
C2	CONDUIT	0.052	0 12:33	0.43	0.14	0.27
C3	CONDUIT	0.051	0 12:41	0.56	0.12	0.21
C4	CONDUIT	0.022	0 12:10	1.28	0.01	0.06
C5	CONDUIT	0.141	0 12:10	2.79	0.28	0.36
C6	CONDUIT	0.003	0 15:39	0.00	0.00	0.09
C7	CONDUIT	0.051	0 14:03	1.86	0.02	0.09
C8	CONDUIT	0.002	0 13:20	0.40	0.00	0.04

Flow Classification Summary

Conduit	Adjusted /Actual Length	----- Fraction of Time in Flow Class -----								
		Up Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl

C1	1.00	0.31	0.00	0.00	0.69	0.00	0.00	0.00	0.00	0.00
C2	1.00	0.31	0.00	0.00	0.69	0.00	0.00	0.00	0.54	0.00
C3	1.00	0.32	0.00	0.00	0.68	0.00	0.00	0.00	0.00	0.00
C4	1.00	0.49	0.00	0.00	0.00	0.51	0.00	0.00	0.16	0.00
C5	1.00	0.05	0.00	0.00	0.00	0.95	0.00	0.00	0.53	0.00
C6	1.00	0.05	0.45	0.00	0.50	0.00	0.00	0.00	0.50	0.00
C7	1.00	0.05	0.00	0.00	0.02	0.93	0.00	0.00	0.27	0.00
C8	1.00	0.49	0.00	0.00	0.51	0.00	0.00	0.00	0.51	0.00

1:10 YEAR

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
75569_pt1	118.14	0.00	0.00	68.39	0.00	35.49	35.49	0.09	0.00	0.300
75569_pt2	118.14	0.00	0.00	68.39	0.00	40.79	40.79	0.17	0.03	0.345
75569_pt3	118.14	0.00	0.00	68.39	0.00	36.92	36.92	0.17	0.01	0.313
75570	118.14	0.00	0.00	21.97	41.75	47.32	89.07	0.97	0.18	0.754
75571	118.14	0.00	0.00	56.31	3.48	46.13	49.61	1.80	0.14	0.420
RE/75567_pt1	118.14	107.36	0.00	68.39	0.00	143.42	143.42	0.88	0.07	0.636
RE/75567_pt2	118.14	0.00	0.00	15.79	61.82	32.38	94.20	0.66	0.09	0.797

Node Depth Summary

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
EXSWMH1	JUNCTION	0.10	0.30	8.77	0 12:26	0.30
EXSWMH2	JUNCTION	0.08	0.26	8.72	0 12:31	0.26
EXSWMH4	JUNCTION	0.09	0.27	8.65	0 12:35	0.27
J1	JUNCTION	0.01	0.07	11.07	0 12:10	0.07
J2	JUNCTION	0.04	0.18	11.68	0 12:10	0.18
J3	JUNCTION	0.00	0.01	10.51	0 14:41	0.01
J4	JUNCTION	0.04	0.10	9.60	0 13:33	0.10
J5	JUNCTION	0.01	0.03	11.53	0 13:00	0.03
OF1	OUTFALL	0.04	0.15	8.36	0 12:35	0.15
OF2	OUTFALL	0.01	0.07	10.57	0 12:10	0.07
OF3	OUTFALL	0.04	0.18	10.92	0 12:10	0.18
OF4	OUTFALL	0.04	0.10	7.60	0 13:33	0.10

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
EXSWMH1	JUNCTION	0.072	0.072	0 12:20	0.88	0.88	0.286
EXSWMH2	JUNCTION	0.000	0.072	0 12:22	0	0.877	0.471
EXSWMH4	JUNCTION	0.000	0.070	0 12:28	0	0.873	0.866
J1	JUNCTION	0.034	0.037	0 12:10	0.174	0.266	0.032
J2	JUNCTION	0.177	0.177	0 12:10	0.966	0.966	0.011
J3	JUNCTION	0.009	0.009	0 12:40	0.173	0.173	16.072
J4	JUNCTION	0.140	0.140	0 12:10	1.79	1.94	11.430
J5	JUNCTION	0.004	0.004	0 13:00	0.0925	0.0925	0.100
OF1	OUTFALL	0.000	0.069	0 12:35	0	0.866	0.000
OF2	OUTFALL	0.000	0.037	0 12:10	0	0.266	0.000
OF3	OUTFALL	0.000	0.176	0 12:10	0	0.966	0.000
OF4	OUTFALL	0.000	0.084	0 13:33	0	1.74	0.000

Node Surcharge Summary

No nodes were surcharged.

Node Flooding Summary

No nodes were flooded.

Outfall Loading Summary

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
OF1	68.27	0.015	0.069	0.866
OF2	52.39	0.006	0.037	0.266

OF3	95.55	0.012	0.176	0.966
OF4	85.42	0.024	0.084	1.744

System	75.41	0.057	0.255	3.842

Link Flow Summary

Link	Type	Maximum Flow CMS	Time of Max Occurrence days hr:min	Maximum Veloc m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	0.072	0 12:22	0.44	0.65	0.32
C2	CONDUIT	0.070	0 12:28	0.47	0.19	0.31
C3	CONDUIT	0.069	0 12:35	0.62	0.16	0.24
C4	CONDUIT	0.037	0 12:10	1.50	0.01	0.07
C5	CONDUIT	0.176	0 12:10	2.97	0.35	0.41
C6	CONDUIT	0.006	0 14:42	0.01	0.00	0.11
C7	CONDUIT	0.084	0 13:33	2.16	0.03	0.12
C8	CONDUIT	0.004	0 13:00	0.48	0.00	0.05

Flow Classification Summary

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class								
		Up		Down	Sub	Sup	Up	Down	Norm	Inlet
		Dry	Dry	Dry	Crit	Crit	Crit	Crit	Ltd	Ctrl
C1	1.00	0.27	0.00	0.00	0.73	0.00	0.00	0.00	0.00	0.00
C2	1.00	0.28	0.00	0.00	0.72	0.00	0.00	0.00	0.56	0.00
C3	1.00	0.28	0.00	0.00	0.72	0.00	0.00	0.00	0.00	0.00
C4	1.00	0.48	0.00	0.00	0.00	0.52	0.00	0.00	0.25	0.00
C5	1.00	0.04	0.00	0.00	0.00	0.96	0.00	0.00	0.38	0.00
C6	1.00	0.04	0.45	0.00	0.51	0.00	0.00	0.00	0.51	0.00
C7	1.00	0.04	0.00	0.00	0.02	0.94	0.00	0.00	0.21	0.00
C8	1.00	0.48	0.00	0.00	0.36	0.16	0.00	0.00	0.52	0.00

1:20 YEAR

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
75569_pt1	137.41	0.00	0.00	74.43	0.00	47.94	47.94	0.13	0.01	0.349
75569_pt2	137.41	0.00	0.00	74.43	0.00	53.90	53.90	0.23	0.05	0.392
75569_pt3	137.41	0.00	0.00	74.43	0.00	49.54	49.54	0.23	0.01	0.361
75570	137.41	0.00	0.00	22.90	48.68	58.61	107.29	1.17	0.21	0.781
75571	137.41	0.00	0.00	60.47	4.06	60.14	64.20	2.32	0.21	0.467
RE/75567_pt1	137.41	128.20	0.00	74.43	0.00	176.89	176.89	1.09	0.09	0.666
RE/75567_pt2	137.41	0.00	0.00	16.46	72.15	40.32	112.48	0.79	0.11	0.819

Node Depth Summary

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
EXSWMH1	JUNCTION	0.11	0.34	8.81	0 12:25	0.34
EXSWMH2	JUNCTION	0.09	0.30	8.76	0 12:27	0.30
EXSWMH4	JUNCTION	0.10	0.31	8.68	0 12:31	0.31
J1	JUNCTION	0.02	0.08	11.08	0 12:10	0.08
J2	JUNCTION	0.04	0.20	11.70	0 12:10	0.20
J3	JUNCTION	0.00	0.01	10.51	0 14:07	0.01
J4	JUNCTION	0.04	0.12	9.62	0 13:14	0.12
J5	JUNCTION	0.01	0.04	11.54	0 12:41	0.04
OF1	OUTFALL	0.05	0.17	8.38	0 12:32	0.17
OF2	OUTFALL	0.02	0.08	10.58	0 12:10	0.08
OF3	OUTFALL	0.04	0.20	10.94	0 12:10	0.20
OF4	OUTFALL	0.04	0.12	7.62	0 13:14	0.12

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
EXSWMH1	JUNCTION	0.094	0.094	0 12:20	1.08	1.08	0.258
EXSWMH2	JUNCTION	0.000	0.093	0 12:21	0	1.08	0.432
EXSWMH4	JUNCTION	0.000	0.091	0 12:26	0	1.08	0.780
J1	JUNCTION	0.046	0.052	0 12:10	0.23	0.355	0.028
J2	JUNCTION	0.214	0.214	0 12:10	1.16	1.16	0.011
J3	JUNCTION	0.014	0.014	0 12:40	0.232	0.232	13.093
J4	JUNCTION	0.205	0.206	0 12:10	2.32	2.53	9.366
J5	JUNCTION	0.006	0.006	0 12:40	0.125	0.125	0.087
OF1	OUTFALL	0.000	0.089	0 12:32	0	1.07	0.000
OF2	OUTFALL	0.000	0.052	0 12:10	0	0.355	0.000
OF3	OUTFALL	0.000	0.213	0 12:10	0	1.16	0.000
OF4	OUTFALL	0.000	0.126	0 13:14	0	2.31	0.000

Node Surcharge Summary

No nodes were surcharged.

Node Flooding Summary

No nodes were flooded.

Outfall Loading Summary

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
OF1	71.34	0.018	0.089	1.069
OF2	54.42	0.008	0.052	0.355

OF3	96.08	0.015	0.213	1.164
OF4	87.27	0.031	0.126	2.311

System	77.28	0.071	0.336	4.899

Link Flow Summary

Link	Type	Maximum Flow CMS	Time of Max Occurrence days hr:min	Maximum Veloc m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	0.093	0 12:21	0.49	0.84	0.37
C2	CONDUIT	0.091	0 12:26	0.51	0.25	0.35
C3	CONDUIT	0.089	0 12:32	0.68	0.21	0.27
C4	CONDUIT	0.052	0 12:10	1.66	0.01	0.08
C5	CONDUIT	0.213	0 12:10	3.12	0.42	0.45
C6	CONDUIT	0.009	0 14:07	0.01	0.00	0.14
C7	CONDUIT	0.126	0 13:14	2.44	0.04	0.14
C8	CONDUIT	0.006	0 12:41	0.55	0.00	0.06

Flow Classification Summary

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class								
		Up		Down	Sub	Sup	Up	Down	Norm	Inlet
		Dry	Dry	Dry	Crit	Crit	Crit	Crit	Ltd	Ctrl
C1	1.00	0.25	0.00	0.00	0.75	0.00	0.00	0.00	0.00	0.00
C2	1.00	0.25	0.00	0.00	0.75	0.00	0.00	0.00	0.57	0.00
C3	1.00	0.25	0.00	0.00	0.75	0.00	0.00	0.00	0.00	0.00
C4	1.00	0.45	0.00	0.00	0.00	0.54	0.00	0.00	0.34	0.00
C5	1.00	0.04	0.00	0.00	0.00	0.96	0.00	0.00	0.31	0.00
C6	1.00	0.04	0.43	0.00	0.53	0.00	0.00	0.00	0.53	0.00
C7	1.00	0.04	0.00	0.00	0.01	0.95	0.00	0.00	0.21	0.00
C8	1.00	0.45	0.00	0.00	0.34	0.21	0.00	0.00	0.54	0.00

1:50 YEAR

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
75569_pt1	164.49	0.00	0.00	81.72	0.00	66.70	66.70	0.17	0.01	0.406
75569_pt2	164.49	0.00	0.00	81.72	0.00	73.54	73.54	0.31	0.06	0.447
75569_pt3	164.49	0.00	0.00	81.72	0.00	68.52	68.52	0.32	0.02	0.417
75570	164.49	0.00	0.00	23.93	58.43	74.76	133.19	1.45	0.27	0.810
75571	164.49	0.00	0.00	65.35	4.87	80.84	85.71	3.10	0.30	0.521
RE/75567_pt1	164.49	157.74	0.00	81.72	0.00	225.44	225.44	1.38	0.13	0.700
RE/75567_pt2	164.49	0.00	0.00	17.20	86.68	51.71	138.39	0.97	0.13	0.841

Node Depth Summary

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
EXSWMH1	JUNCTION	0.12	0.39	8.86	0 12:21	0.39
EXSWMH2	JUNCTION	0.10	0.34	8.81	0 12:25	0.34
EXSWMH4	JUNCTION	0.11	0.35	8.73	0 12:28	0.35
J1	JUNCTION	0.02	0.10	11.10	0 12:10	0.10
J2	JUNCTION	0.05	0.23	11.73	0 12:10	0.23
J3	JUNCTION	0.01	0.02	10.52	0 13:39	0.02
J4	JUNCTION	0.05	0.15	9.65	0 12:59	0.15
J5	JUNCTION	0.02	0.05	11.55	0 12:40	0.05
OF1	OUTFALL	0.05	0.20	8.41	0 12:28	0.20
OF2	OUTFALL	0.02	0.10	10.60	0 12:10	0.10
OF3	OUTFALL	0.05	0.23	10.97	0 12:10	0.23
OF4	OUTFALL	0.05	0.15	7.65	0 12:59	0.15

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
EXSWMH1	JUNCTION	0.126	0.126	0 12:15	1.38	1.38	0.230
EXSWMH2	JUNCTION	0.000	0.124	0 12:20	0	1.38	0.391
EXSWMH4	JUNCTION	0.000	0.121	0 12:23	0	1.37	0.694
J1	JUNCTION	0.064	0.074	0 12:10	0.314	0.487	0.026
J2	JUNCTION	0.267	0.267	0 12:10	1.45	1.45	0.011
J3	JUNCTION	0.023	0.023	0 12:10	0.322	0.322	10.582
J4	JUNCTION	0.304	0.306	0 12:10	3.1	3.39	7.582
J5	JUNCTION	0.010	0.010	0 12:40	0.174	0.174	0.073
OF1	OUTFALL	0.000	0.119	0 12:28	0	1.36	0.000
OF2	OUTFALL	0.000	0.074	0 12:10	0	0.487	0.000
OF3	OUTFALL	0.000	0.267	0 12:10	0	1.45	0.000
OF4	OUTFALL	0.000	0.194	0 12:59	0	3.15	0.000

Node Surcharge Summary

No nodes were surcharged.

Node Flooding Summary

No nodes were flooded.

Outfall Loading Summary

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
OF1	74.75	0.022	0.119	1.365
OF2	58.06	0.010	0.074	0.487

OF3	96.77	0.018	0.267	1.445
OF4	89.24	0.041	0.194	3.152

System	79.71	0.091	0.475	6.449

Link Flow Summary

Link	Type	Maximum Flow CMS	Time of Max Occurrence days hr:min	Maximum Veloc m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	0.124	0 12:20	0.54	1.12	0.42
C2	CONDUIT	0.121	0 12:23	0.57	0.33	0.40
C3	CONDUIT	0.119	0 12:28	0.75	0.28	0.31
C4	CONDUIT	0.074	0 12:10	1.86	0.02	0.10
C5	CONDUIT	0.267	0 12:10	3.30	0.53	0.52
C6	CONDUIT	0.014	0 13:39	0.01	0.00	0.17
C7	CONDUIT	0.194	0 12:59	2.77	0.07	0.18
C8	CONDUIT	0.010	0 12:40	0.63	0.00	0.07

Flow Classification Summary

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class								
		Up		Down	Sub	Sup	Up	Down	Norm	Inlet
		Dry	Dry	Dry	Crit	Crit	Crit	Crit	Ltd	Ctrl
C1	1.00	0.21	0.00	0.00	0.79	0.00	0.00	0.00	0.00	0.00
C2	1.00	0.22	0.00	0.00	0.78	0.00	0.00	0.00	0.58	0.00
C3	1.00	0.22	0.00	0.00	0.78	0.00	0.00	0.00	0.00	0.00
C4	1.00	0.42	0.00	0.00	0.00	0.58	0.00	0.00	0.47	0.00
C5	1.00	0.03	0.00	0.00	0.00	0.97	0.00	0.00	0.25	0.00
C6	1.00	0.03	0.41	0.00	0.56	0.00	0.00	0.00	0.56	0.00
C7	1.00	0.03	0.00	0.00	0.01	0.96	0.00	0.00	0.13	0.00
C8	1.00	0.42	0.00	0.00	0.34	0.24	0.00	0.00	0.58	0.00

Conduit Surcharge Summary

	----- Hours Full -----			Hours	Hours
Conduit	Both Ends	Upstream	Dnstream	Above Full Normal Flow	Capacity Limited
C1	0.01	0.01	0.01	0.38	0.01

1:100 YEAR

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
75569_pt1	186.50	0.00	0.00	86.81	0.00	82.86	82.86	0.22	0.01	0.444
75569_pt2	186.50	0.00	0.00	86.81	0.00	90.36	90.36	0.39	0.08	0.484
75569_pt3	186.50	0.00	0.00	86.81	0.00	84.84	84.84	0.40	0.03	0.455
75570	186.50	0.00	0.00	24.59	66.35	88.08	154.43	1.68	0.31	0.828
75571	186.50	0.00	0.00	68.67	5.53	98.37	103.90	3.76	0.39	0.557
RE/75567_pt1	186.50	181.94	0.00	86.81	0.00	265.97	265.97	1.63	0.15	0.722
RE/75567_pt2	186.50	0.00	0.00	17.67	98.49	61.12	159.62	1.12	0.16	0.856

Node Depth Summary

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
EXSWMH1	JUNCTION	0.14	0.43	8.90	0 12:20	0.43
EXSWMH2	JUNCTION	0.11	0.38	8.85	0 12:23	0.38
EXSWMH4	JUNCTION	0.12	0.38	8.76	0 12:26	0.38
J1	JUNCTION	0.02	0.11	11.11	0 12:10	0.11
J2	JUNCTION	0.05	0.25	11.75	0 12:10	0.25
J3	JUNCTION	0.01	0.02	10.52	0 13:25	0.02
J4	JUNCTION	0.05	0.17	9.67	0 12:49	0.17
J5	JUNCTION	0.02	0.05	11.55	0 12:11	0.05
OF1	OUTFALL	0.06	0.22	8.43	0 12:26	0.22
OF2	OUTFALL	0.02	0.11	10.61	0 12:10	0.11
OF3	OUTFALL	0.05	0.25	10.99	0 12:10	0.25
OF4	OUTFALL	0.05	0.17	7.67	0 12:49	0.17

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
EXSWMH1	JUNCTION	0.155	0.155	0 12:15	1.63	1.63	0.213
EXSWMH2	JUNCTION	0.000	0.153	0 12:16	0	1.63	0.366
EXSWMH4	JUNCTION	0.000	0.148	0 12:22	0	1.62	0.638
J1	JUNCTION	0.080	0.093	0 12:10	0.385	0.601	0.024
J2	JUNCTION	0.311	0.311	0 12:10	1.68	1.68	0.011
J3	JUNCTION	0.032	0.032	0 12:10	0.398	0.398	9.245
J4	JUNCTION	0.389	0.393	0 12:10	3.76	4.12	6.618
J5	JUNCTION	0.014	0.014	0 12:10	0.216	0.216	0.065
OF1	OUTFALL	0.000	0.146	0 12:26	0	1.61	0.000
OF2	OUTFALL	0.000	0.093	0 12:10	0	0.601	0.000
OF3	OUTFALL	0.000	0.311	0 12:10	0	1.68	0.000
OF4	OUTFALL	0.000	0.256	0 12:49	0	3.87	0.000

Node Surcharge Summary

No nodes were surcharged.

Node Flooding Summary

No nodes were flooded.

Outfall Loading Summary

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
OF1	76.90	0.025	0.146	1.612
OF2	60.91	0.012	0.093	0.601
OF3	97.14	0.021	0.311	1.676

OF4	90.49	0.050	0.256	3.867

System	81.36	0.108	0.605	7.755

Link Flow Summary

Link	Type	Maximum Flow CMS	Time of Max Occurrence days hr:min	Maximum Veloc m/sec	Max/ Full Flow	Max/ Full Depth

C1	CONDUIT	0.153	0 12:16	0.58	1.37	0.47
C2	CONDUIT	0.148	0 12:22	0.61	0.41	0.44
C3	CONDUIT	0.146	0 12:26	0.80	0.35	0.35
C4	CONDUIT	0.093	0 12:10	1.98	0.03	0.11
C5	CONDUIT	0.311	0 12:10	3.43	0.61	0.57
C6	CONDUIT	0.019	0 13:25	0.01	0.01	0.20
C7	CONDUIT	0.256	0 12:49	3.00	0.09	0.20
C8	CONDUIT	0.014	0 12:11	0.69	0.01	0.08

Flow Classification Summary

Conduit	Adjusted /Actual Length	----- Fraction of Time in Flow Class -----								
		Up Dry	Down Dry	Sub Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl

C1	1.00	0.19	0.00	0.00	0.81	0.00	0.00	0.00	0.00	0.00
C2	1.00	0.20	0.00	0.00	0.80	0.00	0.00	0.00	0.57	0.00
C3	1.00	0.20	0.00	0.00	0.80	0.00	0.00	0.00	0.00	0.00
C4	1.00	0.39	0.00	0.00	0.00	0.61	0.00	0.00	0.49	0.00
C5	1.00	0.03	0.00	0.00	0.00	0.97	0.00	0.00	0.22	0.00
C6	1.00	0.03	0.38	0.00	0.59	0.00	0.00	0.00	0.59	0.00
C7	1.00	0.03	0.00	0.00	0.01	0.96	0.00	0.00	0.06	0.00
C8	1.00	0.39	0.00	0.00	0.34	0.26	0.00	0.00	0.61	0.00

Conduit Surcharge Summary

Conduit	-----	Hours Full	-----	Hours	Hours
	Both Ends	Upstream	Dnstream	Above Full	Capacity

C1	0.01	0.01	0.01	0.66	0.01

ANNEXURE B: POST-DEVELOPMENT RUNOFF

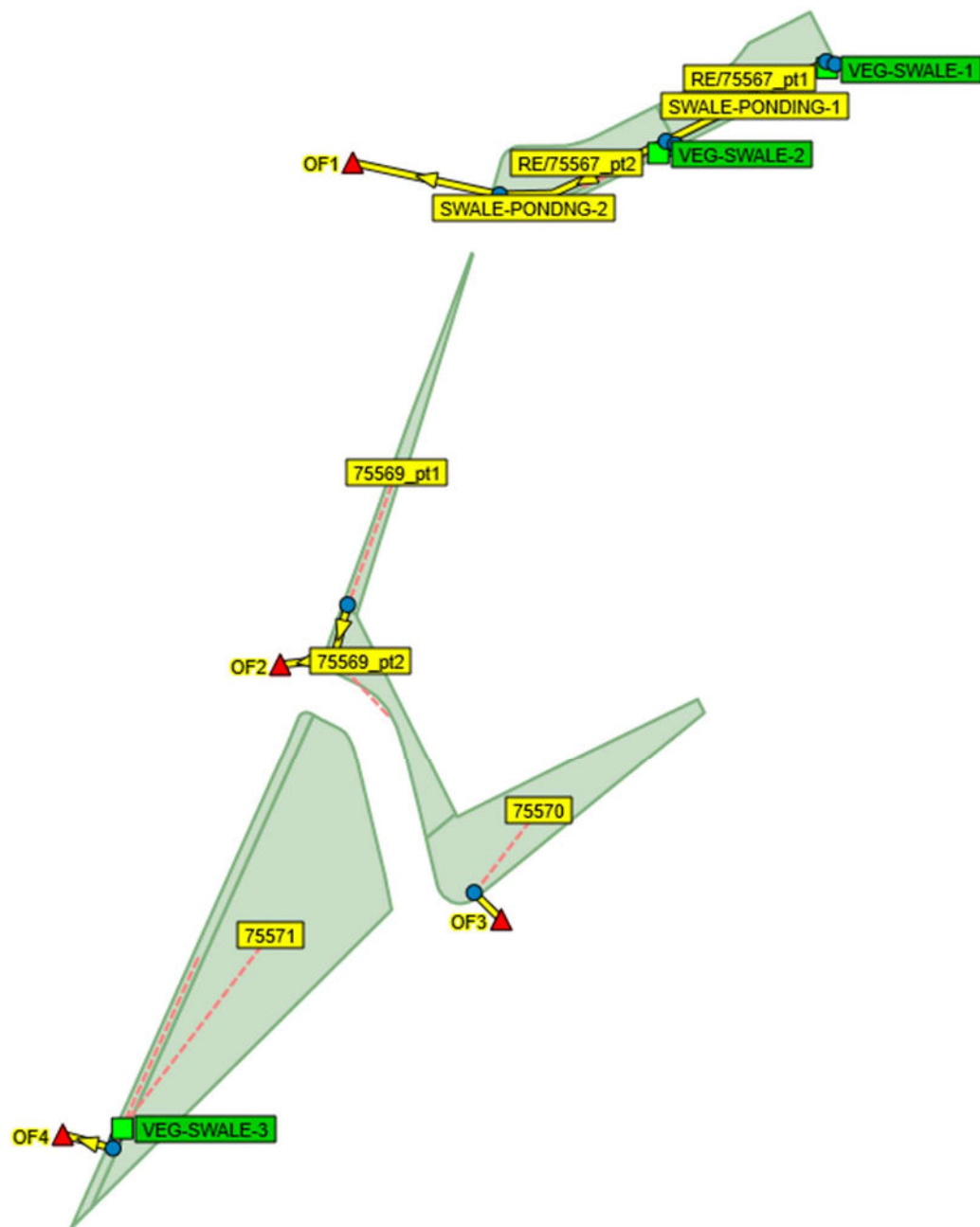


FIGURE B2: PCSWMM POST-DEVELOPMENT MODEL LAYOUT

Note: VEG-SWALE-3 outlet to be reduced from RL9.5m to RL8.5m to improve slope of the vegetated swale and 375mm diameter pipe connection crossing Prince George Drive.

1:0.5 YEAR

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
75569_pt1	33.71	0.00	0.00	26.02	0.00	0.00	0.00	0.00	0.00	0.000
75569_pt2	33.71	0.00	0.00	26.02	0.00	0.00	0.00	0.00	0.00	0.000
75570	33.71	0.00	0.00	26.02	0.00	0.00	0.00	0.00	0.00	0.000
75571	33.71	0.00	0.00	26.02	0.00	0.00	0.00	0.00	0.00	0.000
RE/75567_pt1	33.71	0.00	0.00	26.02	0.00	0.00	0.00	0.00	0.00	0.000
RE/75567_pt2	33.71	0.00	0.00	26.02	0.00	0.00	0.00	0.00	0.00	0.000
SWALE-PONDING-1	33.71	0.00	0.00	27.91	0.00	0.00	0.00	0.00	0.00	0.000
SWALE-PONDING-3	33.71	0.00	0.00	27.91	0.00	0.00	0.00	0.00	0.00	0.000
SWALE-PONDNG-2	33.71	0.00	0.00	27.91	0.00	0.00	0.00	0.00	0.00	0.000

Node Depth Summary

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
EXSWMH1	JUNCTION	0.00	0.00	8.47	0 00:00	0.00
EXSWMH2	JUNCTION	0.00	0.00	8.46	0 00:00	0.00
EXSWMH4	JUNCTION	0.00	0.00	8.38	0 00:00	0.00
J1	JUNCTION	0.00	0.00	11.00	0 00:00	0.00
J2	JUNCTION	0.00	0.00	11.50	0 00:00	0.00
J3	JUNCTION	0.00	0.00	12.50	0 00:00	0.00
J4	JUNCTION	0.00	0.00	9.50	0 00:00	0.00
J5	JUNCTION	0.00	0.00	11.50	0 00:00	0.00
J6	JUNCTION	0.00	0.00	11.50	0 00:00	0.00
OF1	OUTFALL	0.00	0.00	8.21	0 00:00	0.00
OF2	OUTFALL	0.00	0.00	10.50	0 00:00	0.00
OF3	OUTFALL	0.00	0.00	10.74	0 00:00	0.00
OF4	OUTFALL	0.00	0.00	7.50	0 00:00	0.00
VEG-SWALE-1	STORAGE	0.00	0.00	11.50	0 00:00	0.00
VEG-SWALE-2	STORAGE	0.00	0.00	12.50	0 00:00	0.00

Graeme McGill Consulting

VEG-SWALE-3 STORAGE 0.00 0.00 9.50 0 00:00 0.00

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
EXSWMH1	JUNCTION	0.000	0.000	0 00:00	0	0	0.000 ltr
EXSWMH2	JUNCTION	0.000	0.000	0 00:00	0	0	0.000 ltr
EXSWMH4	JUNCTION	0.000	0.000	0 00:00	0	0	0.000 ltr
J1	JUNCTION	0.000	0.000	0 00:00	0	0	0.000 ltr
J2	JUNCTION	0.000	0.000	0 00:00	0	0	0.000 ltr
J3	JUNCTION	0.000	0.000	0 00:00	0	0	0.000 ltr
J4	JUNCTION	0.000	0.000	0 00:00	0	0	0.000 ltr
J5	JUNCTION	0.000	0.000	0 00:00	0	0	0.000 ltr
J6	JUNCTION	0.000	0.000	0 00:00	0	0	0.000 ltr
OF1	OUTFALL	0.000	0.000	0 00:00	0	0	0.000 ltr
OF2	OUTFALL	0.000	0.000	0 00:00	0	0	0.000 ltr
OF3	OUTFALL	0.000	0.000	0 00:00	0	0	0.000 ltr
OF4	OUTFALL	0.000	0.000	0 00:00	0	0	0.000 ltr
VEG-SWALE-1	STORAGE	0.000	0.000	0 00:00	0	0	0.000 ltr
VEG-SWALE-2	STORAGE	0.000	0.000	0 00:00	0	0	0.000 ltr
VEG-SWALE-3	STORAGE	0.000	0.000	0 00:00	0	0	0.000 ltr

Node Surcharge Summary

No nodes were surcharged.

Node Flooding Summary

No nodes were flooded.

Storage Volume Summary

Storage Unit	Average Volume 1000 m³	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m³	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
VEG-SWALE-1	0.000	0.0	0.0	0.0	0.000	0.0	0 00:00	0.000
VEG-SWALE-2	0.000	0.0	0.0	0.0	0.000	0.0	0 00:00	0.000
VEG-SWALE-3	0.000	0.0	0.0	0.0	0.000	0.0	0 00:00	0.000

Outfall Loading Summary

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
OF1	0.00	0.000	0.000	0.000
OF2	0.00	0.000	0.000	0.000
OF3	0.00	0.000	0.000	0.000
OF4	0.00	0.000	0.000	0.000
System	0.00	0.000	0.000	0.000

Link Flow Summary

Link	Type	Maximum Flow CMS	Time of Max Occurrence days hr:min	Maximum Veloc m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	0.000	0 00:00	0.00	0.00	0.00
C2	CONDUIT	0.000	0 00:00	0.00	0.00	0.00
C3	CONDUIT	0.000	0 00:00	0.00	0.00	0.00
C4	CONDUIT	0.000	0 00:00	0.00	0.00	0.00
C5	CONDUIT	0.000	0 00:00	0.00	0.00	0.00
C6	CONDUIT	0.000	0 00:00	0.00	0.00	0.00
C7	CONDUIT	0.000	0 00:00	0.00	0.00	0.00

C8	CONDUIT	0.000	0	00:00	0.00	0.00	0.00
C9	CONDUIT	0.000	0	00:00	0.00	0.00	0.00
OR1	ORIFICE	0.000	0	00:00			0.00
OR2	ORIFICE	0.000	0	00:00			0.00
OR3	ORIFICE	0.000	0	00:00			0.00
W1	WEIR	0.000	0	00:00			0.00
W2	WEIR	0.000	0	00:00			0.00
W3	WEIR	0.000	0	00:00			0.00

Flow Classification Summary

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class								Norm Ltd	Inlet Ctrl
		Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit			
C1	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C3	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C5	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C6	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C7	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C8	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C9	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

1:1 YEAR

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
75569_pt1	53.47	0.00	0.00	36.41	0.00	5.64	5.64	0.01	0.00	0.106
75569_pt2	53.47	0.00	0.00	36.41	0.00	8.49	8.49	0.04	0.00	0.159
75570	53.47	0.00	0.00	36.41	0.00	7.86	7.86	0.09	0.00	0.147
75571	53.47	0.00	0.00	36.41	0.00	6.71	6.71	0.26	0.01	0.125
RE/75567_pt1	53.47	0.00	0.00	36.41	0.00	7.27	7.27	0.04	0.00	0.136
RE/75567_pt2	53.47	0.00	0.00	36.41	0.00	5.04	5.04	0.03	0.00	0.094
SWALE-PONDING-1	53.47	0.00	0.00	40.23	0.00	3.50	3.50	0.00	0.00	0.065
SWALE-PONDING-3	53.47	0.00	0.00	40.23	0.00	1.89	1.89	0.00	0.00	0.035
SWALE-PONDNG-2	53.47	0.00	0.00	40.23	0.00	2.01	2.01	0.00	0.00	0.038

Node Depth Summary

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
EXSWMH1	JUNCTION	0.04	0.06	8.53	0 18:37	0.06
EXSWMH2	JUNCTION	0.03	0.05	8.51	0 20:02	0.05
EXSWMH4	JUNCTION	0.04	0.06	8.44	0 20:18	0.06
J1	JUNCTION	0.01	0.02	11.02	0 13:40	0.02
J2	JUNCTION	0.02	0.02	11.52	0 14:50	0.02
J3	JUNCTION	0.01	0.01	12.51	0 22:31	0.01
J4	JUNCTION	0.03	0.04	9.54	0 18:46	0.04
J5	JUNCTION	0.01	0.01	11.51	0 18:50	0.01
J6	JUNCTION	0.01	0.01	11.51	0 18:03	0.01
OF1	OUTFALL	0.01	0.02	8.23	0 20:18	0.02
OF2	OUTFALL	0.01	0.01	10.51	0 13:40	0.01
OF3	OUTFALL	0.02	0.02	10.77	0 14:50	0.02
OF4	OUTFALL	0.03	0.04	7.54	0 18:46	0.04
VEG-SWALE-1	STORAGE	0.03	0.04	11.54	0 18:03	0.04
VEG-SWALE-2	STORAGE	0.02	0.04	12.54	0 22:31	0.04

Graeme McGill Consulting

VEG-SWALE-3 STORAGE 0.04 0.06 9.56 0 18:45 0.06

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
EXSWMH1	JUNCTION	0.000	0.001	0 18:03	0	0.0365	2.162
EXSWMH2	JUNCTION	0.000	0.002	0 19:50	0	0.0617	2.876
EXSWMH4	JUNCTION	0.000	0.002	0 20:02	0	0.0599	6.587
J1	JUNCTION	0.002	0.002	0 13:40	0.0362	0.0508	0.081
J2	JUNCTION	0.003	0.003	0 14:50	0.0852	0.0852	0.028
J3	JUNCTION	0.000	0.001	0 22:31	0	0.0259	0.122
J4	JUNCTION	0.000	0.008	0 18:45	0	0.224	0.284
J5	JUNCTION	0.000	0.000	0 18:50	0.0147	0.0147	0.193
J6	JUNCTION	0.000	0.001	0 18:03	0	0.0366	0.066
OF1	OUTFALL	0.000	0.002	0 20:18	0	0.0562	0.000
OF2	OUTFALL	0.000	0.002	0 13:40	0	0.0508	0.000
OF3	OUTFALL	0.000	0.003	0 14:50	0	0.0851	0.000
OF4	OUTFALL	0.000	0.008	0 18:46	0	0.224	0.000
VEG-SWALE-1	STORAGE	0.001	0.001	0 16:00	0.0426	0.0426	0.001
VEG-SWALE-2	STORAGE	0.001	0.001	0 20:30	0.0334	0.0334	0.002
VEG-SWALE-3	STORAGE	0.008	0.008	0 16:50	0.264	0.264	0.001

Node Surcharge Summary

No nodes were surcharged.

Node Flooding Summary

No nodes were flooded.

Storage Volume Summary

Storage Unit	Average Volume 1000 m³	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m³	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
VEG-SWALE-1	0.005	2.7	0.0	0.0	0.007	4.4	0 18:03	0.001
VEG-SWALE-2	0.004	2.1	0.0	0.0	0.007	3.9	0 22:31	0.001
VEG-SWALE-3	0.028	4.1	0.0	0.0	0.045	6.6	0 18:45	0.008

Outfall Loading Summary

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
OF1	66.99	0.002	0.002	0.056
OF2	73.56	0.001	0.002	0.051
OF3	73.54	0.002	0.003	0.085
OF4	72.16	0.006	0.008	0.224
System	71.57	0.011	0.013	0.416

Link Flow Summary

Link	Type	Maximum Flow CMS	Time of Max Occurrence days hr:min	Maximum Veloc m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	0.001	0 18:12	0.09	0.01	0.06
C2	CONDUIT	0.002	0 20:02	0.13	0.01	0.06
C3	CONDUIT	0.002	0 20:18	0.20	0.01	0.05
C4	CONDUIT	0.002	0 13:40	0.68	0.00	0.02
C5	CONDUIT	0.003	0 14:50	0.89	0.01	0.05
C6	CONDUIT	0.001	0 22:31	0.94	0.00	0.03
C7	CONDUIT	0.008	0 18:46	1.18	0.03	0.11

C8	CONDUIT	0.000	0	18:50	0.23	0.00	0.01
C9	CONDUIT	0.001	0	18:03	1.11	0.00	0.03
OR1	ORIFICE	0.001	0	18:03			0.37
OR2	ORIFICE	0.001	0	22:31			0.33
OR3	ORIFICE	0.008	0	18:45			0.20
W1	WEIR	0.000	0	00:00			0.00
W2	WEIR	0.000	0	00:00			0.00
W3	WEIR	0.000	0	00:00			0.00

Flow Classification Summary

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class								Norm Ltd	Inlet Ctrl
		Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit			
C1	1.00	0.54	0.00	0.00	0.46	0.00	0.00	0.00	0.00	0.00	0.00
C2	1.00	0.54	0.00	0.00	0.46	0.00	0.00	0.00	0.36	0.00	0.00
C3	1.00	0.55	0.00	0.00	0.45	0.00	0.00	0.00	0.00	0.00	0.00
C4	1.00	0.53	0.00	0.00	0.00	0.47	0.00	0.00	0.00	0.00	0.00
C5	1.00	0.53	0.00	0.00	0.00	0.47	0.00	0.00	0.42	0.00	0.00
C6	1.00	0.54	0.00	0.00	0.00	0.00	0.00	0.46	0.00	0.00	0.00
C7	1.00	0.54	0.00	0.00	0.01	0.46	0.00	0.00	0.13	0.00	0.00
C8	1.00	0.53	0.00	0.00	0.47	0.00	0.00	0.00	0.47	0.00	0.00
C9	1.00	0.53	0.00	0.00	0.00	0.00	0.00	0.47	0.00	0.00	0.00

1:2 YEAR

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
75569_pt1	74.33	0.00	0.00	45.01	0.00	16.60	16.60	0.04	0.00	0.223
75569_pt2	74.33	0.00	0.00	45.01	0.00	20.60	20.60	0.09	0.01	0.277
75570	74.33	0.00	0.00	45.01	0.00	19.74	19.74	0.21	0.01	0.266
75571	74.33	0.00	0.00	45.01	0.00	18.18	18.18	0.71	0.03	0.245
RE/75567_pt1	74.33	0.00	0.00	45.01	0.00	18.95	18.95	0.11	0.01	0.255
RE/75567_pt2	74.33	0.00	0.00	45.01	0.00	15.57	15.57	0.10	0.00	0.209
SWALE-PONDING-1	74.33	0.00	0.00	50.99	0.00	12.92	12.92	0.01	0.00	0.174
SWALE-PONDING-3	74.33	0.00	0.00	50.99	0.00	9.61	9.61	0.02	0.00	0.129
SWALE-PONDNG-2	74.33	0.00	0.00	50.99	0.00	9.94	9.94	0.01	0.00	0.134

Node Depth Summary

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
EXSWMH1	JUNCTION	0.06	0.09	8.56	0 14:43	0.09
EXSWMH2	JUNCTION	0.06	0.08	8.54	0 15:19	0.08
EXSWMH4	JUNCTION	0.07	0.10	8.48	0 15:33	0.10
J1	JUNCTION	0.02	0.04	11.04	0 12:10	0.04
J2	JUNCTION	0.02	0.05	11.55	0 12:40	0.05
J3	JUNCTION	0.01	0.02	12.52	0 16:42	0.02
J4	JUNCTION	0.05	0.07	9.57	0 14:44	0.07
J5	JUNCTION	0.01	0.02	11.52	0 14:00	0.02
J6	JUNCTION	0.01	0.02	11.52	0 14:23	0.02
OF1	OUTFALL	0.03	0.04	8.26	0 15:33	0.04
OF2	OUTFALL	0.02	0.04	10.54	0 12:10	0.04
OF3	OUTFALL	0.02	0.05	10.79	0 12:40	0.05
OF4	OUTFALL	0.05	0.07	7.57	0 14:44	0.07
VEG-SWALE-1	STORAGE	0.05	0.09	11.59	0 14:22	0.09
VEG-SWALE-2	STORAGE	0.05	0.07	12.57	0 16:41	0.07

Graeme McGill Consulting

VEG-SWALE-3 STORAGE 0.07 0.12 9.62 0 14:44 0.12

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
EXSWMH1	JUNCTION	0.000	0.004	0 14:23	0	0.105	1.036
EXSWMH2	JUNCTION	0.000	0.007	0 15:11	0	0.197	1.305
EXSWMH4	JUNCTION	0.000	0.007	0 15:19	0	0.195	2.648
J1	JUNCTION	0.010	0.010	0 12:10	0.0878	0.131	0.040
J2	JUNCTION	0.013	0.013	0 12:40	0.214	0.214	0.014
J3	JUNCTION	0.000	0.003	0 16:41	0	0.0937	0.053
J4	JUNCTION	0.000	0.024	0 14:44	0	0.67	0.126
J5	JUNCTION	0.001	0.001	0 14:00	0.0432	0.0432	0.135
J6	JUNCTION	0.000	0.004	0 14:22	0	0.105	0.034
OF1	OUTFALL	0.000	0.007	0 15:33	0	0.19	0.000
OF2	OUTFALL	0.000	0.010	0 12:10	0	0.131	0.000
OF3	OUTFALL	0.000	0.013	0 12:40	0	0.214	0.000
OF4	OUTFALL	0.000	0.024	0 14:44	0	0.669	0.000
VEG-SWALE-1	STORAGE	0.005	0.005	0 13:00	0.113	0.113	0.001
VEG-SWALE-2	STORAGE	0.003	0.003	0 14:50	0.106	0.106	0.001
VEG-SWALE-3	STORAGE	0.030	0.030	0 13:20	0.725	0.725	0.001

Node Surcharge Summary

No nodes were surcharged.

Node Flooding Summary

No nodes were flooded.

Storage Volume Summary

Storage Unit	Average Volume 1000 m³	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m³	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
VEG-SWALE-1	0.010	6.0	0.0	0.0	0.018	10.5	0 14:22	0.004
VEG-SWALE-2	0.011	5.4	0.0	0.0	0.016	8.2	0 16:41	0.003
VEG-SWALE-3	0.061	8.9	0.0	0.0	0.101	14.9	0 14:44	0.024

Outfall Loading Summary

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
OF1	77.32	0.005	0.007	0.190
OF2	80.75	0.003	0.010	0.131
OF3	80.72	0.005	0.013	0.214
OF4	80.36	0.017	0.024	0.669
System	79.79	0.030	0.041	1.203

Link Flow Summary

Link	Type	Maximum Flow CMS	Time of Max Occurrence days hr:min	Maximum Veloc m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	0.004	0 14:28	0.14	0.04	0.10
C2	CONDUIT	0.007	0 15:19	0.21	0.02	0.10
C3	CONDUIT	0.007	0 15:33	0.28	0.02	0.08
C4	CONDUIT	0.010	0 12:10	1.02	0.00	0.04
C5	CONDUIT	0.013	0 12:40	1.40	0.03	0.11
C6	CONDUIT	0.003	0 16:42	1.29	0.01	0.05
C7	CONDUIT	0.024	0 14:44	1.67	0.08	0.20

C8	CONDUIT	0.001	0	14:00	0.34	0.00	0.03
C9	CONDUIT	0.004	0	14:23	1.60	0.01	0.06
OR1	ORIFICE	0.004	0	14:22			0.81
OR2	ORIFICE	0.003	0	16:41			0.65
OR3	ORIFICE	0.024	0	14:44			0.40
W1	WEIR	0.000	0	00:00			0.00
W2	WEIR	0.000	0	00:00			0.00
W3	WEIR	0.000	0	00:00			0.00

Flow Classification Summary

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class								Norm Ltd	Inlet Ctrl
		Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit			
C1	1.00	0.51	0.00	0.00	0.49	0.00	0.00	0.00	0.00	0.00	0.00
C2	1.00	0.51	0.00	0.00	0.49	0.00	0.00	0.00	0.43	0.00	0.00
C3	1.00	0.51	0.00	0.00	0.49	0.00	0.00	0.00	0.00	0.00	0.00
C4	1.00	0.50	0.00	0.00	0.00	0.50	0.00	0.00	0.09	0.00	0.00
C5	1.00	0.50	0.00	0.00	0.00	0.50	0.00	0.00	0.33	0.00	0.00
C6	1.00	0.51	0.00	0.00	0.00	0.00	0.00	0.49	0.00	0.00	0.00
C7	1.00	0.51	0.00	0.00	0.00	0.49	0.00	0.00	0.00	0.00	0.00
C8	1.00	0.50	0.00	0.00	0.50	0.00	0.00	0.00	0.50	0.00	0.00
C9	1.00	0.51	0.00	0.00	0.00	0.00	0.00	0.49	0.00	0.00	0.00

1:5 YEAR

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
75569_pt1	99.66	0.00	0.00	53.20	0.00	32.52	32.52	0.08	0.00	0.326
75569_pt2	99.66	0.00	0.00	53.20	0.00	37.55	37.55	0.16	0.03	0.377
75570	99.66	0.00	0.00	53.20	0.00	36.47	36.47	0.40	0.04	0.366
75571	99.66	0.00	0.00	53.20	0.00	34.51	34.51	1.34	0.08	0.346
RE/75567_pt1	99.66	0.00	0.00	53.20	0.00	35.48	35.48	0.20	0.01	0.356
RE/75567_pt2	99.66	0.00	0.00	53.20	0.00	31.18	31.18	0.20	0.01	0.313
SWALE-PONDING-1	99.66	0.00	0.00	61.76	0.00	26.81	26.81	0.01	0.00	0.269
SWALE-PONDING-3	99.66	0.00	0.00	61.76	0.00	22.28	22.28	0.05	0.00	0.224
SWALE-PONDNG-2	99.66	0.00	0.00	61.76	0.00	22.78	22.78	0.01	0.00	0.229

Node Depth Summary

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
EXSWMH1	JUNCTION	0.09	0.13	8.60	0 14:08	0.13
EXSWMH2	JUNCTION	0.08	0.12	8.59	0 14:22	0.12
EXSWMH4	JUNCTION	0.09	0.14	8.52	0 14:32	0.14
J1	JUNCTION	0.02	0.07	11.07	0 12:10	0.07
J2	JUNCTION	0.03	0.09	11.59	0 12:10	0.09
J3	JUNCTION	0.02	0.03	12.53	0 15:00	0.03
J4	JUNCTION	0.07	0.11	9.61	0 13:42	0.11
J5	JUNCTION	0.02	0.03	11.53	0 13:00	0.03
J6	JUNCTION	0.02	0.03	11.53	0 13:47	0.03
OF1	OUTFALL	0.04	0.07	8.28	0 14:32	0.07
OF2	OUTFALL	0.02	0.07	10.57	0 12:10	0.07
OF3	OUTFALL	0.03	0.09	10.83	0 12:10	0.09
OF4	OUTFALL	0.07	0.11	7.61	0 13:42	0.11
VEG-SWALE-1	STORAGE	0.09	0.18	11.68	0 13:47	0.18
VEG-SWALE-2	STORAGE	0.08	0.13	12.63	0 15:00	0.13
VEG-SWALE-3	STORAGE	0.12	0.21	9.71	0 13:42	0.21

Graeme McGill Consulting

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
EXSWMH1	JUNCTION	0.000	0.009	0 13:47	0	0.202	0.685
EXSWMH2	JUNCTION	0.000	0.015	0 14:16	0	0.398	0.837
EXSWMH4	JUNCTION	0.000	0.015	0 14:22	0	0.394	1.746
J1	JUNCTION	0.031	0.034	0 12:10	0.16	0.245	0.029
J2	JUNCTION	0.044	0.044	0 12:10	0.396	0.396	0.010
J3	JUNCTION	0.000	0.007	0 15:00	0	0.197	0.033
J4	JUNCTION	0.000	0.061	0 13:42	0	1.31	0.080
J5	JUNCTION	0.004	0.004	0 13:00	0.0847	0.0847	0.103
J6	JUNCTION	0.000	0.009	0 13:47	0	0.202	0.022
OF1	OUTFALL	0.000	0.015	0 14:32	0	0.387	0.000
OF2	OUTFALL	0.000	0.034	0 12:10	0	0.245	0.000
OF3	OUTFALL	0.000	0.044	0 12:10	0	0.395	0.000
OF4	OUTFALL	0.000	0.061	0 13:42	0	1.31	0.000
VEG-SWALE-1	STORAGE	0.015	0.015	0 12:10	0.213	0.213	0.000
VEG-SWALE-2	STORAGE	0.008	0.008	0 13:10	0.213	0.213	0.001
VEG-SWALE-3	STORAGE	0.080	0.080	0 12:40	1.39	1.39	0.000

Node Surcharge Summary

No nodes were surcharged.

Node Flooding Summary

No nodes were flooded.

Storage Volume Summary

Storage Unit	Average Volume 1000 m ³	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m ³	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
VEG-SWALE-1	0.019	11.0	0.0	0.0	0.041	24.1	0 13:47	0.009
VEG-SWALE-2	0.019	9.8	0.0	0.0	0.031	16.0	0 15:00	0.007
VEG-SWALE-3	0.105	15.3	0.0	0.0	0.206	30.2	0 13:42	0.061

Outfall Loading Summary

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10 ⁶ ltr
OF1	81.21	0.010	0.015	0.387
OF2	84.31	0.006	0.034	0.245
OF3	84.30	0.009	0.044	0.395
OF4	83.73	0.033	0.061	1.312
System	83.39	0.058	0.099	2.339

Link Flow Summary

Link	Type	Maximum Flow CMS	Time of Max Occurrence days hr:min	Maximum Veloc m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	0.009	0 13:54	0.17	0.08	0.15
C2	CONDUIT	0.015	0 14:22	0.28	0.04	0.15
C3	CONDUIT	0.015	0 14:32	0.37	0.04	0.12
C4	CONDUIT	0.034	0 12:10	1.46	0.01	0.07
C5	CONDUIT	0.044	0 12:10	2.00	0.09	0.20
C6	CONDUIT	0.007	0 15:00	1.67	0.01	0.08
C7	CONDUIT	0.061	0 13:42	2.16	0.21	0.31
C8	CONDUIT	0.004	0 13:00	0.46	0.00	0.05

Graeme McGill Consulting

C9	CONDUIT	0.009	0	13:47	2.02	0.01	0.08
OR1	ORIFICE	0.009	0	13:47			1.00
OR2	ORIFICE	0.007	0	15:00			1.00
OR3	ORIFICE	0.061	0	13:42			0.71
W1	WEIR	0.000	0	00:00			0.00
W2	WEIR	0.000	0	00:00			0.00
W3	WEIR	0.000	0	00:00			0.00

Flow Classification Summary

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class								Inlet Ctrl
		Up		Down	Sub	Sup	Up	Down	Norm	
		Dry	Dry	Dry	Crit	Crit	Crit	Crit	Ltd	
C1	1.00	0.49	0.00	0.00	0.51	0.00	0.00	0.00	0.00	0.00
C2	1.00	0.49	0.00	0.00	0.51	0.00	0.00	0.00	0.46	0.00
C3	1.00	0.49	0.00	0.00	0.51	0.00	0.00	0.00	0.00	0.00
C4	1.00	0.48	0.00	0.00	0.00	0.52	0.00	0.00	0.22	0.00
C5	1.00	0.48	0.00	0.00	0.00	0.52	0.00	0.00	0.23	0.00
C6	1.00	0.49	0.00	0.00	0.00	0.00	0.00	0.51	0.00	0.00
C7	1.00	0.48	0.00	0.00	0.00	0.51	0.00	0.00	0.04	0.00
C8	1.00	0.48	0.00	0.00	0.37	0.15	0.00	0.00	0.52	0.00
C9	1.00	0.48	0.00	0.00	0.00	0.00	0.00	0.52	0.00	0.00

1:10 YEAR

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
75569_pt1	118.14	0.00	0.00	58.05	0.00	45.34	45.34	0.12	0.01	0.384
75569_pt2	118.14	0.00	0.00	58.05	0.00	51.06	51.06	0.22	0.04	0.432
75570	118.14	0.00	0.00	58.05	0.00	49.82	49.82	0.54	0.07	0.422
75571	118.14	0.00	0.00	58.05	0.00	47.60	47.60	1.85	0.13	0.403
RE/75567_pt1	118.14	0.00	0.00	58.05	0.00	48.69	48.69	0.27	0.03	0.412
RE/75567_pt2	118.14	0.00	0.00	58.05	0.00	43.82	43.82	0.28	0.01	0.371
SWALE-PONDING-1	118.14	0.00	0.00	68.39	0.00	38.19	38.19	0.02	0.00	0.323
SWALE-PONDING-3	118.14	0.00	0.00	68.39	0.00	32.96	32.96	0.07	0.00	0.279
SWALE-PONDNG-2	118.14	0.00	0.00	68.39	0.00	33.55	33.55	0.02	0.00	0.284

Node Depth Summary

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
EXSWMH1	JUNCTION	0.10	0.15	8.62	0 14:10	0.15
EXSWMH2	JUNCTION	0.10	0.14	8.60	0 14:23	0.14
EXSWMH4	JUNCTION	0.11	0.16	8.54	0 14:32	0.16
J1	JUNCTION	0.03	0.08	11.08	0 12:10	0.08
J2	JUNCTION	0.04	0.11	11.61	0 12:10	0.11
J3	JUNCTION	0.02	0.03	12.53	0 15:01	0.03
J4	JUNCTION	0.08	0.14	9.64	0 13:25	0.14
J5	JUNCTION	0.02	0.04	11.54	0 12:41	0.04
J6	JUNCTION	0.02	0.04	11.54	0 13:46	0.04
OF1	OUTFALL	0.05	0.08	8.29	0 14:32	0.08
OF2	OUTFALL	0.03	0.08	10.58	0 12:10	0.08
OF3	OUTFALL	0.04	0.11	10.86	0 12:10	0.11
OF4	OUTFALL	0.08	0.14	7.64	0 13:25	0.14
VEG-SWALE-1	STORAGE	0.13	0.26	11.76	0 13:46	0.26
VEG-SWALE-2	STORAGE	0.12	0.19	12.69	0 15:01	0.19

Graeme McGill Consulting

VEG-SWALE-3 STORAGE 0.15 0.28 9.78 0 13:25 0.28

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
EXSWMH1	JUNCTION	0.000	0.012	0 13:46	0	0.28	0.585
EXSWMH2	JUNCTION	0.000	0.021	0 14:18	0	0.56	0.692
EXSWMH4	JUNCTION	0.000	0.021	0 14:23	0	0.556	1.429
J1	JUNCTION	0.044	0.049	0 12:10	0.218	0.336	0.025
J2	JUNCTION	0.071	0.071	0 12:10	0.54	0.54	0.009
J3	JUNCTION	0.000	0.009	0 15:01	0	0.282	0.026
J4	JUNCTION	0.000	0.094	0 13:25	0	1.83	0.065
J5	JUNCTION	0.006	0.006	0 12:40	0.118	0.118	0.087
J6	JUNCTION	0.000	0.012	0 13:46	0	0.28	0.018
OF1	OUTFALL	0.000	0.021	0 14:32	0	0.548	0.000
OF2	OUTFALL	0.000	0.049	0 12:10	0	0.336	0.000
OF3	OUTFALL	0.000	0.071	0 12:10	0	0.54	0.000
OF4	OUTFALL	0.000	0.094	0 13:25	0	1.83	0.000
VEG-SWALE-1	STORAGE	0.027	0.027	0 12:10	0.293	0.293	0.000
VEG-SWALE-2	STORAGE	0.014	0.014	0 13:00	0.301	0.301	0.001
VEG-SWALE-3	STORAGE	0.130	0.130	0 12:10	1.92	1.92	0.000

Node Surcharge Summary

No nodes were surcharged.

Node Flooding Summary

No nodes were flooded.

Storage Volume Summary

Storage Unit	Average Volume 1000 m³	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m³	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
VEG-SWALE-1	0.029	17.3	0.0	0.0	0.068	40.3	0 13:46	0.012
VEG-SWALE-2	0.029	15.1	0.0	0.0	0.053	27.1	0 15:01	0.009
VEG-SWALE-3	0.138	20.2	0.0	0.0	0.299	43.8	0 13:25	0.094

Outfall Loading Summary

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
OF1	83.12	0.014	0.021	0.548
OF2	86.39	0.008	0.049	0.336
OF3	86.38	0.013	0.071	0.540
OF4	85.76	0.045	0.094	1.829
System	85.41	0.079	0.151	3.254

Link Flow Summary

Link	Type	Maximum Flow CMS	Time of Max Occurrence days hr:min	Maximum Veloc m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	0.012	0 13:51	0.18	0.11	0.17
C2	CONDUIT	0.021	0 14:23	0.30	0.06	0.17
C3	CONDUIT	0.021	0 14:32	0.41	0.05	0.14
C4	CONDUIT	0.049	0 12:10	1.64	0.01	0.08
C5	CONDUIT	0.071	0 12:10	2.30	0.14	0.25
C6	CONDUIT	0.009	0 15:01	1.85	0.02	0.09
C7	CONDUIT	0.094	0 13:25	2.44	0.32	0.39

C8	CONDUIT	0.006	0	12:41	0.54	0.00	0.06
C9	CONDUIT	0.012	0	13:46	2.20	0.02	0.10
OR1	ORIFICE	0.012	0	13:46			1.00
OR2	ORIFICE	0.009	0	15:01			1.00
OR3	ORIFICE	0.094	0	13:25			0.94
W1	WEIR	0.000	0	00:00			0.00
W2	WEIR	0.000	0	00:00			0.00
W3	WEIR	0.000	0	00:00			0.00

Flow Classification Summary

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class								Norm Ltd	Inlet Ctrl
		Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit			
C1	1.00	0.47	0.00	0.00	0.53	0.00	0.00	0.00	0.00	0.00	0.00
C2	1.00	0.47	0.00	0.00	0.53	0.00	0.00	0.00	0.00	0.47	0.00
C3	1.00	0.47	0.00	0.00	0.53	0.00	0.00	0.00	0.00	0.00	0.00
C4	1.00	0.45	0.00	0.00	0.00	0.54	0.00	0.00	0.00	0.30	0.00
C5	1.00	0.45	0.00	0.00	0.00	0.54	0.00	0.00	0.00	0.20	0.00
C6	1.00	0.47	0.00	0.00	0.00	0.00	0.00	0.53	0.00	0.00	0.00
C7	1.00	0.46	0.00	0.00	0.01	0.53	0.00	0.00	0.07	0.00	0.00
C8	1.00	0.45	0.00	0.00	0.34	0.20	0.00	0.00	0.54	0.00	0.00
C9	1.00	0.46	0.00	0.00	0.00	0.00	0.00	0.54	0.00	0.00	0.00

1:20 YEAR

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
75569_pt1	137.41	0.00	0.00	62.34	0.00	59.54	59.54	0.16	0.01	0.433
75569_pt2	137.41	0.00	0.00	62.34	0.00	65.92	65.92	0.28	0.06	0.480
75570	137.41	0.00	0.00	62.34	0.00	64.53	64.53	0.70	0.10	0.470
75571	137.41	0.00	0.00	62.34	0.00	62.04	62.04	2.41	0.20	0.451
RE/75567_pt1	137.41	0.00	0.00	62.34	0.00	63.26	63.26	0.36	0.04	0.460
RE/75567_pt2	137.41	0.00	0.00	62.34	0.00	57.86	57.86	0.37	0.02	0.421
SWALE-PONDING-1	137.41	0.00	0.00	74.43	0.00	50.96	50.96	0.03	0.00	0.371
SWALE-PONDING-3	137.41	0.00	0.00	74.43	0.00	45.09	45.09	0.09	0.00	0.328
SWALE-PONDNG-2	137.41	0.00	0.00	74.43	0.00	45.76	45.76	0.03	0.00	0.333

Node Depth Summary

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
EXSWMH1	JUNCTION	0.12	0.17	8.63	0 14:15	0.17
EXSWMH2	JUNCTION	0.11	0.16	8.62	0 14:28	0.16
EXSWMH4	JUNCTION	0.12	0.18	8.55	0 14:35	0.18
J1	JUNCTION	0.03	0.09	11.09	0 12:10	0.09
J2	JUNCTION	0.04	0.13	11.63	0 12:10	0.13
J3	JUNCTION	0.03	0.04	12.54	0 15:04	0.04
J4	JUNCTION	0.09	0.17	9.67	0 13:15	0.17
J5	JUNCTION	0.02	0.04	11.54	0 12:40	0.04
J6	JUNCTION	0.03	0.04	11.54	0 13:48	0.04
OF1	OUTFALL	0.06	0.09	8.30	0 14:35	0.09
OF2	OUTFALL	0.03	0.09	10.59	0 12:10	0.09
OF3	OUTFALL	0.04	0.13	10.88	0 12:10	0.13
OF4	OUTFALL	0.09	0.17	7.67	0 13:15	0.17
VEG-SWALE-1	STORAGE	0.17	0.36	11.86	0 13:48	0.36
VEG-SWALE-2	STORAGE	0.16	0.28	12.78	0 15:04	0.28
VEG-SWALE-3	STORAGE	0.17	0.34	9.84	0 13:15	0.34

Graeme McGill Consulting

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
EXSWMH1	JUNCTION	0.000	0.014	0 13:48	0	0.366	0.525
EXSWMH2	JUNCTION	0.000	0.025	0 14:22	0	0.74	0.615
EXSWMH4	JUNCTION	0.000	0.025	0 14:28	0	0.736	1.206
J1	JUNCTION	0.058	0.066	0 12:10	0.281	0.436	0.024
J2	JUNCTION	0.099	0.099	0 12:10	0.7	0.7	0.008
J3	JUNCTION	0.000	0.012	0 15:04	0	0.376	0.022
J4	JUNCTION	0.000	0.132	0 13:15	0	2.4	0.049
J5	JUNCTION	0.009	0.009	0 12:40	0.155	0.155	0.075
J6	JUNCTION	0.000	0.014	0 13:48	0	0.366	0.016
OF1	OUTFALL	0.000	0.025	0 14:35	0	0.727	0.000
OF2	OUTFALL	0.000	0.066	0 12:10	0	0.436	0.000
OF3	OUTFALL	0.000	0.099	0 12:10	0	0.7	0.000
OF4	OUTFALL	0.000	0.132	0 13:15	0	2.4	0.000
VEG-SWALE-1	STORAGE	0.040	0.040	0 12:10	0.382	0.382	0.000
VEG-SWALE-2	STORAGE	0.020	0.020	0 12:40	0.398	0.398	0.001
VEG-SWALE-3	STORAGE	0.200	0.200	0 12:10	2.5	2.5	0.000

Node Surcharge Summary

No nodes were surcharged.

Node Flooding Summary

No nodes were flooded.

Storage Volume Summary

Storage Unit	Average Volume 1000 m ³	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m ³	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
VEG-SWALE-1	0.044	26.1	0.0	0.0	0.103	60.8	0 13:48	0.014
VEG-SWALE-2	0.046	23.5	0.0	0.0	0.084	43.4	0 15:04	0.012
VEG-SWALE-3	0.168	24.6	0.0	0.0	0.396	58.0	0 13:15	0.132

Outfall Loading Summary

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10 ⁶ ltr
OF1	85.06	0.017	0.025	0.727
OF2	88.30	0.010	0.066	0.436
OF3	88.29	0.016	0.099	0.700
OF4	87.63	0.057	0.132	2.403
System	87.32	0.100	0.216	4.266

Link Flow Summary

Link	Type	Maximum Flow CMS	Time of Max Occurrence days hr:min	Maximum Veloc m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	0.014	0 13:53	0.19	0.13	0.18
C2	CONDUIT	0.025	0 14:28	0.32	0.07	0.19
C3	CONDUIT	0.025	0 14:35	0.44	0.06	0.15
C4	CONDUIT	0.066	0 12:10	1.80	0.02	0.09
C5	CONDUIT	0.099	0 12:10	2.53	0.20	0.30
C6	CONDUIT	0.012	0 15:04	1.98	0.02	0.11
C7	CONDUIT	0.132	0 13:15	2.67	0.45	0.47
C8	CONDUIT	0.009	0 12:40	0.60	0.00	0.07

Graeme McGill Consulting

C9	CONDUIT	0.014	0	13:48	2.32	0.02	0.10
OR1	ORIFICE	0.014	0	13:48			1.00
OR2	ORIFICE	0.012	0	15:04			1.00
OR3	ORIFICE	0.132	0	13:15			1.00
W1	WEIR	0.000	0	00:00			0.00
W2	WEIR	0.000	0	00:00			0.00
W3	WEIR	0.000	0	00:00			0.00

Flow Classification Summary

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class								Inlet Ctrl
		Up		Down	Sub	Sup	Up	Down	Norm	
		Dry	Dry	Dry	Crit	Crit	Crit	Crit	Ltd	
C1	1.00	0.44	0.00	0.00	0.56	0.00	0.00	0.00	0.00	0.00
C2	1.00	0.44	0.00	0.00	0.56	0.00	0.00	0.00	0.47	0.00
C3	1.00	0.45	0.00	0.00	0.55	0.00	0.00	0.00	0.00	0.00
C4	1.00	0.42	0.00	0.00	0.00	0.58	0.00	0.00	0.40	0.00
C5	1.00	0.42	0.00	0.00	0.00	0.58	0.00	0.00	0.10	0.00
C6	1.00	0.44	0.00	0.00	0.00	0.00	0.00	0.56	0.00	0.00
C7	1.00	0.43	0.00	0.00	0.01	0.56	0.00	0.00	0.09	0.00
C8	1.00	0.42	0.00	0.00	0.34	0.23	0.00	0.00	0.57	0.00
C9	1.00	0.43	0.00	0.00	0.00	0.00	0.00	0.57	0.00	0.00

1:50 YEAR

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
75569_pt1	164.49	0.00	0.00	67.37	0.00	80.57	80.57	0.21	0.01	0.490
75569_pt2	164.49	0.00	0.00	67.37	0.00	87.82	87.82	0.38	0.08	0.534
75570	164.49	0.00	0.00	67.37	0.00	86.22	86.22	0.94	0.14	0.524
75571	164.49	0.00	0.00	67.37	0.00	83.39	83.39	3.24	0.30	0.507
RE/75567_pt1	164.49	0.00	0.00	67.37	0.00	84.78	84.78	0.48	0.06	0.515
RE/75567_pt2	164.49	0.00	0.00	67.37	0.00	78.69	78.69	0.51	0.03	0.478
SWALE-PONDING-1	164.49	0.00	0.00	81.72	0.00	70.15	70.15	0.04	0.00	0.426
SWALE-PONDING-3	164.49	0.00	0.00	81.72	0.00	63.47	63.47	0.13	0.01	0.386
SWALE-PONDNG-2	164.49	0.00	0.00	81.72	0.00	64.23	64.23	0.04	0.00	0.390

Node Depth Summary

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
EXSWMH1	JUNCTION	0.13	0.18	8.65	0 14:25	0.18
EXSWMH2	JUNCTION	0.13	0.17	8.64	0 14:37	0.17
EXSWMH4	JUNCTION	0.14	0.19	8.57	0 14:43	0.19
J1	JUNCTION	0.04	0.11	11.11	0 12:10	0.11
J2	JUNCTION	0.05	0.16	11.66	0 12:10	0.16
J3	JUNCTION	0.03	0.04	12.54	0 15:13	0.04
J4	JUNCTION	0.11	0.20	9.70	0 13:14	0.20
J5	JUNCTION	0.03	0.05	11.55	0 12:11	0.05
J6	JUNCTION	0.03	0.04	11.54	0 13:53	0.04
OF1	OUTFALL	0.07	0.10	8.31	0 14:43	0.10
OF2	OUTFALL	0.04	0.11	10.61	0 12:10	0.11
OF3	OUTFALL	0.05	0.16	10.90	0 12:10	0.16
OF4	OUTFALL	0.11	0.20	7.70	0 13:14	0.20
VEG-SWALE-1	STORAGE	0.25	0.48	11.98	0 13:53	0.48
VEG-SWALE-2	STORAGE	0.24	0.40	12.90	0 15:13	0.40
VEG-SWALE-3	STORAGE	0.21	0.46	9.96	0 13:14	0.46

Graeme McGill Consulting

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
EXSWMH1	JUNCTION	0.000	0.016	0 13:53	0	0.494	0.493
EXSWMH2	JUNCTION	0.000	0.031	0 14:31	0	1	0.601
EXSWMH4	JUNCTION	0.000	0.031	0 14:36	0	0.997	1.090
J1	JUNCTION	0.078	0.091	0 12:10	0.375	0.584	0.022
J2	JUNCTION	0.140	0.140	0 12:10	0.935	0.935	0.008
J3	JUNCTION	0.000	0.015	0 15:13	0	0.511	0.018
J4	JUNCTION	0.000	0.174	0 13:14	0	3.25	0.041
J5	JUNCTION	0.014	0.014	0 12:10	0.21	0.21	0.064
J6	JUNCTION	0.000	0.016	0 13:53	0	0.494	0.013
OF1	OUTFALL	0.000	0.031	0 14:43	0	0.986	0.000
OF2	OUTFALL	0.000	0.091	0 12:10	0	0.584	0.000
OF3	OUTFALL	0.000	0.140	0 12:10	0	0.935	0.000
OF4	OUTFALL	0.000	0.174	0 13:14	0	3.25	0.000
VEG-SWALE-1	STORAGE	0.058	0.058	0 12:10	0.513	0.513	0.000
VEG-SWALE-2	STORAGE	0.030	0.030	0 12:40	0.542	0.542	0.001
VEG-SWALE-3	STORAGE	0.306	0.306	0 12:10	3.37	3.37	0.000

Node Surcharge Summary

No nodes were surcharged.

Node Flooding Summary

No nodes were flooded.

Storage Volume Summary

Storage Unit	Average Volume 1000 m³	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m³	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
VEG-SWALE-1	0.070	41.7	0.0	0.0	0.157	93.0	0 13:53	0.016
VEG-SWALE-2	0.078	40.0	0.0	0.0	0.142	73.0	0 15:13	0.015
VEG-SWALE-3	0.225	33.0	0.0	0.0	0.609	89.3	0 13:14	0.174

Outfall Loading Summary

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
OF1	87.49	0.022	0.031	0.986
OF2	90.51	0.012	0.091	0.584
OF3	90.49	0.020	0.140	0.935
OF4	89.87	0.073	0.174	3.252
System	89.59	0.127	0.323	5.758

Link Flow Summary

Link	Type	Maximum Flow CMS	Time of Max Occurrence days hr:min	Maximum Veloc m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	0.016	0 13:58	0.19	0.16	0.20
C2	CONDUIT	0.031	0 14:36	0.34	0.08	0.21
C3	CONDUIT	0.031	0 14:43	0.47	0.07	0.17
C4	CONDUIT	0.091	0 12:10	1.97	0.02	0.11
C5	CONDUIT	0.140	0 12:10	2.79	0.28	0.36
C6	CONDUIT	0.015	0 15:13	2.12	0.03	0.12
C7	CONDUIT	0.174	0 13:14	2.86	0.59	0.55
C8	CONDUIT	0.014	0 12:11	0.68	0.01	0.08

Graeme McGill Consulting

C9	CONDUIT	0.016	0	13:53	2.44	0.03	0.11
OR1	ORIFICE	0.016	0	13:53			1.00
OR2	ORIFICE	0.015	0	15:13			1.00
OR3	ORIFICE	0.162	0	13:12			1.00
W1	WEIR	0.000	0	00:00			0.00
W2	WEIR	0.000	0	00:00			0.00
W3	WEIR	0.012	0	13:14			0.03

Flow Classification Summary

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class								
		Up		Down	Sub	Sup	Up	Down	Norm	Inlet
		Dry	Dry	Dry	Crit	Crit	Crit	Crit	Ltd	Ctrl
C1	1.00	0.40	0.00	0.00	0.60	0.00	0.00	0.00	0.00	0.00
C2	1.00	0.40	0.00	0.00	0.60	0.00	0.00	0.00	0.35	0.00
C3	1.00	0.41	0.00	0.00	0.59	0.00	0.00	0.00	0.00	0.00
C4	1.00	0.38	0.00	0.00	0.00	0.62	0.00	0.00	0.48	0.00
C5	1.00	0.38	0.00	0.00	0.00	0.61	0.00	0.00	0.07	0.00
C6	1.00	0.40	0.00	0.00	0.00	0.00	0.00	0.60	0.00	0.00
C7	1.00	0.39	0.00	0.00	0.01	0.60	0.00	0.00	0.11	0.00
C8	1.00	0.38	0.00	0.00	0.35	0.26	0.00	0.00	0.61	0.00
C9	1.00	0.39	0.00	0.00	0.00	0.00	0.00	0.61	0.00	0.00

1:100 YEAR

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
75569_pt1	186.50	0.00	0.00	70.80	0.00	98.40	98.40	0.26	0.02	0.528
75569_pt2	186.50	0.00	0.00	70.80	0.00	106.32	106.32	0.45	0.09	0.570
75570	186.50	0.00	0.00	70.80	0.00	104.56	104.56	1.14	0.18	0.561
75571	186.50	0.00	0.00	70.80	0.00	101.46	101.46	3.94	0.39	0.544
RE/75567_pt1	186.50	0.00	0.00	70.80	0.00	102.98	102.98	0.58	0.07	0.552
RE/75567_pt2	186.50	0.00	0.00	70.80	0.00	96.37	96.37	0.62	0.04	0.517
SWALE-PONDING-1	186.50	0.00	0.00	86.81	0.00	86.62	86.62	0.04	0.00	0.464
SWALE-PONDING-3	186.50	0.00	0.00	86.81	0.00	79.34	79.34	0.16	0.01	0.425
SWALE-PONDNG-2	186.50	0.00	0.00	86.81	0.00	80.17	80.17	0.05	0.00	0.430

Node Depth Summary

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
EXSWMH1	JUNCTION	0.14	0.19	8.66	0 14:37	0.19
EXSWMH2	JUNCTION	0.13	0.18	8.64	0 14:47	0.18
EXSWMH4	JUNCTION	0.15	0.20	8.58	0 14:52	0.20
J1	JUNCTION	0.04	0.12	11.12	0 12:10	0.12
J2	JUNCTION	0.05	0.18	11.68	0 12:10	0.18
J3	JUNCTION	0.04	0.05	12.55	0 14:48	0.05
J4	JUNCTION	0.12	0.26	9.76	0 12:43	0.26
J5	JUNCTION	0.03	0.06	11.56	0 12:11	0.06
J6	JUNCTION	0.03	0.04	11.54	0 12:51	0.04
OF1	OUTFALL	0.08	0.10	8.32	0 14:52	0.10
OF2	OUTFALL	0.04	0.12	10.62	0 12:10	0.12
OF3	OUTFALL	0.05	0.18	10.92	0 12:10	0.18
OF4	OUTFALL	0.12	0.26	7.76	0 12:43	0.26
VEG-SWALE-1	STORAGE	0.28	0.50	12.00	0 12:51	0.50
VEG-SWALE-2	STORAGE	0.31	0.50	13.00	0 14:48	0.50
VEG-SWALE-3	STORAGE	0.23	0.50	10.00	0 12:43	0.50

Graeme McGill Consulting

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
EXSWMH1	JUNCTION	0.000	0.017	0 12:51	0	0.561	0.520
EXSWMH2	JUNCTION	0.000	0.034	0 14:42	0	1.17	0.624
EXSWMH4	JUNCTION	0.000	0.034	0 14:47	0	1.16	1.087
J1	JUNCTION	0.095	0.113	0 12:10	0.453	0.71	0.021
J2	JUNCTION	0.175	0.175	0 12:10	1.13	1.13	0.007
J3	JUNCTION	0.000	0.017	0 14:48	0	0.612	0.016
J4	JUNCTION	0.000	0.243	0 12:43	0	3.95	0.037
J5	JUNCTION	0.018	0.018	0 12:10	0.257	0.257	0.057
J6	JUNCTION	0.000	0.017	0 12:51	0	0.562	0.013
OF1	OUTFALL	0.000	0.034	0 14:52	0	1.15	0.000
OF2	OUTFALL	0.000	0.112	0 12:10	0	0.71	0.000
OF3	OUTFALL	0.000	0.175	0 12:10	0	1.13	0.000
OF4	OUTFALL	0.000	0.243	0 12:43	0	3.95	0.000
VEG-SWALE-1	STORAGE	0.075	0.075	0 12:10	0.623	0.623	-0.000
VEG-SWALE-2	STORAGE	0.039	0.039	0 12:30	0.665	0.665	0.001
VEG-SWALE-3	STORAGE	0.398	0.398	0 12:10	4.1	4.1	0.000

Node Surcharge Summary

No nodes were surcharged.

Node Flooding Summary

Flooding refers to all water that overflows a node, whether it ponds or not.

Hours	Maximum Rate	Time of Max Occurrence	Total Flood Volume	Maximum Ponded Depth
-------	-----------------	---------------------------	--------------------------	----------------------------

Node	Flooded	CMS	days hr:min	10^6 ltr	Meters
VEG-SWALE-1	1.27	0.023	0 12:51	0.041	0.000
VEG-SWALE-2	0.55	0.003	0 14:48	0.003	0.000
VEG-SWALE-3	0.28	0.044	0 12:43	0.020	0.000

Storage Volume Summary

Storage Unit	Average Volume 1000 m³	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m³	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
VEG-SWALE-1	0.082	48.5	0.0	0.0	0.169	100.0	0 12:51	0.017
VEG-SWALE-2	0.109	56.2	0.0	0.0	0.194	100.0	0 14:48	0.017
VEG-SWALE-3	0.253	37.1	0.0	0.0	0.682	100.0	0 12:43	0.243

Outfall Loading Summary

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
OF1	88.87	0.025	0.034	1.151
OF2	91.71	0.014	0.112	0.710
OF3	91.70	0.023	0.175	1.134
OF4	91.11	0.084	0.243	3.953
System	90.85	0.146	0.427	6.948

Link Flow Summary

Link	Type	Maximum Flow CMS	Time of Max Occurrence days hr:min	Maximum Veloc m/sec	Max/ Full Flow	Max/ Full Depth
------	------	--------------------------	--	-----------------------------	----------------------	-----------------------

C1	CONDUIT	0.017	0	14:10	0.20	0.16	0.21
C2	CONDUIT	0.034	0	14:47	0.35	0.09	0.22
C3	CONDUIT	0.034	0	14:52	0.48	0.08	0.17
C4	CONDUIT	0.112	0	12:10	2.11	0.03	0.12
C5	CONDUIT	0.175	0	12:10	2.96	0.35	0.41
C6	CONDUIT	0.017	0	14:48	2.20	0.03	0.12
C7	CONDUIT	0.243	0	12:43	3.07	0.83	0.69
C8	CONDUIT	0.018	0	12:11	0.74	0.01	0.09
C9	CONDUIT	0.017	0	12:51	2.46	0.03	0.12
OR1	ORIFICE	0.017	0	12:51			1.00
OR2	ORIFICE	0.017	0	14:48			1.00
OR3	ORIFICE	0.162	0	12:30			1.00
W1	WEIR	0.000	0	00:00			0.00
W2	WEIR	0.000	0	00:00			0.00
W3	WEIR	0.086	0	12:43			0.10

Flow Classification Summary

Conduit	Adjusted /Actual Length	----- Fraction of Time in Flow Class -----								
		Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C1	1.00	0.37	0.00	0.00	0.63	0.00	0.00	0.00	0.00	0.00
C2	1.00	0.37	0.00	0.00	0.63	0.00	0.00	0.00	0.30	0.00
C3	1.00	0.38	0.00	0.00	0.62	0.00	0.00	0.00	0.00	0.00
C4	1.00	0.35	0.00	0.00	0.00	0.65	0.00	0.00	0.47	0.00
C5	1.00	0.35	0.00	0.00	0.00	0.65	0.00	0.00	0.06	0.00
C6	1.00	0.37	0.00	0.00	0.00	0.00	0.00	0.63	0.00	0.00
C7	1.00	0.36	0.00	0.00	0.01	0.63	0.00	0.00	0.12	0.00
C8	1.00	0.35	0.00	0.00	0.35	0.30	0.00	0.00	0.64	0.00
C9	1.00	0.36	0.00	0.00	0.00	0.00	0.00	0.64	0.00	0.00

ANNEXURE C: OPERATION AND MAINTENANCE MANUAL

TABLE C1: STORMWATER MAINTENANCE SCHEDULE																					
COMPONENT	INSPECTIONS [I]			ROUTINE MAINTENANCE [R]			CORRECTIVE AND IRREGULAR MAINTENANCE [C]			ANNUAL SPREAD OF MAINTENANCE ACTIVITIES (I=INSPECTION; R=ROUTINE; OTHER AS SPECIFIED)											
		ACTIVITY	FREQUENCY (months)		ACTIVITY	FREQUENCY (months)		ACTIVITY	FREQUENCY (months)	J	F	M	A	M	J	J	A	S	O	N	D
Vegetated swale overland inlet strip	1.1	Inspect inlet strip for any obstructions	3	1.1	Remove obstructions	3	1.1	Inspect for damage and repair or replace.	As required	I, R			I, R		I, R			I, R			
Vegetated swale Filterbed	2.1	Inspect infiltration bed surfaces for silting and ponding, record dewatering timeof the facility and assess, stating water levels in underdrain (if applicable) to determine if immediate maintenance is required.	3	2.1	Remove silt, litter, surface debris and weeds.	3	2.1	Infill holes and depressions. Replace portions of filterbed which is noted to be non-functioning.	As required	I, R			I, R		I, R			I, R			
	2.2	Check operation of underdrains by inspection of flows after rain.	3	2.2	Rod underdrains to remove sediment and other blockages.	3	2.2	Replace damaged underdrains including stone/geotextile surround.	As required	I, R			I, R		I, R			I, R			
	2.3	Assess plants for diseases, infection, poor growth, invasive species.	3	2.3	Replace diseased, infected and invasive plants. Add plants to maintain coverage.	As required	2.3	As for routine maintenance.	As required	I, R			I, R		I, R			I, R			
	2.4	Inspect inlets and outlets for any blockages	3	2.4	Remove litter, debris and weeds.	3	2.4	Repair structural damage.	As required	I, R			I, R		I, R			I, R			
Vegetated swale Outlet structure	3.1	Inspect for blockages of the orifices.	3	3.1	Remove any obstructions. Repair wear and tear.	3	3.1	Repair structural damage.	As required	I, R			I, R		I, R			I, R			
	3.2	Inspect for blockages in the 375dia outlet pipe.	3	3.2	Remove any obstructions. Repair wear and tear.	3	3.2	Repair structural damage.	As required	I, R			I, R		I, R			I, R			
Vegetated swale Embankment	4.1	Take note of depressions, subsidence or erosion.	3	4.1	Check that embankment dimensions and elevations comply with original design.	3	4.1	Assess routine maintenance report and storm damage and repair to original specifications.	As required	I, R			I		I, R			I			
	4.2	Take note of vegetative cover on inside and outslopes	3	4.2	Replace diseased, infected and invasive plants. Add plants to maintain coverage.	3	4.2	Assess routine maintenance report and storm damage and repair to original specifications.	As required	I, R			I		I, R			I			
Vegetated swale outfall culvert over existing manholes	5.1	Inspect for functionality & buildup of sediment	3	5.1	Note condition of culvert and patch any defects.	3	5.1	Repair structural damage.	As required	I, R			I		I, R			I			