STORMWATER MANAGEMENT STUDY

SKYY COUNTRY GOLF & R.V. RESORT
NE ¼ SEC. 34-39-2-W5M
LACOMBE COUNTY, ALBERTA

Prepared For
SKYY COUNTRY GOLF & R.V. RESORT

Prepared By
A. D. WILLIAMS ENGINEERING INC.

ADWE File No. 15452.00
May, 2009

A. D. Williams
Engineering Inc.
Consulting Engineers

#210 7240 Johnstone Drive
Red Deer, AB T4P 3Y6

Phone 403.755.2395
Fax 403.755.4049

Edmonton
Yellowknife
Calgary
Winnipeg
Red Deer

STORM WATER MANAGEMENT STUDY

PROJECT NAME
Skyy Country Golf & R.V. Resort

PROJECT ADDRESS
Legal Description:
NE ¼ Sec 34-39-2-W5
Lacombe County, Alberta

PREPARED FOR
Skyy Country Golf & R.V. Resort

DATE PREPARED
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Prepared by,

A. D. WILLIAMS ENGINEERING INC.

Benjamin Connolly

Benjamin Connolly, E.I.T
Municipal Engineer

Direct: 403.755.4068
Email: bconnolly@williamsengineering.com

PERMIT TO PRACTICE
A.D. WILLIAMS ENGINEERING INC.
Signature _____
Date May 15/09
PERMIT NUMBER: P 6394
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

Reviewed by,

Bob Doull, P.Eng.
Municipal Engineer

Phone: 403.755.2395
Email: rdoull@williamsengineering.com

PROFESSIONAL ENGINEER ALBERTA R. A. DOULL 13 MAY

A. D. Williams
Engineering Inc.
Consulting Engineers

EXECUTIVE SUMMARY

As a requirement of Lacombe County and Alberta Environment, a storm water management study has been completed for the proposed Skyy Country Golf & R.V. Resort, legally located at NE ¼ Sec. 34-39-2-W5. The storm water management study is required to ensure appropriate storm water runoff controls are maintained. This report describes the storm water management strategy for the proposed Skyy Country Golf & R.V. development. It outlines the methods to be integrated as part of the sites post-development design for controlling storm water runoff. A requirement of the storm water management study is to make certain that a quantity of runoff from the site is controlled in the post-development as well as quality.

The site is located near the north east tip of Sylvan Lake, just north of Sunbreaker Cove, south of Rainy Creek Road (Township Road 400) and west of Sunbreaker Cove Road (Range Road 22) as shown in **Figure 1** of **Appendix A**. Two existing residential lots are located in the north east corner of the quarter section. The existing land use of the subject property is mainly agricultural in nature with long grass cover, lending itself well to future development. The area of the site is approximately 60 Ha (148 acres).

According the Alberta Environment's Water Act and Environmental Protection Enhancement Act, a new development is to make certain that it does not impact the environment in an adverse way. The storm water runoff from the site will have to be managed in both quantity and quality in an acceptable way to manage anticipated environmental impacts. Best Management Practices (BMP's) is a way to help maintain the existing surrounding environment and also to ensure that the post-development discharge is equal or less than the pre-development runoff discharge. The proposed Skyy Country Golf and R.V. Resort will manage storm water runoff through an overland drainage system.

Generally, the western half of the site is gently rolling with two low spots located to the south, while the eastern portion of the site is slightly flatter with one small low area to the south. The low spot in the south of the eastern half of the site will eventually connect with the storm water runoff from the south western corner before ending up in Sylvan Lake. The low spots in the south western corner exhibit areas of marshy ground during heavy rain and primarily consist of trees, small shrubs, tall grass and moss cover. The west portion of the site drains to the south west into the low-lying area. The low-lying south eastern portion of the site will outlet eventually to Sylvan Lake by way of overland flow and infiltration.

Due to the nature of the proposed development, storm water management for Skyy Country will be conducted using overland drainage, such as ditches, swales, and culverts. Individual lots will have to be graded in order to direct the runoff water accordingly. Five storm water management facilities will be used in order to comply with Alberta Environment and Best Management Practices (BMP). Four of the ponds will be located in the central area, as part of the golf course, from just north east of the center to the south west corner of the site as shown in **Figure 5** of **Appendix A**. An additional pond will be located near the middle of the west side of the site also shown in **Figure 5** of **Appendix A.** The ponds have been designed to account for the water runoff from offsite sources including the area on the north side, area to the east side and the two residential lots in the north east corner of the quarter section.

The maximum rates of discharge and pond volumes were calculated by using StormNET (Version 4.11.0), Stormwater and Wastewater Modeling software. The Horton Infiltration method was used in the model. Rainfall data from the Red Deer Industrial Airport was used in order to develop an accurate representation of on-site conditions. The design storm event used in the StormNET model was a 24 hour, 1 in 100 year storm. The rainfall volumes were then distributed over the 24 hour storm duration as per the Chicago Method.

The current pre-development and proposed post-development conditions were both analyzed in StormNET in order to ensure appropriate storm water management controls were maintained. As per Alberta Environment's Water Act, the post-development runoff flow rate of a subdivision must not be greater than the pre-development flow rate for the section of land. The maximum pre-development flow rate during a 1 in 100 year storm for the proposed Skyy Country Golf and R.V. Resort was calculated to be a total of 0.617 m^3/s of discharge towards Sylvan Lake. Upon a post-development analysis, each storm water management facility will be designed with a controlled outlet structure to restrict post-development flow rates. Each individual storm water management facility will have a high water level (HWL) and a normal water level (NWL).

Computer modelling has shown that the new ponds should be sized as follows:

SWMF#1: Max. 1:100 Yr. Storm Volume above NWL = 650 m^3
Surface Area at HWL. = 2,050 m^2
Max Outlet Flow = 0.103 m^3/s

SWMF#2: Max. 1:100 Yr. Storm Volume above NWL = 2,200 m^3
Surface Area at HWL. = 2,850 m^2
Max Outlet Flow = 0.219 m^3/s

SWMF#3: Max. 1:100 Yr. Storm Volume above NWL = 1,550 m^3
Surface Area at HWL. = 1,975 m^2
Max Outlet Flow = 0.198 m^3/s

SWMF#4: Max. 1:100 Yr. Storm Volume above NWL = 8,300 m^3
Surface Area at HWL. = 5,925 m^2
Max Outlet Flow = 0.576 m^3/s

SWMF#5: Max. 1:100 Yr. Storm Volume above NWL = 1,200 m^3
Surface Area at HWL. = 2,350 m^2
Max Outlet Flow = 0.518 m^3/s

As a result, the total maximum 1 in 100 year outlet flow rate from the proposed Skyy Country Golf and R.V. Resort is 0.576 m^3/s. This value is less than the pre-development flow rate.

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APPENDICES

1.0 INTRODUCTION

At the request of the Lacombe County and Alberta Environment, a storm water management study has been completed for the proposed Skyy Country Golf and R.V. Resort legally located at NE ¼ Sec. 34-39-2-W5. The storm water management study is required to ensure appropriate storm water runoff controls are maintained.

This report describes the proposed storm water management strategy for the proposed Skyy Country Golf and R.V. Resort. It outlines the methods to be utilized to handle storm water on site after the site is developed. The report contains details to describe the storm water requirements at full subdivision build out.

This storm water management study has been prepared in support of an application under the Alberta Water Act to describe:

- The quantity of additional surface water runoff expected due to changes to the ground surface at the site; and

- Best Management Practices (BMP) and other measures recommended for the site water management to mitigate the effects of development.

2.0 DESCRIPTION OF STUDY AREA

2.1 LOCATION AND SITE DESCRIPTION

The site is located near the north east tip of Sylvan Lake, just north of Sunbreaker Cove. Specifically, the site is bounded by Rainy Creek Road (Township Road 400) to the north, Sunbreaker Cove (Road Range Road 22) to the east, farmland to the west, and undeveloped forested area to the south. The location of the site is shown in **Figure 1** of **Appendix A**. **Figure 2** of **Appendix A** displays an aerial photo of the site. The area of the site is approximately 60 Ha

The original land use of the property was agricultural in nature. The south western corner of the site is mainly a low-lying treed area. This area is made up of aspen trees, small shrubs, tall grass and moss covered.

2.2 TOPOGRAPHY AND DRAINAGE

Figure 3 of **Appendix A** shows the existing topography of the site. The western portion of the site is gently rolling and slopes to the south. The overall elevation drop from the north-eastern corner to the south-western corner is about 40 meters. There is a ridge of land running from the north east to the south west with a slope of approximately 7% towards the west. The east side of the site is generally flat and slopes to the south. The contours shown in **Figure 4** of **Appendix A** indicate how the water from the site will flow to the south west and will eventually end up in Sylvan Lake.

2.3 SITE INSPECTION

Presently, there are three drainage discharge locations for storm water runoff to exit the site. Two of the drainage discharge locations found in **Figure 3** of **Appendix A** are small, with outlet #2 in the north west corner and outlet #3 in the south east corner. Both outlet #2 and #3 will drain overland directly towards Sylvan Lake through the off site treed area. The main drainage discharge location is in the south west corner of the site which is approximately 500 meters away from sylvan lake. A site inspection was conducted on October 2, 2008 by Mr. Benjamin Connolly and Mr. Ward Yurystowski of A. D. Williams Engineering. Outlet #1 in the south west corner is a small treed area (approximately 3.30 Ha) of native aspen (refer to **photograph #1** on page 5). A portion of land from the east drains though existing inlet #1 onto the site (refer to **photograph #2 and #3** on page 5 and 6**).** Also, a portion of land to the north drains onto the site though existing inlet #3 (refer to **photograph #5 and #6** on page 7**).** The remainder of the site has a few flat areas, some gently rolling hills and the site reflects livestock use (refer to **photograph #7 and #8** on page 8). During the site inspection, there was no actual ponding or visible flowing runoff. The entire site generally flows from the north east corner to the south west corner (refer to **photograph #4** on page 6).

The area of land between the south west corner of the site and Sylvan Lake is made up of native aspen trees with rolling hills throughout. Within the forest, there are a few low lying areas which would store some water in a storm event before it ultimately ended up in Sylvan Lake. This heavily vegetated undulating terrain will aid in filtration of the south west before it reaches Sylvan Lake. While on site, there was no defined outfall found entering Sylvan Lake. This lack of outfall would suggest that water is infiltrating into the ground before ending up in Sylvan Lake. Water will find its way to Sylvan Lake through the treed area if a big enough storm were to occur. The elevation difference between the sites outlet and Sylvan Lake's water level is approximately 12 meters.

There are three inlet locations onto the site which contribute to the overland drainage of the development. It was observed that the runoff from 14.4 Ha of land east of the site is draining onto the development through inlet #1 on the east side of the site as shown in **Figure 5** of **Appendix A**. Inlet #1 is a 600 mm corrugated steel culvert crossing Sunbreaker Cove Road and is approximately 17.3 meters long. Inlet #2 accepts runoff from an additional two residential lots (5.0 Ha) in the north east corner of the N.E. ¼ Sec. 34-29-2-W5. These lots drain overland onto the proposed development also shown in **Figure 5** of **Appendix A**. It was also observed that runoff from 30.1 Ha of land North of the site is draining onto the site through Inlet #3 on the north side of the site as shown in **Figure 5** of **Appendix A**. Inlet #3 is a 600mm corrugated steel culvert crossing Rainy Creek Road. The culvert is approximately 43.5 meters long.

Photograph #1
Looking S within the treed area in the SW corner.

Photograph #2
Looking S on the east side of Sunbreaker Cove Road from the culvert inlet

Photograph #3
Looking N on the east side of Sunbreaker Cove Road from the culvert inlet.

Photograph #4
Looking S on Sunbreaker Cove Road near the residential lots in the NE corner.

Photograph #5
Looking west on the North side of Rainy Creek Road near the culvert inlet.

Photograph #6
Looking east on the North side of Rainy Creek Road near the culvert inlet.

Photograph #7
Looking SE on Rainy Creek Road near the NE corner at recognized the topography of the land.

Photograph #8
Looking NE on the corner of the fence in the SW corner at recognized the topography of the land.

2.4 BEST MANAGEMENT PRACTICES (BMPs)

The following BMPs will apply to the proposed storm water management plan for Skyy Country Golf and R.V. Resort:

2.4.1 Source Control BMPs

It is assumed that either Lacombe County or the Skyy Country Golf and R.V. Resort will implement a street sweeping and winter clean-up program as well as a regular parks and trails clean-up/maintenance schedule. These types of programs would all aid in the reduction of source pollutants such as roadway sediments & particulates, garbage and debris.

2.4.2 Lot-Level BMPs

Due to the nature of the proposed development, individual lots are proposed to be graded with reduced slopes as well as incorporating the existing natural areas. By reducing the runoff slopes on the lots, the time of travel to the storm water management facilities will increase, thus achieve additional depression storage and infiltration on the lots themselves.

2.4.3 Conveyance Systems BMPs

As a result of the proposed overland drainage system concept, grassed swales and vegetated drainage channels will be incorporated as part of the storm water drainage management plan. The drainage from pond to

pond will consist of a wide vegetated channel as well as culverts with rip-rap blankets at their inverts. The drainage from the ditches on the site to the swale running along side of the ponds will use rip-rap blankets as well to help reduce erosion during times of high flow. In roadway ditches or swales with slopes greater than 2.0%, silt fences will be used as an erosive protection measure. The proposed conveyance system will significantly reduce the storm water runoff flow velocities, prevent erosion, reduce peak runoff rates, and promote settlement and infiltration.

2.4.4 End-of-Pipe BMPs

Storm water management facilities in the form of wet ponds are proposed for the Skyy Country Golf and R.V. Resort as shown in **Figure 5** of **Appendix A**. All SWMF's will consist of a rip-rap blanket with geosynthetic lining. SWMF#1 has an overland inlet while the remainder SWMF's have an inlet channel. The pond outlet pipes will have been chosen appropriately in order to reduce peak runoff rates and reduce discharge velocities. A rip-rap blanket and geosynthetic lining would also be built-in as part of the ultimate discharge pipe.

2.4.5 Maintenance and Testing

As part of the golf course maintenance, grass cutting and vegetation maintenance of the site will be required. Regular inspections of the inlet and outlets to the ponds will need to done to ensure that the ponds are operating as designed. Sediment testing in the ponds will be required as well as checking the depth of sediment in the ponds to also help ensure

that the ponds are operating effectively. Erosion around the pond inlets will be avoided through routine maintenance. The maintenance will also help ensure the ponds look respectable as a golf course feature. Any shoreline debris or floating debris in the pond will be removed regularly to maintain efficient operation of the ponds.

3.0 PROPOSED STORMWATER MANAGEMENT STRATEGY

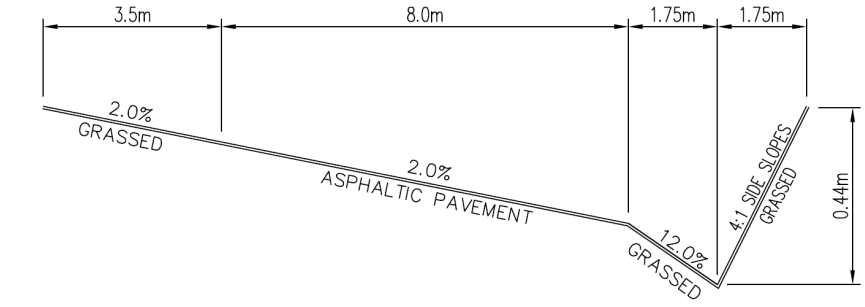
3.1 STORM WATER RUNOFF

Due to the nature of the proposed development, storm water management for the Skyy Country Golf and R.V. Resort will be accomplished using a road with a crossfall. The road right-of-way will be 15 meters wide. The road's cross section will have a width of 8 meters of asphaltic pavement with a 2% cross-fall to a ditch on one side. There will be 3.5 meters of grassed area on each side of the road as shown in **Figure 3.1.1**. Where slope in the ditches and vegetated channels exceed 4%, check dams made from either rip-rap or railroad ties will be installed to reduce velocities and increase infiltration. The grassed ditches will encourage infiltration of stormwater into the soil as per BMP. Individual lots will have to be graded in order to direct the runoff water accordingly. Reduced lot grading will be used as a Source Control BMP. Grades of approximately 1.5% will be used on the majority of lots. The site will utilize five storm water management facilities (SWMFs), with SWMF#4 in the south west corner acting as the ultimate "End of Pipe" BMP. The storm ponds will also act as a water feature to the development. **Figure 5** of **Appendix A** shows the drainage plan for the development at full development conditions. The proposed SWMF's will be wet ponds, in order to best serve the subdivisions overall vision.

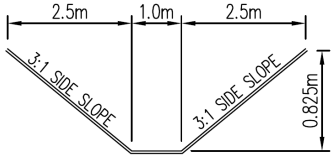
Water will be taken from primarily SWMF #4 for irrigation purposes, which will help lower the post development flows offsite. The water taken from SWMF #4 will be put back onto the site though a system of sprinklers.

Figure 3.1.1

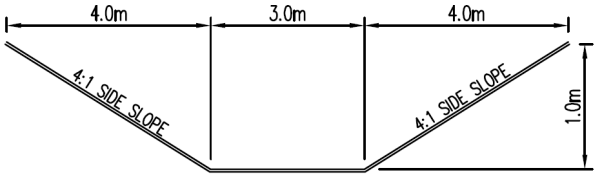
Road with a 2% Crossfall, Ditch, and Vegetated Channel



2% CROSSFALL INTO A DITCH ON ONE SIDE



DITCH CROSS-SECTION



VEGETATED CHANNEL
BETWEEN PONDS

3.2 STORM RETENTION PONDS

3.2.1 Pond Locations

The storm water wet ponds are proposed for the site in order to collect and discharge the runoff as well as add a water feature to the golf course. **Figure 5** of **Appendix A** illustrates the locations of the SWMF's. The largest storm water facility will be located in the south west corner, near the existing outlet #1. This pond will be the final collection point before ultimately discharging off site.

The location of SWMF#1 is just to the north east of the center of the site. This pond will collect the storm water runoff from the lands to the north east. The location of SWMF#2 is in the center of the site. SWMF#2 will collect the discharge from SWMF#1 through a vegetated channel. A cross section of the vegetated channel can be seen in **Figure 3.1.1**. SWMF#2 will also collect runoff from east of the pond. This area includes the runoff from a 14.4 Ha section east of the project boundaries. The location of SWMF#3 is in the center of the south west quarter of the site. This pond will collect the runoff from a relatively small area on its east side. When pond levels rise sufficiently in SWMF#3, the pond will discharge to a vegetated channel which flows to SWMF#4. The location of SWMF#4 is in the south west corner of the site. This pond collects runoff from the lands immediately to its north and east. The location of SWMF#5 is in the middle of the west side of the site. This pond collects the runoff from a 43.2 Ha section north of the condominium lots which also includes the section of land on the north side of Rainy Creek Road.

SWMF #4 accepts discharge from SWMF #3 and #5 during large storm events.

3.2.2 Design Constraints

The location of the groundwater table should not significantly affect the elevation of the wet pond. The estimated groundwater level in the south west corner is between 2.5 and 3 meters below grade. The invert of the pond bottom of SWMF#4 will be located above the seasonal norm of the groundwater level. The outlet for the site is to the south west, on to S.E. ¼ 34-39-2-W5 then onto S.W. ¼ 34-39-2-W5 and then into Sylvan Lake.

3.2.3 Pond Design

The new storm ponds (SWMF #1, 2, 3, 4 and 5) will be designed as wet pond facilities with an active retention zone above the static water level. The ponds will consist of a ditch inlet with a rip-rap blanket as an erosive measure to an extreme rainfall event. Its outlet will consist of a culvert directed towards a channel which drains toward the next downstream SWMF. The SWMF #4 outlet will also consist of a culvert directing flow from the site towards a vegetated channel which will flow into an existing low-lying area. A rip-rap blanket will be used on the downstream end of the culvert as an erosive protective measure. The SWMF #5 will also consist of a culvert directing flow towards a series of ditches and a swale that will flows to SWMF #4. **Table 3.2.3.1** gives recommended design elevations. The ponds have been sized to account for the offsite drainage areas identified in **Figure 5** of **Appendix A**.

Refer to the **SWMF Design Parameters** in **Appendix C** for further pond design details.

A forebay at the entrance of SWMF #4 will be used to encourage settlement of particles. This will allow for more sediment from the storm water to settle coming from the grassed swale and vegetated channel. The forebay will be designed using Alberta Environment design specifications.

Table 3.2.3.1

Recommended Pond Elevations

Location	SWMF #1	SWMF #2	SWMF #3	SWMF #4	SWMF #5
Pond Inlet	977.3 m	971.3 m	963.8 m	954.6 m	966.0 m
Pond Bottom	975.0 m	968.5 m	961.0 m	951.0 m	963.5 m
*Normal Water Depth	2.0 m	2.0 m	2.0 m	2.0 m	2.0 m
Outlet Invert (NWL)	977.0 m	970.5 m	963.0 m	953.0 m	965.5 m
**Max. Water Depth	2.3 m	2.8 m	2.8 m	3.6 m	2.5 m
*Freeboard Depth	2.9 m	3.4 m	3.4 m	4.2 m	3.1 m
***Max. Volume	650 m^3	2200 m^3	1550 m^3	8300 m^3	1200 m^3

*Refers to the depth from the pond bottom
**Refers to the maximum water depth during a 1:100 year storm
***Refers to the maximum volume during a 1:100 year storm above NWL

Stormwater quality guidelines in Alberta require the removal of 85% of sediments of particles 75 µm or greater. Particle settlement in the pond was analyzed to determine if particles would be able to settle in the pond before they reached the outlet. A worst case flow distance was used in the calculations. The slowest particle settling velocity from the expected particles was also used. The calculations showed that the particles would have sufficient time to settle before reaching the outlet.

The Skyy Country Golf and R.V. Resort is a residential subdivision, and it is therefore very unlikely that there will be any "Chemicals of Concern" (COCs) in the subdivision. Due to this, it will not be necessary to construct the SWMF with a pond liner. It should be noted however, that any potential fuel storage on individual lots should have proper containment devices in place.

4.0 ANALYSIS METHODOLOGY

4.1 COMPUTER MODEL

It should be noted that the StormNet Model was created assuming pond side slopes of 7:1 and roads with a 2% inverted crown. The detailed design of the project may use pond side slopes of 5:1 and roads with a 2% cross fall. These will be confirmed in the detailed design.

The maximum rates of discharge and pond volumes were calculated by using StormNET, Stormwater and Wastewater Modeling software. The Horton Infiltration method was used in the model with the parameters listed below:

- Horton Infiltration Parameters
    - Maximum Infiltration Rate 75 mm / hr
    - Minimum Infiltration Rate 7 mm / hr
    - Decay Rate of Infiltration 0.00115 L/sec

4.2 RAINFALL DATA

Intensity-Duration-Frequency Curves (IDF Curves) were used to calculate the maximum rainfall for the design storm event. The curves that were used were developed by Atmospheric Environment Services of Environment Canada for the Red Deer Industrial Airport. **Table 4.2.1** gives the equations that were used to develop the rainfall intensity, and **Table 4.2.2** gives a summary of the precipitation developed from these curves. The design storm event for the StormNET model was the 24 hour, 1 in 100 year storm. The maximum rainfall from the storm was calculated to be approximately 110 mm. The rainfall volumes were distributed over the 24 hour storm duration as per the Chicago Method. The maximum rainfall intensity determined from this method was 69.16 mm/hr for the 1 in 100 year storm event. The r value, defined by the time to peak intensity divided by the duration time of the storm, was found to be 0.4 for the 1 in 100 year storm event. For further information regarding rainfall data, refer to **Appendix B**.

Table 4.2.1

Extrapolated IDF Formulas

Frequency	Average Intensity (mm/hr)	
	5 Minute – 2 Hour Time Interval	2 – 24 Hour Time Interval
100 year	$1477 (t + 4.8)^{-0.93}$	$187 (t – 1.6)^{-0.51}$

Table 4.2.2

Rainfall for Red Deer Industrial Airport (mm)

Duration (hr)	1 in 100 Year
1	31
12	78
24	110

4.3 PRE-DEVELOPMENT INPUTS AND RESULTS

The 1 in 100 year storm event, along with a number of other sub-basin and flow parameters were input into StormNET to develop the current pre-development conditions.

The Horton Infiltration parameters listed above were input into StormNET to characterize the clay-till soil found on site. The site consists of some pasture land, with high grass. There are also some trees in the low-lying marsh land in the south west corner. There is also an area in the center which contains some trees. The following values for Manning's 'n' were used in the model to represent the overland drainage flow parameters:

1. Manning's n = 0.25 for pasture, high grass, fair condition
2. Manning's n = 0.40 for treed area, light underbrush
3. Manning's n = 0.015 in impervious areas for smooth concrete, asphalt, roofs

Using StormNET - Stormwater and Wastewater computer modelling software, the total runoff from site is the result of three outlets. The peak flow of outlet #2 was found to be 0.045 m^3/s. The peak flow of outlet #2 was found to be 0.039 m^3/s. Outlet #1 in the south west corner of the site was found to have an outflow of 0.533 m^3/s. The combined maximum pre-development runoff rate was calculated to be 0.617 m^3/s for the 1 in 100 year storm with the above stated sub basin parameters. This corresponds to a peak discharge of 5.53 L/s/Ha (using 111.6 Ha as the site area). Refer to **Appendix C** for further details on the StormNET pre-development model.

4.4 POST-DEVELOPMENT INPUTS AND RESULTS

The 1 in 100 year storm event, along with a number of other sub-basin and flow parameters were input into StormNET to develop the post-development model.

The post-development situation consists of residential lots with R.V.'s and a golf course. Most lots will have grades between 1 and 2% towards the front or back. A summary of the post-development overland flow sub basin parameters are as follows:

1. Manning's n = 0.25 in grassed, pervious areas
2. Manning's n = 0.015 in impervious areas for smooth concrete, asphalt, roofs

As described above, the pre-development flow rate was found to be 0.617 m^3/s in **Section 4.3**. This corresponds to the maximum rate that the storm water management facility can release water after development.

Using these parameters, the pond size requirements were calculated and listed in **Table 4.4.1**. Using a 300 mm diameter pipe as the primary outlet for SWMF#1, the maximum outflow was found to be 0.103 m^3/s (20.52 L/s/Ha). The outlet for SWMF#2 and #3 both use 300mm diameter pipes. The maximum outflow for SWMF#2 and #3 was found to be 0.219 m^3/s (7.68 L/s/Ha) and 0.198 m^3/s (6.20 L/s/Ha) respectively. The outlet for SWMF#5 uses a 600mm diameter pipe and has a maximum outflow of 0.518 m^3/s (11.99 L/s/Ha). The outlet for SWMF#4 uses a 375 mm diameter pipe which achieves a maximum flow of 0.576 m^3/s (5.12 L/s/Ha). This total post-development outflow is less than the pre-development flow rate off site. Refer to **Appendix C** for post-development computer model results, pond curves, and further details on pond dimensions.

Table 4.4.1

Pond Size Requirements

Pond	Approximate Incremental Tributary Area (Ha)	Total Approximate Tributary Area (Ha)	*Maximum Outlet Flow rate (m^3/s)	**Expected HWL Volume (m^3)	*Approximate HWL Surface Area (m^2)
SWMF#1	5.0	5.0	0.103	650	2,050
SWMF#2	23.5	28.5	0.219	2,200	2,850
SWMF#3	3.4	31.9	0.198	1,550	1,975
SWMF#4	79.7	111.6	0.572	8,300	5,925
SWMF#5	43.2	43.2	0.518	1,200	2,350

*Refers to a 1 in 100 year storm
**Refers to the maximum volume above NWL during a 1 in 100 year storm

CONCLUSION

If possible, drainage on the site after development should keep to the existing drainage paths as well as maintain, at most, the same runoff rate. With the proposed Skyy Country Golf & R.V. Resort concept, storm water runoff will be directed to five storm water facilities running from the north east corner to the south west corner area of the site. Some additional drainage channels and ditches will be necessary in order to allow the storm water runoff to find its way to the proposed SWMF's. All ditches will be designed according to the best practices and protected with grass vegetation as soon as possible in order to prevent erosion. In addition, appropriate erosive control measures, such as silt fencing during construction and rip-rap blanketing as part of the SWMFs in/outlet locations, should be used.

As per Alberta Environment's Water Act, the post-development runoff flow rate of a subdivision must not be greater than the pre-development flow rate for the section of land. The maximum pre-development flow rate during a 1 in 100 year storm for the proposed Skyy Country Golf and R.V. Resort was calculated to be 0.617 m^3/s. The post-development flow rate was found to be 0.576 m^3/s.

Computer modelling has shown that the new pond should be sized as follows:

SWMF#1: Max 1:100 Yr. Volume above NWL = 650 m^3
Surface Area at HWL = 2,050 m^2
Max Outlet Flow = 0.103 m^3/s

SWMF#2: Max 1:100 Yr. Volume above NWL = 2,200 m^3
Surface Area at HWL = 2,850 m^2
Max Outlet Flow = 0.219 m^3/s

SWMF#3: Max 1:100 Yr. Volume above NWL = 1,550 m^3
Surface Area at HWL = 1,975 m^2
Max Outlet Flow = 0.198 m^3/s

SWMF#4: Max 1:100 Yr. Volume above NWL = 8,300 m^3
Surface Area at HWL = 5,925 m^2
Max Outlet Flow = 0.576 m^3/s

SWMF#5: Max 1:100 Yr. Volume above NWL = 1,200 m^3
Surface Area at HWL = 2,350 m^2
Max Outlet Flow = 0.518 m^3/s

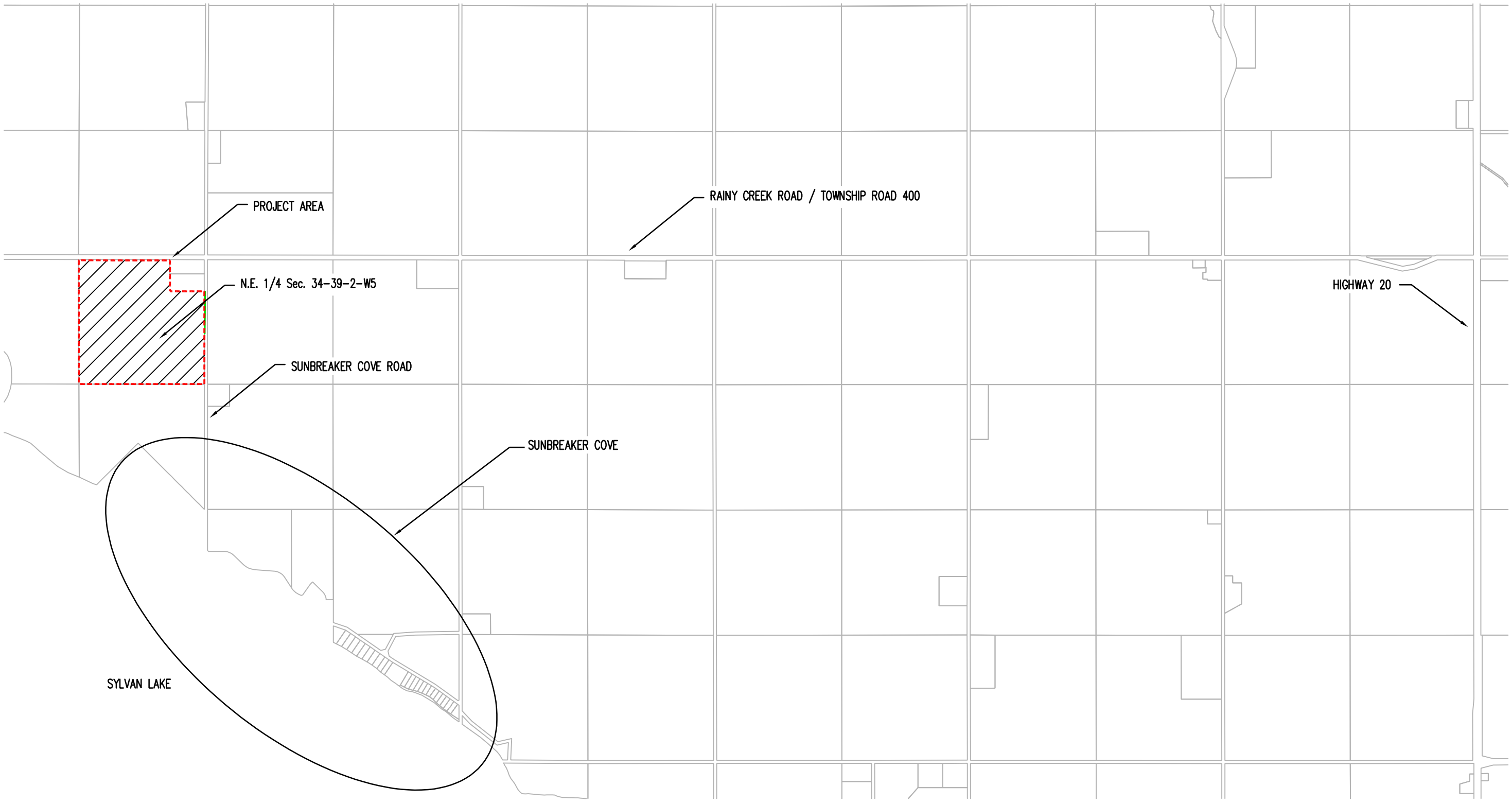
5.0 CLOSURE

This report has been prepared based upon the information referenced herein. It has been prepared in a manner consistent with good engineering judgement. Should new information come to light, A. D. Williams Engineering Inc. requests the opportunity to review this information, and our conclusions contained in this report. This report has been prepared for the exclusive use of Skyy Country Golf and R.V. Resort and there are no representations made by A. D. Williams Engineering Inc. to any other party. Any use which a third party makes of this report, or any reliance on or decisions made based on it are the responsibility of such third parties.

U:\Projects\i15000\i15452.00 - Frontier Sylvan Lake Development\Files\F-Reports\Stormwater_Report\15452-Frontier-Storm_Water_Management_Report.docx

A P P E N D I X A

FIGURES



N

LEGEND:

PROJECT AREA

A. D. Williams Engineering Inc.
Consulting Engineers
EDMONTON • YELLOWKNIFE • CALGARY • WINNIPEG • RED DEER
RED DEER
#210 7240 Johnstone Drive
Red Deer, AB T4P 3Y6
Bus: (403) 755-4065
Fax: (403) 755-4049
www.adwilliams.com
Toll Free: 1-800-263-2393
info@adwilliams.com
Multi-Disciplined Consulting Engineering Services

JOB. TITLE: SKYY COUNTRY GOLF & R.V.
STORM WATER MANAGEMENT STUDY
LACOMBE COUNTY, ALBERTA

DWG. TITLE: REGIONAL CONTEXT PLAN

FIGURE 1

DWN. BY:	DES. BY:	PROJ. MGR.:
BC	BC	DC
PEER REVIEW:	DATE: (YY-MM-DD)	SCALE:
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CLIENT PROJ. #		ADWE PROJ. #
		15452.00

DWG # 15452.00 STM FIG1 OF 5 REV # 2

PATH & FILE NAME: U:\Projects\15000\15452.00 - Frontier Sylvan Lake Development\Dwg\Civil\Stormwater\Figures For Report\15452.00-D-C-001STM Report_rev2.dwg PLOTTED DATE: 4/27/2009 3:32 PM

N

LEGEND:

PROJECT BOUNDARY

A. D. Williams Engineering Inc.
Consulting Engineers

EDMONTON • YELLOWKNIFE • CALGARY • WINNIPEG • RED DEER

RED DEER
#210 7240 Johnstone Drive
Red Deer, AB T4P 3Y6
Bus: (403) 755-4065
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www.adwilliams.com
Toll Free: 1-800-263-2393
info@adwilliams.com

Multi-Disciplined Consulting Engineering Services

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LACOMBE COUNTY, ALBERTA

DWG. TITLE: AERIAL PHOTO

FIGURE 2

DWN. BY:	DES. BY:	PROJ. MGR.:
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PEER REVIEW:	DATE: (YY-MM-DD)	SCALE:
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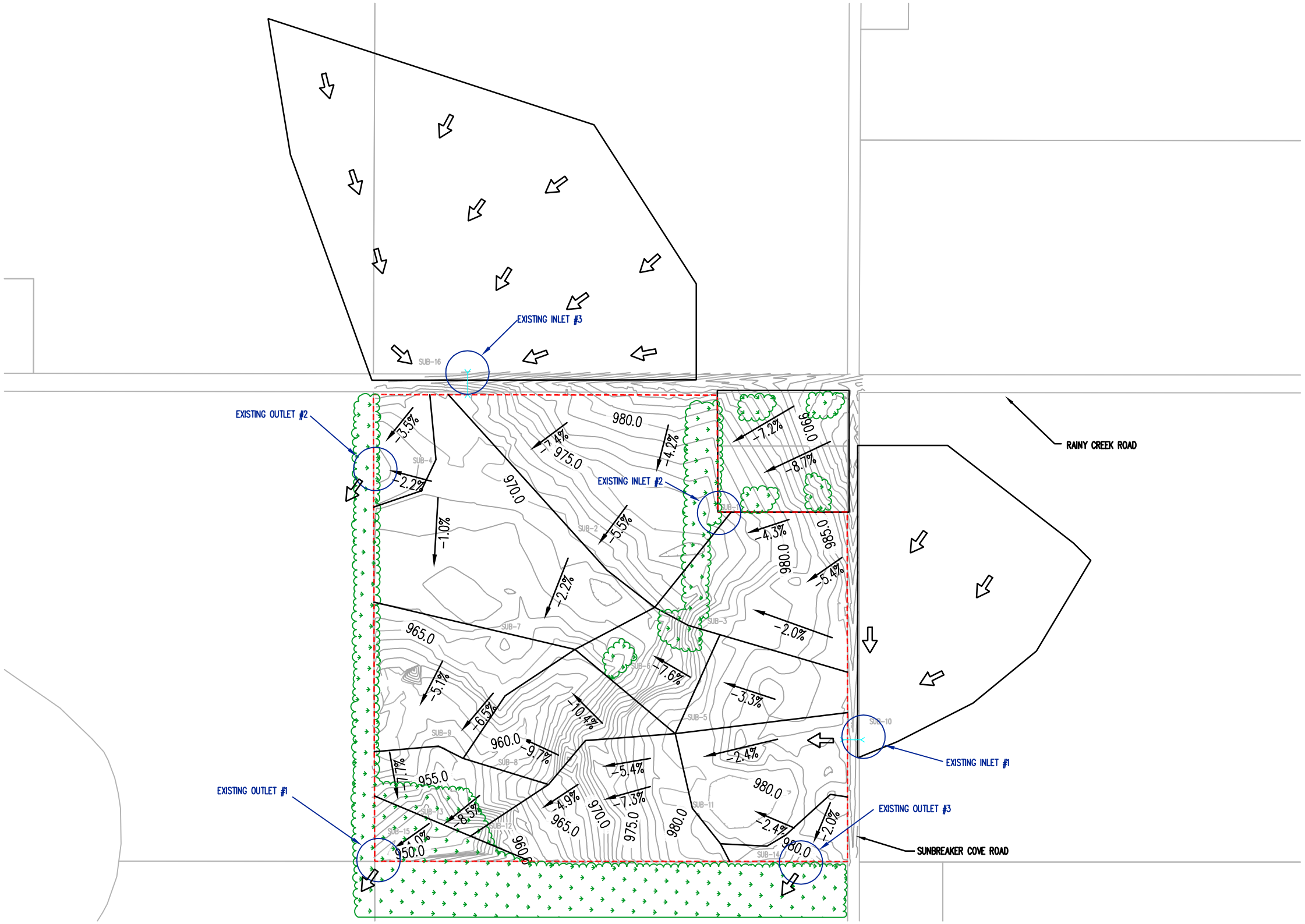
CLIENT PROJ. #		ADWE PROJ. # 15452.00

DWG # 15452.00 STM FIG2 OF 5 REV # 2



LEGEND:

- EXISTING FOLIAGE
- PROJECT BOUNDARY
- DRAINAGE BASIN
- EXISTING CULVERT
- OVERLAND DRAINAGE ROUTE
- ?.?% SLOPE OF OVERLAND DRAINAGE

N

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Consulting Engineers
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#210 7240 Johnstone Drive
Red Deer, AB T4P 3Y6
Bus: (403) 755-4065
Fax: (403) 755-4049
www.adwilliams.com
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info@adwilliams.com
Multi-Disciplined Consulting Engineering Services

JOB. TITLE: SKYY COUNTRY GOLF & R.V. STORM WATER MANAGEMENT STUDY
LACOMBE COUNTY, ALBERTA

DWG. TITLE: EXISTING TOPOGRAPHY & NATURAL FEATURES
FIGURE 3

DWN. BY:	DES. BY:	PROJ. MGR.:
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CLIENT PROJ. #		ADWE PROJ. #
		15452.00

DWG # 15452.00 STM FIG3 OF 5 REV # 2

LEGEND:

PROJECT AREA

OVERLAND DRAINAGE ROUTE

SYLVAN LAKE

N

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Consulting Engineers
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RED DEER
#210 7240 Johnstone Drive
Red Deer, AB T4P 3Y6
Bus: (403) 755-4065
Fax: (403) 755-4049
www.adwilliams.com
Toll Free: 1-800-263-2393
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JOB. TITLE: SKYY COUNTRY GOLF & R.V.
STORM WATER MANAGEMENT STUDY
LACOMBE COUNTY, ALBERTA

DWG. TITLE: OVERALL DRAINAGE PATH FROM SITE
FIGURE 4

DWN. BY:	DES. BY:	PROJ. MGR.:
BC	BC	DC
PEER REVIEW:	DATE: (YY-MM-DD)	SCALE:
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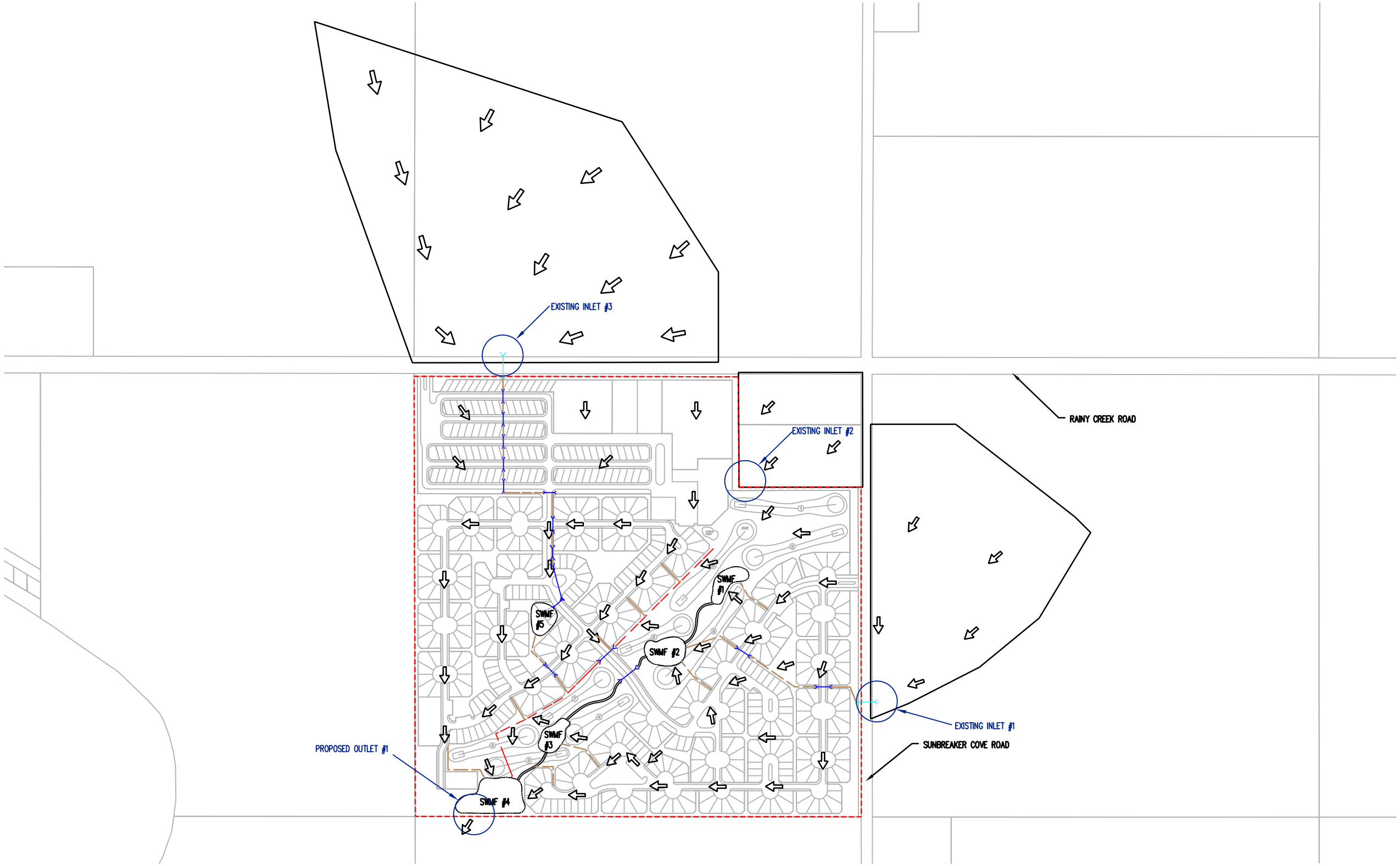
CLIENT PROJ. #		ADWE PROJ. #
		15452.00

DWG # 15452.00 STM FIG4 OF 5 REV # 2



LEGEND:

- PROJECT BOUNDARY
- PROPOSED DITCH
- PROPOSED SWALE
- SWMF TOP OF BERM
- OVERLAND DRAINAGE ROUTE
- PROPOSED CULVERT
- EXISTING CULVERT

N

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Consulting Engineers
EDMONTON • YELLOWKNIFE • CALGARY • WINNIPEG • RED DEER
RED DEER
#210 7240 Johnstone Drive
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Fax: (403) 755-4049
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JOB. TITLE: SKYY COUNTRY GOLF & R.V.
STORM WATER MANAGEMENT STUDY
LACOMBE COUNTY, ALBERTA

DWG. TITLE: PROPOSED OVERLAND FLOW
FIGURE 5

DWN. BY:	DES. BY:	PROJ. MGR.:
BC	BC	DC
PEER REVIEW:	DATE: (YY-MM-DD)	SCALE:
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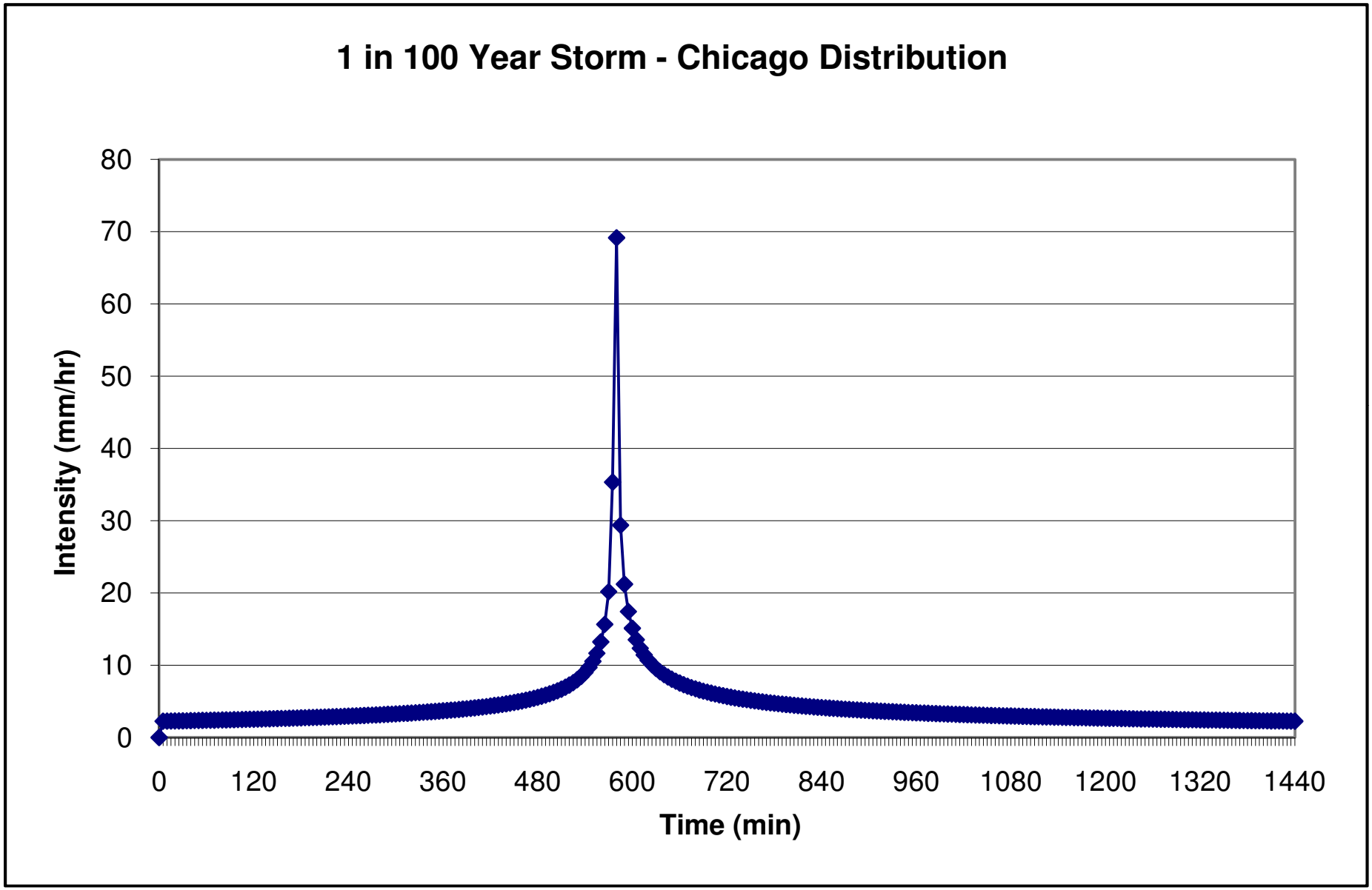
CLIENT PROJ. #		ADWE PROJ. #
		15452.00

DWG # 15452.00 STM FIG5 OF 5 REV # 2

A P P E N D I X B

RAINFALL DATA


1 in 100 Year Storm - Chicago Distribution
Intensity (mm/hr)
80
70
60
50
40
30
20
10
0
0
120
240
360
480
600
720
840
960
1080
1200
1320
1440
Time (min)

Chicago Storm Distribution: 24 hour, 1 in 100 year Storm

Time (min)	Time	Intensity (mm/hr)
0	0:00	0
5	0:05	2.25
10	0:10	2.26
15	0:15	2.27
20	0:20	2.28
25	0:25	2.29
30	0:30	2.3
35	0:35	2.31
40	0:40	2.33
45	0:45	2.34
50	0:50	2.35
55	0:55	2.36
60	1:00	2.37
65	1:05	2.38
70	1:10	2.39
75	1:15	2.41
80	1:20	2.42
85	1:25	2.43
90	1:30	2.44
95	1:35	2.46
100	1:40	2.47
105	1:45	2.48
110	1:50	2.5
115	1:55	2.51
120	2:00	2.52
125	2:05	2.54
130	2:10	2.55
135	2:15	2.57
140	2:20	2.58
145	2:25	2.6
150	2:30	2.61
155	2:35	2.63
160	2:40	2.64
165	2:45	2.66
170	2:50	2.68
175	2:55	2.69
180	3:00	2.71
185	3:05	2.73
190	3:10	2.75
195	3:15	2.77
200	3:20	2.78
205	3:25	2.8
210	3:30	2.82
215	3:35	2.84
220	3:40	2.86
225	3:45	2.88
230	3:50	2.9
235	3:55	2.93
240	4:00	2.95
245	4:05	2.97
250	4:10	2.99
255	4:15	3.02
260	4:20	3.04
265	4:25	3.07
270	4:30	3.09
275	4:35	3.12
280	4:40	3.14
285	4:45	3.17
290	4:50	3.2
295	4:55	3.23
300	5:00	3.26
305	5:05	3.29
310	5:10	3.32
315	5:15	3.35
320	5:20	3.38
325	5:25	3.42
330	5:30	3.45
335	5:35	3.49
340	5:40	3.53
345	5:45	3.56
350	5:50	3.6
355	5:55	3.64
360	6:00	3.69
365	6:05	3.73
370	6:10	3.78
375	6:15	3.82
380	6:20	3.87
385	6:25	3.92
390	6:30	3.98
395	6:35	4.03
400	6:40	4.09
405	6:45	4.15
410	6:50	4.21
415	6:55	4.28
420	7:00	4.35
425	7:05	4.42
430	7:10	4.49
435	7:15	4.57
440	7:20	4.66
445	7:25	4.74
450	7:30	4.84
455	7:35	4.94
460	7:40	5.04
465	7:45	5.16
470	7:50	5.28
475	7:55	5.41

Time (min)	Time	Intensity (mm/hr)
480	8:00	5.55
485	8:05	5.7
490	8:10	5.86
495	8:15	6.04
500	8:20	6.23
505	8:25	6.45
510	8:30	6.68
515	8:35	6.95
520	8:40	7.25
525	8:45	7.59
530	8:50	7.99
535	8:55	8.45
540	9:00	9
545	9:05	9.68
550	9:10	10.53
555	9:15	11.65
560	9:20	13.22
565	9:25	15.65
570	9:30	20.18
575	9:35	35.34
580	9:40	69.156
585	9:45	29.38
590	9:50	21.21
595	9:55	17.42
600	10:00	15.11
605	10:05	13.53
610	10:10	12.35
615	10:15	11.43
620	10:20	10.69
625	10:25	10.07
630	10:30	9.55
635	10:35	9.1
640	10:40	8.71
645	10:45	8.37
650	10:50	8.06
655	10:55	7.78
660	11:00	7.53
665	11:05	7.3
670	11:10	7.1
675	11:15	6.9
680	11:20	6.73
685	11:25	6.56
690	11:30	6.41
695	11:35	6.27
700	11:40	6.13
705	11:45	6.01
710	11:50	5.89
715	11:55	5.78
720	12:00	5.67
725	12:05	5.57

Time (min)	Time	Intensity (mm/hr)
730	12:10	5.47
735	12:15	5.38
740	12:20	5.3
745	12:25	5.22
750	12:30	5.14
755	12:35	5.06
760	12:40	4.99
765	12:45	4.92
770	12:50	4.85
775	12:55	4.79
780	13:00	4.73
785	13:05	4.67
790	13:10	4.61
795	13:15	4.56
800	13:20	4.51
805	13:25	4.45
810	13:30	4.4
815	13:35	4.36
820	13:40	4.31
825	13:45	4.27
830	13:50	4.22
835	13:55	4.18
840	14:00	4.14
845	14:05	4.1
850	14:10	4.06
855	14:15	4.02
860	14:20	3.99
865	14:25	3.95
870	14:30	3.91
875	14:35	3.88
880	14:40	3.85
885	14:45	3.82
890	14:50	3.78
895	14:55	3.75
900	15:00	3.72
905	15:05	3.69
910	15:10	3.67
915	15:15	3.64
920	15:20	3.61
925	15:25	3.58
930	15:30	3.56
935	15:35	3.53
940	15:40	3.51
945	15:45	3.48
950	15:50	3.46
955	15:55	3.43
960	16:00	3.41
965	16:05	3.39
970	16:10	3.37
975	16:15	3.34

Time (min)	Time	Intensity (mm/hr)
980	16:20	3.32
985	16:25	3.3
990	16:30	3.28
995	16:35	3.26
1000	16:40	3.24
1005	16:45	3.22
1010	16:50	3.2
1015	16:55	3.18
1020	17:00	3.17
1025	17:05	3.15
1030	17:10	3.13
1035	17:15	3.11
1040	17:20	3.09
1045	17:25	3.08
1050	17:30	3.06
1055	17:35	3.04
1060	17:40	3.03
1065	17:45	3.01
1070	17:50	3
1075	17:55	2.98
1080	18:00	2.97
1085	18:05	2.95
1090	18:10	2.94
1095	18:15	2.92
1100	18:20	2.91
1105	18:25	2.89
1110	18:30	2.88
1115	18:35	2.87
1120	18:40	2.85
1125	18:45	2.84
1130	18:50	2.83
1135	18:55	2.81
1140	19:00	2.8
1145	19:05	2.79
1150	19:10	2.77
1155	19:15	2.76
1160	19:20	2.75
1165	19:25	2.74
1170	19:30	2.73
1175	19:35	2.71
1180	19:40	2.7
1185	19:45	2.69
1190	19:50	2.68
1195	19:55	2.67
1200	20:00	2.66
1205	20:05	2.65
1210	20:10	2.64
1215	20:15	2.63
1220	20:20	2.62
1225	20:25	2.61
1230	20:30	2.59
1235	20:35	2.58
1240	20:40	2.57
1245	20:45	2.56
1250	20:50	2.56
1255	20:55	2.55
1260	21:00	2.54
1265	21:05	2.53
1270	21:10	2.52
1275	21:15	2.51
1280	21:20	2.5
1285	21:25	2.49
1290	21:30	2.48
1295	21:35	2.47
1300	21:40	2.46
1305	21:45	2.45
1310	21:50	2.45
1315	21:55	2.44
1320	22:00	2.43
1325	22:05	2.42
1330	22:10	2.41
1335	22:15	2.4
1340	22:20	2.4
1345	22:25	2.39
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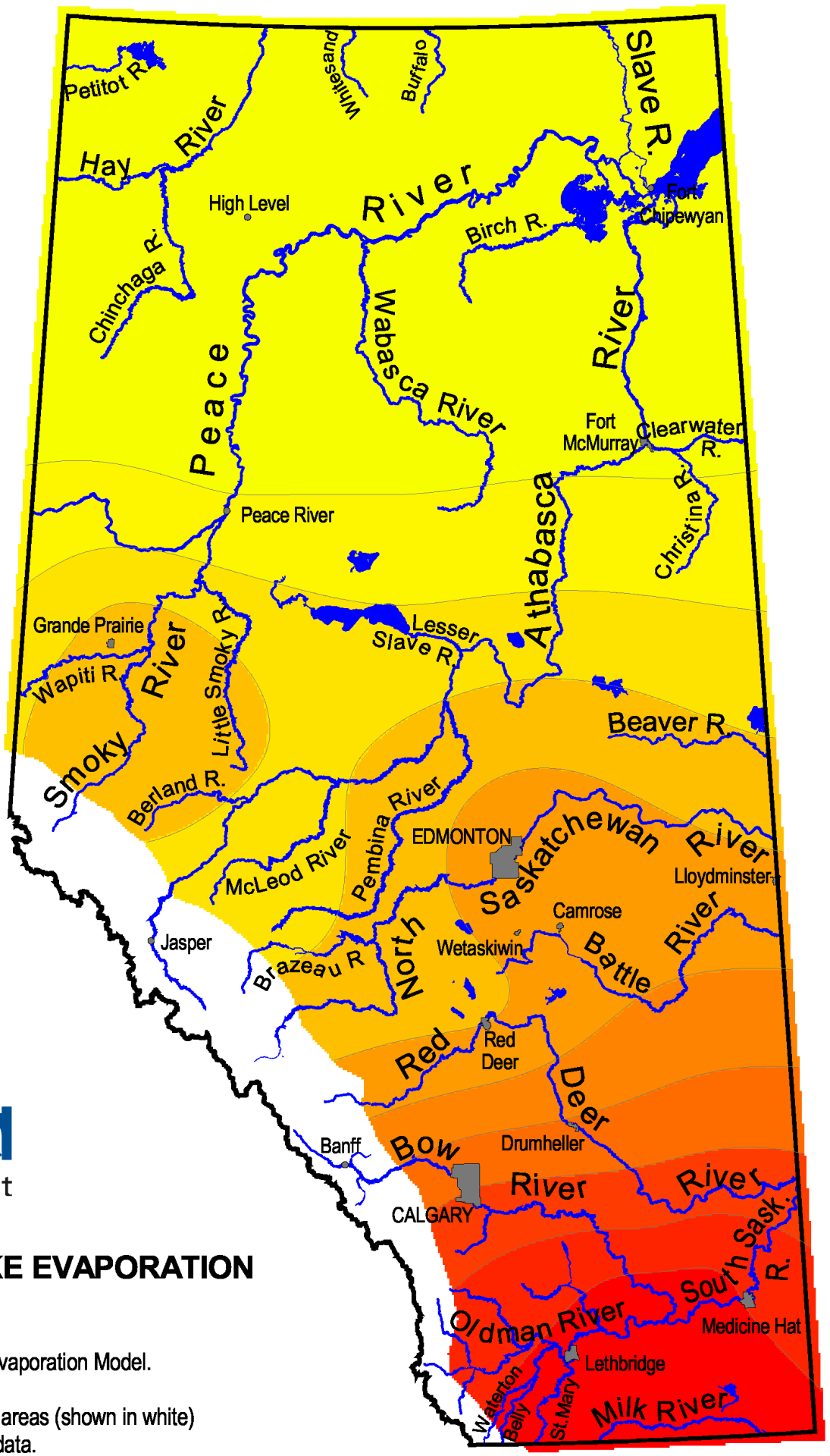
1355	22:35	2.37
1360	22:40	2.36
1365	22:45	2.36
1370	22:50	2.35
1375	22:55	2.34
1380	23:00	2.33
1385	23:05	2.33
1390	23:10	2.32
1395	23:15	2.31
1400	23:20	2.31
1405	23:25	2.3
1410	23:30	2.29
1415	23:35	2.28
1420	23:40	2.28
1425	23:45	2.27
1430	23:50	2.26
1435	23:55	2.26
1440	0:00	2.25



Lake Evaporation (mm)

- 550 - 575
- 575 - 600
- 600 - 625
- 625 - 650
- 650 - 675
- 675 - 700
- 700 - 725
- 725 - 750
- 750 - 775
- 775 - 800
- No Data

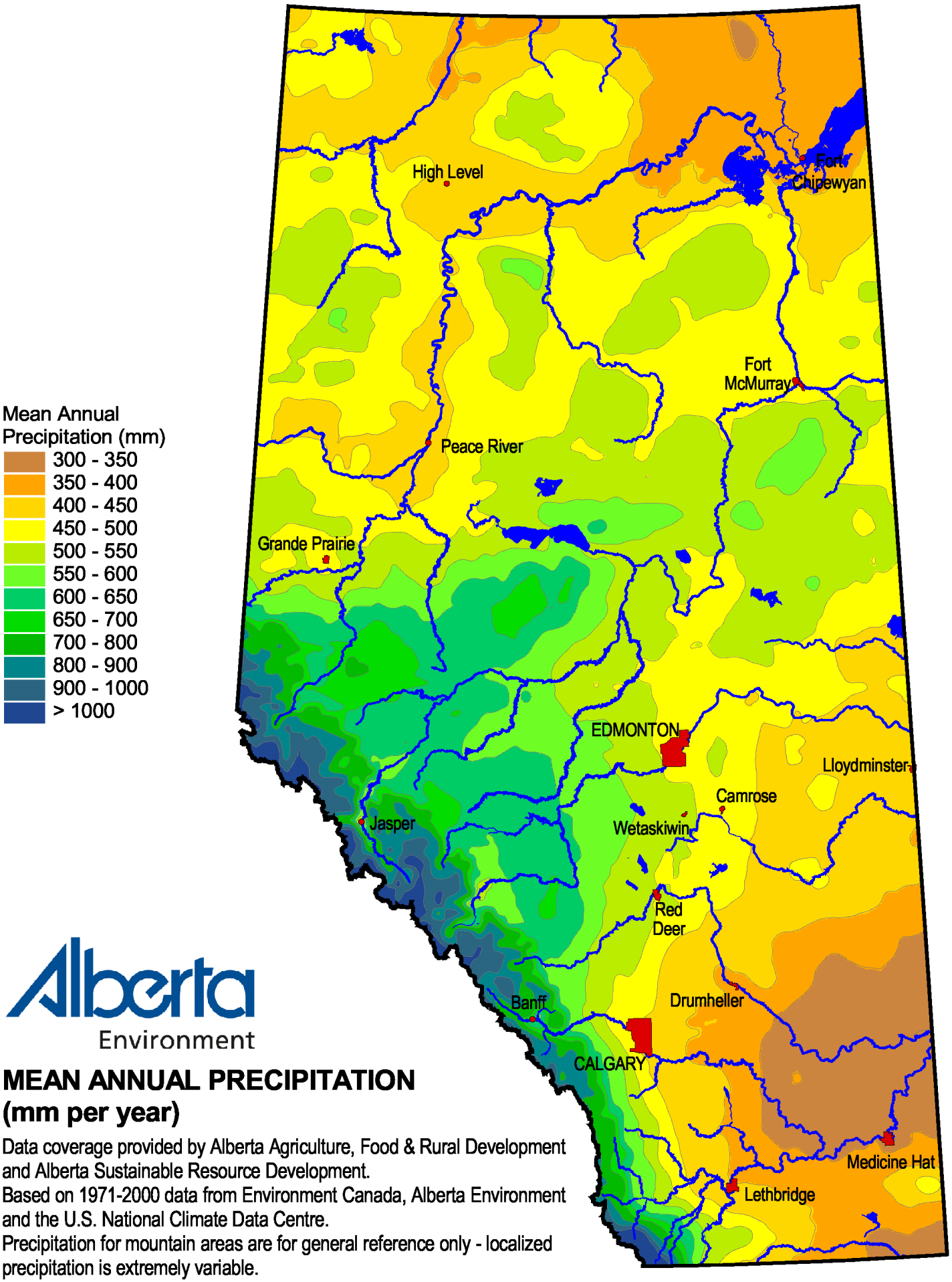
Alberta Environment

MEAN ANNUAL CALCULATED LAKE EVAPORATION (mm per year)

Derived using Morton's CRLE Evaporation Model.

General estimates for mountain areas (shown in white) are not available due to lack of data.

September 9, 2005



Alberta
Environment

MEAN ANNUAL PRECIPITATION (mm per year)

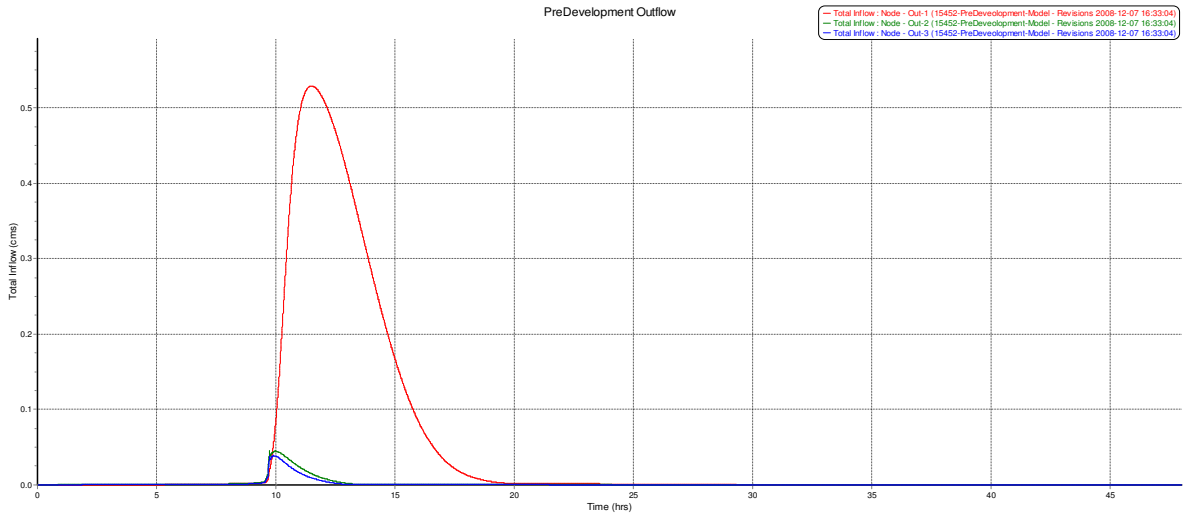
Data coverage provided by Alberta Agriculture, Food & Rural Development and Alberta Sustainable Resource Development.
Based on 1971-2000 data from Environment Canada, Alberta Environment and the U.S. National Climate Data Centre.
Precipitation for mountain areas are for general reference only - localized precipitation is extremely variable.

September 9, 2005

A P P E N D I X C

DESIGN CALCULATIONS AND COMPUTER MODELLING DATA

PreDevelopment Runoff Condition:



Maximum Runoff: Outfall 1 = 0.533 m^3/s

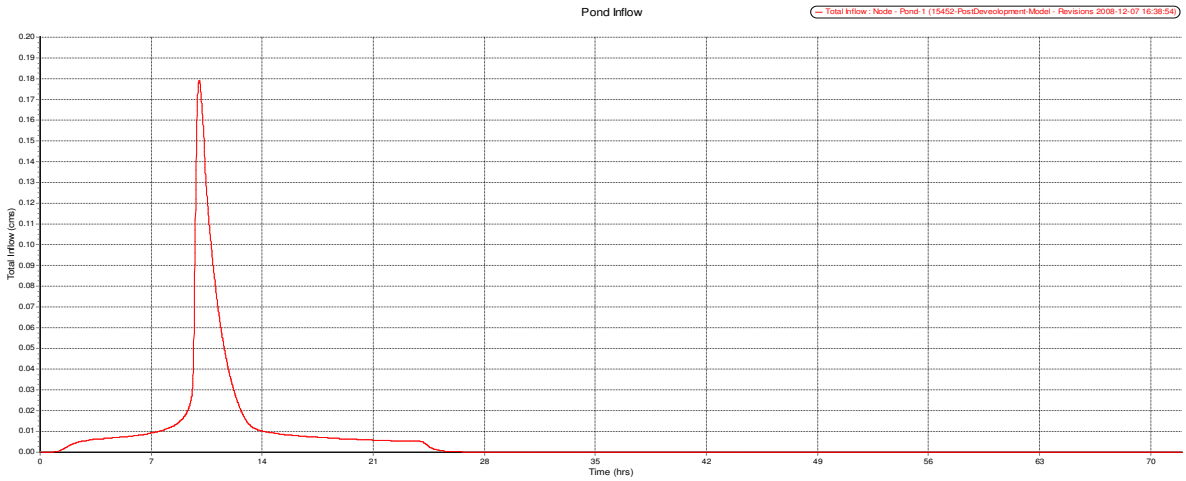
Outfall 2 = 0.045 m^3/s

Outfall 3 = 0.039 m^3/s

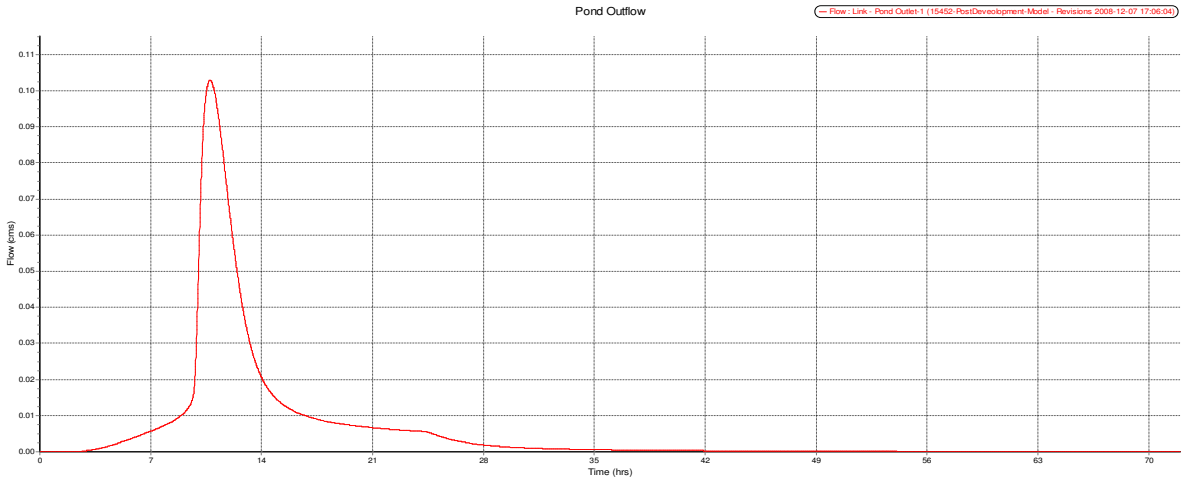
Maximum PreDevelopment Flow off Site = 0.617 m^3/s

PostDevelopment Runoff Conditions:

Pond 1:

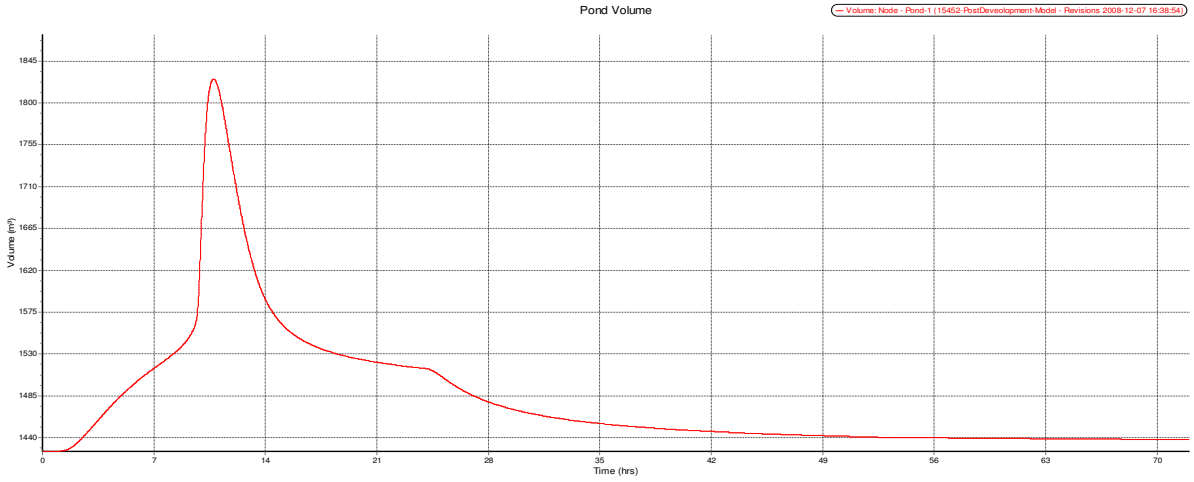


Maximum Pond Inflow Rate = 0.18 m^3/s



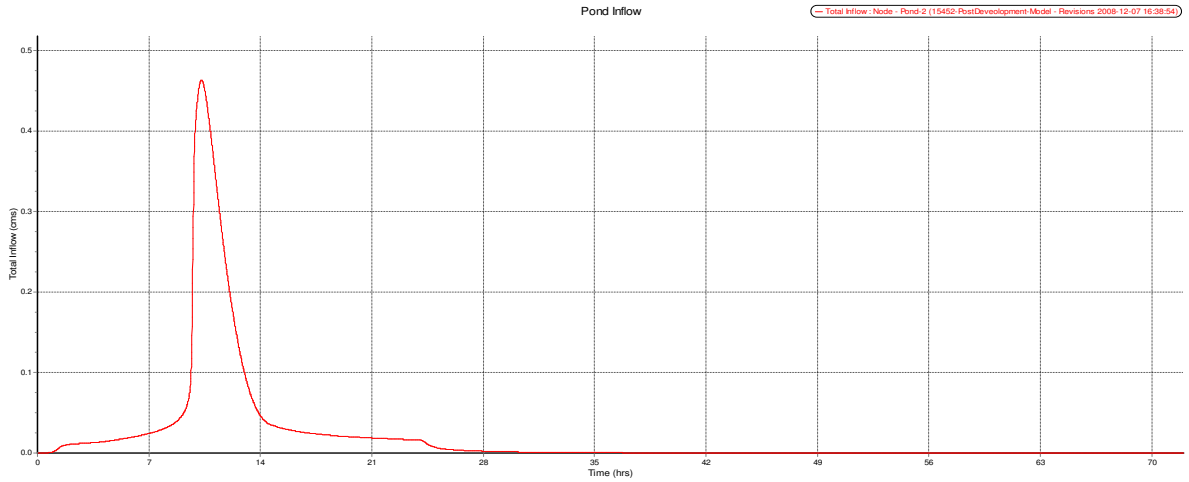
Note: 1 - 300mm Culvert is used as pond outlet

Maximum outlet flow = 0.103 m^3/s

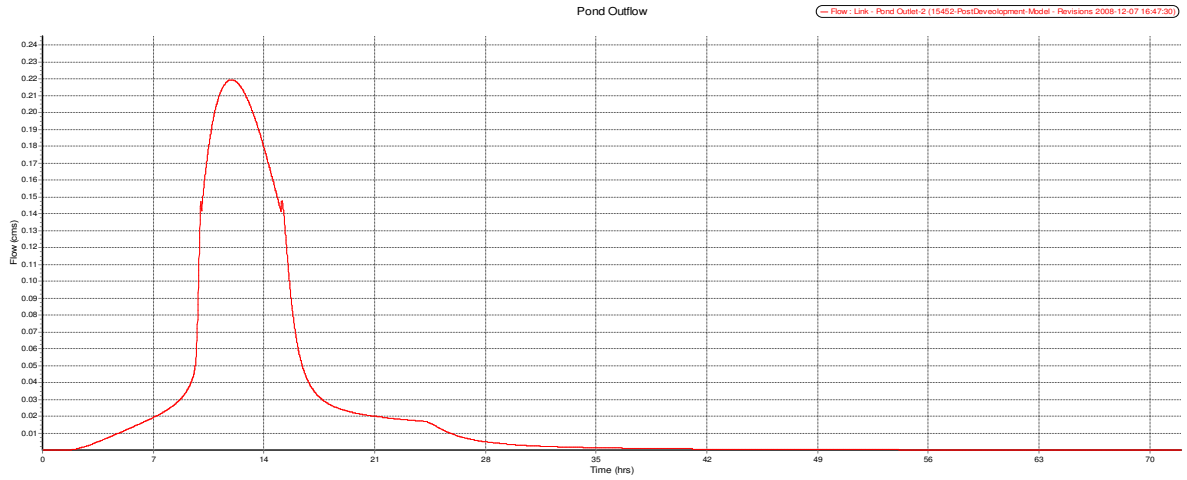


Maximum Pond Volume = 1825 m^3

Pond 2:

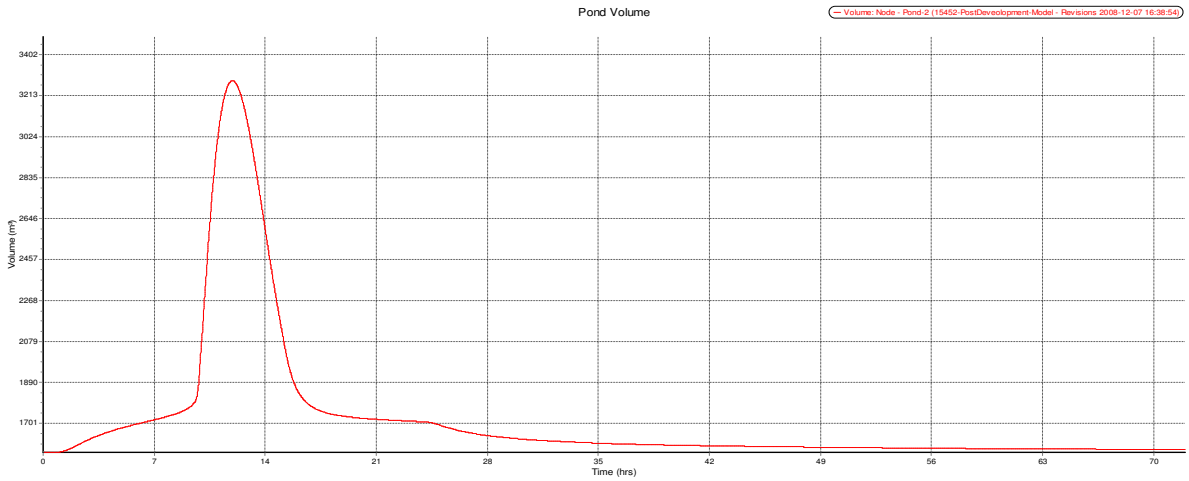


Maximum Pond Inflow Rate = 0.46 m^3/s



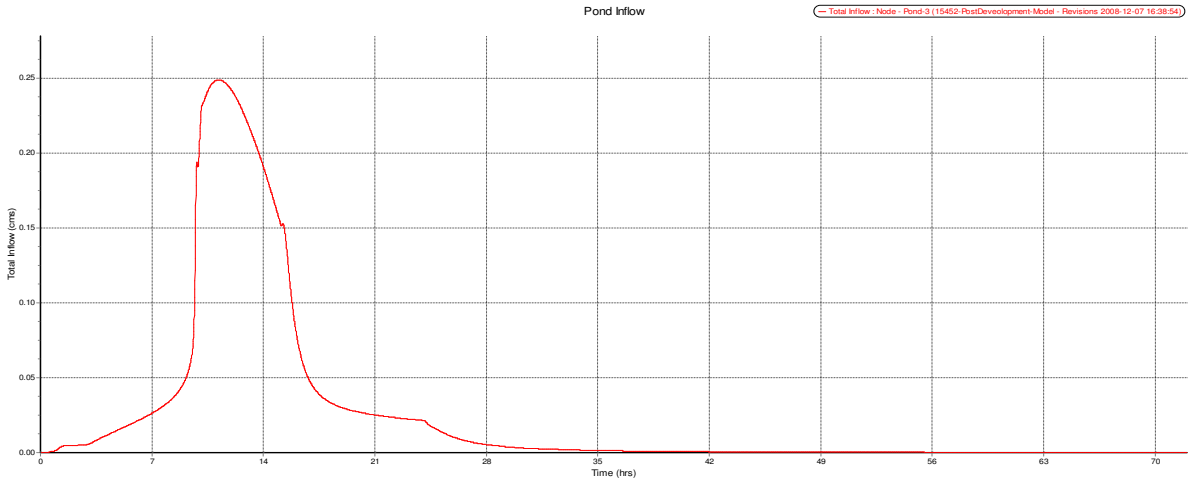
Note: 1 - 300mm Culvert is used as pond outlet

Maximum outlet flow = 0.219 m^3/s

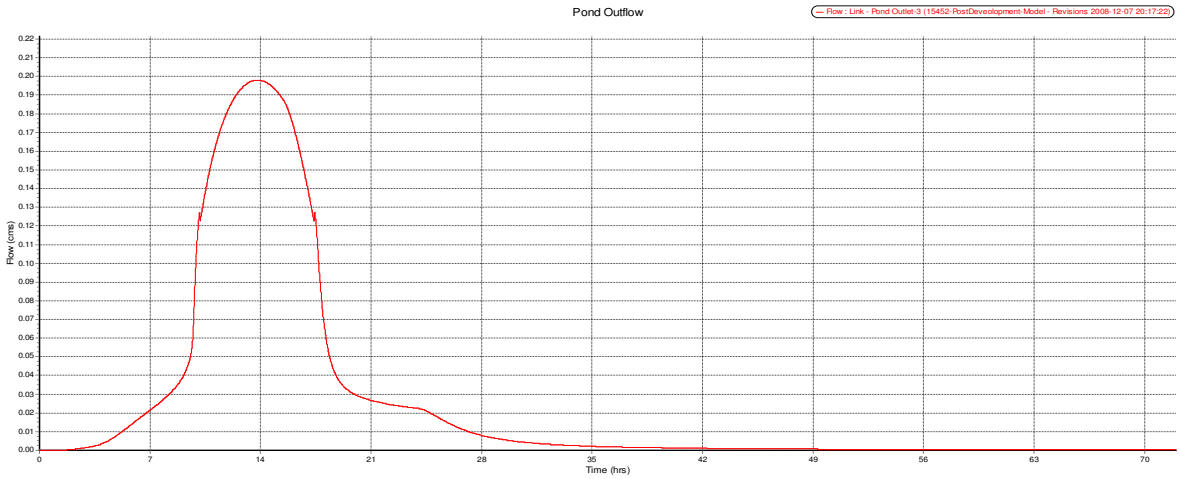


Maximum Pond Volume = 3280 m^3

Pond 3:

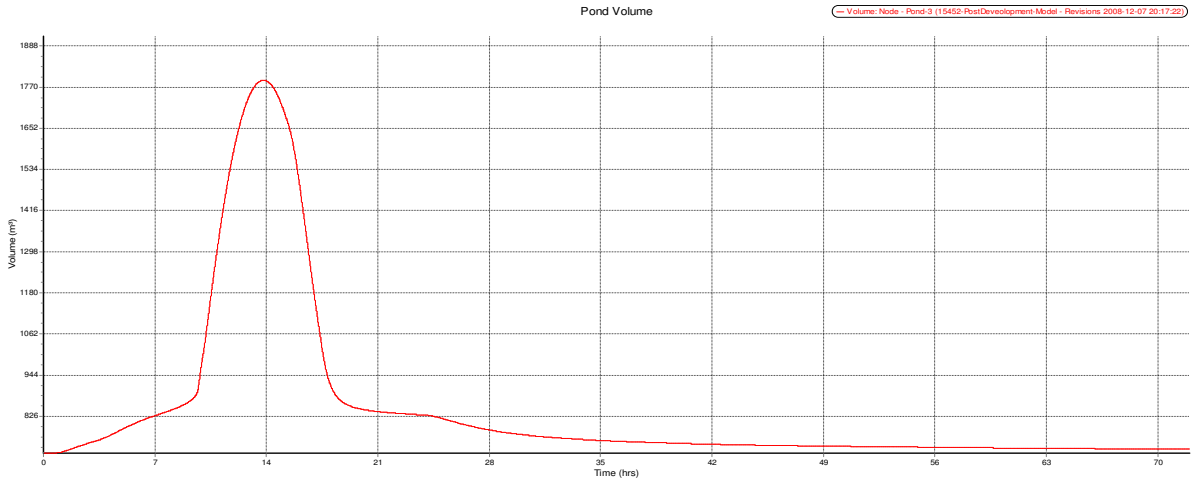


Maximum Pond Inflow Rate = 0.25 m^3/s



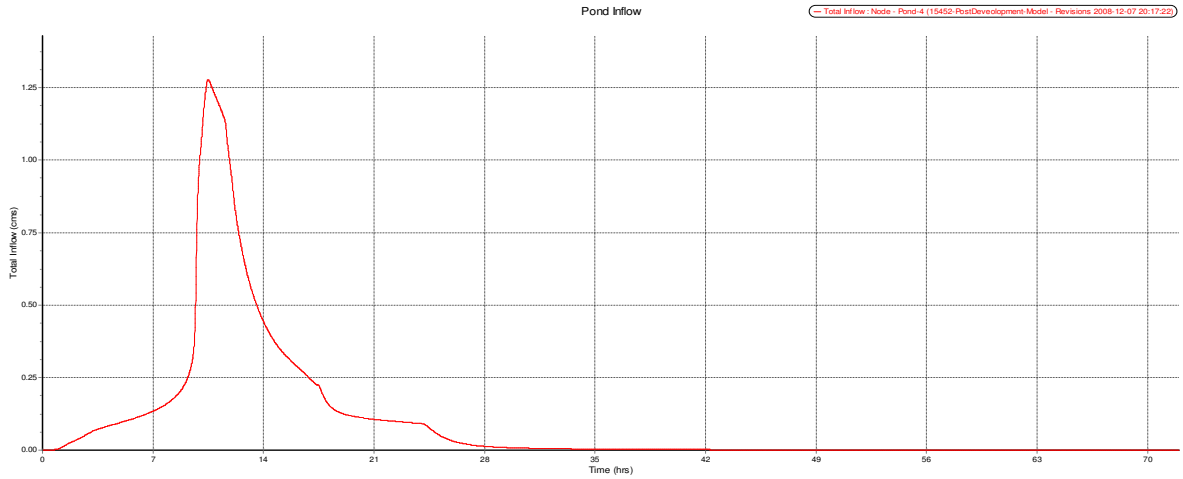
Note: 1 - 300mm Culvert is used as pond outlet

Maximum outlet flow = 0.198 m^3/s

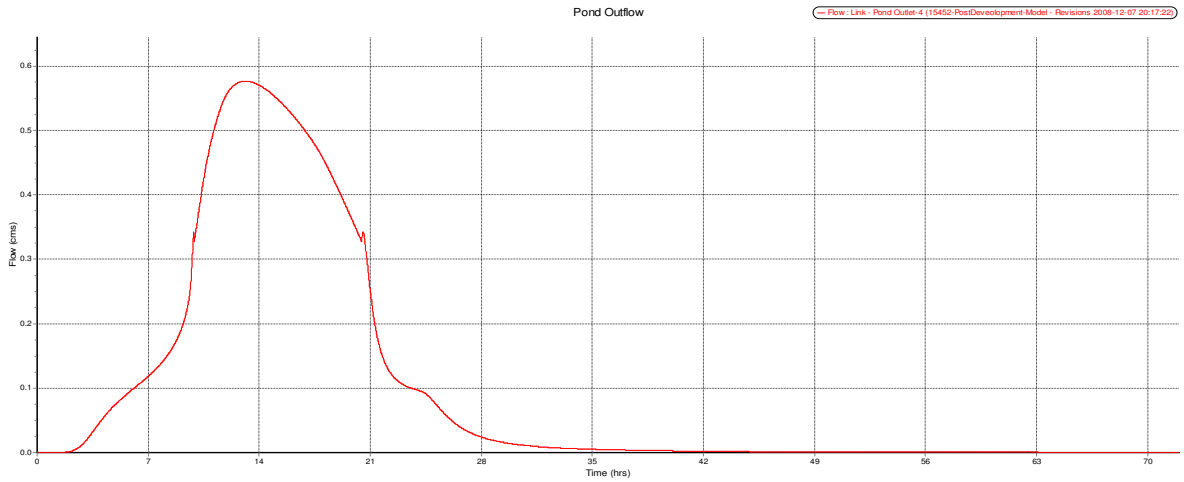


Maximum Pond Volume = 1800 m^3

Pond 4:

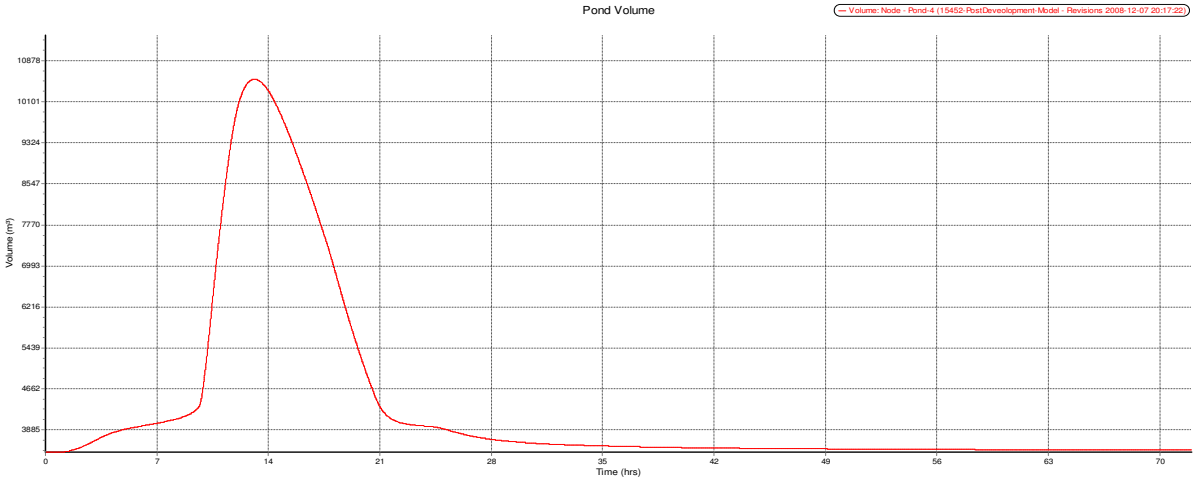


Maximum Pond Inflow Rate = 1.28 m^3/s



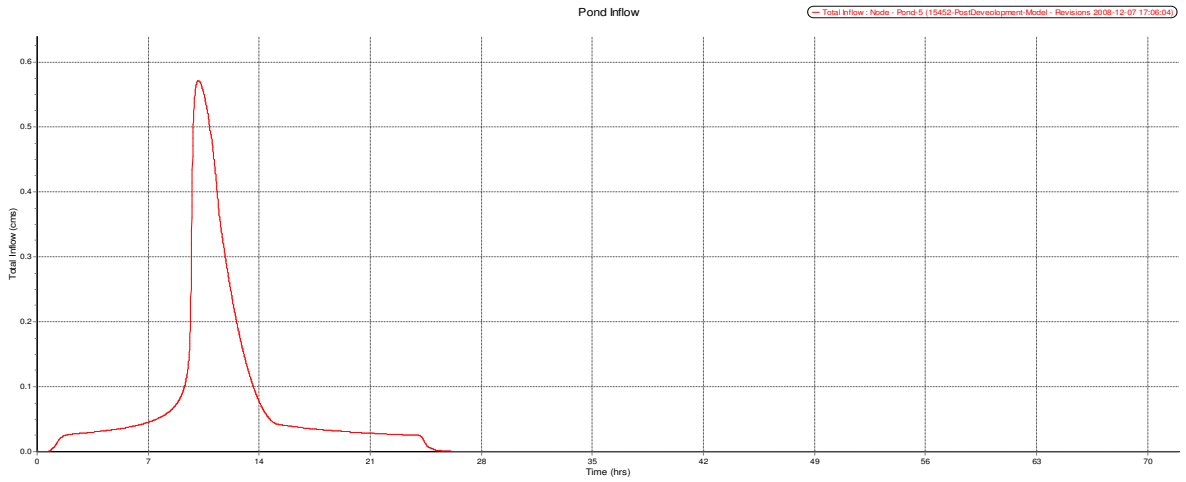
Note: 1 - 375mm Culvert is used as pond outlet

Maximum outlet flow = 0.576 m^3/s

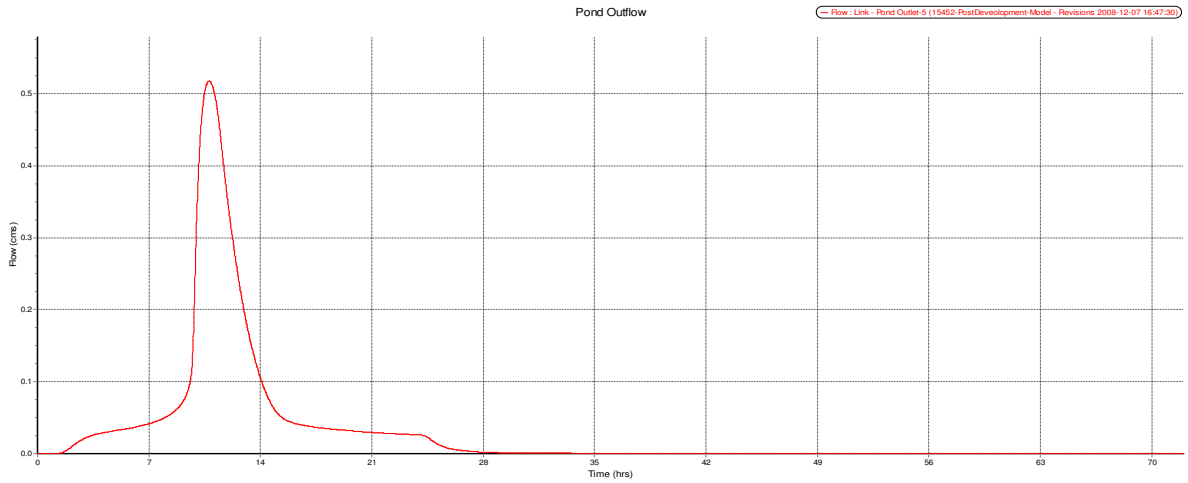


Maximum Pond Volume = 10525 m^3

Pond 5:

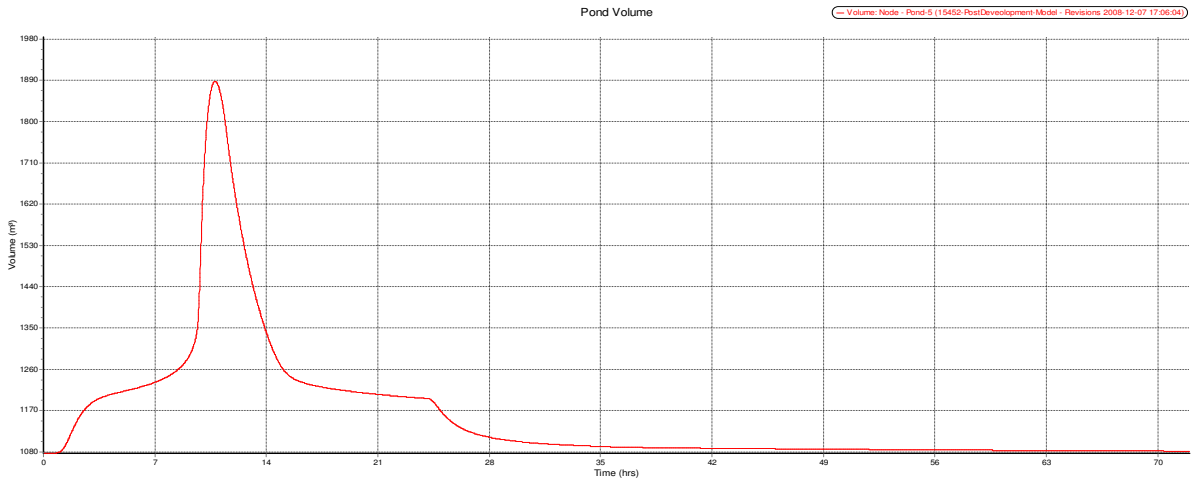


Maximum Pond Inflow Rate = 0.57 m^3/s



Note: 1 - 600mm Culvert is used as pond outlet

Maximum outlet flow = 0.518 m^3/s



Maximum Pond Volume = 1890 m^3

SWMF Design Parameters

Project: Skyy Country Golf and R.V. Resort
Project #: 15452.00
Location: Lacombe County
Designed By: Benjamin Connolly, E.I.T.
Date: May 12, 2009

A. D. Williams Engineering Inc.
Consulting Engineers

Pond ID: **SWMF#1**

Area of bottom of pond = 500 m^2 Length = 22.36068 → *Volumes calculated*
Side slope of pond (H:V = _:1) = 5 Width = 22.36068 by assuming a square shape pond

Elevation	Depth (m)	Area (m^2)	Volume (m^3)	
975.0	0.0	500		→ *Pond Bottom*
975.1	0.1	546	52	
975.2	0.2	593	109	
975.3	0.3	643	171	
975.4	0.4	695	239	
975.5	0.5	749	312	
975.6	0.6	804	391	
975.7	0.7	862	477	
975.8	0.8	922	569	
975.9	0.9	983	668	
976.0	1.0	1047	774	
976.1	1.1	1113	887	
976.2	1.2	1181	1008	
976.3	1.3	1250	1138	
976.4	1.4	1322	1275	
976.5	1.5	1396	1422	
976.6	1.6	1472	1577	
976.7	1.7	1549	1742	
976.8	1.8	1629	1916	
976.9	1.9	1711	2100	
977.0	2.0	1794	2294	→ *Outlet from SWMF*
977.1	2.1	1880	2499	*10m - 300mm Culvert @ 1.0%*
977.2	2.2	1968	2715	
977.3	2.3	2058	2941	→ *High Water Level During 1:100 Year Storm*
977.4	2.4	2149	3179	
977.5	2.5	2243	3429	
977.6	2.6	2339	3690	
977.7	2.7	2436	3964	
977.8	2.8	2536	4251	
977.9	2.9	2638	4550	→ *Top of Berm*

SWMF Design Parameters

Project: Skyy Country Golf and R.V. Resort
Project #: 15452.00
Location: Lacombe County
Designed By: Benjamin Connolly, E.I.T.
Date: May 12, 2009

A. D. Williams Engineering Inc.
Consulting Engineers

Pond ID: **SWMF#1**

Pond Info:

Bottom of Pond Elev =	975.0	→ *5:1 side slopes*
Bottom of Pond Area (m^2) =	500	
Permanent Pool Depth (m) =	2.0	
Permanent Pond (NWL) Elev =	977.0	
Approx. Permanent Pond (NWL) Area (m^2) =	1,794	
Approx. Permanent Pond (NWL) Volume (m^3) =	2,294	
Approx. 1:100 Yr Depth from Pond Bottom (m) =	2.3	
Approx. 1:100 Yr Elev =	977.3	
Approx. 1:100 Yr Area (m^2) =	2,058	
Approx. 1:100 Yr Volume (m^3) =	2,941	
Freeboard Elev=	977.9	

Inlet Info:

W Inlet Elev =	977.3	→ *From overland flow*

Outlet Info:

Outlet Elev (NWL) =	977.0	

10m - 300mm Culvert @ 1.0%

Approx. Contributing Area (ha) =	5.02
Max. Release Rate (L/s/ha) =	20.52
(m^3/s) =	0.103

SWMF Design Parameters

Project: Skyy Country Golf and R.V. Resort
Project #: 15452.00
Location: Lacombe County
Designed By: Benjamin Connolly, E.I.T.
Date: May 12, 2009

A. D. Williams Engineering Inc.
Consulting Engineers

Pond ID: **SWMF#2**

Area of bottom of pond = 650 m^2 Length = 25.4951 → *Volumes calculated*
Side slope of pond (H:V = _:1) = 5 Width = 25.4951 by assuming a square shape pond

Elevation	Depth (m)	Area (m^2)	Volume (m^3)	
968.5	0.0	650		→ *Pond Bottom*
968.6	0.1	702	68	
968.7	0.2	756	141	
968.8	0.3	812	219	
968.9	0.4	870	304	
969.0	0.5	930	395	
969.1	0.6	992	493	
969.2	0.7	1056	597	
969.3	0.8	1122	709	
969.4	0.9	1190	828	
969.5	1.0	1260	955	
969.6	1.1	1332	1090	
969.7	1.2	1406	1234	
969.8	1.3	1482	1386	
969.9	1.4	1560	1547	
970.0	1.5	1640	1717	
970.1	1.6	1722	1897	
970.2	1.7	1806	2087	
970.3	1.8	1892	2288	
970.4	1.9	1980	2498	
970.5	2.0	2070	2720	→ *Outlet from SWMF*
970.6	2.1	2162	2952	*10m - 300mm Culvert @ 2.0%*
970.7	2.2	2256	3196	
970.8	2.3	2352	3452	
970.9	2.4	2450	3720	
971.0	2.5	2550	4000	
971.1	2.6	2652	4292	
971.2	2.7	2756	4598	
971.3	2.8	2862	4916	→ *High Water Level During 1:100 Year Storm*
971.4	2.9	2970	5249	
971.5	3.0	3080	5595	
971.6	3.1	3192	5955	
971.7	3.2	3306	6329	
971.8	3.3	3422	6718	
971.9	3.4	3540	7122	→ *Top of Berm*

SWMF Design Parameters

Project: Skyy Country Golf and R.V. Resort
Project #: 15452.00
Location: Lacombe County
Designed By: Benjamin Connolly, E.I.T.
Date: May 12, 2009

A. D. Williams Engineering Inc.
Consulting Engineers

Pond ID: **SWMF#2**

Pond Info:

Bottom of Pond Elev =	968.5	→ *5:1 side slopes*
Bottom of Pond Area (m^2) =	650	
Permanent Pool Depth (m) =	2.0	
Permanent Pond (NWL) Elev =	970.5	
Approx. Permanent Pond (NWL) Area (m^2) =	2,070	
Approx. Permanent Pond (NWL) Volume (m^3) =	2,720	
Approx. 1:100 Yr Depth from Pond Bottom (m) =	2.8	
Approx. 1:100 Yr Elev =	971.3	
Approx. 1:100 Yr Area (m^2) =	2,862	
Approx. 1:100 Yr Volume (m^3) =	4,916	
Freeboard Elev=	971.9	

Inlet Info:

W Inlet Elev =	971.3	→ *From vegetated channel*

Outlet Info:

Outlet Elev (NWL) =	970.5	

10m - 300mm Culvert @ 2.00%

Approx. Contributing Area (ha) =	28.53
Max. Release Rate (L/s/ha) =	7.68
(m^3/s) =	0.219

SWMF Design Parameters

Project: Skyy Country Golf and R.V. Resort
Project #: 15452.00
Location: Lacombe County
Designed By: Benjamin Connolly, E.I.T.
Date: May 12, 2009

A. D. Williams Engineering Inc.
Consulting Engineers

Pond ID: **SWMF#3**

Area of bottom of pond = 270 m^2 Length = 16.43168 → *Volumes calculated*
Side slope of pond (H:V = _:1) = 5 Width = 16.43168 by assuming a square shape pond

Elevation	Depth (m)	Area (m^2)	Volume (m^3)	
961.0	0.0	270		→ *Pond Bottom*
961.1	0.1	304	29	
961.2	0.2	340	61	
961.3	0.3	378	97	
961.4	0.4	417	137	
961.5	0.5	459	182	
961.6	0.6	503	232	
961.7	0.7	549	287	
961.8	0.8	597	347	
961.9	0.9	647	413	
962.0	1.0	699	484	
962.1	1.1	752	562	
962.2	1.2	808	647	
962.3	1.3	866	739	
962.4	1.4	926	837	
962.5	1.5	988	943	
962.6	1.6	1052	1057	
962.7	1.7	1118	1180	
962.8	1.8	1186	1310	
962.9	1.9	1255	1449	
963.0	2.0	1327	1597	→ *Outlet from SWMF*
963.1	2.1	1401	1755	*10m - 300mm Culvert @ 1.0%*
963.2	2.2	1477	1922	
963.3	2.3	1555	2099	
963.4	2.4	1635	2286	
963.5	2.5	1717	2483	
963.6	2.6	1800	2692	
963.7	2.7	1886	2911	
963.8	2.8	1974	3142	→ *High Water Level During 1:100 Year Storm*
963.9	2.9	2064	3384	
964.0	3.0	2156	3639	
964.1	3.1	2250	3906	
964.2	3.2	2346	4185	
964.3	3.3	2443	4477	
964.4	3.4	2543	4783	→ *Top of Berm*

SWMF Design Parameters

Project: Skyy Country Golf and R.V. Resort
Project #: 15452.00
Location: Lacombe County
Designed By: Benjamin Connolly, E.I.T.
Date: May 12, 2009

A. D. Williams Engineering Inc.
Consulting Engineers

Pond ID: **SWMF#3**

Pond Info:

Bottom of Pond Elev =	961.0	→ *5:1 side slopes*
Bottom of Pond Area (m^2) =	270	
Permanent Pool Depth (m) =	2.0	
Permanent Pond (NWL) Elev =	963.0	
Approx. Permanent Pond (NWL) Area (m^2) =	1,327	
Approx. Permanent Pond (NWL) Volume (m^3) =	1,597	
Approx. 1:100 Yr Depth from Pond Bottom (m) =	2.7	
Approx. 1:100 Yr Elev =	963.7	
Approx. 1:100 Yr Area (m^2) =	1,974	
Approx. 1:100 Yr Volume (m^3) =	3,142	
Freeboard Elev=	964.4	

Inlet Info:

W Inlet Elev =	963.8	→ *From vegetated channel*

Outlet Info:

Outlet Elev (NWL) =	963.0	

10m - 300mm Culvert @ 1.00%

Approx. Contributing Area (ha) =	31.92
Max. Release Rate (L/s/ha) =	6.20
(m^3/s) =	0.198

SWMF Design Parameters

Project: Skyy Country Golf and R.V. Resort
Project #: 15452.00
Location: Lacombe County
Designed By: Benjamin Connolly, E.I.T.
Date: May 12, 2009
Pond ID: **SWMF#4**

A. D. Williams Engineering Inc.
Consulting Engineers

Area of bottom of pond = 1680 m^2 Length = 40.9878 → *Volumes calculated*
Side slope of pond (H:V = _:1) = 5 Width = 40.9878 by assuming a square shape pond

Elevation	Depth (m)	Area (m^2)	Volume (m^3)	
951.0	0.0	1680		→ *Pond Bottom*
951.1	0.1	1763	172	
951.2	0.2	1848	353	
951.3	0.3	1935	542	
951.4	0.4	2024	741	
951.5	0.5	2115	949	
951.6	0.6	2208	1166	
951.7	0.7	2303	1394	
951.8	0.8	2400	1632	
951.9	0.9	2499	1880	
952.0	1.0	2600	2140	
952.1	1.1	2703	2411	
952.2	1.2	2808	2693	
952.3	1.3	2915	2987	
952.4	1.4	3024	3293	
952.5	1.5	3135	3611	
952.6	1.6	3248	3942	
952.7	1.7	3363	4286	
952.8	1.8	3480	4644	
952.9	1.9	3599	5015	
953.0	2.0	3720	5400	→ *Outlet from SWMF*
953.1	2.1	3842	5799	*10m - 375mm Culvert @ 4.0%*
953.2	2.2	3967	6212	
953.3	2.3	4094	6641	
953.4	2.4	4223	7084	
953.5	2.5	4354	7543	
953.6	2.6	4487	8018	
953.7	2.7	4622	8508	
953.8	2.8	4759	9015	
953.9	2.9	4898	9539	
954.0	3.0	5039	10079	
954.1	3.1	5182	10636	
954.2	3.2	5327	11212	
954.3	3.3	5474	11804	
954.4	3.4	5623	12415	
954.5	3.5	5774	13045	
954.6	3.6	5927	13693	→ *High Water Level During 1:100 Year Storm*
954.7	3.7	6082	14360	
954.8	3.8	6239	15046	
954.9	3.9	6398	15752	
955.0	4.0	6559	16478	
955.1	4.1	6722	17224	
955.2	4.2	6887	17991	→ *Top of Berm*

SWMF Design Parameters

Project: Skyy Country Golf and R.V. Resort
Project #: 15452.00
Location: Lacombe County
Designed By: Benjamin Connolly, E.I.T.
Date: May 12, 2009

A. D. Williams Engineering Inc.
Consulting Engineers

Pond ID: **SWMF#4**

Pond Info:

Bottom of Pond Elev =	951.0	→ *5:1 side slopes*
Bottom of Pond Area (m^2) =	1,680	
Permanent Pool Depth (m) =	2.0	
Permanent Pond (NWL) Elev =	953.0	
Approx. Permanent Pond (NWL) Area (m^2) =	3,720	
Approx. Permanent Pond (NWL) Volume (m^3) =	5,400	
Approx. 1:100 Yr Depth from Pond Bottom (m) =	3.6	
Approx. 1:100 Yr Elev =	954.6	
Approx. 1:100 Yr Area (m^2) =	5,927	
Approx. 1:100 Yr Volume (m^3) =	13,693	
Freeboard Elev=	955.2	

Inlet Info:

W Inlet Elev =	954.6	→ *From vegetated channel*

Outlet Info:

Outlet Elev (NWL) =	953.0	

10m - 375mm Culvert @ 4.00%

Approx. Contributing Area (ha) =	111.6
Max. Release Rate (L/s/ha) =	5.16
(m^3/s) =	0.576

SWMF Design Parameters

Project: Skyy Country Golf and R.V. Resort
Project #: 15452.00
Location: Lacombe County
Designed By: Benjamin Connolly, E.I.T.
Date: May 12, 2009

A. D. Williams Engineering Inc.
Consulting Engineers

Pond ID: **SWMF#5**

Area of bottom of pond = 550 m^2 Length = 23.45208 → *Volumes calculated*
Side slope of pond (H:V = _:1) = 5 Width = 23.45208 by assuming a square shape pond

Elevation	Depth (m)	Area (m^2)	Volume (m^3)	
963.5	0.0	550		→ *Pond Bottom*
963.6	0.1	598	57	
963.7	0.2	648	120	
963.8	0.3	700	187	
963.9	0.4	754	261	
964.0	0.5	810	340	
964.1	0.6	867	425	
964.2	0.7	927	517	
964.3	0.8	989	616	
964.4	0.9	1053	721	
964.5	1.0	1119	835	
964.6	1.1	1187	955	
964.7	1.2	1257	1084	
964.8	1.3	1329	1221	
964.9	1.4	1403	1367	
965.0	1.5	1479	1521	
965.1	1.6	1556	1685	
965.2	1.7	1636	1858	
965.3	1.8	1718	2041	
965.4	1.9	1802	2235	
965.5	2.0	1888	2438	→ *Outlet from SWMF*
965.6	2.1	1976	2652	*10m - 375mm Culvert @ 4.0%*
965.7	2.2	2066	2877	
965.8	2.3	2158	3114	
965.9	2.4	2252	3362	
966.0	2.5	2348	3622	→ *High Water Level During 1:100 Year Storm*
966.1	2.6	2446	3894	
966.2	2.7	2545	4179	
966.3	2.8	2647	4476	
966.4	2.9	2751	4787	
966.5	3.0	2857	5111	
966.6	3.1	2965	5448	→ *Top of Berm*

SWMF Design Parameters

Project: Skyy Country Golf and R.V. Resort
Project #: 15452.00
Location: Lacombe County
Designed By: Benjamin Connolly, E.I.T.
Date: May 12, 2009

A. D. Williams Engineering Inc.
Consulting Engineers

Pond ID: **SWMF#5**

Pond Info:

Bottom of Pond Elev =	963.5	→ *5:1 side slopes*
Bottom of Pond Area (m^2) =	550	
Permanent Pool Depth (m) =	2.0	
Permanent Pond (NWL) Elev =	965.5	
Approx. Permanent Pond (NWL) Area (m^2) =	1,888	
Approx. Permanent Pond (NWL) Volume (m^3) =	2,438	
Approx. 1:100 Yr Depth from Pond Bottom (m) =	2.5	
Approx. 1:100 Yr Elev =	966.0	
Approx. 1:100 Yr Area (m^2) =	2,348	
Approx. 1:100 Yr Volume (m^3) =	3,622	
Freeboard Elev=	966.6	

Inlet Info:

W Inlet Elev =	966.0	→ *From vegetated channel*

Outlet Info:

Outlet Elev (NWL) =	965.5	

10m - 600mm Culvert @ 2.00%

Approx. Contributing Area (ha) =	43.2
Max. Release Rate (L/s/ha) =	11.99
(m^3/s) =	0.518

PreDevelopment Model - Skyy Country Golf & R.V.

BOSS International StormNET® - Version 4.11.0 (Build 13753)

****
Analysis Options
****
Flow Units ..... cms
Subbasin Hydrograph Method. EPA SWMM
Infiltration Method ..... Horton
Link Routing Method ..... Hydrodynamic
Pond Exfiltration..... None
Starting Date OCT-06-2008 00:00:00
Ending Date OCT-08-2008 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:00:15
Wet Time Step 00:00:15
Dry Time Step 01:00:00
Routing Time Step ..... 0.50 sec

****
Element Count
****
Number of rain gages 1
Number of subbasins 16
Number of nodes 6
Number of links 3
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Gage ID	Data Source	Data Type	Interval hours
Gage-1	TS-1	INTENSITY	0.08

****
Subbasin Summary
****

Subbasin ID	Total Area hectares	Equiv. Width m	Imperv. Area %	Average Slope %	Raingage
Sub-1	5.05	210.00	5.00	6.0000	Gage-1
Sub-10	14.52	350.00	1.00	5.5000	Gage-1
Sub-11	5.05	180.00	1.00	1.5000	Gage-1
Sub-12	5.98	160.00	1.00	7.0000	Gage-1
Sub-13	2.65	130.00	1.00	7.0000	Gage-1
Sub-14	1.34	110.00	5.00	4.0000	Gage-1
Sub-15	1.48	110.00	1.00	1.0000	Gage-1
Sub-16	30.14	440.00	1.00	5.0000	Gage-1
Sub-2	11.76	350.00	1.00	5.0000	Gage-1
Sub-3	6.41	240.00	1.00	3.5000	Gage-1
Sub-4	1.92	130.00	5.00	3.0000	Gage-1
Sub-5	3.16	120.00	1.00	4.0000	Gage-1
Sub-6	2.41	130.00	1.00	9.0000	Gage-1
Sub-7	10.09	350.00	1.00	1.0000	Gage-1
Sub-8	2.77	110.00	1.00	8.5000	Gage-1
Sub-9	6.45	280.00	1.00	5.0000	Gage-1

****
Node Summary
****

Node ID	Element Type	Invert Elevation	Maximum Depth	Ponded Area	External Inflow

PreDevelopment Model - Skyy Country Golf & R.V.

		m	m	m²
Jun-1	JUNCTION	970.50	2.00	10.000
Jun-2	JUNCTION	964.50	2.00	10.000
Jun-3	JUNCTION	958.80	2.00	10.000
Out-1	OUTFALL	949.64	2.00	0.000
Out-2	OUTFALL	967.60	0.00	0.000
Out-3	OUTFALL	976.83	0.00	0.000

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length m	Slope %	Manning's Roughness
Con-1	Jun-1	Jun-2	CONDUIT	149.3	4.0198	0.2500
Con-2	Jun-2	Jun-3	CONDUIT	261.8	2.1771	0.2500
Con-3	Jun-3	Out-1	CONDUIT	205.4	4.4594	0.2500

****
Cross Section Summary
****

Link ID	Shape	Depth/ Diameter m	Width m	No. of Barrels	Cross Sectional Area m²	Full Flow Hydraulic Radius m	Design Flow Capacity cms
Con-1	TRAPEZOIDAL	2.00	45.00	1	50.00	1.11	42.90
Con-2	TRAPEZOIDAL	2.00	45.00	1	50.00	1.11	31.57
Con-3	TRAPEZOIDAL	2.00	45.00	1	50.00	1.11	45.18

********** Runoff Quantity Continuity **********	Volume hectare-m	Depth mm
Total Precipitation	12.220	109.910
Evaporation Loss	0.200	1.797
Infiltration Loss	11.246	101.147
Surface Runoff	0.774	6.966
Final Surface Storage	0.000	0.000
Continuity Error (%)	0.000	

********** Flow Routing Continuity **********	Volume hectare-m	Volume Mliters
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.774	7.745
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.775	7.755
Surface Flooding	0.000	0.000
Evaporation Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.002
Continuity Error (%)	-0.151	

****
EPA SWMM Time of Concentration Computations Report
****

Tc = (0.94 * (L^0.6) * (n^0.6)) / ((i^0.4) * (S^0.3))

Where:

Tc = Time of Concentration (min)
L = Flow Length (ft)

```
        n  = Manning's Roughness
        i  = Rainfall Intensity (in/hr)
        S  = Slope (ft/ft)

--------------
Subbasin Sub-1
--------------

        Flow length (m):                            240.48
        Pervious Manning's Roughness:              0.25000
        Impervious Manning's Roughness:            0.01500
        Pervious Rainfall Intensity (mm/hr):       0.00710
        Impervious Rainfall Intensity (mm/hr):     0.00710
        Slope (%):                                 6.00000
        Computed TOC (minutes):                     100.25

--------------
Subbasin Sub-10
--------------

        Flow length (m):                            414.86
        Pervious Manning's Roughness:              0.25000
        Impervious Manning's Roughness:            0.01500
        Pervious Rainfall Intensity (mm/hr):       0.00710
        Impervious Rainfall Intensity (mm/hr):     0.00710
        Slope (%):                                 5.50000
        Computed TOC (minutes):                     146.30

--------------
Subbasin Sub-11
--------------

        Flow length (m):                            280.56
        Pervious Manning's Roughness:              0.25000
        Impervious Manning's Roughness:            0.01500
        Pervious Rainfall Intensity (mm/hr):       0.00710
        Impervious Rainfall Intensity (mm/hr):     0.00710
        Slope (%):                                 1.50000
        Computed TOC (minutes):                     170.85

--------------
Subbasin Sub-12
--------------

        Flow length (m):                            373.75
        Pervious Manning's Roughness:              0.25000
        Impervious Manning's Roughness:            0.01500
        Pervious Rainfall Intensity (mm/hr):       0.00710
        Impervious Rainfall Intensity (mm/hr):     0.00710
        Slope (%):                                 7.00000
        Computed TOC (minutes):                     127.83

--------------
Subbasin Sub-13
--------------

        Flow length (m):                            203.85
        Pervious Manning's Roughness:              0.25000
        Impervious Manning's Roughness:            0.01500
        Pervious Rainfall Intensity (mm/hr):       0.00710
        Impervious Rainfall Intensity (mm/hr):     0.00710
        Slope (%):                                 7.00000
        Computed TOC (minutes):                      88.85

--------------
Subbasin Sub-14
--------------

        Flow length (m):                            121.82
        Pervious Manning's Roughness:              0.25000
        Impervious Manning's Roughness:            0.01500
        Pervious Rainfall Intensity (mm/hr):       0.00710
```

```
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                4.00000
        Computed TOC (minutes):                     75.28

--------------
Subbasin Sub-15
--------------

        Flow length (m):                           134.55
        Pervious Manning's Roughness:             0.40000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                1.00000
        Computed TOC (minutes):                    164.59

--------------
Subbasin Sub-16
--------------

        Flow length (m):                           685.00
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                5.00000
        Computed TOC (minutes):                    203.40

--------------
Subbasin Sub-2
--------------

        Flow length (m):                           336.00
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                5.00000
        Computed TOC (minutes):                    132.66

--------------
Subbasin Sub-3
--------------

        Flow length (m):                           267.08
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                3.50000
        Computed TOC (minutes):                    128.64

--------------
Subbasin Sub-4
--------------

        Flow length (m):                           147.69
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                3.00000
        Computed TOC (minutes):                     92.12

--------------
Subbasin Sub-5
--------------

        Flow length (m):                           263.33
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
```

```
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                4.00000
        Computed TOC (minutes):                    122.55

--------------
Subbasin Sub-6
--------------

        Flow length (m):                           185.38
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                9.00000
        Computed TOC (minutes):                     77.84

--------------
Subbasin Sub-7
--------------

        Flow length (m):                           288.29
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                1.00000
        Computed TOC (minutes):                    196.12

--------------
Subbasin Sub-8
--------------

        Flow length (m):                           251.82
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                8.50000
        Computed TOC (minutes):                     95.16

--------------
Subbasin Sub-9
--------------

        Flow length (m):                           230.36
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                5.00000
        Computed TOC (minutes):                    105.77


**********************
Subbasin Runoff Summary
**********************
```

Subbasin ID	Total Rainfall mm	Total Runon mm	Total Evap. mm	Total Infil. mm	Total Runoff mm	Peak Runoff cms	Runoff Coefficient	Time of Concentration days	Time of Concentration hh:mm:ss
Sub-1	109.910	0.000	1.842	91.812	16.255	0.11	0.148	0	01:40:14
Sub-10	109.910	0.000	1.792	97.531	10.587	0.19	0.096	0	02:26:18
Sub-11	109.910	30.439	1.794	105.453	33.102	0.15	0.236	0	02:50:50
Sub-12	109.910	27.954	1.793	103.992	32.078	0.15	0.233	0	02:07:49
Sub-13	109.910	144.536	1.793	110.207	142.445	0.24	0.560	0	01:28:51
Sub-14	109.910	0.000	1.841	90.749	17.319	0.04	0.158	0	01:15:16
Sub-15	109.910	384.666	1.794	120.840	371.941	0.36	0.752	0	02:44:35
Sub-16	109.910	0.000	1.792	99.390	8.728	0.27	0.079	0	03:23:23
Sub-2	109.910	29.349	1.797	104.459	33.002	0.37	0.237	0	02:12:39
Sub-3	109.910	0.000	1.792	96.857	11.261	0.10	0.102	0	02:08:38

Sub-4	109.910	0.000	1.842	91.471	16.597	0.05	0.151	0	01:32:07
Sub-5	109.910	0.000	1.792	96.613	11.504	0.05	0.105	0	02:02:32
Sub-6	109.910	15.085	1.793	97.611	25.591	0.09	0.205	0	01:17:50
Sub-7	109.910	38.464	1.793	108.701	37.880	0.28	0.255	0	03:16:06
Sub-8	109.910	0.000	1.792	95.456	12.661	0.06	0.115	0	01:35:09
Sub-9	109.910	59.257	1.793	107.990	59.383	0.25	0.351	0	01:45:46
Averages / Totals	109.910	21.812	1.797	101.147	28.777	2.311	0.218		

****
Node Depth Summary
****

Node ID	Average Depth Attained m	Maximum Depth Attained m	Maximum HGL Attained m	Time of Max Occurrence days	Time of Max Occurrence hh:mm	Maximum Ponded Volume ha-mm	Total Time Flooded minutes	Retention Time hh:mm:ss
Jun-1	0.01	0.10	970.60	0	10:01	0	0	0:00:00
Jun-2	0.02	0.19	964.69	0	10:38	0	0	0:00:00
Jun-3	0.01	0.14	958.94	0	11:47	0	0	0:00:00
Out-1	0.01	0.14	949.78	0	11:47	0	0	0:00:00
Out-2	0.00	0.00	967.60	0	00:00	0	0	0:00:00
Out-3	0.00	0.00	976.83	0	00:00	0	0	0:00:00

****
Node Flow Summary
****

Node ID	Element Type	Maximum Lateral Inflow cms	Maximum Total Inflow cms	Time of Peak Inflow Occurrence days	Time of Peak Inflow Occurrence hh:mm	Maximum Flooding Overflow cms	Time of Peak Flooding Occurrence days	Time of Peak Flooding Occurrence hh:mm
Jun-1	JUNCTION	0.099	0.099	0	10:10	0.00		
Jun-2	JUNCTION	0.089	0.187	0	10:10	0.00		
Jun-3	JUNCTION	0.060	0.213	0	10:40	0.00		
Out-1	OUTFALL	0.361	0.533	0	11:52	0.00		
Out-2	OUTFALL	0.045	0.045	0	09:45	0.00		
Out-3	OUTFALL	0.039	0.039	0	09:55	0.00		

****
Outfall Loading Summary
****

Outfall Node ID	Flow Frequency (%)	Average Flow cms	Maximum Flow cms
Out-1	98.31	0.042	0.533
Out-2	50.25	0.004	0.045
Out-3	50.15	0.003	0.039
System	66.24	0.049	0.550

****
Link Flow Summary
****

Link ID	Element Type	Time of Peak Flow Occurrence days hh:mm	Maximum Velocity Attained m/sec	Length Factor	Peak Flow during Analysis cms	Design Flow Capacity cms	Ratio of Maximum /Design Flow	Ratio of Maximum Flow Depth	Surch Mi

Con-1	CONDUIT	0	10:15	0.16	1.00	0.098	42.897	0.00	0.07
Con-2	CONDUIT	0	10:57	0.15	1.00	0.170	31.569	0.01	0.08
Con-3	CONDUIT	0	11:47	0.20	1.00	0.181	45.182	0.00	0.07

****
Flow Classification Summary
****

	--- Fraction of Time in Flow Class ----							Avg.	Avg.
Link	Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Froude Number	Flow Change
Con-1	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.02	0.0000
Con-2	0.00	0.01	0.00	0.99	0.00	0.00	0.00	0.02	0.0000
Con-3	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.04	0.0000

****
Highest Continuity Errors
****
Node Jun-3 (5.27%)
Node Jun-2 (-3.72%)

****
Time-Step Critical Elements
****
None

****
Highest Flow Instability Indexes
****
All links are stable.

****
Routing Time Step Summary
****
Minimum Time Step : 0.50 sec
Average Time Step : 0.50 sec
Maximum Time Step : 0.50 sec
Percent in Steady State : 2.46
Average Iterations per Step : 1.98

Analysis begun on: Tue Dec 09 10:09:27 2008
Analysis ended on: Tue Dec 09 10:09:40 2008
Total elapsed time: 00:00:13

PostDevelopment Model - Skyy Country Golf & R.V.

BOSS International StormNET® - Version 4.11.0 (Build 13753)

****
Analysis Options
****
Flow Units ..... cms
Subbasin Hydrograph Method. EPA SWMM
Infiltration Method ..... Horton
Link Routing Method ..... Hydrodynamic
Pond Exfiltration..... None
Starting Date OCT-02-2008 00:00:00
Ending Date OCT-05-2008 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:00:30
Wet Time Step 00:00:30
Dry Time Step 01:00:00
Routing Time Step ..... 5.00 sec

****
Element Count
****
Number of rain gages 1
Number of subbasins 80
Number of nodes 107
Number of links 106
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Gage ID	Data Source	Data Type	Interval hours
Gage-1	TS-1	INTENSITY	0.08

****
Subbasin Summary
****

Subbasin ID	Total Area hectares	Equiv. Width m	Imperv. Area %	Average Slope %	Raingage
Sub-1	0.26	40.00	1.00	0.5000	Gage-1
Sub-10	0.49	50.00	1.00	3.0000	Gage-1
Sub-11	0.53	60.00	1.00	3.0000	Gage-1
Sub-12	1.42	70.00	1.00	3.5000	Gage-1
Sub-120	30.14	440.00	1.00	5.0000	Gage-1
Sub-121	1.04	80.00	35.00	0.5000	Gage-1
Sub-122	1.66	90.00	35.00	0.5000	Gage-1
Sub-123	2.90	130.00	35.00	0.5000	Gage-1
Sub-13	2.81	200.00	1.00	3.0000	Gage-1
Sub-14	14.44	350.00	1.00	5.5000	Gage-1
Sub-15	5.08	210.00	5.00	6.0000	Gage-1
Sub-16	0.58	40.00	20.00	1.5000	Gage-1
Sub-17	1.22	40.00	20.00	1.5000	Gage-1
Sub-18	0.48	40.00	20.00	2.0000	Gage-1
Sub-19	0.47	30.00	45.00	2.0000	Gage-1
Sub-2	1.26	100.00	35.00	1.0000	Gage-1
Sub-20	1.28	100.00	35.00	1.0000	Gage-1
Sub-21	0.38	60.00	35.00	3.0000	Gage-1
Sub-22	0.53	50.00	45.00	2.0000	Gage-1
Sub-23	0.76	70.00	35.00	0.5000	Gage-1
Sub-24	0.75	60.00	1.00	0.5000	Gage-1
Sub-25	0.52	60.00	25.00	1.0000	Gage-1
Sub-26	1.08	80.00	35.00	2.0000	Gage-1

Sub-27	0.84	80.00	35.00	2.0000	Gage-1
Sub-28	0.35	40.00	1.00	3.0000	Gage-1
Sub-29	2.19	90.00	1.00	3.5000	Gage-1
Sub-3	0.15	30.00	1.00	1.0000	Gage-1
Sub-30	0.55	60.00	35.00	2.0000	Gage-1
Sub-31	0.54	60.00	35.00	2.0000	Gage-1
Sub-32	0.65	40.00	5.00	0.5000	Gage-1
Sub-33	0.61	30.00	35.00	3.0000	Gage-1
Sub-34	0.53	60.00	35.00	0.5000	Gage-1
Sub-35	0.81	50.00	30.00	3.0000	Gage-1
Sub-36	0.57	60.00	35.00	0.5000	Gage-1
Sub-37	0.43	30.00	35.00	0.5000	Gage-1
Sub-38	0.44	30.00	1.00	1.0000	Gage-1
Sub-39	0.48	80.00	35.00	2.0000	Gage-1
Sub-4	2.23	100.00	1.00	3.5000	Gage-1
Sub-40	0.09	20.00	1.00	2.0000	Gage-1
Sub-41	0.80	60.00	35.00	3.0000	Gage-1
Sub-42	0.78	60.00	35.00	3.0000	Gage-1
Sub-43	0.27	40.00	1.00	0.5000	Gage-1
Sub-44	0.34	40.00	1.00	0.5000	Gage-1
Sub-45	0.65	70.00	35.00	1.0000	Gage-1
Sub-46	0.55	70.00	1.00	0.5000	Gage-1
Sub-47	0.43	40.00	35.00	2.0000	Gage-1
Sub-48	1.31	90.00	35.00	1.5000	Gage-1
Sub-49	0.22	30.00	35.00	2.0000	Gage-1
Sub-5	2.23	110.00	35.00	1.5000	Gage-1
Sub-50	0.35	50.00	1.00	0.5000	Gage-1
Sub-51	0.76	60.00	35.00	0.5000	Gage-1
Sub-52	0.64	90.00	35.00	0.5000	Gage-1
Sub-53	0.16	40.00	1.00	0.5000	Gage-1
Sub-54	0.46	80.00	35.00	0.5000	Gage-1
Sub-55	0.35	80.00	35.00	0.5000	Gage-1
Sub-56	0.42	40.00	45.00	0.5000	Gage-1
Sub-57	0.26	30.00	25.00	0.5000	Gage-1
Sub-58	0.36	60.00	65.00	3.0000	Gage-1
Sub-59	0.61	60.00	35.00	3.0000	Gage-1
Sub-6	4.22	110.00	10.00	3.5000	Gage-1
Sub-60	0.65	60.00	1.00	0.5000	Gage-1
Sub-61	0.30	70.00	1.00	1.0000	Gage-1
Sub-62	0.30	50.00	80.00	1.0000	Gage-1
Sub-63	0.50	50.00	1.00	3.0000	Gage-1
Sub-64	0.34	50.00	35.00	0.5000	Gage-1
Sub-65	0.18	50.00	1.00	0.5000	Gage-1
Sub-66	0.42	40.00	35.00	0.5000	Gage-1
Sub-67	0.66	80.00	35.00	1.0000	Gage-1
Sub-68	0.78	80.00	35.00	2.0000	Gage-1
Sub-69	0.75	70.00	35.00	1.0000	Gage-1
Sub-7	2.18	200.00	1.00	3.5000	Gage-1
Sub-70	0.26	20.00	80.00	1.0000	Gage-1
Sub-71	0.59	80.00	45.00	1.0000	Gage-1
Sub-72	0.88	90.00	1.00	1.0000	Gage-1
Sub-73	0.52	60.00	1.00	3.0000	Gage-1
Sub-74	0.60	80.00	35.00	2.0000	Gage-1
Sub-75	0.69	80.00	35.00	2.0000	Gage-1
Sub-76	0.77	90.00	35.00	3.0000	Gage-1
Sub-8	1.29	80.00	35.00	1.5000	Gage-1
Sub-9	0.97	60.00	1.00	3.5000	Gage-1

****
Node Summary
****

Node ID	Element Type	Invert Elevation m	Maximum Depth m	Ponded Area m²	External Inflow
Jun-1	JUNCTION	969.00	1.00	10.000	
Jun-10	JUNCTION	983.07	1.00	0.000	
Jun-106	JUNCTION	973.00	1.00	10.000	
Jun-107	JUNCTION	968.80	1.00	10.000	
Jun-108	JUNCTION	966.00	1.00	10.000	
Jun-109	JUNCTION	962.50	1.00	10.000	

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Jun-110	JUNCTION	962.00	1.00	0.000
Jun-111	JUNCTION	958.00	1.00	10.000
Jun-112	JUNCTION	955.50	1.00	0.000
Jun-113	JUNCTION	967.50	1.12	10.000
Jun-115	JUNCTION	967.20	1.00	0.000
Jun-116	JUNCTION	966.55	1.00	10.000
Jun-117	JUNCTION	966.75	1.00	10.000
Jun-122	JUNCTION	966.90	0.50	0.000
Jun-123	JUNCTION	980.00	1.00	10.000
Jun-124	JUNCTION	982.27	1.00	0.000
Jun-125	JUNCTION	982.88	1.00	0.000
Jun-126	JUNCTION	982.66	1.00	10.000
Jun-129	JUNCTION	966.68	1.00	0.000
Jun-13	JUNCTION	970.00	1.00	10.000
Jun-130	JUNCTION	970.16	1.00	10.000
Jun-131	JUNCTION	970.85	1.00	10.000
Jun-135	JUNCTION	955.25	2.50	0.000
Jun-136	JUNCTION	958.00	1.00	0.000
Jun-14	JUNCTION	961.50	1.12	10.000
Jun-147	JUNCTION	969.90	1.00	0.000
Jun-15	JUNCTION	982.80	1.00	10.000
Jun-154	JUNCTION	967.70	1.00	10.000
Jun-155	JUNCTION	968.40	1.00	0.000
Jun-156	JUNCTION	971.60	1.00	10.000
Jun-157	JUNCTION	969.20	1.00	10.000
Jun-158	JUNCTION	969.10	1.00	10.000
Jun-159	JUNCTION	966.05	0.75	0.000
Jun-16	JUNCTION	977.00	1.12	0.000
Jun-18	JUNCTION	980.73	1.00	0.000
Jun-19	JUNCTION	959.40	0.12	10.000
Jun-2	JUNCTION	968.50	1.00	0.000
Jun-20	JUNCTION	967.00	1.00	10.000
Jun-21	JUNCTION	972.80	0.12	0.000
Jun-22	JUNCTION	966.70	1.00	0.000
Jun-23	JUNCTION	963.00	1.00	10.000
Jun-24	JUNCTION	962.30	1.00	10.000
Jun-25	JUNCTION	960.60	1.20	20.000
Jun-26	JUNCTION	967.52	0.12	10.000
Jun-27	JUNCTION	957.90	0.62	10.000
Jun-28	JUNCTION	959.20	1.15	0.000
Jun-29	JUNCTION	961.30	0.12	0.000
Jun-3	JUNCTION	977.90	1.00	10.000
Jun-31	JUNCTION	980.65	0.12	0.000
Jun-34	JUNCTION	968.50	0.20	0.000
Jun-35	JUNCTION	968.20	0.12	0.000
Jun-39	JUNCTION	968.65	0.50	0.000
Jun-4	JUNCTION	976.90	1.00	0.000
Jun-40	JUNCTION	968.20	0.12	0.000
Jun-42	JUNCTION	967.20	0.12	0.000
Jun-43	JUNCTION	968.35	0.12	0.000
Jun-44	JUNCTION	964.70	0.12	0.000
Jun-45	JUNCTION	960.80	0.20	0.000
Jun-46	JUNCTION	964.70	0.06	0.000
Jun-47	JUNCTION	960.71	0.06	0.000
Jun-48	JUNCTION	968.35	0.12	0.000
Jun-49	JUNCTION	965.70	0.12	0.000
Jun-5	JUNCTION	970.30	1.00	0.000
Jun-50	JUNCTION	959.90	0.06	0.000
Jun-51	JUNCTION	959.70	0.12	0.000
Jun-52	JUNCTION	958.90	1.00	10.000
Jun-53	JUNCTION	959.30	0.12	0.000
Jun-54	JUNCTION	959.40	0.12	0.000
Jun-55	JUNCTION	958.60	1.00	10.000
Jun-56	JUNCTION	960.50	0.15	0.000
Jun-57	JUNCTION	969.40	0.12	0.000
Jun-6	JUNCTION	962.90	1.00	0.000
Jun-60	JUNCTION	966.15	1.00	10.000
Jun-61	JUNCTION	968.30	0.50	5.000
Jun-62	JUNCTION	975.00	0.12	0.000
Jun-63	JUNCTION	970.00	1.12	0.000
Jun-64	JUNCTION	965.30	1.00	0.000
Jun-65	JUNCTION	963.50	1.00	10.000

Jun-67	JUNCTION	982.00	1.00	10.000
Jun-68	JUNCTION	982.40	0.06	0.000
Jun-69	JUNCTION	979.40	1.00	10.000
Jun-7	JUNCTION	952.60	1.00	0.000
Jun-70	JUNCTION	974.80	1.00	10.000
Jun-71	JUNCTION	959.50	1.00	10.000
Jun-72	JUNCTION	966.00	1.00	10.000
Jun-74	JUNCTION	968.50	1.00	10.000
Jun-76	JUNCTION	972.30	1.00	10.000
Jun-79	JUNCTION	974.00	0.06	0.000
Jun-8	JUNCTION	986.11	0.12	0.000
Jun-80	JUNCTION	967.50	1.00	10.000
Jun-82	JUNCTION	982.10	0.12	0.000
Jun-83	JUNCTION	977.10	1.00	0.000
Jun-84	JUNCTION	978.80	1.00	10.000
Jun-85	JUNCTION	981.80	1.00	0.000
Jun-86	JUNCTION	982.25	0.06	0.000
Jun-88	JUNCTION	982.58	1.00	0.000
Jun-89	JUNCTION	983.58	0.12	0.000
Jun-9	JUNCTION	983.13	0.60	0.000
Jun-90	JUNCTION	980.70	0.12	0.000
Jun-92	JUNCTION	981.05	1.00	0.000
Jun-95	JUNCTION	981.77	1.00	0.000
Out-1	OUTFALL	949.50	3.00	0.000
Pond-1	STORAGE	975.00	2.50	1900.000
Pond-2	STORAGE	968.50	2.90	2700.000
Pond-3	STORAGE	961.00	3.40	1800.000
Pond-4	STORAGE	951.00	5.00	6000.000
Pond-5	STORAGE	963.50	3.00	1850.000

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Link Summary
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Link ID	From Node	To Node	Element Type	Length m	Slope %	Manning's Roughness
Channel-1	Jun-4	Pond-2	CONDUIT	90.0	6.0000	0.1000
Channel-2	Jun-5	Jun-1	CONDUIT	61.1	2.1263	0.1000
Channel-3	Jun-2	Pond-3	CONDUIT	158.0	2.9741	0.1000
Channel-4	Jun-6	Jun-136	CONDUIT	40.0	12.2500	0.1000
Channel-5	Jun-136	Pond-4	CONDUIT	35.0	6.5437	0.0320
Con-1	Jun-34	Jun-35	CONDUIT	49.7	0.6034	0.0150
Con-101	Jun-90	Jun-16	CONDUIT	47.8	5.6462	0.0150
Con-102	Jun-89	Jun-90	CONDUIT	46.9	6.1484	0.0150
Con-104	Jun-92	Jun-31	CONDUIT	41.0	0.9749	0.3000
Con-107	Jun-95	Jun-92	CONDUIT	87.3	0.8249	0.3000
Con-119	Jun-61	Jun-122	CONDUIT	40.0	3.5035	0.0320
Con-149	Jun-122	Jun-22	CONDUIT	13.9	1.0096	0.0150
Con-150	Jun-57	Jun-20	CONDUIT	58.1	4.1287	0.0150
Con-151	Jun-65	Jun-24	CONDUIT	15.6	3.7445	0.0150
Con-152	Jun-35	Jun-26	CONDUIT	91.4	0.7426	0.0150
Con-159	Jun-15	Jun-67	CONDUIT	91.3	0.8759	0.0150
Con-160	Jun-69	Jun-70	CONDUIT	107.5	4.2787	0.0150
Con-161	Jun-67	Jun-69	CONDUIT	106.5	2.4413	0.0150
Con-163	Jun-79	Jun-76	CONDUIT	46.6	3.6512	0.3000
Con-164	Jun-31	Jun-16	CONDUIT	85.0	3.1184	0.0150
Con-165	Jun-76	Jun-74	CONDUIT	76.5	4.9667	0.0150
Con-174	Jun-135	Pond-4	CONDUIT	58.3	1.0285	0.0320
Con-176	Jun-71	Jun-136	CONDUIT	54.7	2.7407	0.0320
Con-188	Jun-130	Jun-147	CONDUIT	24.3	1.0502	0.0320
Con-190	Jun-108	Jun-109	CONDUIT	74.8	4.6766	0.3000
Con-191	Jun-25	Jun-55	CONDUIT	81.6	2.4519	0.3000
Con-196	Jun-154	Jun-113	CONDUIT	20.2	0.9299	0.0150
Con-197	Jun-155	Jun-154	CONDUIT	70.9	0.9876	0.0320
Con-198	Jun-147	Jun-157	CONDUIT	82.2	0.8513	0.0150
Con-199	Jun-156	Jun-113	CONDUIT	109.5	2.8308	0.0150
Con-200	Jun-157	Jun-158	CONDUIT	14.2	0.4992	0.0150
Con-201	Jun-158	Jun-155	CONDUIT	87.7	0.7984	0.0150
Con-202	Jun-60	Jun-159	CONDUIT	20.2	0.4708	0.0150
Con-203	Jun-159	Pond-5	CONDUIT	10.0	0.2349	0.0150
Con-205	Jun-13	Jun-80	CONDUIT	44.4	5.6256	0.0150

Con-208	Jun-84	Jun-83	CONDUIT	27.8	4.5144	0.0320
Con-23	Jun-8	Jun-82	CONDUIT	89.8	4.4645	0.0150
Con-31	Jun-26	Jun-42	CONDUIT	53.1	0.6046	0.0150
Con-32	Jun-19	Jun-52	CONDUIT	52.6	0.9509	0.0150
Con-36	Jun-21	Jun-63	CONDUIT	45.8	3.9267	0.0150
Con-50	Jun-42	Jun-44	CONDUIT	85.9	2.9093	0.0150
Con-51	Jun-39	Jun-43	CONDUIT	43.4	0.6909	0.3000
Con-52	Jun-44	Jun-45	CONDUIT	88.9	4.3879	0.0150
Con-53	Jun-45	Jun-19	CONDUIT	84.6	1.6543	0.0150
Con-54	Jun-46	Jun-47	CONDUIT	89.2	4.4726	0.3000
Con-55	Jun-48	Jun-40	CONDUIT	12.4	1.2097	0.0150
Con-56	Jun-40	Jun-49	CONDUIT	42.7	5.8507	0.0150
Con-57	Jun-43	Jun-40	CONDUIT	18.8	0.7970	0.0150
Con-59	Jun-47	Jun-50	CONDUIT	74.0	1.0944	0.3000
Con-60	Jun-50	Jun-51	CONDUIT	31.0	0.6450	0.3000
Con-61	Jun-52	Jun-27	CONDUIT	79.6	0.6278	0.0150
Con-62	Jun-51	Jun-53	CONDUIT	59.6	0.6713	0.0150
Con-63	Jun-53	Jun-52	CONDUIT	57.2	0.6988	0.0150
Con-64	Jun-54	Jun-53	CONDUIT	18.5	0.5397	0.0150
Con-65	Jun-49	Jun-29	CONDUIT	87.8	5.0131	0.0150
Con-66	Jun-29	Jun-56	CONDUIT	64.4	1.2424	0.0150
Con-67	Jun-56	Jun-28	CONDUIT	15.7	1.9096	0.0320
Con-76	Jun-62	Jun-21	CONDUIT	98.5	2.2342	0.0150
Con-78	Jun-64	Jun-65	CONDUIT	73.9	2.4361	0.0320
Con-81	Jun-68	Jun-67	CONDUIT	52.2	0.7664	0.3000
Con-83	Jun-70	Jun-13	CONDUIT	79.8	6.0173	0.0150
Con-93	Jun-80	Jun-14	CONDUIT	96.2	5.1959	0.0150
Con-94	Jun-82	Jun-18	CONDUIT	85.3	1.0175	0.0150
Con-97	Jun-86	Jun-85	CONDUIT	70.6	0.6371	0.3000
Culvert-1	Jun-9	Jun-10	CONDUIT	23.5	0.2381	0.0150
Culvert-10	Jun-1	Jun-2	CONDUIT	20.2	2.2006	0.0150
Culvert-11	Jun-131	Jun-130	CONDUIT	43.9	1.5812	0.0150
Culvert-2	Jun-126	Jun-88	CONDUIT	15.2	0.4218	0.0150
Culvert-3	Jun-123	Jun-84	CONDUIT	20.2	3.4239	0.0150
Culvert-4	Jun-115	Jun-20	CONDUIT	25.0	0.8013	0.0150
Culvert-5	Jun-117	Jun-129	CONDUIT	9.7	0.3481	0.0150
Culvert-6	Jun-116	Jun-60	CONDUIT	61.3	0.6524	0.0150
Culvert-9	Jun-109	Jun-110	CONDUIT	23.3	1.9284	0.0150
Ditch-1	Jun-113	Jun-115	CONDUIT	41.3	0.7269	0.0320
Ditch-10	Jun-28	Jun-55	CONDUIT	46.1	1.3021	0.0320
Ditch-11	Jun-10	Jun-125	CONDUIT	31.4	0.6041	0.0320
Ditch-12	Jun-125	Jun-126	CONDUIT	41.3	0.5322	0.0320
Ditch-13	Jun-88	Jun-124	CONDUIT	45.1	0.6872	0.0320
Ditch-14	Jun-124	Jun-85	CONDUIT	56.5	0.8322	0.0320
Ditch-15	Jun-85	Jun-123	CONDUIT	42.6	4.2273	0.0320
Ditch-17	Jun-83	Pond-2	CONDUIT	98.1	5.8086	0.0320
Ditch-18	Jun-18	Pond-1	CONDUIT	92.3	4.0425	0.3000
Ditch-19	Jun-16	Pond-2	CONDUIT	90.0	6.2222	0.3000
Ditch-2	Jun-20	Jun-117	CONDUIT	34.6	0.7228	0.0320
Ditch-20	Jun-74	Jun-72	CONDUIT	42.0	5.9538	0.0320
Ditch-21	Jun-72	Pond-3	CONDUIT	40.0	5.3750	0.0320
Ditch-22	Jun-14	Jun-71	CONDUIT	34.0	5.3798	0.0320
Ditch-25	Jun-27	Jun-135	CONDUIT	67.4	0.9650	0.0320
Ditch-27	Jun-3	Pond-1	CONDUIT	134.0	0.4104	0.0320
Ditch-3	Jun-129	Jun-116	CONDUIT	19.5	0.6382	0.0320
Ditch-6	Jun-23	Jun-109	CONDUIT	39.1	1.2784	0.0320
Ditch-7	Jun-63	Jun-107	CONDUIT	44.7	2.6846	0.0320
Ditch-8	Jun-22	Jun-108	CONDUIT	45.0	1.5542	0.0320
Ditch-9	Jun-24	Jun-25	CONDUIT	46.7	3.2086	0.0320
Outlet Ditch	Jun-7	Out-1	CONDUIT	91.7	1.2001	0.0320
Pond Outlet-1	Pond-1	Jun-4	CONDUIT	10.0	0.6893	0.0150
Pond Outlet-2	Pond-2	Jun-5	CONDUIT	10.0	1.1790	0.0150
Pond Outlet-3	Pond-3	Jun-6	CONDUIT	10.0	0.6893	0.0150
Pond Outlet-4	Pond-4	Jun-7	CONDUIT	10.0	1.7130	0.0150
Pond Outlet-5	Pond-5	Jun-64	CONDUIT	10.0	0.7861	0.0150
Swale-1	Jun-106	Jun-107	CONDUIT	85.7	4.8985	0.0320
Swale-2	Jun-107	Jun-108	CONDUIT	89.2	3.1397	0.3000
Swale-4	Jun-110	Jun-25	CONDUIT	89.1	1.5711	0.3000
Swale-6	Jun-55	Jun-111	CONDUIT	9.8	1.5035	0.0320
Swale-7	Jun-111	Jun-112	CONDUIT	38.2	6.5394	0.3000
Swale-8	Jun-112	Pond-4	CONDUIT	47.1	1.8054	0.3000

PostDevelopment Model - Skyy Country Golf & R.V.

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Cross Section Summary
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Link ID	Shape	Depth/ Diameter m	Width m	No. of Barrels	Cross Sectional Area m²	Full Flow Hydraulic Radius m	Design Flow Capacity cms
Channel-1	TRAPEZOIDAL	1.00	11.00	1	7.00	0.62	12.50
Channel-2	TRAPEZOIDAL	1.00	11.00	1	7.00	0.62	7.44
Channel-3	TRAPEZOIDAL	1.00	11.00	1	7.00	0.62	8.80
Channel-4	TRAPEZOIDAL	1.00	11.00	1	7.00	0.62	17.86
Channel-5	TRAPEZOIDAL	1.00	11.00	1	7.00	0.62	46.70
Con-1	IRREGULAR	0.12	16.00	1	0.80	0.01	0.23
Con-101	IRREGULAR	0.12	16.00	1	0.80	0.01	0.69
Con-102	IRREGULAR	0.12	16.00	1	0.80	0.01	0.72
Con-104	IRREGULAR	0.06	6.00	1	0.18	0.61	0.04
Con-107	IRREGULAR	0.06	6.00	1	0.18	0.61	0.04
Con-119	TRAPEZOIDAL	0.50	4.00	1	1.25	0.30	3.28
Con-149	CIRCULAR	0.45	0.45	1	0.16	0.11	0.30
Con-150	IRREGULAR	0.12	16.00	1	0.80	0.01	0.59
Con-151	CIRCULAR	0.45	0.45	1	0.16	0.11	0.69
Con-152	IRREGULAR	0.12	16.00	1	0.80	0.01	0.25
Con-159	IRREGULAR	0.12	16.00	1	0.80	0.01	0.27
Con-160	IRREGULAR	0.12	16.00	1	0.80	0.01	0.60
Con-161	IRREGULAR	0.12	16.00	1	0.80	0.01	0.45
Con-163	IRREGULAR	0.06	6.00	1	0.18	0.61	0.08
Con-164	IRREGULAR	0.12	16.00	1	0.80	0.01	0.51
Con-165	IRREGULAR	0.12	16.00	1	0.80	0.01	0.65
Con-174	TRAPEZOIDAL	0.50	4.00	1	1.25	0.30	1.78
Con-176	TRAPEZOIDAL	1.00	9.00	1	5.00	0.54	17.17
Con-188	TRAPEZOIDAL	1.00	7.00	1	4.00	0.55	8.56
Con-190	TRAPEZOIDAL	1.00	8.00	1	5.00	0.60	2.57
Con-191	TRAPEZOIDAL	1.00	8.00	1	5.00	0.60	1.86
Con-196	CIRCULAR	0.60	0.60	1	0.28	0.15	0.53
Con-197	TRAPEZOIDAL	1.00	7.00	1	4.00	0.55	8.30
Con-198	CIRCULAR	0.60	0.60	1	0.28	0.15	0.49
Con-199	IRREGULAR	0.12	16.00	1	0.80	0.01	0.49
Con-200	CIRCULAR	0.60	0.60	1	0.28	0.15	0.45
Con-201	CIRCULAR	0.60	0.60	1	0.28	0.15	0.48
Con-202	CIRCULAR	0.75	0.75	1	0.44	0.19	0.68
Con-203	CIRCULAR	0.75	0.75	1	0.44	0.19	0.68
Con-205	IRREGULAR	0.12	16.00	1	0.80	0.01	0.69
Con-208	TRAPEZOIDAL	1.00	7.00	1	4.00	0.55	20.66
Con-23	IRREGULAR	0.12	16.00	1	0.80	0.01	0.61
Con-31	IRREGULAR	0.12	16.00	1	0.80	0.01	0.23
Con-32	IRREGULAR	0.12	16.00	1	0.80	0.01	0.28
Con-36	IRREGULAR	0.12	16.00	1	0.80	0.01	0.57
Con-50	IRREGULAR	0.12	16.00	1	0.80	0.01	0.49
Con-51	IRREGULAR	0.06	6.00	1	0.18	0.61	0.04
Con-52	IRREGULAR	0.12	16.00	1	0.80	0.01	0.61
Con-53	IRREGULAR	0.12	16.00	1	0.80	0.01	0.37
Con-54	IRREGULAR	0.06	6.00	1	0.18	0.61	0.09
Con-55	IRREGULAR	0.12	16.00	1	0.80	0.01	0.32
Con-56	IRREGULAR	0.12	16.00	1	0.80	0.01	0.70
Con-57	IRREGULAR	0.12	16.00	1	0.80	0.01	0.26
Con-59	IRREGULAR	0.06	6.00	1	0.18	0.61	0.05
Con-60	IRREGULAR	0.06	6.00	1	0.18	0.61	0.03
Con-61	IRREGULAR	0.12	16.00	1	0.80	0.01	0.23
Con-62	IRREGULAR	0.12	16.00	1	0.80	0.01	0.24
Con-63	IRREGULAR	0.12	16.00	1	0.80	0.01	0.24
Con-64	IRREGULAR	0.12	16.00	1	0.80	0.01	0.21
Con-65	IRREGULAR	0.12	16.00	1	0.80	0.01	0.65
Con-66	IRREGULAR	0.12	16.00	1	0.80	0.01	0.32
Con-67	IRREGULAR	0.15	16.00	1	1.13	0.05	0.71
Con-76	IRREGULAR	0.12	16.00	1	0.80	0.01	0.43
Con-78	TRAPEZOIDAL	1.00	7.00	1	4.00	0.55	13.04
Con-81	IRREGULAR	0.06	6.00	1	0.18	0.61	0.04
Con-83	IRREGULAR	0.12	16.00	1	0.80	0.01	0.71
Con-93	IRREGULAR	0.12	16.00	1	0.80	0.01	0.66
Con-94	IRREGULAR	0.12	16.00	1	0.80	0.01	0.29

Con-97	IRREGULAR	0.06	6.00	1	0.18	0.61	0.03
Culvert-1	CIRCULAR	0.60	0.60	1	0.28	0.15	0.26
Culvert-10	CIRCULAR	0.45	0.45	1	0.16	0.11	0.39
Culvert-11	CIRCULAR	0.60	0.60	1	0.28	0.15	0.67
Culvert-2	CIRCULAR	0.60	0.60	1	0.28	0.15	0.39
Culvert-3	CIRCULAR	0.60	0.60	1	0.28	0.15	1.30
Culvert-4	CIRCULAR	0.60	0.60	1	0.28	0.15	0.48
Culvert-5	CIRCULAR	0.60	0.60	1	0.28	0.15	0.45
Culvert-6	CIRCULAR	0.75	0.75	1	0.44	0.19	0.78
Culvert-9	CIRCULAR	0.60	0.60	1	0.28	0.15	0.78
Ditch-1	TRAPEZOIDAL	1.00	7.00	1	4.00	0.55	7.12
Ditch-10	TRAPEZOIDAL	1.00	7.00	1	4.00	0.55	9.53
Ditch-11	TRAPEZOIDAL	1.00	7.00	1	4.00	0.55	6.49
Ditch-12	TRAPEZOIDAL	1.00	7.00	1	4.00	0.55	6.09
Ditch-13	TRAPEZOIDAL	1.00	7.00	1	4.00	0.55	6.92
Ditch-14	TRAPEZOIDAL	1.00	7.00	1	4.00	0.55	7.62
Ditch-15	TRAPEZOIDAL	1.00	7.00	1	4.00	0.55	17.17
Ditch-17	TRAPEZOIDAL	1.00	7.00	1	4.00	0.55	20.13
Ditch-18	TRAPEZOIDAL	1.00	9.00	1	5.00	0.54	2.22
Ditch-19	TRAPEZOIDAL	1.00	7.00	1	4.00	0.55	2.22
Ditch-2	TRAPEZOIDAL	1.00	7.00	1	4.00	0.55	7.10
Ditch-20	TRAPEZOIDAL	1.00	7.00	1	4.00	0.55	20.38
Ditch-21	TRAPEZOIDAL	1.00	9.00	1	5.00	0.54	24.05
Ditch-22	TRAPEZOIDAL	1.00	7.00	1	4.00	0.55	20.27
Ditch-25	TRAPEZOIDAL	0.50	4.00	1	1.25	0.30	1.72
Ditch-27	TRAPEZOIDAL	1.00	7.00	1	4.00	0.55	5.35
Ditch-3	TRAPEZOIDAL	1.00	7.00	1	4.00	0.55	6.82
Ditch-6	TRAPEZOIDAL	1.00	7.00	1	4.00	0.55	9.44
Ditch-7	TRAPEZOIDAL	1.00	7.00	1	4.00	0.55	13.69
Ditch-8	TRAPEZOIDAL	1.00	7.00	1	4.00	0.55	10.41
Ditch-9	TRAPEZOIDAL	1.00	7.00	1	4.00	0.55	14.96
Outlet Ditch	TRAPEZOIDAL	1.00	11.00	1	7.00	0.62	17.47
Pond Outlet-1	CIRCULAR	0.30	0.30	1	0.07	0.07	0.08
Pond Outlet-2	CIRCULAR	0.30	0.30	1	0.07	0.07	0.12
Pond Outlet-3	CIRCULAR	0.30	0.30	1	0.07	0.07	0.08
Pond Outlet-4	CIRCULAR	0.38	0.38	1	0.11	0.09	0.30
Pond Outlet-5	CIRCULAR	0.60	0.60	1	0.28	0.15	0.75
Swale-1	TRAPEZOIDAL	1.00	8.00	1	5.00	0.60	24.62
Swale-2	TRAPEZOIDAL	1.00	8.00	1	5.00	0.60	2.10
Swale-4	TRAPEZOIDAL	1.00	8.00	1	5.00	0.60	1.49
Swale-6	TRAPEZOIDAL	1.00	8.00	1	5.00	0.60	27.53
Swale-7	TRAPEZOIDAL	1.00	8.00	1	5.00	0.60	3.03
Swale-8	TRAPEZOIDAL	1.00	8.00	1	5.00	0.60	1.59

****
Transect Summary
****

Transect XS-1
Area:

0.0004	0.0014	0.0032	0.0058	0.0090
0.0130	0.0176	0.0230	0.0292	0.0360
0.0436	0.0518	0.0608	0.0706	0.0810
0.0922	0.1040	0.1166	0.1300	0.1440
0.1588	0.1742	0.1904	0.2074	0.2250
0.2434	0.2624	0.2822	0.3028	0.3240
0.3460	0.3686	0.3920	0.4163	0.4420
0.4691	0.4977	0.5277	0.5591	0.5920
0.6263	0.6621	0.6993	0.7379	0.7780
0.8195	0.8625	0.9069	0.9527	1.0000

Hrad:

0.0217	0.0433	0.0650	0.0867	0.1083
0.1300	0.1516	0.1733	0.1950	0.2166
0.2383	0.2600	0.2816	0.3033	0.3250
0.3466	0.3683	0.3900	0.4116	0.4333
0.4549	0.4766	0.4983	0.5199	0.5416
0.5633	0.5849	0.6066	0.6283	0.6499
0.6716	0.6933	0.7149	0.7362	0.7560
0.7747	0.7924	0.8095	0.8260	0.8422
0.8581	0.8739	0.8895	0.9052	0.9208
0.9365	0.9522	0.9680	0.9839	1.0000

```
Width:
            0.0150     0.0300     0.0450     0.0600     0.0750
            0.0900     0.1050     0.1200     0.1350     0.1500
            0.1650     0.1800     0.1950     0.2100     0.2250
            0.2400     0.2550     0.2700     0.2850     0.3000
            0.3150     0.3300     0.3450     0.3600     0.3750
            0.3900     0.4050     0.4200     0.4350     0.4500
            0.4650     0.4800     0.4950     0.5200     0.5500
            0.5800     0.6100     0.6400     0.6700     0.7000
            0.7300     0.7600     0.7900     0.8200     0.8500
            0.8800     0.9100     0.9400     0.9700     1.0000

Transect XS-3
Area:
            0.0004     0.0016     0.0036     0.0064     0.0100
            0.0144     0.0196     0.0256     0.0324     0.0400
            0.0484     0.0576     0.0676     0.0784     0.0900
            0.1024     0.1156     0.1296     0.1444     0.1600
            0.1764     0.1936     0.2116     0.2304     0.2500
            0.2704     0.2916     0.3136     0.3364     0.3600
            0.3844     0.4096     0.4356     0.4624     0.4900
            0.5184     0.5476     0.5776     0.6084     0.6400
            0.6724     0.7056     0.7396     0.7744     0.8100
            0.8464     0.8836     0.9216     0.9604     1.0000
Hrad:
            0.0200     0.0400     0.0600     0.0800     0.1000
            0.1200     0.1400     0.1600     0.1800     0.2000
            0.2200     0.2400     0.2600     0.2800     0.3000
            0.3200     0.3400     0.3600     0.3800     0.4000
            0.4200     0.4400     0.4600     0.4800     0.5000
            0.5200     0.5400     0.5600     0.5800     0.6000
            0.6200     0.6400     0.6600     0.6800     0.7000
            0.7200     0.7400     0.7600     0.7800     0.8000
            0.8200     0.8400     0.8600     0.8800     0.9000
            0.9200     0.9400     0.9600     0.9800     1.0000
Width:
            0.0200     0.0400     0.0600     0.0800     0.1000
            0.1200     0.1400     0.1600     0.1800     0.2000
            0.2200     0.2400     0.2600     0.2800     0.3000
            0.3200     0.3400     0.3600     0.3800     0.4000
            0.4200     0.4400     0.4600     0.4800     0.5000
            0.5200     0.5400     0.5600     0.5800     0.6000
            0.6200     0.6400     0.6600     0.6800     0.7000
            0.7200     0.7400     0.7600     0.7800     0.8000
            0.8200     0.8400     0.8600     0.8800     0.9000
            0.9200     0.9400     0.9600     0.9800     1.0000

Transect XS-5
Area:
            0.0004     0.0016     0.0036     0.0064     0.0100
            0.0143     0.0195     0.0255     0.0323     0.0398
            0.0482     0.0573     0.0673     0.0781     0.0896
            0.1019     0.1151     0.1290     0.1438     0.1593
            0.1756     0.1927     0.2107     0.2294     0.2489
            0.2692     0.2903     0.3122     0.3349     0.3584
            0.3827     0.4078     0.4337     0.4604     0.4878
            0.5161     0.5452     0.5750     0.6057     0.6372
            0.6694     0.7025     0.7363     0.7710     0.8064
            0.8427     0.8797     0.9182     0.9583     1.0000
Hrad:
            0.0195     0.0389     0.0584     0.0778     0.0973
            0.1168     0.1362     0.1557     0.1751     0.1946
            0.2141     0.2335     0.2530     0.2724     0.2919
            0.3113     0.3308     0.3503     0.3697     0.3892
            0.4086     0.4281     0.4476     0.4670     0.4865
            0.5059     0.5254     0.5449     0.5643     0.5838
            0.6032     0.6227     0.6422     0.6616     0.6811
            0.7005     0.7200     0.7395     0.7589     0.7784
            0.8071     0.8350     0.8622     0.8888     0.9148
            0.9403     0.9615     0.9747     0.9875     1.0000
Width:
            0.0188     0.0375     0.0563     0.0750     0.0938
```

```
            0.1125     0.1313     0.1500     0.1688     0.1875
            0.2063     0.2250     0.2438     0.2625     0.2813
            0.3000     0.3188     0.3375     0.3563     0.3750
            0.3938     0.4125     0.4313     0.4500     0.4688
            0.4875     0.5063     0.5250     0.5438     0.5625
            0.5813     0.6000     0.6188     0.6375     0.6563
            0.6750     0.6938     0.7125     0.7313     0.7500
            0.7688     0.7875     0.8063     0.8250     0.8438
            0.8625     0.8875     0.9250     0.9625     1.0000

**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Total Precipitation ......        12.237       109.910
Evaporation Loss .........         0.217         1.951
Infiltration Loss ........         9.524        85.543
Surface Runoff ...........         2.496        22.416
Final Surface Storage ....         0.000         0.000
Continuity Error (%) .....        -0.000

**************************        Volume        Volume
Flow Routing Continuity        hectare-m       Mliters
**************************     ---------      ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         2.495        24.947
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.000
External Outflow .........         2.486        24.858
Surface Flooding .........         0.000         0.000
Evaporation Loss .........         0.000         0.000
Initial Stored Volume ....         0.826         8.260
Final Stored Volume ......         0.834         8.341
Continuity Error (%) .....         0.024


************************************************
EPA SWMM Time of Concentration Computations Report
************************************************

        Tc = (0.94 * (L^0.6) * (n^0.6)) / ((i^0.4) * (S^0.3))

        Where:

        Tc = Time of Concentration (min)
        L  = Flow Length (ft)
        n  = Manning's Roughness
        i  = Rainfall Intensity (in/hr)
        S  = Slope (ft/ft)

--------------
Subbasin Sub-1
--------------

        Flow length (m):                            65.00
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                0.50000
        Computed TOC (minutes):                     98.78

--------------
Subbasin Sub-10
--------------

        Flow length (m):                            98.00
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
```

```
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                3.00000
        Computed TOC (minutes):                     73.83

--------------
Subbasin Sub-11
--------------

        Flow length (m):                            88.33
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                3.00000
        Computed TOC (minutes):                     69.37

--------------
Subbasin Sub-12
--------------

        Flow length (m):                           202.86
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                3.50000
        Computed TOC (minutes):                    109.07

--------------
Subbasin Sub-120
--------------

        Flow length (m):                           685.00
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                5.00000
        Computed TOC (minutes):                    203.40

--------------
Subbasin Sub-121
--------------

        Flow length (m):                           130.00
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                0.50000
        Computed TOC (minutes):                    116.32

--------------
Subbasin Sub-122
--------------

        Flow length (m):                           184.44
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                0.50000
        Computed TOC (minutes):                    143.49

--------------
Subbasin Sub-123
--------------

        Flow length (m):                           223.08
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
```

```
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                0.50000
        Computed TOC (minutes):                    160.83

--------------
Subbasin Sub-13
--------------

        Flow length (m):                           140.50
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                3.00000
        Computed TOC (minutes):                     91.64

--------------
Subbasin Sub-14
--------------

        Flow length (m):                           412.57
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                5.50000
        Computed TOC (minutes):                    145.82

--------------
Subbasin Sub-15
--------------

        Flow length (m):                           241.90
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                6.00000
        Computed TOC (minutes):                    100.60

--------------
Subbasin Sub-16
--------------

        Flow length (m):                           145.00
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                1.50000
        Computed TOC (minutes):                    101.18

--------------
Subbasin Sub-17
--------------

        Flow length (m):                           305.00
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                1.50000
        Computed TOC (minutes):                    158.07

--------------
Subbasin Sub-18
--------------

        Flow length (m):                           120.00
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
```

```
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                2.00000
        Computed TOC (minutes):                     82.85

--------------
Subbasin Sub-19
--------------

        Flow length (m):                           156.67
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                2.00000
        Computed TOC (minutes):                     77.65

--------------
Subbasin Sub-2
--------------

        Flow length (m):                           126.00
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                1.00000
        Computed TOC (minutes):                     92.73

--------------
Subbasin Sub-20
--------------

        Flow length (m):                           128.00
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                1.00000
        Computed TOC (minutes):                     93.61

--------------
Subbasin Sub-21
--------------

        Flow length (m):                            63.33
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                3.00000
        Computed TOC (minutes):                     44.14

--------------
Subbasin Sub-22
--------------

        Flow length (m):                           106.00
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                2.00000
        Computed TOC (minutes):                     61.42

--------------
Subbasin Sub-23
--------------

        Flow length (m):                           108.57
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
```

```
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                0.50000
        Computed TOC (minutes):                    104.41

--------------
Subbasin Sub-24
--------------

        Flow length (m):                           125.00
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                0.50000
        Computed TOC (minutes):                    146.24

--------------
Subbasin Sub-25
--------------

        Flow length (m):                            86.67
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                1.00000
        Computed TOC (minutes):                    80.72

--------------
Subbasin Sub-26
--------------

        Flow length (m):                           135.00
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                2.00000
        Computed TOC (minutes):                    78.50

--------------
Subbasin Sub-27
--------------

        Flow length (m):                           105.00
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                2.00000
        Computed TOC (minutes):                    67.51

--------------
Subbasin Sub-28
--------------

        Flow length (m):                            87.50
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                3.00000
        Computed TOC (minutes):                    68.97

--------------
Subbasin Sub-29
--------------

        Flow length (m):                           243.33
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
```

```
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                3.50000
        Computed TOC (minutes):                    121.65

--------------
Subbasin Sub-3
--------------

        Flow length (m):                            50.00
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                1.00000
        Computed TOC (minutes):                     68.55

--------------
Subbasin Sub-30
--------------

        Flow length (m):                            91.67
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                2.00000
        Computed TOC (minutes):                     62.23

--------------
Subbasin Sub-31
--------------

        Flow length (m):                            90.00
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                2.00000
        Computed TOC (minutes):                     61.55

--------------
Subbasin Sub-32
--------------

        Flow length (m):                           162.50
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                0.50000
        Computed TOC (minutes):                    166.99

--------------
Subbasin Sub-33
--------------

        Flow length (m):                           203.33
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                3.00000
        Computed TOC (minutes):                     88.87

--------------
Subbasin Sub-34
--------------

        Flow length (m):                            88.33
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
```

```
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                0.50000
        Computed TOC (minutes):                     92.25

--------------
Subbasin Sub-35
--------------

        Flow length (m):                           162.00
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                3.00000
        Computed TOC (minutes):                     81.07

--------------
Subbasin Sub-36
--------------

        Flow length (m):                            95.00
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                0.50000
        Computed TOC (minutes):                     96.37

--------------
Subbasin Sub-37
--------------

        Flow length (m):                           143.33
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                0.50000
        Computed TOC (minutes):                    123.34

--------------
Subbasin Sub-38
--------------

        Flow length (m):                           146.67
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                1.00000
        Computed TOC (minutes):                    130.74

--------------
Subbasin Sub-39
--------------

        Flow length (m):                            60.00
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                2.00000
        Computed TOC (minutes):                     48.26

--------------
Subbasin Sub-4
--------------

        Flow length (m):                           223.00
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
```

```
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                3.50000
        Computed TOC (minutes):                    115.45

--------------
Subbasin Sub-40
--------------

        Flow length (m):                            45.00
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                2.00000
        Computed TOC (minutes):                     52.27

--------------
Subbasin Sub-41
--------------

        Flow length (m):                           133.33
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                3.00000
        Computed TOC (minutes):                     68.99

--------------
Subbasin Sub-42
--------------

        Flow length (m):                           130.00
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                3.00000
        Computed TOC (minutes):                     67.95

--------------
Subbasin Sub-43
--------------

        Flow length (m):                            67.50
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                0.50000
        Computed TOC (minutes):                    101.04

--------------
Subbasin Sub-44
--------------

        Flow length (m):                            85.00
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                0.50000
        Computed TOC (minutes):                    116.03

--------------
Subbasin Sub-45
--------------

        Flow length (m):                            92.86
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
```

```
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                1.00000
        Computed TOC (minutes):                     77.21

--------------
Subbasin Sub-46
--------------

        Flow length (m):                            78.57
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                0.50000
        Computed TOC (minutes):                    110.68

--------------
Subbasin Sub-47
--------------

        Flow length (m):                           107.50
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                2.00000
        Computed TOC (minutes):                     68.47

--------------
Subbasin Sub-48
--------------

        Flow length (m):                           145.56
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                1.50000
        Computed TOC (minutes):                     89.53

--------------
Subbasin Sub-49
--------------

        Flow length (m):                            73.33
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                2.00000
        Computed TOC (minutes):                     54.43

--------------
Subbasin Sub-5
--------------

        Flow length (m):                           202.73
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                1.50000
        Computed TOC (minutes):                    109.22

--------------
Subbasin Sub-50
--------------

        Flow length (m):                            70.00
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
```

```
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                0.50000
        Computed TOC (minutes):                    103.27

--------------
Subbasin Sub-51
--------------

        Flow length (m):                           126.67
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                0.50000
        Computed TOC (minutes):                    114.52

--------------
Subbasin Sub-52
--------------

        Flow length (m):                            71.11
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                0.50000
        Computed TOC (minutes):                    80.99

--------------
Subbasin Sub-53
--------------

        Flow length (m):                            40.00
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                0.50000
        Computed TOC (minutes):                    73.82

--------------
Subbasin Sub-54
--------------

        Flow length (m):                            57.50
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                0.50000
        Computed TOC (minutes):                    71.30

--------------
Subbasin Sub-55
--------------

        Flow length (m):                            43.75
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                0.50000
        Computed TOC (minutes):                    60.52

--------------
Subbasin Sub-56
--------------

        Flow length (m):                           105.00
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
```

```
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                0.50000
        Computed TOC (minutes):                     92.57

--------------
Subbasin Sub-57
--------------

        Flow length (m):                            86.67
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                0.50000
        Computed TOC (minutes):                     99.38

--------------
Subbasin Sub-58
--------------

        Flow length (m):                            60.00
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                3.00000
        Computed TOC (minutes):                     29.47

--------------
Subbasin Sub-59
--------------

        Flow length (m):                           101.67
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                3.00000
        Computed TOC (minutes):                     58.64

--------------
Subbasin Sub-6
--------------

        Flow length (m):                           383.64
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                3.50000
        Computed TOC (minutes):                    150.98

--------------
Subbasin Sub-60
--------------

        Flow length (m):                           108.33
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                0.50000
        Computed TOC (minutes):                    134.21

--------------
Subbasin Sub-61
--------------

        Flow length (m):                            42.86
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
```

```
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                1.00000
        Computed TOC (minutes):                     62.49

--------------
Subbasin Sub-62
--------------

        Flow length (m):                            60.00
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                1.00000
        Computed TOC (minutes):                     29.29

--------------
Subbasin Sub-63
--------------

        Flow length (m):                           100.00
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                3.00000
        Computed TOC (minutes):                     74.73

--------------
Subbasin Sub-64
--------------

        Flow length (m):                            68.00
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                0.50000
        Computed TOC (minutes):                     78.85

--------------
Subbasin Sub-65
--------------

        Flow length (m):                            36.00
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                0.50000
        Computed TOC (minutes):                     69.30

--------------
Subbasin Sub-66
--------------

        Flow length (m):                           105.00
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                0.50000
        Computed TOC (minutes):                    102.33

--------------
Subbasin Sub-67
--------------

        Flow length (m):                            82.50
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
```

```
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                1.00000
        Computed TOC (minutes):                     71.92

--------------
Subbasin Sub-68
--------------

        Flow length (m):                            97.50
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                2.00000
        Computed TOC (minutes):                     64.58

--------------
Subbasin Sub-69
--------------

        Flow length (m):                           107.14
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                1.00000
        Computed TOC (minutes):                     84.13

--------------
Subbasin Sub-7
--------------

        Flow length (m):                           109.00
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                3.50000
        Computed TOC (minutes):                     75.14

--------------
Subbasin Sub-70
--------------

        Flow length (m):                           130.00
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                1.00000
        Computed TOC (minutes):                     46.58

--------------
Subbasin Sub-71
--------------

        Flow length (m):                            73.75
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                1.00000
        Computed TOC (minutes):                     60.83

--------------
Subbasin Sub-72
--------------

        Flow length (m):                            97.78
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
```

```
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                1.00000
        Computed TOC (minutes):                    102.51

--------------
Subbasin Sub-73
--------------

        Flow length (m):                            86.67
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                3.00000
        Computed TOC (minutes):                     68.58

--------------
Subbasin Sub-74
--------------

        Flow length (m):                            75.00
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                2.00000
        Computed TOC (minutes):                     55.17

--------------
Subbasin Sub-75
--------------

        Flow length (m):                            86.25
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                2.00000
        Computed TOC (minutes):                     60.00

--------------
Subbasin Sub-76
--------------

        Flow length (m):                            85.56
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                3.00000
        Computed TOC (minutes):                     52.87

--------------
Subbasin Sub-8
--------------

        Flow length (m):                           161.25
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      0.00710
        Impervious Rainfall Intensity (mm/hr):    0.00710
        Slope (%):                                1.50000
        Computed TOC (minutes):                     95.20

--------------
Subbasin Sub-9
--------------

        Flow length (m):                           161.67
        Pervious Manning's Roughness:             0.25000
        Impervious Manning's Roughness:           0.01500
```

PostDevelopment Model - Skyy Country Golf & R.V.

```
Pervious Rainfall Intensity (mm/hr):      0.00710
Impervious Rainfall Intensity (mm/hr):    0.00710
Slope (%):                                3.50000
Computed TOC (minutes):                     95.19
```

****
Subbasin Runoff Summary
****

Subbasin ID	Total Rainfall mm	Total Runon mm	Total Evap. mm	Total Infil. mm	Total Runoff mm	Peak Runoff cms	Runoff Coefficient	Time of Concentration days	Time of Concentration hh:mm:ss
Sub-1	109.910	0.000	1.792	95.614	12.503	0.01	0.114	0	01:38:46
Sub-10	109.910	0.000	1.792	94.505	13.613	0.01	0.124	0	01:13:49
Sub-11	109.910	0.000	1.792	94.304	13.813	0.02	0.126	0	01:09:22
Sub-12	109.910	0.000	1.792	96.056	12.062	0.03	0.110	0	01:49:04
Sub-120	109.910	0.000	1.792	99.390	8.728	0.27	0.079	0	03:23:23
Sub-121	109.910	0.000	2.253	63.266	44.391	0.07	0.404	0	01:56:19
Sub-122	109.910	0.000	2.266	63.967	43.677	0.10	0.397	0	02:23:29
Sub-123	109.910	0.000	2.274	64.376	43.260	0.16	0.394	0	02:40:49
Sub-13	109.910	0.000	1.792	95.301	12.816	0.06	0.117	0	01:31:38
Sub-14	109.910	0.000	1.792	97.513	10.605	0.19	0.096	0	02:25:49
Sub-15	109.910	0.000	1.842	91.827	16.241	0.11	0.148	0	01:40:36
Sub-16	109.910	0.000	2.037	77.348	30.525	0.03	0.278	0	01:41:10
Sub-17	109.910	0.000	2.046	79.154	28.709	0.05	0.261	0	02:38:04
Sub-18	109.910	0.000	2.034	76.695	31.181	0.02	0.284	0	01:22:50
Sub-19	109.910	0.000	2.379	52.598	54.933	0.04	0.500	0	01:17:38
Sub-2	109.910	0.000	2.242	62.603	45.064	0.09	0.410	0	01:32:43
Sub-20	109.910	0.000	2.243	62.629	45.038	0.09	0.410	0	01:33:36
Sub-21	109.910	0.000	2.220	61.196	46.493	0.04	0.423	0	00:44:08
Sub-22	109.910	0.000	2.366	52.194	55.349	0.05	0.504	0	01:01:25
Sub-23	109.910	0.000	2.248	62.936	44.725	0.05	0.407	0	01:44:24
Sub-24	109.910	0.000	1.792	97.529	10.589	0.01	0.096	0	02:26:14
Sub-25	109.910	0.000	2.100	71.829	35.980	0.03	0.327	0	01:20:43
Sub-26	109.910	0.000	2.236	62.187	45.487	0.08	0.414	0	01:18:30
Sub-27	109.910	0.000	2.231	61.862	45.816	0.07	0.417	0	01:07:30
Sub-28	109.910	0.000	1.792	94.287	13.831	0.01	0.126	0	01:08:58
Sub-29	109.910	0.000	1.792	96.577	11.541	0.04	0.105	0	02:01:39
Sub-3	109.910	0.000	1.792	94.268	13.850	0.00	0.126	0	01:08:32
Sub-30	109.910	0.000	2.228	61.707	45.974	0.05	0.418	0	01:02:13
Sub-31	109.910	0.000	2.228	61.687	45.994	0.04	0.418	0	01:01:32
Sub-32	109.910	0.000	1.843	94.290	13.777	0.01	0.125	0	02:46:59
Sub-33	109.910	0.000	2.241	62.491	45.178	0.04	0.411	0	01:28:52
Sub-34	109.910	0.000	2.242	62.589	45.078	0.04	0.410	0	01:32:15
Sub-35	109.910	0.000	2.168	67.052	40.690	0.05	0.370	0	01:21:04
Sub-36	109.910	0.000	2.244	62.708	44.958	0.04	0.409	0	01:36:22
Sub-37	109.910	0.000	2.256	63.454	44.200	0.03	0.402	0	02:03:20
Sub-38	109.910	0.000	1.792	96.939	11.178	0.01	0.102	0	02:10:44
Sub-39	109.910	0.000	2.222	61.308	46.379	0.04	0.422	0	00:48:15
Sub-4	109.910	0.000	1.792	96.322	11.795	0.04	0.107	0	01:55:26
Sub-40	109.910	0.000	1.792	93.548	14.546	0.00	0.132	0	00:52:16
Sub-41	109.910	0.000	2.232	61.906	45.772	0.06	0.416	0	01:08:59
Sub-42	109.910	0.000	2.231	61.875	45.803	0.06	0.417	0	01:07:57
Sub-43	109.910	0.000	1.792	95.712	12.405	0.01	0.113	0	01:41:02
Sub-44	109.910	0.000	1.792	96.347	11.771	0.01	0.107	0	01:56:01
Sub-45	109.910	0.000	2.235	62.149	45.526	0.05	0.414	0	01:17:12
Sub-46	109.910	0.000	1.792	96.124	11.994	0.01	0.109	0	01:50:41
Sub-47	109.910	0.000	2.231	61.891	45.788	0.03	0.417	0	01:08:28
Sub-48	109.910	0.000	2.241	62.510	45.158	0.09	0.411	0	01:29:31
Sub-49	109.910	0.000	2.225	61.482	46.203	0.02	0.420	0	00:54:25
Sub-5	109.910	0.000	2.250	63.071	44.589	0.15	0.406	0	01:49:13
Sub-50	109.910	0.000	1.792	95.809	12.309	0.01	0.112	0	01:43:16
Sub-51	109.910	0.000	2.252	63.217	44.441	0.05	0.404	0	01:54:31
Sub-52	109.910	0.000	2.237	62.260	45.412	0.05	0.413	0	01:20:59
Sub-53	109.910	0.000	1.792	94.505	13.613	0.00	0.124	0	01:13:49
Sub-54	109.910	0.000	2.233	61.974	45.703	0.04	0.416	0	01:11:18
Sub-55	109.910	0.000	2.228	61.657	46.024	0.03	0.419	0	01:00:31
Sub-56	109.910	0.000	2.390	52.968	54.552	0.03	0.496	0	01:32:34
Sub-57	109.910	0.000	2.104	72.455	35.351	0.01	0.322	0	01:39:22

Sub-58	109.910	0.000	2.613	32.756	74.541	0.05	0.678	0	00:29:28
Sub-59	109.910	0.000	2.227	61.603	46.080	0.05	0.419	0	00:58:38
Sub-6	109.910	19.551	1.913	94.631	32.916	0.12	0.254	0	02:30:58
Sub-60	109.910	0.000	1.792	97.074	11.043	0.01	0.100	0	02:14:12
Sub-61	109.910	0.000	1.792	93.997	14.121	0.01	0.128	0	01:02:29
Sub-62	109.910	0.000	2.842	18.716	88.351	0.05	0.804	0	00:29:17
Sub-63	109.910	0.000	1.792	94.546	13.572	0.01	0.123	0	01:14:43
Sub-64	109.910	0.000	2.236	62.197	45.477	0.03	0.414	0	01:18:50
Sub-65	109.910	0.000	1.792	94.301	13.817	0.01	0.126	0	01:09:17
Sub-66	109.910	0.000	2.247	62.878	44.785	0.03	0.407	0	01:42:19
Sub-67	109.910	0.000	2.233	61.992	45.684	0.05	0.416	0	01:11:55
Sub-68	109.910	0.000	2.230	61.776	45.904	0.06	0.418	0	01:04:34
Sub-69	109.910	0.000	2.238	62.353	45.319	0.06	0.412	0	01:24:07
Sub-7	109.910	0.000	1.792	94.564	13.554	0.06	0.123	0	01:15:08
Sub-70	109.910	0.000	2.903	18.850	88.158	0.03	0.802	0	00:46:34
Sub-71	109.910	0.000	2.366	52.179	55.364	0.06	0.504	0	01:00:49
Sub-72	109.910	0.000	1.792	95.776	12.342	0.02	0.112	0	01:42:30
Sub-73	109.910	0.000	1.792	94.269	13.849	0.02	0.126	0	01:08:34
Sub-74	109.910	0.000	2.225	61.503	46.181	0.05	0.420	0	00:55:10
Sub-75	109.910	0.000	2.227	61.642	46.040	0.06	0.419	0	00:59:59
Sub-76	109.910	0.000	2.224	61.438	46.248	0.07	0.421	0	00:52:52
Sub-8	109.910	0.000	2.244	62.675	44.992	0.09	0.409	0	01:35:12
Sub-9	109.910	0.000	1.792	95.457	12.660	0.02	0.115	0	01:35:11
Averages / Totals	109.910	0.741	1.951	85.543	23.157	3.583	0.209		

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Node Depth Summary
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Node ID	Average Depth Attained m	Maximum Depth Attained m	Maximum HGL Attained m	Time of Max Occurrence days	Time of Max Occurrence hh:mm	Maximum Ponded Volume ha-mm	Total Time Flooded minutes	Retention Time hh:mm:ss
Jun-1	0.07	0.29	969.29	0	11:59	0	0	0:00:00
Jun-10	0.02	0.19	983.26	0	10:15	0	0	0:00:00
Jun-106	0.00	0.01	973.01	0	10:15	0	0	0:00:00
Jun-107	0.04	0.26	969.06	0	10:22	0	0	0:00:00
Jun-108	0.04	0.31	966.31	0	10:23	0	0	0:00:00
Jun-109	0.04	0.24	962.74	0	10:07	0	0	0:00:00
Jun-110	0.06	0.41	962.41	0	10:12	0	0	0:00:00
Jun-111	0.10	0.52	958.52	0	10:27	0	0	0:00:00
Jun-112	0.21	1.00	956.50	0	10:37	0	0	0:00:00
Jun-113	0.05	0.39	967.89	0	09:55	0	0	0:00:00
Jun-115	0.08	0.68	967.88	0	09:55	0	0	0:00:00
Jun-116	0.08	0.56	967.11	0	10:11	0	0	0:00:00
Jun-117	0.09	0.70	967.45	0	10:11	0	0	0:00:00
Jun-122	0.01	0.08	966.98	0	10:07	0	0	0:00:00
Jun-123	0.03	0.22	980.22	0	10:14	0	0	0:00:00
Jun-124	0.03	0.21	982.48	0	10:12	0	0	0:00:00
Jun-125	0.02	0.21	983.09	0	10:15	0	0	0:00:00
Jun-126	0.04	0.34	983.00	0	10:15	0	0	0:00:00
Jun-129	0.05	0.44	967.12	0	10:11	0	0	0:00:00
Jun-13	0.02	0.08	970.08	0	09:50	0	0	0:00:00
Jun-130	0.02	0.20	970.35	0	10:25	0	0	0:00:00
Jun-131	0.04	0.30	971.15	0	10:25	0	0	0:00:00
Jun-135	0.03	0.17	955.42	0	09:49	0	0	0:00:00
Jun-136	0.02	0.08	958.08	0	09:54	0	0	0:00:00
Jun-14	0.02	0.14	961.64	0	09:51	0	0	0:00:00
Jun-147	0.04	0.33	970.23	0	10:20	0	0	0:00:00
Jun-15	0.01	0.05	982.85	0	09:46	0	0	0:00:00
Jun-154	0.06	0.39	968.09	0	09:48	0	0	0:00:00
Jun-155	0.04	0.26	968.66	0	09:46	0	0	0:00:00
Jun-156	0.01	0.05	971.65	0	10:12	0	0	0:00:00
Jun-157	0.07	0.53	969.73	0	09:45	0	0	0:00:00
Jun-158	0.06	0.44	969.54	0	09:46	0	0	0:00:00
Jun-159	0.10	0.63	966.68	0	10:10	0	0	0:00:00
Jun-16	0.05	0.36	977.36	0	09:56	0	0	0:00:00
Jun-18	0.04	0.36	981.09	0	09:54	0	0	0:00:00

Jun-19	0.02	0.10	959.50	0	09:53	0	0	0:00:00
Jun-2	0.05	0.21	968.71	0	12:06	0	0	0:00:00
Jun-20	0.05	0.46	967.46	0	10:11	0	0	0:00:00
Jun-21	0.01	0.07	972.87	0	10:35	0	0	0:00:00
Jun-22	0.01	0.08	966.78	0	09:45	0	0	0:00:00
Jun-23	0.01	0.08	963.08	0	09:45	0	0	0:00:00
Jun-24	0.04	0.21	962.51	0	10:46	0	0	0:00:00
Jun-25	0.20	1.11	961.71	0	11:02	0	0	0:00:00
Jun-26	0.02	0.08	967.60	0	09:52	0	0	0:00:00
Jun-27	0.03	0.18	958.08	0	09:48	0	0	0:00:00
Jun-28	0.01	0.12	959.32	0	09:49	0	0	0:00:00
Jun-29	0.01	0.07	961.37	0	09:49	0	0	0:00:00
Jun-3	0.01	0.15	978.05	0	10:06	0	0	0:00:00
Jun-31	0.01	0.04	980.69	0	10:00	0	0	0:00:00
Jun-34	0.01	0.03	968.53	0	10:15	0	0	0:00:00
Jun-35	0.01	0.06	968.26	0	09:49	0	0	0:00:00
Jun-39	0.00	0.03	968.68	0	10:14	0	0	0:00:00
Jun-4	0.02	0.10	977.00	0	10:47	0	0	0:00:00
Jun-40	0.01	0.04	968.24	0	09:46	0	0	0:00:00
Jun-42	0.01	0.06	967.26	0	09:53	0	0	0:00:00
Jun-43	0.00	0.04	968.39	0	10:15	0	0	0:00:00
Jun-44	0.01	0.06	964.76	0	09:51	0	0	0:00:00
Jun-45	0.02	0.09	960.89	0	09:51	0	0	0:00:00
Jun-46	0.00	0.02	964.72	0	10:06	0	0	0:00:00
Jun-47	0.00	0.04	960.75	0	10:15	0	0	0:00:00
Jun-48	0.01	0.06	968.41	0	09:45	0	0	0:00:00
Jun-49	0.01	0.05	965.75	0	09:47	0	0	0:00:00
Jun-5	0.04	0.16	970.46	0	11:57	0	0	0:00:00
Jun-50	0.01	0.05	959.95	0	10:03	0	0	0:00:00
Jun-51	0.01	0.05	959.75	0	10:17	0	0	0:00:00
Jun-52	0.04	0.21	959.11	0	10:40	0	0	0:00:00
Jun-53	0.01	0.06	959.36	0	10:16	0	0	0:00:00
Jun-54	0.00	0.03	959.43	0	10:00	0	0	0:00:00
Jun-55	0.03	0.16	958.76	0	10:25	0	0	0:00:00
Jun-56	0.02	0.08	960.58	0	09:50	0	0	0:00:00
Jun-57	0.01	0.05	969.45	0	09:45	0	0	0:00:00
Jun-6	0.03	0.10	963.00	0	13:48	0	0	0:00:00
Jun-60	0.10	0.70	966.85	0	10:10	0	0	0:00:00
Jun-61	0.00	0.03	968.33	0	10:05	0	0	0:00:00
Jun-62	0.02	0.08	975.08	0	09:45	0	0	0:00:00
Jun-63	0.02	0.11	970.11	0	09:49	0	0	0:00:00
Jun-64	0.04	0.22	965.52	0	10:47	0	0	0:00:00
Jun-65	0.06	0.31	963.81	0	10:47	0	0	0:00:00
Jun-67	0.01	0.07	982.07	0	09:48	0	0	0:00:00
Jun-68	0.01	0.05	982.45	0	09:45	0	0	0:00:00
Jun-69	0.01	0.08	979.48	0	09:49	0	0	0:00:00
Jun-7	0.06	0.18	952.78	0	13:08	0	0	0:00:00
Jun-70	0.02	0.08	974.88	0	09:50	0	0	0:00:00
Jun-71	0.02	0.18	959.68	0	09:51	0	0	0:00:00
Jun-72	0.01	0.08	966.08	0	09:47	0	0	0:00:00
Jun-74	0.01	0.08	968.58	0	09:47	0	0	0:00:00
Jun-76	0.01	0.06	972.36	0	09:46	0	0	0:00:00
Jun-79	0.01	0.05	974.05	0	09:45	0	0	0:00:00
Jun-8	0.01	0.04	986.15	0	09:45	0	0	0:00:00
Jun-80	0.02	0.09	967.59	0	09:52	0	0	0:00:00
Jun-82	0.02	0.09	982.19	0	09:51	0	0	0:00:00
Jun-83	0.02	0.13	977.23	0	10:11	0	0	0:00:00
Jun-84	0.01	0.12	978.92	0	10:10	0	0	0:00:00
Jun-85	0.01	0.13	981.93	0	10:13	0	0	0:00:00
Jun-86	0.00	0.03	982.28	0	10:10	0	0	0:00:00
Jun-88	0.02	0.20	982.78	0	10:12	0	0	0:00:00
Jun-89	0.01	0.04	983.62	0	09:45	0	0	0:00:00
Jun-9	0.04	0.36	983.49	0	10:15	0	0	0:00:00
Jun-90	0.01	0.05	980.75	0	09:45	0	0	0:00:00
Jun-92	0.01	0.06	981.11	0	09:49	0	0	0:00:00
Jun-95	0.00	0.03	981.80	0	10:06	0	0	0:00:00
Out-1	0.00	0.00	949.50	0	00:00	0	0	0:00:00
Pond-1	2.05	2.24	977.24	0	10:44	0	0	0:00:00
Pond-2	2.13	2.79	971.29	0	11:56	0	0	0:00:00
Pond-3	2.17	2.79	963.79	0	13:49	0	0	0:00:00
Pond-4	2.38	3.60	954.60	0	13:07	0	0	0:00:00
Pond-5	2.09	2.52	966.02	0	10:46	0	0	0:00:00

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Node Flow Summary
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Node ID	Element Type	Maximum Lateral Inflow cms	Maximum Total Inflow cms	Time of Peak Inflow Occurrence days	Time of Peak Inflow Occurrence hh:mm	Maximum Flooding Overflow cms	Time of Peak Flooding Occurrence days	Time of Peak Flooding Occurrence hh:mm
Jun-1	JUNCTION	0.000	0.219	0	11:57	0.00		
Jun-10	JUNCTION	0.000	0.192	0	10:15	0.00		
Jun-106	JUNCTION	0.010	0.010	0	10:15	0.00		
Jun-107	JUNCTION	0.011	0.158	0	09:50	0.00		
Jun-108	JUNCTION	0.016	0.201	0	10:00	0.00		
Jun-109	JUNCTION	0.014	0.234	0	10:05	0.00		
Jun-110	JUNCTION	0.041	0.249	0	10:08	0.00		
Jun-111	JUNCTION	0.000	0.780	0	10:25	0.00		
Jun-112	JUNCTION	0.000	0.779	0	10:27	0.00		
Jun-113	JUNCTION	0.161	0.578	0	09:47	0.00		
Jun-115	JUNCTION	0.000	0.561	0	09:46	0.00		
Jun-116	JUNCTION	0.033	0.543	0	10:10	0.00		
Jun-117	JUNCTION	0.000	0.533	0	10:09	0.00		
Jun-122	JUNCTION	0.000	0.018	0	10:05	0.00		
Jun-123	JUNCTION	0.000	0.251	0	10:13	0.00		
Jun-124	JUNCTION	0.014	0.236	0	10:11	0.00		
Jun-125	JUNCTION	0.048	0.212	0	10:15	0.00		
Jun-126	JUNCTION	0.000	0.212	0	10:15	0.00		
Jun-129	JUNCTION	0.000	0.532	0	10:12	0.00		
Jun-13	JUNCTION	0.045	0.255	0	09:49	0.00		
Jun-130	JUNCTION	0.000	0.267	0	10:25	0.00		
Jun-131	JUNCTION	0.267	0.267	0	10:24	0.00		
Jun-135	JUNCTION	0.000	0.178	0	09:48	0.00		
Jun-136	JUNCTION	0.000	0.415	0	09:54	0.00		
Jun-14	JUNCTION	0.081	0.321	0	09:51	0.00		
Jun-147	JUNCTION	0.067	0.289	0	10:20	0.00		
Jun-15	JUNCTION	0.036	0.036	0	09:44	0.00		
Jun-154	JUNCTION	0.000	0.440	0	09:46	0.00		
Jun-155	JUNCTION	0.097	0.446	0	09:46	0.00		
Jun-156	JUNCTION	0.039	0.039	0	10:09	0.00		
Jun-157	JUNCTION	0.148	0.365	0	09:45	0.00		
Jun-158	JUNCTION	0.000	0.360	0	09:45	0.00		
Jun-159	JUNCTION	0.000	0.562	0	10:10	0.00		
Jun-16	JUNCTION	0.051	0.127	0	09:45	0.00		
Jun-18	JUNCTION	0.049	0.105	0	09:45	0.00		
Jun-19	JUNCTION	0.049	0.174	0	09:49	0.00		
Jun-2	JUNCTION	0.000	0.219	0	11:59	0.00		
Jun-20	JUNCTION	0.055	0.595	0	09:50	0.00		
Jun-21	JUNCTION	0.000	0.113	0	10:31	0.00		
Jun-22	JUNCTION	0.052	0.060	0	09:45	0.00		
Jun-23	JUNCTION	0.058	0.058	0	09:44	0.00		
Jun-24	JUNCTION	0.051	0.532	0	10:45	0.00		
Jun-25	JUNCTION	0.016	0.760	0	10:35	0.00		
Jun-26	JUNCTION	0.040	0.067	0	09:45	0.00		
Jun-27	JUNCTION	0.089	0.181	0	09:47	0.00		
Jun-28	JUNCTION	0.029	0.111	0	09:49	0.00		
Jun-29	JUNCTION	0.052	0.091	0	09:45	0.00		
Jun-3	JUNCTION	0.061	0.061	0	09:59	0.00		
Jun-31	JUNCTION	0.000	0.024	0	09:53	0.00		
Jun-34	JUNCTION	0.010	0.010	0	09:44	0.00		
Jun-35	JUNCTION	0.038	0.045	0	09:45	0.00		
Jun-39	JUNCTION	0.007	0.007	0	10:10	0.00		
Jun-4	JUNCTION	0.000	0.103	0	10:44	0.00		
Jun-40	JUNCTION	0.000	0.037	0	09:45	0.00		
Jun-42	JUNCTION	0.027	0.071	0	09:50	0.00		
Jun-43	JUNCTION	0.004	0.010	0	10:01	0.00		
Jun-44	JUNCTION	0.063	0.113	0	09:45	0.00		
Jun-45	JUNCTION	0.062	0.152	0	09:45	0.00		
Jun-46	JUNCTION	0.005	0.005	0	10:05	0.00		
Jun-47	JUNCTION	0.006	0.011	0	10:08	0.00		

Jun-48	JUNCTION	0.034	0.034	0	09:44	0.00
Jun-49	JUNCTION	0.019	0.052	0	09:45	0.00
Jun-5	JUNCTION	0.000	0.219	0	11:56	0.00
Jun-50	JUNCTION	0.007	0.018	0	10:13	0.00
Jun-51	JUNCTION	0.000	0.019	0	10:11	0.00
Jun-52	JUNCTION	0.053	0.214	0	09:51	0.00
Jun-53	JUNCTION	0.029	0.033	0	10:10	0.00
Jun-54	JUNCTION	0.005	0.005	0	09:55	0.00
Jun-55	JUNCTION	0.014	0.781	0	10:23	0.00
Jun-56	JUNCTION	0.026	0.094	0	09:48	0.00
Jun-57	JUNCTION	0.063	0.063	0	09:44	0.00
Jun-6	JUNCTION	0.000	0.198	0	13:49	0.00
Jun-60	JUNCTION	0.057	0.562	0	10:09	0.00
Jun-61	JUNCTION	0.018	0.018	0	10:05	0.00
Jun-62	JUNCTION	0.121	0.121	0	09:45	0.00
Jun-63	JUNCTION	0.068	0.141	0	09:49	0.00
Jun-64	JUNCTION	0.000	0.518	0	10:47	0.00
Jun-65	JUNCTION	0.006	0.520	0	10:46	0.00
Jun-67	JUNCTION	0.090	0.137	0	09:45	0.00
Jun-68	JUNCTION	0.025	0.025	0	09:44	0.00
Jun-69	JUNCTION	0.089	0.180	0	09:45	0.00
Jun-7	JUNCTION	0.000	0.576	0	13:07	0.00
Jun-70	JUNCTION	0.090	0.230	0	09:47	0.00
Jun-71	JUNCTION	0.000	0.321	0	09:51	0.00
Jun-72	JUNCTION	0.000	0.122	0	09:47	0.00
Jun-74	JUNCTION	0.055	0.134	0	09:45	0.00
Jun-76	JUNCTION	0.044	0.092	0	09:45	0.00
Jun-79	JUNCTION	0.051	0.051	0	09:44	0.00
Jun-8	JUNCTION	0.027	0.027	0	09:44	0.00
Jun-80	JUNCTION	0.045	0.282	0	09:50	0.00
Jun-82	JUNCTION	0.094	0.116	0	09:45	0.00
Jun-83	JUNCTION	0.000	0.276	0	10:10	0.00
Jun-84	JUNCTION	0.067	0.277	0	10:10	0.00
Jun-85	JUNCTION	0.010	0.251	0	10:12	0.00
Jun-86	JUNCTION	0.005	0.005	0	10:05	0.00
Jun-88	JUNCTION	0.048	0.230	0	10:11	0.00
Jun-89	JUNCTION	0.036	0.036	0	09:44	0.00
Jun-9	JUNCTION	0.192	0.192	0	10:15	0.00
Jun-90	JUNCTION	0.044	0.078	0	09:45	0.00
Jun-92	JUNCTION	0.031	0.032	0	09:44	0.00
Jun-95	JUNCTION	0.005	0.005	0	09:55	0.00
Out-1	OUTFALL	0.000	0.576	0	13:08	0.00
Pond-1	STORAGE	0.021	0.179	0	10:01	0.00
Pond-2	STORAGE	0.036	0.463	0	10:18	0.00
Pond-3	STORAGE	0.026	0.247	0	11:18	0.00
Pond-4	STORAGE	0.063	1.278	0	10:29	0.00
Pond-5	STORAGE	0.010	0.572	0	10:10	0.00

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Detention Pond Summary
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Detention Pond ID	Maximum Ponded Volume 1000 m³	Maximum Ponded Volume (%)	Time of Max Ponded Volume days hh:mm	Average Ponded Volume 1000 m³	Average Ponded Volume (%)	Maximum Pond Outflow cms	Maximum Exfiltration Rate cmm	Time of Exfiltr hh:
Pond-1	1.826	78	0 10:44	1.504	64	0.10	0.00	0:
Pond-2	3.282	92	0 11:56	1.822	51	0.22	0.00	0:
Pond-3	1.790	57	0 13:49	0.934	30	0.20	0.00	0:
Pond-4	10.526	50	0 13:07	4.978	24	0.58	0.00	0:
Pond-5	1.888	65	0 10:46	1.199	41	0.52	0.00	0:

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Outfall Loading Summary
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Outfall Node ID	Flow Average	Maximum

	Frequency (%)	Flow cms	Flow cms
Out-1	98.08	0.168	0.576
System	98.08	0.168	0.576

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Link Flow Summary
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Link ID	Element Type	Time of Peak Flow Occurrence days hh:mm	Maximum Velocity Attained m/sec	Length Factor	Peak Flow during Analysis cms	Design Flow Capacity cms	Ratio of Maximum /Design Flow	Ratio of Maximum Flow Depth	Surch Mi
Channel-1	CONDUIT	0 10:47	0.41	1.00	0.103	12.502	0.01	0.08	
Channel-2	CONDUIT	0 11:57	0.25	1.00	0.219	7.442	0.03	0.23	
Channel-3	CONDUIT	0 12:06	0.43	1.00	0.219	8.802	0.02	0.14	
Channel-4	CONDUIT	0 13:49	0.77	1.00	0.198	17.863	0.01	0.08	
Channel-5	CONDUIT	0 09:54	1.58	1.31	0.415	46.695	0.01	0.08	
Con-1	CHANNEL	0 10:15	0.09	1.00	0.008	0.225	0.04	0.38	
Con-101	CHANNEL	0 09:45	0.52	1.00	0.069	0.689	0.10	0.43	
Con-102	CHANNEL	0 09:45	0.34	1.00	0.035	0.719	0.05	0.38	
Con-104	CHANNEL	0 09:53	0.21	1.00	0.024	0.043	0.56	0.80	
Con-107	CHANNEL	0 10:06	0.06	1.00	0.004	0.039	0.11	0.67	
Con-119	CONDUIT	0 10:05	0.29	1.00	0.018	3.279	0.01	0.11	
Con-149	CONDUIT	0 10:05	1.17	1.42	0.017	0.296	0.06	0.15	
Con-150	CHANNEL	0 09:45	0.17	1.00	0.059	0.589	0.10	0.71	
Con-151	CONDUIT	0 10:47	5.51	2.05	0.520	0.685	0.76	0.57	
Con-152	CHANNEL	0 09:49	0.14	1.00	0.033	0.250	0.13	0.58	
Con-159	CHANNEL	0 09:46	0.15	1.00	0.028	0.271	0.10	0.52	
Con-160	CHANNEL	0 09:49	0.55	1.00	0.168	0.600	0.28	0.65	
Con-161	CHANNEL	0 09:48	0.40	1.00	0.109	0.453	0.24	0.61	
Con-163	CHANNEL	0 09:45	0.35	1.00	0.049	0.083	0.59	0.88	
Con-164	CHANNEL	0 10:00	0.34	1.00	0.023	0.512	0.04	0.31	
Con-165	CHANNEL	0 09:46	0.37	1.00	0.083	0.646	0.13	0.57	
Con-174	CONDUIT	0 09:49	0.82	1.00	0.178	1.777	0.10	0.30	
Con-176	CONDUIT	0 09:52	1.63	1.00	0.321	17.172	0.02	0.13	
Con-188	CONDUIT	0 10:25	0.57	1.00	0.267	8.560	0.03	0.26	
Con-190	CONDUIT	0 10:08	0.25	1.00	0.197	2.566	0.08	0.27	
Con-191	CONDUIT	0 10:58	0.33	1.00	0.718	1.858	0.39	0.58	
Con-196	CONDUIT	0 09:47	2.47	1.07	0.426	0.530	0.80	0.64	
Con-197	CONDUIT	0 09:46	0.72	1.00	0.440	8.301	0.05	0.32	
Con-198	CONDUIT	0 10:20	1.37	1.00	0.289	0.491	0.59	0.70	
Con-199	CHANNEL	0 10:12	0.37	1.00	0.038	0.488	0.08	0.38	
Con-200	CONDUIT	0 09:45	1.48	1.41	0.360	0.447	0.81	0.81	
Con-201	CONDUIT	0 09:46	2.15	1.00	0.359	0.476	0.76	0.58	
Con-202	CONDUIT	0 10:10	1.35	1.05	0.562	0.678	0.83	0.89	
Con-203	CONDUIT	0 10:10	1.62	2.13	0.562	0.682	0.82	0.73	
Con-205	CHANNEL	0 09:50	0.70	1.00	0.254	0.687	0.37	0.72	
Con-208	CONDUIT	0 10:10	1.60	1.35	0.276	20.656	0.01	0.13	
Con-23	CHANNEL	0 09:45	0.13	1.00	0.023	0.612	0.04	0.52	
Con-31	CHANNEL	0 09:52	0.22	1.00	0.054	0.225	0.24	0.59	
Con-32	CHANNEL	0 09:53	0.26	1.00	0.168	0.283	0.59	0.92	
Con-36	CHANNEL	0 10:35	0.53	1.00	0.113	0.574	0.20	0.55	
Con-50	CHANNEL	0 09:53	0.37	1.00	0.070	0.494	0.14	0.51	
Con-51	CHANNEL	0 10:14	0.11	1.00	0.007	0.036	0.18	0.57	
Con-52	CHANNEL	0 09:51	0.38	1.00	0.106	0.607	0.17	0.62	
Con-53	CHANNEL	0 09:51	0.33	1.00	0.141	0.373	0.38	0.77	
Con-54	CHANNEL	0 10:06	0.17	1.00	0.005	0.092	0.06	0.47	
Con-55	CHANNEL	0 09:45	0.26	1.00	0.034	0.319	0.11	0.43	
Con-56	CHANNEL	0 09:46	0.39	1.00	0.035	0.701	0.05	0.35	
Con-57	CHANNEL	0 10:01	0.15	1.00	0.009	0.259	0.04	0.29	
Con-59	CHANNEL	0 10:15	0.13	1.00	0.011	0.045	0.24	0.70	
Con-60	CHANNEL	0 10:11	0.17	1.00	0.019	0.035	0.53	0.79	
Con-61	CHANNEL	0 10:40	0.28	1.00	0.126	0.230	0.55	0.78	
Con-62	CHANNEL	0 10:17	0.13	1.00	0.018	0.237	0.08	0.43	
Con-63	CHANNEL	0 10:16	0.08	1.00	0.032	0.242	0.13	0.74	
Con-64	CHANNEL	0 10:00	0.06	1.00	0.005	0.213	0.02	0.35	

Con-65	CHANNEL	0	09:47	0.27	1.00	0.046	0.649	0.07	0.49
Con-66	CHANNEL	0	09:49	0.28	1.00	0.077	0.323	0.24	0.62
Con-67	CHANNEL	0	09:50	0.40	1.00	0.093	0.705	0.13	0.45
Con-76	CHANNEL	0	10:31	0.46	1.00	0.113	0.433	0.26	0.60
Con-78	CONDUIT	0	10:47	1.09	1.00	0.518	13.037	0.04	0.26
Con-81	CHANNEL	0	09:45	0.14	1.00	0.021	0.038	0.56	0.90
Con-83	CHANNEL	0	09:50	0.68	1.00	0.227	0.711	0.32	0.68
Con-93	CHANNEL	0	09:52	0.70	1.00	0.275	0.661	0.42	0.73
Con-94	CHANNEL	0	09:51	0.28	1.00	0.073	0.292	0.25	0.60
Con-97	CHANNEL	0	10:10	0.05	1.00	0.005	0.035	0.15	0.75
Culvert-1	CONDUIT	0	10:15	1.51	1.00	0.192	0.260	0.74	0.46
Culvert-10	CONDUIT	0	11:59	2.41	1.12	0.219	0.389	0.56	0.56
Culvert-11	CONDUIT	0	10:25	2.40	1.00	0.267	0.669	0.40	0.42
Culvert-2	CONDUIT	0	10:16	1.72	1.25	0.212	0.387	0.55	0.45
Culvert-3	CONDUIT	0	10:14	3.69	1.73	0.251	1.296	0.19	0.29
Culvert-4	CONDUIT	0	09:50	2.27	1.00	0.519	0.476	1.09	0.88
Culvert-5	CONDUIT	0	10:12	2.07	2.06	0.532	0.451	1.18	0.86
Culvert-6	CONDUIT	0	10:12	1.37	1.00	0.543	0.779	0.70	0.84
Culvert-9	CONDUIT	0	10:08	1.51	1.11	0.234	0.780	0.30	0.54
Ditch-1	CONDUIT	0	09:46	0.57	1.00	0.561	7.122	0.08	0.53
Ditch-10	CONDUIT	0	09:50	0.76	1.00	0.112	9.531	0.01	0.12
Ditch-11	CONDUIT	0	10:15	0.60	1.00	0.192	6.492	0.03	0.20
Ditch-12	CONDUIT	0	10:15	0.43	1.00	0.212	6.093	0.03	0.27
Ditch-13	CONDUIT	0	10:12	0.68	1.00	0.230	6.924	0.03	0.21
Ditch-14	CONDUIT	0	10:12	0.90	1.00	0.236	7.620	0.03	0.17
Ditch-15	CONDUIT	0	10:13	0.93	1.00	0.251	17.174	0.01	0.18
Ditch-17	CONDUIT	0	10:11	1.59	1.00	0.276	20.131	0.01	0.13
Ditch-18	CONDUIT	0	09:59	0.21	1.00	0.102	2.225	0.05	0.25
Ditch-19	CONDUIT	0	09:56	0.24	1.00	0.091	2.222	0.04	0.22
Ditch-2	CONDUIT	0	10:09	0.55	1.00	0.533	7.101	0.07	0.58
Ditch-20	CONDUIT	0	09:47	1.24	1.00	0.122	20.381	0.01	0.08
Ditch-21	CONDUIT	0	09:47	1.15	1.00	0.121	24.048	0.01	0.08
Ditch-22	CONDUIT	0	09:51	1.37	1.09	0.321	20.271	0.02	0.16
Ditch-25	CONDUIT	0	09:48	0.81	1.00	0.178	1.721	0.10	0.30
Ditch-27	CONDUIT	0	10:06	0.41	1.00	0.058	5.351	0.01	0.11
Ditch-3	CONDUIT	0	10:12	0.57	1.05	0.532	6.824	0.08	0.50
Ditch-6	CONDUIT	0	09:45	0.36	1.00	0.057	9.444	0.01	0.14
Ditch-7	CONDUIT	0	09:49	0.67	1.00	0.141	13.686	0.01	0.18
Ditch-8	CONDUIT	0	09:45	0.36	1.00	0.058	10.413	0.01	0.19
Ditch-9	CONDUIT	0	10:46	0.65	1.00	0.532	14.962	0.04	0.56
Outlet Ditch	CONDUIT	0	13:08	0.98	1.00	0.576	17.472	0.03	0.16
Pond Outlet-1	CONDUIT	0	10:44	2.49	1.45	0.103	0.084	1.23	0.57
Pond Outlet-2	CONDUIT	0	11:56	3.79	1.70	0.219	0.119	1.85	0.76
Pond Outlet-3	CONDUIT	0	13:49	3.96	1.45	0.198	0.084	2.36	0.67
Pond Outlet-4	CONDUIT	0	13:07	6.62	2.34	0.576	0.304	1.90	0.73
Pond Outlet-5	CONDUIT	0	10:47	2.82	2.54	0.518	0.753	0.69	0.62
Swale-1	CONDUIT	0	10:15	0.03	1.00	0.010	24.622	0.00	0.14
Swale-2	CONDUIT	0	10:22	0.19	1.00	0.148	2.103	0.07	0.29
Swale-4	CONDUIT	0	10:12	0.10	1.00	0.247	1.487	0.17	0.70
Swale-6	CONDUIT	0	10:25	0.77	4.07	0.780	27.527	0.03	0.34
Swale-7	CONDUIT	0	10:27	0.24	1.00	0.779	3.035	0.26	0.76
Swale-8	CONDUIT	0	10:37	0.33	1.00	0.775	1.594	0.49	0.61

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Flow Classification Summary
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	--- Fraction of Time in Flow Class ----							Avg.	Avg.
Link	Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Froude Number	Flow Change
Channel-1	0.02	0.00	0.00	0.00	0.00	0.00	0.98	0.17	0.0000
Channel-2	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.09	0.0000
Channel-3	0.02	0.00	0.00	0.00	0.00	0.00	0.98	0.19	0.0000
Channel-4	0.00	0.01	0.00	0.99	0.00	0.00	0.00	0.38	0.0000
Channel-5	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.80	0.0000
Con-1	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.06	0.0000
Con-101	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.46	0.0000
Con-102	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.25	0.0000
Con-104	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.19	0.0000

Con-107	0.00	0.11	0.00	0.89	0.00	0.00	0.00	0.01	0.0000
Con-119	0.01	0.51	0.00	0.48	0.00	0.00	0.00	0.05	0.0000
Con-149	0.00	0.01	0.00	0.90	0.09	0.00	0.00	0.26	0.0000
Con-150	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.04	0.0000
Con-151	0.00	0.01	0.00	0.18	0.81	0.00	0.00	2.36	0.0000
Con-152	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.11	0.0000
Con-159	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.11	0.0000
Con-160	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.45	0.0000
Con-161	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.32	0.0000
Con-163	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.24	0.0000
Con-164	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.37	0.0000
Con-165	0.00	0.00	0.00	0.70	0.29	0.00	0.00	0.51	0.0000
Con-174	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.34	0.0000
Con-176	0.00	0.00	0.00	0.82	0.18	0.00	0.00	0.46	0.0000
Con-188	0.00	0.49	0.00	0.50	0.00	0.00	0.00	0.10	0.0000
Con-190	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.07	0.0000
Con-191	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.08	0.0000
Con-196	0.00	0.00	0.00	0.53	0.47	0.00	0.00	0.62	0.0000
Con-197	0.00	0.39	0.00	0.61	0.00	0.00	0.00	0.18	0.0000
Con-198	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.28	0.0000
Con-199	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.32	0.0000
Con-200	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.36	0.0000
Con-201	0.00	0.00	0.00	0.53	0.47	0.00	0.00	0.58	0.0000
Con-202	0.00	0.16	0.00	0.83	0.00	0.00	0.00	0.32	0.0000
Con-203	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.39	0.0000
Con-205	0.00	0.00	0.00	0.99	0.01	0.00	0.00	0.50	0.0000
Con-208	0.28	0.04	0.00	0.54	0.14	0.00	0.00	0.47	0.0000
Con-23	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.06	0.0000
Con-31	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.19	0.0000
Con-32	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.13	0.0000
Con-36	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.45	0.0000
Con-50	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.37	0.0000
Con-51	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.11	0.0000
Con-52	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.34	0.0000
Con-53	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.26	0.0000
Con-54	0.05	0.02	0.00	0.92	0.00	0.00	0.00	0.06	0.0000
Con-55	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.19	0.0000
Con-56	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.34	0.0000
Con-57	0.00	0.01	0.00	0.98	0.00	0.00	0.00	0.06	0.0000
Con-59	0.05	0.00	0.00	0.95	0.00	0.00	0.00	0.09	0.0000
Con-60	0.05	0.00	0.00	0.95	0.00	0.00	0.00	0.11	0.0000
Con-61	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.24	0.0000
Con-62	0.00	0.05	0.00	0.95	0.00	0.00	0.00	0.05	0.0000
Con-63	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.03	0.0000
Con-64	0.00	0.11	0.00	0.89	0.00	0.00	0.00	0.01	0.0000
Con-65	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.22	0.0000
Con-66	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.20	0.0000
Con-67	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.33	0.0000
Con-76	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.30	0.0000
Con-78	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.37	0.0000
Con-81	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.08	0.0000
Con-83	0.00	0.00	0.00	0.97	0.03	0.00	0.00	0.55	0.0000
Con-93	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.59	0.0000
Con-94	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.25	0.0000
Con-97	0.00	0.07	0.00	0.92	0.00	0.00	0.00	0.01	0.0000
Culvert-1	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.27	0.0000
Culvert-10	0.01	0.00	0.00	0.17	0.82	0.00	0.00	1.43	0.0000
Culvert-11	0.00	0.00	0.00	0.53	0.46	0.00	0.00	0.73	0.0000
Culvert-2	0.00	0.00	0.00	0.88	0.11	0.00	0.00	0.46	0.0000
Culvert-3	0.00	0.00	0.00	0.51	0.49	0.00	0.00	1.48	0.0000
Culvert-4	0.00	0.00	0.00	0.55	0.45	0.00	0.00	0.60	0.0000
Culvert-5	0.00	0.00	0.00	0.55	0.44	0.00	0.00	0.61	0.0000
Culvert-6	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.39	0.0000
Culvert-9	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.52	0.0000
Ditch-1	0.00	0.10	0.00	0.90	0.00	0.00	0.00	0.15	0.0000
Ditch-10	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.16	0.0000
Ditch-11	0.42	0.05	0.00	0.52	0.00	0.00	0.00	0.10	0.0000
Ditch-12	0.00	0.42	0.00	0.58	0.00	0.00	0.00	0.09	0.0000
Ditch-13	0.30	0.07	0.00	0.63	0.00	0.00	0.00	0.16	0.0000
Ditch-14	0.30	0.00	0.00	0.70	0.00	0.00	0.00	0.22	0.0000
Ditch-15	0.00	0.30	0.00	0.69	0.00	0.00	0.00	0.23	0.0000
Ditch-17	0.28	0.00	0.00	0.00	0.00	0.00	0.72	0.47	0.0000

Ditch-18	0.00	0.00	0.00	0.97	0.00	0.00	0.03	0.05	0.0000
Ditch-19	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.08	0.0000
Ditch-2	0.00	0.09	0.00	0.91	0.00	0.00	0.00	0.15	0.0000
Ditch-20	0.30	0.02	0.00	0.61	0.07	0.00	0.00	0.38	0.0000
Ditch-21	0.30	0.00	0.00	0.00	0.00	0.00	0.70	0.37	0.0000
Ditch-22	0.00	0.00	0.00	0.75	0.25	0.00	0.00	0.49	0.0000
Ditch-25	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.33	0.0000
Ditch-27	0.07	0.00	0.00	0.00	0.00	0.00	0.93	0.07	0.0000
Ditch-3	0.00	0.12	0.00	0.88	0.00	0.00	0.00	0.17	0.0000
Ditch-6	0.00	0.49	0.00	0.51	0.00	0.00	0.00	0.05	0.0000
Ditch-7	0.00	0.15	0.00	0.85	0.00	0.00	0.00	0.16	0.0000
Ditch-8	0.00	0.45	0.00	0.55	0.00	0.00	0.00	0.05	0.0000
Ditch-9	0.00	0.00	0.00	0.34	0.01	0.00	0.65	0.38	0.0000
Outlet Ditch	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.47	0.0000
Pond Outlet-1	0.01	0.00	0.00	0.24	0.75	0.00	0.00	1.34	0.0000
Pond Outlet-2	0.00	0.00	0.00	0.01	0.98	0.00	0.00	1.97	0.0001
Pond Outlet-3	0.01	0.00	0.00	0.01	0.98	0.00	0.00	1.96	0.0001
Pond Outlet-4	0.01	0.00	0.00	0.01	0.99	0.00	0.00	2.97	0.0001
Pond Outlet-5	0.01	0.00	0.00	0.41	0.58	0.00	0.00	1.18	0.0000
Swale-1	0.00	0.51	0.00	0.49	0.00	0.00	0.00	0.00	0.0000
Swale-2	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.05	0.0000
Swale-4	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.01	0.0000
Swale-6	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.22	0.0000
Swale-7	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.05	0.0000
Swale-8	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.07	0.0000

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Time-Step Critical Elements
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Link Pond Outlet-4 (26.86%)
Link Pond Outlet-3 (18.47%)


*******************************
Highest Flow Instability Indexes
*******************************
All links are stable.


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Routing Time Step Summary
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Minimum Time Step           :     1.85 sec
Average Time Step           :     3.98 sec
Maximum Time Step           :     5.00 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     2.00


Analysis begun on:  Tue Dec 09 10:30:00 2008
Analysis ended on:  Tue Dec 09 10:30:42 2008
Total elapsed time: 00:00:42
```