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South Fergus MESP & Secondary Plan

PRELIMINARY STORMWATER MANAGEMENT PLAN

South Fergus Landowners Group

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1 Introduction

Tatham Engineering Limited has been retained by the South Fergus Landowners Group to provide engineering support in the development of a Master Environmental Servicing Study (MESP) and Secondary Plan outlining the objectives, constraints, design criteria, development concept and implementation plan for a proposed mixed-use development in the South Fergus Secondary Plan area within the Township of Centre Wellington.

1.1 SECONDARY PLAN AREA

The South Fergus Secondary Plan Area (Study Area) consists of approximately 147.5 ha of undeveloped land in the south end of Fergus, Township of Centre Wellington, County of Wellington. It is generally bound by Second Line to the south, Guelph Road to the west, McQueen Boulevard to the north and Scotland Street to the east, as illustrated on the Preferred Land Use Plan in Appendix A.

The Study Area consists of properties both east and west of Tower Street South (Highway 6) as follows:

- 925 and 935 Scotland Street;
- 200 McQueen Boulevard;
- 7856 and 7872 2nd Line;
- 963 and 1000 Tower Street South; and
- 936 Guelph Road.

1.2 PROPOSED DEVELOPMENT

The Study Area is proposed to be developed according to Preferred Land Use Plan (refer to Appendix A). The plan identifies various proposed land uses including:

- residential developments (low and medium density);
- employment areas (commercial, gateway and corridor);
- mixed use;
- a future school; and
- recreation areas including neighbourhood parks, trails and natural heritage lands.

The Preferred Land Use Plan has been used in this report to assess the future drainage conditions and determine a stormwater management strategy and water quantity and quality control targets. It is noted that the specifics of the land use plan are subject to change prior to detailed design. As such, the stormwater strategy presented herein recognizes the ultimate conditions of the Study Area are subject to change and thus flexibility has been included in the stormwater management plan to account for this potential.

1.3 STUDY PURPOSE

This Preliminary Stormwater Management Plan (SWM) report has been prepared to outline the existing conditions and document the proposed stormwater management strategy for the Study Area. Specifically, it outlines the proposed drainage patterns for development, the stormwater management criteria and strategy to provide water quality and quantity control, and the erosion and sediment control plan. Following approval this information will be used to develop a detailed stormwater management strategy and ultimately the final design for the Study Area.

2 Background

2.1 NICHOL DRAIN NO. 2 SUBWATERSHED STUDY

In 1996, the *Nichol Drain No. 2 Subwatershed Study*[1] was prepared to provide a general overview of the environmental features within the Nichol Drain No. 2 watershed and to establish the basis for a stormwater management strategy for the lands in the Study Area east of Tower Street South (Highway 6). The approved stormwater management strategy recommended in this report aimed at minimizing the impacts of future development in the watershed.

The key conclusions and recommendations of the *Nichol Drain No. 2 Subwatershed Study* are summarized as follows:

- Nichol Drain No. 2 is an intermittent watercourse with limited fish potential (Type 3 habitat) although Swan Creek (receiving waterbody of Nichol Drain No. 2) is a coldwater fishery in excellent condition;
- groundwater discharge into Nichol Drain No. 2 is limited in the headwater reaches in the Study Area;
- the soils in the Nichol Drain No. 2 watershed are composed of several soil types including Harriston Loam (predominate soil type), Listowel Loam and Parkhill Loam;
- the wetlands in the Study Area east of Tower Street South (Highway 6) are located more than 750 m from the Provincially Significant Speed – Lutteral Swan Creek Wetland Complex meaning the on-site wetlands are not part of this Provincially significant Wetland Complex;
- the Nichol Drain No. 2 watershed covers an area of 559.4 ha at the downstream study limit (confluence with Drain No. 11) and an existing condition (1996) peak flow summary was presented as provided in Table 1; and
- two stormwater management strategies were developed, assessed and evaluated, and Alternative 2 – Peak Flow Control was identified as the preferred solution for the lands east of Tower Street South (Highway 6) in the Study Area.

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[1] *Nichol Drain No. 2 Subwatershed Study*. R.J. Burnside & Associates Ltd., October 1996.

Table 1: Nichol Drain No. 2 Subwatershed Study Peak Flow Summary

STORM	PEAK FLOW (m^3/s)			
	Outlet of Wetland (Node 11)	Upstream of Hwy 6 (Node 14)	At 2nd Line (Node 19)	Study Limit
25 mm	0.4	0.4	0.6	1.1
1:2-Year	1.0	1.1	1.4	2.4
1:5-Year	2.8	3.0	4.0	7.2
1:10-Year	3.9	4.3	5.6	10.3
1:25-Year	6.5	7.1	9.2	16.4
1:50-Year	8.5	9.3	11.9	21.5
1:100-Year	10.1	11.3	15.5	29.1
Regional	12.7	14.2	20.0	45.9

The preferred stormwater management plan identified in the *Nichol Drain No. 2 Subwatershed Study* consists of the following:

- construct a water quantity and quality control stormwater management facility (SWMF) west of Nichol Drain No. 2 immediately east of Tower Street South (Highway 6) to service Phase 1 of development;
- construct a stormwater quality control SWMF immediately upstream of the existing wetland on-site to treat surface runoff from future development prior to discharging into the wetland;
- modify the wetland outlet to the downstream system as necessary to provide the requisite water quantity control for the future development lands draining through the wetland;
- construct a water quantity and quality control SWMF east of Nichol Drain No. 2 immediately east of Tower Street South (Highway 6) to service the remainder of the future development lands east of Tower Street;
- abandon Nichol Drain No. 2 upstream of Tower Street South (Highway 6);
- enclose the drain at the rear of the Highway Commercial lands in a storm sewer with an overland flow route sized to convey the Regional Storm peak flow as part of future development;

- lot level and conveyance SWM best management practices (BMPs) are to be evaluated as part of the detailed design of each individual development in the Study Area;
- appropriate environmental setbacks are to be established and respected and enhancement opportunities explored for each natural heritage feature identified in the Study Area; and
- development be restricted to areas outside the establish Regulatory floodplain.

To date, the Highway Commercial lands have been developed and a conveyance channel along the rear of the Highway Commercial lands has been constructed. Also, Phase 1 of the preferred SWM strategy, specifically the construction of the water quantity and quality SWMF west of Nichol Drain No. 2, has been implemented.

It is noted that the *Nichol Drain No. 2 Subwatershed Study* focused primarily on the lands east of Tower Street South (Highway 6) and did not provide a recommended SWM strategy for the lands west of Tower Street South (Highway 6) in the Study Area.

2.2 ADDITIONAL BACKGROUND DOCUMENTS

In addition to the *Nichol Drain No. 2 Subwatershed Study*, the following documents and guidelines were reviewed in preparation of this report:

- *Development Manual (Draft)*, Township of Centre Wellington, 2018;
- *Policies for the Administration of the Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation*, Grand River Conservation Authority, 2015;
- *Policies and Procedures for Compliance with the Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation*, Grand River Conservation Authority, 2009;
- *Preliminary Site Servicing & Stormwater Management Report*, St. Andrews Subdivision, Gamsby and Mannerow Limited, 2010;
- *Technical Guide – River & Stream System: Flood Hazard Limit*, Ontario Ministry of Natural Resources, 2002;
- *Technical Guide – River & Stream Systems: Erosion Hazard Limit*, Ontario Ministry of Natural resources, 2002; and
- *Township of Centre Wellington Comprehensive Zoning By-Law No. 2009-045,* Township of Centre Wellington, 2023.

3 Existing Site Conditions

The existing drainage conditions in the South Fergus Study Area were established through a review of the available topographic mapping and aerial photos, topographic survey, site reconnaissance, and a review of the available background information. The existing drainage conditions are illustrated on the Existing Conditions Drainage Plan (Drawing DP-2) enclosed and summarized in the following sections.

3.1 TOPOGRAPHY

In support of the South Fergus MESP and Secondary Plan, Northway/Photomap Remote Sensing Ltd. conducted a drone survey capturing new aerial photography and topographic mapping of the Study Area in the fall of 2020. To supplement the drone survey data, Tatham Engineering conducted a topographic survey of Nichol Drain No. 2 and other key hydrologic features in the Study Area. This topographic data was used to establish the existing drainage patterns in the Study Area.

The lands within the Study Area generally drain overland as sheet flow to Nichol Drain No. 2. The drain runs southwest through the Study Area, crossing Tower Street South (Highway 6) and 2nd Line.

3.2 SOIL CONDITIONS

The Canada Department of Agriculture's 1963 *Soils Survey of Wellington County* report defines the soils in the Study Area as:

- Harriston Loam – well drained soils belonging to soils group BC;
- Listowel Loam – imperfectly drained soils belonging to soils group BC;
- Parkhill Loam – poorly drained soils belonging to soils group BC; and
- Muck – organic deposits accumulated in wet undrained depressions.

A geotechnical investigation conducted by Golder in support of the MESP and Secondary Plan identified the Study Area soils ranging from sand and gravel to silty clay. The soils are generally sand, silty sand and till near the surface in the agricultural areas on-site and clayey silt to silty clay in the wetland areas. The geotechnical investigation is summarized in the *Hydrogeological Investigation* included in Appendix B.

3.3 GROUNDWATER CONDITIONS

To characterise the regional geological setting, existing hydrogeological conditions and groundwater levels in the Study Area, a hydrogeological study was conducted and the existing groundwater conditions are described in the *Hydrogeological Investigation* included in Appendix B. In accordance with the Terms of Reference (ToR), a groundwater monitoring program tracked seasonal groundwater elevations, infiltration testing occurred on-site to determine the suitability of infiltration based low impact development (LID) measures and groundwater recharge requirements were established within the Study Area.

The Hydrogeological Investigation concluded that the seasonal high groundwater levels across the Study Area are at or within 1.2 m of existing grade. Infiltration rates range from 36 mm/hr to 71 mm/hr at the tested locations and water quality samples collected from BH20-3, BH20-4, and BH20-8 reported exceedances in Cobalt, Iron, Copper, Vanadium and Zinc.

3.4 DRAINAGE PATTERNS

As noted, surface runoff from the Study Area is conveyed through a municipal drain complex (Nichol Drain No. 2) that ultimately drains into Swan Creek, south of the Study Area. The drainage network consists of a series of municipal drainage channels which are characterised as part of the *Fluvial Geomorphological Characterization and Erosion Threshold Assessment* included in Appendix C. The drainage patterns within and external to the Study Area are described as follows:

- north of the Study Area, the Cherry Hills Estates subdivision drains to the upstream end of the drainage channel (Point of Interest D) constructed at the rear of the Highway Commercial lands fronting Tower Street South (Highway 6);
- the Highway Commercial lands also drain into this drainage channel via a series of storm sewers and culverts;
- approximately 12.4 ha of agricultural land within the Study Area also drains overland as sheet flow into the drainage channel between Point of Interest D and E;
- this drainage channel drains into the water quantity and quality control SWMF constructed west of Nichol Drain No. 2, immediately east of Tower Street South (Highway 6) as part of the Highway Commercial development;
- the SWMF outlets into Nichol Drain No. 2 immediately upstream of Tower Street South (Highway 6) at Point of Interest F;

- approximately 29.6 ha of agricultural land north of Scotland Street drains overland as sheet flow to a culvert crossing Scotland Street (Point of Interest A) and into the Study Area at the location of the former Turner Drain;
- surface runoff from the external drainage area combined with runoff from agricultural lands within the Study Area drains overland into the upstream end of Nichol Drain No. 2 (Point of Interest B) and into the on-site wetland;
- the wetland stores runoff releasing it into Nichol Drain No. 2 at Point of Interest C;
- Nichol Drain No. 2 crosses Tower Street South (Highway 6) via an 1820 mm × 3020 mm concrete box culvert at Point of Interest F after receiving flow from the existing SWMF;
- approximately 4.9 ha of land west of Guelph Road drains overland as sheet flow to a culvert crossing Guelph Road (Point of Interest G) and into the Study Area and into a wetland identified immediately east of Guelph Road;
- this wetland drains via a municipal drain which converges with Nichol Drain No. 2 at Point of Interest I;
- at this confluence, a crossing (1200 mm diameter CSP culvert) has been installed to provide access to either side of Nichol Drain No. 2;
- west of Tower Street South (Highway 6) Nichol Drain No. 2 runs southeast to 2nd Line (Point of Interest J), crossing 2nd Line via an 1800 mm × 3000 mm concrete box culvert;
- at Point of Interest J, the Nichol Drain No. 2 watershed encompasses a total of 217.1 ha of mixed use residential, commercial and agricultural land;
- downstream of 2nd Line at the limit of the Study Area and confluence with Drain No. 11, the Nichol Drain No. 2 watershed has a total drainage area of 542.8 ha;
- the northwest corner of the Study Area is located outside the Nichol Drain No. 2 watershed and drains west overland as sheet flow towards the Nichol Drain No. 13 and the Grand River;
- approximately 15.3 ha of undeveloped land (catchment 117 and 122) currently drains overland into the existing stormwater management facility in the Westminster subdivision (via 450mm diameter CSP culvert under McQueen Boulevard);
- the Westminster SWM Pond outlets into Nichol Drain No. 13 at Point of Interest L; and
- approximately 5.3 ha of land on the northwest corner of the site (catchment 123) drains north in roadside ditches to Nichol Drain No. 13 at Point of Interest L.

3.5 STORMWATER INFRASTRUCTURE

The storm infrastructure located in the Study Area is limited to drainage channels, municipal drains, a stormwater management facility, tile drains and various culvert crossings. Also assessed in this report is the stormwater management facility just northwest of the area boundary in the Westminster subdivision.

As discussed, surface runoff from the Study Area is conveyed through a municipal drain complex (Nichol Drain No. 2) that eventually drains into Swan Creek, south of the Study Area. Surface runoff from the Cherry Hill Estates subdivision is conveyed via storm sewer and the municipal road allowance to the drainage channel constructed at the rear of the Highway Commercial lands fronting Tower Street South (Highway 6). The drainage channel conveys runoff to the water quantity and quality control SWMF constructed west of Nichol Drain No. 2, immediately east of Tower Street South (Highway 6) as part of the Highway Commercial development.

3.5.1 Nichol Drain No. 2 Phase 1 Pond

The Nichol Drain No. 2 SWMF was designed to provide the requisite water quantity and quality controls for the Cherry Hills Estates subdivision, the Highway Commercial lands, and a portion of the future development lands within the Study Area (catchment 105) to the northeast of the drainage channel at the rear of the Highway Commercial lands. The SWMF was designed with the following storage volumes:

- 3,926 m^3 of permanent pool storage;
- 6,175 m^3 of extended detention storage; and
- 21,030 m^3 of total active storage.

Discharge from the SWMF into Nichol Drain No. 2 occurs via:

- primary outlet – 1200 mm diameter CSP culvert complete with inlet and outlet headwalls; and
- overflow spillway – 20 m wide broad crested weir with an invert elevation of 411.00 m.

3.5.2 Nichol Drain No. 2 Road Crossings

Within the Study Area, there are three culvert crossings located on Nichol Drain No. 2, two road crossings and a farm access crossing as follows:

- Tower Street South (Highway 6) - 1820 mm × 3020 mm concrete box culvert;
- Farm Access – 1200 mm diameter CSP culvert; and
- 2nd Line - 1800 mm × 3000 mm concrete box culvert.

3.5.3 Westminster Subdivision SWM Pond

The Westminster SWM Pond was designed to provide quantity and quality controls for:

- Westminster subdivision;
- some rear yard drainage from houses on the south side of Elora Street between Tower Street South and the pedestrian walkway west of Aberdeen Street;
- the Highway Commercial lands west of Tower Street South;
- approximately 7 ha of future commercial development lands outside of the Study Area cornering Tower Street South and McQueen Boulevard; and
- an additional 10.3 ha of undeveloped agricultural land within the Study Area, to the south and west of the future commercial development.

The SWM Pond was designed with the following storage volumes:

- 2,916 m^3 of permanent pool storage;
- 3,793 m^3 of extended detention storage; and
- 10,175 m^3 of total active storage.

Discharge from the SWM pond to Nichol Drain No. 13 occurs via:

- primary quality control orifice – a 130 mm diameter orifice discharging to a 450 mm storm sewer;
- two catch basin maintenance holes – positioned at minor and major flow water levels discharging to the 450 mm diameter storm sewer;
- primary outlet pipe – a 525 mm diameter storm sewer conveying discharge from the primary orifice and two maintenance holes; and
- an overflow channel – 4.0 m wide broad crested weir using the Cumming Crescent ROW as an overland flow route to Nichol Drain No. 13.

3.5.4 Wetlands

Although not explicitly stormwater infrastructure, the wetlands within the Study Area also provide water quantity and quality control as part of the existing drainage system. The wetlands attenuate peak flows by storing runoff and releasing it into the downstream drainage system at reduced rates. In storing the water, the wetland also provides time for sediment and contaminants to settle out of the runoff and nutrient uptake through wetland vegetation, treating the runoff. A stage-storage-discharge relationship was developed for this existing system to represent its function in the hydrologic cycle under existing conditions.

3.6 HYDROLOGIC ANALYSIS

A hydrologic analysis of the Nichol Drain No. 2 watershed upstream of the downstream Study Area limit (Point of Interest K) has been completed to quantify the existing condition peak flows generated within and draining through the Study Area. A Visual OTTHYMO (VO6) hydrologic model has been created to quantify the peak flows for the 25 mm storm, 1:2-year though 1:100-year design storms and the Regional (Hurricane Hazel) Storm. The 1:2-year through 1:100-year design storms have been simulated using the 4-hour Chicago and 12-hour and 24-hour SCS Type II design storm distributions. The hydrologic analysis completed is described in the following sections.

3.6.1 Design Storms

Design storm distributions were developed from rainfall Intensity-Duration-Frequency (IDF) curves obtained from the Ministry of Transportation's (MTO) IDF lookup tool. The IDF coefficients for the study area are summarised in Table 2.

Table 2: IDF Coefficient Summary

RETURN PERIOD	A	B
1:2-Year	23.3	-0.699
1:5-Year	30.8	-0.699
1:10-Year	35.7	-0.699
1:25-Year	41.8	-0.699
1:50-Year	46.4	-0.699
1:100-Year	51.0	-0.699

3.6.2 Model Parameters

Curve Numbers (CN) for the delineated subcatchments were calculated based on the soil group classification and land use. As previously noted, soil group coverage was obtained from the *Soils Survey of Wellington County*. Land use data for the Study Area was obtained from the Ministry of Natural Resources and Forestry's (MNRF) Southern Ontario Land Resource Information System (SOLRIS). A summary of the hydrologic model input parameters is provided Table 3.

Table 3: Existing Catchment Characteristics Summary

CATCHMENT ID	AREA (HA)	CN	% IMPERVIOUS
101	29.6	81.9	4%
102	33.3	81.0	8%
103	30.2	79.7	3%
104	9.0	72.9	0%
105	12.1	79.4	6%
106	4.7	71.4	60%
107	12.4	78.9	86%
108	5.7	74.2	67%
109	9.7	81.0	12%
110	3.8	85.6	10%
111	15.2	83.9	6%
112	10.1	76.9	0%
113	13.2	76.9	4%
114	10.4	76.6	6%
115	5.3	79.6	8%
116	9.7	81.4	23%
117	15.4	81.2	4%
118	5.3	80.7	17%
119	61.5	75.5	3%
120	19.7	78.0	5%
121	23.8	83.5	4%
122	47.1	81.9	4%
123	27.6	81	5%
124	59.1	77	2%
125	50.7	76.6	0%
126	34.0	83.9	6%

3.6.3 Results Summary

Summaries of the watershed response at key areas of interest within the Study Area are provided in Table 4 through Table 6 whereas detailed results of the hydrologic analysis are included in Appendix D for reference. As illustrated, the peak flows generated as part of this study correlate well with the previously completed Subwatershed Study for the minor storms (1:2-year through 1:10-year design storms) and Regional (Hurricane Hazel) Storm. For the 1:25-year through 1:100-year design storms, the Subwatershed Study peak flows exceed those predicted through this study. This may be due to the overcontrol of peak flows released from the existing SWMF as it was designed to provide water quantity control for a larger area than currently developed.

Table 4: Existing Conditions Peak Flow Summary – Upstream of Highway 6 (POI F)

STORM	4-HOUR CHICAGO	12-HOUR SCS	24-HOUR SCS	SUBWATERSHED STUDY (1996)
1:2-Year	1.04	1.74	2.21	1.1
1:5-Year	1.84	3.25	4.07	3.0
1:10-Year	2.44	4.26	5.19	4.3
1:25-Year	3.45	5.74	6.93	7.1
1:50-Year	4.14	6.92	8.14	9.3
1:100-Year	4.88	8.01	9.29	11.3
Regional		14.34		14.2

Table 5: Existing Conditions Peak Flow Summary – Upstream of Line 2 (POI J)

STORM	4-HOUR CHICAGO	12-HOUR SCS	24-HOUR SCS	SUBWATERSHED STUDY (1996)
1:2-Year	1.25	2.12	2.72	1.4
1:5-Year	2.33	3.85	4.90	4.0
1:10-Year	3.05	5.13	6.31	5.6
1:25-Year	4.21	6.85	8.35	9.2
1:50-Year	5.13	8.26	9.93	11.9
1:100-Year	6.09	9.72	11.56	15.5
Regional		20.00		20.0

Table 6: Existing Conditions Peak Flow Summary – Nicole Drain No. 13 Crossing

STORM	4-HOUR CHICAGO	12-HOUR SCS	24-HOUR SCS
1:2-Year	0.58	0.93	1.22
1:5-Year	0.91	1.74	2.29
1:10-Year	1.13	2.31	2.84
1:25-Year	1.57	2.99	3.65
1:50-Year	2.14	3.48	4.29
1:100-Year	2.55	4.12	4.85
Regional		5.89	

3.7 STREAMFLOW MONITORING & CALIBRATION

In accordance with the ToR, three streamflow monitoring stations were installed in the Study Area to collect streamflow and precipitation data. An additional streamflow device was installed downstream of the Study Area boundary at the 4 Line crossing.

Each streamflow monitoring station utilises a data logger and collects water level measurements every 15 minutes. Monthly manual streamflow measurements and water level readings were collected to develop a streamflow rating curve (depth versus streamflow) at each streamflow monitoring location which is then used to convert water depth to streamflow from the recorded data. The streamflow monitoring locations are illustrated on the Existing Condition Drainage Plan (Drawing DP-2) enclosed. Graphs of the streamflow and temperature data from each of the four monitoring locations is included available in Appendix E for reference.

4 Natural Hazards Assessment

Nichol Drain No. 2 is regulated by the Grand River Conservation Authority for natural hazards. A preliminary natural hazards study has been prepared to establish the flood and erosion hazard limits associated with Nichol Drain No. 2 across the Study Area in accordance with:

- *Technical Guide – River & Stream System: Flood Hazard Limit*, Ontario Ministry of Natural Resources, 2002; and
- *Technical Guide – River & Stream Systems: Erosion Hazard Limit*, Ontario Ministry of Natural resources, 2002.

The natural hazards assessment completed is described in the following sections.

4.1 FLOOD HAZARD ANALYSIS

To establish the flood hazard limits within the Study Area, a topographic survey of Nichol Drain No. 2 was completed, and a HEC-RAS hydraulic model of the municipal drain was created. A description of the key hydrologic and hydraulic model parameters used to define Nichol Drain No. 2 in the HEC-RAS hydraulic model is provided in the following sections.

4.1.1 Boundary Conditions

Similar to the Subwatershed Study, the HEC-RAS model was extended approximately 700 m downstream of 2nd Line to the confluence with Drain No. 11. The hydraulic model was extended downstream to ensure any potential inaccuracies regarding the downstream boundary condition are resolved downstream of the Study Area. The downstream boundary condition has been set as 0.3% or the normal depth of Nichol Drain No. 2 at the downstream study limit and a sensitivity analysis was performed to confirm the downstream boundary condition establishes an appropriate starting water elevation for the Study Area.

4.1.2 Cross-Section Geometry

The cross-section geometry was developed from the topographic survey undertaken in November 2020, and a Digital Elevation Model (DEM) developed from topographic mapping prepared by Northway/Photomap Remote Sensing Inc. in the fall of 2020. The topographic survey data was used to define the main channel reaches of Nichol Drain No. 2 while the topographic mapping defined the channel overbanks. The reach lengths were determined based on the distance between consecutive cross-sections along the river centreline. The overbank reach lengths were determined based on the anticipated path of the center of mass of the overbank flow.

4.1.3 Manning's Roughness Coefficient

The Manning's roughness coefficient depends on several factors including surface roughness, vegetation, channel irregularities and obstructions. The HEC-RAS Reference Manual provides standard values for various channel and floodplain types. Based on field observations, the Manning's roughness coefficients were set as follows:

- 0.045 for the main channel where it was observed to contain some weeds and stones, and some pooled areas (a value of 0.040 was adopted for the areas of the main channel which have been artificially straightened and contain lower and less dense vegetation);
- 0.100 for the channel overbanks through weedy and wooded areas, including the identified wetland areas; and
- 0.060 within the floodplain with less dense tree cover.

4.1.4 Contraction & Expansion Coefficients

Energy losses occur due to the contraction and expansion of flow between cross-sections. This is most significant at culverts or bridges. Contraction and expansion coefficients have been set according to Table 5-2 of the HEC-RAS Reference Manual. Entrance losses for culverts have been set according to Tables 6-3 and 6-4 of the HEC-RAS Reference Manual and exit losses have been set to 1.0 which is typical for an abrupt transition.

4.1.5 Culverts

The culvert shape, size, length and inverts were determined from field observations and topographic survey data. Manning's roughness coefficients of 0.013 were used for the concrete box culverts, and 0.024 for CSP culverts. A summary of the culverts modelled in the HEC-RAS hydraulic model is provided in Table 7.

Table 7: Existing Culvert Summary

LOCATION	TYPE	LENGTH (m)	UPSTREAM INVERT (m)	DOWNSTREAM INVERT (m)
Highway 6	3.02 x 1.82 m Concrete Box	39	408.7	408.6
Field Crossing	1.2 m dia. CSP	6	406.1	406.2
Line 2	3.0 x 2.0 m Concrete Box	17	405.9	405.9

4.1.6 Hydraulic Analysis

The Regional (Hurricane Hazel) Storm peak flows generated through the hydrologic analysis were simulated in the HEC-RAS hydraulic model to establish the Regional floodplain associated with Nichol Drain No. 2 through the Study Area. The Regional floodplain is illustrated on the Natural Hazards Plan (Drawing FM-1) enclosed and the detailed hydraulic analysis results are included in Appendix F for reference.

During the flood hazard assessment, it was noted that a spill occurs across Guelph Line during the Regional Storm due to insufficient channel capacity in Nichol Drain No. 2 which is exacerbated by the flow constriction caused by the 2nd Line culvert crossing. An unsteady 1D/2D HEC-RAS model was developed to evaluate the impacts floodplain storage, peak flow attenuation and the spill have on the Regional floodplain upstream of 2nd Line. The model predicts water will backup through Nichol Drain No. 2, through the adjoining municipal drain into the wetland immediately east of Guelph Line and overtop Guelph Line during the Regional Storm. Once Guelph Line overtops, the water spills southeast to the intersection of Guelph Line and 2nd Line and continues southeast until it is reintroduced back into Nichol Drain No. 2 approximately 360 m downstream of 2nd Line.

4.2 EROSION HAZARD ANALYSIS

The MNRF *Technical Guide – River and Stream Systems: Erosion Hazard Limit* defines the erosion hazard limit for an unconfined system as 20 times the bankfull channel width centered on the meander belt axis. The *Fluvial Geomorphological Characterization and Erosion Threshold Assessment* included in Appendix C provides a preliminary assessment of potential geomorphic change and erosion potential of Nichol Drain No. 2. The geomorphological characterisation indicates the channel reaches through the Secondary Plan area are susceptible to erosion and channel instability. The erosion hazard limits have therefore been established as 20 times the assessed bankfull width of each respective channel reach in accordance with the MNRF guidelines. The erosion hazard limits are illustrated on the Natural Hazards Plan (Drawing NH-1) enclosed.

5 Stormwater Management Plan

The stormwater management plan developed for the Study Area is in accordance with the available background reports and criteria set forth in the MECP *Stormwater Management Planning and Design Manual* (2003) and the *Township of Centre Wellington Development Manual – Draft* (2018). The stormwater management plan has been designed in accordance with the SWM criteria established for the Study Area and presented in the following section.

5.1 STORMWATER MANAGEMENT CRITERIA

Based on the background information and existing conditions analysis, a clear understanding of the stormwater management criteria was achieved. In summary, the following criteria are to be addressed in the proposed stormwater management plan:

- the stormwater management plan must maintain existing stormwater runoff rates at key road crossings along Nichol Drain No. 2 and No. 13 by restricting post-development peak flow rates to pre-development levels for the 1:2-year through 1:100-year return frequency design storms. Where necessary additional erosion control should be provided based on the specific receiving watercourse and geomorphological recommendations;
- the stormwater management plan must achieve the required Level 1 “Enhanced” water quality treatment to Provincial standards in the form of 80% total suspended solids (TSS) removal for the site effluent at all SWMF outlets, as the site is in close proximity to Swan Creek and the Grand River;
- water balance conditions and infiltration techniques should be considered for implementation throughout the Study Area based on the findings of the groundwater and hydrogeological recommendations; and
- safe conveyance of the Regulatory Storm event peak flows through the Study Area to the downstream drainage system must be provided within the development plan.

5.2 PROPOSED DRAINAGE PATTERNS

The most recent land use plan was used to create proposed drainage patterns and identify where quantity and quality control will be required following development to achieve the established criteria. The proposed catchments for the development are outlined in the Proposed Conditions Drainage Plan (Drawing DP-3). In all developed catchments the minor flows generated will drain via storm sewer and major storms will be conveyed overland through the municipal right-of-way (ROW) and overland flow routes to their respective outlets (SWM facilities). The proposed drainage patterns are summarized as follows:

- the exiting Highway Commercial lands and Cherry Hills Estates drainage routes remain unchanged from existing conditions. Approximately 10.3 ha of newly developed land will continue to drain to the constructed channel, into the existing Nichol Drain No. 2 Phase 1 SWMF which requires no changes to its active storage capacity or outlet design;
- the low-density residential areas adjacent to Scotland Street, and approximately 1 ha of medium density residential lands (Catchments 202-204) will drain to SWMF 405 situated at the upstream end of the wetland. SWMF 405 will discharge to the wetland at its upper end;
- the surface runoff from 29.6 ha of agricultural land east of Scotland Street (Catchment 201) will continue to drain to the existing Scotland Street culvert crossing (Point of Interest A) where it will be collected and be conveyed to SWMF 405;
- approximately 3.1 ha of future park land to the east of the upstream end of the wetland (Catchments 207 & 215) will drain overland directly into the wetland and into Nichol Drain No. 2;
- SWMF 404 will be situated on the south side of Nichol Drain No. 2 opposite to the existing Nichol Drain No. 2 Phase 1 SWMF and will receive drainage from the area bound by:
    - Highway 6 to the west;
    - 2nd Line to the south;
    - the proposed extension of McTavish Street to the east; and
    - the southern edge of the wetlands and parks to the north.

  An area of approximately 10.2 ha containing a medium density residential block and the institutional block will drain to a forebay on the north side of the pond, and the rest to a second forebay adjacent to Highway 6. SWMF 404 will outlet into Nichol Drain No. 2 upstream of the culvert crossing at Highway 6 (at Point of Interest F);
- in the northwest corner of the property (bound by Guelph Road to the west, McQueen Boulevard to the north, Highway 6 to the east and wetlands to the south), approximately 8.9 ha of the low-density residential lands and 7.1 ha of the mixed-use lands will drain south into SWMF 403, and then into the Nichol Drain No. 2 (Point of Interest I). The remaining lands in this corner will drain to the northwest towards SWMF 406 at the corner of Guelph Road and the proposed extension of McQueen Boulevard, which will outlet into a roadside ditch on Guelph Road and into Nichol Drain No. 13 (Point of Interest L);
- a small area of approximately 2.6 ha of low-density residential lands (Catchment 224) will drain uncontrolled into an oil grit separator to provide treatment and then into the existing wetland in catchment 218;

- the proposed highway commercial development along McQueen Boulevard (Catchment 221) will drain to the Westminster subdivision SWM Pond;
- the proposed low density residential lands at the corner of Guelph Road and 2nd line will drain to SWMF 402 on the west side of Nicol Drain No. 2, with approximately 0.4 ha draining uncontrolled to the north into the wetland;
- the remaining medium density residential lands and highway commercial lands at the corner of Highway 6 and 2nd Line will drain into SWMF 401 just east of Nichol Drain No. 2; and
- the catchments and Nichol Drain No. 2 downstream of 2nd Line will remain unchanged from existing conditions.

5.3 STORMWATER QUANTITY & EROSION CONTROL

Water quantity control at key points of interest is required in the form of post to pre-development peak flow attenuation. In addition, safe conveyance of the Regulatory (Hurricane Hazel) Storm peak flows must be provided.

The stormwater drainage infrastructure will be designed according to the dual drainage principle, with major and minor drainage systems. As stated previously, the minor drainage system will consist of a network of storm sewers, roadside ditches and drainage swales and will be designed to collect and convey the runoff from frequent storms, up to and including the 1:5-year return frequency design storm. The major drainage system will convey runoff exceeding the capacity of the minor system using the municipal ROW and overland flow routes to direct flow into one of the six SWM facilities proposed in the Study Area.

The hydrologic analysis and subsequent SWMF sizing have considered the receiving waterbodies in establishing the flow control criteria. In instances where the main receiving system is a wetland with some additional attenuation capabilities, this has been considered and flow controls adjusted accordingly. In addition, for systems with discharge direct to a drain or watercourse the flow control requirements for erosion protection have also been considered in the design of the SWMF. Specific details on the erosion control requirements are included in the Fluvial Geomorphic Characterization & Erosion Threshold Assessment included in Appendix C.

The results of the Fluvial Geomorphic Characterization & Erosion Threshold Assessment determined that the proposed stormwater management plan provides effective erosion control, and there are no adverse impacts anticipated on the downstream reaches of Nichol Drain No. 2 due to development in the Study Area. Additionally, the proposed HEC-RAS model of Nichol Drain No. 2 support this conclusion, and a table summarizing the velocity and shear stress in the channel downstream of 2nd Line under existing and proposed conditions is included in Appendix C.

5.3.1 Hydrologic Analysis

Imperviousness percentages were assigned for each land use designation using the MTO *Drainage Management Manual* (1997). Aerial imagery of the surrounding subdivisions was used to calculate the impervious coverage in residential and institutional areas to provide a representative imperviousness estimate for those land uses. The *Township of Centre Wellington Comprehensive Zoning By-Law No. 2009-045* (2021) was referenced for maximum lot coverages of each land use, and the *LSRCA Technical Guidelines for Stormwater Management Submissions* (2016) was used as an additional source of information. Conservative hydrologic parameters have been used to ensure appropriate sizing of all stormwater infrastructure designed in this report. The values used for each land use are summarized in Table 8, and supporting figures and material is available in Appendix G for reference.

Table 8: Land Use Type Impervious Percentage Summary

LAND USE	IMPERVIOUS PERCENTAGE	DIRECTLY CONNECTED IMPERVIOUS PERCENTAGE
Low-Density Residential	40%	20%
Medium-Density Residential	70%	45%
Commercial/Mixed Use	85%	85%
Institutional/School	60%	60%
Park/Lawn	0%	0%

The existing conditions Visual OTTHYMO hydrologic model was updated to reflect the proposed conditions of the Study Area to quantify the peak flows throughout the Study Area, establish the performance of existing SWMF and establish quantity control requirements for the proposed SWMF. The 1:2-year through 1:100-year return frequency design storms have been simulated using the 4-hour Chicago and the 12 and 24-hour SCS Type II design storm distributions. The Regional Storm was modelled using the Hurricane Hazel storm distribution. The proposed condition VO results at the Nichol Drain No. 2 Highway 6 crossing (Point of Interest F) are summarized in Table 9 and provided in Appendix G for reference.

Table 9: Point of Interest F (Highway 6 Crossing) Peak Flow Summary

DESIGN STORM	PEAK FLOW (m^3/s)					
	EXISTING CONDITIONS			PROPOSED CONDITIONS		
	4-hr CHI	12-hr SCS	24-hr SCS	4-hr CHI	12-hr SCS	24-hr SCS
25 mm	0.39	-	-	0.20	-	-
1:5-year	1.84	3.25	4.07	1.16	2.74	3.52
1:25-year	3.45	5.74	6.93	2.94	5.00	6.09
1:100-year	4.88	8.01	9.29	4.51	7.05	8.63
Regional		14.34			16.58	

The proposed conditions VO model results at the 2nd Line crossing of Nichol Drain No. 2 (Point of Interest J) are summarized in Table 10 and provided in Appendix G for reference.

Table 10: Point of Interest J (2nd Line Crossing) Peak Flow Summary

DESIGN STORM	PEAK FLOW (m^3/s)					
	EXISTING CONDITIONS			PROPOSED CONDITIONS		
	4-hr CHI	12-hr SCS	24-hr SCS	4-hr CHI	12-hr SCS	24-hr SCS
25 mm	0.44	-	-	0.26	-	-
1:5-year	2.33	3.85	4.90	1.39	3.19	4.14
1:25-year	4.21	6.85	8.35	3.48	6.01	7.32
1:100-year	6.09	9.72	11.56	5.47	8.43	10.35
Regional		20.00			21.74	

The proposed conditions VO results at the Guelph Road crossing of Nichol Drain No. 13 (Point of Interest L) are summarized in Table 11 and provided in Appendix G for reference.

Table 11: Point of Interest L (Nichol Drain No. 13 Crossing) Peak Flow Summary

	PEAK FLOW (m^3/s)					
STORM	EXISTING CONDITIONS			PROPOSED CONDITIONS		
	4-hr CHI	12-hr SCS	24-hr SCS	4-hr CHI	12-hr SCS	24-hr SCS
25 mm	0.39	-	-	0.38	-	-
1:5-year	0.91	1.74	2.29	0.85	1.56	2.03
1:25-year	1.57	2.99	3.65	1.45	2.60	3.30
1:100-year	2.55	4.12	4.85	2.20	3.95	4.86
Regional		5.89			6.04	

5.4 STORMWATER MANAGEMENT FACILITIES

There are six new SWMFs proposed in the Study Area to provide quantity and quality controls as required by the MOE Stormwater Management Planning and Design Manual, and the design criteria specified in the Township of Centre Wellington Development Manual - Draft (2018). The existing Nichol Drain No. 2 Phase 1 wet pond, the Westminster Subdivision wet pond and natural wetland have been assessed at a preliminary level and confirmed they are adequate. However, we recommend these facilities/features be reassessed at detailed design to confirm their functionality as design and development plans evolve.

5.4.1 SWM Facility 401

Given the amount of attenuation provided upstream, SWM Facility 401 acts mainly as a water quality pond for its service area of approximately 6.4 ha of residential and highway commercial lands cornering Highway 6 and 2nd Line. The outlet configuration consists of a primary orifice for the 25 mm water quality storm, a ditch inlet catch basin (DICB) as a secondary outlet, and an emergency overflow weir to discharge major storm flows. The overflow weir is positioned at an elevation of 408.10 m in its initial layout as this facility is not required to provide a significant amount of quantity control due to the overcontrol provided in the facilities upstream. Table 12 summarizes the operating conditions of SWM Facility 401, and Stage-Storage-Discharge tables are available in Appendix G for reference.

Table 12: SWM Facility 401 Operating Conditions Summary

STORM	DISCHARGE (m^3/s)			STORAGE (m^3)		
	CHICAGO	12-HOUR	24-HOUR	CHICAGO	12-HOUR	24-HOUR
25 mm	0.018	-	-	921	-	-
1:2-year	0.022	0.029	0.057	1,379	1,790	1,888
1:5-year	0.053	0.134	0.217	1,872	2,136	2,272
1:10-year	0.088	0.256	0.449	1,993	2,338	2,518
1:25-year	0.150	0.592	1.005	2,160	2,584	2,742
1:50-year	0.218	0.966	1.421	2,274	2,723	2,922
1:100-year	0.294	1.309	1.785	2,402	2,882	3,042
Regional	-	0.894	-	-	2,695	-

Note: 12hr refers to the 12hr SCS Type II design storm, and 24hr refers to the 24hr SCS Type II design storm.

There is an opportunity to reduce the size of SWM Pond 401 by implementing on-site controls in the gateway commercial lands that the pond services which can be explored at the detailed design stage.

5.4.2 SWM Facility 402

Given the amount of attenuation provided upstream, SWM Facility 402 acts primarily as a water quality pond for its service area of 8.3 ha of residential lands at the corner of 2nd Line and Guelph Road. The outlet configuration consists of a primary orifice for the 25 mm water quality storm, a ditch inlet catch basin (DICB) as a secondary outlet, and an emergency overflow weir to outlet major storm flows. The overflow weir is positioned at an elevation of 409.70 m in its initial layout as this facility is not required to provide a significant amount of quantity control due to the overcontrol provided in the facilities upstream. Table 13 summarized the operating conditions of SWMF facility 402, and Stage-Storage-Discharge tables are available in Appendix G for reference.

Table 13: SWM Facility 402 Operating Conditions Summary

STORM	DISCHARGE (m^3/s)			STORAGE (m^3)		
	CHICAGO	12-HOUR	24-HOUR	CHICAGO	12-HOUR	24-HOUR
25 mm	0.007	-	-	676	-	-
1:2-year	0.021	0.047	0.084	1,095	1,396	1,561
1:5-year	0.061	0.142	0.221	1,457	1,824	2,065
1:10-year	0.096	0.236	0.337	1,615	2,111	2,399
1:25-year	0.148	0.367	0.510	1,842	2,472	2,809
1:50-year	0.203	0.479	0.817	2,009	2,739	3,071
1:100-year	0.261	0.689	1.125	2,186	2,985	3,279
Regional	-	1.055	-	-	3,223	-

Note: 12hr refers to the 12hr SCS Type II design storm, and 24hr refers to the 24hr SCS Type II design storm.

5.4.3 SWM Facility 403

SWM Facility 403 is proposed as a wet pond and provides quantity and quality control for approximately 16 ha of developable land in the northwest corner of the Study Area before it discharges to Nichol Drain No. 2. The outlet configuration consists of a primary orifice for the 25 mm water quality storm, a ditch inlet catch basin (DICB) as a secondary outlet, and an emergency overflow weir for the Regulatory Storm. Table 14 summarizes the operating conditions of SWM Facility 403, and stage-storage-discharge tables are available in Appendix G for reference.

Table 14: SWM Facility 403 Operating Conditions Summary

STORM	DISCHARGE (m^3/s)			STORAGE (m^3)		
	CHICAGO	12-HOUR	24-HOUR	CHICAGO	12-HOUR	24-HOUR
25 mm	0.03	-	-	2,332	-	-
1:2-year	0.04	0.08	0.13	3,465	4,363	4,746
1:5-year	0.10	0.24	0.39	4,633	5,385	5,866
1:10-year	0.18	0.45	0.65	5,035	6,034	6,549
1:25-year	0.29	0.74	1.06	5,524	6,765	7,415
1:50-year	0.40	1.01	1.41	5,871	7,326	8,078
1:100-year	0.51	1.32	1.77	6,245	7,891	8,852
Regional	-	1.82	-	-	8,987	-

Note: 12hr refers to the 12hr SCS Type II design storm, and 24hr refers to the 24hr SCS Type II design storm.

There is opportunity to reduce the size of SWM Pond 403 by implementing on-site controls in the mixed-use area that the pond services which can be explored at the detailed design stage.

5.4.4 SWM Facility 404

SWM Facility 404 is a proposed wet pond and provides quantity and quality control for approximately 38.6 ha of developable land southwest of the proposed McTavish Street extension and southeast of Nichol Drain No. 2, before discharging into Nichol Drain No. 2 just upstream of Highway 6. The outlet configuration consists of a primary orifice for the 25 mm water quality storm, a ditch inlet catch basin (DICB) as a secondary outlet, and an emergency overflow weir for the Regulatory Storm. Table 15 summarizes the operating conditions of SWM Facility 404, and stage-storage-discharge tables are available in Appendix G for reference.

Table 15: SWM Facility 404 Operating Conditions Summary

STORM	DISCHARGE (m^3/s)			STORAGE (m^3)		
	CHICAGO	12-HOUR	24-HOUR	CHICAGO	12-HOUR	24-HOUR
25 mm	0.040	-	-	5,115	-	-
1:2-year	0.057	0.207	0.342	7,785	9,619	10,563
1:5-year	0.267	0.615	0.963	10,047	11,914	13,280
1:10-year	0.420	1.023	1.226	11,003	13,502	15,309
1:25-year	0.664	1.257	1.402	12,138	15,831	18,356
1:50-year	0.896	1.374	1.527	13,025	17,883	20,783
1:100-year	1.138	1.488	1.641	13,959	20,004	23,226
Regional	-	4.005	-	-	28,120	-

Note: 12hr refers to the 12hr SCS Type II design storm, and 24hr refers to the 24hr SCS Type II design storm.

There is opportunity to reduce the size of SWM Pond 404 by implementing on-site controls in the mixed-use area that the pond services which can be explored at the detailed design stage.

5.4.5 SWM Facility 405

SWM Facility 405 is a wet pond providing quality control with some quantity control for approximately 30.2 ha of developable land east of the proposed McTavish Street extension, and 29.6 ha of external land before it discharges to the existing wetland and Nichol Drain No. 2. The outlet configuration consists of a primary orifice for the 25 mm water quality storm, a ditch inlet catch basin (DICB) as a secondary outlet, and an emergency overflow weir for major storms greater than the required extended detention level. Strict post to pre quantity control is not required for this pond due to the wetland immediately downstream providing control ensuring that flows beyond the wetland do not increase in the post development condition. Table 16 summarizes the operating conditions of SWM Facility 405, and stage-storage-discharge tables are available in Appendix G for reference.

As per the request of the Township, an analysis was completed to investigate the impact of removing SWM Facility 405. It was concluded that the wetland alone does not provide sufficient water quantity control, as flows increase at Tower Street and 2nd Line from pre to post conditions. It was also concluded that due to the volume of flow conveyed through this facility, the SWM facility provides the best water quality treatment compared to a series of oil grit separators.

Table 16: SWM Facility 405 Operating Conditions Summary

STORM	DISCHARGE (m^3/s)			STORAGE (m^3)		
	CHICAGO	12-HOUR	24-HOUR	CHICAGO	12-HOUR	24-HOUR
25 mm	0.064	-	-	4,208	-	-
1:2-year	0.145	0.509	0.917	7,190	8,674	9,376
1:5-year	0.585	1.687	2.356	8,879	9,864	10,236
1:10-year	1.080	2.566	3.279	9,481	10,328	10,630
1:25-year	1.764	3.581	4.800	9,909	10,752	11,261
1:50-year	2.288	4.529	6.480	10,210	11,128	11,784
1:100-year	2.823	5.648	8.353	10,434	11,528	12,442
Regional	-	6.733	-	-	11,861	-

Note: 12hr refers to the 12hr SCS Type II design storm, and 24hr refers to the 24hr SCS Type II design storm.

5.4.6 SWM Facility 406

SWM Facility 406 is a wet pond providing quality and quantity control for approximately 18.8 ha of land in the northwest corner of the Study Area and outlets to a roadside ditch on Guelph Road before entering Nichol Drain No. 13. The outlet configuration consists of a primary orifice for the 25 mm water quality storm, a ditch inlet catch basin (DICB) as a secondary outlet, and an emergency overflow weir for major storms greater than the required extended detention level. Table 17 summarizes the operating conditions of SWM Facility 406, and stage-storage-discharge tables are available in Appendix G for reference.

Table 17: SWM Facility 406 Operating Conditions Summary

STORM	DISCHARGE (m^3/s)			STORAGE (m^3)		
	CHICAGO	12-HOUR	24-HOUR	CHICAGO	12-HOUR	24-HOUR
25 mm	0.04	-	-	2,180	-	-
1:2-year	0.05	0.06	0.06	3,274	4,378	4,992
1:5-year	0.06	0.11	0.18	4,648	5,944	6,378
1:10-year	0.06	0.22	0.38	5,598	6,527	7,045
1:25-year	0.17	0.48	0.72	6,351	7,284	7,854
1:50-year	0.26	0.71	0.90	6,645	7,828	8,644
1:100-year	0.35	0.87	1.06	6,954	8,484	9,464
Regional	-	1.77	-	-	11,219	-

5.4.7 Existing Nichol Drain No. 2 Phase 1 SWMF

The only change to the watershed of the Nichol Drain No. 2 Phase 1 SWMF is the medium-density residential development proposed to the northeast of the rear drainage channel of the highway commercial lands. As with the existing conditions model, the stage-storage-discharge table from the 1996 Nichol Drain No. 2 Subwatershed Study was used to model the proposed conditions in VO. Under proposed conditions, the SWMF operates normally and does not require any improvements. Table 18 summarizes the operating conditions of the existing Nichol Drain No. 2 Phase 1 SWMF, and stage-storage-discharge tables are available in Appendix G for reference.

Table 18: Nichol Drain No. 2 Phase 1 SWMF Proposed Operating Conditions Summary

STORM	DISCHARGE (m^3/s)			STORAGE (m^3)		
	CHICAGO	12-HOUR	24-HOUR	CHICAGO	12-HOUR	24-HOUR
25 mm	0.14 *(0.08)*	-	-	3,169 *(2,486)*	-	-
1:2-year	0.47 *(0.36)*	1.07 *(0.78)*	1.22 *(1.01)*	3,472 *(3,377)*	3,984 *(3,732)*	4,174 *(3,924)*
1:5-year	0.94 *(0.75)*	1.39 *(1.35)*	1.66 *(1.51)*	3,860 *(3,703)*	4,744 *(4,635)*	5,706 *(5,187)*
1:10-year	1.27 *(1.03)*	1.69 *(1.59)*	1.90 *(1.81)*	4,336 *(3,944)*	5,807 *(5,473)*	6,530 *(6,243)*
1:25-year	1.52 *(1.32)*	1.99 *(1.90)*	2.25 *(2.17)*	5,196 *(4,495)*	6,837 *(6,520)*	7,707 *(7,426)*
1:50-year	1.78 *(1.52)*	2.31 *(2.22)*	2.62 *(2.43)*	6,125 *(5,196)*	7,887 *(7,599)*	8,925 *(8,306)*
1:100-year	1.99 *(1.79)*	2.65 *(2.43)*	3.11 *(2.77)*	6,827 *(6,166)*	9,051 *(8,289)*	9,871 *(9,424)*
Regional	-	4.49 *(4.66)*	-	-	11,381 *(11,556)*	-

Note: Italicized values indicate the flows and pond operating characteristics under pre-development conditions.

5.4.8 Westminster Subdivision Existing SWM Pond

As per the meeting minutes included in Appendix H, the Township requested that additional flows should not be routed to the existing Westminster SWM facility due to outlet constraints. The proposal includes a 13 ha reduction in the contributing area of the Westminster Subdivision SWM facility, as this runoff will be diverted to SWM Facility 406. As a result of these changes, the Westminster Subdivision SWM facility has reduced water levels and discharge rates under all design storm scenarios. Even with this reduction in drainage area the modeling indicates the overflow weir (set at elevation 411.55m) is still being utilized during the 1:25-year through 1:100-year 24-hour SCS Type II design storms and the 1:100-year 12-hour SCS Type II storm. The Regional Storm also comes within 2 cm of overtopping the pond (Top of Pond = 411.95m). The design of the Westminster Subdivision SWMF completed by Gamsby and Mannerow Limited in April 2010 specified the overflow spillway would be used during storm events greater than the 1:25-year through 1:100-year design storms, therefore these proposed changes to the pond are in compliance with the original approved design. The proposed operating conditions of the Westminster Subdivision SWMF are summarized in Table 19.

Table 19: Westminster Subdivision SWMF Proposed Operating Conditions Summary

STORM	DISCHARGE (m^3/s)			STORAGE (m^3)		
	CHICAGO	12-HOUR	24-HOUR	CHICAGO	12-HOUR	24-HOUR
25 mm	0.02	-	-	2,761	-	-
1:2-year	0.11	0.29	0.37	4,066	4,601	5,149
1:5-year	0.29	0.39	0.48	4,585	6,203	7,237
1:10-year	0.37	0.51	0.62	5,133	7,404	8,453
1:25-year	0.39	0.63	0.66	6,231	8,795	10,305
1:50-year	0.45	0.63	0.86	7,101	10,049	11,452
1:100-year	0.58	0.80	1.13	7,744	11,171	12,363
Regional	-	2.04	-	-	14,618	-

5.4.9 Wetlands

Although the wetlands in the Study Area are not explicitly stormwater infrastructure, they will continue to collect run-off directed towards them in the post development condition and in this way will be used for quantity control under proposed conditions. As discussed previously, the wetland downstream of SWMF 405 will provide peak flow attenuation before the Nichol Drain No. 2 Highway 6 crossing. The hydrologic function of the wetland is summarized in the model results and background available in Appendix G. The results confirm the small change in pre to post development flows directed to the wetlands will not change its function from a water conveyance perspective.

5.5 STORMWATER QUALITY CONTROL & WATER BALANCE

Nichol Drain No. 2 and No. 13 are a part of the Grand River watershed, and therefore MECP Level 1 "Enhanced" water quality control in the form of 80% total suspended solids (TSS) removal is required for all discharges to the two municipal drains. The stormwater quality management plan is outlined in the following sections. In addition, the consideration and provision of additional at-source and conveyance SWM measures for the purposes of maintaining site water balance and infiltration has also been reviewed and addressed below.

5.5.1 Stormwater Management Facilities

Water quality control for most of the Study Area will primarily be provided through the proposed SWMFs. Table 3.2 in the Ministry of the Environment *Stormwater Management Planning and Design Manual* states that each SWMF requires a specific quantity of water quality storage based on the imperviousness of its contributing area, and these values are summarized in the ‘Storage Required’ column of Table 20. A summary of each SWMFs quality control volumes is provided in Table 20, and detailed water quality calculations are provided in Appendix I for reference.

Forebays constructed at each inlet of the SWMFs will provide sufficient water quality treatment for the runoff generated by the areas proposed in the Study Area. Forebays have been sized to provide adequate settling and dispersion lengths and storage volumes for the sediments being conveyed in the runoff. Forebay calculations are provided in Appendix I for reference.

The Nichol Drain No. 2 SWM Facility (Pond ID: 65) does not currently have sufficient permanent pool volume to comply with MOE water quality standards under proposed conditions. A proposed plan to retrofit the pond by expanding the permanent pool has been developed which would provide the requisite permanent pool volume. A sketch of the proposed retrofit is provided in Appendix I which is to be confirmed at detailed design.

Table 20: Proposed SWMF Quality Control Summary

POND ID	% IMP.	STORAGE REQUIRED (m^3/ha)	PERMANENT POOL STORAGE (m^3)		EXTENDED DETENTION STORAGE (m^3)		ACTIVE STORAGE (m^3)	
			Required	Provided	Required	Provided	Required	Provided
401	76%	235	1,238	2,392	1,055	1,778	1,715	2,469
402	40%	153	938	3,132	723	1,104	1,001	2,871
403	66%	213	2,764	7,089	2,572	4,121	3,987	9,877
404	63%	209	6,517	10,672	4,172	6,443	9,274	25,291
405	25%	115	4,484	6,465	4,868	6,840	6,277	13,098
406	60%	199	2,993	5,281	2,740	5,612	4,320	11,592
400[1]	54%	185	2,916[2]	2,260	2,879	3,792	3,718	10,174
65[1]	59%	163	5,652	5,726[3]	5,737	6,175	7,333	21,030

[1] Pond 400 is the existing Westminster subdivision SWM pond, and 65 is the existing Nichol Drain No. 2 Phase 1 SWMF.

[2] Permanent pool volume based off provided SSD, reducing forebay volume to assume 0.6 m of sediment accumulation to achieve 1:10-year forebay cleanout frequency.

[3] Permanent Pool Storage for the Nichol Drain No. 2 Phase 1 SWMF is the updated value accounting for the proposed pond modifications.

The detention target in each SWMF is set between 24 and 48 hours for the 25 mm water quality storm and the maximum extended detention volume, based on the Ministry of the Environment *Stormwater Management Planning and Design Manual*, 2003. The detention times for each SWMF were calculated using the falling head orifice equation (Equation 4.10, MOE, 2003) and are summarized in Table 21. Full calculations are provided in Appendix I for reference.

The Westminster subdivision SWM Facility currently has drawdown times exceeding 48 hours for both the water quality storm and extended detention volume. The drainage area to this pond is proposed to decrease, resulting in improved drawdown times. The existing Nichol Drain No. 2 Phase 1 SWMF currently has a drawdown time of less than 24 hours. As part of the proposed retrofit, the water quality outlet pipe is recommended to be reduced to a 200 mm STM. This pipe diameter change combined with the increased permanent pool area increases the drawdown times to satisfy the MOE standards. The proposed drawdown times for both the Westminster subdivision SWM Facility and Nichol Drain No. 2 Phase 1 SWMF are summarized in Table 21.

Table 21: Proposed SWMF Drawdown Time Summary

SWMF ID	DRAWDOWN TIME (HOURS)	
	25 mm WATER QUALITY STORM	EXTENDED DETENTION VOLUME
401	23.57	35.38
402	36.15	49.90
403	29.35	42.13
404	42.66	50.04
405	29.97	39.46
406	26.83	44.84
400	48.99	60.99
65	30.13	39.24

5.5.2 Oil Grit Separators

On the west side of the property adjacent to Guelph Road, approximately 2.6 ha of low-density residential land (catchment 224) will drain directly into the wetland to the south. Primary quality control for this catchment will be provided by an oil grit separator that outlets to the wetland and into the west branch of Nichol Drain No. 2.

5.5.3 Water Balance and Infiltration

The maintenance of infiltration and water balance has also been a consideration in the development of the stormwater strategy for the Study Area. Based on the background groundwater and hydrogeological work completed and included under separate cover infiltration targets have been established for each development area. Low impact development techniques such as soakaway pits and rain gardens on lots and common space areas can be implemented to achieve the necessary balance. It is not anticipated that widespread LIDs in the public right of way will be required at this time. Given the predominance of relatively high groundwater levels in many areas infiltration targets and implementation strategies should be revisited at the time of detailed design to confirm feasibility.

5.6 NICHOL DRAIN NO. 13 PROPOSED CONDITIONS HYDRAULIC ANALYSIS

The stormwater management plan as presented is currently directing drainage to Nichol Drain No. 13 along Guelph Road, and accordingly the Guelph Road roadside ditch capacity needed to be assessed to confirm that flows can be safely conveyed from SWM Facility 406 to Nichol Drain No. 13. Two options were considered.

- Improve the eastern roadside ditch of Guelph Road and the 450 mm dia. culverts beneath Cummings Crescent to convey flow to the 1150 mm dia. CSP beneath Guelph Road at the upstream end of Nichol Drain No. 13 (Point of Interest L); or
- Convey flow from SWM Facility 406 immediately beneath Guelph Road to the western roadside ditch and provide ditch improvements to Nichol Drain No. 13 (Point of Interest L).

A hydraulic model was generated using HEC-RAS to review the available alternatives. The results confirm that containing flow within the eastern ditch as configured was not feasible, therefore the western ditch was reviewed for its potential to convey peak flows. The model results for the western ditch are available in Appendix J for reference.

It is recommended the discharge from SWM Facility 406 be conveyed beneath Guelph Road via twin 730 x 1150 elliptical CSP culverts and into the roadside ditch west of Guelph Road. Regrading the ditch to have a longitudinal slope of 0.3% with 2:1 side slopes will provide the capacity to convey the 1:100-year return frequency design storm peak flow to Nichol Drain No. 13.

In the future, Guelph Road will be urbanized between Elora Street and 2nd Line. As part of the urbanization of Guelph Road, the existing roadside ditches will be removed and replaced with storm sewer. A 1,050 mm diameter storm sewer is required in the future to convey the 1:100-year peak flow from SWMF 406 to Nichol Drain No. 13. Guelph Road should be designed as an overland flow route to convey the Regional Storm peak flow safely to Nichol Drain No. 13. A preliminary calculation based on the standard road geometry of the Township of Centre Wellington determined that an urbanized ROW would have the capacity to convey flows from SWM Facility 406 within the ROW. This calculation is provided in Appendix J.

SWMF 406 will provide the requisite water quality treatment, extended detention, pond drawdown time and erosion control for the runoff draining from the South Fergus Study Area to Nichol Drain No. 13. This combined with the reduction in peak flows draining to Nichol Drain No. 13 will ensure flooding and erosion along Nichol Drain No. 13 is not worsened. To confirm this, A HEC-RAS model was developed from Point of Interest L to where the municipal drain outlets to the Grand River.

An analysis of Nichol Drain No. 13 was conducted to assess the municipal drain capacity under proposed conditions. To establish the drain capacity, the DEM was used to create a HEC-RAS hydraulic model, and a description of the key hydrologic and hydraulic model parameters used to define Nichol Drain No. 13 in the HEC-RAS hydraulic model is provided in the following sections.

Boundary Conditions

The HEC-RAS model includes the municipal drain from Guelph Line to its outlet into the Grand River. The hydraulic model was terminated at the Grand River because it is anticipated to not cause any significant backwater conditions in the municipal drain, based on the floodplain mapping from the GRCA. The downstream boundary condition has been set to 16% or the normal depth, due to the steep side slopes of the Grand River banks at the outlet location.

Cross Section Geometry

The cross section geometry was developed from the Northway/Photomap Remote Sensing Inc. DEM. There was no topographic survey conducted of the channel, therefore channel and overbank geometry were taken from the DEM.

Manning's Roughness Coefficient

The Manning's roughness coefficient depends on several factors including surface roughness, vegetation, channel irregularities and obstructions. The HEC-RAS Reference Manual provides standard values for various channel and floodplain types. Based on field observations, the Manning's roughness coefficients were set as follows:

- 0.045 for the main channel as this is a conservative estimate of channel roughness, vegetation and irregularities;
- 0.035 for the overland flow routes with mature row crops; and
- 0.060 within the floodplain where there is tree cover and light brush.

Contraction & Expansion Coefficients

Energy losses occur due to the contraction and expansion of flow between cross sections. This is most significant at culverts or bridges. Contraction and expansion coefficients have been set according to Table 5-2 of the HEC-RAS Reference Manual. Entrance losses for culverts have been set according to Tables 6-3 and 6-4 of the HEC-RAS Reference Manual and exit losses have been set to 1.0 which is typical for an abrupt transition.

Culverts

The culvert shape, size, length and inverts were estimated from available mapping and Google Streetview due to the lack of topographic survey data and the inability to access private property. The road crossing beneath South River Road was estimated to be a 600 mm diameter CSP culvert, and therefore the Manning's roughness coefficient of 0.024 was assigned to it. Any field crossings along the channel were omitted from the model.

Hydraulic Analysis

The goal of this assessment is to compare the flood elevations and erosion potential under existing and proposed conditions of the Study Area. Since the peak flow rates of the 1:2- to 1:50-year design storms entering Nichol Drain No. 13 from Guelph Line are maintained or decrease from existing to proposed conditions, the floodplains are expected to shrink and erosion potential is expected to decrease in the channel. To support this, a summary of the flows, shear stresses and velocities in the channel is available in Appendix J. The model confirms the marginal increases to the 1:100-year design storm and Regional Storm event flows result in negligible increases in water level and thus are not expected to increase the floodplain extent. It is noted the model estimates the 600 mm culvert crossing of South River Road will overtop currently under all return frequency design storms. The occurrence of overtopping for the more frequent events will be reduced due to the lower flows expected in the 1:2-year to 1:50-year events. Negligible change is expected in the 1:100 and Regional Storms flood elevations due to the very minor increase in flows and flood characteristics predicted by the model. Confirmation of the South River Road culvert capacity should be verified at detailed design of Phase 2 of development in the Study Area. HEC-RAS results and confirmation of reduced erosion threshold velocities are available in Appendix J for reference.

6 Siltation & Erosion Control

Siltation and erosion control will be implemented for all construction activities within the Study Area, including vegetation clearing, topsoil stripping, road construction and stockpiling of materials. The basic principles considered to minimize erosion and sedimentation and resultant negative environmental impacts include:

1. minimize disturbance activities where possible;
2. expose the smallest possible land area to erosion for the shortest possible time;
3. institute additional erosion control measures as required immediately;
4. implement sediment and erosion control measures before the onset of construction activities;
5. carry out regular inspections of erosion/sediment control measures and repair or maintain as necessary; and
6. carry out inspections of the SWMFs as outlined in a proposed Operation and Maintenance schedule.

It is recommended that the SWMF associated with each phase of development be constructed first when developing an area in the Study Area to provide sediment storage and quality control during construction activities.

The proposed grading, servicing and building construction should be carried out in such a manner that a minimum amount of erosion occurs and such that sedimentation facilities control any erosion that does occur. Additional erosion, sediment, and pollution control measures should include the following:

1. erecting of silt fences around all construction sites;
2. providing sediment traps (e.g. berms, geotextile and stone barriers in swales);
3. confining refuelling/servicing of equipment to areas well away from the minor/major system elements; and
4. fitting catch basins and inlet structures with sediment traps during construction activities and cleaning out as required.

7 Development Phasing

From a stormwater management perspective, development within the Study Area can proceed based on preference by the landowner's group as long as the SWMF associated with each development area is constructed at the onset of development in that area. It is noted, if development occurs in the SWMF 401 or 402 service areas in advance of development upstream, SWMFs 401 and 402 may need to be expanded to provide post to pre-development peak flow attenuation for their contributing areas. Similarly, if development occurs in the SWMF 405 service area prior to the construction of SWMF 404, SWMF 405 may need to be expanded to provide a greater level of quantity control than prescribed herein. The conceptual SWMF designs should be reviewed and finalized at the detailed design phase.

Additional development phasing constraints are described in the *South Fergus MESP and Secondary Plan Transportation Plan* and *South Fergus MESP and Secondary* Plan *Functional Servicing Report*, both of which have been prepared by Tatham Engineering and submitted under separate cover.

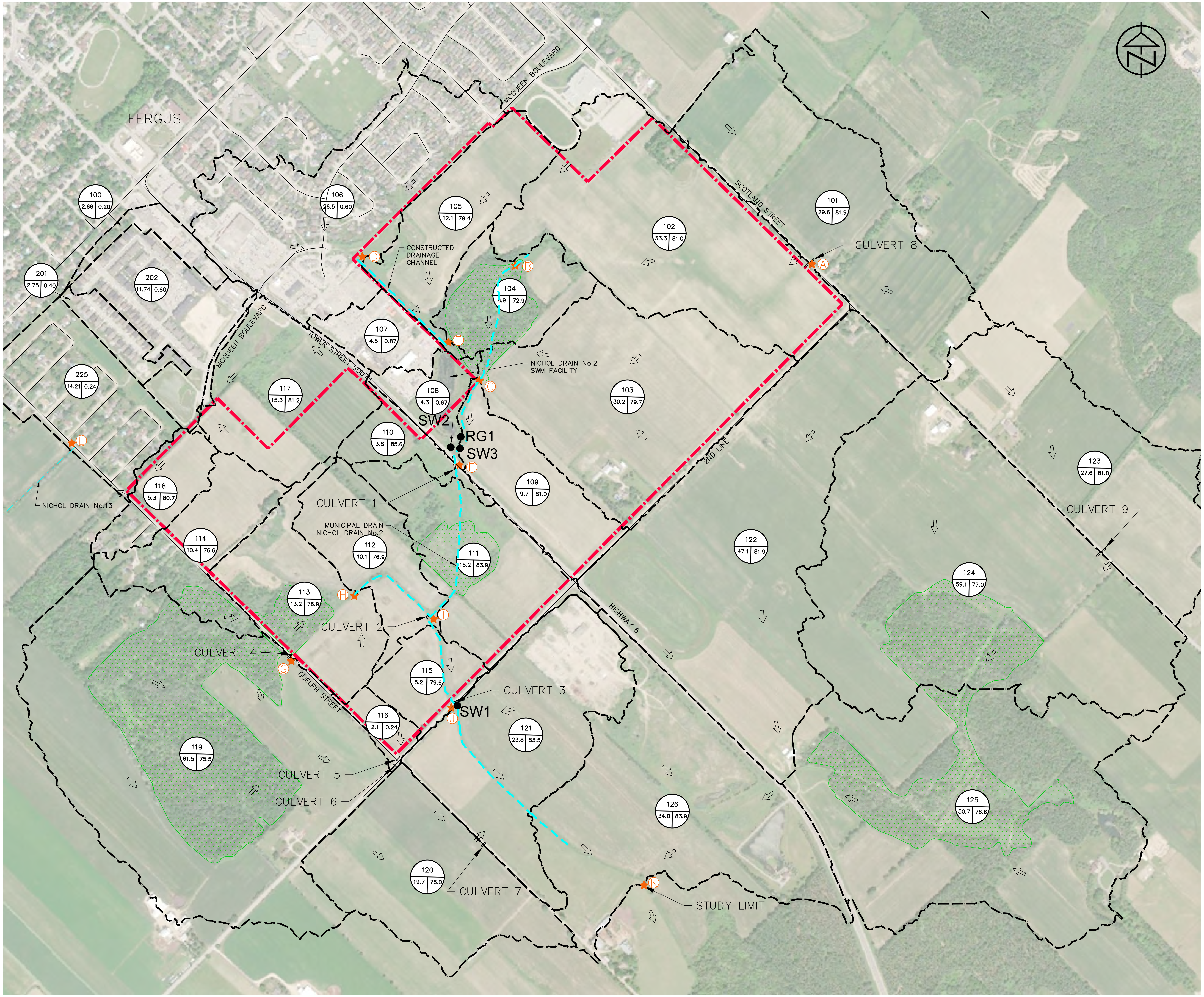
8 Summary

The proposed stormwater management plan has been prepared in accordance with the MECP and the Township of Centre Wellington guidelines, while satisfying the stormwater management constraints and criteria placed on the site.

The stormwater management plan maintains existing drainage conditions at the limits of the Study Area by restricting post development peak flow rates to pre-development levels and reduces the potential for adverse impacts resulting from changes to drainage as a result of the development. The stormwater management facilities proposed provide the primary water quantity control necessary. The stormwater management plan provides the required Level 1 “Enhanced” water quality control for the site effluent at the site outlets. Safe conveyance of the Regulatory Storm peak flows through the Study Area to the downstream drainage system is provided and the drainage from all external lands is accommodated within the proposed drainage design.

Construction and maintenance of siltation and erosion control facilities and adherence to strict housekeeping measures during site servicing and building construction will reduce the transportation of sediment from the Study Area, improving stormwater quality and mitigating environmental impacts during construction.

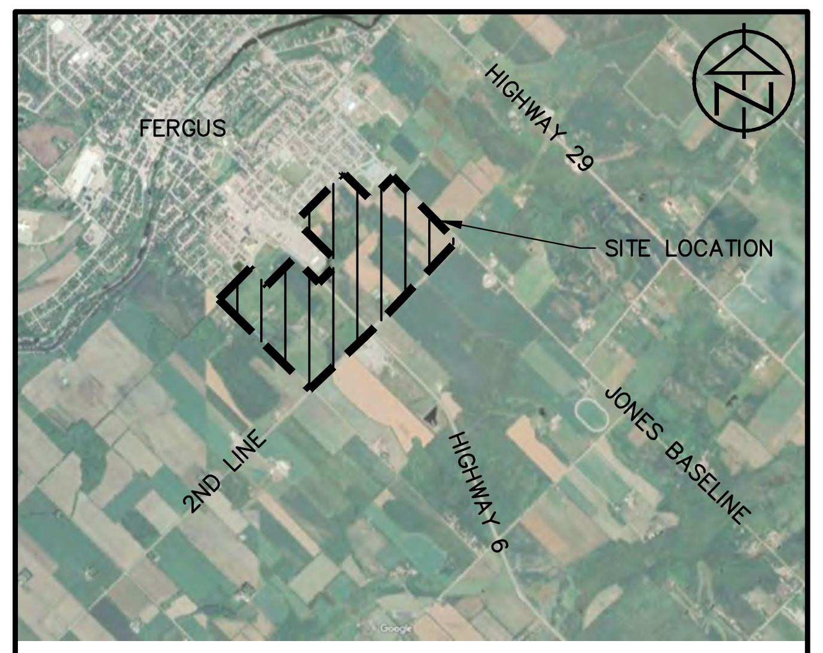
In summary, the proposed stormwater management plan supports the concept of an environmentally sustainable development. The proposed plan will mitigate anticipated stormwater impacts associated with the development of the Study Area.



DP-2

EXISTING DRAINAGE PLAN

South Fergus MESP and Secondary Plan
Town of Fergus
Township of Centre Wellington
County of Wellington



KEY PLAN
SCALE (N.T.S.)

CULVERTS

CULVET 1:	3.02m X 1.82m BOX CULVERT
CULVERT 2:	1.2mø CSP
CULVERT 3:	3.0m X 2.0m BOX CULVERT
CULVERT 4:	0.55mø & 0.6mø HDPE
CULVERT 5:	TO BE DETERMINED
CULVERT 6:	TO BE DETERMINED
CULVERT 7:	TO BE DETERMINED
CULVERT 8:	0.45mø CSP
CULVERT 9:	0.45mø CSP

LEGEND

🟥	SOUTH FERGUS SECONDARY PLAN AREA
⇦	OVERLAND FLOW DIRECTION
▬ ▪ ▬	CATCHMENT BOUNDARY
🟩	WETLANDS
12–104 / 2.72 | 0.65	CATCHMENT ID CURVE NUMBER / IMPERVIOUS FRACTION CATCHMENT AREA
●SW	STREAMFLOW MONITORING LOCATION
●RG	RAIN GAUGE LOCATION
★ Ⓐ	POINT OF INTEREST

Base Map Source: TOPOGRAPHIC SURVEY (TATHAM) COMBINED WITH TOPOGRAPHIC MAPPING (NORTHWAY/PHOTOMAP REMOTE SENSING LTD.)

DATE: JUNE 14, 2021
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DRAWN: KF

north

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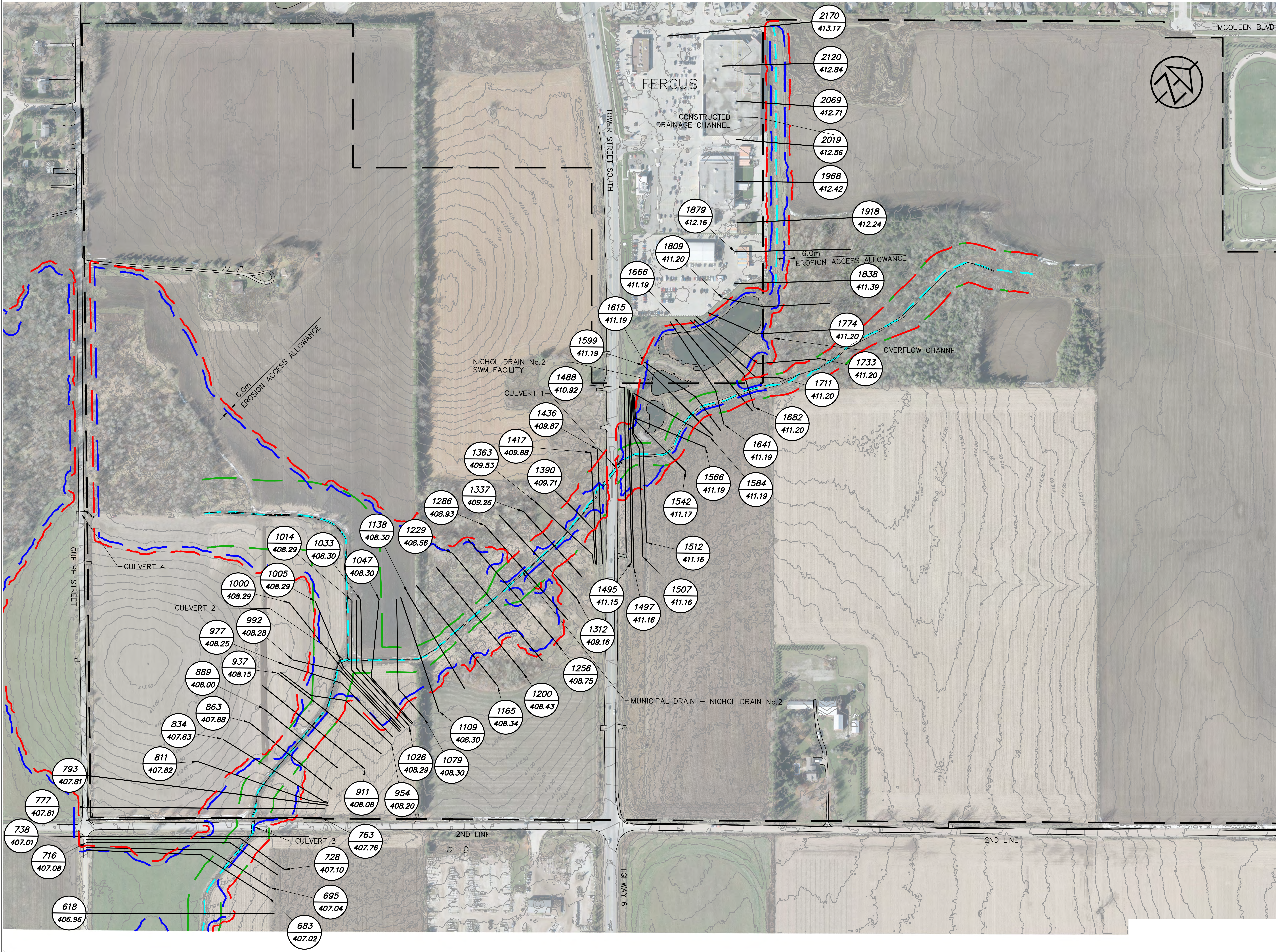
MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE

FRICORP ECOLOGICAL SERVICES

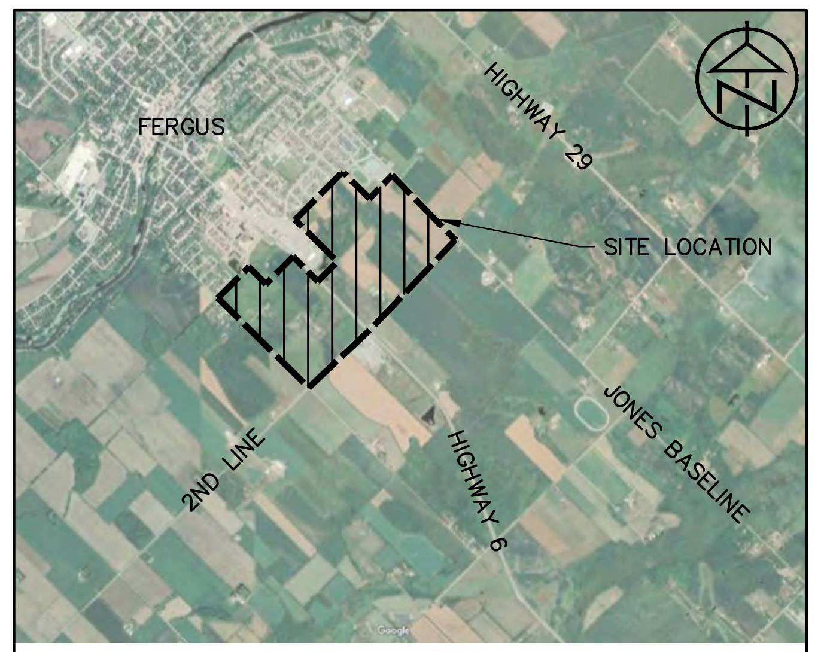
TATHAM ENGINEERING



FM-1

NATURAL HAZARDS PLAN

South Fergus MESP and Secondary Plan
Town of Fergus
Township of Centre Wellington
County of Wellington



KEY PLAN
SCALE (N.T.S.)

CULVERTS

CULVERT 1:	3.05m x 1.82m CONCRETE BOX CULVERT
CULVERT 2:	1.20mø CSP
CULVERT 3:	3.0m x 2.0m CONCRETE BOX CULVERT
CULVERT 4:	0.6mø HDPE CULVERT AND 0.55mø HDPE CULVERT

LEGEND

FLOOD HAZARD LIMIT	—
NATURAL HAZARD LIMIT	—
CENTERLINE OF DRAIN	– –
EROSION HAZARD LIMIT	—
SOUTH FERGUS SECONDARY PLAN AREA	— —
HEC-RAS RIVER STATION	90
REGIONAL WATER SURFACE ELEVATION	411.24
EXISTING CONTOUR	419.50

Base Map Source: TOPOGRAPHIC SURVEY (TATHAM) COMBINED WITH TOPOGRAPHIC MAPPING (NORTHWAY/PHOTOMAP REMOTE SENSING LTD.)

DATE:	JUNE 14, 2021
SCALE:	1:2500
FILE:	120157
DRAWN:	KF

north

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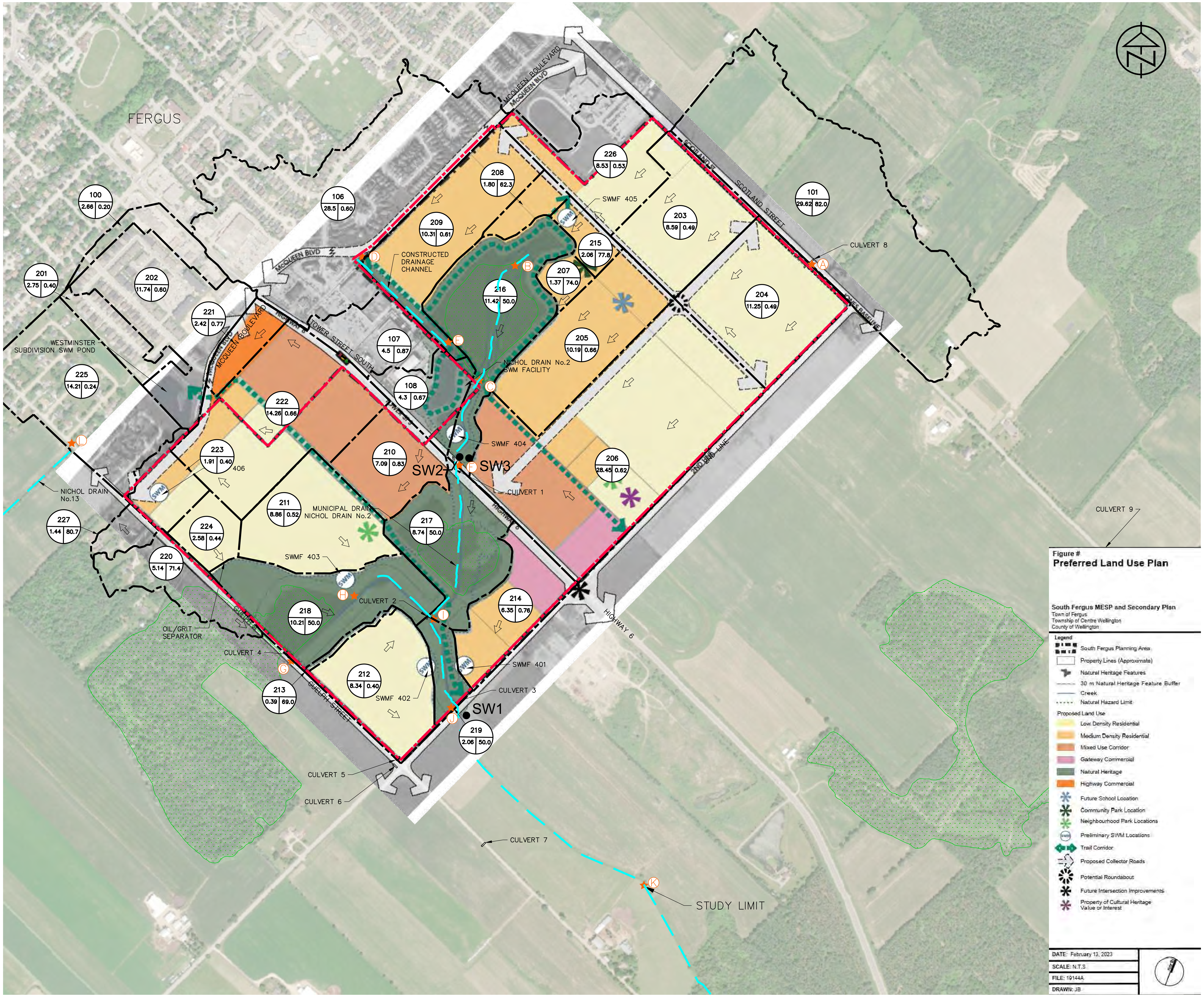
MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE

FRICORP ECOLOGICAL SERVICES

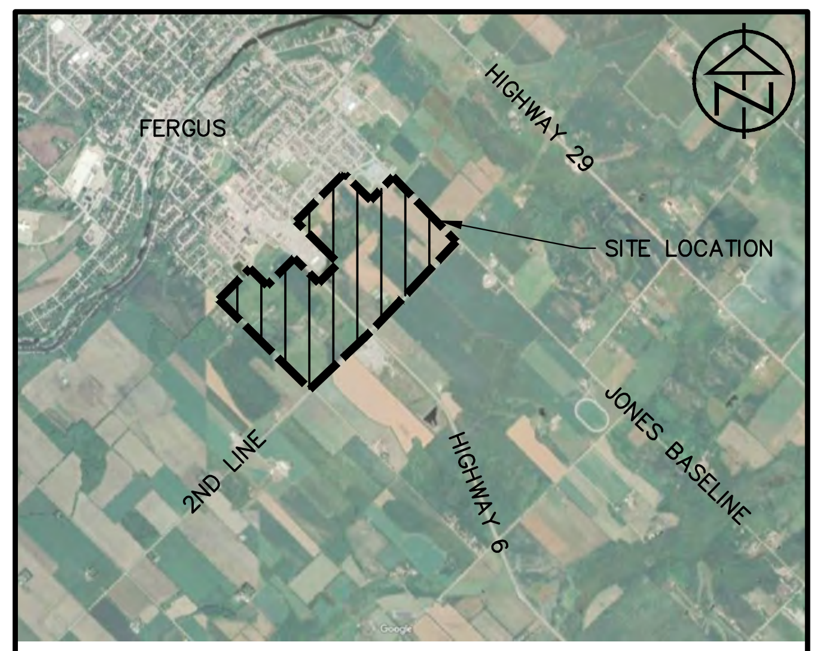
TATHAM ENGINEERING



DP-3

PROPOSED DRAINAGE PLAN

South Fergus MESP and Secondary Plan
Town of Fergus
Township of Centre Wellington
County of Wellington



KEY PLAN
SCALE (N.T.S.)

CULVERTS

CULVET 1:	3.02m X 1.82m BOX CULVERT
CULVERT 2:	1.2mø CSP
CULVERT 3:	3.0m X 2.0m BOX CULVERT
CULVERT 4:	0.55mø & 0.6mø HDPE
CULVERT 5:	TO BE DETERMINED
CULVERT 6:	TO BE DETERMINED
CULVERT 7:	TO BE DETERMINED
CULVERT 8:	0.45mø CSP
CULVERT 9:	0.45mø CSP

LEGEND

SOUTH FERGUS SECONDARY PLAN AREA
OVERLAND FLOW DIRECTION
CATCHMENT BOUNDARY
WETLANDS
108 — CATCHMENT ID
0.67 — CURVE NUMBER / IMPERVIOUS FRACTION
4.3 — CATCHMENT AREA
●SW STREAMFLOW MONITORING LOCATION
★Ⓐ POINT OF INTEREST

Base Map Source: TOPOGRAPHIC SURVEY (TATHAM) COMBINED WITH TOPOGRAPHIC MAPPING (NORTHWAY/PHOTOMAP REMOTE SENSING LTD.)

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north

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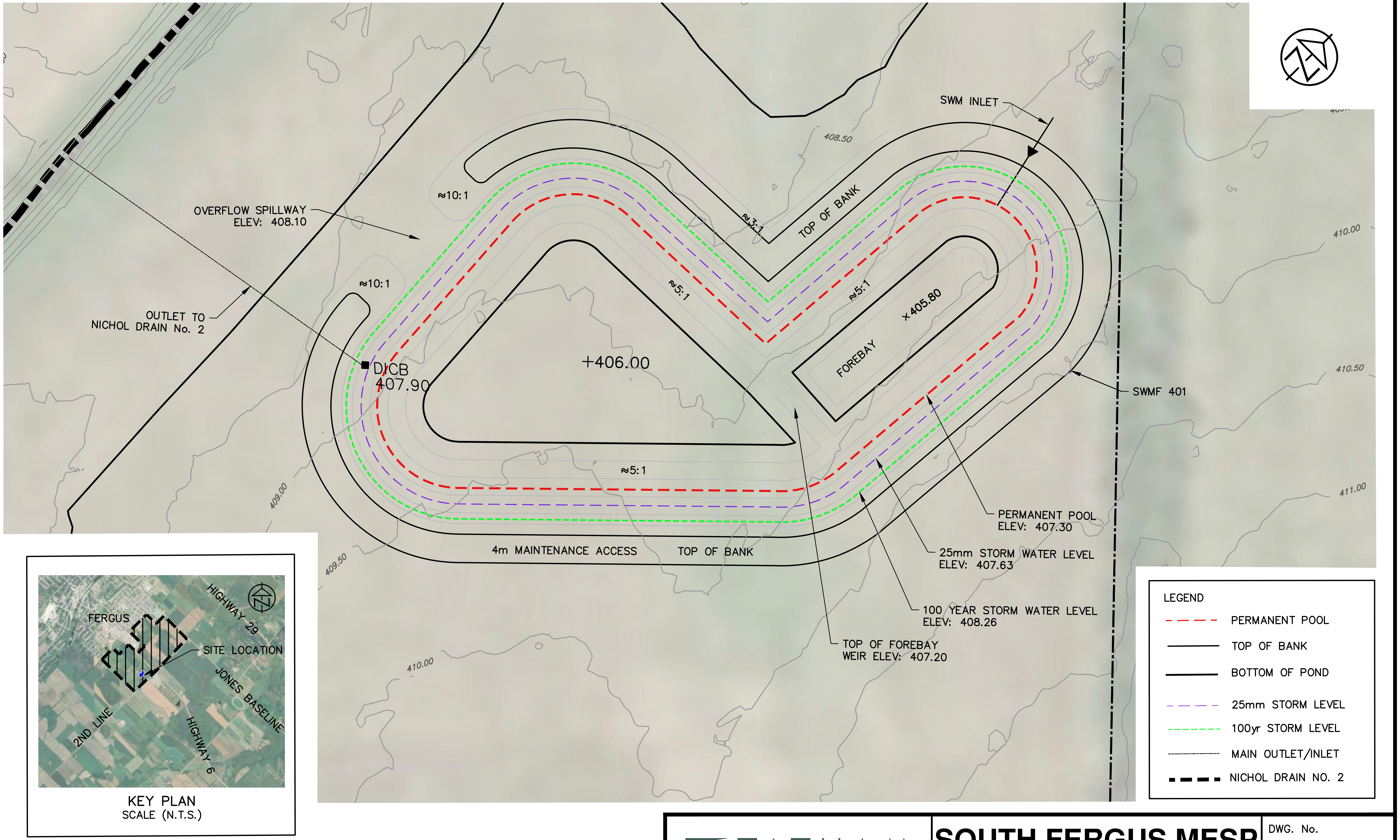
MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE

FRICORP ECOLOGICAL SERVICES

TATHAM ENGINEERING



KEY PLAN
SCALE (N.T.S.)

LEGEND

– – –	PERMANENT POOL
———	TOP OF BANK
———	BOTTOM OF POND
– – –	25mm STORM LEVEL
- - - -	100yr STORM LEVEL
········	MAIN OUTLET/INLET
▬ ▬ ▬	NICHOL DRAIN NO. 2

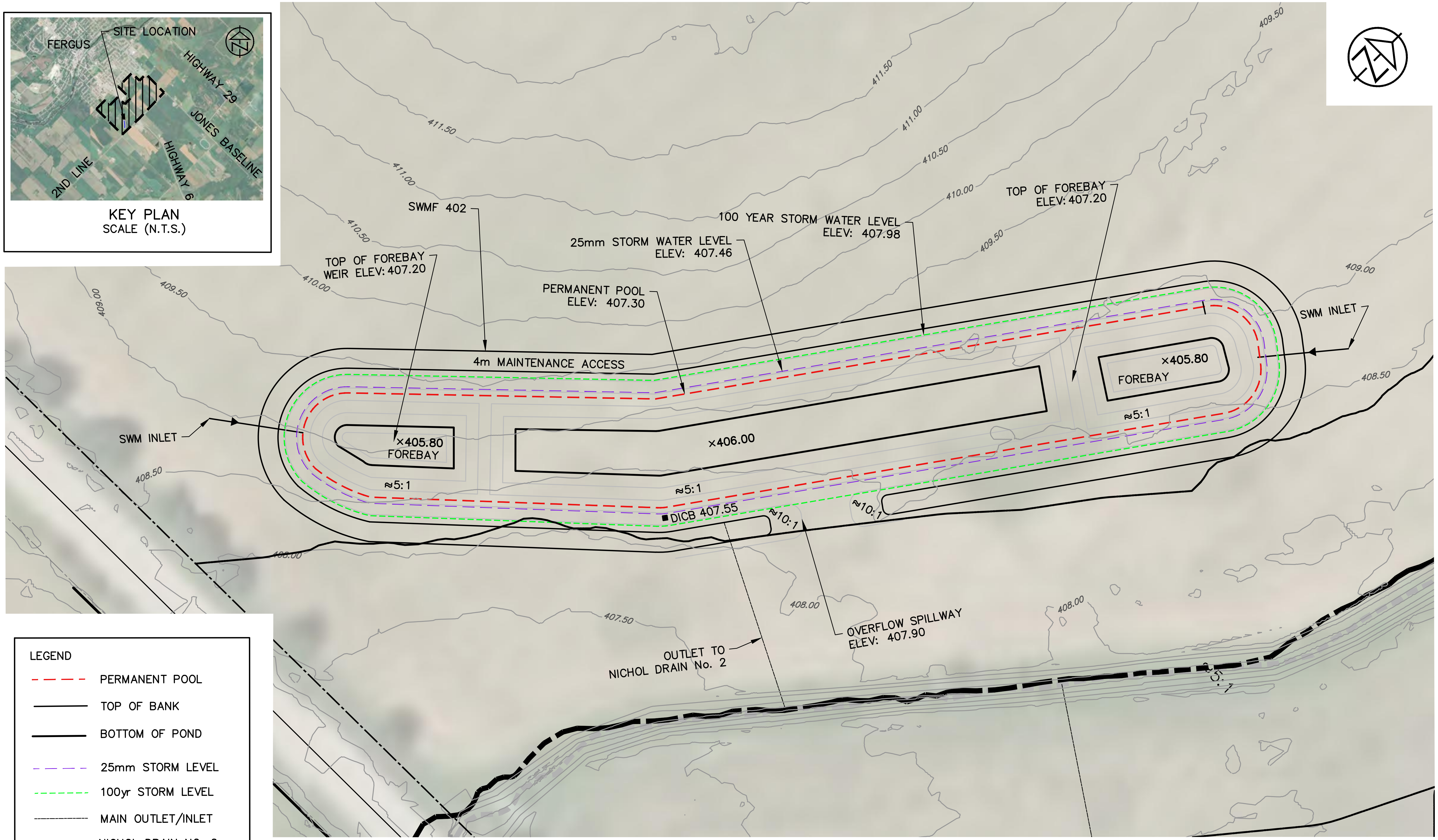
TATHAM
ENGINEERING

SOUTH FERGUS MESP
STORMWATER FACILITY 401

DWG. No.
SWM-1

SCALE: 1:500
DRAWN: CW
DATE: MAY. 2022
JOB NO. 120157

Drawing Name: 120157 – SWM.dwg, Plotted: Mar 06, 2023



LEGEND

- - -	PERMANENT POOL
——	TOP OF BANK
━━	BOTTOM OF POND
- - -	25mm STORM LEVEL
- - -	100yr STORM LEVEL
-·-·-	MAIN OUTLET/INLET
▬ ▬	NICHOL DRAIN NO. 2

TATHAM
ENGINEERING

SOUTH FERGUS MESP
STORMWATER FACILITY 402

DWG. No.
SWM-2

SCALE: 1:750
DRAWN: CW
DATE: MAY. 2022
JOB NO. 120157

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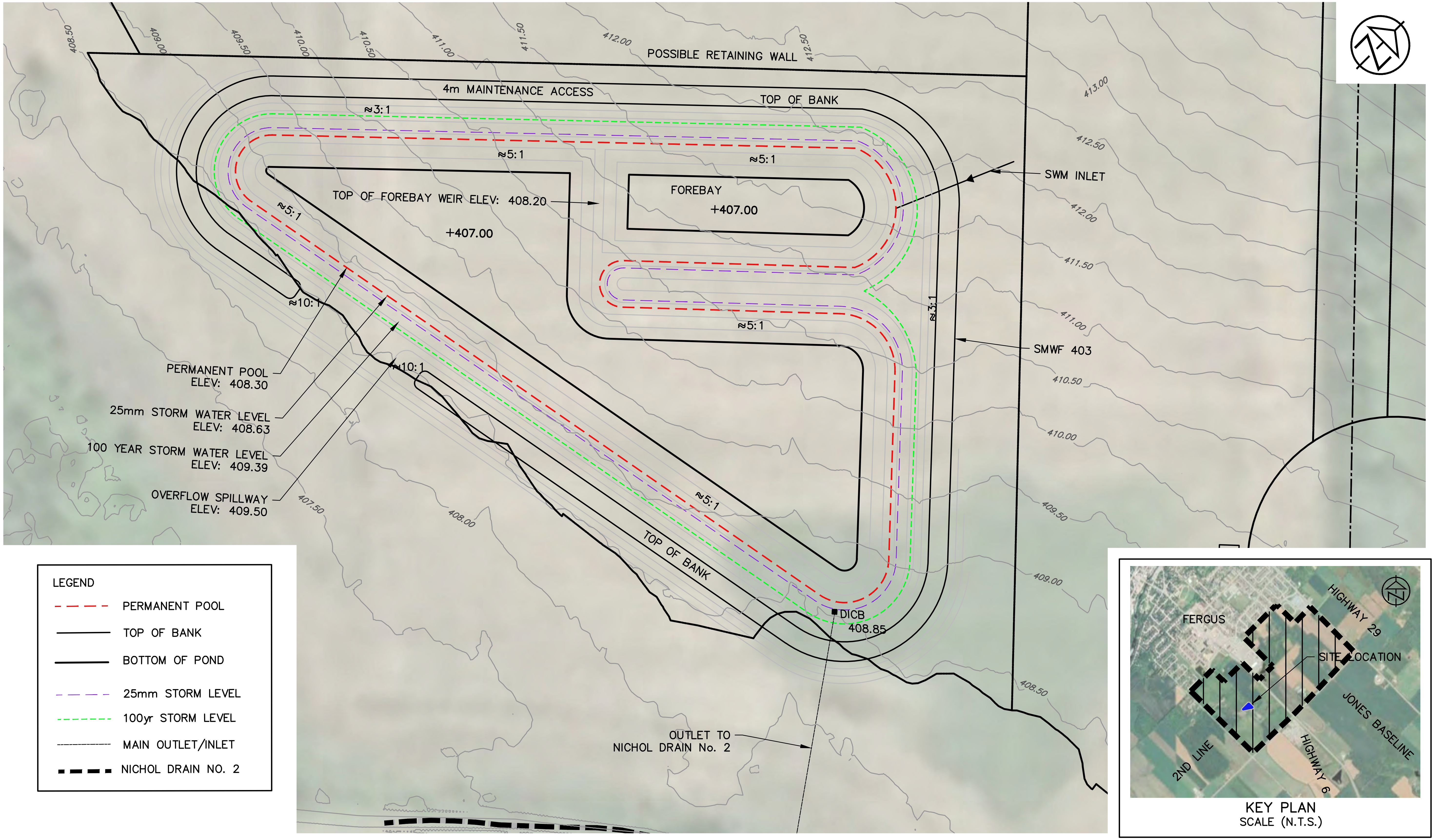

KEY PLAN
SCALE (N.T.S.)

TATHAM
ENGINEERING

SOUTH FERGUS MESP
STORMWATER FACILITY 403

DWG. No.
SWM-3

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DRAWN: CW
DATE: MAY. 2022
JOB NO. 120157

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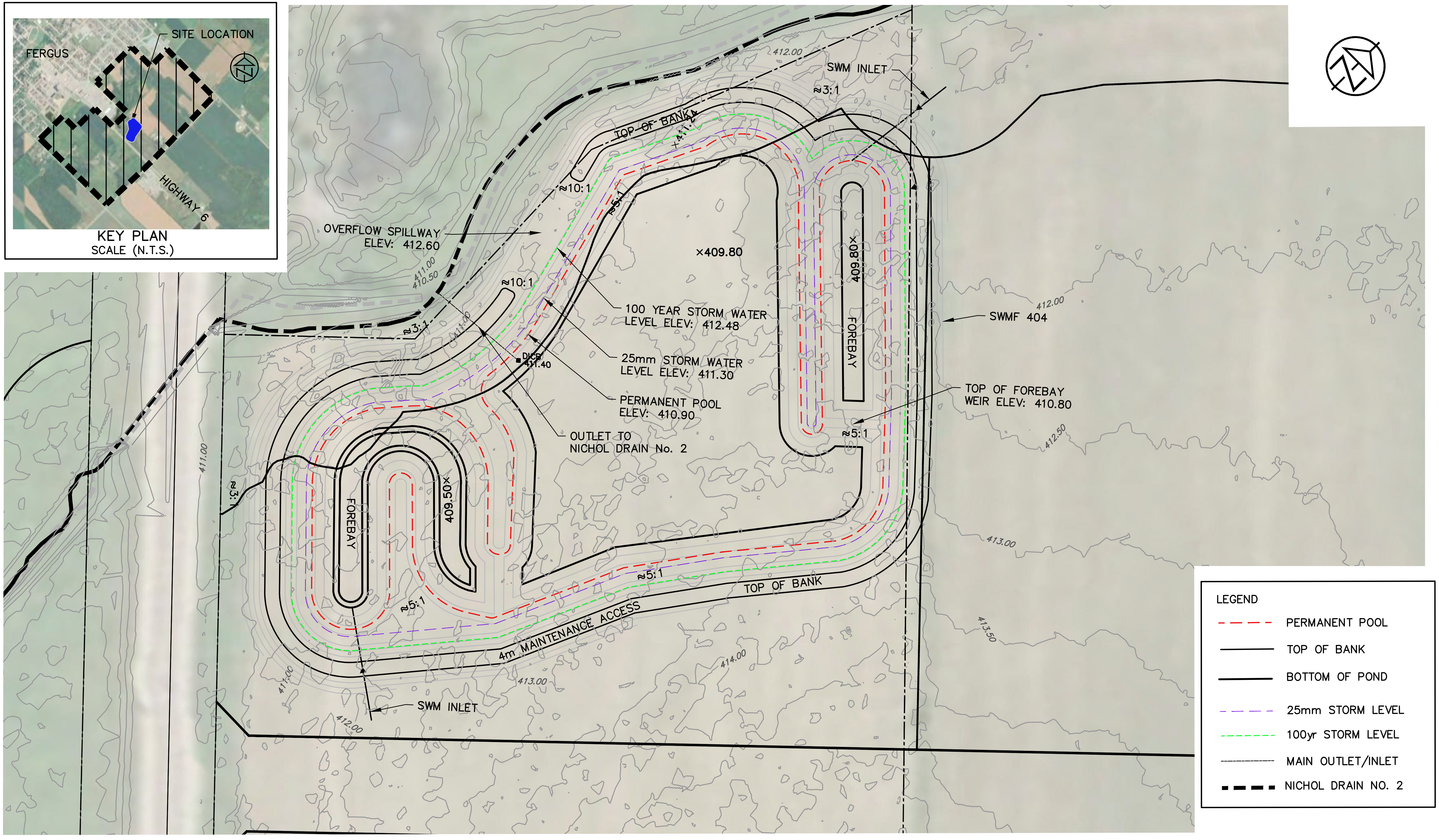

TATHAM
ENGINEERING

SOUTH FERGUS MESP
STORMWATER FACILITY 404

DWG. No.
SWM-4

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DATE: MAY. 2022
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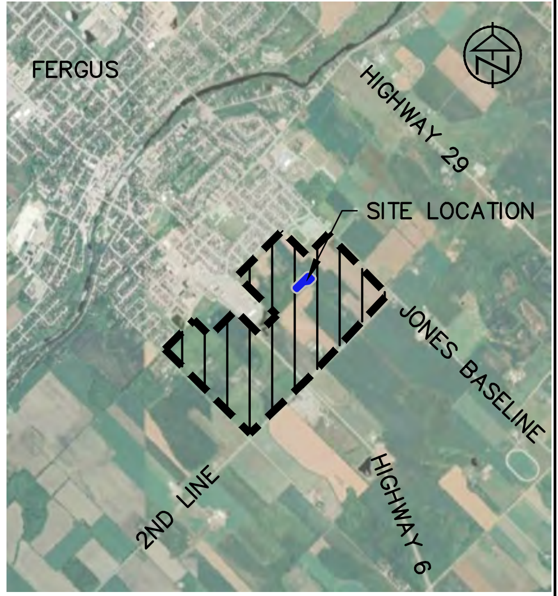

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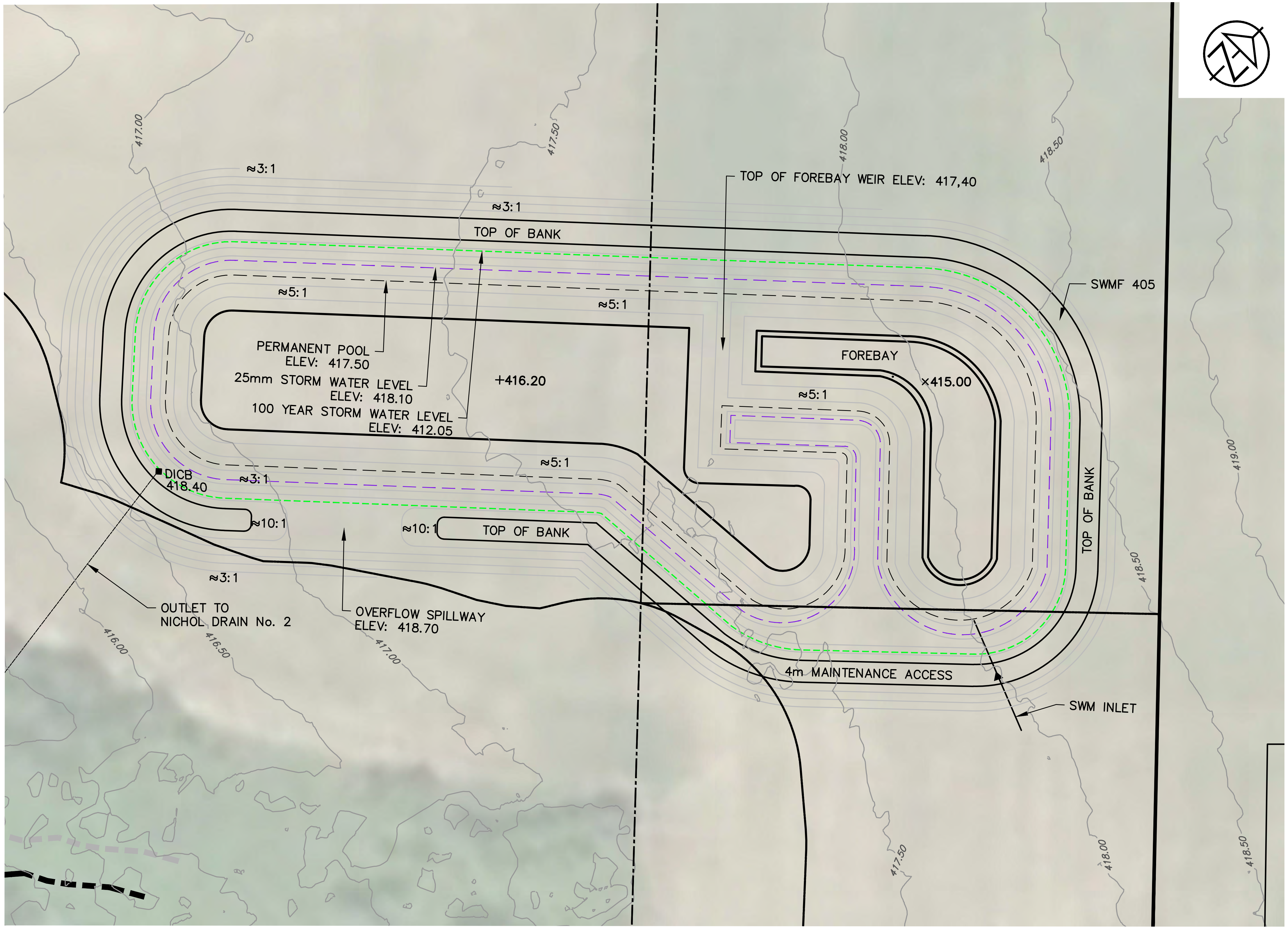


LEGEND

– – –	PERMANENT POOL
———	TOP OF BANK
———	BOTTOM OF POND
– – –	25mm STORM LEVEL
- - - -	100yr STORM LEVEL
-------	MAIN OUTLET/INLET
▬ ▬ ▬	NICHOL DRAIN NO. 2

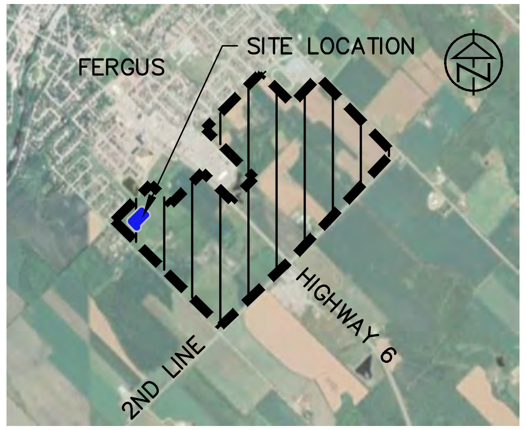
TATHAM
ENGINEERING

SOUTH FERGUS MESP
STORMWATER FACILITY 405

DWG. No.
SWM-5

SCALE: 1:750
DRAWN: CW
DATE: MAY. 2022
JOB NO. 120157

Drawing Name: 120157 – SWM.dwg, Plotted: Mar 06, 2023



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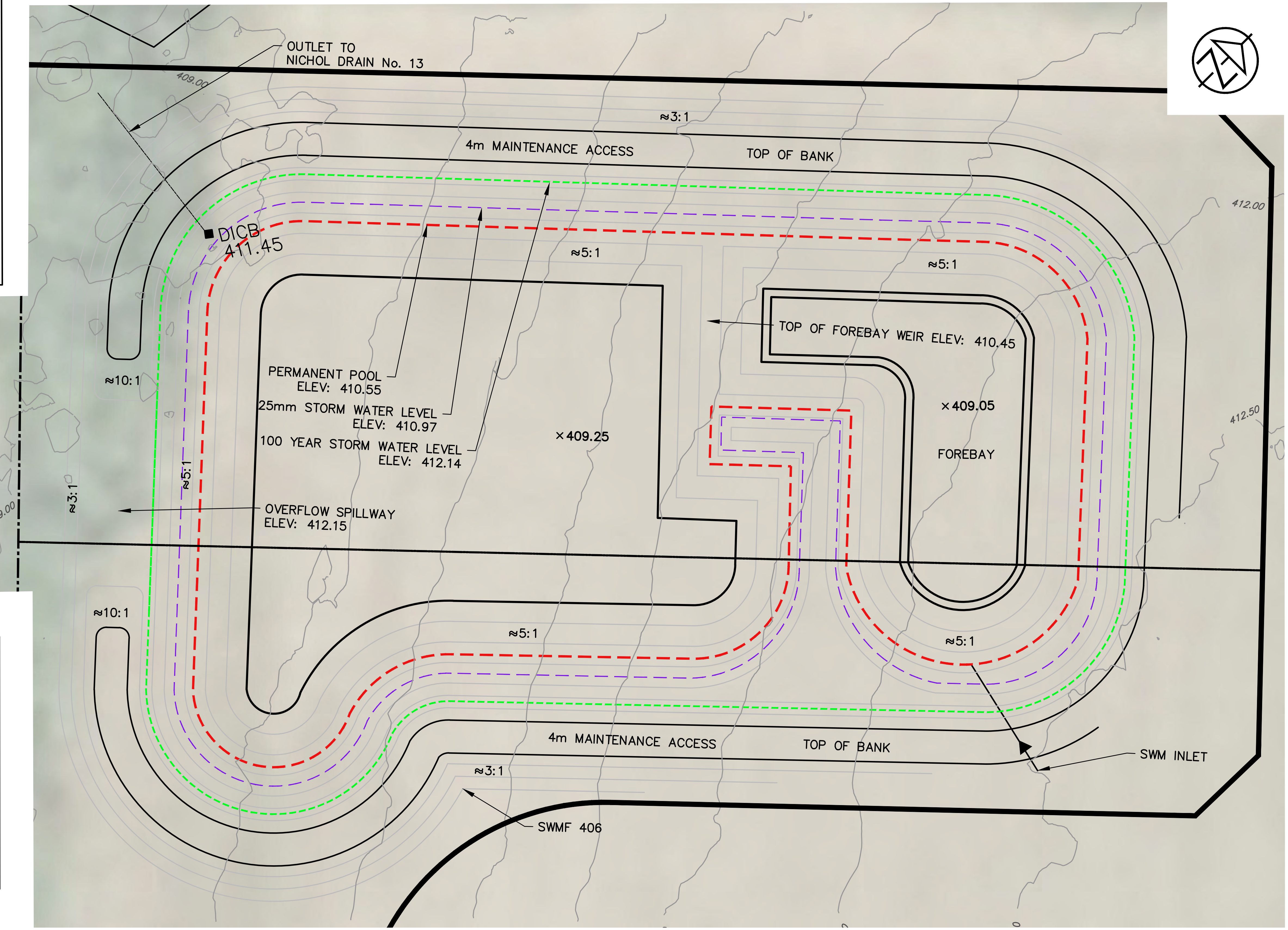

LEGEND

– – – –	PERMANENT POOL
———	TOP OF BANK
━━━	BOTTOM OF POND
– – – –	25mm STORM LEVEL
- - - - -	100yr STORM LEVEL
············	MAIN OUTLET/INLET
■ ■ ■	NICHOL DRAIN NO. 2

TATHAM
ENGINEERING

SOUTH FERGUS MESP
STORMWATER FACILITY 406

DWG. No.
SWM-6

SCALE: 1:500
DRAWN: CW
DATE: MAY. 2022
JOB NO. 120157

Drawing Name: 120157 – SWM.dwg, Plotted: Dec 21, 2023

Appendix A:
Preferred Land Use Plan

Figure #

Preferred Land Use Plan

South Fergus MESP and Secondary Plan
Town of Fergus
Township of Centre Wellington
County of Wellington

Legend

- ▪▪ South Fergus Planning Area
- ☐ Property Lines (Approximate)
- Natural Heritage Features
- - - 30 m Natural Heritage Feature Buffer
- — Creek
- ••••• Natural Hazard Limit

Proposed Land Use

- 🟨 Low Density Residential
- 🟧 Medium Density Residential
- 🟫 Mixed Use Corridor
- 🟪 Gateway Commercial
- 🟩 Natural Heritage
- 🟧 Highway Commercial
- ✳ Future School Location
- ✳ Community Park Location
- ✳ Neighbourhood Park Locations
- SWM Preliminary SWM Locations
- ⇔ Trail Corridor
- ⇨ Proposed Collector Roads
- ○ Potential Roundabout
- ✳ Future Intersection Improvements
- ✳ Property of Cultural Heritage Value or Interest

DATE: February 13, 2023
SCALE: N.T.S
FILE: 19144A
DRAWN: JB

north

K:\19144A - South Fergus MESP and Secondary Plan\CP

MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE

FRICORP ECOLOGICAL SERVICES

TATHAM ENGINEERING

Appendix B:
Hydrogeological Investigation

REPORT

Hydrogeological Investigation

Proposed Mixed-Use Development
Fergus, Ontario

Submitted to:

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April 4, 2023

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1.0 INTRODUCTION

WSP Canada Inc. (WSP), previously Golder Associates Ltd. (Golder), has been retained by Tatham Engineering Ltd. (Tatham) to conduct a hydrogeological investigation for a proposed mixed-use development to be located in the South Fergus Secondary Plan area within the Township of Centre Wellington, Ontario (the site). The location of the site is shown on the Key Plan, Figure 1. The purpose of this hydrogeological investigation was to characterize the existing hydrogeological conditions at the site.

This report provides the results of the hydrogeological investigation and should be read in conjunction with the *"Important Information and Limitations of This Report"* (Appendix A). The reader's attention is specifically drawn to this information, as it is essential for the proper use and interpretation of this report. The factual data, interpretations and recommendations contained in this report pertain to a specific project as described in the report and are not applicable to any other project or site location. If the project is modified in concept, location or elevation, or if the project is not initiated within eighteen months of the date of the report, WSP should be given an opportunity to confirm that the recommendations in this report are still valid.

2.0 BACKGROUND

2.1 Site and Project Description

The site is located in Fergus, Ontario and is bounded by Guelph Street to the west, Scotland Street to the east, 2nd Line to the south and McQueen Boulevard to the north. As shown on the Site Plan, Figure 2, the site is divided by Tower Street South (Highway 6) and consists of properties located both east and west of Tower Street South. The site consists of approximately 147.5 hectares (ha) of undeveloped land and is currently a mixture of treed areas, agricultural fields and residential homes. A storm water management (SWM) facility is located immediately east of Tower Street South and north of the site.

As shown on the Preferred Land Use Plan prepared by MHBC Planning Ltd. (dated May 26, 2022; see Appendix B), the proposed mixed-use development is generally comprised of low and medium density residential blocks, with mixed-use corridor and gateway commercial blocks located to the east and west of Tower Street South, a future school block, a business park, natural heritage areas, neighbourhood and community parks, six SWM ponds and internal roads.

2.2 Topography, Drainage and Natural Heritage Features

The site is located within the Upper Middle Grand River Subwatershed of the Grand River Watershed. Grand River is located approximately 800 metres (m) northwest of the site. In general, the site drains towards a municipal drain referred to as "Nichol Drain No. 2", which is located in the central portion of the site, beginning east of Tower Street South and flowing in a southwest direction through the SWMF and towards Swan Creek. A detailed summary of drainage patterns at the site is provided in the South Fergus Master Environmental Servicing Plan (MESP) & Secondary Plan prepared by Tatham (Tatham, 2022), and the Existing Drainage Plan is provided in Appendix B.

Based on available on-line Grand River Conservation Authority (GRCA) mapping (https://maps.grandriver.ca), three Provincially Significant Wetlands (PSW's) are located at the site and are generally located adjacent to Nichol Drain No. 2. The three PSWs are approximately 5.1 ha, 2.0 ha and 2.1 ha in areas from east to west, respectively (refer to Figure 2). Also, a relatively large PSW, approximately 23.4 ha in size, is located west of the site on the west side of Guelph Street and an unevaluated wetland, approximately 0.7 ha in size, is located approximately 325 m northeast of the site.

GRCA mapping indicates that portions of the site adjacent to Nichol Drain No. 2 and the three PSW's are located within GRCA regulated areas, as shown on Figure 3, Regulated Areas.

2.3 Physiography and Geology

The site is mapped within the physiographic region of southern Ontario known as the Guelph Drumlin Field. Physiographic mapping in the vicinity of the site indicates a drumlinized till plain. According to published mapping and as presented on Figure 4, Quaternary Map, the surficial soil conditions are composed of stone-poor sandy silt- to silty sand-textured glacial till overlain by sandy and gravelly glaciofluvial deposits. The geologic mapping is generally consistent with the conditions encountered during the site-specific subsurface investigation (discussed below in Section 3.2).

2.4 Wellhead Protection Areas (WHPA) and Significant Groundwater Recharge Areas (SGRA)

Based on available GRCA mapping (https://maps.grandriver.ca), one public use well (no. 6705606) is located approximately 400 m north of the site and one municipal well (no. 6715276) is located approximately 1.3 kilometres (km) northwest of the site. The site is located within the Wellhead Water Quantity Zone in an area designated by the GRCA as Significant Risk. Further, portions of the site are located within areas designated as Wellhead Protection Areas (WHPA)-B/C/D, or the 2-, 5- and 25-year travel time zones, respectively, as shown on Figure 5, Wellhead Protection Areas. Refer to Section 2.5, Water Well Records, for further discussion on the public use well (no. 6705606).

Portions of the site are located within a Significant Groundwater Recharge Area (SGRA), as shown on Figure 6, Significant Groundwater Recharge Areas. A SGRA is defined in O. Reg. 287/07 as an area within which it is desirable to regulate or monitor drinking water threats that may affect the recharge of an aquifer.

2.5 Water Well Records

Water well records were obtained from the Ministry of the Environment, Conservation and Parks (MECP). Approximately 93 water well records were reported for wells located within 500 m of the site, 10 of which are reported to be located on the site (nos. 7129536, 6713976, 7047856, 6706231, 6715679, 6704215, 6705444, 6715788, 6712498 and 6701780). The locations of the wells with reported water well records are shown on Figure 7, Ministry Recorded Wells. A table summarizing the water well record data is provided in Appendix C, MECP Recorded Wells. It is noted that, historically, there was not a requirement to register dug wells with the MECP, and they can be under-represented in the water well record database.

Little information was provided on 11 of the records (nos. 7129536 [on site], 7047857, 7047856 [on site], 6715145, 7184231, 6714798, 6715788 [on site], 7042040, 7042039, 7194694 and 7203122), which are not discussed further. The remaining 82 wells were constructed between 1948 and 2012 and include 7 test holes/observation wells (including no. 6715679 located on the site) and 75 water supply wells. The water supply wells are comprised of:

- One public use well (no. 6705606), located approximately 400 m north of the site. This deep drilled bedrock well was installed in July 1975 and is situated on the east side of the intersection of McQueen Boulevard and Scotland Street, with a ground surface elevation of approximately 422.1 m above sea level (masl), and with a reported well depth of 124.4 m. It is noted that the municipal well discussed in Section 2.4 (no. 6715276) is located more than 500 m from the site (i.e., 1.3 km northwest of the site) and is a deep drilled bedrock well with a reported well depth of 79.5 m;

- One municipal use well (i.e., no. 6712498), located on the west side of the site. This municipal use well was constructed in March 1998 and has a ground surface elevation of approximately 406.3 masl. The well is screened deep in the bedrock unit with a reported well depth of 128.0 m. The current status of this well is not known to WSP, however, it is noted that available GRCA mapping does not indicate that there is an active municipal supply well at this location;
- Sixty-five domestic wells, all of which are drilled wells with well depths ranging from about 19.5 m below ground surface (mbgs) to 78.6 mbgs, two of which are located on the site (nos. 6713976 and 6705444);
- Six livestock wells with well depths ranging from about 11.3 mbgs to 128.9 mbgs, three of which are located on the site (nos. 6706231, 6704215 and 6701780);
- One commercial well with a well depth of 39.6 mbgs; and
- One well of unknown use with a depth of 57.9 mbgs.

A door-to-door private water well survey was carried out on June 30th, 2022, at a total of 13 properties fronting onto either Guelph Street, Scotland Street, Jones Baseline or 2nd Line. The purposes of the well survey were to assess the locations of existing groundwater users and private wells; to assess the aquifers being utilized in the vicinity of the site; to document existing well conditions based on information supplied by the well owners; and to assist in assessing the potential impacts of the proposed development on local groundwater users.

Well owners were asked to complete a water well survey form, which requested basic information on water use, well construction, existing well conditions, and historical problems. Given the COVID-19 pandemic situation and the physical distancing restrictions in place at the time of the survey, one attempt was made to contact the residences and the well survey forms were left at the door, where possible, with information on how to return it to WSP. The well survey form was returned from 1 address; no responses were received from the remaining residences. Based on the information provided in the single survey response, a deep drilled well is present on the site at 935 Scotland Street (well approximately 70 m deep) and is interpreted to utilize the bedrock aquifer.

3.0 SITE CHARACTERIZATION

3.1 Drilling and Monitoring Well Installation

As a part of this hydrogeological investigation, ten boreholes (BH20-1 to BH20-10) were advanced to depths ranging from approximately 7.7 mbgs to 12.7 mbgs in December 2020 and January 2021. The locations of the boreholes are provided on Figure 2. Single 50-millimetre (mm) diameter monitoring wells were installed in BH20-2 to BH20-10, with nested wells (i.e., one deep and one shallow monitoring well) installed in BH20-6, BH20-8 and BH20-10. A sand filter pack was placed to surround the screen in each well. Above the screen, the annulus surrounding the PVC riser pipe was backfilled to the ground surface with bentonite pellets. Each monitoring well was completed with a protective monument-style protective casing set in concrete.

The field work for this investigation was monitored by a member of our field staff, who arranged for the clearance of underground services, observed the drilling and logged the boreholes. The soil samples obtained during this investigation were described in the field, placed in appropriate containers, labelled and transported to our Whitby laboratory for further examination and selective classification testing (natural water content and grain size distribution testing).

In addition, three shallow staff gauge (SG) and piezometer (P) pairs, SG1/P1 to SG3/P3, were manually installed in Nichol Drain No.2, as shown on Figure 2. All piezometers are 19-mm inside diameter stainless steel drive points, installed to approximate depths of 1.0 mbgs to 1.5 mbgs. The three pairs were installed to assess the vertical hydraulic gradient.

The as-installed borehole, staff gauge and piezometer locations and elevations (referenced to a geodetic datum) were surveyed by the project surveyor and provided to WSP.

The subsurface soil and groundwater conditions encountered in the boreholes, and details of the monitoring well installations are provided on the Record of Borehole sheets (Appendix D). It should be noted that the boundaries between the strata on the borehole records have been inferred from drilling observations and non-continuous sampling. They generally represent transitions from one soil type to another and should not be inferred to represent exact planes of geological change. Further, conditions will vary between and beyond the boreholes.

3.2 Subsurface Soil Conditions

The subsurface soils encountered are consistent with geological mapping for the area, and generally consisted of topsoil and localized fill soils overlying non-cohesive deposits (ranging in gradation from gravel and sand to sandy silt) and/or glacial till deposits (ranging in gradation from gravelly silty sand till to silty clay till). Localized cohesive deposits of silty clay to clayey silt were encountered at varying depths in BH20-2, BH20-3 and BH20-7.

A deposit of wet sand and gravel was encountered in BH20-1 beneath the glacial till soils at an approximate depth of 6.8 mbgs, and a deposit of wet sand was encountered beneath the silty clay soils in BH20-7 at an approximate depth of 5.3 mbgs.

The Record of Borehole sheets and grain size distribution curves for selected soil samples are provided in Appendix D. Inferred cross-sectional drawings are provided in Figures 8A and 8B.

3.3 Water Level Monitoring

Groundwater levels were measured manually in the monitoring wells on January 19 and 29, March 12, June 11, July 23 and November 19, 2021, and June 30, July 5 and July 19, 2022. Water level depths and elevations are provided in Table E-1, Water Level Depths and Elevations (Appendix E). It should be noted that these observations reflect the groundwater conditions encountered at the time of the field investigation and some seasonal and annual fluctuations should be anticipated.

The depth to groundwater measured in the monitoring wells ranged from -0.12 mbgs (i.e., 0.12 m above ground surface; measured in BH20-7 on March 12, 2021) to 4.05 mbgs (BH20-10-D [deep] on July 23, 2021) and from elevations of 404.38 m (BH20-8-D [deep] on July 23, 2021) to 420.28 m (BH20-10-D [deep] and BH20-10-S [shallow] on March 12, 2021) on the dates monitored. The groundwater elevation data on March 12, 2021, are shown on Figure 9, Groundwater Flow. In general, shallow groundwater flow is inferred to follow topography, with flow in an eastern or western direction towards Nichol Drain No. 2, depending on location, as shown on Figure 9.

A total of 3 nested wells were installed at the site (BH20-6-S/D, BH20-8-S/D and BH20-10-S/D). The groundwater elevations in BH20-6-S (shallow) and BH20-8-S (shallow) were higher than the groundwater elevations in the deeper wells on all monitoring events, indicating a downward vertical gradient at those locations on those dates. Therefore, the groundwater levels measured in BH20-6-D (deep) and BH20-8-D (deep) are not considered representative of water table conditions. The groundwater elevations in BH20-10-S (shallow) and BH20-10-D (deep) were approximately equal on all monitoring events, indicating a neutral vertical gradient.

At the staff gauge and piezometer pair SG1/P1, the vertical gradient was upwards on the monitoring events on January 19, March 12 and November 19, 2021, and was downwards on the monitoring events on June 11 and July 23, 2021. The watercourse was observed to be frozen at the location of SG1 on January 29, 2021, and a staff gauge reading could not be measured. Also, SG1 was observed to be destroyed on June 30, 2022, and therefore no readings could be measured on June 30, July 5 and July 19, 2022.

At the staff gauge and piezometer pair SG2/P2, the vertical gradient was upwards on the monitoring events on January 19, March 12, June 11, and November 19, 2021, and was downwards on the monitoring events on July 23, 2021, June 30, July 5 and July 19, 2022. The watercourse was observed to be frozen at the location of SG2 on January 29, 2021, and a staff gauge reading could not be measured.

At the staff gauge and piezometer pair SG3/P3, the vertical gradient was upwards on the monitoring events on March 12 and November 19, 2021, and was downwards on the monitoring events on June 11 and July 23, 2021. The watercourse was observed to be frozen at the location of SG3 on January 19 and 29, 2021, and a staff gauge reading could not be measured. Also, the watercourse was observed to be dry at the location of SG3 on June 30 and July 19, 2022.

Automatic data loggers (i.e., pressure transducers) were installed in BH20-2, BH20-4, BH20-6-S (shallow), BH20-8-S (shallow), BH20-8-D (deep), BH20-10-S (shallow) and P2 on January 29, 2021, and set to record every six hours. The data loggers were downloaded on July 5, 2022. It is noted that the data logger installed in P2 appears to have malfunctioned and therefore no data could be obtained. Daily precipitation data was obtained from Environment and Climate Change Canada (ECCC) for the Fergus Shand Dam Meteorological Station (ID 6142400), which was the nearest station to the site with daily precipitation data for this period. Hydrographs of the groundwater level data with daily precipitation data are provided as Figure E-1 and graphs of the groundwater temperature data are provided as Figure E-2 (Appendix E). The data indicate that the groundwater elevation in all monitoring wells fluctuated seasonally, with groundwater levels generally increasing in the Fall and Spring and decreasing in the Winter and Summer. As shown, the groundwater elevations in monitoring wells BH20-2, BH20-4, BH20-6-S (shallow), BH20-8-S (shallow) and BH20-8-D (deep) increased with a delayed response to some rain events during this period. A similar but muted groundwater elevation trend is observed at BH20-10-S (shallow).

3.4 Hydraulic Testing

Single-well response testing (i.e., rising head testing) was carried out in BH20-3, BH20-4, BH20-6-S (shallow), BH20-8-S (shallow) and BH20-10-S (shallow) on June 11, 2021, and in BH20-2 on July 23, 2021. The rising head tests were carried out by rapidly lowering the water levels by purging with a dedicated Waterra foot valve and tubing. The resulting water level recoveries were monitored with an electronic water level tape and automatic pressure transducers. The recovery data were analyzed using the AQTESOLV for Windows (1996 – 2007) Version 4.5 software. The Bouwer and Rice (1976) method for unconfined conditions was applied to the rising head test data. Estimates of hydraulic conductivity (K) obtained from the rising head tests are summarized below in Table 1. Summary printouts of the rising head test data and results from AQTESOLV are included in Appendix F.

Table 1: Summary of Estimated Hydraulic Conductivity

Monitoring Well ID	Screened Interval (masl)	Screened Unit	K (m/s)
BH20-2	410.2 to 413.2	gravelly SILTY SAND (TILL)	2×10^{-8}
BH20-3	406.7 to 409.8	SILTY CLAY / sandy SILT / sandy SILT (TILL)	2×10^{-7}
BH20-4	413.3 to 414.8	gravelly SILTY SAND / SAND and GRAVEL	5×10^{-6}
BH20-6-S	404.0 to 407.0	SILT and SAND (TILL)	3×10^{-8}
BH20-8-S	403.2 to 406.2	sandy SILT / SILTY SAND / GRAVEL and SAND	3×10^{-7}
BH20-10-S	417.3 to 420.4	SAND	4×10^{-5}

Notes:
m/s – metres per second

The estimated hydraulic conductivity values are considered reasonable for the units tested.

3.5 Guelph Permeameter Testing

Soil infiltration rate testing was carried out on July 25, 2022, in the unsaturated zone, using a Guelph Permeameter (Soilmoisture Equipment Corp., Model 2800K1). The Guelph Permeameter was operated in accordance with the procedures outlined by the manufacturer (Soilmoisture Equipment Corp., 2012) using a single head method. The apparatus was installed at the base of hand-augered test holes.

Once the outflow of water at the depth of installation reached a steady-state flow rate, the field-saturated hydraulic conductivity, K_{fs}, of the soil was estimated using the following equation (Elrick et. al., 1989):

$$K_{fs} = \frac{C_1 Q_1}{2\,\pi\, H_1^2 + \pi\, a^2\, C_1 + 2\,\pi \frac{H_1}{\alpha^*}}$$

Where: C_1 = shape factor
Q_1 = flow rate (cm^3/s)
H_1 = water column height (cm)
a = well radius (cm)
α^* = alpha factor (0.12 cm^{-1} for Type 3 soils)

The field data and analysis of the infiltration rate tests are presented as Figures F-1 to F-6, Appendix F. Based on the resulting K_{fs} in centimetres per second (cm/s), the corresponding infiltration rates (mm/hr) were estimated using the approximate relationship presented in the *Low Impact Development Stormwater Management Planning and Design Guide* (or "*Design Guide*") (TRCA and CVCA, 2010). A summary of the infiltration rate test results is presented in Table 2, below.

Table 2: Summary of Estimated Infiltration Rates

Test	Soil Description	Test Depth Relative to Grade (mbgs)	Est. Field-Saturated Hydraulic Conductivity K_{fs} (cm/s)	Estimated Infiltration Rate [1] (mm/hr)
GP-20-2 (near BH20-2)	gravelly SILTY SAND (TILL)	0.61	$2x10^{-4}$	58
GP-20-4 (near BH20-4)	sandy SILT	0.60	$1x10^{-4}$	50
GP-20-6 (near BH20-6-D)	sandy SILT to SILTY SAND	0.65	$2x10^{-5}$	36
GP-20-7 (near BH20-7)	sandy SILTY CLAY to CLAYEY SILT	0.63	$5x10^{-5}$	44
GP-20-8 (near BH20-8-D)	sandy SILT	0.71	$5x10^{-4}$	67
GP-20-10 (near BH20-10-S)	SAND	0.65	$7x10^{-4}$	71

Notes:
mbgs – metres below ground surface. cm/s - centimetres per second. mm/hr – millimetres per hour
[1] – based on Table C1 from TRCA and CVCA (2010).

The infiltration rate estimates from this investigation are based on the test methods discussed above and are for the corresponding soil types encountered. They represent the soil conditions at the tested locations and depths only; conditions may vary between and beyond the tested locations.

For design purposes, a correction factor should be applied to estimate the design infiltration rate in accordance with guidance provided in TRCA and CVCA (2010), to account for potential reductions in soil permeability due to compaction, smearing during the construction of a given infiltration feature and the gradual accumulation of fine sediments over the lifespan of the infiltration feature. Care should be taken during construction of any proposed infiltration measures to preserve the existing soil structure and avoid compaction and re-working which could reduce its infiltrative properties.

3.6 Groundwater Quality

Groundwater samples were collected from monitoring wells BH20-3, BH20-8-S (shallow) and BH20-10-S (shallow) on March 12, 2021, and from monitoring wells BH20-4, BH20-8-S (shallow) and BH20-10-S (shallow) on July 5, 2022. The samples were collected using a peristaltic pump, low flow sampling techniques, and generally accepted environmental engineering protocols, and stored on ice in coolers until delivered, under chain-of-custody documentation, to AGAT Laboratories of Mississauga, Ontario for chemical analysis.

The samples were analyzed for inorganic and general chemistry parameters and selected metals, and compared to the MECP *Policies, Guidelines and Provincial Water Quality Objectives of the Ministry of Environment and Energy* (PWQO), *Table 2 – Table of PWQOs and Interim PWQOs* (July 1994, Reprinted February 1999). The laboratory analytical reports are included in Appendix G. The following Table 3 summarizes the exceedances of the PWQO.

Groundwater sampled from a monitoring well can contain elevated levels of suspended sediment in the water (i.e., Total Suspended Solids [TSS]). The collected groundwater samples were not analyzed for TSS; however, the samples were analyzed for turbidity which has a positive correlation with TSS. The turbidity measurements for each groundwater sample are included below in Table 3. In general, the elevated concentrations of metals with exceedances are likely attributed to elevated levels of sediment in the groundwater samples and interference from the dissolution of suspended sediment during sample acidification. Therefore, should dewatering be required at the site, the amount of sediment in the water should be reduced prior to discharge in order to meet the PWQO (e.g., with the use of a sedimentation tank or sediment filter bag). However, the results indicate that the PWQO exceedance for iron in BH20-10-S on July 5, 2022, is primarily from the dissolved fraction, which may be present as a result of mineral deposits and may not be significantly lowered with the removal of sediment. It is noted that the sample collected from BH20-10-S on March 12, 2021, met the PWQO for iron.

Table 3: Summary of Groundwater Quality Exceedances and Turbidity

Parameter	Units	PWQO	BH20-3	BH20-4	BH20-8-S (shallow)	BH20-10-S (shallow)
Groundwater Sample Collected on March 12, 2021 (BH20-3, BH20-8-S and BH20-10-S)						
Total Cobalt	mg/L	0.0009	0.0008	NA	**0.0015**	<0.0005
Total Iron	mg/L	0.30	**1.84**	NA	**3.30**	0.049
Turbidity	NTU	NA	39.4	NA	234	4.4
Groundwater Sample Collected on July 5, 2022 (BH20-4, BH20-8-S and BH20-10-S)						
Total Cobalt	mg/L	0.0009	NA	<0.0005	**0.0020**	<0.0005
Total Iron	mg/L	0.30	NA	<0.010	**4.27**	**0.410**
Total Copper	mg/L	0.005	NA	0.001	**0.006**	0.001
Total Vanadium	mg/L	0.006	NA	<0.002	**0.007**	<0.002
Total Zinc	mg/L	0.030	NA	<0.020	**0.060**	<0.020
Turbidity	NTU	NA	NA	8.9	246	0.7

Notes:
Bold font values exceed the PWQO.
NA = Not Applicable

4.0 DISCUSSION

The site is located in the south of Fergus, Ontario, consisting primarily of undeveloped land comprised of a mixture of treed areas, agricultural fields and residential homes. The Grand River is located approximately 800 m northwest of the site and Nichol Drain No. 2 is located in the central portion of the site. In general, the site drains east and west, depending on location, towards Nichol Drain No. 2, which includes three PSW areas adjacent to the watercourse. Portions of the site adjacent to Nichol Drain No. 2 and the three PSW’s are located within GRCA regulated areas.

The findings of this investigation indicate that shallow native soils are primarily comprised of non-cohesive deposits and/or glacial till deposits. Based on MECP water well records, the thickness of the overburden unit ranges from about 25 m thick near the southeast portion of the site to about 9 m thick in the northwest portion of the site. In general, the overburden unit thins out moving northwest towards the Grand River, where MECP water well records indicate that bedrock is encountered at ground surface. Shallow groundwater flow at the site is inferred to follow local topography, with flow in an eastern or western direction towards Nichol Drain No. 2, depending on location.

In 1996, R.J. Burnside & Associates Ltd. (Burnside) issued the Nichol Drain No. 2 Subwatershed Study. Burnside indicated that Nichol Drain No. 2 is an intermittent watercourse and that groundwater discharge is limited in the headwater reaches in the Secondary Plan area. Data from the SG1/P1, SG2/P2 and SG3/P3 pairs installed in Nichol Drain No. 2 identified an upward hydraulic gradient at all three SG/P pairs in March and November 2021, and generally a downward hydraulic gradient in the June and July 2021/22 monitoring events. The data from the SG/P pairs indicate that the watercourse was frozen in late January 2021. No surface water was present at staff gauge SG3 on the monitoring events in July 2021 and in June and July 2022, with groundwater levels at least 0.9 m below ground surface in piezometer P3 on those dates. Collectively, these data confirm the intermittent nature of Nichol Drain No. 2 with seasonal groundwater discharge during the monitoring period.

Based on MECP water well records, there are a total of 75 water supply wells located within 500 m of the site, which are primarily comprised of deep drilled bedrock wells. The site is located within the Wellhead Water Quantity Zone in an area designated by the GRCA as Significant Risk, with portions of the site located within areas designated as WHPA-B/C/D, or the 2-, 5- and 25-year travel time zones, respectively. A public use well (no. 6705606) is located approximately 400 m north of the site and is a deep drilled bedrock well with a reported well depth of 124.4 m. Also, a municipal well (no. 6715276) is located approximately 1.3 km northwest of the site and is a deep drilled bedrock well with a reported well depth of 79.5 m. Portions of the site are mapped by GRCA as SGRA, likely due to published geological mapping indicating the presence of sandy and gravelly glaciofluvial deposits on parts of the site. It is noted that the geological mapping is generally consistent with the conditions encountered during the site-specific subsurface investigation.

The proposed mixed-use development is understood to be comprised of low and medium density residential blocks, with mixed-use corridor and gateway commercial blocks located to the east and west of Tower Street South, a future school block, a business park, natural heritage areas, neighbourhood and community parks, six SWM ponds and internal roads. It is recommended that a site-wide water balance assessment and feature-based water balance assessments for Nichol Drain No. 2 and the PSW’s be conducted to assess the potential hydrogeological impacts of the proposed development with respect to average annual post-development infiltration rates. Also, a detailed assessment of short-term (construction) and long-term dewatering needs and potential impacts to receptors should be carried out at the time of detailed design and in conjunction with obtaining dewatering permitting from the MECP.

5.0 CLOSURE

We trust that this submission meets your current requirements. If you have any questions regarding the contents of this report, please contact the undersigned.

Signature Page

Yours truly

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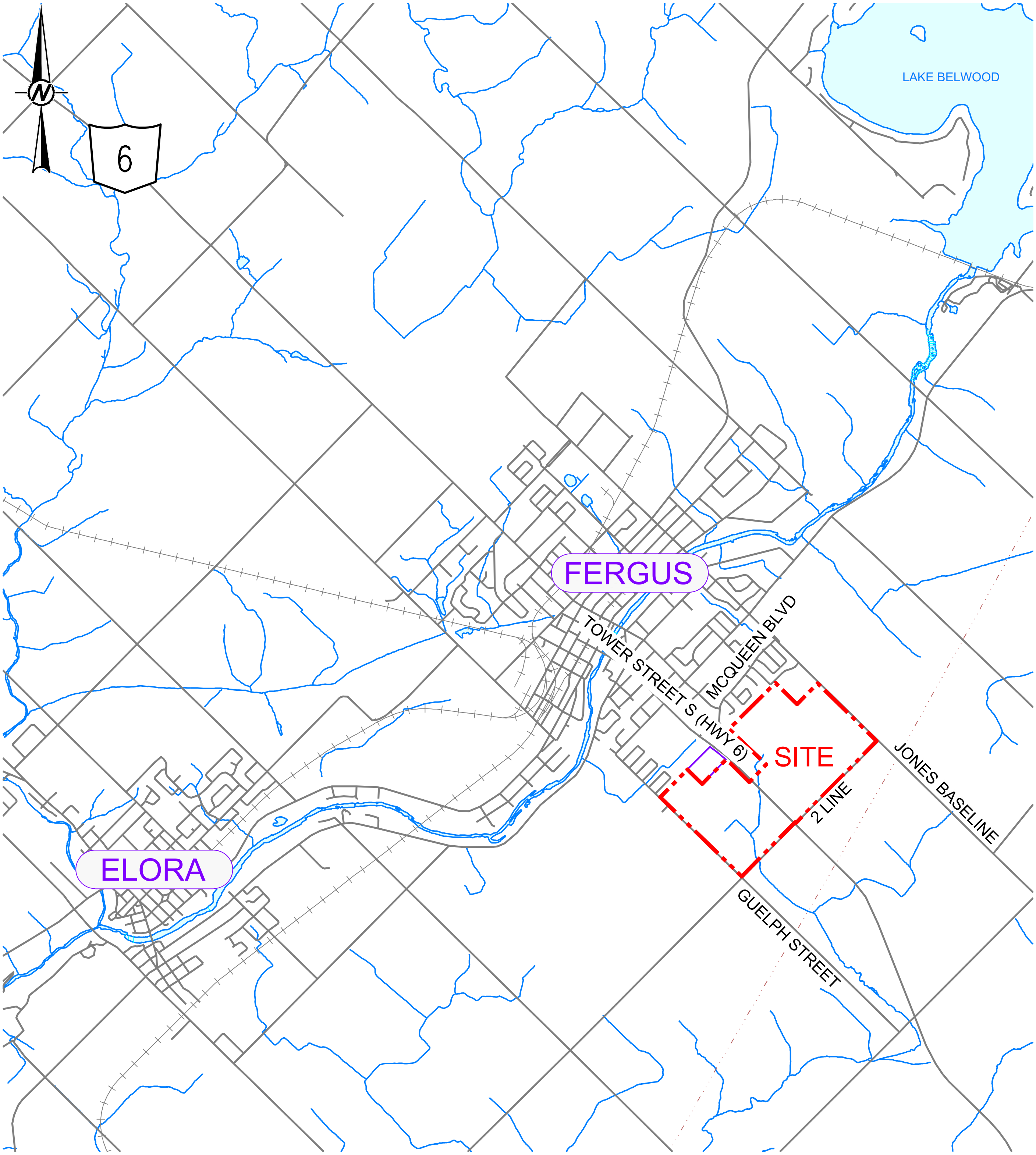
Associate, Senior Hydrogeologist

JJG/MAS/JP/lb

https://golderassociates.sharepoint.com/sites/124833/project files/6 deliverables/report/20141301-rev0-hydrogeological investigation report - south fergus 4apr2023.docx

Figures



PLAN LEGEND

— · — PLAN BOUNDARY

0 1000 2000 3000 m

1:50000

CLIENT
TATHAM ENGINEERING LIMITED

PROJECT
SOUTH FERGUS
HYDROGEOLOGICAL INVESTIGATION

CONSULTANT
WSP GOLDER

YYYY-MM-DD	2020-09-17
DESIGNED	
PREPARED	JPR
REVIEWED	JG
APPROVED	MAS

TITLE
KEY PLAN

PROJECT NO.	CONTROL	REV.	FIGURE
20141301	0002	----	1

Last Edited By: jregier Date: 2022-07-28 Time:9:59:44 AM | Printed By: JRegier Date: 2022-08-04 Time:12:15:15 PM
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25 mm

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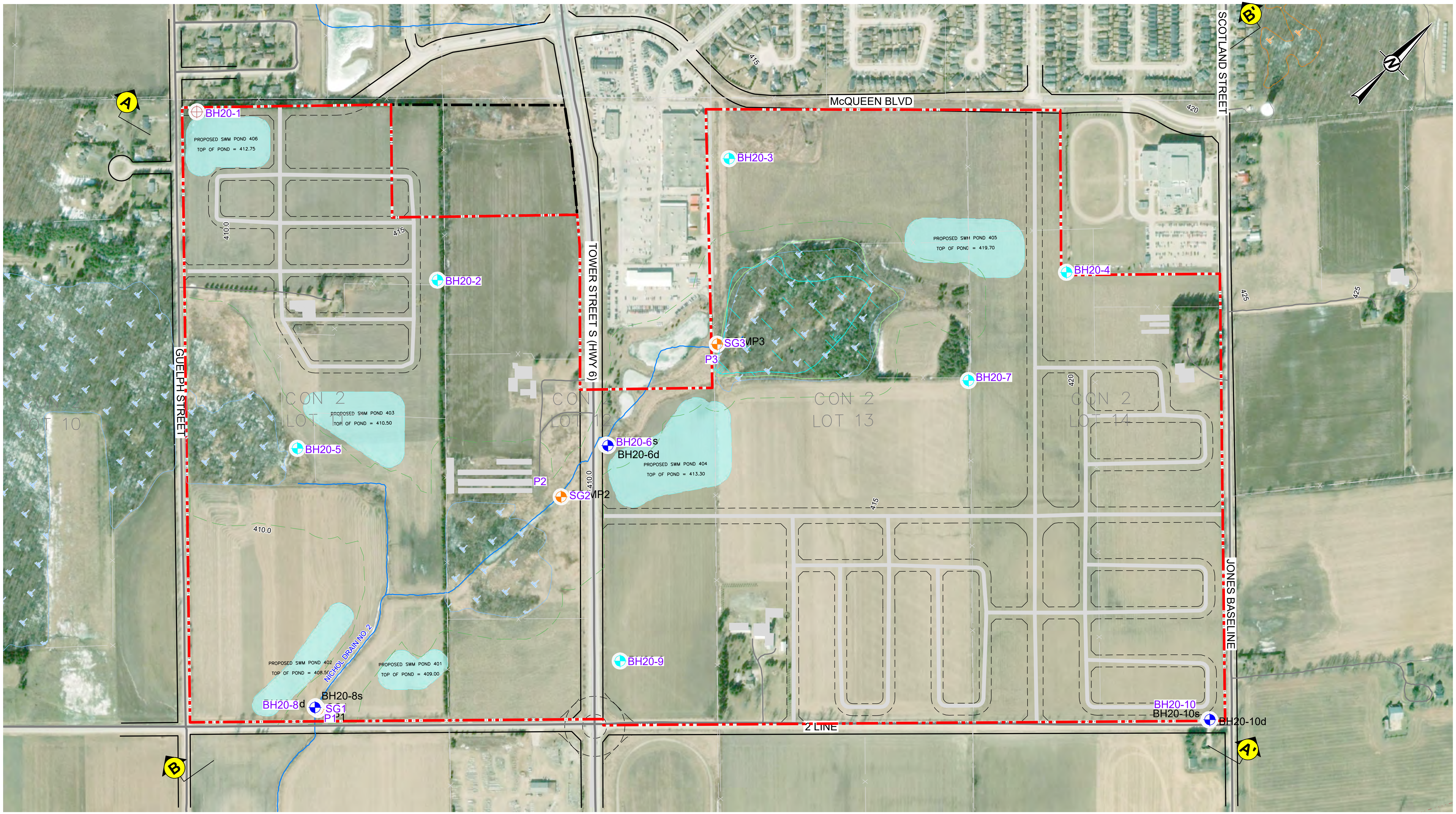


PLAN LEGEND

▬ ▪ ▬	PLAN BOUNDARY
⊕	TEST BOREHOLE
◐	SHALLOW MONITORING WELL
◐	SHALLOW & DEEP NESTED MONITORING WELL
◐	STAFF GAUGE / MINI-PIEZOMETER
↟ ↟ ↟	PROVINCIALLY SIGNIFICANT WETLANDS
↟ ↟ ↟	UNEVALUATED WETLANDS

MAP KEY

ALL MAPPED LOCATIONS ARE APPROXIMATE AND NOT TO SCALE

PROPOSED DEVELOPMENT PLAN, TATHAM ENGINEERING, 2022

ALIGNMENT OF ORTHOGRAPHIC IMAGERY IS APPROXIMATED TO SELECT FEATURES ON DATUM. AWAY FROM POINTS OF ALIGNMENT THE ORTHOGRAPHIC IMAGE MAY BE DIMENSIONALLY SKEWED OR PROJECTED OFF THE MAP DATUM PLANE.

0 120 240 360 m

1:6000

PLOTTED 11X17" TABLOID

PROJECTION IS UTM NAD 83 ZONE 17

CLIENT
TATHAM ENGINEERING LIMITED

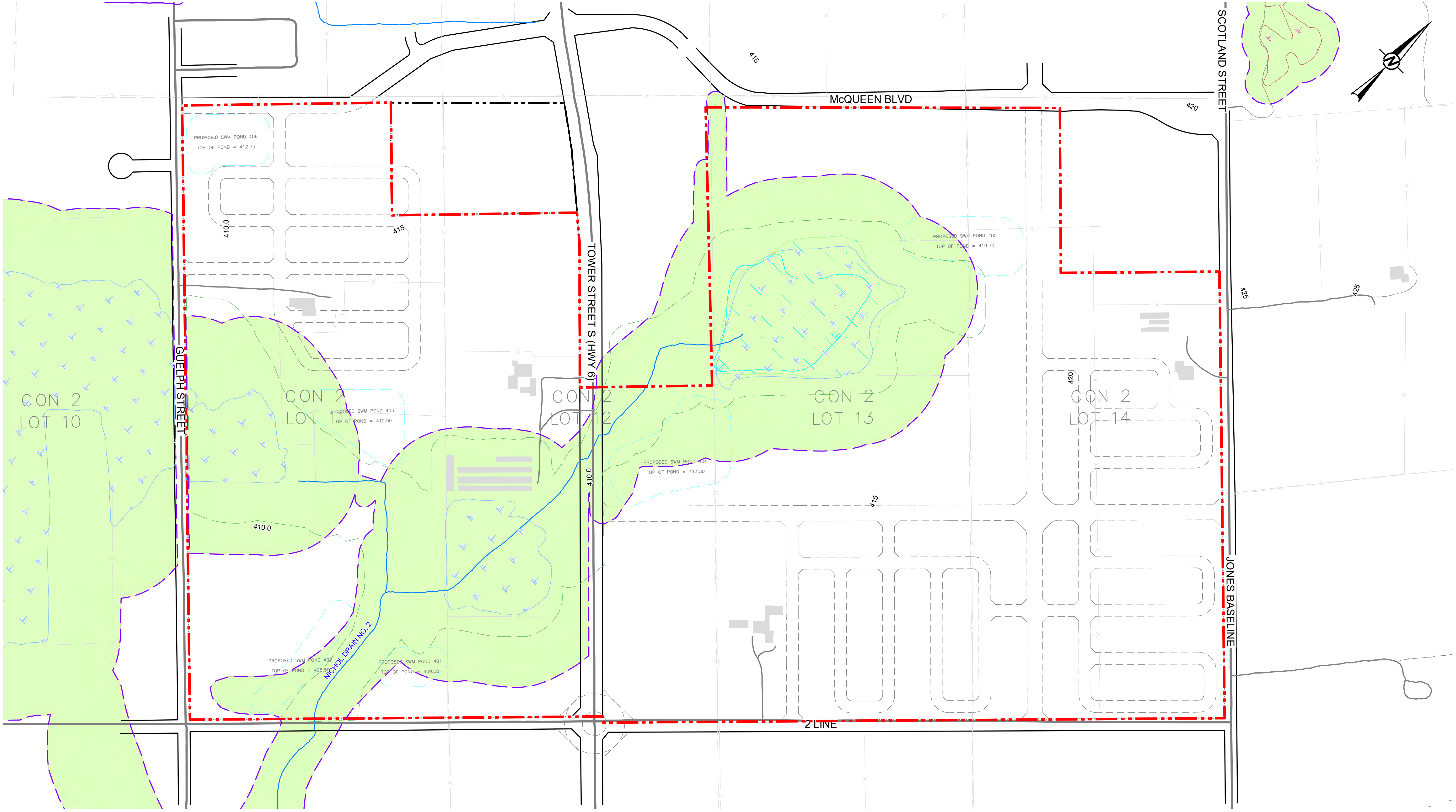
CONSULTANT
WSP GOLDER

YYYY-MM-DD	2022-07-28
DESIGNED	
PREPARED	JPR
REVIEWED	JG
APPROVED	MAS

PROJECT
SOUTH FERGUS
HYDROGEOLOGICAL INVESTIGATION

TITLE
SITE PLAN

PROJECT NO.	CONTROL	REV.	FIGURE
20141301	0002	----	2



PLAN LEGEND

🟥 PLAN BOUNDARY

🟩 REGULATED AREA (GRAND RIVER CONSERVATION AUTHORITY)

CONSERVATION LIMIT

PROVINCIALLY SIGNIFICANT WETLANDS

UNEVALUATED WETLANDS

NOTES:

ALL MAPPED LOCATIONS ARE APPROXIMATE AND NOT TO SCALE

REGULATED AREAS AND WETLANDS COURTESY GRCA DIGITAL MAPPING 2022

0 120 240 360 m

1:6000

PLOTTED 11X17" TABLOID

PROJECTION IS UTM NAD 83 ZONE 17

CLIENT
TATHAM ENGINEERING LIMITED

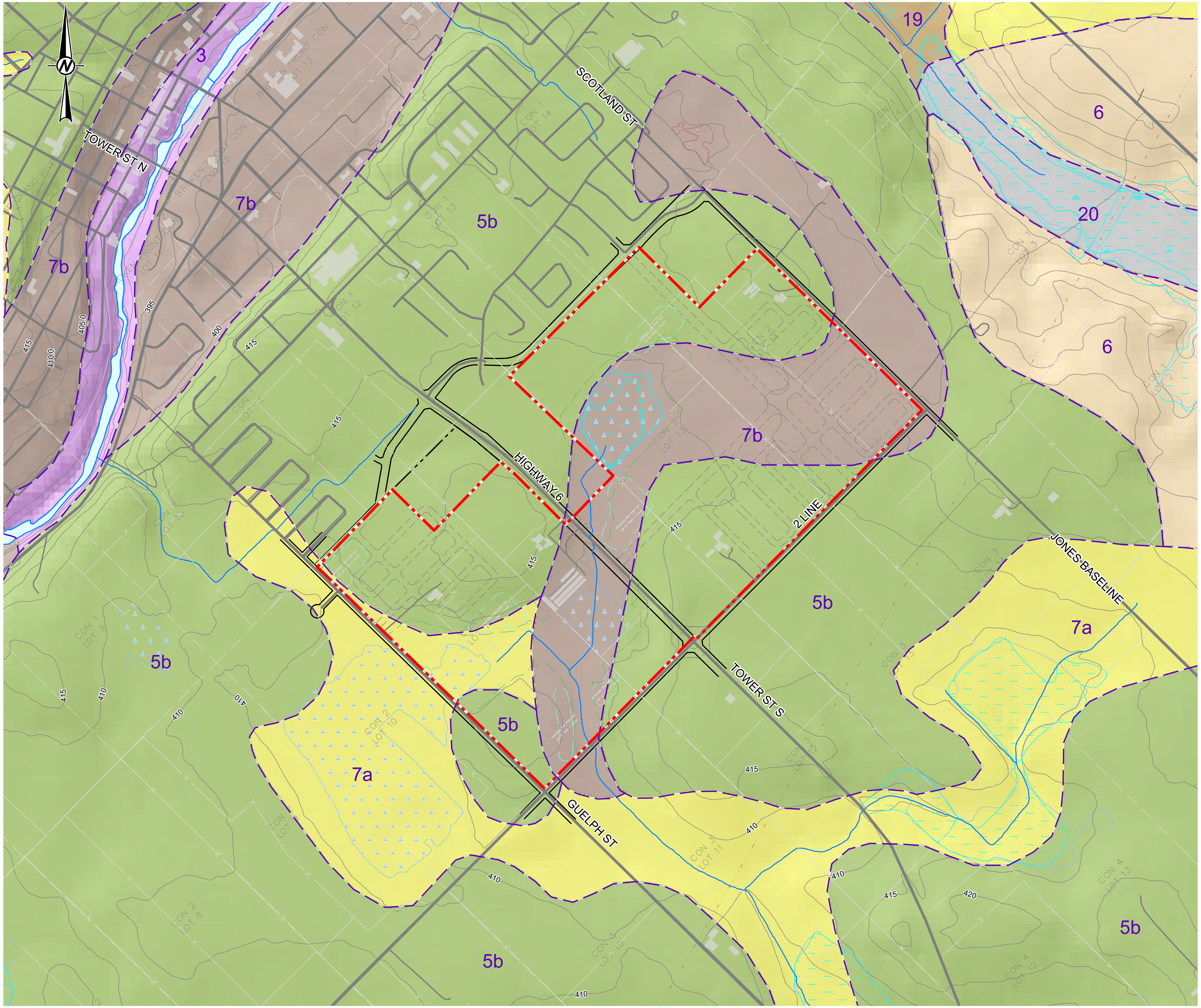
CONSULTANT
WSP GOLDER

YYYY-MM-DD	2022-07-18
DESIGNED	
PREPARED	JPR
REVIEWED	JG
APPROVED	MAS

PROJECT
SOUTH FERGUS
HYDROGEOLOGICAL INVESTIGATION

TITLE
REGULATED AREAS

PROJECT NO.	CONTROL	REV.	FIGURE
20141301	0002	----	3



SURFICIAL SOILS

▨	20	ORGANIC DEPOSITS
▨	19	FLUVIAL SILT, SAND, GRAVEL
▨	7a	DISTAL SAND & GRAVEL
▨	7b	GLACIOFLUVIAL SAND & GRAVEL OUTWASH
▨	6	ICE CONTACT SEDIMENTS, ESKERS
▨	5b	ABLATION TILL
▨	3	PALEOZOIC BEDROCK

PLAN LEGEND

—·—	PLAN BOUNDARY
╨	WETLANDS (GRCA)
╌	WETLANDS (MNR)

REFERENCES & DISCLAIMERS

QUATERNARY MAPPING ONTARIO GEOLOGICAL SURVEY, QUEEN'S PRINTER 2016

ALIGNMENT OF ORTHOGRAPHIC IMAGERY IS APPROXIMATED TO SELECT FEATURES ON DATUM. AWAY FROM POINTS OF ALIGNMENT THE ORTHOGRAPHIC IMAGE MAY BE DIMENSIONALLY SKEWED OR PROJECTED OFF THE MAP DATUM PLANE.

0 250 500 750 m

1:12500

CLIENT
TATHAM ENGINEERING LIMITED

PROJECT
SOUTH FERGUS
HYDROGEOLOGICAL INVESTIGATION

TITLE
QUATERNARY MAP

CONSULTANT

GOLDER

YYYY-MM-DD	2022-07-18
DESIGNED	
PREPARED	JPR
REVIEWED	JG
APPROVED	MAS

PROJECT NO.	CONTROL	REV.	FIGURE
20141301	0002	----	4

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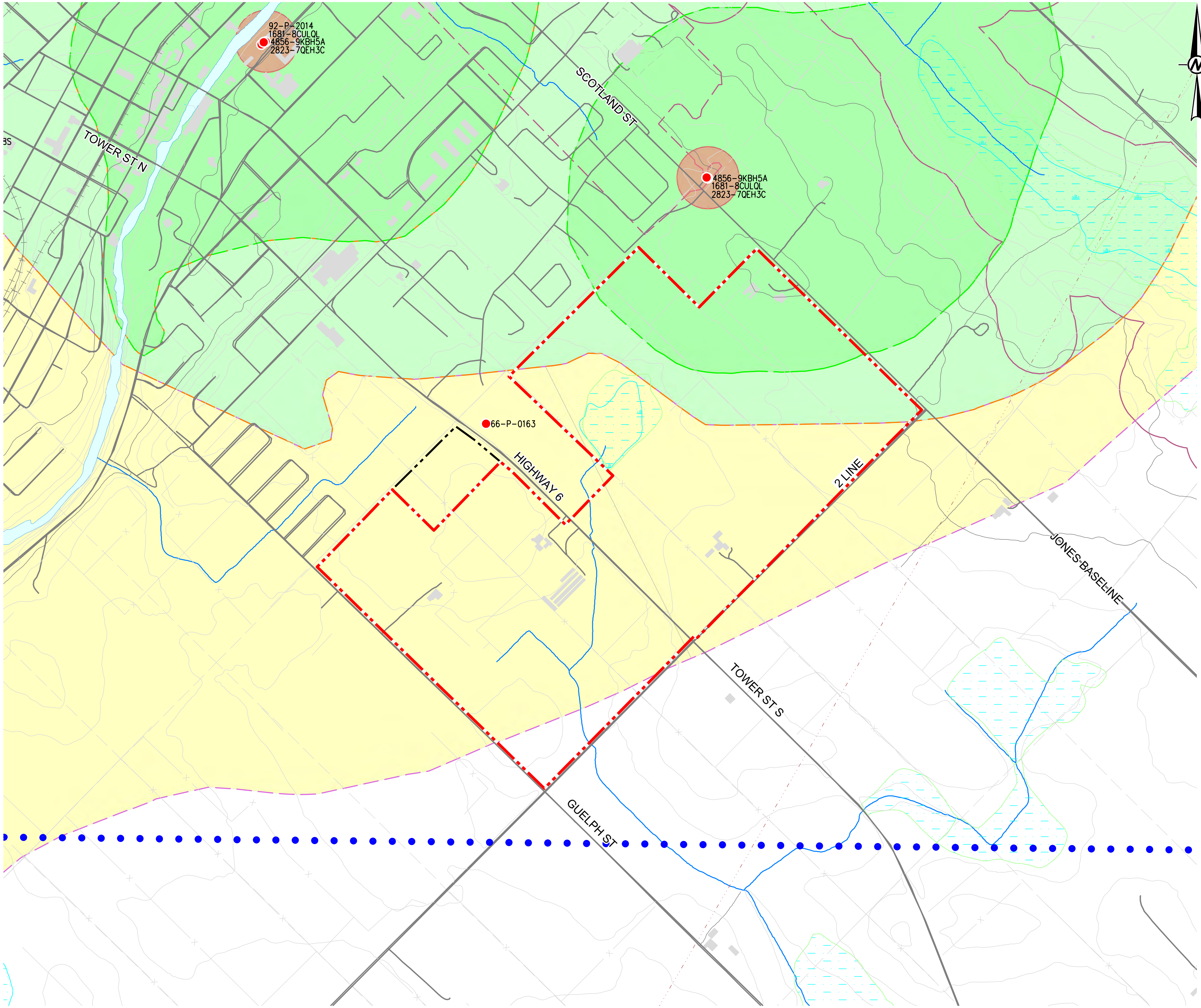
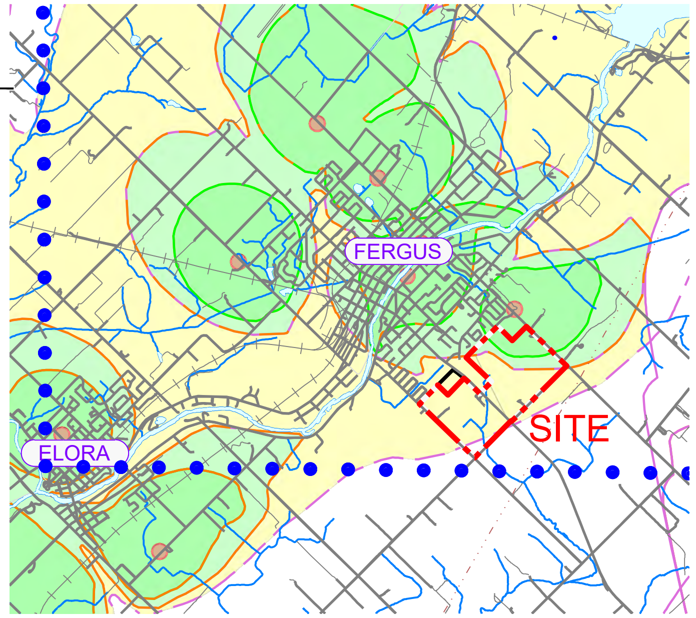


REGIONAL PLAN 1:100,000



PLAN LEGEND

🟥	PLAN BOUNDARY
●	WELLHEAD PROTECTION AREA A / MUNICIPAL WELL SITE
● 66-P-0163	PERMITTED WATER TAKING
🟩	WELLHEAD PROTECTION AREA B
🟩	WELLHEAD PROTECTION AREA C
🟨	WELLHEAD PROTECTION AREA D
● ● ●	WATER QUANTITY PROECTION LIMIT

REFERENCES & DISCLAIMERS

WELLHEAD PROTECTION AREAS, GRAND VALLEY CONSERVATION AUTHORITY (GRCA); 2009

MAPPED FEATURES ARE APPROXIMATE AND NOT TO SCALE.

0 250 500 750 m

1:12500

PLOTTED 11X17" TABLOID

PROJECTION IS UTM NAD 83 ZONE 17

CLIENT
TATHAM ENGINEERING LIMITED

PROJECT
SOUTH FERGUS
HYDROGEOLOGICAL INVESTIGATION

TITLE
WELLHEAD PROTECTION AREAS

CONSULTANT

wsp GOLDER

YYYY-MM-DD	2022-07-18
DESIGNED	
PREPARED	JPR
REVIEWED	JG
APPROVED	MAS

PROJECT NO.	CONTROL	REV.	FIGURE
20141301	0002	----	5

25 mm

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

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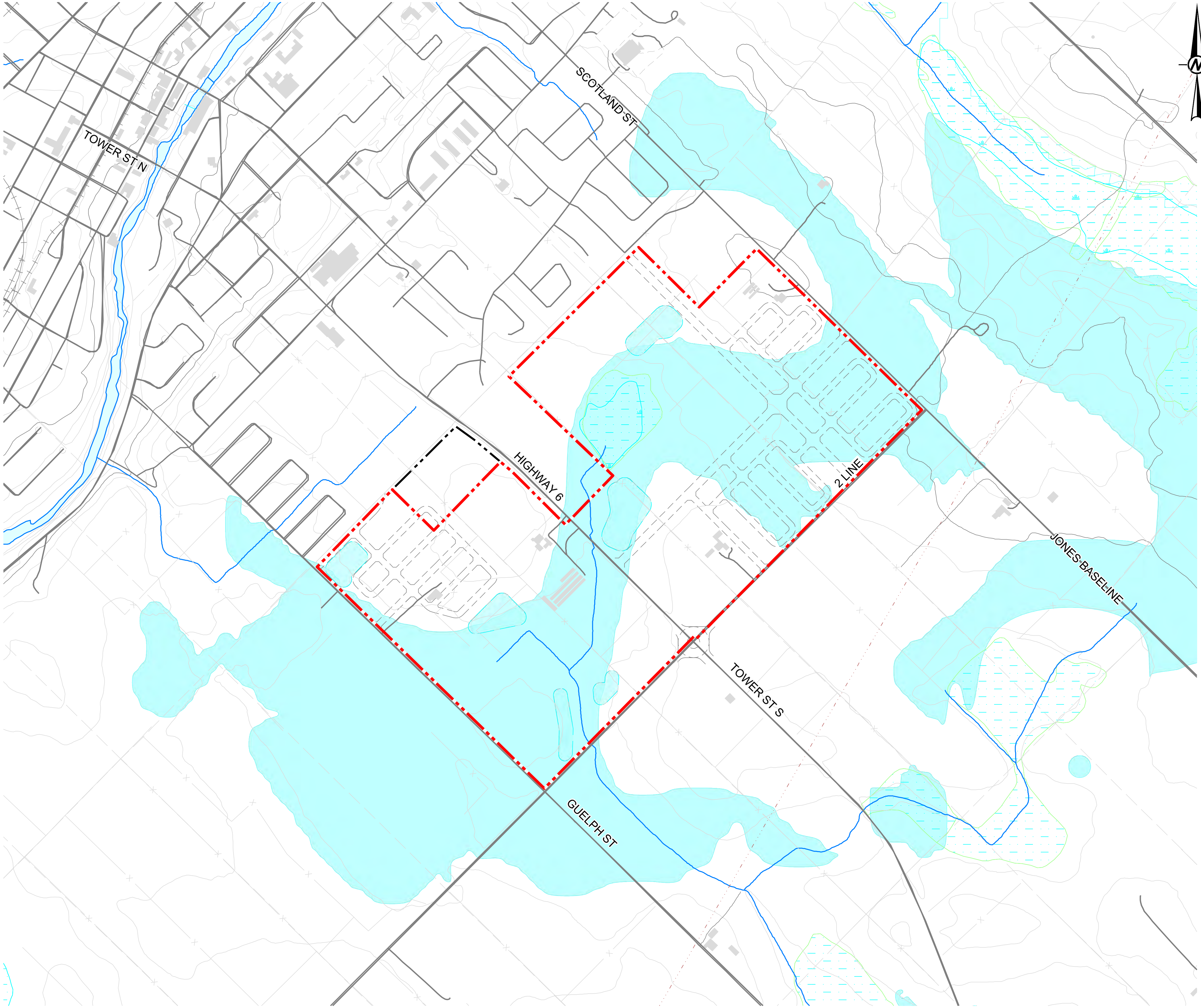

PLAN LEGEND

▬ · ▬	PLAN BOUNDARY
🟦	SIGNIFICANT RECHARGE AREA (>200 mm/Year)

REFERENCES & DISCLAIMERS

SIGNIFICANT RECHARGE AREAS, GRAND VALLEY CONSERVATION AUTHORITY (GRCA); 2009

MAPPED FEATURES ARE APPROXIMATE AND NOT TO SCALE.

0 250 500 750 m

1:12500

PLOTTED 11X17" TABLOID

PROJECTION IS UTM NAD 83 ZONE 17

CLIENT
TATHAM ENGINEERING LIMITED

PROJECT
SOUTH FERGUS
HYDROGEOLOGICAL INVESTIGATION

TITLE
SIGNIFICANT GROUNDWATER RECHARGE AREAS

CONSULTANT

WSP GOLDER

YYYY-MM-DD	2022-07028
DESIGNED	
PREPARED	JPR
REVIEWED	JG
APPROVED	MAS

PROJECT NO.	CONTROL	REV.	FIGURE
20141301	0002	----	6

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25 mm

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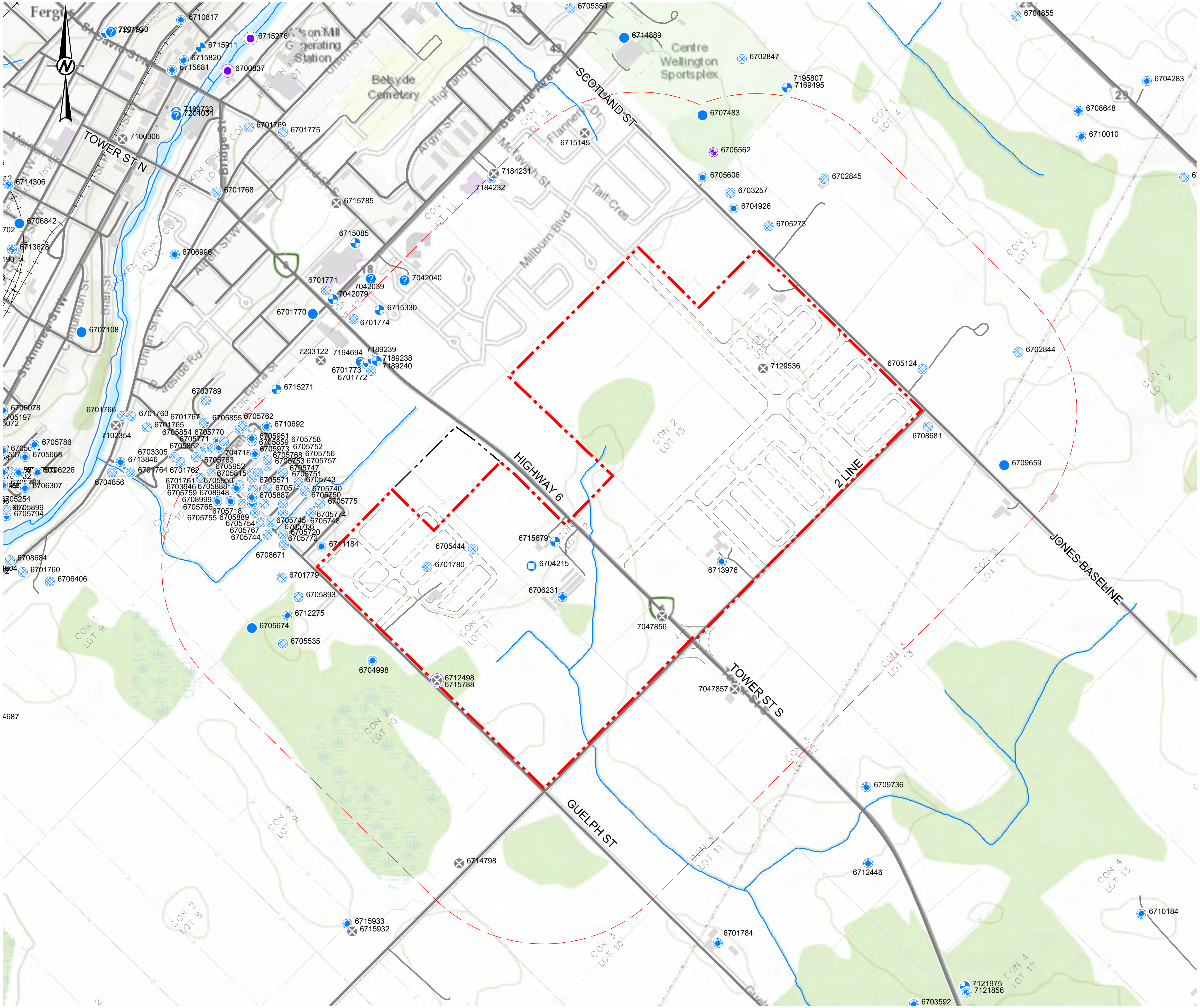

RECORDED WELLS

◌	SHALLOW DUG OR BORED <10 M
◈	SANDPOINT
○	DEEP BORED WELL >10 M
●	DRILLED OVERBURDEN WELL
◐	TEST OR OBSERVATION WELL
▨	DRILLED BEDROCK WELL
◉	MUNICIPAL / PUBLIC SUPPLY
●	MONITORING WELL
⊗	RECORD OF ABANDONMENT
?	INFORMATION UNRECORDED

PLAN LEGEND

— · — PLAN BOUNDARY WITH 500 m OFFSET

REFERENCE

MINISTRY OF ENVIRONMENT WATER WELL INFORMATION SYSTEM, QUEEN'S PRINTER.
LOCATION AND ELEVATIONS OF FIELD VERIFIED WELLS ARE SUBJECT TO REVISION.

0 250 500 750 m

1:12500

CLIENT
TATHAM ENGINEERING LIMITED

PROJECT
SOUTH FERGUS
HYDROGEOLOGICAL INVESTIGATION

TITLE
MINISTRY RECORDED WELLS

CONSULTANT

WSP GOLDER

YYYY-MM-DD	2022-07-18
DESIGNED	
PREPARED	JPR
REVIEWED	JG
APPROVED	MAS

PROJECT NO.	CONTROL	REV.	FIGURE
20141301	0002	----	7

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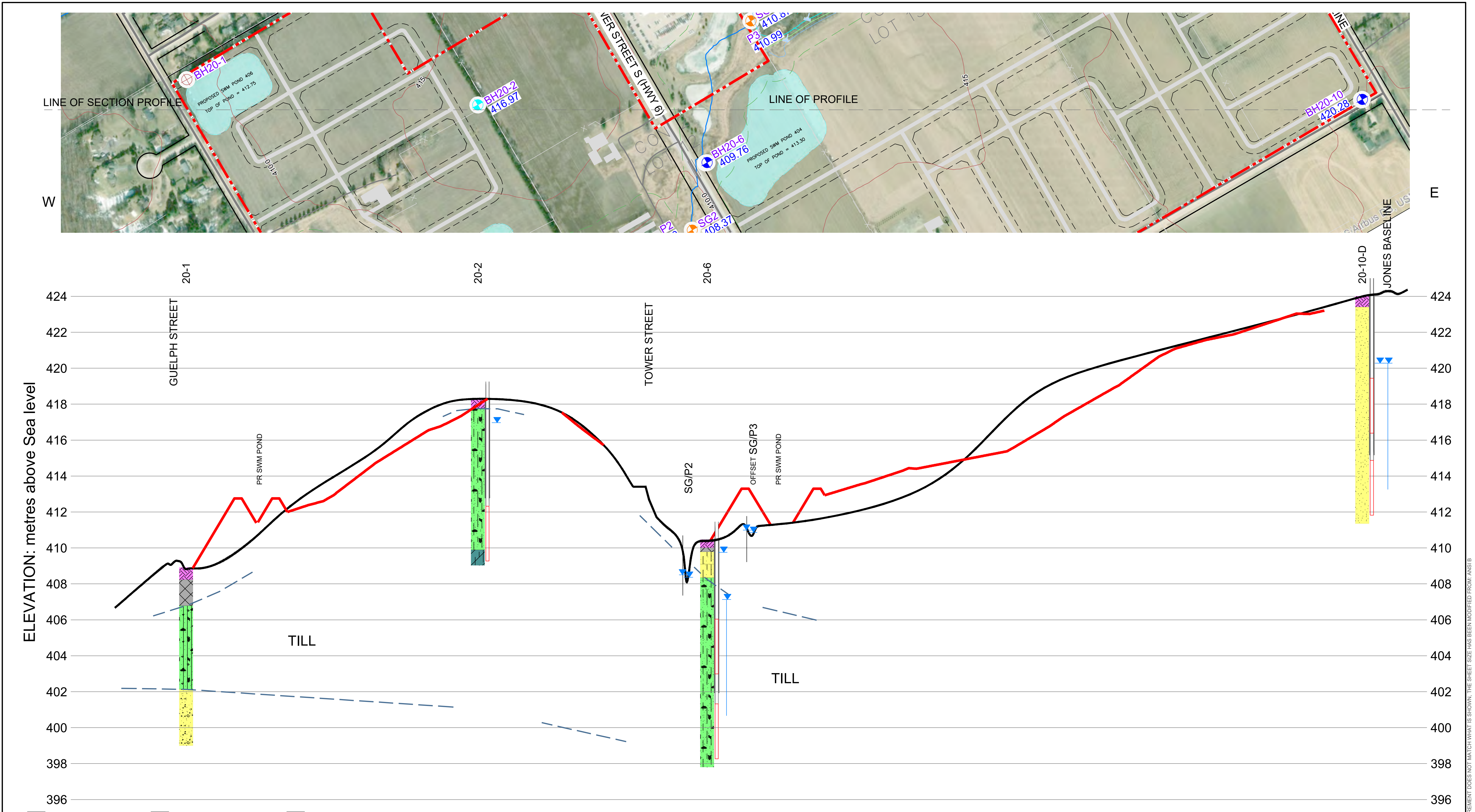

- Fill
- Sand & Gravel
- Sand
- Sand Trace Silt
- Silty Sand
- Sandy Silt
- Silt with to trace Sand
- Clayey Silt
- Silty Clay
- Granular Till
- Silt Till
- Silty Sand / Sandy Silt Till
- Silty Clay Till

BH1 Borehole ID

▼ Recorded Static Water Level

▯ Screen

0 40 80 120 m

1:2000

CLIENT
TATHAM ENGINEERING LIMITED

CONSULTANT
WSP GOLDER

YYYY-MM-DD	2022-07-18
DESIGNED	
PREPARED	JPR
REVIEWED	JG
APPROVED	MAS

PROJECT
SOUTH FERGUS
HYDROGEOLOGICAL INVESTIGATION

TITLE
SITE SECTION A - A'

PROJECT NO.	CONTROL	REV.	FIGURE
20141301	0002	----	8A

Path: \\golder.gds\complexdata\office\Ontario\SIM\Clients\CC_Tatham\South_Fergus_Line2\99_PROJ\20141301\40_PROD\0002_2022_HYD\ | File Name: 20141301-0002-CH-0002.dwg | Last Edited By: jregier Date: 2022-07-28 Time:10:53:23 AM | Printed By: JRegier Date: 2022-08-04 Time:12:35:15 PM

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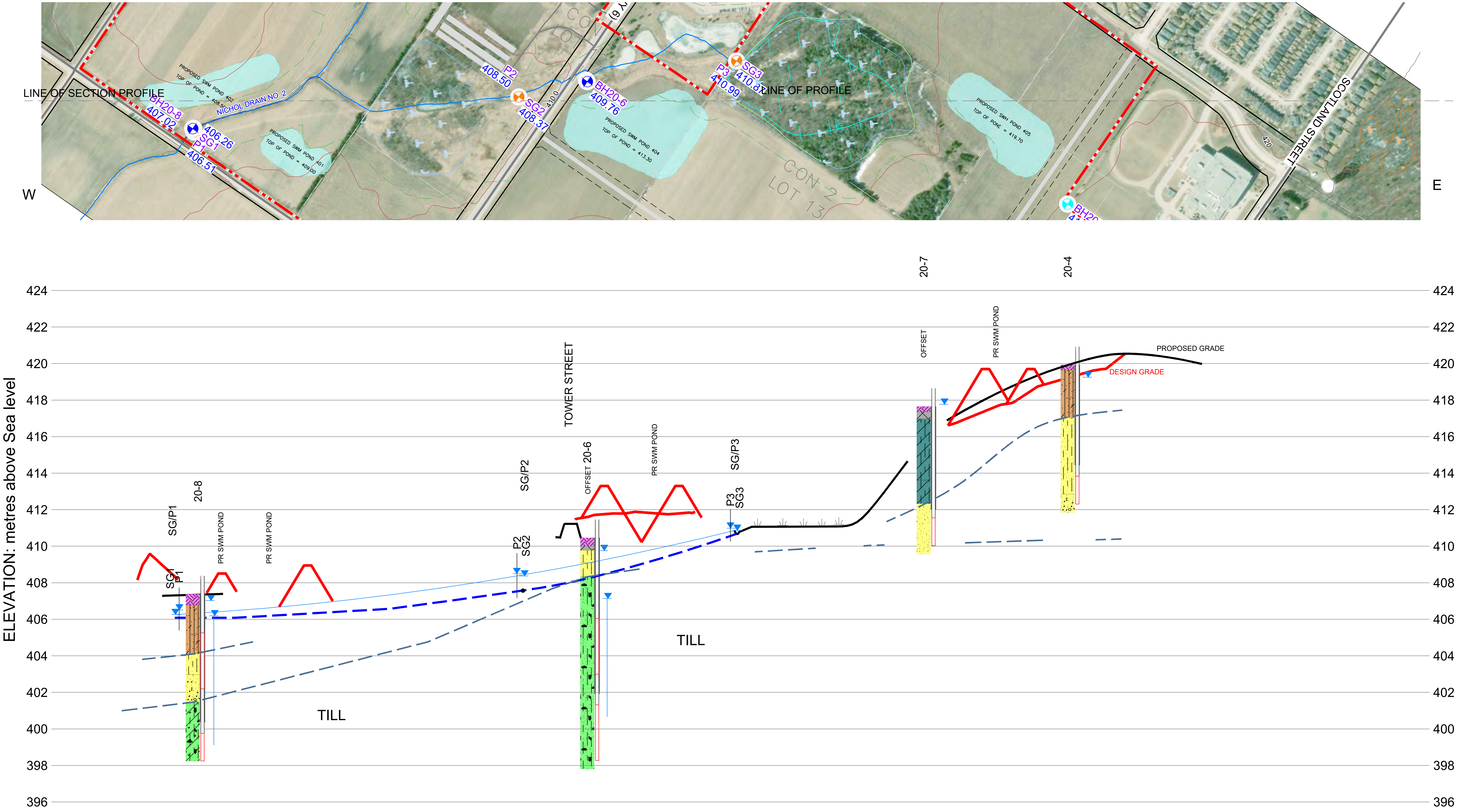

▨ Fill

▨ Sand & Gravel

▨ Sand

▨ Sand Trace Silt
Silty Sand

▨ Sandy Silt

▨ Silt
with to trace Sand

▨ Clayey Silt

▨ Silty Clay

▨ Granular Till

▨ Silt Till

▨ Silty Sand /
Sandy Silt Till

▨ Silty Clay Till

BH1 Borehole ID

▼ Recorded Static Water Level

▯ Screen

0 40 80 120 m
1:2000

CLIENT
TATHAM ENGINEERING LIMITED

CONSULTANT

YYYY-MM-DD	2022-07-18
DESIGNED	
PREPARED	JPR
REVIEWED	JG
APPROVED	MAS

PROJECT
SOUTH FERGUS
HYDROGEOLOGICAL INVESTIGATION

TITLE
SITE SECTION B - B'

PROJECT NO.	CONTROL	REV.	FIGURE
20141301	0002	----	8B

Path: \\golder.gds\complexdata\office\Ontario\SIM\Clients\CC_Tatham\South_Fergus_Line2\99_PROJ\20141301\40_PROD\0002_2022_HYD\ | File Name: 20141301-0002-CH-0002.dwg | Last Edited By: jregier Date: 2022-07-28 Time:10:53:23 AM | Printed By: JRegier Date: 2022-08-04 Time:12:35:43 PM

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25 mm
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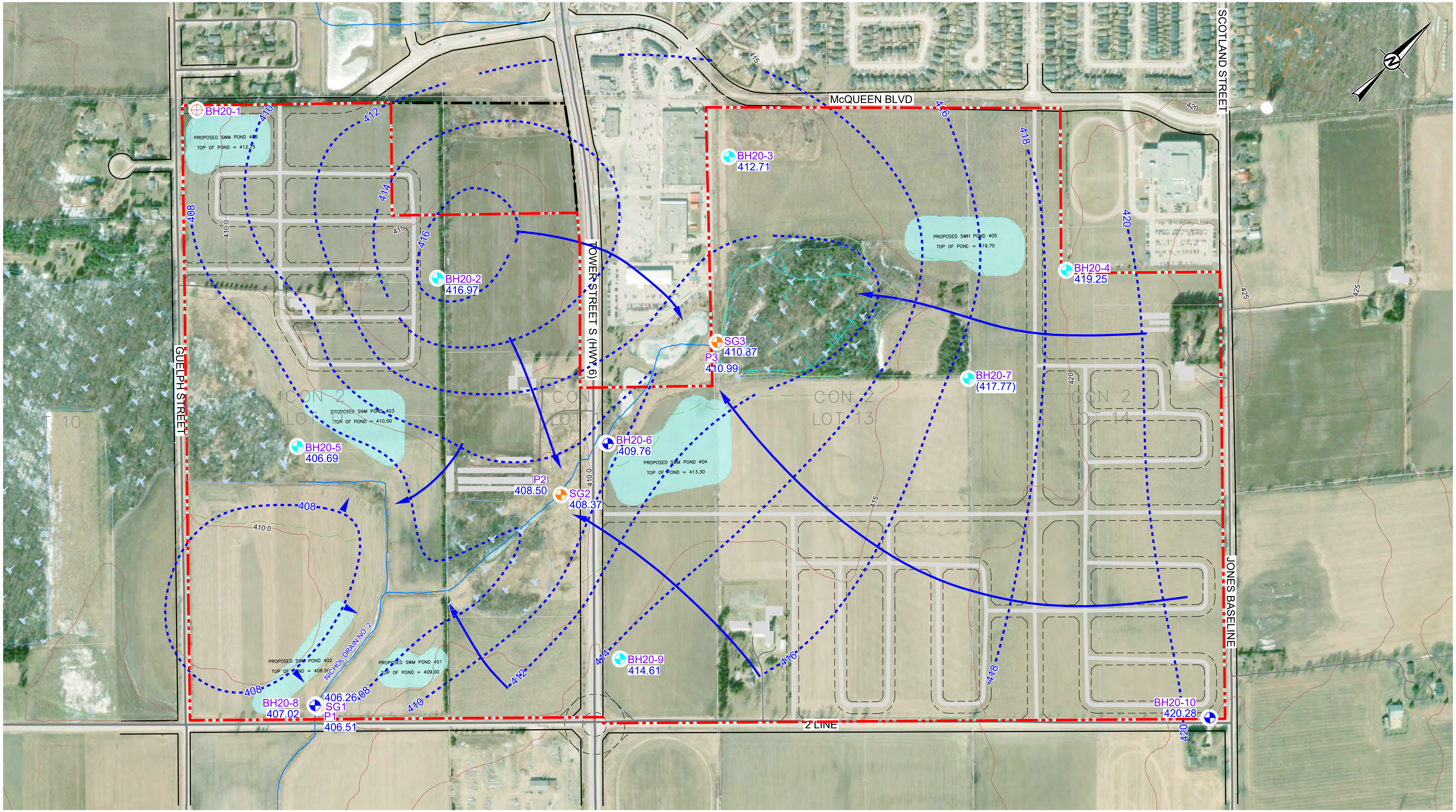


PLAN LEGEND

▬ · ▬	PLAN BOUNDARY
⊕	TEST BOREHOLE
●	SHALLOW MONITORING WELL
●	SHALLOW & DEEP NESTED MONITORING WELL
●	STAFF GAUGE / MINI-PIEZOMETER
435.67	STATIC WATER LEVEL, VALUE IN BRACKETS FROM DEEPER SCREENED PORTION () ARTESIAN
·······	INTERPOLATED GROUNDWATER FLOW
⫯ ⫯ ⫯	PROVINCIALLY SIGNIFICANT WETLANDS
⫯ ⫯ ⫯	UNEVALUATED

MAP KEY

ALL MAPPED LOCATIONS ARE APPROXIMATE AND NOT TO SCALE

WETLANDS GRCA

ALIGNMENT OF ORTHOGRAPHIC IMAGERY IS APPROXIMATED TO SELECT FEATURES ON DATUM. AWAY FROM POINTS OF ALIGNMENT THE ORTHOGRAPHIC IMAGE MAY BE DIMENSIONALLY SKEWED OR PROJECTED OFF THE MAP DATUM PLANE.

0 120 240 360 m

1:6000

PLOTTED 11X17" TABLOID

PROJECTION IS UTM NAD 83 ZONE 17

CLIENT
TATHAM ENGINEERING LIMITED

PROJECT
SOUTH FERGUS
HYDROGEOLOGICAL INVESTIGATION

CONSULTANT
WSP GOLDER

YYYY-MM-DD	2022-07-18
DESIGNED	
PREPARED	JPR
REVIEWED	JG
APPROVED	MAS

TITLE
GROUNDWATER FLOW
12 MARCH 2021

PROJECT NO.	CONTROL	REV.	FIGURE
20141301	0002	----	9

Path: \\golder.gds\complexdata\office\Ontario\SIM\Clients\CC_Tatham\South_Fergus_Line2\99_PROJ\20141301\40_PROD\0002_2022_HYD | File Name: 20141301-0002-CH-0002.dwg | Last Edited By: jregier Date: 2022-07-28 Time:10:53:23 AM | Printed By: JRegier Date: 2022-08-04 Time:12:37:01 PM

25 mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

APPENDIX A

Important Information and Limitations of this Report

IMPORTANT INFORMATION AND LIMITATIONS OF THIS REPORT

Standard of Care: WSP Canada Inc. (WSP) has prepared this report in a manner consistent with that level of care and skill ordinarily exercised by members of the engineering and science professions currently practicing under similar conditions in the jurisdiction in which the services are provided, subject to the time limits and physical constraints applicable to this report. No other warranty, expressed or implied is made.

Basis and Use of the Report: This report has been prepared for the specific site, design objective, development and purpose described to WSP by the Client. The factual data, interpretations and recommendations pertain to a specific project as described in this report and are not applicable to any other project or site location. Any change of site conditions, purpose, development plans or if the project is not initiated within eighteen months of the date of the report may alter the validity of the report. WSP cannot be responsible for use of this report, or portions thereof, unless WSP is requested to review and, if necessary, revise the report.

The information, recommendations and opinions expressed in this report are for the sole benefit of the Client. No other party may use or rely on this report or any portion thereof without WSP's express written consent. If the report was prepared to be included for a specific permit application process, then upon the reasonable request of the client, WSP may authorize in writing the use of this report by the regulatory agency as an Approved User for the specific and identified purpose of the applicable permit review process. Any other use of this report by others is prohibited and is without responsibility to WSP. The report, all plans, data, drawings and other documents as well as all electronic media prepared by WSP are considered its professional work product and shall remain the copyright property of WSP, who authorizes only the Client and Approved Users to make copies of the report, but only in such quantities as are reasonably necessary for the use of the report by those parties. The Client and Approved Users may not give, lend, sell, or otherwise make available the report or any portion thereof to any other party without the express written permission of WSP. The Client acknowledges that electronic media is susceptible to unauthorized modification, deterioration and incompatibility and therefore the Client cannot rely upon the electronic media versions of WSP's report or other work products.

The report is of a summary nature and is not intended to stand alone without reference to the instructions given to WSP by the Client, communications between WSP and the Client, and to any other reports prepared by WSP for the Client relative to the specific site described in the report. In order to properly understand the suggestions, recommendations and opinions expressed in this report, reference must be made to the whole of the report. WSP cannot be responsible for use of portions of the report without reference to the entire report.

Unless otherwise stated, the suggestions, recommendations and opinions given in this report are intended only for the guidance of the Client in the design of the specific project. The extent and detail of investigations, including the number of test holes, necessary to determine all of the relevant conditions which may affect construction costs would normally be greater than has been carried out for design purposes. Contractors bidding on, or undertaking the work, should rely on their own investigations, as well as their own interpretations of the factual data presented in the report, as to how subsurface conditions may affect their work, including but not limited to proposed construction techniques, schedule, safety and equipment capabilities.

Soil, Rock and Ground water Conditions: Classification and identification of soils, rocks, and geologic units have been based on commonly accepted methods employed in the practice of geotechnical engineering and related disciplines. Classification and identification of the type and condition of these materials or units involves judgment, and boundaries between different soil, rock or geologic types or units may be transitional rather than abrupt. Accordingly, WSP does not warrant or guarantee the exactness of the descriptions.

Special risks occur whenever engineering or related disciplines are applied to identify subsurface conditions and even a comprehensive investigation, sampling and testing program may fail to detect all or certain subsurface conditions. The environmental, geologic, geotechnical, geochemical and hydrogeologic conditions that WSP interprets to exist between and beyond sampling points may differ from those that actually exist. In addition to soil variability, fill of variable physical and chemical composition can be present over portions of the site or on adjacent properties. The professional services retained for this project include only the geotechnical aspects of the subsurface conditions at the site, unless otherwise specifically stated and identified in the report. The presence or implication(s) of possible surface and/or subsurface contamination resulting from previous activities or uses of the site and/or resulting from the introduction onto the site of materials from off-site sources are outside the terms of reference for this project and have not been investigated or addressed.

Soil and groundwater conditions shown in the factual data and described in the report are the observed conditions at the time of their determination or measurement. Unless otherwise noted, those conditions form the basis of the recommendations in the report. Groundwater conditions may vary between and beyond reported locations and can be affected by annual, seasonal and meteorological conditions. The condition of the soil, rock and groundwater may be significantly altered by construction activities (traffic, excavation, groundwater level lowering, pile driving, blasting, etc.) on the site or on adjacent sites. Excavation may expose the soils to changes due to wetting, drying or frost. Unless otherwise indicated the soil must be protected from these changes during construction.

Sample Disposal: WSP will dispose of all uncontaminated soil and/or rock samples 90 days following issue of this report or, upon written request of the Client, will store uncontaminated samples and materials at the Client’s expense. In the event that actual contaminated soils, fills or groundwater are encountered or are inferred to be present, all contaminated samples shall remain the property and responsibility of the Client for proper disposal.

Follow-Up and Construction Services: All details of the design were not known at the time of submission of WSP’s report. WSP should be retained to review the final design, project plans and documents prior to construction, to confirm that they are consistent with the intent of WSP’s report.

During construction, WSP should be retained to perform sufficient and timely observations of encountered conditions to confirm and document that the subsurface conditions do not materially differ from those interpreted conditions considered in the preparation of WSP’s report and to confirm and document that construction activities do not adversely affect the suggestions, recommendations and opinions contained in WSP’s report. Adequate field review, observation and testing during construction are necessary for WSP to be able to provide letters of assurance, in accordance with the requirements of many regulatory authorities. In cases where this recommendation is not followed, WSP's responsibility is limited to interpreting accurately the information encountered at the borehole locations, at the time of their initial determination or measurement during the preparation of the Report.

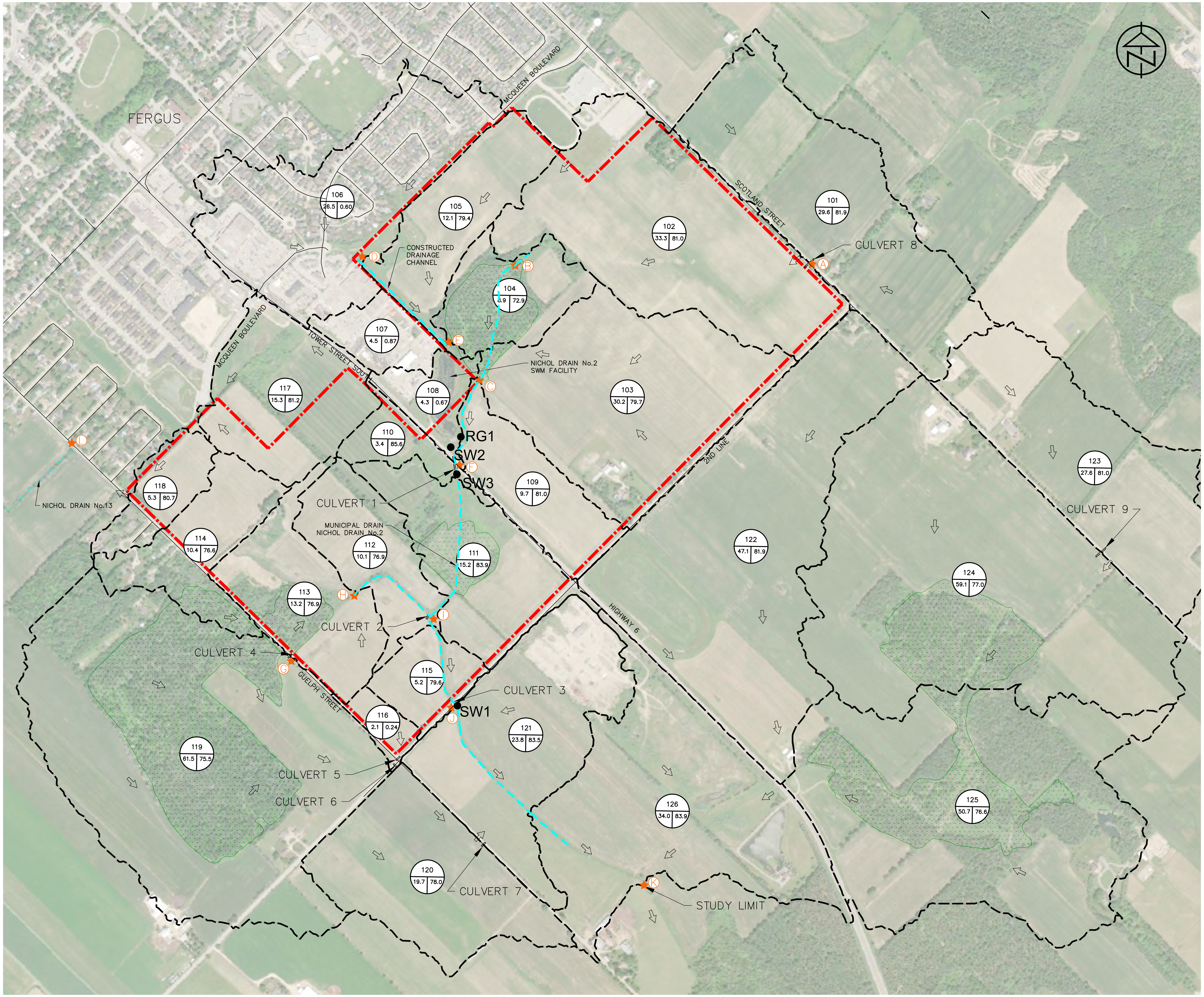
Changed Conditions and Drainage: Where conditions encountered at the site differ significantly from those anticipated in this report, either due to natural variability of subsurface conditions or construction activities, it is a condition of this report that WSP be notified of any changes and be provided with an opportunity to review or revise the recommendations within this report. Recognition of changed soil and rock conditions requires experience and it is recommended that WSP be employed to visit the site with sufficient frequency to detect if conditions have changed significantly.

Drainage of subsurface water is commonly required either for temporary or permanent installations for the project. Improper design or construction of drainage or dewatering can have serious consequences. WSP takes no responsibility for the effects of drainage unless specifically involved in the detailed design and construction monitoring of the system.

APPENDIX B

Provided Drawings

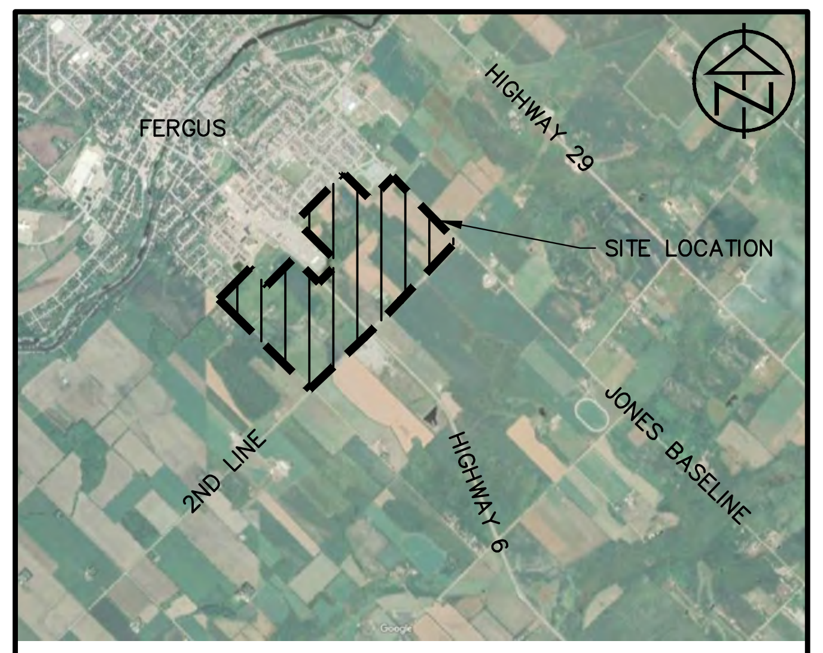
Figure 1: Preliminary Land Use Plan



DP-2

EXISTING DRAINAGE PLAN

South Fergus MESP and Secondary Plan
Town of Fergus
Township of Centre Wellington
County of Wellington



KEY PLAN
SCALE (N.T.S.)

CULVERTS

CULVET 1:	3.02m X 1.82m BOX CULVERT
CULVERT 2:	1.2mø CSP
CULVERT 3:	3.0m X 2.0m BOX CULVERT
CULVERT 4:	0.55mø & 0.6mø HDPE
CULVERT 5:	TO BE DETERMINED
CULVERT 6:	TO BE DETERMINED
CULVERT 7:	TO BE DETERMINED
CULVERT 8:	0.45mø CSP
CULVERT 9:	0.45mø CSP

LEGEND

🟥	SOUTH FERGUS SECONDARY PLAN AREA
⇦	OVERLAND FLOW DIRECTION
— · —	CATCHMENT BOUNDARY
🟩	WETLANDS
12-104 / 3.70 / 0.80	CATCHMENT ID CURVE NUMBER / IMPERVIOUS FRACTION CATCHMENT AREA
●SW	STREAMFLOW MONITORING LOCATION
●RG	RAIN GAUGE LOCATION
★Ⓐ	POINT OF INTEREST

Base Map Source: TOPOGRAPHIC SURVEY (TATHAM) COMBINED WITH TOPOGRAPHIC MAPPING (NORTHWAY/PHOTOMAP REMOTE SENSING LTD.)

DATE:	JUNE 14, 2021
SCALE:	1:2500
FILE:	120157
DRAWN:	KF

north

I:\2020 Projects\120157 - South Fergus MESP and Secondary Plan\C3D\Creek Analysis - Design\Received\Report

MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE

FRICORP ECOLOGICAL SERVICES

TATHAM ENGINEERING

APPENDIX C

MECP Water Well Record Summary

LABEL	CON	DATE	EASTING	ELEV	WTR	FND	SCR TOP	LEN	SWL	RATE	TIME	PL	DRILLER	TYPE	WELL NAME
	LOT	mmm-yr	NORTHING	masl	mbgl	Qu	mbgl	m	mbgl	L/min	min	mbgl	METHOD	STAT	DESCRIPTION OF MATERIALS
6701761	1	Jun-56	550197	411.5	59.4	Fr			22.3	45	120	22.9	2521	WS	**MOE# 6701761**
	10		4838104										CT	DO	0.0 CLAY 12.2 CLAY STNS 18.6 GREY LMSN 59.4
6701762	1	Apr-59	550132	412.1	52.4	Fr			23.2	32	120	23.2	2521	WS	**MOE# 6701762**
	10		4838155										CT	DO	0.0 CLAY 16.2 GREY LMSN 27.4 YLLW LMSN 30.5
															GREY LMSN 42.7 YLLW LMSN 52.4
6701772		Apr-62	550746	414.8	39.6	Fr			16.8	32	120	18.3	1659	WS	**MOE# 6701772**
			4838448										CT	CO	0.0 CLAY MSND 4.6 CLAY STNS 14.6 GREY LMSN
															39.6
6701773		Jun-63	550732	415.1	38.1	Fr			19.8	45	120	21.3	1659	WS	**MOE# 6701773**
			4838469										CT	DO	0.0 CLAY STNS 15.2 GREY LMSN 38.7
6701774		May-66	550689	415.4	21.3	Fr			21.9	55	15	25.9	2406	WS	**MOE# 6701774**
			4838615										CT	DO	0.0 TPSL 0.3 BRWN CLAY 10.7 GREY CLAY STNS
															17.1 GREY LMSN 27.4 BRWN LMSN 52.1
6701779	2	Aug-67	550458	408.1	27.4	Fr			11.9	36	180	18.3	1659	WS	**MOE# 6701779**
	10		4837783										CT	DO	0.0 CLAY STNS 9.1 GREY LMSN 29.3
6701780	2	Nov-48	550926	411.8	126.5	Fr			12.2	36	360	36.6	2411	WS	**MOE# 6701780**
	2		4837818										CT	ST	0.0 CLAY 9.1 GRVL 12.2 LMSN 128.9
6702844	1	Apr-56	552828	426.7	54.9	Fr			11.0	45	240	13.1	1648	WS	**MOE# 6702844**
	3		4838509										CT	DO	0.0 CLAY STNS 22.9 GRVL 26.2 LMSN 54.9
6702845	1	Sep-64	552204	425.8	32.9	Fr			19.8	45	120	22.9	1659	WS	**MOE# 6702845**
	4		4839066										CT	DO	0.0 CLAY MSND 21.9 GREY LMSN 32.9
6703257	1	Sep-68	551902	422.1	45.7	Fr			18.3	45	120	25.9	2521	WS	**MOE# 6703257**
	4		4839021										CT	DO	0.0 CLAY 24.7 GREY LMSN 45.7
6703946	1	May-71	550312	411.5	38.1	Fr			8.5	27	480	15.2	1659	WS	**MOE# 6703946**
	11		4838071										CT	DO	0.0 CLAY STNS 9.1 GREY LMSN 38.1
6704215	2	Feb-71	551262	414.5	9.1	Fr			3.7	9	60	11.0	3637	WS	**MOE# 6704215**
	12		4837821		3.0	Fr							BR	ST	0.0 BRWN TPSL 0.3 BRWN CLAY SAND GRVL 3.0
															GREY CLAY STNS SAND 11.3
6704926	1	Sep-73	551912	423.1	50.9	Fr			20.1	41	600	28.7	3316	WS	**MOE# 6704926**
	4		4838971		44.5	Fr							RC	DO	0.0 BRWN CLAY STNS 28.0 BRWN LMSN 45.7 WHTE
															LMSN 51.8
6704998	2	Feb-74	550750	410.0	38.1	Fr			10.1	45	60	13.7	2336	WS	**MOE# 6704998**
	10		4837516		30.5	Fr							CT	DO	0.0 BRWN CLAY STNS 4.6 BRWN CLAY GRVL 8.8
															BRWN ROCK 27.4 BRWN ROCK 30.5 BRWN ROCK 38.4
6705124	1	Jun-74	552520	423.7	40.2	Fr			17.7	45	60	21.3	2336	WS	**MOE# 6705124**
	3		4838454										RC	DO	0.0 TPSL 0.3 BRWN CLAY FSND 19.8 GREY CLAY
															STNS 22.3 BRWN ROCK 25.9 GREY ROCK 31.7 BRWN
															ROCK 40.2
6705273	1	Sep-74	552025	422.1	22.3	Fr			16.5	23	60	19.8	3740	WS	**MOE# 6705273**
	4		4838914										RA	DO	0.0 BRWN CLAY STNS 13.1 GREY HPAN BLDR 18.6
															BRWN LMSN LYRD 20.7 BRWN LMSN FCRD 22.3
6705444	2	Jan-75	551073	416.1	34.4	Fr			15.2	45	60	24.4	2521	WS	**MOE# 6705444**
	11		4837876										CT	DO	0.0 CLAY 9.4 GREY LMSN 34.4

LABEL	CON LOT	DATE mmm-yr	EASTING NORTHING	ELEV masl	WTR mbgl	FND Qu	SCR TOP mbgl	LEN m	SWL mbgl	RATE L/min	TIME min	PL mbgl	DRILLER METHOD	TYPE STAT	WELL NAME DESCRIPTION OF MATERIALS
6705535	2 10	May-75	550462 4837571	411.5	33.5	Fr			9.1	68	60	18.3	2336 RC	WS DO	**MOE# 6705535** 0.0 BRWN CLAY STNS 11.6 BRWN ROCK 33.5
6705562	1 5	May-75	551847 4839152	422.1	99.1 48.8 19.8	Fr Fr Fr			15.2				2336 RC	TH MU	**MOE# 6705562** 0.0 TPSL 0.6 BRWN CLAY STNS 3.7 GREY CLAY STNS 14.6 BRWN ROCK 47.2 BRWN ROCK 100.0
6705571	1 11	Nov-75	550366 4838067	411.5	21.3	Fr			14.6	18	60	16.8	3740 RA	WS DO	**MOE# 6705571** 0.0 BLCK TPSL 0.3 BRWN CLAY STNS 11.3 BRWN LMSN 21.3
6705606	1 5	Jul-75	551812 4839071	422.1	107.3 74.7 45.7 45.7 45.7	Fr Fr Fr Fr Fr			16.8		60		2336 CT	WS PU	**MOE# 6705606** 0.0 BRWN CLAY STNS 4.0 GREY CLAY STNS 15.2 ROCK FCRD 20.1 BRWN ROCK 42.7 BRWN ROCK 67.1 YLLW ROCK 74.7 BRWN ROCK 99.7 GREY ROCK 108.2 GREY ROCK 124.4
6705674	2 10	Aug-75	550362 4837621	413.0	29.3	Fr			13.7	45	60		2336 RC	WS DO	**MOE# 6705674** 0.0 BRWN CLAY STNS 5.5 GREY CLAY STNS 12.2 BRWN ROCK 28.3 CLAY ROCK FCRD 29.3
6705718	1 11	Sep-75	550332 4838021	410.0	43.3	Fr			15.2	27	60	22.9	2336 RC	WS DO	**MOE# 6705718** 0.0 BRWN CLAY SAND GRVL 6.1 BRWN CLAY STNS SAND 9.8 GREY ROCK 15.8 BRWN ROCK 43.3
6705720	1 11	Sep-75	550462 4837921	410.0	29.3 24.4	- -			14.6	36	60	18.3	2336 RC	WS DO	**MOE# 6705720** 0.0 BRWN CLAY STNS 8.8 BRWN LMSN 14.9 29.3
6705740	1 11	Oct-75	550532 4838061	411.5	38.7	Fr			16.2	36	60	21.3	2336 RC	WS DO	**MOE# 6705740** 0.0 BRWN TPSL 0.3 BRWN CLAY STNS SAND 9.1 BRWN ROCK 38.7
6705743	1 11	Oct-75	550512 4838091	411.5	38.7	Fr			16.8	36	60	22.9	2336 RC	WS DO	**MOE# 6705743** 0.0 BRWN TPSL 0.3 BRWN CLAY STNS SAND 9.1 BRWN ROCK 38.7
6705744	1 11	Oct-75	550412 4837921	410.0	29.6	Fr			13.4	36	60		2336 RC	WS DO	**MOE# 6705744** 0.0 BRWN TPSL 0.3 BRWN CLAY STNS 7.6 GREY CLAY STNS 9.1 BRWN ROCK 29.6
6705745	1 11	Oct-75	550462 4837991	410.0	29.6	Fr			13.4	36	60	22.9	2336 RC	WS DO	**MOE# 6705745** 0.0 BRWN TPSL 0.3 BRWN CLAY STNS 7.6 GREY CLAY STNS 9.1 BRWN ROCK 29.6
6705746	1 11	Oct-75	550412 4838071	411.5	38.7	Fr			16.5	36	60	22.9	2336 RC	WS DO	**MOE# 6705746** 0.0 BRWN TPSL 0.3 BRWN CLAY STNS 6.1 GREY CLAY STNS 11.6 BRWN ROCK 38.7
6705747	1 11	Oct-75	550462 4838121	411.5	38.7	Fr			16.5	36	60	22.9	2336 RC	WS DO	**MOE# 6705747** 0.0 BRWN TPSL 0.3 BRWN CLAY STNS 7.6 GREY CLAY STNS 11.6 BRWN ROCK 38.7
6705748	1 11	Oct-75	550462 4838021	410.0	38.7	-			16.5	36	60	21.3	2336 RC	WS DO	**MOE# 6705748** 0.0 BRWN TPSL 0.3 BRWN CLAY STNS 7.3 GREY CLAY STNS 11.9 BRWN ROCK 38.7

LABEL	CON	DATE	EASTING	ELEV	WTR	FND	SCR TOP	LEN	SWL	RATE	TIME	PL	DRILLER	TYPE	WELL NAME
	LOT	mmm-yr	NORTHING	masl	mbgl	Qu	mbgl	m	mbgl	L/min	min	mbgl	METHOD	STAT	DESCRIPTION OF MATERIALS
6705750	1	Oct-75	550462	410.0	38.7	Fr			16.8	36	60	22.9	2336	WS	**MOE# 6705750**
	11		4838021										RC	DO	0.0 BRWN TPSL 0.3 BRWN CLAY 7.6 GREY CLAY STNS 11.6 BRWN ROCK 38.7
6705751	1	Jun-75	550382	411.5	36.6	Fr			15.5	36	60	22.9	2336	WS	**MOE# 6705751**
	11		4838121										RC	DO	0.0 BRWN TPSL 0.3 BRWN CLAY STNS 9.1 GREY CLAY STNS 12.8 BRWN ROCK 36.6
6705752	1	Oct-75	550362	411.5	41.8	Fr			18.6	36	60	24.4	2336	WS	**MOE# 6705752**
	11		4838121										RC	DO	0.0 TPSL 0.3 BRWN CLAY STNS 9.1 GREY CLAY STNS 12.8 BRWN ROCK 43.0
6705753	1	Jul-75	550412	411.5	36.6	Fr			15.2	36	60	22.6	2336	WS	**MOE# 6705753**
	11		4838151										RC	DO	0.0 BRWN TPSL 0.3 BRWN CLAY STNS 9.1 GREY CLAY STNS 12.8 BRWN ROCK 36.6
6705754	1	Jun-75	550372	410.0	36.6	Fr			15.2	36	60	22.3	2336	WS	**MOE# 6705754**
	11		4837991										RC	DO	0.0 BRWN TPSL 0.3 BRWN CLAY STNS 6.1 GREY CLAY STNS 10.4 BRWN ROCK 36.6
6705755	1	May-75	550402	410.0	37.8	Fr			14.3	36	60	21.3	2336	WS	**MOE# 6705755**
	11		4838021										RC	DO	0.0 BRWN TPSL 0.3 BRWN CLAY STNS 6.1 GREY CLAY STNS 10.4 BRWN ROCK 37.8
6705756	1	Dec-75	550362	411.5	41.1	-			18.9	36	60	24.4	2336	WS	**MOE# 6705756**
	11		4838121										RC	DO	0.0 BRWN TPSL 0.3 BRWN CLAY STNS 9.1 GREY CLAY STNS 12.8 BRWN ROCK 41.1
6705757	1	Nov-75	550412	413.0	38.1	Fr			20.1	36	60	24.4	2336	WS	**MOE# 6705757**
	11		4838141										RC	DO	0.0 BRWN TPSL 0.3 BRWN CLAY STNS 9.1 GREY CLAY 12.8 BRWN ROCK 38.1
6705758	1	Nov-75	550362	413.0	42.7	Fr			19.8	36	60	24.1	2336	WS	**MOE# 6705758**
	11		4838101										RC	DO	0.0 TPSL 0.3 BRWN CLAY STNS 8.8 GREY CLAY STNS 12.5 BRWN ROCK 42.7
6705759	1	Nov-75	550312	411.5	37.5	-			17.1	36	60	24.4	2336	WS	**MOE# 6705759**
	11		4838081										RC	DO	0.0 BRWN TPSL 0.3 BRWN CLAY STNS 10.1 BRWN ROCK 37.5
6705762	1	Nov-75	550332	413.0	47.9	Fr			25.9	36	60	29.9	2336	WS	**MOE# 6705762**
	11		4838271										RA	DO	0.0 BRWN TPSL 0.3 BRWN CLAY STNS 9.1 GREY CLAY STNS 15.2 BRWN ROCK 47.9
6705763	1	Nov-75	550182	413.0	47.9	Fr			25.6	36	60	29.9	2336	WS	**MOE# 6705763**
	11		4838171										RA	DO	0.0 BRWN TPSL 0.3 BRWN CLAY 7.6 GREY CLAY 14.0 BRWN ROCK 47.9
6705765	1	Apr-75	550322	411.5	42.7	Fr			21.3	45	60	25.9	2336	WS	**MOE# 6705765**
	11		4838081										RC	DO	0.0 BRWN TPSL 0.3 BRWN CLAY STNS 9.1 GREY CLAY STNS GRVL 14.3 BRWN ROCK 43.3
6705766	1	Sep-75	550422	410.0	33.8	Fr			14.6	45	60	19.8	2336	WS	**MOE# 6705766**
	11		4837961										RC	DO	0.0 BRWN TPSL 0.3 BRWN CLAY STNS 7.6 GREY CLAY STNS 10.7 BRWN ROCK 33.8

LABEL	CON LOT	DATE mmm-yr	EASTING NORTHING	ELEV masl	WTR mbgl	FND Qu	SCR TOP LEN mbgl m	SWL mbgl	RATE L/min	TIME min	PL mbgl	DRILLER METHOD	TYPE STAT	WELL NAME DESCRIPTION OF MATERIALS
6705767	1 11	Sep-75	550392 4837961	410.0	38.1	Fr		14.6	45	60	19.8	2336 RC	WS ST	**MOE# 6705767** 0.0 BRWN TPSL 0.3 BRWN CLAY STNS 7.6 GREY CLAY STNS 10.7 BRWN ROCK 38.1
6705768	1 11	Jun-75	550412 4838161	413.0	43.0	Fr		18.9	45	60	24.4	2336 RC	WS DO	**MOE# 6705768** 0.0 BRWN CLAY STNS 7.6 GREY CLAY STNS 14.0 BRWN ROCK 43.0
6705770	1 11	Aug-75	550272 4838221	413.0	39.0	Fr		23.8	32	60	27.4	2336 RC	WS DO	**MOE# 6705770** 0.0 BRWN TPSL 0.3 BRWN CLAY STNS SAND 12.8 BRWN ROCK 39.0
6705772	1 11	Oct-75	550462 4837921	408.4	29.3	Fr		13.7	45	60	18.3	2336 RR	WS DO	**MOE# 6705772** 0.0 BRWN CLAY STNS 7.9 BRWN ROCK 29.3
6705774	1 11	Oct-75	550552 4837991	410.0	38.4	Fr		16.8	68	60	22.9	2336 RC	WS ST	**MOE# 6705774** 0.0 BRWN CLAY STNS 8.5 BRWN ROCK 38.4
6705775	1 11	Oct-75	550582 4838021	410.0	38.4	Fr		16.8	68	60	21.3	2336 RC	WS DO	**MOE# 6705775** 0.0 BRWN CLAY STNS 8.5 BRWN ROCK 38.4
6705815	1 11	Oct-75	550232 4838121	413.0	32.6	Fr		18.3	23	150	24.4	3740 RA	WS DO	**MOE# 6705815** 0.0 BLCK TPSL 0.3 BRWN CLAY STNS 11.3 BRWN LMSN CLAY LYRD 32.6
6705855	1 11	Dec-75	550322 4838261	413.0	45.1	Fr		24.4	36	60	32.0	2336 RC	WS DO	**MOE# 6705855** 0.0 BRWN TPSL 0.3 BRWN CLAY STNS 7.6 GREY CLAY STNS 13.4 BRWN ROCK 45.1
6705859	1 11	Dec-75	550362 4838221	413.0	44.5	Fr		22.9	36	60	30.5	2336 RA	WS DO	**MOE# 6705859** 0.0 TPSL 0.3 BRWN CLAY STNS 7.6 GREY CLAY STNS 14.0 BRWN ROCK 44.5
6705887	1 11	Jan-76	550362 4838041	410.0	48.2	Fr		15.2	36	60	21.3	2336 CT	WS DO	**MOE# 6705887** 0.0 BRWN CLAY STNS GRVL 9.1 BRWN ROCK 48.2
6705888	1 11	Jan-76	550302 4838081	411.5	45.1	Fr		21.3	36	60	27.4	2336 CT	WS DO	**MOE# 6705888** 0.0 BRWN CLAY STNS 10.1 BRWN ROCK 45.1
6705889	1 11	Jan-76	550362 4838021	410.0	38.4	Fr		22.9	36	60	30.5	2336 CT	WS DO	**MOE# 6705889** 0.0 BRWN CLAY STNS GRVL 11.0 BRWN ROCK 38.4
6705893	2 10	Dec-75	550512 4837721	408.4	23.8	Fr		10.1	27	60	11.3	3740 RA	WS DO	**MOE# 6705893** 0.0 BRWN CLAY 4.6 GREY HPAN BLDR 10.4 GREY LMSN 14.6 BRWN LMSN 23.8
6705950	1 11	Mar-76	550312 4838071	411.5	36.0	Fr		16.2	36	60	19.8	2336 CT	WS DO	**MOE# 6705950** 0.0 TPSL 0.3 BRWN CLAY STNS GRVL 9.1 BRWN ROCK 36.0
6705951	1 11	Jun-76	550362 4838231	413.0	44.8	Fr		22.9	36	60	29.0	2336 CT	WS DO	**MOE# 6705951** 0.0 BRWN CLAY STNS GRVL 12.8 BRWN ROCK 44.8
6705952	1 11	Jul-76	550312 4838071	411.5	36.0	Fr		20.4	36	60	24.4	2336 CT	WS DO	**MOE# 6705952** 0.0 BRWN CLAY STNS GRVL 9.1 BRWN ROCK 36.0
6705973	1 11	Mar-76	550372 4838181	413.0	44.2	Fr		18.3	45	60	21.3	2336 CT	WS DO	**MOE# 6705973** 0.0 BRWN CLAY SAND STNS 10.4 BRWN ROCK 25.9 BRWN CLAY ROCK 29.0 BRWN ROCK 45.1

LABEL	CON LOT	DATE mmm-yr	EASTING NORTHING	ELEV masl	WTR mbgl	FND Qu	SCR TOP LEN mbgl m	SWL mbgl	RATE L/min	TIME min	PL mbgl	DRILLER METHOD	TYPE STAT	WELL NAME DESCRIPTION OF MATERIALS
6706231	2 12	Dec-76	551362 4837721	410.0	38.1	Fr		7.3	82	120	15.2	2564 CT	WS ST	**MOE# 6706231** 0.0 GRVL CLAY 11.6 GREY LMSN 39.3
6707483	1 5	Feb-81	551812 4839271	420.6	57.9 44.2	Fr Fr		22.6	73	120	24.7	2336 RC	WS ST	**MOE# 6707483** 0.0 TPSL 0.3 BRWN CLAY STNS 6.1 GREY CLAY STNS 20.7 GREY CLAY GRVL 22.6 GREY STNS 26.8 BRWN STNS MGRD 44.2 BRWN STNS LTCL 58.8
6708671	2 11	Nov-86	550465 4837888	409.7				9.1	45	120	19.8	2564 CT	WS DO	**MOE# 6708671** 0.0 CLAY 6.1 GRVL 13.7 LMSN 31.1
6708681	3 14	Jul-86	552537 4838269	425.8	53.6	Fr		21.9	23	210	23.2	1669 CT	WS DO	**MOE# 6708681** 0.0 BLCK TPSL 0.6 BRWN CLAY 3.0 BRWN SAND 12.2 BRWN GRVL 18.3 GREY HPAN 25.6 BRWN LMSN 53.6
6708948	1 10	Jul-87	550293 4838029	410.0	36.6	Fr		20.7	27	120	70.1	2644 RA	WS DO	**MOE# 6708948** 0.0 TPSL CLAY 6.7 CLAY STNS 12.2 LMSN 78.6
6708999	1 10	Nov-87	550251 4838029	410.0	62.5	Fr		18.3	23	60	23.8	3740 RC	WS DO	**MOE# 6708999** 0.0 BRWN CLAY 5.5 GREY HPAN STNS 12.2 GREY LMSN 62.5
6709659	1 2	Jul-88	552783 4838145	431.9	19.5	Fr		7.3	50	120	13.1	3518 RA	WS DO	**MOE# 6709659** 0.0 BRWN TPSL 0.6 BRWN CLAY SAND SOFT 4.9 BRWN SAND STNS CLAY 18.3 BRWN GRVL 19.5
6710692	1 14	Jul-91	550410 4838270	414.8	61.9 50.6	Fr Fr		30.2	91	60		2663 RA	WS DO	**MOE# 6710692** 0.0 BRWN TPSL FILL 0.3 BRWN CLAY FGVL 10.7 GREY CLAY FGVL 18.3 BRWN ROCK 61.9
6711184	1 11	May-93	550586 4837883	408.7	34.1	Fr		13.7	45	1440	15.2	3317 RC	WS DO	**MOE# 6711184** 0.0 BRWN CLAY STNS SAND 9.4 BRWN LMSN CLAY 18.3 BRWN LMSN 39.6
6712275	2 4	Jun-97	550476 4837661	410.6	35.4	Fr		13.7	114	60	19.8	2336 RA	WS DO	**MOE# 6712275** 0.0 BRWN CLAY STNS 4.6 GREY CLAY STNS 11.3 BRWN ROCK 24.4 BRWN ROCK 35.4
6712498	2 11	Mar-98	550958 4837453	406.3	128.0 112.8 94.5 94.5 94.5 94.5 94.5 94.5 94.5	Fr Fr Fr Fr Fr Fr Fr Fr Fr		4.9				2336 RA	WS MU	**MOE# 6712498** 0.0 BRWN PRDG FILL 0.3 BLCK TPSL 0.6 BRWN CLAY SAND 1.5 BRWN CLAY STNS 2.7 GREY CLAY GRVL 7.3 GREY GRVL CLAY 8.5 GREY CLAY SAND GRVL 9.8 GREY LMSN FCRD CLAY 14.9 BRWN LMSN FCRD CLAY 43.9 GREY LMSN FCRD CLAY 71.6 GREY LMSN DKCL 78.6 GREY LMSN LTCL 112.5 GREY SNDS LTCL 114.0 GREY LMSN LTCL 118.0 GREY LMSN SNDS 128.0
6713976	2 12	Nov-01	551874 4837835	416.7	51.8	-		14.3	32	60	33.5	6865 RC	WS DO	**MOE# 6713976** 0.0 BRWN CLAY 1.2 BRWN CLAY GRVL 4.6 GREY CLAY STNS 18.3 GREY LMSN 19.5 BRWN LMSN 37.2 LMSN 51.8
6714798	2 10	Oct-03	551029 4836864	409.7				NR				6865 -	AQ NU	**MOE# 6714798** 0.0

LABEL	CON LOT	DATE mmm-yr	EASTING NORTHING	ELEV masl	WTR FND mbgl	Qu	SCR TOP mbgl	LEN m	SWL mbgl	RATE L/min	TIME min	PL mbgl	DRILLER METHOD	TYPE STAT	WELL NAME DESCRIPTION OF MATERIALS
6715145	1 14	Jul-04	551433 4839214	417.0					NR				7238 -	AB -	**MOE# 6715145 TAG#A008933** 0.0
6715271		Jan-05	550441 4838389	416.1	0.6	Un	1.5	-1.5	NR				6607 -	OW -	**MOE# 6715271 TAG#A019245** 0.0 BRWN SAND 0.9 BRWN TILL 3.0
6715330		May-05	550773 4838644	416.7	1.5	Un	2.4	-2.1	NR				6607 -	OW -	**MOE# 6715330 TAG#A016916** 0.0 BRWN SILT TPSL 0.9 BRWN SILT SAND CLAY 4.6
6715679	2 12	Nov-05	551338 4837899	413.6			3.0	-3.0	NR				7230 -	TH NU	**MOE# 6715679 TAG#A035788** 0.0 BRWN TPSL 0.6 BRWN SAND GRVL 6.1
6715788	2 11	Apr-06	551016 4837414	409.0					NR				4011 -	AB -	**MOE# 6715788** 0.0
7042039		Sep-06	550745 4838745	416.1					NR				1737 -	- -	**MOE# 7042039** 0.0
7042040		Sep-06	550853 4838740	416.1					NR				1737 -	- -	**MOE# 7042040** 0.0
7047187	1 11	Jun-07	550256 4838201	414.8	39.0	Fr			25.0	36	60	25.9	6865 RA	WS DO	**MOE# 7047187 TAG#A034710** 0.0 BRWN CLAY STNS 10.1 BRWN GRVL SAND CLAY 16.2 GREY LMSN 21.3 GREY LMSN LYRD 39.6
7047856	2 12	Jul-07	551682 4837658	414.5					NR				2663 -	AB -	**MOE# 7047856** 0.0
7047857	3 12	Jul-07	551916 4837424	416.1					NR				2663 -	AB -	**MOE# 7047857** 0.0
7129536	2 14	Jul-09	552007 4838456	419.1					NR				7221 -	AS -	**MOE# 7129536** 0.0
7184231	1 14	Jun-12	551141 4839083	420.0					NR				7146 -	AS -	**MOE# 7184231** 0.0
7184232	1 13	Jun-12	551133 4839068	420.0	54.9	Fr			23.2	55	120	24.4	7146 CT	WS -	**MOE# 7184232 TAG#A124137** 0.0 BRWN TPSL 0.6 BRWN CLAY STNS 6.1 GREY CLAY 12.2 GREY CLAY GRVL 22.9 BRWN LMSN 29.0 BRWN SHLE LMSN 54.9 BRWN LMSN HARD 57.9
7189238		Mar-12	550736 4838474	415.1			1.2	-3.0	NR				7238 -	OW TH	**MOE# 7189238 TAG#A102173** 0.0 BRWN FILL GRVL SOFT 1.5 BRWN SILT CLAY SOFT 3.0 BRWN TILL GRVL HARD 4.3
7189239		Mar-12	550750 4838485	415.4			1.2	-3.0	NR				7238 -	OW TH	**MOE# 7189239 TAG#A102170** 0.0 BRWN FILL GRVL SOFT 1.5 BRWN SILT CLAY SOFT 3.0 BRWN TILL GRVL HARD 4.3
7189240		Mar-12	550764 4838481	415.1			1.2	-3.0	NR				7238 -	OW TH	**MOE# 7189240 TAG#A102176** 0.0 BRWN FILL GRVL SOFT 1.5 BRWN SILT CLAY SOFT 3.0 BRWN TILL GRVL HARD 4.3
7194694		Feb-12	550712 4838478	415.4					NR				7215 -	- -	**MOE# 7194694 TAG#A126388** 0.0
7203122		May-13	550584 4838482	415.7					NR				7385 -	AB NU	**MOE# 7203122** 0.0

LABEL	CON	DATE	EASTING	ELEV	WTR	FND	SCR TOP	LEN	SWL	RATE	TIME	PL	DRILLER	TYPE	WELL NAME
	LOT	mmm-yr	NORTHING	masl	mbgl	Qu	mbgl	m	mbgl	L/min	min	mbgl	METHOD	STAT	DESCRIPTION OF MATERIALS

	QUALITY:		TYPE:		USE:				METHOD :
Fr	Fresh	WS	Water Supply	CO	Comercial	NU	Not Used	CT	Cable Tool
Mn	Mineral	AQ	Abandoned Quality	DO	Domestic	IR	Irrigation	JT	Jetting
Sa	Salty	AS	Abandoned Supply	MU	Municipal	AL	Alteration	RC	Rotary Conventional
Su	Sulphur	AB	Abandonment Record	PU	Public	MO	Monitoring	RA	Rotary Air
--	Unrecorded	TH	Test Hole or Observation	ST	Stock	-	Not Recorded	BR	Boring

Easting and Northings UTM NAD 83 Zone 17, Translated from Recorded UTM NAD, subject to Field Verified Location or Improved Location Accuracy.

Records Copyright Ministry of Environment Queen's Printer. Selected information tabulated to metric with changes and corrections subject to Driller's Records.

APPENDIX D

Record of Borehole Sheets & Grain Size Distribution Curves

PROJECT: 20141301 (1000)
LOCATION: N 4837829.60; E 550594.30

RECORD OF BOREHOLE: 20-1

BORING DATE: December 14, 15 and 18, 2020

SHEET 1 OF 2
DATUM: Geodetic

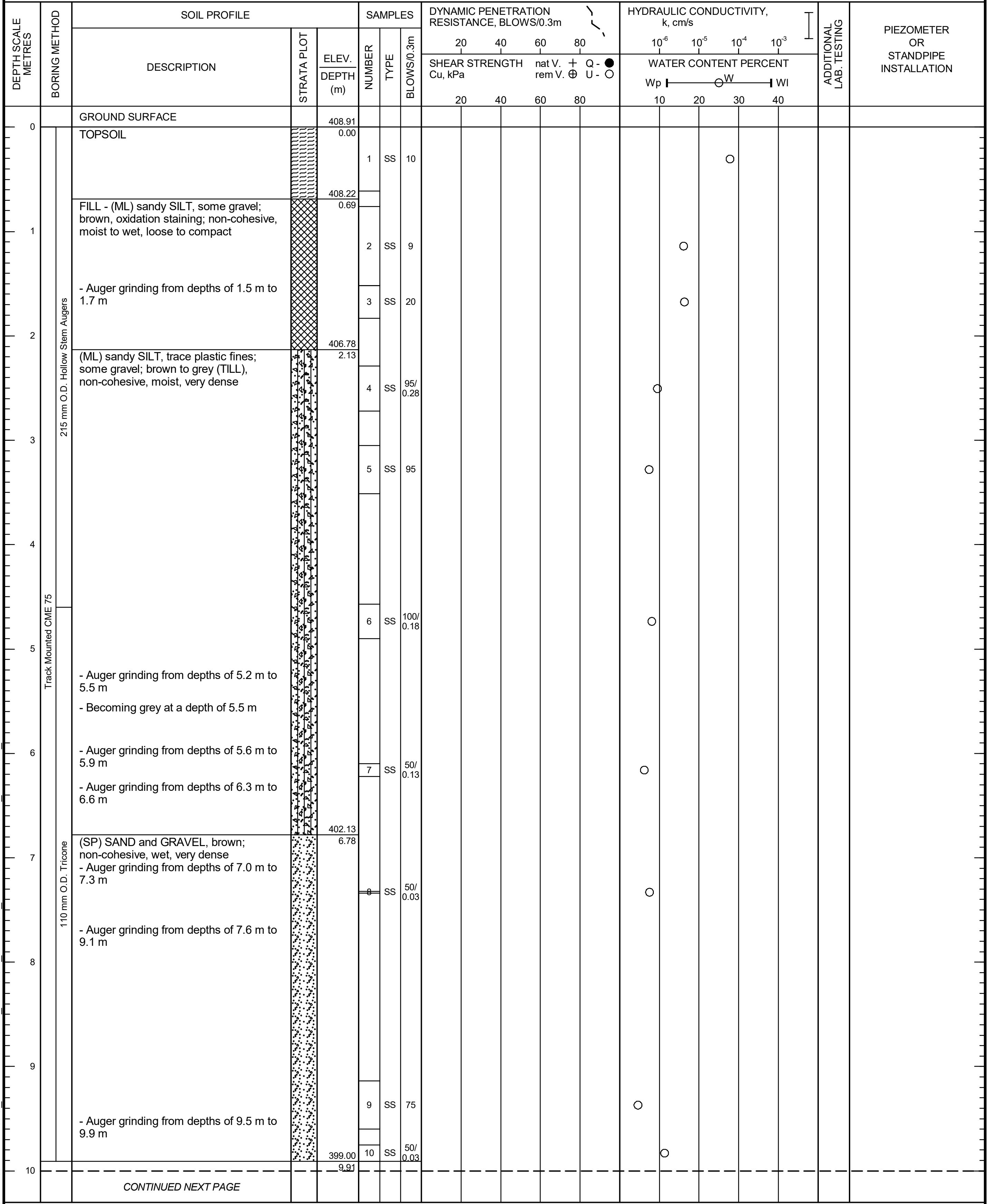
SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

BORING METHOD: Track Mounted CME 75; 215 mm O.D. Hollow Stem Augers (0 to 4.6 m); 110 mm O.D. Tricone (4.6 m to 9.91 m)

DESCRIPTION	ELEV. DEPTH (m)
GROUND SURFACE	408.91
TOPSOIL	0.00
FILL - (ML) sandy SILT, some gravel; brown, oxidation staining; non-cohesive, moist to wet, loose to compact - Auger grinding from depths of 1.5 m to 1.7 m	408.22 0.69
(ML) sandy SILT, trace plastic fines; some gravel; brown to grey (TILL), non-cohesive, moist, very dense - Auger grinding from depths of 5.2 m to 5.5 m - Becoming grey at a depth of 5.5 m - Auger grinding from depths of 5.6 m to 5.9 m - Auger grinding from depths of 6.3 m to 6.6 m	406.78 2.13
(SP) SAND and GRAVEL, brown; non-cohesive, wet, very dense - Auger grinding from depths of 7.0 m to 7.3 m - Auger grinding from depths of 7.6 m to 9.1 m - Auger grinding from depths of 9.5 m to 9.9 m	402.13 6.78
	399.00 9.91
CONTINUED NEXT PAGE	

NUMBER	TYPE	BLOWS/0.3m
1	SS	10
2	SS	9
3	SS	20
4	SS	95/ 0.28
5	SS	95
6	SS	100/ 0.18
7	SS	50/ 0.13
8	SS	50/ 0.03
9	SS	75
10	SS	50/ 0.03



DEPTH SCALE
1 : 50

GOLDER
MEMBER OF WSP

LOGGED: AGB
CHECKED: MJB

PROJECT: 20141301 (1000)

RECORD OF BOREHOLE: 20-1

SHEET 2 OF 2

LOCATION: N 4837829.60; E 550594.30

BORING DATE: December 14, 15 and 18, 2020

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m 20 40 60 80	HYDRAULIC CONDUCTIVITY, k, cm/s 10^{-6} 10^{-5} 10^{-4} 10^{-3}	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa nat V. + Q - ● rem V. ⊕ U - ○ 20 40 60 80	WATER CONTENT PERCENT Wp ⊢ ○W ⊣ Wl 10 20 30 40		
		--- CONTINUED FROM PREVIOUS PAGE ---									
10		END OF BOREHOLE NOTE: 1. Rock fragments recovered from casing upon completion of drilling.									
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: AGB

CHECKED: MJB

PROJECT: 20141301 (1000)

LOCATION: N 4837914.60; E 551074.40

RECORD OF BOREHOLE: 20-2

BORING DATE: December 17, 2020

SHEET 1 OF 2

DATUM: Geodetic

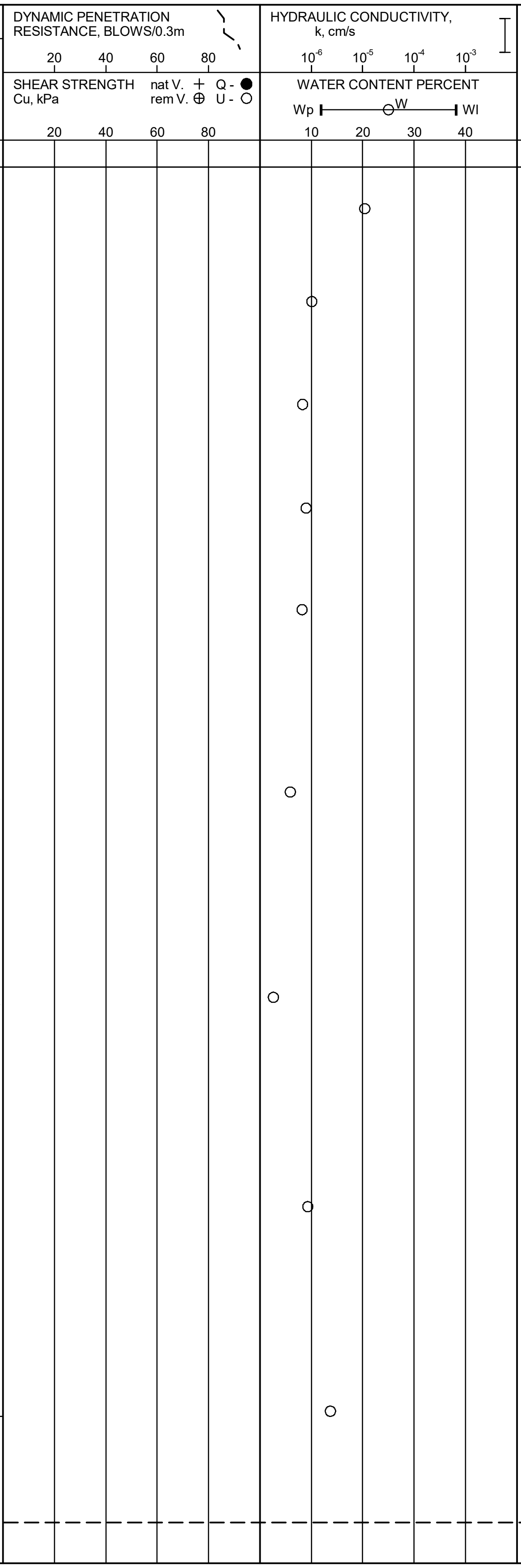
SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

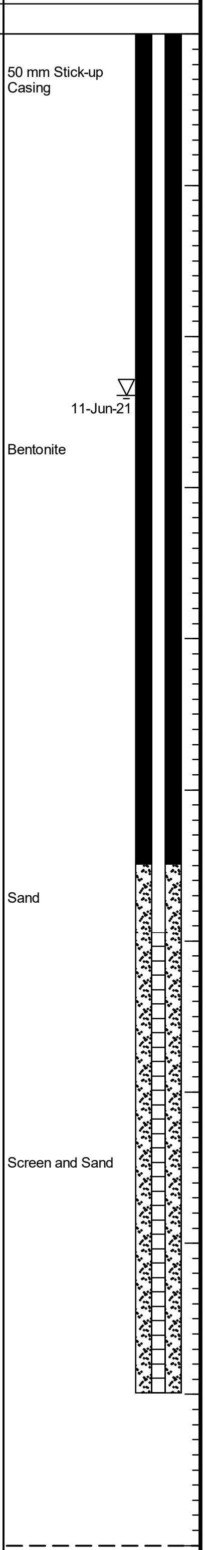
HAMMER TYPE: AUTOMATIC

BORING METHOD: Track Mounted CME 75; 150 mm Solid Stem Augers

DESCRIPTION	ELEV. / DEPTH (m)
GROUND SURFACE	418.26
TOPSOIL	418.26 0.00
(SM) gravelly SILTY SAND, brown (TILL); non-cohesive, moist, dense to very dense - Auger grinding at depth of 1.7 m - Auger grinding from depths of 4.0 m to 5.3 m - Auger grinding from depths of 4.9 m to 5.3 m - Auger grinding from depths of 6.1 m to 6.7 m - Auger grinding from depths of 7.2 m to 7.6 m	417.75 0.51
(CL) SILTY CLAY, trace sand, grey; cohesive, w<PL, hard	409.88 8.38
END OF BOREHOLE	409.04 9.22

NUMBER	TYPE	BLOWS/0.3m	ADDITIONAL LAB. TESTING
1	SS	5	
2	SS	40	
3	SS	39	
4	SS	94	
5	SS	95/ 0.28	
6	SS	50/ 0.08	
7	SS	50/ 0.05	
8	SS	50/ 0.1	MH
9	SS	50/ 0.08	





NOTE:

1. Ground water level measured in monitoring well as follows:

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DEPTH SCALE

1 : 50

GOLDER MEMBER OF WSP

LOGGED: AGB

CHECKED: MJB

PROJECT: 20141301 (1000)

LOCATION: N 4837914.60; E 551074.40

RECORD OF BOREHOLE: 20-2

SHEET 2 OF 2

BORING DATE: December 17, 2020

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m 20 40 60 80 SHEAR STRENGTH Cu, kPa nat V. + Q - ● rem V. ⊕ U - ○ 20 40 60 80	HYDRAULIC CONDUCTIVITY, k, cm/s 10^{-6} 10^{-5} 10^{-4} 10^{-3} WATER CONTENT PERCENT Wp ⊢ ○W ⊣ Wl 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m				
		--- CONTINUED FROM PREVIOUS PAGE ---									

Date	Depth(m)	Elev. (m)
19-Jan-21	2.52	415.74
29-Jan-21	2.48	415.79
12-Mar-21	1.30	416.97
11-Jun-21	2.39	415.87

10

11

12

13

14

15

16

17

18

19

20

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: AGB

CHECKED: MJB

PROJECT: 20141301 (1000)

LOCATION: N 4838399.70; E 551274.30

RECORD OF BOREHOLE: 20-3

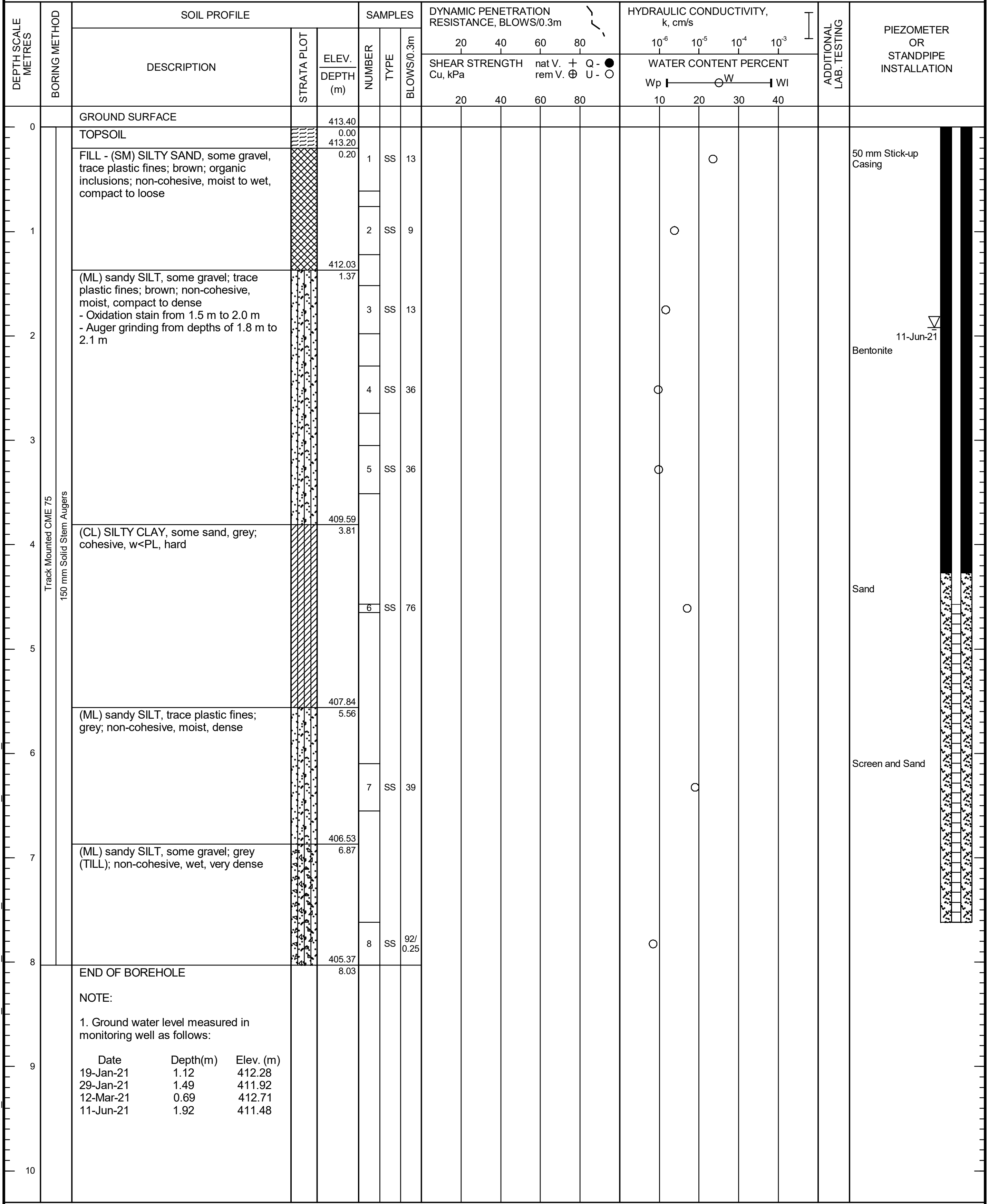
BORING DATE: January 6, 2021

SHEET 1 OF 1

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC



DESCRIPTION	ELEV. DEPTH (m)
GROUND SURFACE	413.40
TOPSOIL	0.00
FILL - (SM) SILTY SAND, some gravel, trace plastic fines; brown; organic inclusions; non-cohesive, moist to wet, compact to loose	413.20 0.20
(ML) sandy SILT, some gravel; trace plastic fines; brown; non-cohesive, moist, compact to dense - Oxidation stain from 1.5 m to 2.0 m - Auger grinding from depths of 1.8 m to 2.1 m	412.03 1.37
(CL) SILTY CLAY, some sand, grey; cohesive, w<PL, hard	409.59 3.81
(ML) sandy SILT, trace plastic fines; grey; non-cohesive, moist, dense	407.84 5.56
(ML) sandy SILT, some gravel; grey (TILL); non-cohesive, wet, very dense	406.53 6.87
END OF BOREHOLE	405.37 8.03

NUMBER	TYPE	BLOWS/0.3m
1	SS	13
2	SS	9
3	SS	13
4	SS	36
5	SS	36
6	SS	76
7	SS	39
8	SS	92/ 0.25

NOTE:

1. Ground water level measured in monitoring well as follows:

Date	Depth(m)	Elev. (m)
19-Jan-21	1.12	412.28
29-Jan-21	1.49	411.92
12-Mar-21	0.69	412.71
11-Jun-21	1.92	411.48

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: AGB

CHECKED: MJB

PROJECT: 20141301 (1000)
LOCATION: N 4838662.50; E 551803.90

RECORD OF BOREHOLE: 20-4

BORING DATE: January 6, 2021

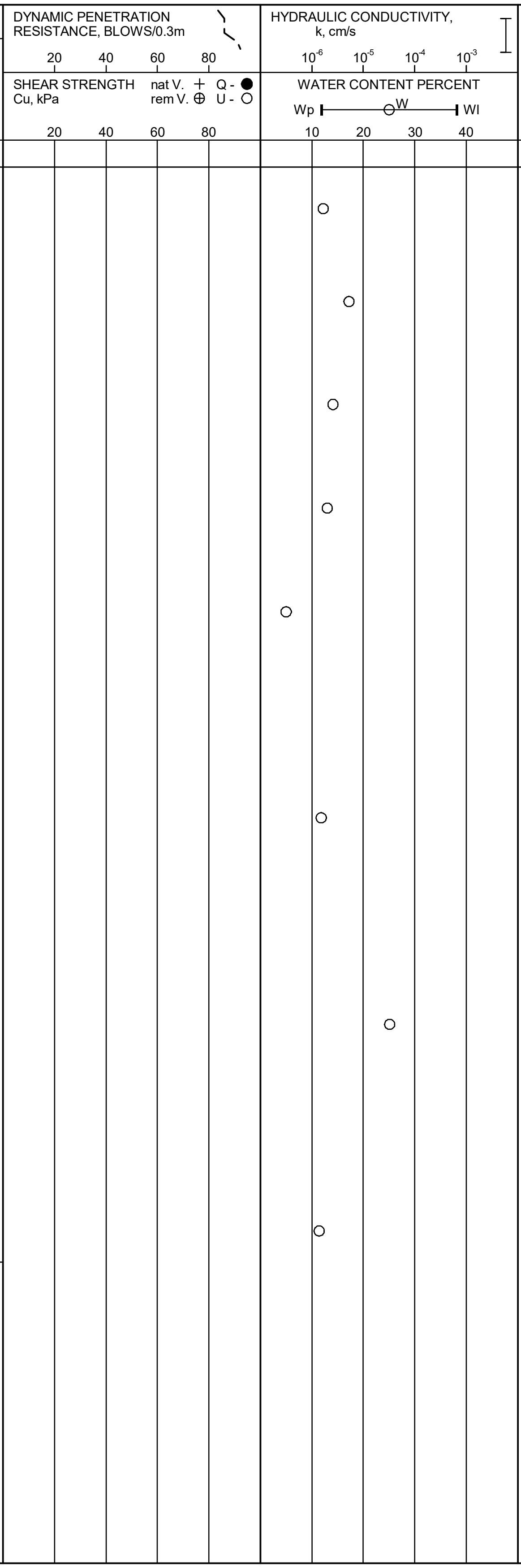
SHEET 1 OF 1
DATUM: Geodetic

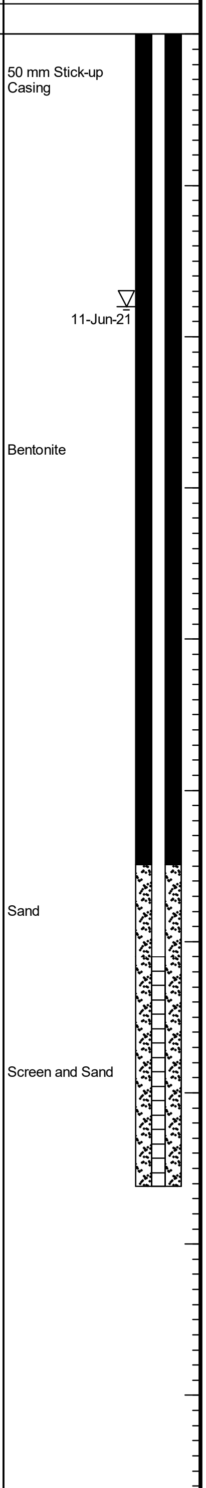
SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

BORING METHOD: Track Mounted CME 75 / 215 mm O.D. Hollow Stem Augers

SOIL PROFILE DESCRIPTION	ELEV. DEPTH (m)	SAMPLES NUMBER	TYPE	BLOWS/0.3m	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
GROUND SURFACE	419.93					
TOPSOIL	0.00					
(ML) sandy SILT, some gravel; trace plastic fines; brown; non-cohesive, moist, compact	419.63 0.30	1	SS	12		50 mm Stick-up Casing
		2	SS	10		
		3	SS	25		11-Jun-21
		4	SS	15		Bentonite
(SM) gravelly SILTY SAND, brown; non-cohesive, wet, compact to dense	417.03 2.90	5	SS	27		
- Auger grinding from depths of 4.6 m to 5.2 m		6	SS	32	MH	
						Sand
		7	SS	32		Screen and Sand
(SP) SAND and GRAVEL, brown; non-cohesive, moist, loose	412.84 7.09	8	SS	6		
END OF BOREHOLE	411.85 8.08					





NOTE:

1. Ground water level measured in monitoring well as follows:

Date	Depth(m)	Elev. (m)
19-Jan-21	1.17	418.76
29-Jan-21	1.51	418.42
12-Mar-21	0.68	419.25
11-Jun-21	1.80	418.13

DEPTH SCALE
1 : 50

GOLDER
MEMBER OF WSP

LOGGED: AGB
CHECKED: MJB

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PROJECT: 20141301 (1000)

LOCATION: N 4837552.60; E 551107.40

RECORD OF BOREHOLE: 20-5

BORING DATE: December 16, 2020

SHEET 1 OF 1

DATUM: Geodetic

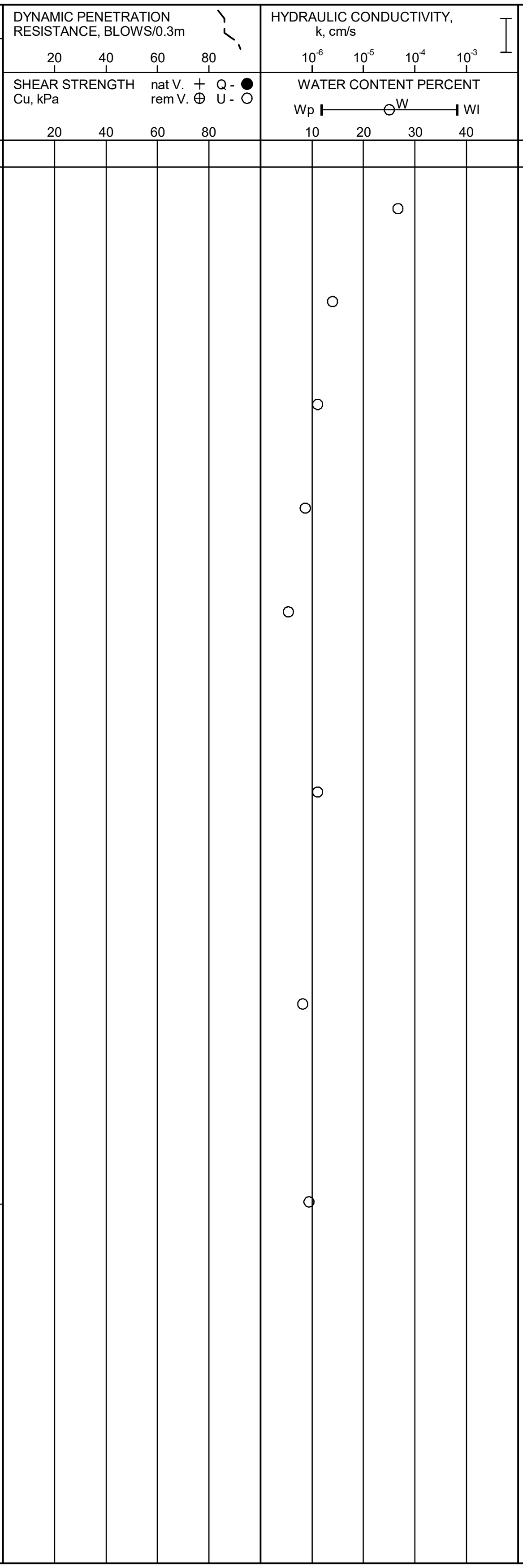
SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

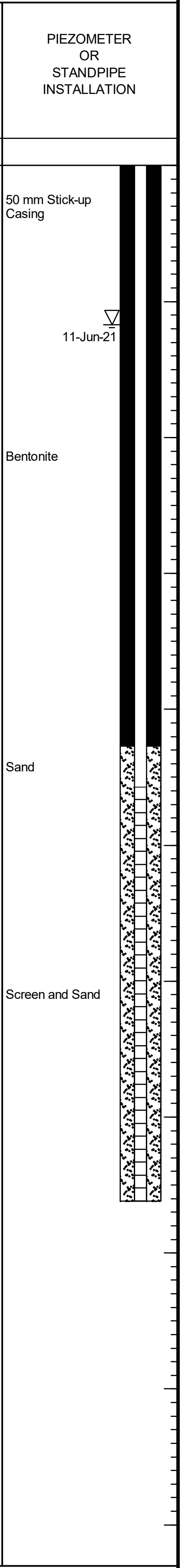
HAMMER TYPE: AUTOMATIC

BORING METHOD: Track Mounted CME 75; 100 mm O.D. Tricone

DEPTH SCALE METRES: 0 to 10

SOIL PROFILE DESCRIPTION	ELEV. DEPTH (m)	SAMPLES NUMBER	TYPE	BLOWS/0.3m	ADDITIONAL LAB. TESTING
GROUND SURFACE	407.29				
TOPSOIL	0.00	1	SS	5	
FILL - (SM) SILTY SAND, grey; non-cohesive, moist, loose	406.83 0.46				
FILL - (CL) sandy SILTY CLAY, some gravel; brown; rootlets; cohesive, w~PL, stiff	406.60 0.69	2	SS	10	
(SM) gravelly SILTY SAND, grey (TILL); non-cohesive, moist, very dense	405.92 1.37	3	SS	10	
		4	SS	72	
- Auger grinding from depths of 3.1 m to 3.8 m		5	SS	50/ 0.08	
		6	SS	50/ 0.08	MH
		7	SS	50/ 0.15	
		8	SS	50/ 0.03	
END OF BOREHOLE	399.64 7.65				





NOTE:

1. Ground water level measured in monitoring well as follows:

Date	Depth(m)	Elev. (m)
19-Jan-21	0.65	406.65
29-Jan-21	0.75	406.55
12-Mar-21	0.60	406.69
11-Jun-21	1.17	406.12

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: AGB

CHECKED: MJB

PROJECT: 20141301 (1000)
LOCATION: N 4837920.60; E 551468.90

RECORD OF BOREHOLE: 20-6

BORING DATE: January 8, 2021

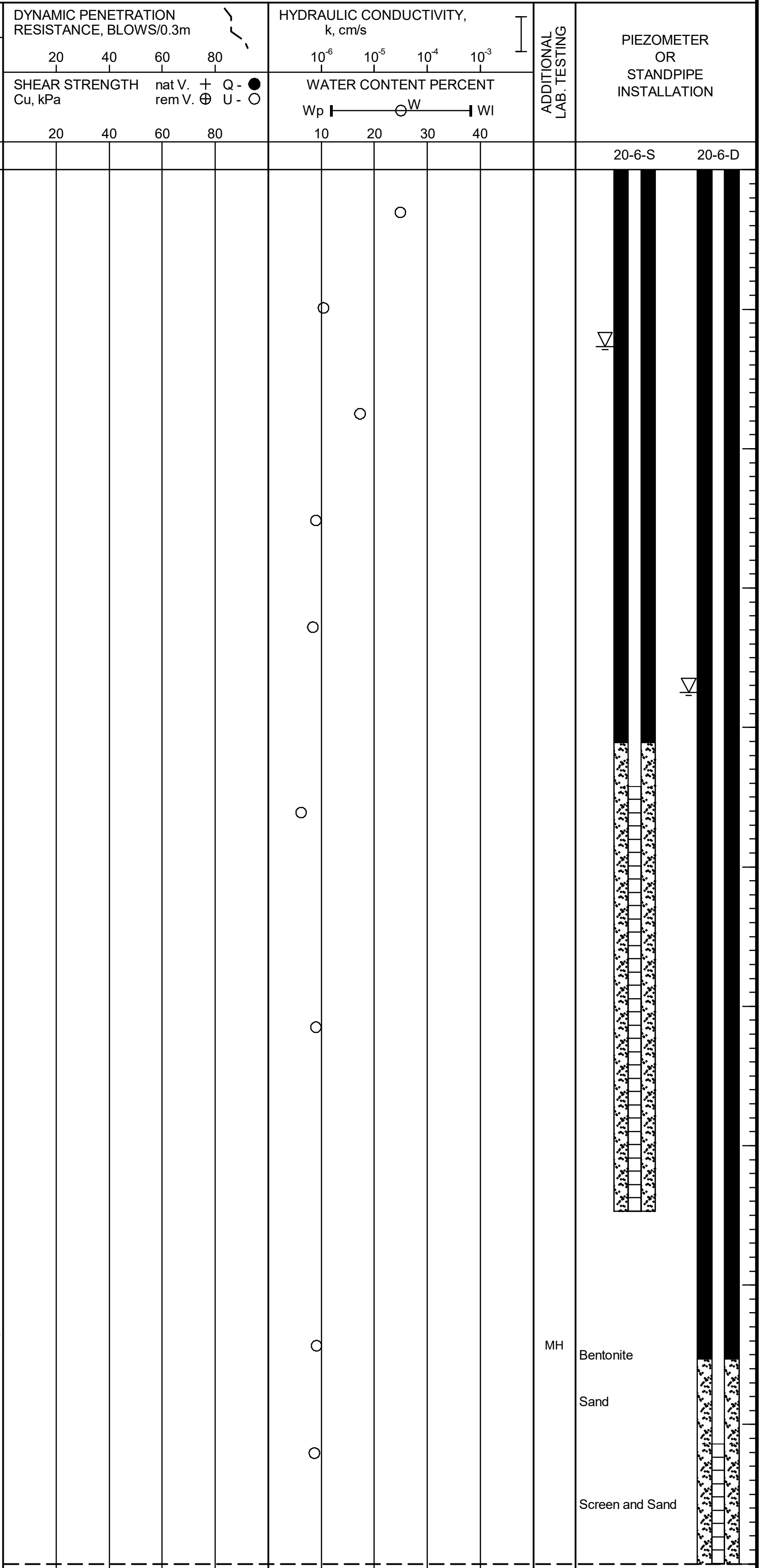
SHEET 1 OF 2
DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

BORING METHOD: Track Mounted CME 75 — 125 mm O.D. Tricone

DEPTH SCALE METRES	SOIL PROFILE DESCRIPTION	ELEV. DEPTH (m)	SAMPLES NUMBER	TYPE	BLOWS/0.3m	ADDITIONAL LAB. TESTING
	GROUND SURFACE	410.46				
0	TOPSOIL	0.00	1	SS	8	
	FILL - (ML) sandy SILT, some gravel; brown, oxidation staining; organic inclusions, non-cohesive, moist, loose	410.00 0.46				
1	(SM) SILTY SAND, some gravel; brown; non-cohesive, moist, compact	409.77 0.69	2	SS	23	
	(SP) SAND, non-cohesive, wet, compact	409.09 1.37	3	SS	21	
2	(ML) SILT and SAND, some gravel; grey (TILL); non-cohesive, moist, very dense	408.33 2.13	4	SS	70	
3			5	SS	95	
4			6	SS	50/ 0.08	
6			7	SS	50/ 0.1	
7	- Auger grinding from depths of 7.6 m to 8.2 m		8	SS	50/ 0.03	
8			9	SS	100/ 0.25	MH
9	- Auger grinding from depths of 9.0 m to 9.1 m		10	SS	50/ 0.13	
	- Auger grinding from depths of 9.5 m to 9.8 m					
10	*CONTINUED NEXT PAGE*					



DEPTH SCALE
1 : 50

GOLDER
MEMBER OF WSP

LOGGED: AGB
CHECKED: MJB

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PROJECT: 20141301 (1000)
LOCATION: N 4837920.60; E 551468.90

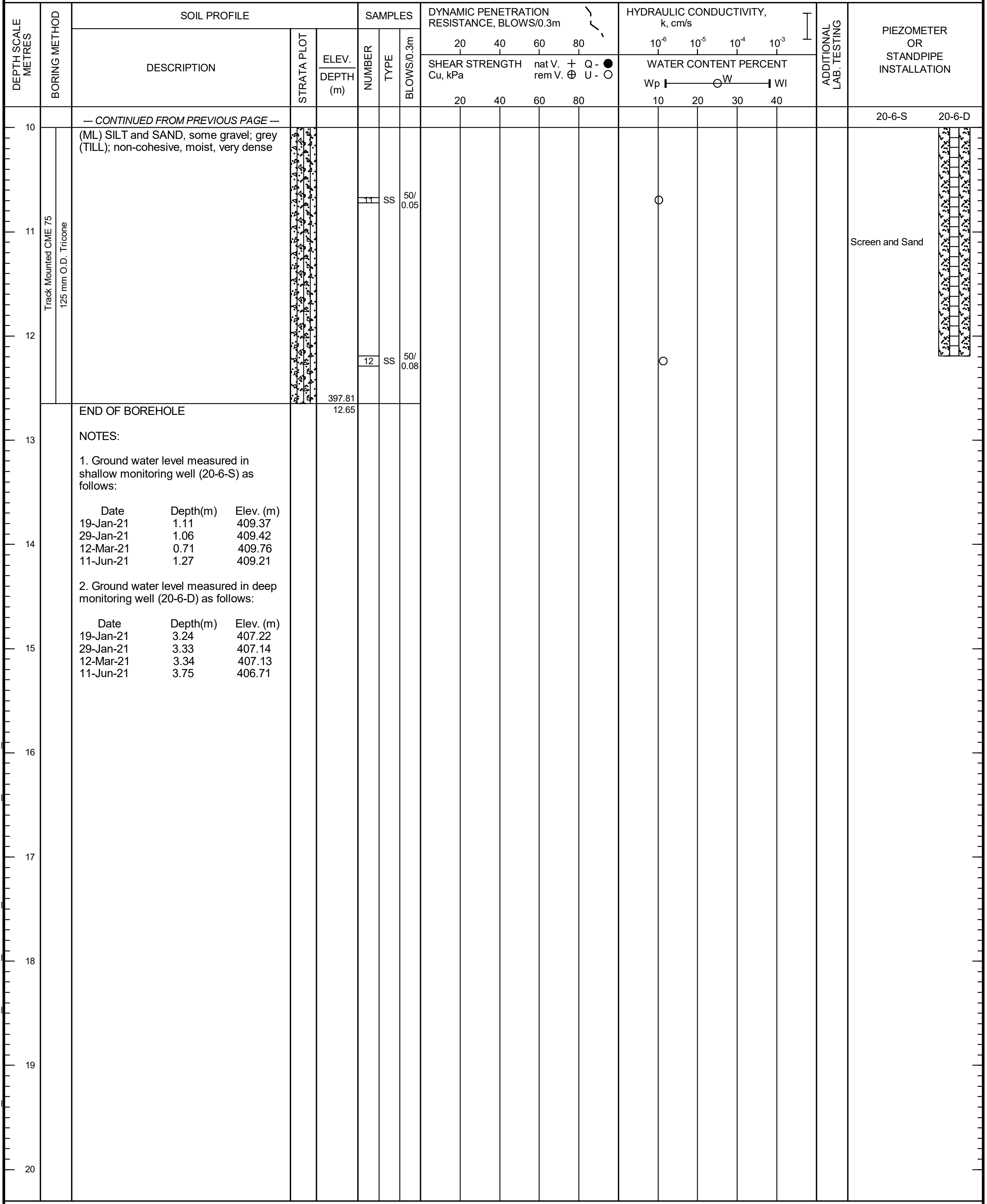
RECORD OF BOREHOLE: 20-6

BORING DATE: January 8, 2021

SHEET 2 OF 2
DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC



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DESCRIPTION	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m
(ML) SILT and SAND, some gravel; grey (TILL); non-cohesive, moist, very dense		11	SS	50/ 0.05
		12	SS	50/ 0.08
	397.81 12.65			
END OF BOREHOLE				

NOTES:

1. Ground water level measured in shallow monitoring well (20-6-S) as follows:

Date	Depth(m)	Elev. (m)
19-Jan-21	1.11	409.37
29-Jan-21	1.06	409.42
12-Mar-21	0.71	409.76
11-Jun-21	1.27	409.21

2. Ground water level measured in deep monitoring well (20-6-D) as follows:

Date	Depth(m)	Elev. (m)
19-Jan-21	3.24	407.22
29-Jan-21	3.33	407.14
12-Mar-21	3.34	407.13
11-Jun-21	3.75	406.71

DEPTH SCALE
1 : 50

GOLDER
MEMBER OF WSP

LOGGED: AGB
CHECKED: MJB

PROJECT: 20141301 (1000)

LOCATION: N 4838420.40; E 551815.90

RECORD OF BOREHOLE: 20-7

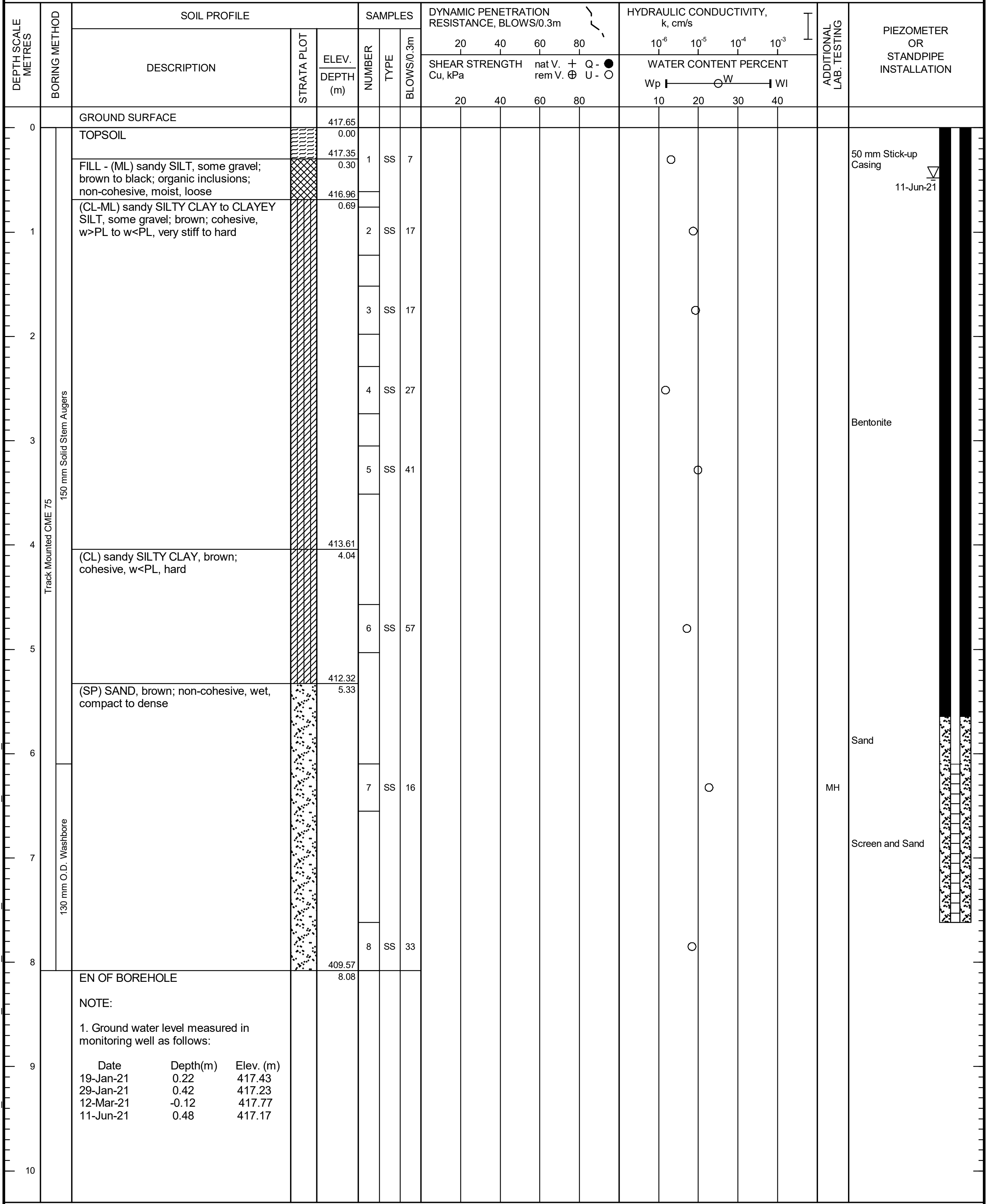
BORING DATE: January 8, 2021

SHEET 1 OF 1

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC



DESCRIPTION	ELEV. DEPTH (m)
GROUND SURFACE	417.65
TOPSOIL	0.00
FILL - (ML) sandy SILT, some gravel; brown to black; organic inclusions; non-cohesive, moist, loose	417.35 0.30
(CL-ML) sandy SILTY CLAY to CLAYEY SILT, some gravel; brown; cohesive, w>PL to w<PL, very stiff to hard	416.96 0.69
(CL) sandy SILTY CLAY, brown; cohesive, w<PL, hard	413.61 4.04
(SP) SAND, brown; non-cohesive, wet, compact to dense	412.32 5.33
EN OF BOREHOLE	409.57 8.08

NUMBER	TYPE	BLOWS/0.3m	ADDITIONAL LAB. TESTING
1	SS	7	
2	SS	17	
3	SS	17	
4	SS	27	
5	SS	41	
6	SS	57	
7	SS	16	MH
8	SS	33	

NOTE:

1. Ground water level measured in monitoring well as follows:

Date	Depth(m)	Elev. (m)
19-Jan-21	0.22	417.43
29-Jan-21	0.42	417.23
12-Mar-21	-0.12	417.77
11-Jun-21	0.48	417.17

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: AGB

CHECKED: MJB

PROJECT: 20141301 (1000)

LOCATION: N 4837269.10; E 551432.50

RECORD OF BOREHOLE: 20-8

SHEET 1 OF 2

DATUM: Geodetic

BORING DATE: December 21, 2020

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

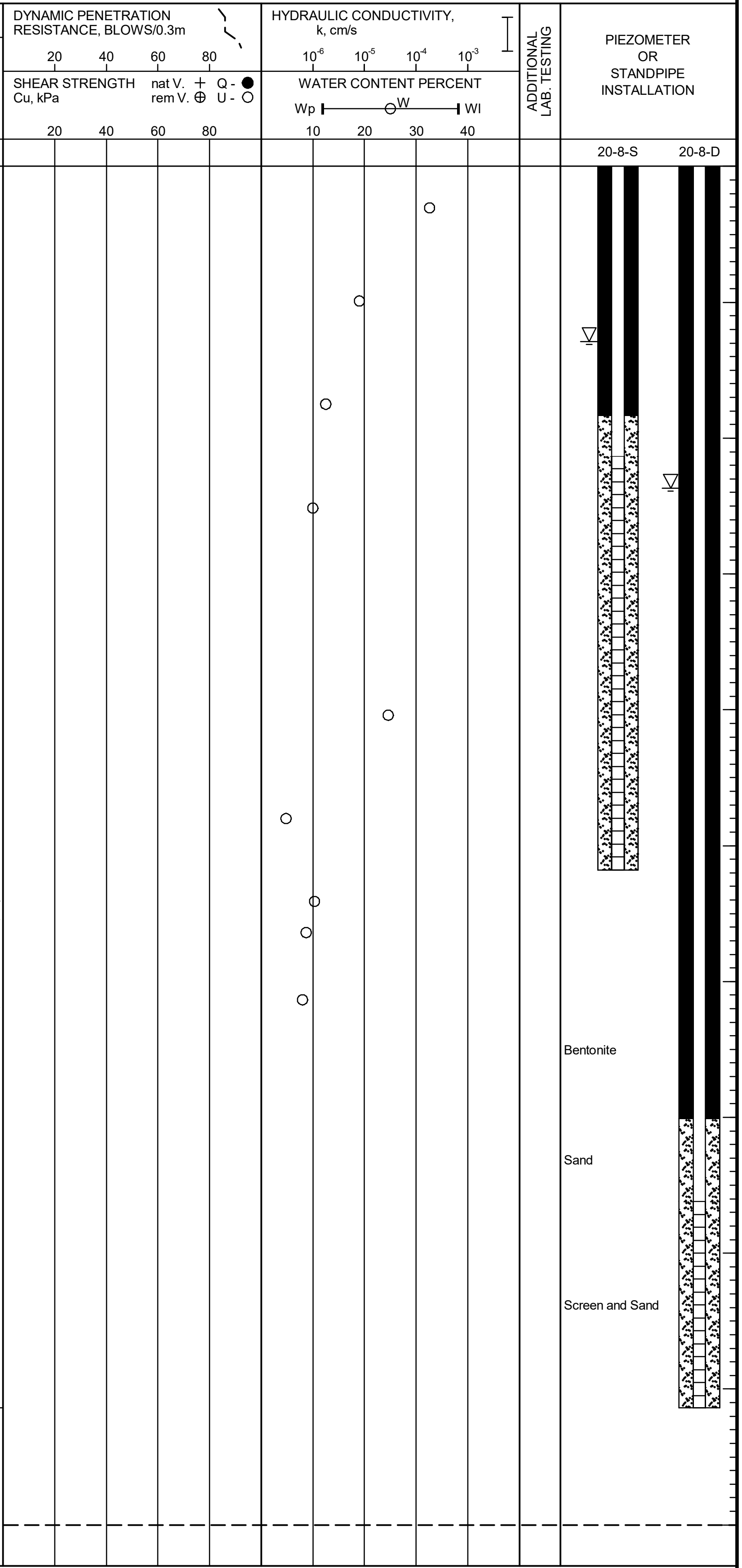
BORING METHOD: Track Mounted CME 75 / 100 mm O.D. Tricone

SOIL PROFILE – DESCRIPTION	ELEV. / DEPTH (m)
GROUND SURFACE	407.38
TOPSOIL	0.00
(ML) sandy SILT, some gravel; brown, oxidation staining; non-cohesive, moist, compact	406.69 0.69
(SM) SILTY SAND, brown; non-cohesive, wet, loose to compact	404.10 3.28
(GP) GRAVEL and SAND, grey; non-cohesive, wet, dense to very dense - Auger grinding from depths of 5.0 m to 5.2 m	402.96 4.42
(CL-ML) sandy SILTY CLAY to CLAYEY SILT, some gravel; grey (TILL); cohesive, w<PL, hard - Auger grinding from depths of 6.1 m to 6.4 m - Auger grinding from depths of 6.6 m to 7.0 m	401.46 5.92
END OF BOREHOLE	398.24 9.14

NOTES:

1. SPT attempted at 9.1 m termninated due to split spoon refusal.

SAMPLES NUMBER	TYPE	BLOWS/0.3m
1	SS	6
2	SS	10
3	SS	19
4	SS	16
5	SS	9
6	SS	22
7	SS	41
8A 8B	SS	100/ 0.25
9	SS	50/ 0.08
10	SS	50/ 0.1



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DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

LOGGED: AGB

CHECKED: MJB

PROJECT: 20141301 (1000)

RECORD OF BOREHOLE: 20-8

SHEET 2 OF 2

LOCATION: N 4837269.10; E 551432.50

BORING DATE: December 21, 2020

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m 20 40 60 80 / SHEAR STRENGTH Cu, kPa nat V. + Q - ● rem V. ⊕ U - ○ 20 40 60 80	HYDRAULIC CONDUCTIVITY, k, cm/s 10^{-6} 10^{-5} 10^{-4} 10^{-3} / WATER CONTENT PERCENT Wp ⊢ ○W ⊣ Wl 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									20-8-S 20-8-D

2. Ground water level measured in shallow monitoring well (20-8-S) as follows:

Date	Depth(m)	Elev. (m)
19-Jan-21	0.63	406.82
29-Jan-21	0.87	406.58
12-Mar-21	0.43	407.02
11-Jun-21	1.29	406.16

3. Ground water level measured in deep monitoring well (20-8-D) as follows:

Date	Depth(m)	Elev. (m)
19-Jan-21	0.62	406.76
29-Jan-21	1.23	406.15
12-Mar-21	1.20	406.19
11-Jun-21	2.37	405.01

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GTA-BHS 001 S:\CLIENTS\CC_TATHAM\SOUTH_FERGUS\SOUTH_FERGUS_LINE2\02_DATA\GINT\SOUTH_FERGUS_LINE2.GPJ GAL-MIS.GDT 6/14/21

DEPTH SCALE
1 : 50

GOLDER
MEMBER OF WSP

LOGGED: AGB
CHECKED: MJB

PROJECT: 20141301 (1000)
LOCATION: N 4837682.00; E 551736.20

RECORD OF BOREHOLE: 20-9

BORING DATE: January 5, 2021

SHEET 1 OF 1
DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

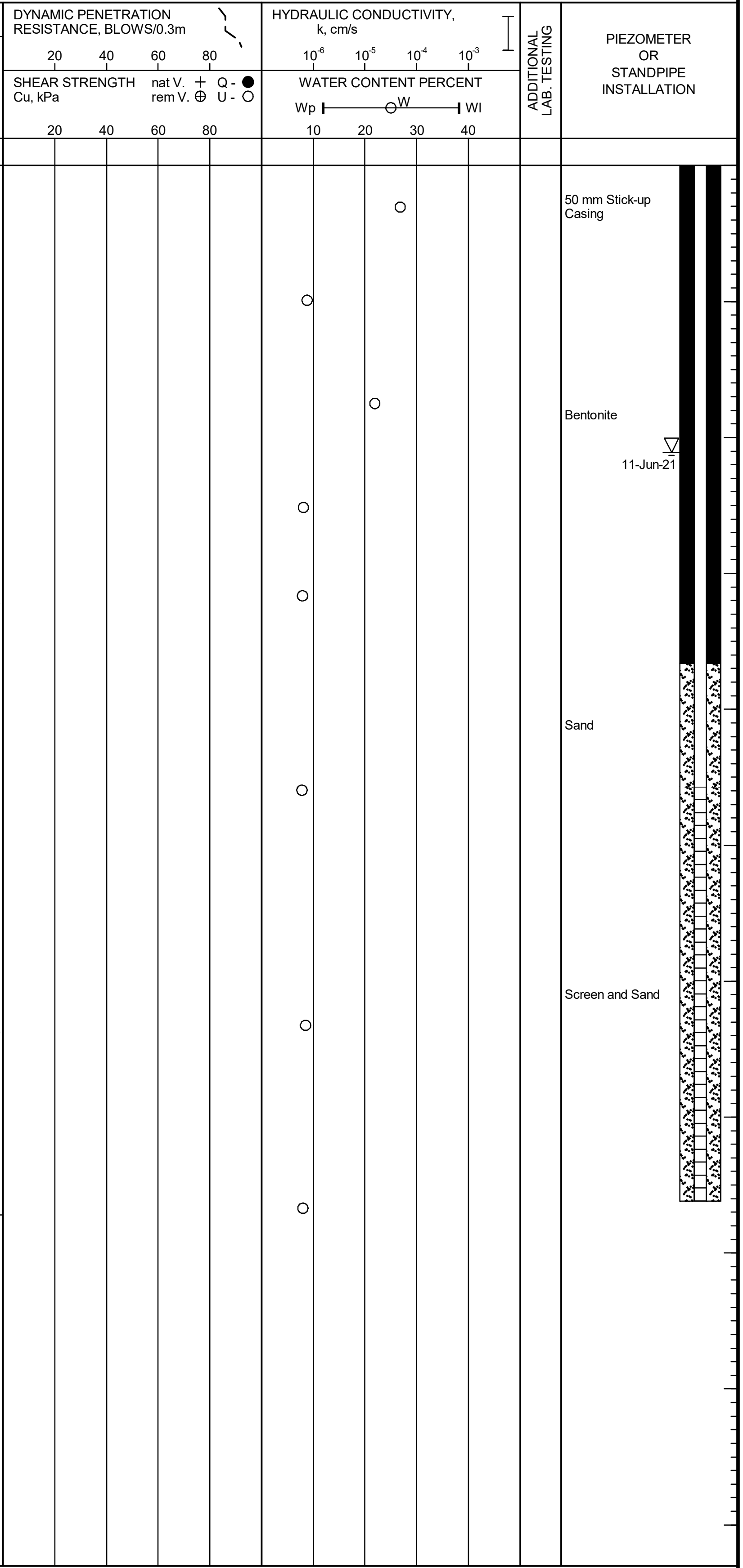
HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE DESCRIPTION	ELEV. DEPTH (m)	SAMPLE NUMBER	TYPE	BLOWS/0.3m
		GROUND SURFACE	414.98			
0	Track Mounted CME 75 150 mm O.D. Tricone	TOPSOIL	0.00			
		(CL-ML) sandy SILTY CLAY to CLAYEY SILT, some gravel; brown (TILL); cohesive, w<PL, very stiff to hard	414.68 0.30	1	SS	4
1				2	SS	15
		- Auger grinding from depths of 1.5 m to 2.3 m		3	SS	18
2						
				4	SS	64
		- Auger grinding from depths of 2.7 m to 3.1 m				
3				5	SS	50/ 0.13
4						
				6	SS	50/ 0.2
5		- Auger grinding from depths of 4.9 m to 6.1 m				
6		- Auger grinding from depths of 6.1 m to 7.0 m		7	SS	50/ 0.05
7						
			407.26	8	SS	50/ 0.1
		END OF BOREHOLE	7.72			
8						
9						
10						

NOTE:

1. Ground water level measured in monitoring well as follows:

Date	Depth(m)	Elev. (m)
19-Jan-21	0.41	414.58
29-Jan-21	0.88	414.11
12-Mar-21	0.37	414.61
11-Jun-21	2.11	412.88



DEPTH SCALE
1 : 50

GOLDER
MEMBER OF WSP

LOGGED: AGB
CHECKED: MJB

PROJECT: 20141301 (1000)
LOCATION: N 4838305.50; E 552497.70

RECORD OF BOREHOLE: 20-10

BORING DATE: January 11, 2021

SHEET 1 OF 2
DATUM: Geodetic

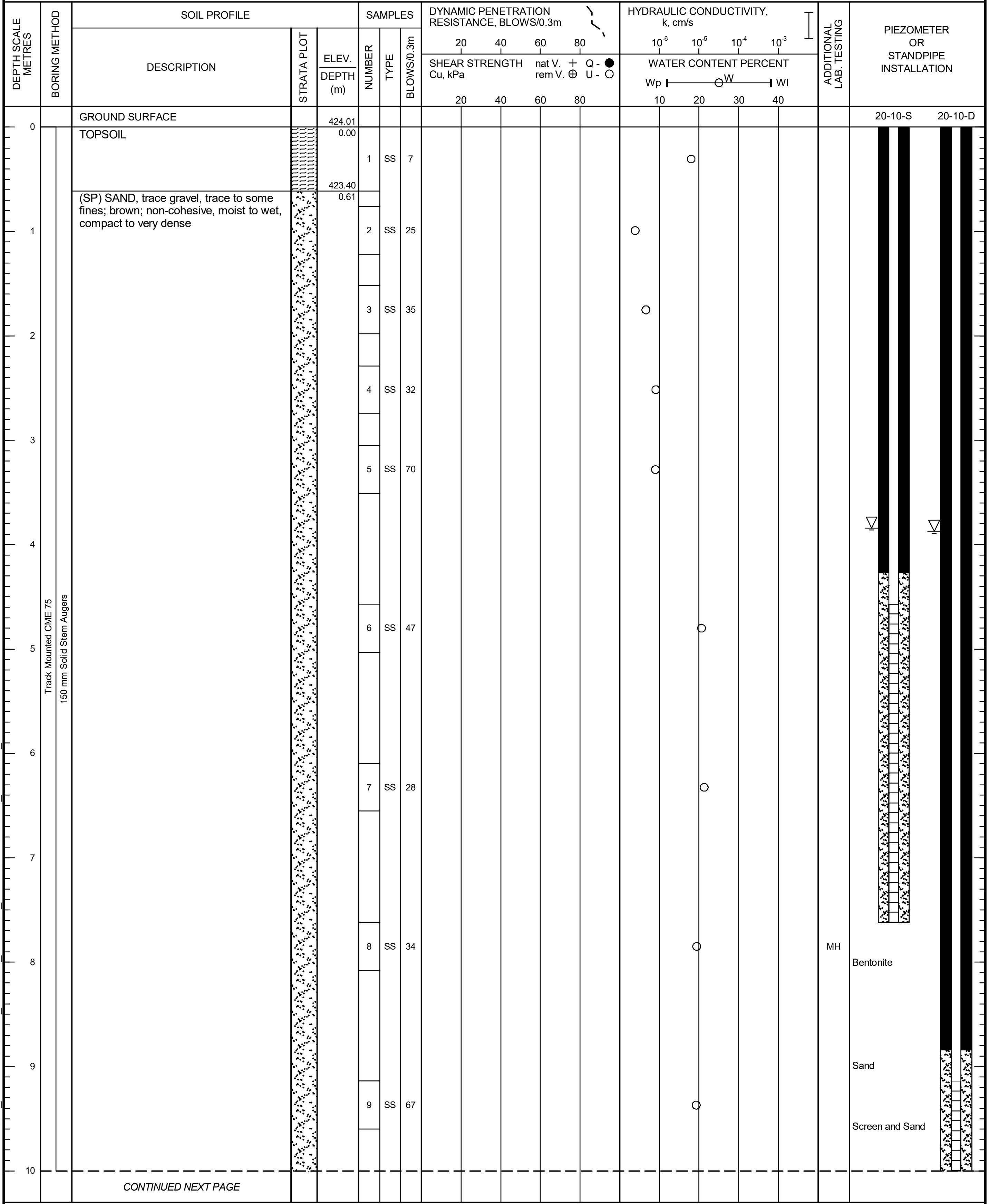
SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

BORING METHOD: Track Mounted CME 75 / 150 mm Solid Stem Augers

DESCRIPTION	ELEV. DEPTH (m)
GROUND SURFACE	424.01
TOPSOIL	0.00
(SP) SAND, trace gravel, trace to some fines; brown; non-cohesive, moist to wet, compact to very dense	423.40 0.61

NUMBER	TYPE	BLOWS/0.3m	ADDITIONAL LAB. TESTING
1	SS	7	
2	SS	25	
3	SS	35	
4	SS	32	
5	SS	70	
6	SS	47	
7	SS	28	
8	SS	34	MH
9	SS	67	



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DEPTH SCALE
1 : 50

GOLDER
MEMBER OF WSP

LOGGED: AGB
CHECKED: MJB

GTA-BHS 001 S:\CLIENTS\CC_TATHAM\SOUTH_FERGUS_LINE2\02_DATA\GINT\SOUTH_FERGUS_LINE2.GPJ GAL-MIS.GDT 6/14/21

PROJECT: 20141301 (1000)

RECORD OF BOREHOLE: 20-10

SHEET 2 OF 2

LOCATION: N 4838305.50; E 552497.70

BORING DATE: January 11, 2021

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m 20 40 60 80 SHEAR STRENGTH Cu, kPa nat V. + Q - ● rem V. ⊕ U - ○ 20 40 60 80	HYDRAULIC CONDUCTIVITY, k, cm/s 10^{-6} 10^{-5} 10^{-4} 10^{-3} WATER CONTENT PERCENT Wp ⊢—○W—⊣ Wl 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									20-10-S 20-10-D
10	Track Mounted CME 75 150 mm Solid Stem Augers	(SP) SAND, trace gravel, trace to some fines; brown; non-cohesive, moist to wet, compact to very dense									
					10	SS	84		○		
11											Screen and Sand
12											
					11	SS	81		○		
				411.36 12.65							
13		END OF BOREHOLE									

NOTES:

1. Ground water level measured in shallow monitoring well (20-6-S) as follows:

Date	Depth(m)	Elev. (m)
19-Jan-21	3.80	420.18
29-Jan-21	3.87	420.11
12-Mar-21	3.71	420.28
11-Jun-21	3.84	420.14

2. Ground water level measured in deep monitoring well (20-6-D) as follows:

Date	Depth(m)	Elev. (m)
19-Jan-21	3.83	420.18
29-Jan-21	3.92	420.10
12-Mar-21	3.73	420.28
11-Jun-21	3.87	420.14

14

15

16

17

18

19

20

DEPTH SCALE

1 : 50

GOLDER
MEMBER OF WSP

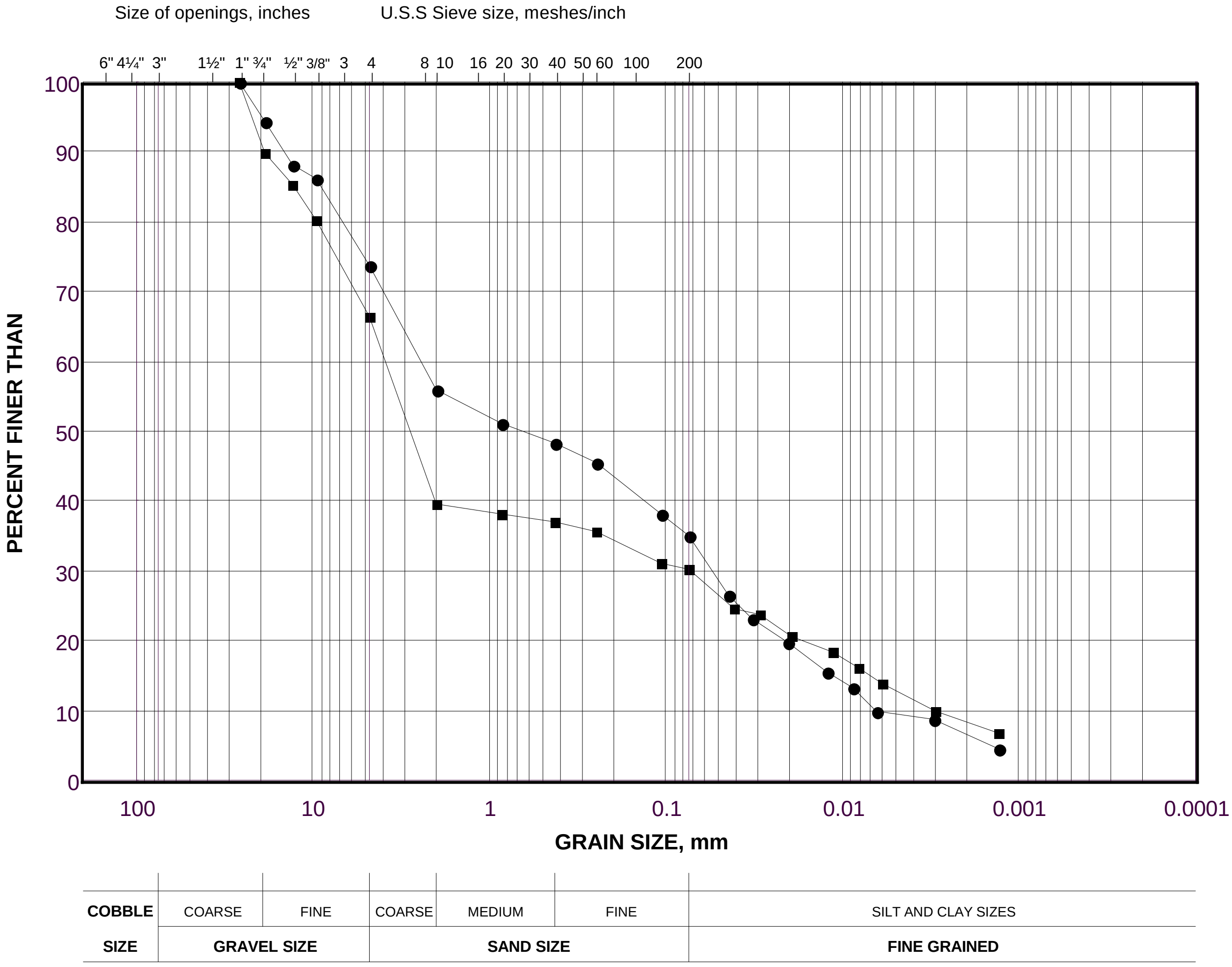
LOGGED: AGB

CHECKED: MJB

GRAIN SIZE DISTRIBUTION

(SM) gravelly SILTY SAND (TILL)

FIGURE i



LEGEND

SYMBOL	BOREHOLE	SAMPLE	DEPTH(m)
●	20-5	6	4.6 - 4.7
■	20-2	8	7.6 - 7.7

Project Number: 20141301

Checked By: ____________________

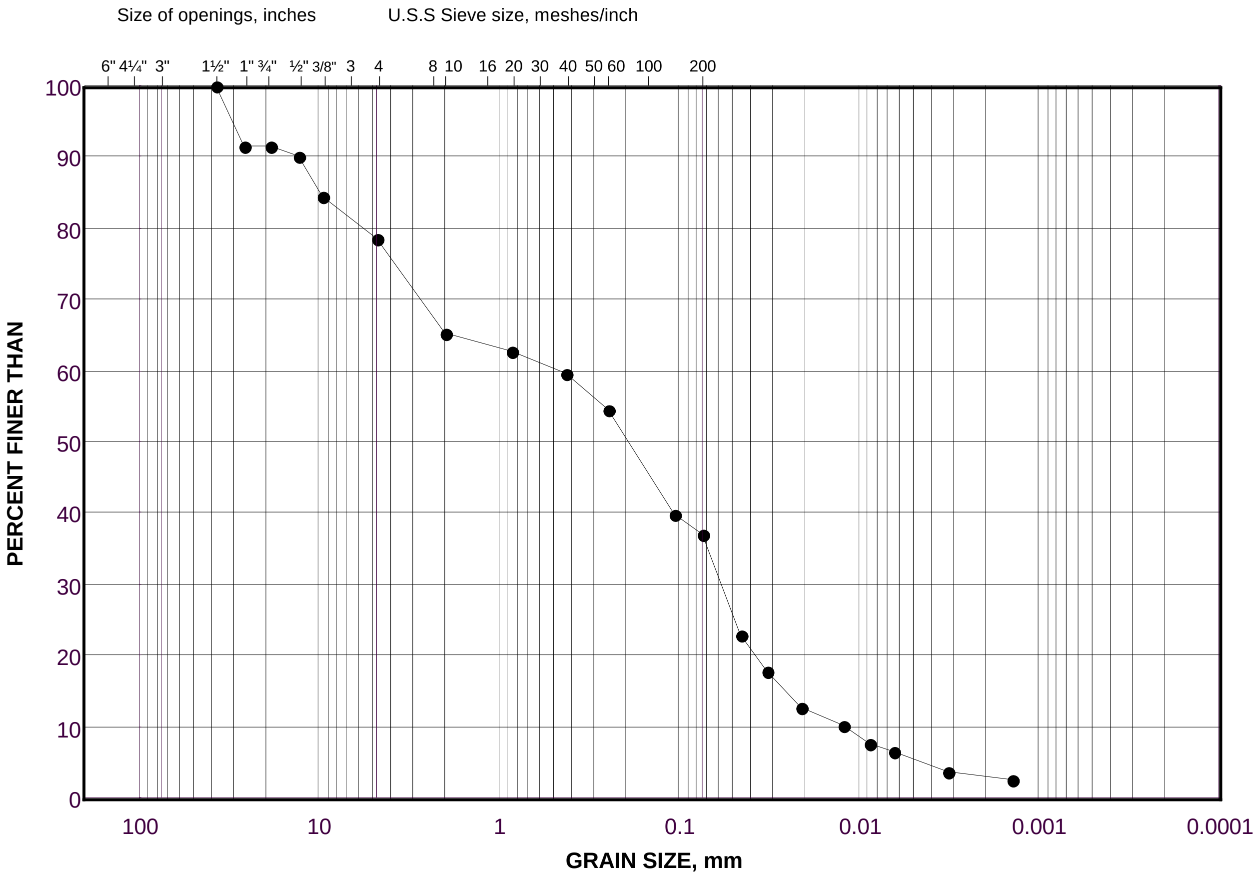
Golder Associates

Date: 14-Jun-21

GRAIN SIZE DISTRIBUTION

(SM) gravelly SILTY SAND

FIGURE ii



COBBLE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY SIZES
SIZE	**GRAVEL SIZE**		**SAND SIZE**			**FINE GRAINED**

LEGEND

SYMBOL	BOREHOLE	SAMPLE	DEPTH(m)
●	20-4	6	4.6 - 5.0

Project Number: 20141301

Checked By: ____________________

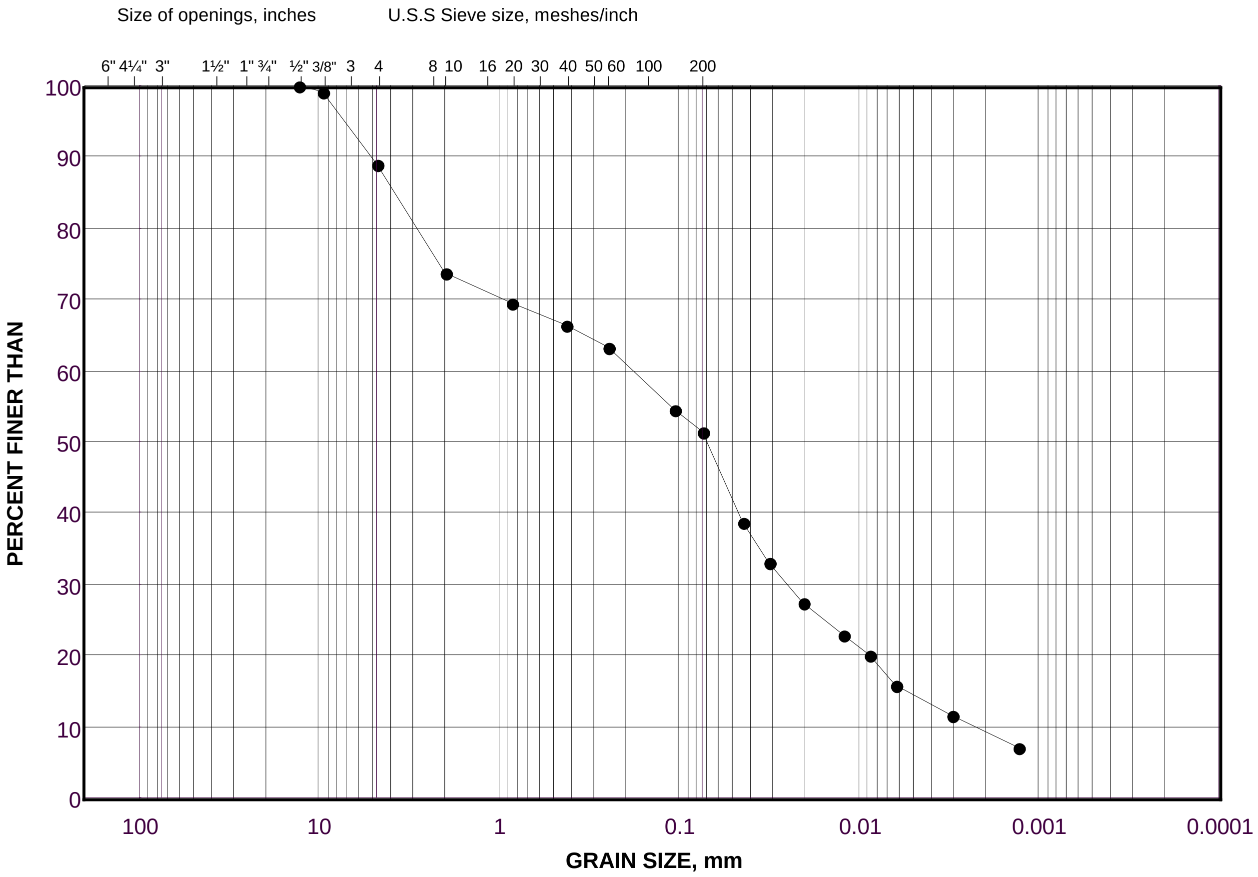
Golder Associates

Date: 14-Jun-21

GRAIN SIZE DISTRIBUTION

(ML) SILT and SAND (TILL)

FIGURE iii



COBBLE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY SIZES
SIZE	**GRAVEL SIZE**		**SAND SIZE**			**FINE GRAINED**

LEGEND

SYMBOL	BOREHOLE	SAMPLE	DEPTH(m)
●	20-6	9	8.2 - 8.6

Project Number: 20141301

Checked By: ____________________

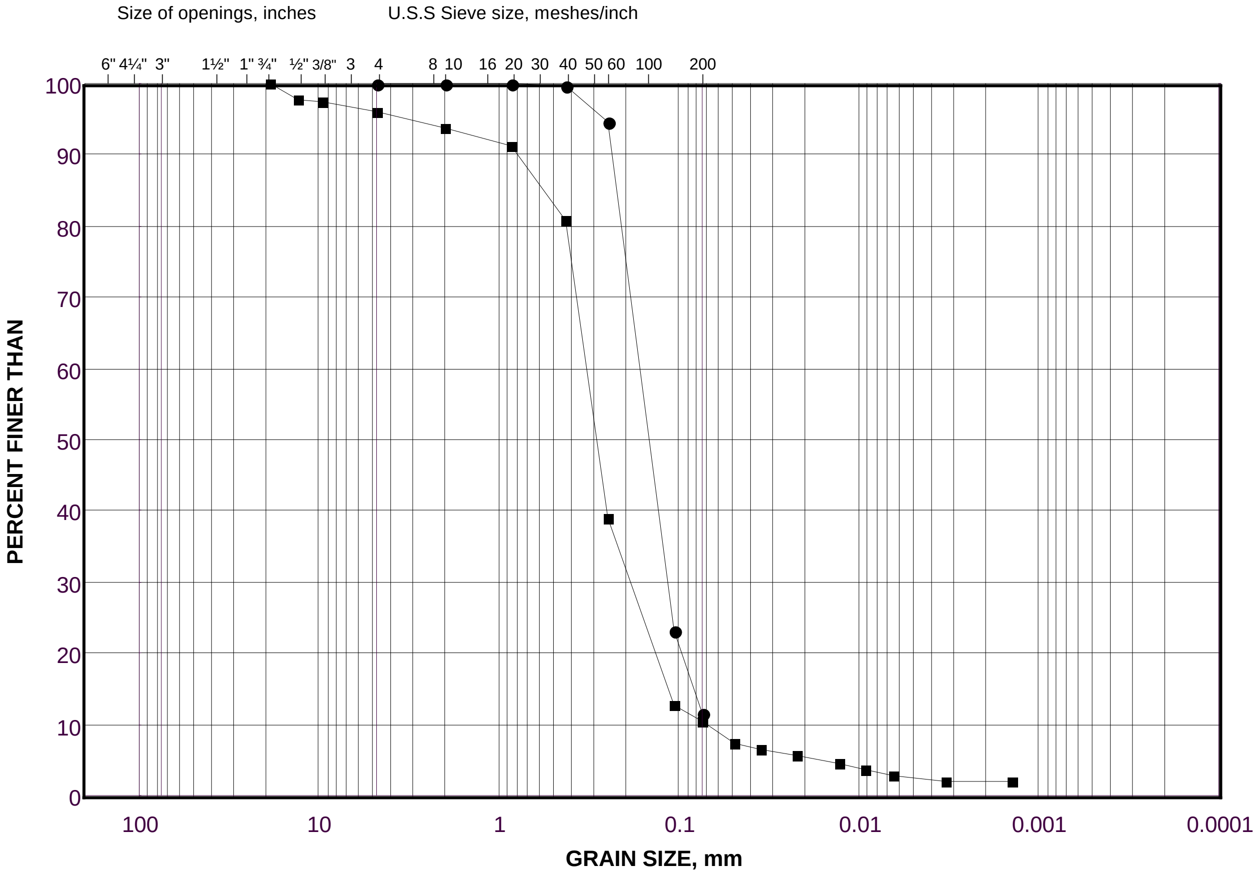
Golder Associates

Date: 14-Jun-21

GRAIN SIZE DISTRIBUTION

(SP) SAND

FIGURE iv



COBBLE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY SIZES
SIZE	**GRAVEL SIZE**		**SAND SIZE**			**FINE GRAINED**

LEGEND

SYMBOL	BOREHOLE	SAMPLE	DEPTH(m)
●	20-7	7	6.1 - 6.6
■	20-10	8	7.6 - 8.1

Project Number: 20141301

Checked By: ____________________

Golder Associates

Date: 14-Jun-21

APPENDIX E

Water Level Depths and Elevations

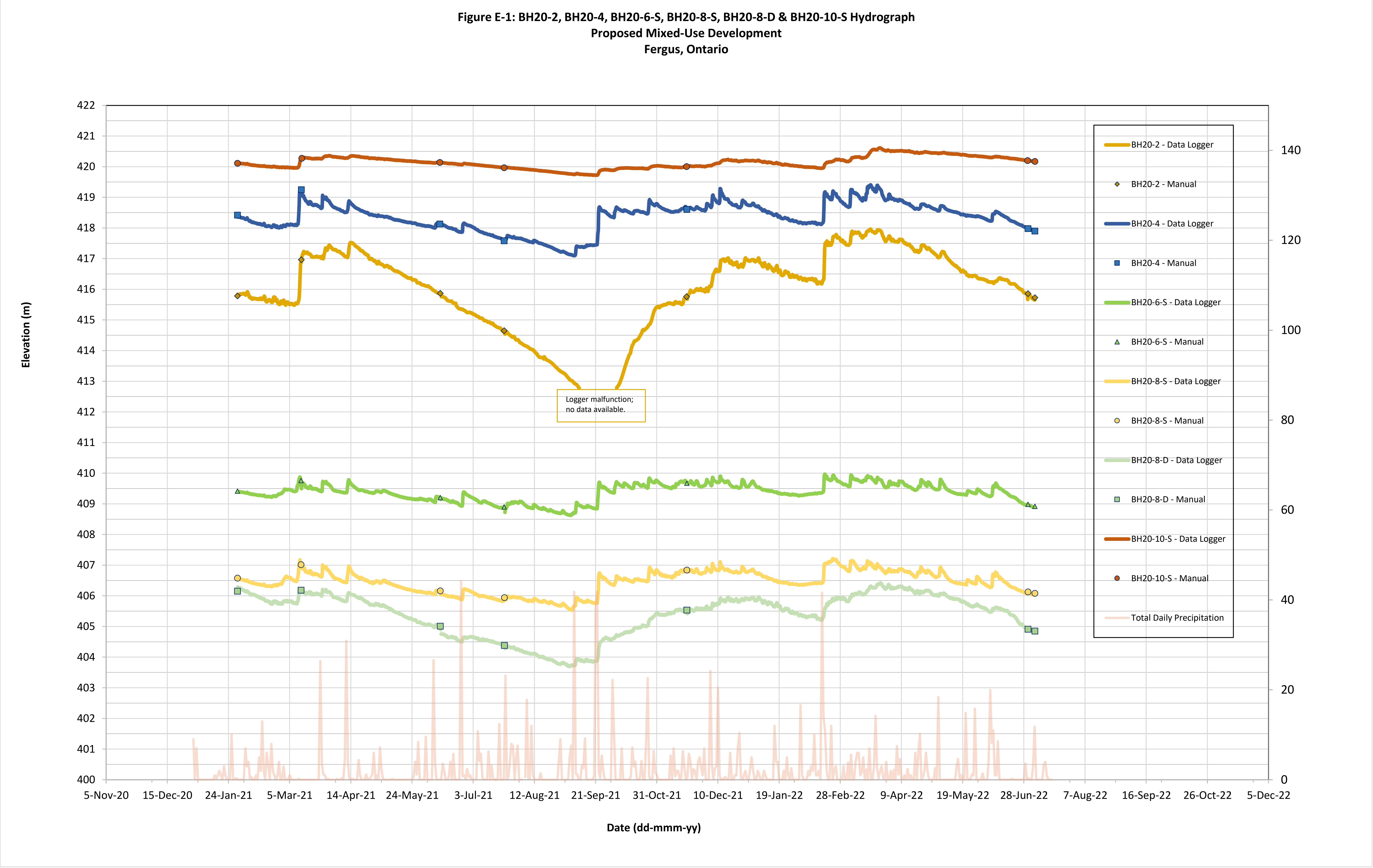
Table E-1 - Water Level Depths and Elevations
Proposed Mixed-Use Development, Fergus, Ontario

Monitoring Well ID	Ground Surface Elevation (m)	Screen Interval (m)			19-Jan-21		29-Jan-21		12-Mar-21		11-Jun-21		23-Jul-21		19-Nov-21		30-Jun-22		05-Jul-22		19-Jul-22	
					Depth (mbgs)	Elevation (m)	Depth (mbgs)	Elevation (m)	Depth (mbgs)	Elevation (m)	Depth (mbgs)	Elevation (m)	Depth (mbgs)	Elevation (m)	Depth (mbgs)	Elevation (m)	Depth (mbgs)	Elevation (m)	Depth (mbgs)	Elevation (m)	Depth (mbgs)	Elevation (m)
BH20-2	418.26	410.2	to	413.2	2.52	415.74	2.48	415.79	1.30	416.97	2.39	415.87	3.61	414.65	2.50	415.76	2.40	415.86	2.53	415.73	3.16	415.10
BH20-3	413.40	406.7	to	409.8	1.12	412.28	1.49	411.92	0.69	412.71	1.92	411.48	2.43	410.98	1.24	412.16	NA - Destroyed		NA - Destroyed		NA - Destroyed	
BH20-4	419.93	413.3	to	414.8	1.17	418.76	1.51	418.42	0.68	419.25	1.80	418.13	2.35	417.58	1.32	418.61	1.95	417.98	2.03	417.90	2.31	417.62
BH20-5	407.29	400.7	to	403.7	0.65	406.65	0.75	406.55	0.60	406.69	1.17	406.12	1.97	405.32	0.68	406.61	1.02	406.27	-	-	1.48	405.81
BH20-6-S	410.47	404.0	to	407.0	1.11	409.37	1.06	409.42	0.71	409.76	1.27	409.21	1.57	408.90	0.80	409.68	1.49	408.99	1.55	408.92	1.78	408.69
BH20-6-D	410.46	399.3	to	402.3	3.24	407.22	3.33	407.14	3.34	407.13	3.75	406.71	4.04	406.42	2.99	407.48	3.67	406.79	3.72	406.74	3.91	406.55
BH20-7	417.65	410.9	to	412.4	0.22	417.43	0.42	417.23	-0.12	417.77	0.48	417.17	0.84	416.81	0.16	417.49	0.68	416.98	-	-	0.86	416.79
BH20-8-S	407.45	403.2	to	406.2	0.63	406.82	0.87	406.58	0.43	407.02	1.29	406.16	1.51	405.94	0.61	406.84	1.32	406.13	1.37	406.08	1.63	405.82
BH20-8-D	407.38	399.1	to	400.6	0.62	406.76	1.23	406.15	1.20	406.19	2.37	405.01	3.00	404.38	1.85	405.54	2.47	404.92	2.53	404.85	2.85	404.53
BH20-9	414.98	408.3	to	411.4	0.41	414.58	0.88	414.11	0.37	414.61	2.11	412.88	2.45	412.53	0.68	414.30	2.14	412.85	-	-	2.54	412.44
BH20-10-S	423.98	417.3	to	420.4	3.80	420.18	3.87	420.11	3.71	420.28	3.84	420.14	4.02	419.97	3.98	420.01	3.78	420.20	3.81	420.17	3.91	420.07
BH20-10-D	424.01	412.8	to	415.8	3.83	420.18	3.92	420.10	3.73	420.28	3.87	420.14	4.05	419.96	4.02	419.99	3.81	420.20	3.84	420.17	3.94	420.07
Piezometer																						
P1	406.55	-	-	-	0.31	406.24	0.34	406.21	0.04	406.51	0.49	406.06	0.39	406.16	0.31	406.24	0.47	406.09	0.46	406.09	0.57	405.98
P2	408.49	-	-	-	0.21	408.29	0.26	408.24	-0.01	408.50	0.46	408.03	0.45	408.05	0.19	408.30	0.43	408.06	0.48	408.02	0.65	407.84
P3	411.11	-	-	-	0.27	410.84	0.32	410.80	0.12	410.99	0.40	410.72	0.86	410.26	0.27	410.85	0.87	410.24	-	-	DRY	
Staff Gauge																						
SG1	405.82	-	-	-	-0.35	406.17	N/A - Frozen		-0.44	406.26	-0.40	406.22	-0.39	406.21	-0.36	406.18	NA - Destroyed		NA - Destroyed		NA - Destroyed	
SG2	407.57	-	-	-	-0.54	408.11	N/A - Frozen		-0.795	408.37	-0.42	407.99	-0.64	408.21	-0.58	408.15	-0.54	408.11	-0.66	408.23	-0.43	408.00
SG3	410.72	-	-	-	N/A - Frozen		N/A - Frozen		-0.15	410.87	-0.02	410.74	DRY		-0.05	410.77	DRY		-	-	DRY	

Notes:

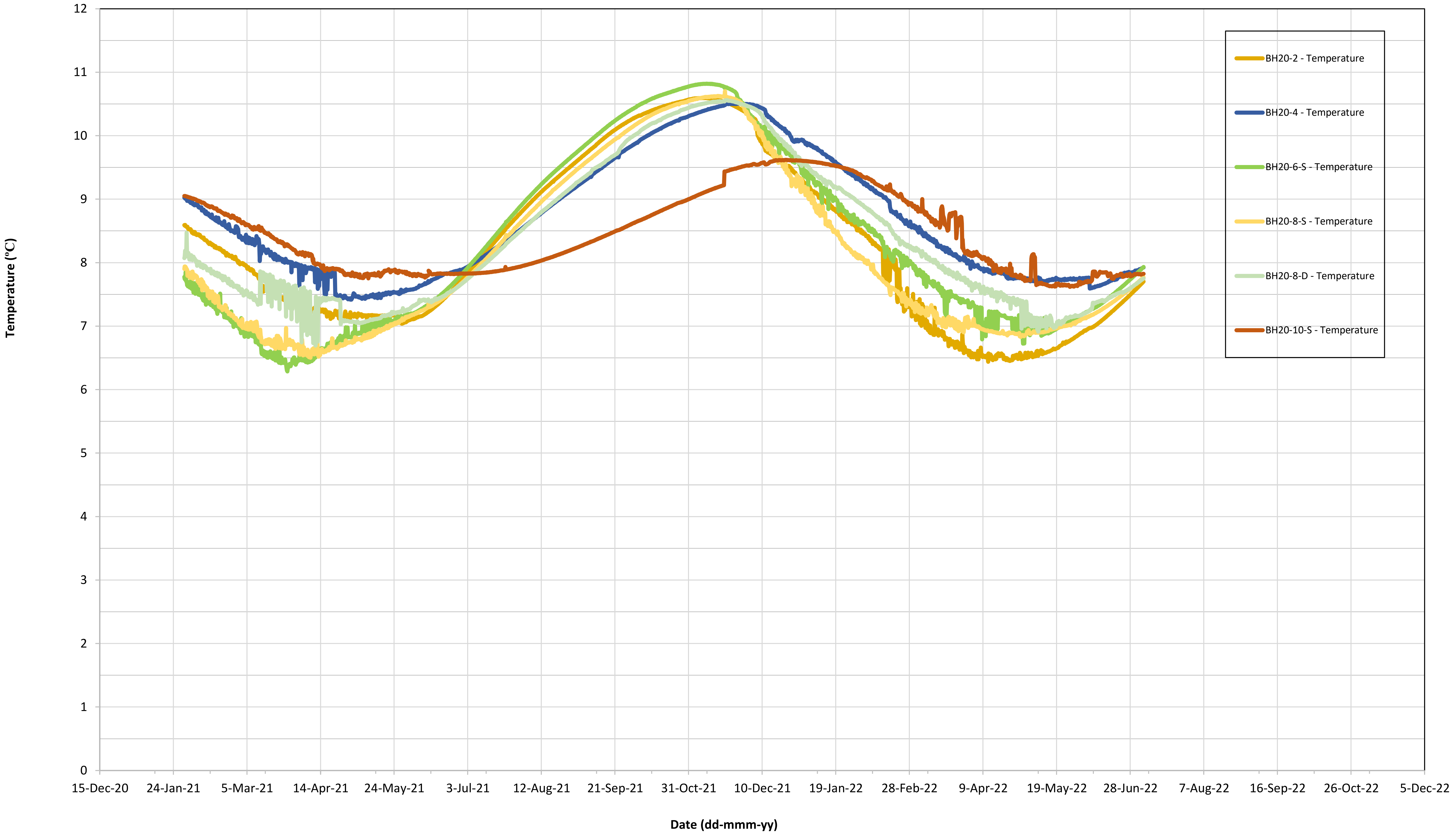
1) mbgs = metres below ground surface
2) A negative water level depth represents an above ground surface water level.
3) NA = Not Accessible

Input by: JJG
Checked by: JP



Entered by: JJG
Checked by: JP

Figure E-2: BH20-2, BH20-4, BH20-6-S, BH20-8-S, BH20-8-D & BH20-10-S Temperature
Proposed Mixed-Use Development
Fergus, Ontario



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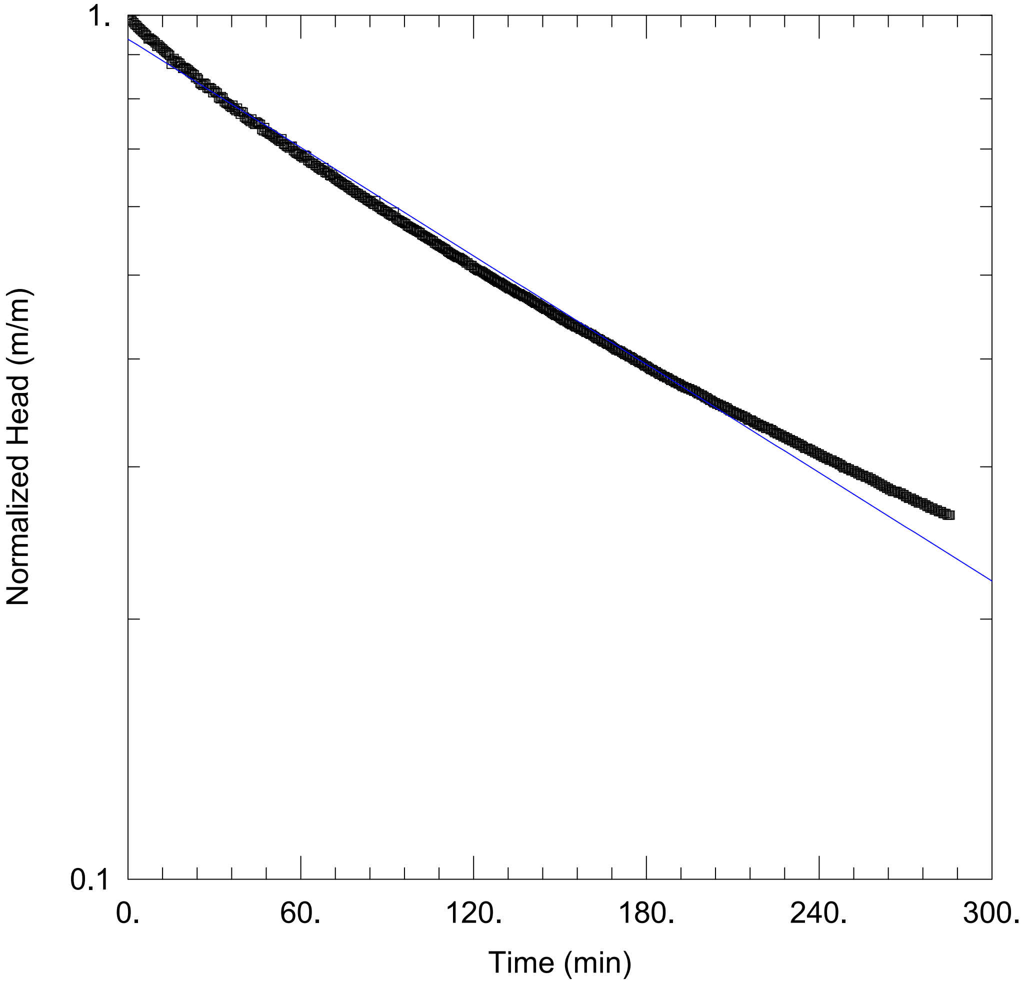
Checked by: JP

APPENDIX F

Hydraulic Conductivity Testing



WELL TEST ANALYSIS

PROJECT INFORMATION

Company: WSP Canada Inc.
Client: Tathum Engineering Ltd
Project: 20141301
Location: South Fergus
Test Well: BH20-2
Test Date: 23Jul2021

AQUIFER DATA

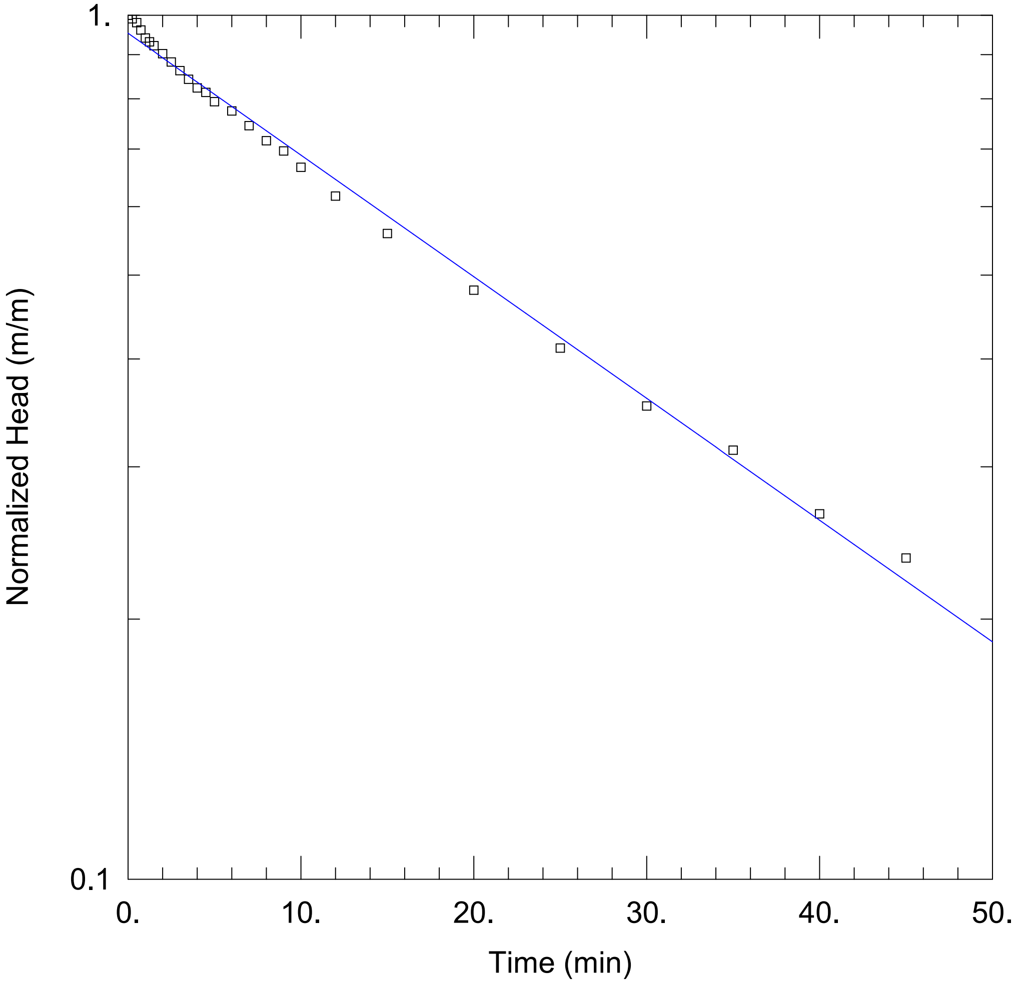
Saturated Thickness: 5.39 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH20-2)

Initial Displacement: 0.815 m
Total Well Penetration Depth: 5.39 m
Casing Radius: 0.025 m
Static Water Column Height: 5.39 m
Screen Length: 3.5 m
Well Radius: 0.075 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 2.3E-8 m/sec
y0 = 0.7645 m



WELL TEST ANALYSIS

PROJECT INFORMATION

Company: WSP Canada Inc.
Client: Tathum Engineering Ltd
Project: 20141301
Location: South Fergus
Test Well: BH20-3
Test Date: 11June2021

AQUIFER DATA

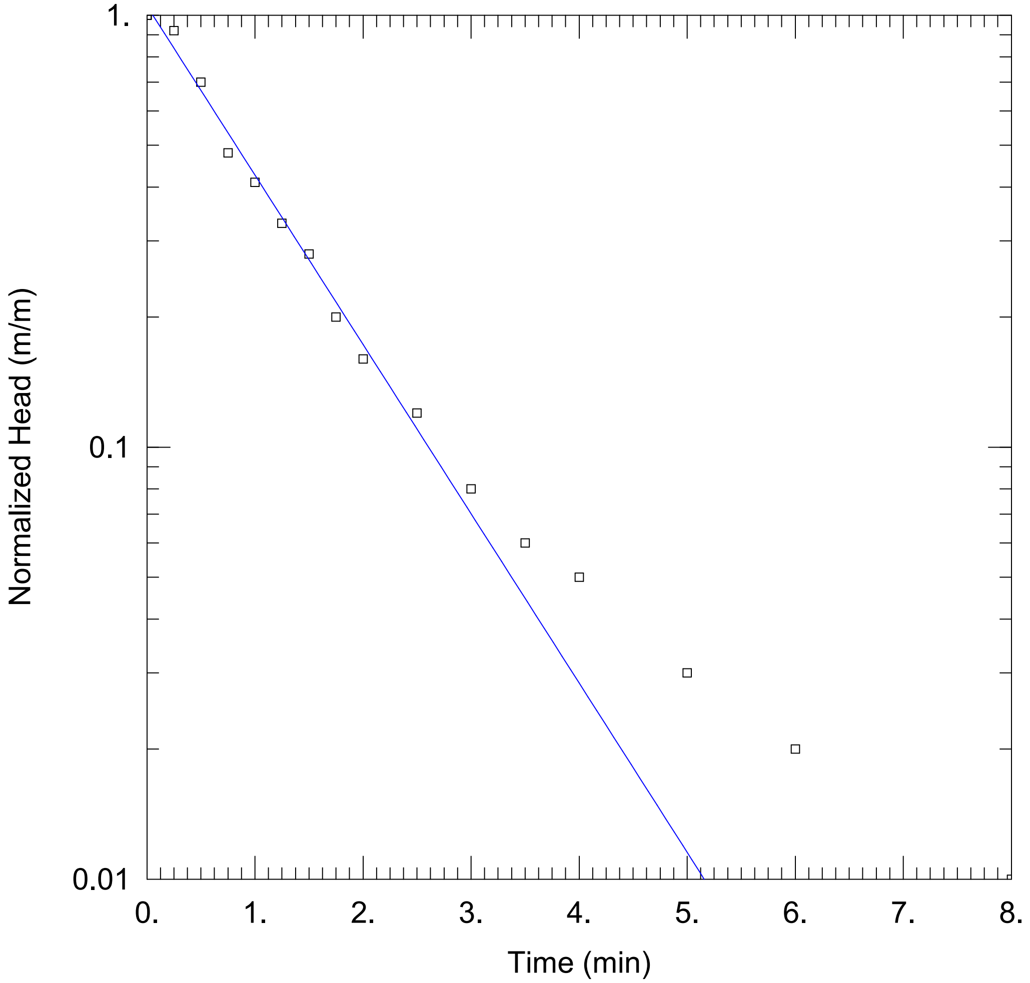
Saturated Thickness: 5.68 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH20-3)

Initial Displacement: 1.02 m
Total Well Penetration Depth: 5.68 m
Casing Radius: 0.025 m
Static Water Column Height: 5.68 m
Screen Length: 3.3 m
Well Radius: 0.075 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.654E-7 m/sec
y0 = 0.9717 m



WELL TEST ANALYSIS

PROJECT INFORMATION

Company: WSP Canada Inc.
Client: Tathum Engineering Ltd
Project: 20141301
Location: South Fergus
Test Well: BH20-4
Test Date: 11June2021

AQUIFER DATA

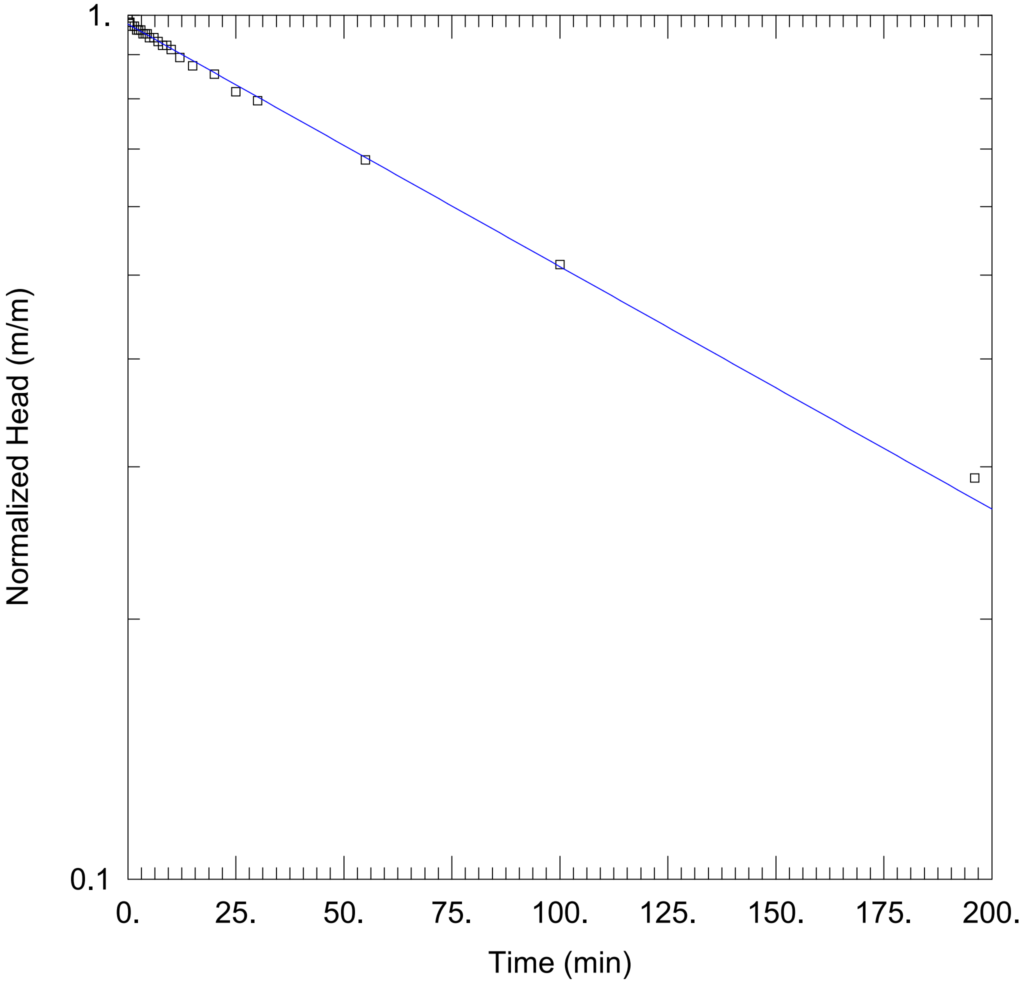
Saturated Thickness: 6.28 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH20-4)

Initial Displacement: 1. m
Total Well Penetration Depth: 5.8 m
Casing Radius: 0.025 m
Static Water Column Height: 6.28 m
Screen Length: 2.1 m
Well Radius: 0.108 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 5.439E-6 m/sec
y0 = 1.049 m



WELL TEST ANALYSIS

PROJECT INFORMATION

Company: WSP Canada Inc.
Client: Tathum Engineering Ltd
Project: 20141301
Location: South Fergus
Test Well: BH20-6-S
Test Date: 11June2021

AQUIFER DATA

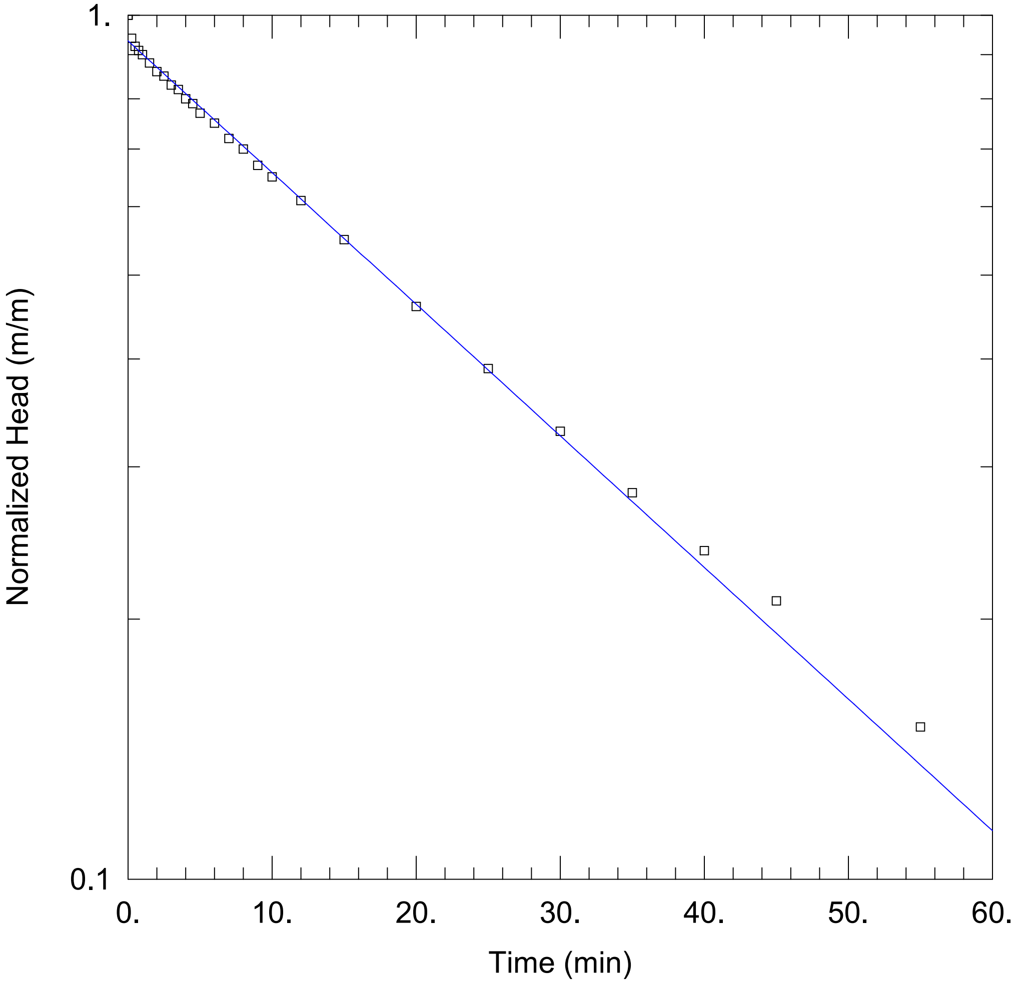
Saturated Thickness: 6.24 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH20-6-S)

Initial Displacement: 1.03 m
Total Well Penetration Depth: 6.24 m
Casing Radius: 0.025 m
Static Water Column Height: 6.24 m
Screen Length: 3.4 m
Well Radius: 0.063 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 3.403E-8 m/sec
y0 = 1.005 m



WELL TEST ANALYSIS

PROJECT INFORMATION

Company: WSP Canada Inc.
Client: Tathum Engineering Ltd
Project: 20141301
Location: South Fergus
Test Well: BH20-8-S
Test Date: 11June2021

AQUIFER DATA

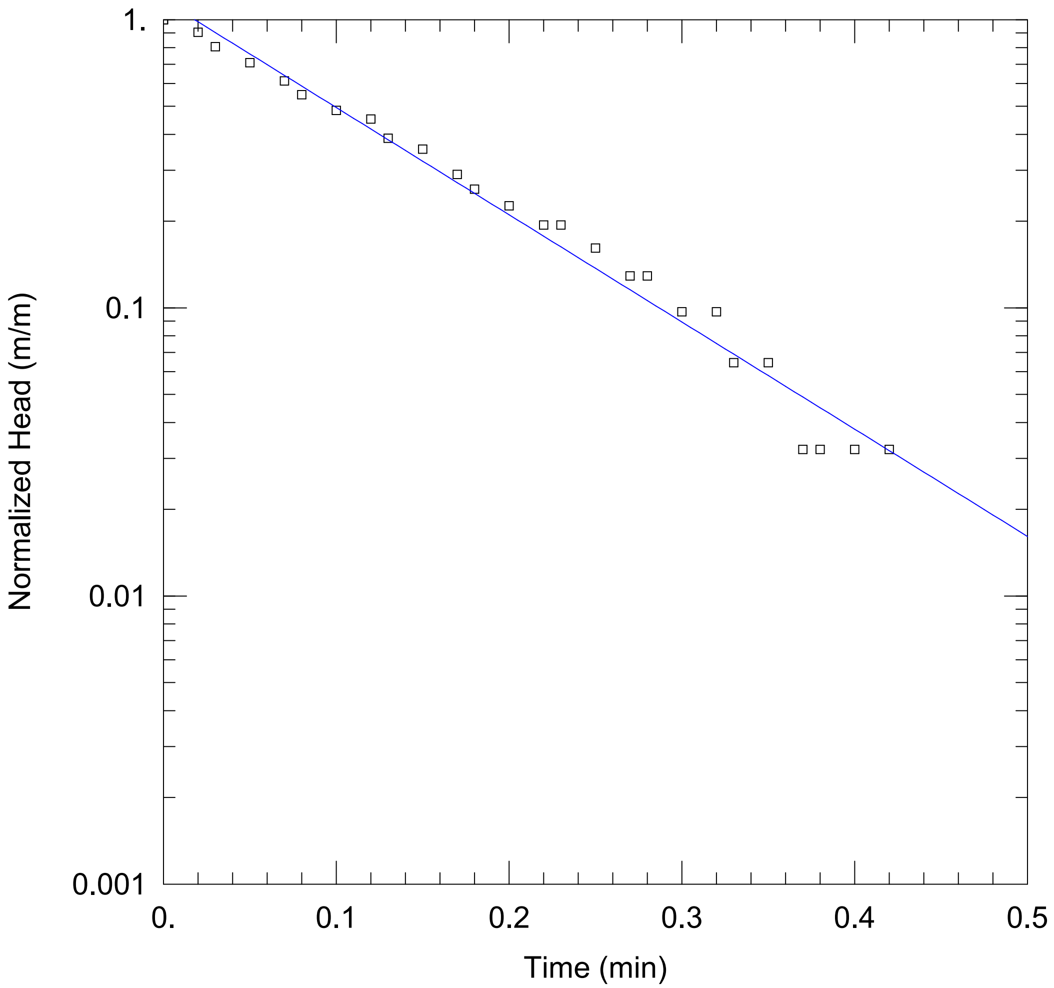
Saturated Thickness: 4.63 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH20-8-S)

Initial Displacement: 1. m
Static Water Column Height: 4.63 m
Total Well Penetration Depth: 3.91 m
Screen Length: 3.4 m
Casing Radius: 0.034 m
Well Radius: 0.05 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 3.031E-7 m/sec
y0 = 0.9335 m



WELL TEST ANALYSIS

PROJECT INFORMATION

Company: WSP Canada Inc.
Client: Tathum Engineering Ltd
Project: 20141301
Location: South Fergus
Test Well: BH20-10-S
Test Date: 11June2021

AQUIFER DATA

Saturated Thickness: 8.81 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH20-10-S)

Initial Displacement: 0.31 m
Total Well Penetration Depth: 3.76 m
Casing Radius: 0.025 m
Static Water Column Height: 8.81 m
Screen Length: 3.3 m
Well Radius: 0.075 m

SOLUTION

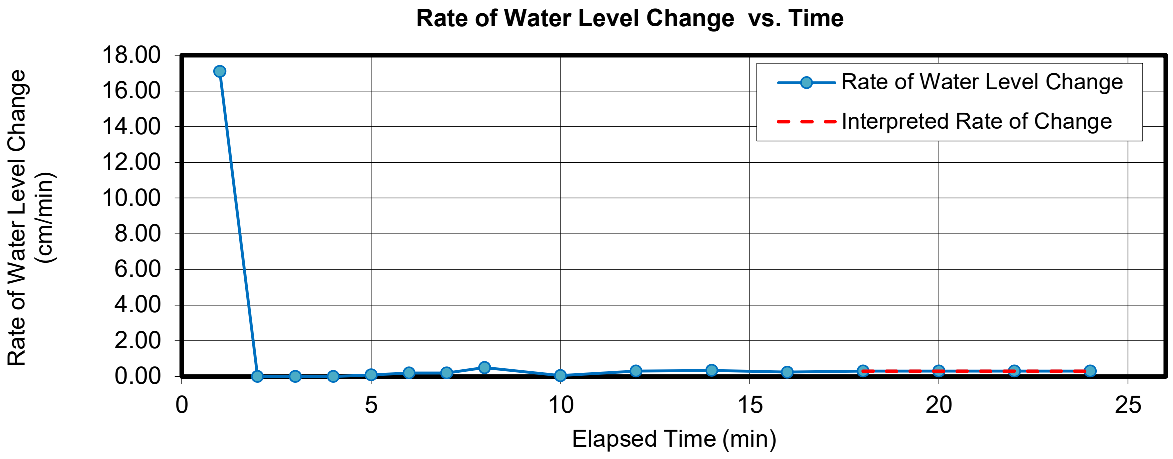
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 3.456E-5 m/sec
y0 = 0.3616 m

Constant Head Permeameter Test Report - GP20-2

Figure F-1

Approximate Location: **1.5 m South of BH20-2**
Test Depth: **0.61 m below grade**



Elapsed Time (min)	Water Level in Reservoir (cm)	Water Level Change (cm)	Infiltration (cm/min)
0.0	0.0	0.0	0.00
1.0	17.1	17.1	17.10
2.0	17.1	0.0	0.00
3.0	17.1	0.0	0.00
4.0	17.1	0.0	0.00
5.0	17.2	0.1	0.10
6.0	17.4	0.2	0.20
7.0	17.6	0.2	0.20
8.0	18.1	0.5	0.50
10.0	18.2	0.1	0.05
12.0	18.8	0.6	0.30
14.0	19.5	0.7	0.35
16.0	20.0	0.5	0.25
18.0	20.6	0.6	0.30
20.0	21.2	0.6	0.30
22.0	21.8	0.6	0.30
24.0	22.4	0.6	0.30

Soil Type 3 - gravelly SILTY SAND (TILL)

Interpreted Rate of:

Water Level Change (R_1) = 5E-03 cm/s

Steady Intake Water Rate (Q_1) = 2E-01 cm^3/s

hole radius (a) = 3 cm

Water column height in hole (H_1) = 10 cm

Shape factor for H_1/a = (C_1) = 1.3 -

Soil Type Coefficient α^* = 0.12 cm^{-1}

Single Head Analysis

$$K_{fs} = \frac{C_1 Q_1}{2\pi H_1^2 + \pi a^2 C_1 + 2\pi \frac{H_1}{\alpha^*}}$$

Field Saturated Hydraulic Conductivity (K_{fs})

K_{fs} = **2E-04** cm/s

🟩 =input data

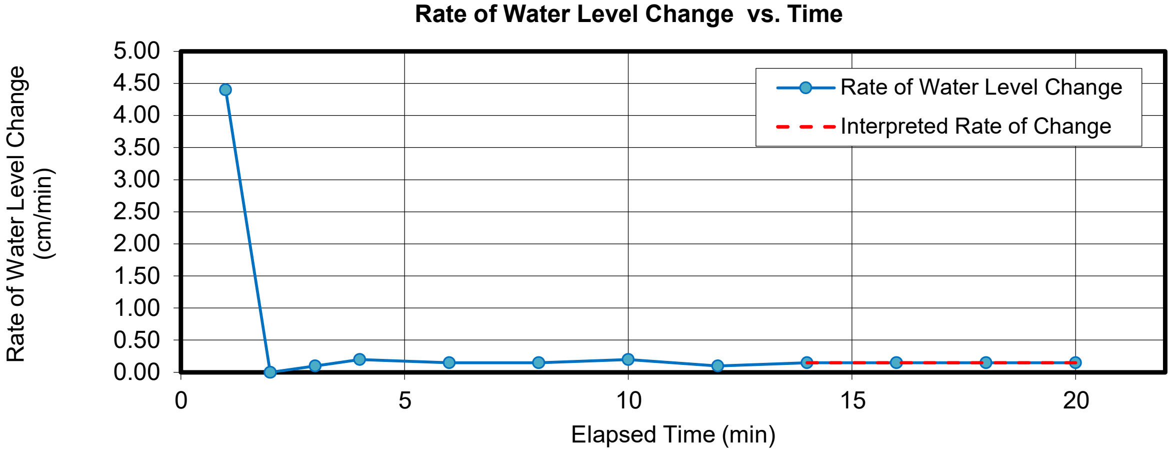
DATE: 2022-07-19
PROJECT: 20141301

PREPARED BY: AGB
REVIEW: JG

Constant Head Permeameter Test Report - Test GP20-4

Figure F-2

Approximate Location: **1.4 m North of BH20-4**
Test Depth: **0.60 m below grade**



Elapsed Time (min)	Water Level in Reservoir (cm)	Water Level Change (cm)	Infiltration (cm/min)
0.0	0.0	0.0	0.00
1.0	4.4	4.4	4.40
2.0	4.4	0.0	0.00
3.0	4.5	0.1	0.10
4.0	4.7	0.2	0.20
6.0	5.0	0.3	0.15
8.0	5.3	0.3	0.15
10.0	5.7	0.4	0.20
12.0	5.9	0.2	0.10
14.0	6.2	0.3	0.15
16.0	6.5	0.3	0.15
18.0	6.8	0.3	0.15
20.0	7.1	0.3	0.15

Soil Type 3 - sandy SILT

Interpreted Rate of:

Water Level Change (R_1) =	3E-03	cm/s
Steady Intake Water Rate (Q_1) =	9E-02	cm^3/s
hole radius (a) =	3	cm
Water column height in hole (H_1) =	10	cm
Shape factor for H_1/a = (C_1) =	1.3	-
Soil Type Coefficient α^* =	0.12	cm^{-1}

Single Head Analysis

$$K_{fs} = \frac{C_1 Q_1}{2\pi H_1^2 + \pi a^2 C_1 + 2\pi \frac{H_1}{\alpha^*}}$$

Field Saturated Hydraulic Conductivity (K_{fs})

K_{fs} = **1E-04** cm/s

🟩 =input data

DATE: 2022-07-19

PROJECT: 20141301

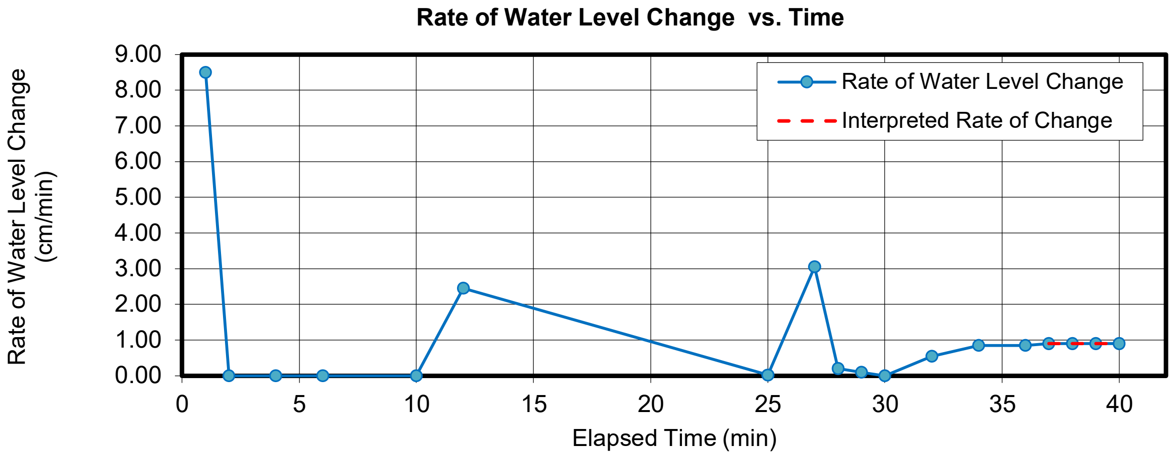
PREPARED BY: AGB

REVIEW: JG

Constant Head Permeameter Test Report - GP20-6

Figure F-3

Approximate Location: **2 m East of BH20-6-D**
Test Depth: **0.65 m below grade**



Elapsed Time (min)	Water Level in Reservoir (cm)	Water Level Change (cm)	Infiltration (cm/min)
0.0	0.0	0.0	0.00
1.0	8.5	8.5	8.50
2.0	8.5	0.0	0.00
4.0	8.5	0.0	0.00
6.0	8.5	0.0	0.00
10.0	8.5	0.0	0.00
12.0	13.4	4.9	2.45
25.0	13.7	0.3	0.02
27.0	19.8	6.1	3.05
28.0	20.0	0.2	0.20
29.0	20.1	0.1	0.10
30.0	20.1	0.0	0.00
32.0	21.2	1.1	0.55
34.0	22.9	1.7	0.85
36.0	24.6	1.7	0.85
37.0	25.5	0.9	0.90
38.0	26.4	0.9	0.90
39.0	27.3	0.9	0.90
40.0	28.2	0.9	0.90

Soil Type 3 - sandy SILT to SILTY SAND

Interpreted Rate of:

Water Level Change (R_1) = 2E-02 cm/s

Steady Intake Water Rate (Q_1) = 3E-02 cm^3/s

hole radius (a) = 3 cm

Water column height in hole (H_1) = 20 cm

Shape factor for H_1/a = (C_1) = 2.0 -

Soil Type Coefficient α^* = 0.12 cm^{-1}

Single Head Analysis

$$K_{fs} = \frac{C_1 Q_1}{2\pi H_1^2 + \pi a^2 C_1 + 2\pi \frac{H_1}{\alpha^*}}$$

Field Saturated Hydraulic Conductivity (K_{fs})

K_{fs} = **2E-05** cm/s

🟩 =input data

DATE: 2022-07-19

PROJECT: 20141301

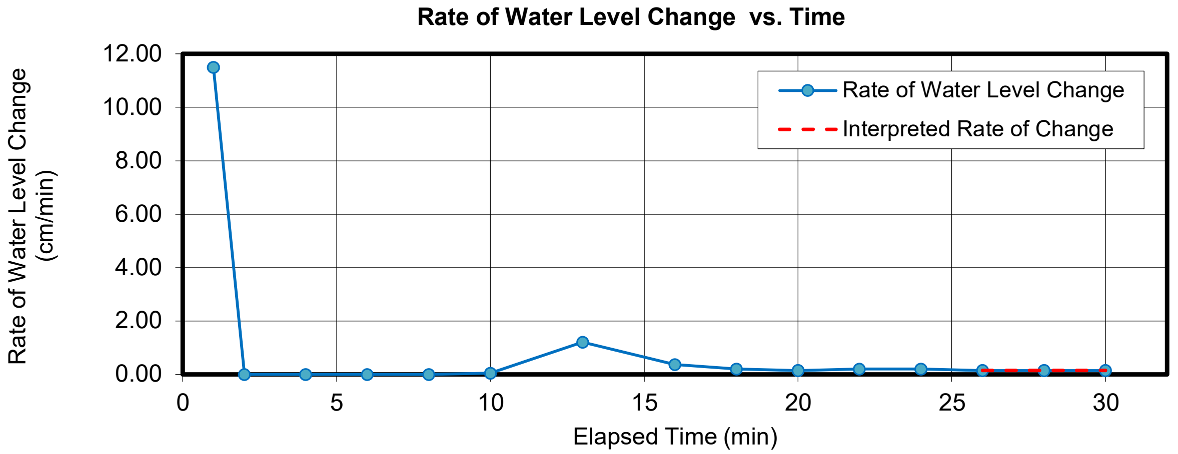
PREPARED BY: AGB

REVIEW: JG

Constant Head Permeameter Test Report - Test GP20-7

Figure F-4

Approximate Location: **2 m East of BH20-7**
Test Depth: **0.63 m below grade**



Elapsed Time (min)	Water Level in Reservoir (cm)	Water Level Change (cm)	Infiltration (cm/min)
0.0	0.0	0.0	0.00
1.0	11.5	11.5	11.50
2.0	11.5	0.0	0.00
4.0	11.5	0.0	0.00
6.0	11.5	0.0	0.00
8.0	11.5	0.0	0.00
10.0	11.6	0.1	0.05
13.0	15.2	3.6	1.20
16.0	16.3	1.1	0.37
18.0	16.7	0.4	0.20
20.0	17.0	0.3	0.15
22.0	17.4	0.4	0.20
24.0	17.8	0.4	0.20
26.0	18.1	0.3	0.15
28.0	18.4	0.3	0.15
30.0	18.7	0.3	0.15

🟩 =input data

Soil Type 3 - sandy SILTY CLAY to CLAYEY SILT

Interpreted Rate of:

Water Level Change (R_1) =	3E-03	cm/s
Steady Intake Water Rate (Q_1) =	9E-02	cm^3/s
hole radius (a) =	3	cm
Water column height in hole (H_1) =	20	cm
Shape factor for H_1/a = (C_1) =	2.0	-
Soil Type Coefficient α^* =	0.12	cm^{-1}

Single Head Analysis

$$K_{fs} = \frac{C_1 Q_1}{2\pi H_1^2 + \pi a^2 C_1 + 2\pi \frac{H_1}{\alpha^*}}$$

Field Saturated Hydraulic Conductivity (K_{fs})

K_{fs} = **5E-05** cm/s

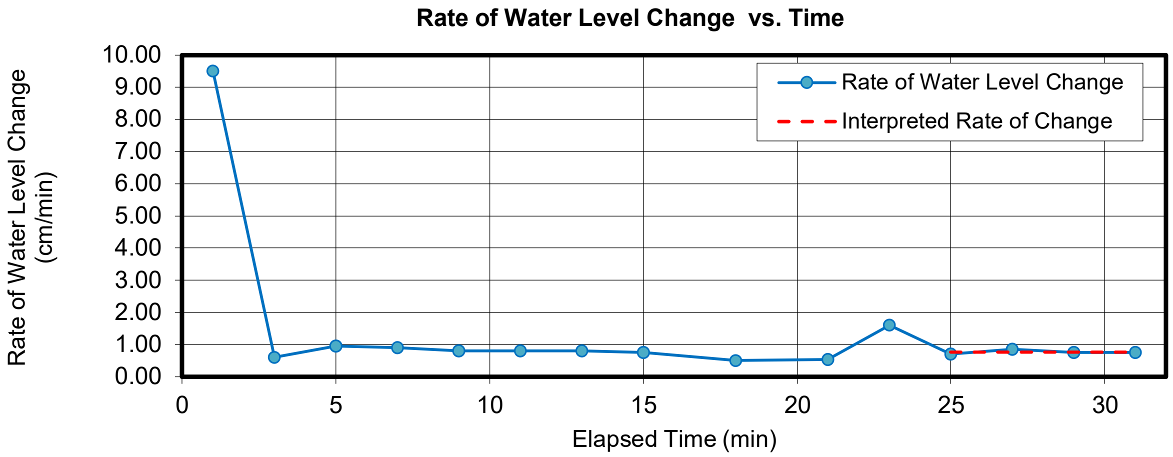
DATE: 2022-07-19
PROJECT: 20141301

PREPARED BY: AGB
REVIEW: JG

Constant Head Permeameter Test Report - GP20-8

Figure F-5

Approximate Location: **1.5 m West of BH20-8-D**
Test Depth: **0.71 m below grade**



Elapsed Time (min)	Water Level in Reservoir (cm)	Water Level Change (cm)	Infiltration (cm/min)
0.0	0.0	0.0	0.00
1.0	9.5	9.5	9.50
3.0	10.7	1.2	0.60
5.0	12.6	1.9	0.95
7.0	14.4	1.8	0.90
9.0	16.0	1.6	0.80
11.0	17.6	1.6	0.80
13.0	19.2	1.6	0.80
15.0	20.7	1.5	0.75
18.0	22.2	1.5	0.50
21.0	23.8	1.6	0.53
23.0	27.0	3.2	1.60
25.0	28.4	1.4	0.70
27.0	30.1	1.7	0.85
29.0	31.6	1.5	0.75
31.0	33.1	1.5	0.75

Soil Type 3 - sandy SILT

Interpreted Rate of:

Water Level Change (R_1) =	1E-02	cm/s
Steady Intake Water Rate (Q_1) =	4E-01	cm^3/s
hole radius (a) =	3	cm
Water column height in hole (H_1) =	10	cm
Shape factor for H_1/a = (C_1) =	1.3	-
Soil Type Coefficient α^* =	0.12	cm^{-1}

Single Head Analysis

$$K_{fs} = \frac{C_1 Q_1}{2\pi H_1^2 + \pi a^2 C_1 + 2\pi \frac{H_1}{\alpha^*}}$$

Field Saturated Hydraulic Conductivity (K_{fs})

K_{fs} = **5E-04** cm/s

🟩 =input data

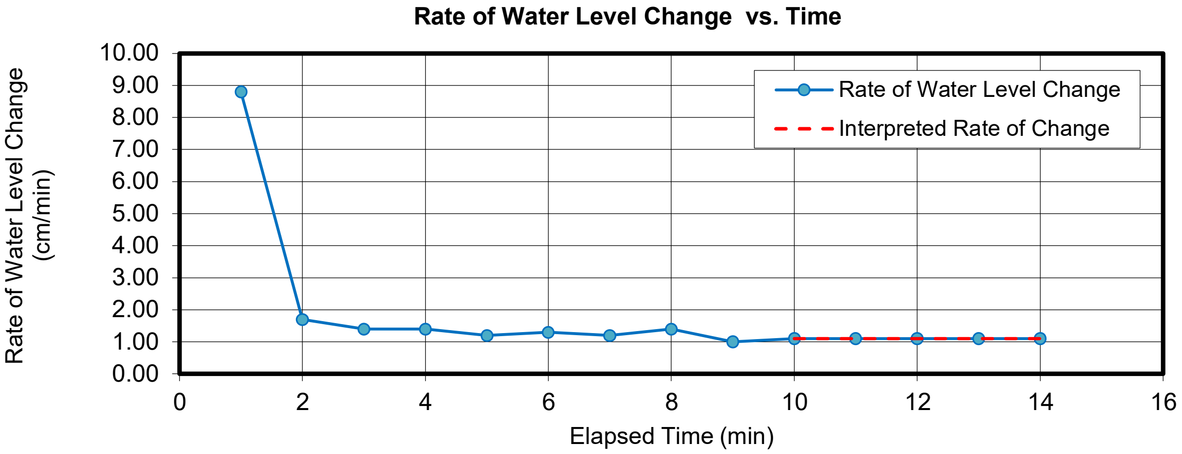
DATE: 2022-07-19
PROJECT: 20141301

PREPARED BY: AGB
REVIEW: JG

Constant Head Permeameter Test Report - GP20-10

Figure F-6

Approximate Location: **1 m North of BH20-10-S**
Test Depth: **0.65 m below grade**



Elapsed Time (min)	Water Level in Reservoir (cm)	Water Level Change (cm)	Infiltration (cm/min)
0.0	0.0	0.0	0.00
1.0	8.8	8.8	8.80
2.0	10.5	1.7	1.70
3.0	11.9	1.4	1.40
4.0	13.3	1.4	1.40
5.0	14.5	1.2	1.20
6.0	15.8	1.3	1.30
7.0	17.0	1.2	1.20
8.0	18.4	1.4	1.40
9.0	19.4	1.0	1.00
10.0	20.5	1.1	1.10
11.0	21.6	1.1	1.10
12.0	22.7	1.1	1.10
13.0	23.8	1.1	1.10
14.0	24.9	1.1	1.10

Soil Type 3 - SAND

Interpreted Rate of:

Water Level Change (R_1) =	2E-02	cm/s
Steady Intake Water Rate (Q_1) =	6E-01	cm^3/s
hole radius (a) =	3	cm
Water column height in hole (H_1) =	10	cm
Shape factor for H_1/a = (C_1) =	1.3	-
Soil Type Coefficient α^* =	0.12	cm^{-1}

Single Head Analysis

$$K_{fs} = \frac{C_1 Q_1}{2\pi H_1^2 + \pi a^2 C_1 + 2\pi \frac{H_1}{\alpha^*}}$$

Field Saturated Hydraulic Conductivity (K_{fs})

K_{fs} = **7E-04** cm/s

🟩 =input data

DATE: 2022-07-19

PROJECT: 20141301

PREPARED BY: AGB

REVIEW: JG

APPENDIX G

Groundwater Analytical Results

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

CLIENT NAME: GOLDER ASSOCIATES LTD.
100 SCOTIA COURT
WHITBY, ON L1N8Y6
(905) 723-2727

ATTENTION TO: Joel Gopaul

PROJECT: 20141301

AGAT WORK ORDER: 21T721685

WATER ANALYSIS REVIEWED BY: Yris Verastegui, Report Reviewer

DATE REPORTED: Mar 23, 2021

PAGES (INCLUDING COVER): 11

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*Notes

Member of: Association of Professional Engineers and Geoscientists of Alberta (APEGA)
Western Enviro-Agricultural Laboratory Association (WEALA)
Environmental Services Association of Alberta (ESAA)

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Certificate of Analysis

AGAT WORK ORDER: 21T721685
PROJECT: 20141301

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

CLIENT NAME: GOLDER ASSOCIATES LTD.
ATTENTION TO: Joel Gopaul
SAMPLING SITE:
SAMPLED BY:

Dissolved Al & Hg

DATE RECEIVED: 2021-03-15
DATE REPORTED: 2021-03-23

			SAMPLE DESCRIPTION:	20-3-F	20-8-SF	20-10-SF
			SAMPLE TYPE:	Water	Water	Water
			DATE SAMPLED:	2021-03-12 10:00	2021-03-12 12:00	2021-03-12 16:00
Parameter	**Unit**	**G / S**	**RDL**	**2217740**	**2217743**	**2217745**
Aluminum-dissolved	mg/L	*	0.004	<0.004	<0.004	<0.004
Dissolved Mercury	mg/L	0.0002	0.0001	<0.0001	<0.0001	<0.0001

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO * Variable - refer to guideline reference document
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

2217740-2217745 Metals analysis completed on a filtered sample.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: Iris Verástegui

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
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http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 21T721685
PROJECT: 20141301

CLIENT NAME: GOLDER ASSOCIATES LTD.
SAMPLING SITE:

ATTENTION TO: Joel Gopaul
SAMPLED BY:

Water Quality Assessment - PWQO (mg/L)

DATE RECEIVED: 2021-03-15

DATE REPORTED: 2021-03-23

			SAMPLE DESCRIPTION:	**20-3**		**20-8-S**		**20-10-S**
			SAMPLE TYPE:	**Water**		**Water**		**Water**
			DATE SAMPLED:	**2021-03-12 10:00**		**2021-03-12 12:00**		**2021-03-12 16:00**
Parameter	**Unit**	**G / S**	**RDL**	**2217736**	**RDL**	**2217742**	**RDL**	**2217744**
Electrical Conductivity	µS/cm		2	920	2	663	2	2210
pH	pH Units	6.5-8.5	NA	7.87	NA	7.90	NA	7.71
Saturation pH (Calculated)				6.52		6.79		6.75
Langelier Index (Calculated)				1.35		1.11		0.960
Hardness (as CaCO3) (Calculated)	mg/L		0.5	583	0.5	430	0.5	508
Total Dissolved Solids	mg/L		20	530	20	354	20	1150
Alkalinity (as CaCO3)	mg/L		5	401	5	276	5	278
Bicarbonate (as CaCO3)	mg/L		5	401	5	276	5	278
Carbonate (as CaCO3)	mg/L		5	<5	5	<5	5	<5
Hydroxide (as CaCO3)	mg/L		5	<5	5	<5	5	<5
Fluoride	mg/L		0.05	<0.05	0.05	<0.05	0.07	<0.07
Chloride	mg/L		0.50	24.4	0.20	25.3	1.0	528
Nitrate as N	mg/L		0.25	<0.25	0.10	0.65	0.5	0.6
Nitrite as N	mg/L		0.25	<0.25	0.10	<0.10	0.5	<0.5
Bromide	mg/L		0.25	<0.25	0.10	<0.10	0.5	<0.5
Sulphate	mg/L		0.50	70.9	0.20	35.0	1.0	16.2
Ortho Phosphate as P	mg/L		0.50	<0.50	0.20	<0.20	1.0	<1.0
Reactive Silica	mg/L		0.25	21.6	0.05	15.1	0.05	8.09
Ammonia as N	mg/L		0.02	<0.02	0.02	0.04	0.02	0.14
Ammonia-Un-ionized (Calculated)	mg/L	0.02	0.000002	<0.000002	0.000002	0.00173	0.000002	0.00400
Total Phosphorus	mg/L	*	0.02	0.05	0.06	0.19	0.02	<0.02
Total Organic Carbon	mg/L		0.5	1.4	0.5	1.2	0.5	2.3
True Colour	TCU		5	<5	5	<5	5	<5
Turbidity	NTU		0.5	39.4	0.5	234	0.5	4.4
Total Calcium	mg/L		0.05	137	0.05	115	0.05	166
Total Magnesium	mg/L		0.05	58.5	0.05	34.7	0.05	22.7
Total Potassium	mg/L		0.05	1.60	0.05	2.15	0.05	1.34
Total Sodium	mg/L		0.05	8.05	0.05	5.56	0.05	234
Total Antimony	mg/L	0.020	0.001	<0.001	0.001	<0.001	0.001	<0.001

Certified By: Iris Verástegui

Certificate of Analysis

AGAT WORK ORDER: 21T721685

PROJECT: 20141301

CLIENT NAME: GOLDER ASSOCIATES LTD.

ATTENTION TO: Joel Gopaul

SAMPLING SITE:

SAMPLED BY:

Water Quality Assessment - PWQO (mg/L)

DATE RECEIVED: 2021-03-15

DATE REPORTED: 2021-03-23

SAMPLE DESCRIPTION:				20-3		20-8-S		20-10-S
SAMPLE TYPE:				Water		Water		Water
DATE SAMPLED:				2021-03-12 10:00		2021-03-12 12:00		2021-03-12 16:00
Parameter	**Unit**	**G / S**	**RDL**	**2217736**	**RDL**	**2217742**	**RDL**	**2217744**
Total Arsenic	mg/L	0.1	0.003	0.004	0.003	0.004	0.003	<0.003
Total Barium	mg/L		0.002	0.120	0.002	0.134	0.002	0.101
Total Beryllium	mg/L	*	0.0005	<0.0005	0.0005	<0.0005	0.0005	<0.0005
Total Boron	mg/L	0.2	0.010	0.018	0.010	0.015	0.010	0.023
Total Cadmium	mg/L	0.0002	0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001
Total Chromium	mg/L		0.003	<0.003	0.003	0.003	0.003	<0.003
Total Cobalt	mg/L	0.0009	0.0005	0.0008	0.0005	**0.0015**	0.0005	<0.0005
Total Copper	mg/L	0.005	0.001	0.001	0.001	0.003	0.001	<0.001
Total Iron	mg/L	0.3	0.010	**1.84**	0.010	**3.30**	0.010	0.049
Total Lead	mg/L	*	0.001	<0.001	0.001	0.004	0.001	<0.001
Total Manganese	mg/L		0.002	0.160	0.002	0.287	0.002	0.115
Total Molybdenum	mg/L	0.040	0.002	<0.002	0.002	0.002	0.002	<0.002
Total Nickel	mg/L	0.025	0.003	<0.003	0.003	0.004	0.003	0.021
Total Selenium	mg/L	0.1	0.004	<0.004	0.004	<0.004	0.004	<0.004
Total Silver	mg/L	0.0001	0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001
Total Strontium	mg/L		0.005	0.288	0.005	0.222	0.005	0.717
Total Thallium	mg/L	0.0003	0.0003	<0.0003	0.0003	<0.0003	0.0003	<0.0003
Total Tin	mg/L		0.002	<0.002	0.002	<0.002	0.002	<0.002
Total Titanium	mg/L		0.002	0.016	0.002	0.122	0.002	<0.002
Total Tungsten	mg/L	0.030	0.010	<0.010	0.010	<0.010	0.010	<0.010
Total Uranium	mg/L	0.005	0.002	<0.002	0.002	0.002	0.002	<0.002
Total Vanadium	mg/L	0.006	0.002	<0.002	0.002	0.005	0.002	<0.002
Total Zinc	mg/L	0.030	0.005	<0.005	0.005	0.014	0.005	<0.005
Total Zirconium	mg/L	0.004	0.004	<0.004	0.004	<0.004	0.004	<0.004

Certified By: Iris Verástegui

Water Quality Assessment - PWQO (mg/L)

DATE RECEIVED: 2021-03-15

DATE REPORTED: 2021-03-23

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO * Variable - refer to guideline reference document
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

2217736 Dilution required, RDL has been increased accordingly.
Un-ionized Ammonia detection limit is a calculated RDL. The calculation of Un-ionized Ammonia is based on lab measured parameters (ammonia as N, pH and temperature).Values are reported as calculated.

2217742-2217744 Dilution required, RDL has been increased accordingly.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: Iris Verástegui

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	UNIT	GUIDEVALUE	RESULT
2217736	20-3	ON PWQO	Water Quality Assessment - PWQO (mg/L)	Total Iron	mg/L	0.3	1.84
2217742	20-8-S	ON PWQO	Water Quality Assessment - PWQO (mg/L)	Total Cobalt	mg/L	0.0009	0.0015
2217742	20-8-S	ON PWQO	Water Quality Assessment - PWQO (mg/L)	Total Iron	mg/L	0.3	3.30

Quality Assurance

CLIENT NAME: GOLDER ASSOCIATES LTD. **AGAT WORK ORDER: 21T721685**
PROJECT: 20141301 **ATTENTION TO: Joel Gopaul**
SAMPLING SITE: **SAMPLED BY:**

Water Analysis

RPT Date: Mar 23, 2021			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Water Quality Assessment - PWQO (mg/L)															
Electrical Conductivity	2217742	2217742	663	665	0.3%	< 2	102%	90%	110%						
pH	2217742	2217742	7.90	7.63	3.5%	NA	101%	90%	110%						
Total Dissolved Solids	2207987		172	180	4.5%	< 20	98%	80%	120%						
Alkalinity (as CaCO3)	2217742	2217742	276	273	1.1%	< 5	88%	80%	120%						
Bicarbonate (as CaCO3)	2217742	2217742	276	273	1.1%	< 5	NA								
Carbonate (as CaCO3)	2217742	2217742	<5	<5	NA	< 5	NA								
Hydroxide (as CaCO3)	2217742	2217742	<5	<5	NA	< 5	NA								
Fluoride	2217736	2217736	<0.05	<0.05	NA	< 0.05	99%	90%	110%	104%	90%	110%	100%	85%	115%
Chloride	2217736	2217736	24.4	25.0	2.4%	< 0.10	90%	70%	130%	104%	80%	120%	107%	70%	130%
Nitrate as N	2217736	2217736	<0.25	<0.25	NA	< 0.05	94%	70%	130%	105%	80%	120%	107%	70%	130%
Nitrite as N	2217736	2217736	<0.25	<0.25	NA	< 0.05	94%	70%	130%	102%	80%	120%	102%	70%	130%
Bromide	2217736	2217736	<0.25	<0.25	NA	< 0.05	107%	90%	110%	107%	90%	110%	111%	85%	115%
Sulphate	2217736	2217736	70.9	70.6	0.4%	< 0.10	98%	70%	130%	105%	80%	120%	105%	70%	130%
Ortho Phosphate as P	2217736	2217736	<0.50	<0.50	NA	< 0.10	98%	70%	130%	101%	80%	120%	100%	70%	130%
Reactive Silica	2222108		18.1	18.3	1.1%	< 0.05	98%	90%	110%	100%	90%	110%	115%	80%	120%
Ammonia as N	2220598		<0.02	<0.02	NA	< 0.02	106%	70%	130%	99%	80%	120%	117%	70%	130%
Total Phosphorus	2222108		<0.02	<0.02	NA	< 0.02	101%	70%	130%	102%	80%	120%	105%	70%	130%
Total Organic Carbon	2217736	2217736	1.4	1.3	NA	< 0.5	92%	90%	110%	91%	90%	110%	90%	80%	120%
True Colour	2217736	2217736	<5	<5	NA	< 5	102%	90%	110%						
Turbidity	2217736	2217736	39.4	39.2	0.5%	< 0.5	101%	80%	120%						
Total Calcium	2213263		7.79	7.10	9.3%	< 0.05	102%	70%	130%	101%	80%	120%	98%	70%	130%
Total Magnesium	2213263		0.83	0.87	4.7%	< 0.05	108%	70%	130%	107%	80%	120%	105%	70%	130%
Total Potassium	2213263		0.31	0.08	NA	< 0.05	107%	70%	130%	103%	80%	120%	102%	70%	130%
Total Sodium	2213263		2.74	2.46	10.8%	< 0.05	106%	70%	130%	101%	80%	120%	104%	70%	130%
Total Antimony	2213263		<0.001	<0.001	NA	< 0.001	107%	70%	130%	105%	80%	120%	98%	70%	130%
Total Arsenic	2213263		<0.003	<0.003	NA	< 0.003	94%	70%	130%	104%	80%	120%	101%	70%	130%
Total Barium	2213263		0.015	0.015	0.0%	< 0.002	99%	70%	130%	100%	80%	120%	97%	70%	130%
Total Beryllium	2213263		<0.0005	<0.0005	NA	< 0.0005	100%	70%	130%	102%	80%	120%	95%	70%	130%
Total Boron	2213263		<0.010	<0.010	NA	< 0.010	100%	70%	130%	100%	80%	120%	95%	70%	130%
Total Cadmium	2213263		0.0001	0.0001	NA	< 0.0001	101%	70%	130%	101%	80%	120%	96%	70%	130%
Total Chromium	2213263		<0.003	<0.003	NA	< 0.003	100%	70%	130%	98%	80%	120%	98%	70%	130%
Total Cobalt	2213263		0.0038	0.0037	2.7%	< 0.0005	99%	70%	130%	104%	80%	120%	100%	70%	130%
Total Copper	2213263		0.001	0.002	NA	< 0.001	101%	70%	130%	102%	80%	120%	99%	70%	130%
Total Iron	2213263		0.308	0.336	8.7%	< 0.010	99%	70%	130%	101%	80%	120%	98%	70%	130%
Total Lead	2213263		<0.001	<0.001	NA	< 0.001	98%	70%	130%	100%	80%	120%	97%	70%	130%
Total Manganese	2213263		1.45	1.50	3.4%	< 0.002	98%	70%	130%	101%	80%	120%	95%	70%	130%
Total Molybdenum	2213263		<0.002	<0.002	NA	< 0.002	103%	70%	130%	104%	80%	120%	102%	70%	130%
Total Nickel	2213263		<0.003	<0.003	NA	< 0.003	100%	70%	130%	104%	80%	120%	100%	70%	130%
Total Selenium	2213263		<0.004	<0.004	NA	< 0.004	107%	70%	130%	107%	80%	120%	106%	70%	130%

Quality Assurance

CLIENT NAME: GOLDER ASSOCIATES LTD.
PROJECT: 20141301
SAMPLING SITE:

AGAT WORK ORDER: 21T721685
ATTENTION TO: Joel Gopaul
SAMPLED BY:

Water Analysis (Continued)

RPT Date: Mar 23, 2021			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Total Silver	2213263		<0.0001	<0.0001	NA	< 0.0001	103%	70%	130%	105%	80%	120%	100%	70%	130%
Total Strontium	2213263		0.035	0.041	15.8%	< 0.005	99%	70%	130%	102%	80%	120%	103%	70%	130%
Total Thallium	2213263		<0.0003	<0.0003	NA	< 0.0003	94%	70%	130%	105%	80%	120%	98%	70%	130%
Total Tin	2213263		<0.002	<0.002	NA	< 0.002	101%	70%	130%	105%	80%	120%	98%	70%	130%
Total Titanium	2213263		0.004	<0.002	NA	< 0.002	102%	70%	130%	109%	80%	120%	102%	70%	130%
Total Tungsten	2213263		<0.010	<0.010	NA	< 0.010	97%	70%	130%	100%	80%	120%	95%	70%	130%
Total Uranium	2213263		<0.002	<0.002	NA	< 0.002	103%	70%	130%	101%	80%	120%	101%	70%	130%
Total Vanadium	2213263		<0.002	<0.002	NA	< 0.002	99%	70%	130%	104%	80%	120%	100%	70%	130%
Total Zinc	2213263		<0.005	0.014	NA	< 0.005	103%	70%	130%	105%	80%	120%	110%	70%	130%
Total Zirconium	2213263		<0.004	<0.004	NA	< 0.004	98%	70%	130%	100%	80%	120%	98%	70%	130%
Dissolved Al & Hg															
Aluminum-dissolved	2217740	2217740	<0.004	0.005	NA	< 0.004	107%	70%	130%	111%	80%	120%	93%	70%	130%
Dissolved Mercury	2211353		< 0.0001	< 0.0001	NA	< 0.0001	102%	70%	130%	103%	80%	120%	99%	70%	130%

Comments: NA signifies Not Applicable.
If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.
Matrix spike: Spike level < native concentration. Matrix spike acceptance limits do not apply.

Certified By: Iris Verástegui

Method Summary

CLIENT NAME: GOLDER ASSOCIATES LTD.
PROJECT: 20141301
SAMPLING SITE:

AGAT WORK ORDER: 21T721685
ATTENTION TO: Joel Gopaul
SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Aluminum-dissolved	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Mercury	MET-93-6100	modified from EPA 245.2 and SM 3112 B	CVAAS
Electrical Conductivity	INOR-93-6000	modified from SM 2510 B	PC TITRATE
pH	INOR-93-6000	modified from SM 4500-H+ B	PC TITRATE
Saturation pH (Calculated)		SM 2320 B	CALCULATION
Langelier Index (Calculated)		SM 2330B	CALCULATION
Hardness (as CaCO3) (Calculated)	MET-93-6105	modified from EPA SW-846 6010C & 200.7 & SM 2340 B	CALCULATION
Total Dissolved Solids	INOR-93-6028	modified from EPA 1684,ON MOECC E3139,SM 2540C,D	BALANCE
Alkalinity (as CaCO3)	INOR-93-6000	SM 2320 B	PC TITRATE
Bicarbonate (as CaCO3)	INOR-93-6000	SM 2320 B	PC TITRATE
Carbonate (as CaCO3)	INOR-93-6000	SM 2320 B	PC TITRATE
Hydroxide (as CaCO3)	INOR-93-6000	SM 2320 B	PC TITRATE
Fluoride	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Chloride	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Nitrate as N	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Bromide	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Sulphate	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Ortho Phosphate as P	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Reactive Silica	INOR-93-6070	QuickChem 10-114-27-1-A & SM 4500 Si-F	LACHAT FIA
Ammonia as N	INOR-93-6059	modified from SM 4500-NH3 H	LACHAT FIA
Ammonia-Un-ionized (Calculated)		MOE REFERENCE, PWQOs Tab 2	CALCULATION
Total Phosphorus	INOR-93-6022	modified from SM 4500-P B and SM 4500-P E	SPECTROPHOTOMETER
Total Organic Carbon	INOR-93-6049	modified from SM 5310 B	SHIMADZU CARBON ANALYZER
True Colour	INOR-93-6046	SM 2120 B	SPECTROPHOTOMETER
Turbidity	INOR-93-6044	modified from SM 2130 B	NEPHELOMETER
Total Calcium	MET-93-6105	modified from EPA 6010D	ICP/OES
Total Magnesium	MET-93-6105	modified from EPA 6010D	ICP/OES
Total Potassium	MET-93-6105	modified from EPA 6010D	ICP/OES
Total Sodium	MET-93-6105	modified from EPA 6010D	ICP/OES
Total Antimony	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Arsenic	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Barium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Beryllium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Boron	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Cadmium	MET -93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Chromium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Cobalt	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS

Method Summary

CLIENT NAME: GOLDER ASSOCIATES LTD.
PROJECT: 20141301
SAMPLING SITE:

AGAT WORK ORDER: 21T721685
ATTENTION TO: Joel Gopaul
SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Total Copper	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Iron	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Lead	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Manganese	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Molybdenum	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Nickel	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Selenium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Silver	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Strontium	INOR-93-6003	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Thallium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Tin	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Titanium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Tungsten	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Uranium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Vanadium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Zinc	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Zirconium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS

AGAT Laboratories

MED

5835 Coopers Avenue
Mississauga, Ontario L4Z 1Y2
Ph: 905.712.5100 Fax: 905.712.5122
webearth.agatlabs.com

Laboratory Use Only

Work Order #: 21T721685

Cooler Quantity:

Arrival Temperatures: 1.7 | .8 | 1.8
3.8 | 3.5 | 4.1

Custody Seal Intact: ☐Yes ☐No ☐N/A

Notes: FREE ICE

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

Report Information:

Company: Golder

Contact: Joel Gopaul

Address: 100 Scotia Crt

Phone:
Fax:

Reports to be sent to:

1. Email: Joel_Gopaul2@golder.com

2. Email: Aaron_Beard@golder.com

Regulatory Requirements:

(Please check all applicable boxes)

☐ Regulation 153/04

Table ____ *Indicate One*

☐Ind/Com

☐Res/Park

☐Agriculture

Soil Texture *(Check One)*

☐Coarse

☐Fine

☐ Excess Soils R406

Table ____ *Indicate One*

☐ Regulation 558

☐ CCME

☐ Sewer Use

☐Sanitary ☐Storm

____ *Region*

☒ Prov. Water Quality Objectives (PWQO)

☐ Other

____ *Indicate One*

Is this submission for a **Record of Site Condition?**
☐ Yes ☒ No

Report Guideline on *Certificate of Analysis*
☒ Yes ☐ No

Turnaround Time (TAT) Required:

Regular TAT **(Most Analysis)** ☒ 5 to 7 Business Days

Rush TAT **(Rush Surcharges Apply)**

☐ 3 Business Days ☐ 2 Business Days ☐ Next Business Day

OR Date Required (Rush Surcharges May Apply):

Please provide prior notification for rush TAT

**TAT is exclusive of weekends and statutory holidays*

For 'Same Day' analysis, please contact your AGAT CPM

Project Information:

Project: 20141301

Site Location: South Fergus

Sampled By: AG/AB

AGAT ID #:
PO:

Please note: If quotation number is not provided, client will be billed full price for analysis.

Invoice Information:

Bill To Same: Yes ☒ No ☐

Company: Golder

Contact: Joel Gopaul

Address:

Email: Joel_Gopaul2@golder.com

Sample Matrix Legend

B	Biota
GW	Ground Water
O	Oil
P	Paint
S	Soil
SD	Sediment
SW	Surface Water

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI, DOC Y / N	O. Reg 153 Metals & Inorganics	O. Reg 153 Metals - ☐CrVI, ☐Hg, ☐HWSB	O. Reg 153 BTEX, F1-F4 PHCs Analyze F4G if required ☐Yes ☐No	PAHs	Total PCBs ☐Aroclor	VOC	O. Reg 558 Landfill Disposal Characterization TCLP: TCLP: ☐M&I ☐VOCs ☐ABNs ☐B(a)P ☐PCBs	O. Reg 406 Excess Soils SPLP Rainwater Leach SPLP: ☐Metals ☐VOCs ☐SVOCs	O. Reg 406 Excess Soils Characterization Package pH, ICPMS Metals, BTEX, F1-F4	Salt - EC/SAR	WQA	dissolved Al	dissolved Hg					Potentially Hazardous or High Concentration (Y/N)
20-3	12/03/21	10:00 AM	7	GW	~~diss~~	N											X							N
20-3-F	↓	10:00 AM	3	↓	dissolved Al, Hg	Y												X	X					N
20-8-S		12:00 PM	7			N											X							N
20-8-SF		12:00 PM	3		dissolved Al, Hg	Y												X	X					N
20-10-S		4:00 PM	7			N											X							N
20-10-SF		4:00 PM	3		dissolved Al, Hg	Y												X	X					N
		AM PM																						
		AM PM																						
		AM PM																						
		AM PM																						
		AM PM																						

Samples Relinquished By (Print Name and Sign): Aaron Beard (aBeard)
Date: 14/03/21
Time: 11:00

Samples Received By (Print Name and Sign): D.
Date: 03/15/21
Time: 11:25

Samples Relinquished By (Print Name and Sign): D
Date: 03/15/21
Time: 2:00

Samples Received By (Print Name and Sign):
Date:
Time:

Samples Relinquished By (Print Name and Sign):
Date:
Time:

Samples Received By (Print Name and Sign):
Date:
Time:

Page 1 of 1

Nº: T116062

Pink Copy - Client | Yellow Copy - AGAT | White Copy- AGAT

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

CLIENT NAME: GOLDER ASSOCIATES LTD.
100 SCOTIA COURT
WHITBY, ON L1N8Y6
(905) 723-2727
ATTENTION TO: Joel Gopaul
PROJECT: 20141301
AGAT WORK ORDER: 22T916870
WATER ANALYSIS REVIEWED BY: Yris Verastegui, Report Reviewer
DATE REPORTED: Jul 28, 2022
PAGES (INCLUDING COVER): 10
VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

Notes

Disclaimer:

- All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.
- All samples will be disposed of within 30 days after receipt unless a Long Term Storage Agreement is signed and returned. Some specialty analysis may be exempt, please contact your Client Project Manager for details.
- AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.
- This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
- The test results reported herewith relate only to the samples as received by the laboratory.
- Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, or non-infringement. AGAT assumes no responsibility for any errors or omissions in the guidelines contained in this document.
- All reportable information as specified by ISO/IEC 17025:2017 is available from AGAT Laboratories upon request.

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Western Enviro-Agricultural Laboratory Association (WEALA)
Environmental Services Association of Alberta (ESAA)

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Certificate of Analysis

AGAT WORK ORDER: 22T916870
PROJECT: 20141301

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

CLIENT NAME: GOLDER ASSOCIATES LTD.
SAMPLING SITE:South Furgus

ATTENTION TO: Joel Gopaul
SAMPLED BY:AGB

Water Quality Assessment - PWQO (mg/L)

DATE RECEIVED: 2022-07-06

DATE REPORTED: 2022-07-28

			SAMPLE DESCRIPTION:	20-4	20-8-S		20-10-S
			SAMPLE TYPE:	Water	Water		Water
			DATE SAMPLED:	2022-07-05 13:00	2022-07-05 16:30		2022-07-05 15:00
Parameter	Unit	G / S	RDL	4057067	4057078	RDL	4057079
Electrical Conductivity	µS/cm		2	771	645	2	1070
pH	pH Units	6.5-8.5	NA	7.83	7.87	NA	7.90
Saturation pH (Calculated)				6.90	6.76		6.85
Langelier Index (Calculated)				0.926	1.11		1.05
Hardness (as CaCO3) (Calculated)	mg/L		0.5	314	451	0.5	368
Total Dissolved Solids	mg/L		10	436	384	10	604
Alkalinity (as CaCO3)	mg/L		5	288	279	5	300
Bicarbonate (as CaCO3)	mg/L		5	288	279	5	300
Carbonate (as CaCO3)	mg/L		5	<5	<5	5	<5
Hydroxide (as CaCO3)	mg/L		5	<5	<5	5	<5
Fluoride	mg/L		0.05	<0.05	<0.05	0.05	<0.05
Chloride	mg/L		0.10	65.8	25.5	0.12	162
Nitrate as N	mg/L		0.05	3.29	0.25	0.05	1.26
Nitrite as N	mg/L		0.05	<0.05	<0.05	0.05	<0.05
Bromide	mg/L		0.05	<0.05	<0.05	0.05	<0.05
Sulphate	mg/L		0.10	18.7	40.2	0.10	7.48
Ortho Phosphate as P	mg/L		0.10	<0.10	<0.10	0.10	<0.10
Ammonia as N	mg/L		0.02	<0.02	0.02	0.02	<0.02
Ammonia-Un-ionized (Calculated)	mg/L	0.02	0.000002	<0.000002	0.000990	0.000002	<0.000002
Total Phosphorus	mg/L	*	0.02	0.02	0.03	0.02	<0.02
Total Organic Carbon	mg/L		0.5	1.0	1.4	0.5	1.1
True Colour	TCU		5.00	<5.00	<5.00	5.00	<5.00
Turbidity	NTU		0.5	8.9	246	0.5	0.7
Total Calcium	mg/L		0.20	106	127	0.20	100
Total Magnesium	mg/L		0.10	11.9	32.4	0.10	28.7
Total Potassium	mg/L		0.50	<0.50	0.68	0.50	<0.50
Total Sodium	mg/L		0.10	81.0	4.27	0.10	27.9
Aluminum-dissolved	mg/L	*	0.004	0.005	0.005	0.004	0.005
Total Antimony	mg/L	0.020	0.001	<0.001	<0.001	0.001	<0.001

Certified By: Iris Verástegui

Certificate of Analysis

AGAT WORK ORDER: 22T916870
PROJECT: 20141301

CLIENT NAME: GOLDER ASSOCIATES LTD.
SAMPLING SITE:South Furgus

ATTENTION TO: Joel Gopaul
SAMPLED BY:AGB

Water Quality Assessment - PWQO (mg/L)

DATE RECEIVED: 2022-07-06

DATE REPORTED: 2022-07-28

			SAMPLE DESCRIPTION:	20-4	20-8-S		20-10-S
			SAMPLE TYPE:	Water	Water		Water
			DATE SAMPLED:	2022-07-05 13:00	2022-07-05 16:30		2022-07-05 15:00
Parameter	Unit	G / S	RDL	4057067	4057078	RDL	4057079
Total Arsenic	mg/L	0.1	0.003	<0.003	0.004	0.003	<0.003
Total Barium	mg/L		0.002	0.024	0.140	0.002	0.029
Total Beryllium	mg/L	*	0.001	<0.001	<0.001	0.001	<0.001
Total Boron	mg/L	0.2	0.010	0.048	0.036	0.010	0.041
Total Cadmium	mg/L	0.0002	0.0001	0.0001	<0.0001	0.0001	<0.0001
Total Chromium	mg/L		0.003	<0.003	0.006	0.003	<0.003
Total Cobalt	mg/L	0.0009	0.0005	<0.0005	0.0020	0.0005	<0.0005
Total Copper	mg/L	0.005	0.001	0.001	0.006	0.001	0.001
Total Iron	mg/L	0.3	0.010	<0.010	4.27	0.010	0.410
Total Lead	mg/L	*	0.001	<0.001	0.005	0.001	<0.001
Total Manganese	mg/L		0.002	<0.002	0.232	0.002	0.015
Dissolved Mercury	mg/L	0.0002	0.0001	<0.0001	<0.0001	0.0001	<0.0001
Total Molybdenum	mg/L	0.040	0.002	<0.002	<0.002	0.002	<0.002
Total Nickel	mg/L	0.025	0.003	<0.003	0.003	0.003	<0.003
Total Selenium	mg/L	0.1	0.002	<0.002	0.002	0.002	<0.002
Total Silver	mg/L	0.0001	0.0001	0.0001	<0.0001	0.0001	<0.0001
Total Strontium	mg/L		0.005	0.332	0.228	0.005	0.146
Total Thallium	mg/L	0.0003	0.0003	<0.0003	<0.0003	0.0003	<0.0003
Total Tin	mg/L		0.002	<0.002	<0.002	0.002	<0.002
Total Titanium	mg/L		0.010	<0.010	0.129	0.010	0.021
Total Tungsten	mg/L	0.030	0.010	<0.010	<0.010	0.010	<0.010
Total Uranium	mg/L	0.005	0.002	<0.002	<0.002	0.002	<0.002
Total Vanadium	mg/L	0.006	0.002	<0.002	0.007	0.002	<0.002
Total Zinc	mg/L	0.030	0.020	<0.020	0.060	0.020	<0.020
Total Zirconium	mg/L	0.004	0.004	<0.004	<0.004	0.004	<0.004
Lab Filtration Aluminum Dissolved				2022/7/7	2022/7/7		2022/7/7

Certified By: Iris Verástegui

Water Quality Assessment - PWQO (mg/L)

DATE RECEIVED: 2022-07-06

DATE REPORTED: 2022-07-28

Comments:	RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO * Variable - refer to guideline reference document Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.
4057067-4057079	Diss.Al analysis completed on a lab filtered sample. Dilution required, RDL has been increased accordingly. Un-ionized Ammonia detection limit is a calculated RDL. The calculation of Un-ionized Ammonia is based on lab measured parameters (ammonia as N, pH and temperature).Values are reported as calculated.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: Iris Verástegui

Exceedance Summary

AGAT WORK ORDER: 22T916870

PROJECT: 20141301

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

CLIENT NAME: GOLDER ASSOCIATES LTD.

ATTENTION TO: Joel Gopaul

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	UNIT	GUIDEVALUE	RESULT
4057078	20-8-S	ON PWQO	Water Quality Assessment - PWQO (mg/L)	Total Cobalt	mg/L	0.0009	0.0020
4057078	20-8-S	ON PWQO	Water Quality Assessment - PWQO (mg/L)	Total Copper	mg/L	0.005	0.006
4057078	20-8-S	ON PWQO	Water Quality Assessment - PWQO (mg/L)	Total Iron	mg/L	0.3	4.27
4057078	20-8-S	ON PWQO	Water Quality Assessment - PWQO (mg/L)	Total Vanadium	mg/L	0.006	0.007
4057078	20-8-S	ON PWQO	Water Quality Assessment - PWQO (mg/L)	Total Zinc	mg/L	0.030	0.060
4057079	20-10-S	ON PWQO	Water Quality Assessment - PWQO (mg/L)	Total Iron	mg/L	0.3	0.410

Quality Assurance

CLIENT NAME: GOLDER ASSOCIATES LTD.
PROJECT: 20141301
SAMPLING SITE:South Furgus

AGAT WORK ORDER: 22T916870
ATTENTION TO: Joel Gopaul
SAMPLED BY:AGB

Water Analysis

RPT Date: Jul 28, 2022			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits Lower	Acceptable Limits Upper	Recovery	Acceptable Limits Lower	Acceptable Limits Upper	Recovery	Acceptable Limits Lower	Acceptable Limits Upper
Water Quality Assessment - PWQO (mg/L)															
Electrical Conductivity	4056352		136	133	2.2%	< 2	104%	90%	110%						
pH	4056352		6.93	6.89	0.6%	NA	102%	90%	110%						
Total Dissolved Solids	4056343		74	74	0.0%	< 10	96%	80%	120%						
Alkalinity (as CaCO3)	4056352		24	21	NA	< 5	90%	80%	120%						
Bicarbonate (as CaCO3)	4056352		24	21	NA	< 5	NA								
Carbonate (as CaCO3)	4056352		<5	<5	NA	< 5	NA								
Hydroxide (as CaCO3)	4056352		<5	<5	NA	< 5	NA								
Fluoride	4054678		<0.05	<0.05	NA	< 0.05	104%	70%	130%	108%	80%	120%	101%	70%	130%
Chloride	4054678		126	125	0.8%	< 0.10	101%	70%	130%	103%	80%	120%	NA	70%	130%
Nitrate as N	4054678		0.34	0.33	3.0%	< 0.05	97%	70%	130%	101%	80%	120%	100%	70%	130%
Nitrite as N	4054678		<0.05	<0.05	NA	< 0.05	93%	70%	130%	105%	80%	120%	102%	70%	130%
Bromide	4054678		<0.05	<0.05	NA	< 0.05	110%	70%	130%	100%	80%	120%	101%	70%	130%
Sulphate	4054678		100	100	0.0%	< 0.10	99%	70%	130%	101%	80%	120%	98%	70%	130%
Ortho Phosphate as P	4054678		<0.10	<0.10	NA	< 0.10	91%	70%	130%	104%	80%	120%	99%	70%	130%
Ammonia as N	4055609		0.16	0.16	0.0%	< 0.02	106%	70%	130%	102%	80%	120%	94%	70%	130%
Total Phosphorus	4060901		0.20	0.19	5.1%	< 0.02	99%	70%	130%	98%	80%	120%	NA	70%	130%
Total Organic Carbon	4057785		2.3	2.3	NA	< 0.5	99%	90%	110%	93%	90%	110%	89%	80%	120%
True Colour	4057785		115	110	4.4%	< 5	104%	90%	110%						
Turbidity	4055797		258	262	1.5%	< 0.5	102%	80%	120%						
Total Calcium	4061728		253	268	5.8%	< 0.20	106%	70%	130%	104%	80%	120%	92%	70%	130%
Total Magnesium	4061728		54.6	49.4	10.0%	< 0.10	99%	70%	130%	97%	80%	120%	87%	70%	130%
Total Potassium	4061728		46.1	50.0	8.1%	< 0.50	98%	70%	130%	96%	80%	120%	71%	70%	130%
Total Sodium	4061728		2100	2410	13.7%	< 0.10	104%	70%	130%	95%	80%	120%	NA	70%	130%
Aluminum-dissolved	4057067	4057067	0.005	0.005	NA	< 0.004	108%	70%	130%	103%	80%	120%	108%	70%	130%
Total Antimony	4061728		<0.001	<0.001	NA	< 0.001	99%	70%	130%	95%	80%	120%	100%	70%	130%
Total Arsenic	4061728		0.003	0.005	NA	< 0.003	93%	70%	130%	91%	80%	120%	91%	70%	130%
Total Barium	4061728		0.048	0.051	6.1%	< 0.002	100%	70%	130%	97%	80%	120%	104%	70%	130%
Total Beryllium	4061728		<0.001	<0.001	NA	< 0.001	100%	70%	130%	87%	80%	120%	78%	70%	130%
Total Boron	4061728		2.41	2.58	6.8%	< 0.010	100%	70%	130%	94%	80%	120%	84%	70%	130%
Total Cadmium	4061728		<0.0001	<0.0001	NA	< 0.0001	99%	70%	130%	94%	80%	120%	89%	70%	130%
Total Chromium	4061728		0.005	0.005	NA	< 0.003	103%	70%	130%	102%	80%	120%	102%	70%	130%
Total Cobalt	4061728		0.0020	0.0022	NA	< 0.0005	104%	70%	130%	93%	80%	120%	99%	70%	130%
Total Copper	4061728		0.015	0.016	6.5%	< 0.001	101%	70%	130%	99%	80%	120%	87%	70%	130%
Total Iron	4061728		5.12	5.94	14.8%	< 0.010	111%	70%	130%	101%	80%	120%	102%	70%	130%
Total Lead	4061728		0.002	0.002	NA	< 0.001	100%	70%	130%	93%	80%	120%	87%	70%	130%
Total Manganese	4061728		0.543	0.556	2.4%	< 0.002	101%	70%	130%	93%	80%	120%	89%	70%	130%
Dissolved Mercury	4057067	4057067	<0.0001	<0.0001	NA	< 0.0001	102%	70%	130%	100%	80%	120%	98%	70%	130%
Total Molybdenum	4061728		<0.002	<0.002	NA	< 0.002	100%	70%	130%	101%	80%	120%	106%	70%	130%
Total Nickel	4061728		0.003	0.003	NA	< 0.003	101%	70%	130%	89%	80%	120%	91%	70%	130%

Quality Assurance

CLIENT NAME: GOLDER ASSOCIATES LTD.
PROJECT: 20141301
SAMPLING SITE:South Furgus

AGAT WORK ORDER: 22T916870
ATTENTION TO: Joel Gopaul
SAMPLED BY:AGB

Water Analysis (Continued)

RPT Date: Jul 28, 2022			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Total Selenium	4061728		0.036	0.032	11.8%	< 0.002	101%	70%	130%	88%	80%	120%	87%	70%	130%
Total Silver	4061728		0.0006	0.0005	18.2%	< 0.0001	100%	70%	130%	87%	80%	120%	86%	70%	130%
Total Strontium	4061728		10.2	10.8	5.7%	< 0.005	104%	70%	130%	94%	80%	120%	74%	70%	130%
Total Thallium	4061728		<0.0003	<0.0003	NA	< 0.0003	107%	70%	130%	96%	80%	120%	87%	70%	130%
Total Tin	4061728		<0.002	<0.002	NA	< 0.002	104%	70%	130%	99%	80%	120%	101%	70%	130%
Total Titanium	4061728		0.013	0.020	NA	< 0.010	109%	70%	130%	92%	80%	120%	119%	70%	130%
Total Tungsten	4061728		<0.010	<0.010	NA	< 0.010	101%	70%	130%	98%	80%	120%	103%	70%	130%
Total Uranium	4061728		<0.002	<0.002	NA	< 0.002	96%	70%	130%	93%	80%	120%	96%	70%	130%
Total Vanadium	4061728		0.004	0.005	NA	< 0.002	103%	70%	130%	94%	80%	120%	104%	70%	130%
Total Zinc	4061728		0.023	0.022	NA	< 0.020	99%	70%	130%	97%	80%	120%	92%	70%	130%
Total Zirconium	4061728		<0.004	<0.004	NA	< 0.004	98%	70%	130%	100%	80%	120%	101%	70%	130%

Comments: NA signifies Not Applicable.
If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.
Matrix spike: Spike level < native concentration. Matrix spike acceptance limits do not apply.

Certified By: Iris Verástegui

Method Summary

CLIENT NAME: GOLDER ASSOCIATES LTD.
PROJECT: 20141301
SAMPLING SITE:South Furgus

AGAT WORK ORDER: 22T916870
ATTENTION TO: Joel Gopaul
SAMPLED BY:AGB

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Electrical Conductivity	INOR-93-6000	modified from SM 2510 B	PC TITRATE
pH	INOR-93-6000	modified from SM 4500-H+ B	PC TITRATE
Saturation pH (Calculated)		SM 2320 B	CALCULATION
Langelier Index (Calculated)		SM 2330B	CALCULATION
Hardness (as CaCO3) (Calculated)	MET-93-6105	modified from EPA SW-846 6010C & 200.7 & SM 2340 B	CALCULATION
Total Dissolved Solids	INOR-93-6028	modified from EPA 1684,ON MOECC E3139,SM 2540C,D	BALANCE
Alkalinity (as CaCO3)	INOR-93-6000	Modified from SM 2320 B	PC TITRATE
Bicarbonate (as CaCO3)	INOR-93-6000	modified from SM 2320 B	PC TITRATE
Carbonate (as CaCO3)	INOR-93-6000	modified from SM 2320 B	PC TITRATE
Hydroxide (as CaCO3)	INOR-93-6000	modified from SM 2320 B	PC TITRATE
Fluoride	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Chloride	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Nitrate as N	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Bromide	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Sulphate	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Ortho Phosphate as P	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Ammonia as N	INOR-93-6059	modified from SM 4500-NH3 H	LACHAT FIA
Ammonia-Un-ionized (Calculated)		MOE REFERENCE, PWQOs Tab 2	CALCULATION
Total Phosphorus	INOR-93-6022	modified from SM 4500-P B and SM 4500-P E	SPECTROPHOTOMETER
Total Organic Carbon	INOR-93-6049	modified from SM 5310 B	SHIMADZU CARBON ANALYZER
True Colour	INOR-93-6074	modified from SM 2120 B	LACHAT FIA
Turbidity	INOR-93-6044	modified from SM 2130 B	NEPHELOMETER
Total Calcium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP/MS
Total Magnesium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP/MS
Total Potassium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP/MS
Total Sodium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP/MS
Aluminum-dissolved	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Total Antimony	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Arsenic	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Barium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Beryllium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Boron	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Cadmium	MET -93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Chromium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Cobalt	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS

Method Summary

CLIENT NAME: GOLDER ASSOCIATES LTD.
PROJECT: 20141301
SAMPLING SITE:South Furgus

AGAT WORK ORDER: 22T916870
ATTENTION TO: Joel Gopaul
SAMPLED BY:AGB

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Total Copper	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Iron	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Lead	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Manganese	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Dissolved Mercury	MET-93-6100	modified from EPA 245.2 and SM 3112 B	CVAAS
Total Molybdenum	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Nickel	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Selenium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Silver	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Strontium	INOR-93-6003	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Thallium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Tin	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Titanium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Tungsten	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Uranium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Vanadium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Zinc	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Zirconium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Lab Filtration Aluminum Dissolved	SR-78-9001		FILTRATION

AGAT Laboratories

5835 Coopers Avenue
Mississauga, Ontario L4Z 1Y2
Ph: 905.712.5100 Fax: 905.712.5122
webearth.agatlabs.com

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

Laboratory Use Only

Work Order #: 22T916870

Cooler Quantity: 1 large

Arrival Temperatures: 6.2 | 6.9 | 7.1

Custody Seal Intact: ☐ Yes ☐ No ☐ N/A

Notes: Bagged Ice

Report Information:

Company: Golder
Contact: Joel Gopaul
Address: 100 Scotia Crt
Phone: Fax:
Reports to be sent to:
1. Email: Joel_Gopaul2@golder.com
2. Email: Aaron_Beard@golder.com

Regulatory Requirements:

(Please check all applicable boxes)

☐ Regulation 153/04
Table ___ *Indicate One*
☐ Ind/Com
☐ Res/Park
☐ Agriculture
Soil Texture *(Check One)*
☐ Coarse
☐ Fine

☐ Excess Soils R406
Table ___ *Indicate One*
☐ Regulation 558
☐ CCME

☐ Sewer Use
☐ Sanitary ☐ Storm
___ *Region*
☒ Prov. Water Quality Objectives (PWQO)
☐ Other
___ *Indicate One*

Is this submission for a Record of Site Condition?
☐ Yes ☒ No

Report Guideline on *Certificate of Analysis*
☒ Yes ☐ No

Turnaround Time (TAT) Required:

Regular TAT ☒ 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

☐ 3 Business Days ☐ 2 Business Days ☐ Next Business Day

OR Date Required (Rush Surcharges May Apply):

Please provide prior notification for rush TAT
**TAT is exclusive of weekends and statutory holidays*

For 'Same Day' analysis, please contact your AGAT CPM

Project Information:

Project: 20141301
Site Location: South Fergus
Sampled By: AGB
AGAT Quote #: PO:
Please note: If quotation number is not provided, client will be billed full price for analysis.

Sample Matrix Legend

B	Biota
GW	Ground Water
O	Oil
P	Paint
S	Soil
SD	Sediment
SW	Surface Water

Invoice Information:

Bill To Same: Yes ☒ No ☐

Company: Golder
Contact: Joel Gopaul
Address:
Email: Joel_Gopaul2@golder.com

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - [✓ Metals], [✓ Hg], CrVI, DOC	O. Reg 153							O. Reg 558	O. Reg 406								
						Y / N	Metals & Inorganics	Metals - ☐ CrVI, ☐ Hg, ☐ HWSB	BTEX, F1-F4 PHCs	PAHs	PCBs	VOC	Aroclors	Landfill Disposal Characterization TCLP: TCLP: ☐ M&I ☐ VOCs ☐ ABNs ☐ B(a)P ☐ PCBs	Excess Soils SPLP Rainwater Leach SPLP: ☐ Metals ☐ VOCs ☐ SVOCs	Excess Soils Characterization Package pH, ICPMS Metals, BTEX, F1-F4	Corrosivity: Include Moisture ☐ Sulphide ☐	WQA	dissolved Al	dissolved Hg			Potentially Hazardous or High Concentration (Y/N)
20-4	05/07/22	13:00 AM PM	10	GW	dissolved Al, Hg	Y												X	X	X			
20-8S	05/07/22	16:30 AM PM	10	GW	" "	Y												X	X	X			
20-10S	05/07/22	15:00 AM PM	10	GW	" "	Y												X	X	X			
		AM PM																					
		AM PM																					
		AM PM																					
		AM PM																					
		AM PM																					
		AM PM																					
		AM PM																					
		AM PM																					

Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time
Aaron Beard	06/07/22	9:00	Anthony Dasilva		
Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time
Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time

'22 JUL 6 1:54PM

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Appendix C:
Fluvial Geomorphic Characterization & Erosion Threshold Assessment

water's edge
ENVIRONMENTAL SOLUTIONS TEAM LTD.

October 4, 2022
WE 20035

Daniel Twigger. B.Sc. Eng., P.Eng
Tatham Engineering Limited
115 Sandford Fleming Dr., Suite 200
Collingwood, Ontario
L9Y 5A6

Dear Mr. Twigger:

RE: South Fergus, Wellington County
Fluvial Geomorphic Characterization and Erosion Threshold Assessment

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Water's Edge was authorized by Tatham Engineering Limited to complete a fluvial geomorphic characterization and erosion threshold assessment on the Nichol Drain No.2 watercourse located in South Fergus, formally Township of Nichol. In preparation for a proposed development on the land, a Master Environmental Servicing Plan is being performed. The following report is a summary of existing conditions at the development site based on background review and field study.

This report first characterizes the existing watercourse and watershed conditions within the study area based on the desktop assessments and field investigations. Secondly, the report establishes the erosion threshold criteria through an erosion threshold assessment. Relevant literature on the site was reviewed and confirmed and if necessary, updated based on a desktop analysis and synoptic level field survey(s). Results from the desktop assessments were used to determine cross-sections to undertake detailed field surveys sufficient to determine erosion thresholds.

1. BACKGROUND REVIEW

We have completed our assessment of the creek in accordance with the approved project Terms of Reference. Data sources for the analysis include:

- Background Information: Nichol Drain No. 2 Plan
  - Nichol Drain No. 2 Phase I Storm Water Management Facility: Final Design Report prepared by Totten Sims Hubicki Associates (Rev. 2, 1997)
  - Nichol Drain No. 2 Subwatershed Study prepared by R.J. Burnside & Associates Limited (1996)
  - Nichol Drain No. 2 Watershed Study prepared by Ecological Services Group for Planning LTD. (1996)
- Physiography of Southern Ontario by Chapman & Putnam (digital data from Ministry of Northern Development and Mines (MNDM));
- Ontario Flow Assessment Tool (OFAT);
- Ontario Base Mapping (OBM);
- Site Survey and Field Assessments

Relevant literature on the site was reviewed and confirmed and if necessary, updated based on a desktop analysis and synoptic geomorphic survey(s). The drain has been well studied in the past in preparation for the construction of the present Stormwater Management Facility. The study site, named Nichol Drain No. 2, is part of a municipal drain complex that drains into the Swan Creek Wetland complex, a tributary of the Grand River. While the drain complex is not necessarily a pristine natural feature, the downstream Swan Creek has been identified by the MNRF as a cold-water stream with important fish habitat. The previous ecological study from 1996 has concluded the area does not apply as a part of the Swan Creek complex but has some limited wetland function. Several isolated broadleaf swamp stands have been identified in the previous reports which still stand on present day farmland. Most notably on the western edge of the study site (**Figure 1).** In a watershed study, the Turner Drain coming out of Scotland Street (now called Jones Baseline) has been identified as the originating drain for this complex.

The Subwatershed study done in 1996 has noted the Nichol Drain No. 2 does not exhibit characteristics of natural stream with silt buildup limiting habitats for fish. There is little riparian cover and some groundwater input, however, has limited fish population. There is also an existing tile drain system, something the designers of the stormwater facility was careful to avoid impacting. The soil in the study area is mostly loam with poor drainage characteristics. These features noted in the 1996 study are still true of the current drainage system.

However, the study site has also changed significantly since the data collection done in these reports. Since the 1996 study, the Stormwater Management facility has been built on Tower Street South and the area north of the study site has developed into commercial land. Currently, the study site itself is mostly agricultural with patches of naturalized forest and wetland. Tower Street South bisects the study site with a stormwater management facility (SWM) located right of the road. A creek drains through a culvert under Tower Street South which has been lined with riverstone. The facility has been designed to hold 100-year flow. Some drains noted on the 1996 report do not exist anymore, most notable the Turner Drain from Jones Baseline (previously Scotland Road). Some culverts in the 1996 reports could not be found, such as the Turner Drain culvert and the culvert on the northeast boundary, close to Millburn road. Instead, an informal path with a small pile of dirt has been put in by the farmer.

Figure 1: Location of study area within Fergus, Ontario

Figure 2: **Reach map for study area**

1.1 Physiography and Surficial Geology

Understanding the surficial and underlying geology for the study area provides insight into the geological influence on channel geometry, expected rates of erosion, and helps define the quantity and type of sediment available for watercourses to transport and deposit.

The study area is located in the Guelph Drumlin Field, with the watercourse in a drumlinized till plain. The physical landforms around the site are mostly drumlins, spillways, and till plain. The underlying quaternary geology is Pleistocene in age (**Figure 2**). Directly under the watercourses are glaciofluvial deposits, consisting of sand to gravel deposits while sandy silt till surrounds the watercourse (**Figure 3**). The soil underlying the watercourse is mostly loam with some muck/peat.

1.2 General Watershed Characteristics

The Nichol Drainage No. 2 watercourses collect agricultural drainage, flow into Swan Creek and eventually the Grand River. **Table 1** shows the land use breakdown for the watersheds in the study area and the total watercourse length within the study area.

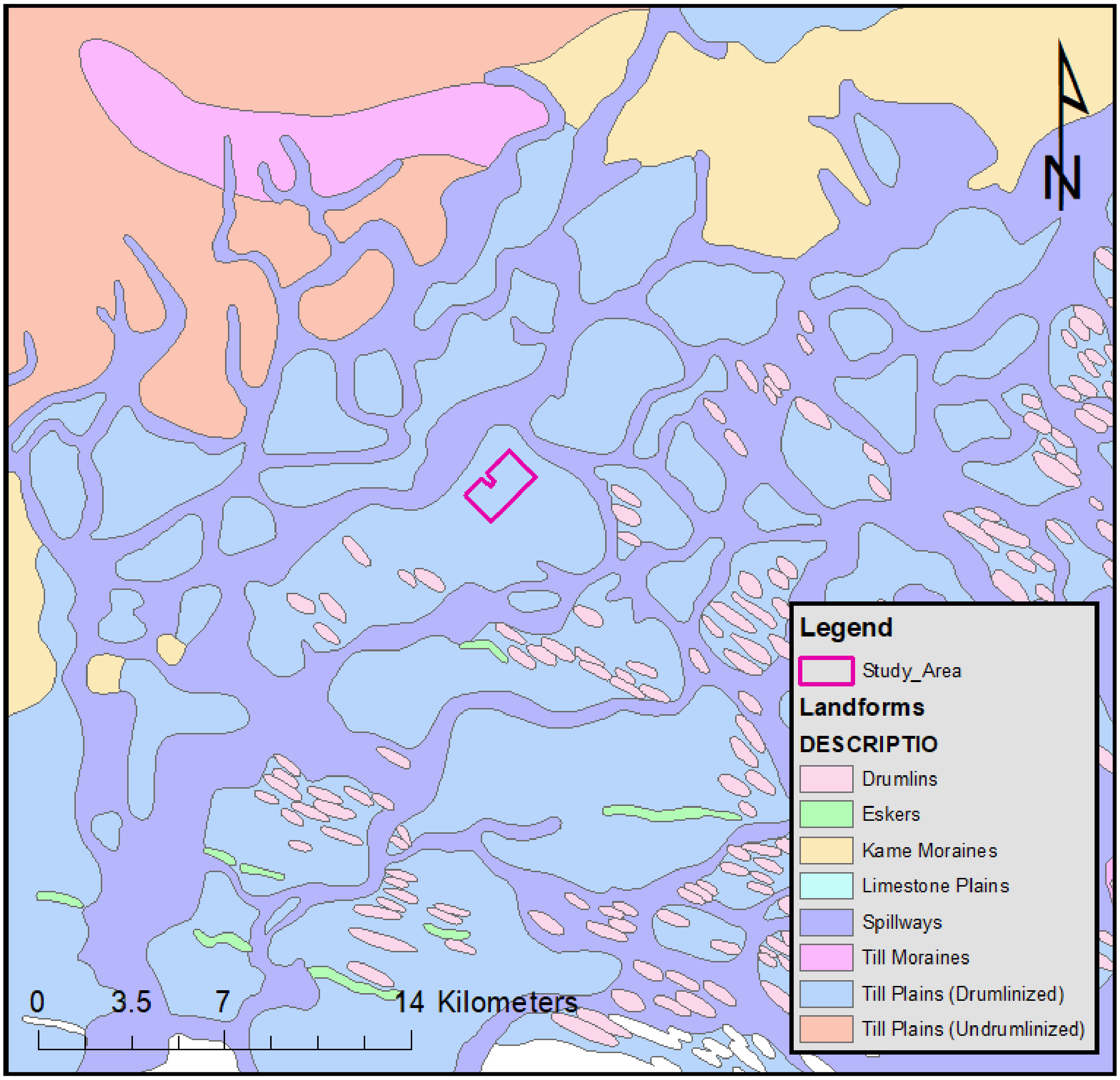


Figure 3: Physiographic landforms of Study Area

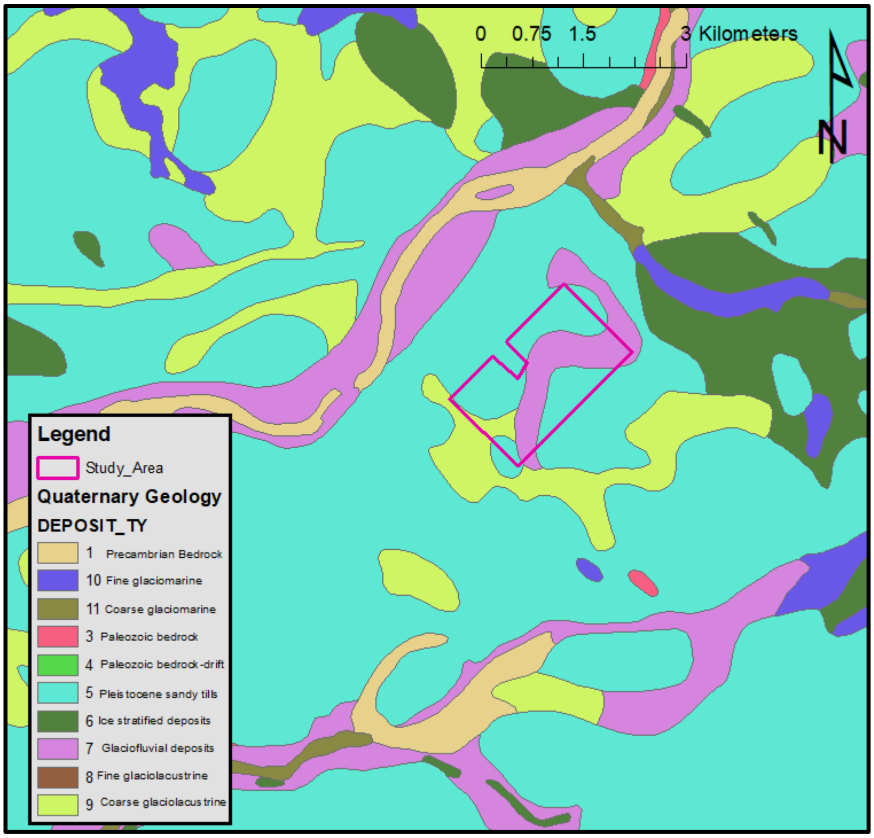


Figure 4: Quaternary Geology of Study Area

Table 1: Watershed Characteristics

Reach	Watercourse Length in watershed (m)	Watershed Area (km^2)	Land use Characteristics		
			Rural/ Agricultural (%)	Urbanized (%)	Other (%)
1	538	NA*	NA	NA	NA
2	105	0.99**	90	4	6
3	168	0.99**	90	4	6
4	196	0.99**	90	4	6
5	209	1.6	70	25	5
6	222	1.8	72	24	3
7	131	2.0	74	22	4
8	327	2.0	74	21	5
9	503	0.11	91	0	9

**No OFAT information available*

***Watershed for Reaches 2, 3, and 4 combined as one.*

2. FIELD INVESTIGATIONS

The study reaches of the watercourse within the subject property is located just south of Fergus, Ontario (**Figure 1**). Staff visited the study site in November 2020 to gather a synoptic level understanding of the trends and channel condition through the application of rapid assessments (check sheets). In erosion assessments in which the aim is to determine threshold values to guide water discharge to local creeks, these rapid assessments often identify the most sensitive locations. Therefore, the identified areas are often the focus of the erosion assessment. Locations for detailed surveys of profile, cross-section, and particle analysis were selected based on the potential discharge location, and at appropriate locations downstream. **Appendix A** contains a series of ground photography taken during the site visits.

2.1 Reach Delineation

Channel morphology and substrate characteristics can change along a watercourse. Hence, it becomes imperative to account for this variation by delineating lengths of a watercourse that exhibit similar planform, sediment substrate, land use, local geology, valley confinement, hydrology and gradient. The channel reaches in the study area can be characterized as small and silty channelized waterways and others feature grass and wood-dominated wetlands (**Figure 1**). The study area channels are similar with low gradients and relatively fine bed material. For this study, channel geometries and sediment conditions have been examined in detail at nine reaches.

2.2 Geomorphic Characteristics

The study reaches can be described as a single threaded channel with two major confluences. Nine sections or reaches were surveyed and with their local longitudinal profile to obtain bankfull slopes. The reach characteristics of the delineated reaches are described below and the reach summary of the geomorphic characteristics of the cross sections surveyed are shown in **Table 2**.

Table 2: Summary of Study Area Geomorphic Parameters

Parameter	Reach 1	Reach 2	Reach 3	Reach 4	Reach 5	Reach 6	Reach 7	Reach 8*	Reach 9
Bankfull Width (m)	6.4	3.7	1.4	2.5	2.4	1.1	1.6	2.1	6.9
Bankfull Mean Depth (m)	2.2	0.1	0.2	0.2	0.3	0.2	0.3	0.2	1.0
Bankfull Max Depth (m)	1.0	0.3	0.3	0.3	0.4	0.3	0.5	0.3	1.7
Bankfull Area (m^2)	3.7	0.6	0.3	0.5	0.7	0.2	0.5	0.4	4.9
Wetted Perimeter (m)	6.8	3.8	4.6	2.6	2.6	1.3	2.0	2.2	7.2
Hydraulic Radius (m)	0.6	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.6
Width-Depth Ratio	11.0 Low	27.7 Mod. – High	6.4 Low	39.8 Very High	9.4 Low	6.1 Low	5.4 Low	11.6 Mod. – High	10.9 Mod.
Entrenchment Ratio	2.2 Mod.	1.8 Mod.	2.4 Slightly	2.4 Slightly	2.8 Slightly – Mod.	4.5 Slightly	3.7 Slightly	2.3 Mod.	1.69 Mod.
Channel Substrate D_{50} (mm)	0.3	0.3	0.4	0.4	14.2	0.8	0.8	14.2	0.8
Channel Substrate D_{84} (mm)	4.0	4.0	2.4	2.4	41.0	2.0	1.9	31.6	1.8
Rosgen Classification	B	B	E	C-D	E-B	E	E	B	A-G

Reach 1
This reach is a channelized drainage ditch not noted in the 1996 watershed reports. This channel runs along the east side of commercial land. Several culverts from the parking lot drain into this channel. The water originates from a culvert on the north end. A culvert diverts water into the current SWM facility; however, the channelized reach also continues past the SWM facility to become Reach 2. The channel is entrenched with a bankfull width of approximately 1.95 m. The channel has almost no pool-riffle structure and is highly silted. The bank slopes are vegetated with cat tails and grasses, but the riparian zone is otherwise bare with a farmer field to the east and a parking lot to the west. There is little evidence of scour or planimetric adjustment, however the bank may have been obscured by grassy vegetation. As the reach approaches the SWM facility, the channel develops backwater characteristics. The channel widens, deepens, and is very silted. This may be because of the known beaver activity in the area. In fact, at that location was a freshly felled tree stump.

Reach 2
This is a single-threaded channel has also been channelized or dug out and runs parallel to the SWM facility. Compared to Reach 1, it is wide, shallow, and less entrenched and well canopied. The reach is also heavily silted with few riffle-pool structures. The creek substrate is mostly fallen leaves and vegetation from surrounding trees. Several trees are growing out of this channel with some leaning from the bank sides. There is some bank scour on the bottom fifth of bank but otherwise this channel shows poor flow. The channel narrows and splits into three segments near the end of the SWM facility connecting to Reach 3 and Reach 4. Here, the creek substrate is small boulder and an overflow spillway also drains from here, however there is no evidence of flow. There is also a palette placed here as an informal bridge. The riparian zone is well canopied and well vegetation although the water is cloudy and stagnant.

Reach 3
This channel runs through a naturalized patch in what was classified as ‘broadleaf swamp, in the 1996 watershed study reports’. The channel is small, shallow, and not entrenched at all. It can be difficult to follow and in the low flow conditions of the site visit, would appear and reappear. The channel is dynamic and flows through patches of grass, swamp, and often divides and rejoins itself throughout the naturalized patch. The channel has some riffle-pool structures developing in sections with consistent flow and past areas of wetland flow. The creek substrate is a sandy soil mixed with surrounding vegetation. In some areas, trees and shrubs would grow out of the creek. The riparian zone is well canopied and wide, but the creek lacks good in-stream habitats.

Reach 4
Although this section is extremely short, it has been classified as its own reach for ease of description. This reach is the end of what was previously labelled the Turner Drain in 1996 reports. The Turner Drain as a channel with moving water does not exist anymore. Instead, the farmer has piled dirt on top of several culverts to drain their agricultural fields. These culverts drain into a scour pool which flow into a grassy wetland patch. This water is what eventually becomes Reach 4. The riparian zone here is poorly canopied, excavated and contains most grassy vegetation. It is possible further work is planned here.

Reach 5
This reach is downstream of the SWM facility where a creek runs out of the SWM ponds and through a culvert under Tower Street South which discharges into a wetland patch. This creek has the most defined riffle-pool structure seen in the study area with meandering and gravel point bar formation. The creek is entrenched with grass vegetation and almost no tree canopy. The riparian zone is narrow but fenced and protected from the surrounding farmland. The banks are highly scoured, especially on outside bends, showing signs of recent erosion as high as 1 m above the water level seen during field inspection. There are recent terraces formed from previous high flow. This is likely because the channel narrows significantly at the culvert outlet and high flows scour the entrenched channel, created huge scours. The creek substrate at riffles are small cobbles with

little siltation and occasional small boulders. As you go downstream the reach, the channel widens and flows backwards due to backwater. Reach 6 ends at the pond created by a beaver dam.

Reach 6
Reach 6 is characterized by significant woody debris jams, a beaver dam, and tall grassy vegetation. The beaver dam is the controlling feature of this reach. From historical air photos, a backwater pond drains and fills regularly, likely due to beaver activity. The channel is formed in soil and has poor riffle-pool structure and is highly silted. In some parts of the channel, grassy vegetation has fallen in, forming the creek bed. Large woody debris has fallen into the channel at some spot acting as riffles. There is little scour or evidence of degradation or planimetric adjustment.

Reach 7
This reach is short and distinguished from Reach 6 because it is artificially straightened and meant to drain two agricultural fields on the north and south sides. The riparian zone is poorly canopied and narrow with mostly grassy vegetation and some shrubs. The channel is slightly entrenched and shows some scour on small meanders that are beginning to form. The channel substrate is mostly soil and has poor riffle-pool structure. The banks are protected by the grassy vegetation and roots. The reach ends at a three-way intersection with Reach 9 and 10 with a culvert joining Reach 10. This intersection has been excavated and Reach 8 and 9 join here before discharging through a culvert into Reach 10.

Reach 8
This reach is an artificially straightened drainage channel that is the final reach downstream of Reach 1, 2, 3, 4, 5, 6, 7, and 9. It begins at a culvert which diverts flow from Reaches 7 and 9. This channel is highly entrenched with very steep banks of short grass vegetation. Just beyond the banks are agricultural fields. This reach contains good riffle-pool structure and has less siltation issues seen in other reaches. The creek substrate at riffles is between coarse gravel and fine cobbles, similar to riffles in Reach 5. There is some minor scour but overall, the channel shows few signs of aggradation, degradation, or planimetric adjustment.

The reach terminates at 2 Line Road, where is flows beneath a road bridge. Here, a wooden pedestrian bridge has been built over the creek as well.

Reach 9
This reach was originally have thought to discharge from culvert 5, noted in the 1996 watershed studies. However, upon field inspection, culvert 5 discharges little to no water with no discernable channel to follow. Instead, Reach 9 originates at the border between broadleaf swamp and agricultural fields. This reach has been straightened and acts as a drainage channel for the surrounding agricultural fields and upstream broadleaf swamp.

The channel itself is not entrenched, and similar in nature to Reach 1. This reach has narrow riparian buffer one tree thick and is otherwise surrounded by agricultural fields. The creek substrate is soil and decaying vegetation, and the banks show little to no sign of erosion. The channel is dry for much of its length, at least during field inspections in Autumn. The channel ends at the culvert leading to Reach 8, which eventually flows under 2 Line Road.

2.3 Stream Assessment Scores

In addition to classification of a stream system, various techniques for geomorphic assessments are used to better understand general stream conditions (stability, habitat, erosion/degradation, riparian, etc.). Rapid field assessments provide an indication of the channel stability and ecological stream condition, while also identifying primary processes in action (e.g. widening). The Rapid Geomorphic Assessment (RGA) and the Rapid Stream Assessment Technique (RSAT) together provide a thorough description of the existing channel conditions. The field sheets of these assessments are provided in **Appendix C**.

The RGA assessment focuses entirely on the geomorphic component of a river system. The RGA method consists of four factors that summarize various components of channel adjustment. The RGA check sheet documents indicators of different modes of channel adjustment: widening, aggradation, degradation, and planform adjustment. These observations are quantified to produce a value that indicates the state of channel stability: "In Regime/Stable" (<0.20), "Transitional/Stressed" (0.21-0.40), or "In Adjustment/Unstable" (>0.40).

Results for the RGA (**Table 3**) show that the study reach is in a state of adjustment which indicates that the channel morphology is not within the range of variance and evidence of instability is widespread. The primary indicators of geomorphic change were noted to be those of widening and degradation, specifically in Reach 1 which has contributed to a poor overall score.

Table 3: **RGA Results**

Reach	Form of Adjustment				Stability Index	Condition
	Aggradation	Degradation	Widening	Planform Adjustment		
Reach 1	0.29	0.11	0.22	0.17	0.20	**In Regime**
Reach 2	0.17	0.00	0.22	0.14	0.13	**In Regime**
Reach 3	0.43	0.25	0.33	0.43	0.36	**Transitional**
Reach 4	0.29	0.00	0.22	0.14	0.16	**In Regime**
Reach 5	0.43	0.38	0.33	0.00	0.28	**Transitional**
Reach 6	0.29	0.25	0.11	0.43	0.27	**Transitional**
Reach 7	0.29	0.00	0.11	0.29	0.17	**In Regime**
Reach 8	0.43	0.38	0.33	0.29	0.36	**Transitional**
Reach 9	0.29	0.13	0.00	0.14	0.14	**In Regime**

RSAT employs a semi-quantitative approach to characterize stream conditions whereby the user assigns a score to 6 different evaluation criteria. Abiotic and biotic indicators which influence overall stream quality have been streamlined and weighted appropriately within each of the evaluation criteria. The six criteria are:

1. Channel stability;
2. Channel scouring and sediment deposition;
3. Physical in-stream habitat;
4. Water quality;
5. Riparian habitat conditions; and
6. Biological conditions

River channel stability and cross-sectional characterization is a critical component of RSAT. The entire channel was inspected for signs of instability (such as bank sloughing, recently exposed non-woody tree roots, general absence of vegetation within the bottom third of the bank, recent tree falls, etc.) and channel degradation or downcutting (such as high banks in small headwater streams and erosion around man-made structures). Observations were noted and cross-section measurements were made.

A rapid assessment of soil conditions along the river banks was also conducted to determine soil texture and potential erodibility of the watercourse bank. Qualitative water quality measurements were also made (temperature, turbidity, colour and odour) along with an indication of substrate fouling (i.e., the unwanted accumulation of sediment). RSAT also typically involves a quantitative sampling and evaluation of benthic organisms. As no benthic sampling was undertaken, the score was based on site conditions and general observations of water quality. Reach 9 did not contain any water at the time of assessment, and so, has an incomplete RSAT score.

Each category was assigned a value which was then summed to provide an overall score and ranking. **Table 4** details the range of scores and rankings with a higher score suggesting a healthier system. Within these broad categories, we evaluated the study area and determined a RSAT score of 21.7. The channel is of "Fair" quality.

Table 4: RSAT Summary Results

Category	Reach 1	Reach 2	Reach 3	Reach 4	Reach 5	Reach 6	Reach 7	Reach 8	Reach 9	Max Possible Score
Channel Stability	8	9	8	8	8	9	7	6	10	11
Channel Scour & Sediment Deposition	5	5	6	6	6	6	6	6	6	8
Physical In-Stream Habitat	3	4	5	5	6	5	6	6	1	8
Water Quality	5	3	6	7	6	6	6	7	NA	8
Riparian Habitat Conditions	6	4	6	6	5	6	1	1	4	7
Biological Indicators	4	5	6	6	7	7	5	6	NA	8
Total Score	**22**	**21**	**28**	**30**	**29**	**29**	**23**	**26**	**NA**	**50**
Condition	**Fair**	**Fair**	**Fair**	**Fair**	**Fair**	**Fair**	**Fair**	**Fair**	**NA**	

3. EROSION THRESHOLD ANALYSIS

To establish the appropriate erosion control criteria, an erosion threshold analysis supports and directs various control methods for land development to mitigate increased runoff that may adversely affect stream channel form and process.

3.1 General

A fluvial geomorphological survey was completed on November 4, 2020. For an erosion threshold assessment, bankfull cross-sections were surveyed at a few locations because it can be expected that channel velocities and shear stresses on the bed are greatest through these sections therefore providing the most representative values. The longitudinal profile was also surveyed to determine the channel slopes.

This detailed field data (cross-section, gradient, and particle distribution) is used to estimate the bankfull discharge, shear stress, and critical discharge values. Specifically, the critical discharge indicates the point at which sustained flows tend to entrain and transport sediment. In this analysis, the critical shear stress was determined using a suite of calculations based off sediment size, determined by sieve analysis and pebble counts. Based on the critical shear stress, a critical depth is back-calculated and a critical discharge is determined. This critical discharge can then be applied as an erosion threshold target when controlling effluent input to the watercourse.

3.2 Erosion Threshold Considerations and Discussion

Specific cross-section locations were surveyed within the site. Critical threshold parameters were computed for those cross-sections where bankfull indicators were reliable. Attempts were made to locate naturally formed riffles for cross-sectional surveys as these provide locations where flows are concentrated, and their composition is indicative of the type of material that becomes mobilized under frequent flow conditions below and up to the bankfull discharge. However, some of the reaches of Nichol Drain No. 2 had poor riffle-pool structure and thus, indicative cross-sections were taken, regardless of riffle structure. Reaches 1, 2, 3, 4, 6, 7, and 9 were calculated as vegetated channels given they were lined with either grasses or leaf litter.

Using the data collected during the field investigations and desktop analysis, bankfull characteristics for cross-sections were summarized. The bankfull energy gradient, bed materials, and channel classification are also summarized (**Table 2**). Erosion threshold values were completed for cross-sections and are presented in **Table 5.**

Table 5: **Summary Hydraulics**

Reach	Unit Stream Power (W/m^2)	Bed Ratio	Critical Shear Stress (N/m^2)	Critical Bed Flow Depth (m)	Critical Bed Flow Discharge (m^3/s)
1*	15.4	32.4	0.23	0.016	0.0000
2*	0.73	4.8	0.23	0.027	0.0055
3*	35.7	50.8	0.27	0.003	0.0000
4*	27.3	36.5	0.27	0.004	0.0000
5	18.6	0.99	10.59	0.214	0.0632
6*	19.6	14	0.57	0.009	0.0000
7*	17.6	20	0.55	0.011	0.0023
8	2.1	1	10.58	0.146	0.0235
9*	17.0	20.8	0.55	0.024	0.0000

**Using formulas for vegetated channels*

Critical flows were calculated by the back calculation of the critical hydraulic radiuses and corresponded area of the critical hydraulic radiuses. These values generally vary with respect to the slope, roughness, and grain size. Influencing factors such as prevailing flows, land use, geology, human intervention, and in-channel structures will cause variation along the channel and need careful consideration when observing natural thresholds of erosion. The critical bed flow for mobilizing the sediment in the ten cross-sections ranged from 0.16 to 6.63 m^3/s. Overall, the results from each of the methods are very similar for the reaches where erosion threshold could be calculated with grain size. For the reaches with vegetated channels, a critical shear stress of 16.8 N/m^2 is used for each of them, regardless of particle size. This value is derived from the maximum shear stress of grass.

3.3 Erosion Analysis and Impact Assessment

To fully understand the implications of the erosion threshold determination, an event based hydrologic models were developed to assess outflows relative to the erosion threshold. The hydrographs were run with a software called ERIC (Erosion Indices Calculator) developed by the University of Waterloo to do exceedance analysis. Both pre-development and post-development hydrographs (given by Tatham) and the corresponding cross section for each outlet were included in the model. Critical shear stress calculated in the previous section was also added in the model for each outlet. The hydrographs were for five different outlets in the study area (E, C, F, H, and J). Each site has eight hydrographs (25 mm, 1:2 yr, 1:5 yr, 1:10 yr, 1:25 yr, 1:50 yr, 1:100 yr and the Regulatory) for both pre- and post- development. Site E is located upstream of Reach 2, Site C is located downstream of Reach 2, Site F is located upstream of Reach 5, Site H is located upstream of Reach 9 and Site J is located downstream of Reach 8. The channel related parameters used in ERIC are the data gathered from surveyed cross sections.

The results of the erosion threshold analyses are presented in **Table 6.**

Table 6 a- Erosion Indices For 2 yr hydrographs at all 5 sites

Sites	**E (Reach 2)**		**C**		**F**		**H**		**J**	
Hydrograph	**pre**	**post**	**pre**	**post**	**pre**	**post**	**Pre**	**post**	**pre**	**post**
CTEH	12	14.1	13.2	11.4	5.9	5.8	3.2	4.2	2.2	0
CESS	17.5	26.4	22.9	9.9	34.6	26.6	3.1	4.23	2.4	0

Table 6 b- Erosion Indices For 50 yr hydrographs at all 5 sites

Sites	**E**		**C**		**F**		**H**		**J**	
Hydrograph	**pre**	**post**	**pre**	**post**	**pre**	**post**	**pre**	**post**	**pre**	**post**
CTEH	18.1	20.2	16.6	15.5	10.9	12.9	6.9	10.3	5.4	5.5
CESS	45.8	63	39.8	38.3	107.6	125.6	13.8	18.3	5	4.8

Table 6 c- Erosion Indices For 100 yr hydrographs at all 5 sites

Sites	**E**		**C**		**F**		**H**		**J**	
Hydrograph	**pre**	**post**	**pre**	**post**	**pre**	**post**	**pre**	**post**	**pre**	**post**
CTEH	19.1	21.4	17.2	15.8	13.3	13.7	8.4	11.8	5.9	6
CESS	52.1	71.1	41.5	36.2	117.9	136.5	15.9	21.3	5.4	5

The location of the proposed SWM ponds are shown in **Figure 5** (circled in yellow). The most upstream facility is Pond E which discharges into the upstream end of Reach 2. These flows combine with the discharge from Pond C into the downstream end of Reach 2. Reach 2 flows combine with the discharge from Pond F above Hwy 6 and enter Reach 5, then Reach 6 and then Reach 7 where it combines with the flows from Pond H (Reach 9) to enter Reach 8. Pond J discharges into Reach 8 before the total combined flows leave the site.

Table 6 presents two values for determining erosion potential at each site, specifically the Cumulative Excess Shear Stress (Pa-hrs) (CESS) and Cumulative Time of Exceedance (hrs) (CTEH). The results presented in the table are discussed as follows:

1. The CTEH value shows the time in hours that the hydrograph was above threshold flow determined in **Table 5**. In addition, the CESS value shows the time in Pascal-hours that that hydrograph was above the threshold shear determined in **Table 5**.

2. Intuitively, CTEH and CESS values increase at each site for larger storm events (e.g. the CTEH for Location E is 12 for the 1:2 year event but 19.1 for the 1:100 year event.

3. Discharges from Pond E and Pond H typically have slightly larger post than pre values for both CTEH and CESS. However, both of these flow into downstream reaches where erosion potential is less in each case, i.e. flows at E flow into C and H flows into J where in each scenario the CTEH and CESS values are reduced from pre to post.

4. For Location J, the 2 year values for CTEH and CESS are both satisfactory. However, for the 50 year and 100 year events, the CTEH is slightly increased from pre to post but the CESS decreases from pre to post. As such, while the hours above the erosion threshold is slightly exceeded, the cumulative shear still remains less.

5. We note that the 2-yr event is the channel forming event and is most related to channel erosion. Conversely, the 100-yr event is floodplain event and has less impact on stream erosion. **Table 6** shows that the erosion parameters during the 2 year event meet the target for most sites and is only slightly larger for post-development condition at two upstream sites (E and H). Both E and H flow into downstream reaches where targets are met.

6. Location F is unique in that the 2 year channel forming event results meet targets while the 50 year and 100 year floodplain events have slight exceedances. As per Point 4, the slight increase of CESS and CTEH for site F for large events is not crucial and any flows are mitigated in the downstream reach.

7. Although there are some minor increases for post-development CESS values compared to that of pre-development for upstream Locations H and E, the results show that the downstream Locations C, F, and J have higher flows with less erosion occurring for post-development conditions compare to pre-development conditions.

8. Further to Point 4, the CESS values show that erosion in the most downstream reach does not exceed the existing conditions and as the flows leave the site, CTEH values are within 2% of pre-development hours for 50 and 100-yr events. We find that this is negligible and conclude that erosion thresholds are met for the proposed development.

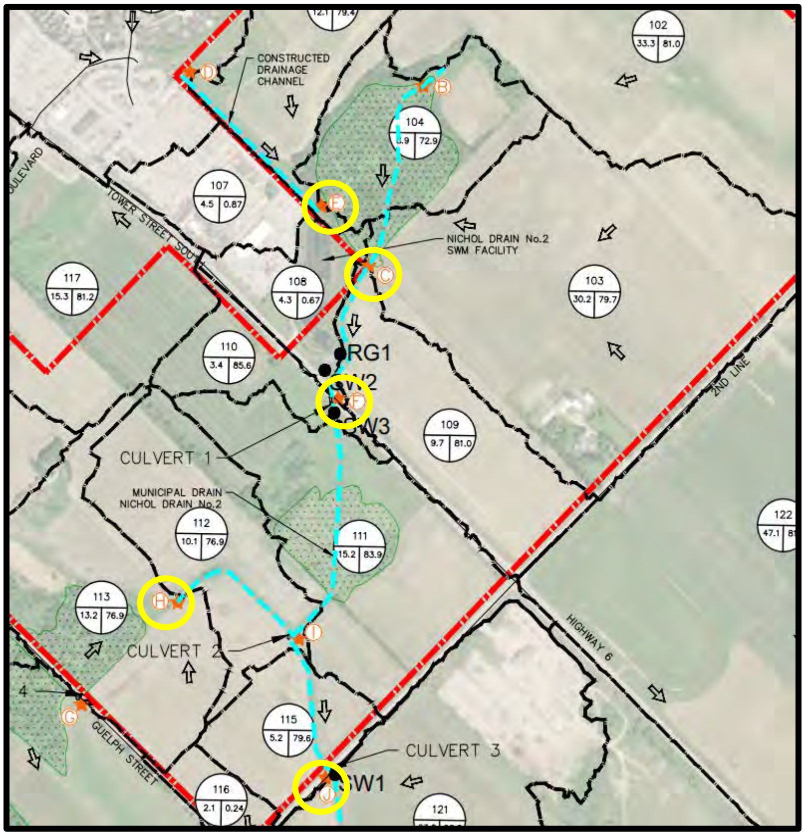


Figure 5: The location of the proposed SWM ponds in the study area (circled in yellow)

4. MAJOR ISSUES, CONCERNS, AND CONSTRAINTS

There are a few minor issues and concerns for the future development of the area, including a new SWM facility. The major one is the beaver dams in the area are likely contributing to blockages in the current stormwater management pond. On the day of field work, City crews were removing beaver dams in the culverts and warned of beaver traps within the wetland on Reach 1. Even downstream, there is more beaver activity which has shaped the area significantly. These beavers alter landscape significantly and can be difficult to remove. In the future, it will be useful to watch out for beaver activity as it may interfere with the proper functioning of the stormwater management facility.

5. SUMMARY AND CONCLUSION

In order to carry out an erosion threshold analysis for the proposed development, a geomorphic survey was completed at the site, including sieve analyses to characterize channel materials. Erosion threshold analysis for the watercourse was performed to provide direction on stormwater management. Reaches in the South Fergus Study area were identified delineated based on similar geomorphic properties including but not limited to: size, flow, biological indicators, riparian cover, erosive features, sedimentation, and planimetric adjustment. Ten cross-sections were identified in the study reach where erosion threshold parameters could be identified. An RGA, RSAT, and general geomorphic characteristics were calculated for each reach, including an initial erosion threshold assessment.

Based on our site investigations, assessments, and analyses, we conclude that:

1. RGA and RSAT scores suggest somewhat stable reaches for South Fergus. The RSAT becomes Fair for all reaches and the RGA shows in transitional and in regime for all reaches (**Tables 3 and 4**);
2. The system can be classified as mostly agricultural drainage channels that also have an existing stormwater management facility and beaver activity;
3. Development of the upstream watershed is proposed, which includes various SWM facilities to provide flow attenuation;
4. Effective erosion control is provided by the proposed SWM facilities; and,
5. Our analyses and results indicate that there will be no impact on downstream reaches of Nichol Drain #2.

Respectfully submitted,

Asal Montakhab

Ed Gazendam, Ph.D., P. Eng.,
President, Sr. Geomorphologist

Asal Montakhab, M. Sc.,
River Scientist

Water's Edge Environmental Solutions Team Ltd.

ATTACHMENTS
Appendix A: Photographs

water's edge
ENVIRONMENTAL SOLUTIONS TEAM LTD.

Fluvial Geomorphology

Natural Channel Design

Stream Restoration

Monitoring

Erosion Assessment

Sediment Transport

Visit our Website at www.watersedge-est.ca

APPENDIX A:

Photographs

REACH 1

PHOTOGRAPH NO.: 1
FROM: Centre of Creek
LOOKING: Downstream

PHOTOGRAPH NO.:2
FROM: Centre of Creek
LOOKING: Downstream

PHOTOGRAPH NO.: 3
FROM: Right bank
LOOKING: Upstream

REACH 2

PHOTOGRAPH NO.: 4
FROM: Centre of Creek
LOOKING: Downstream

PHOTOGRAPH NO.: 5
FROM: Left Bank
LOOKING: Downstream

REACH 3

PHOTOGRAPH NO.: 6
FROM: Culvert
LOOKING: Downstream
NOTES: Scoured, soil banks

PHOTOGRAPH NO.: 7
FROM: Centre of Creek
LOOKING: Downstream

PHOTOGRAPH NO.: 8
FROM: Culvert
LOOKING: Upstream at culvert

REACH 4

PHOTOGRAPH NO.: 9
FROM: Centre of crossing
LOOKING: Downstream

PHOTOGRAPH NO.: 10
FROM: Centre of crossing
LOOKING: Downstream
NOTES: Creek begins to disappear

PHOTOGRAPH NO.: 11
FROM: Right bank
LOOKING: Downstream

PHOTOGRAPH NO.: 12
FROM: Centre of Creek
LOOKING: Downstream

REACH 5

PHOTOGRAPH NO.: 13
FROM: Centre of creek, at road
LOOKING: Downstream
NOTE: Cobble inflection points

PHOTOGRAPH NO.: 14
FROM: Left Bank
LOOKING: Downstream

PHOTOGRAPH NO.: 15
FROM: Road Culvert
LOOKING: Upstream, towards current stormwater management facility

PHOTOGRAPH NO.: 16
FROM: Centre of creek
LOOKING: Downstream

PHOTOGRAPH NO.: 17
FROM: At major riffle
LOOKING: Downstream
NOTE: High scour along right bank

REACH 6

PHOTOGRAPH NO.: 18
FROM: Centre of Creek
LOOKING: Downstream

PHOTOGRAPH NO.: 19
FROM: Left bank
LOOKING: Downstream

PHOTOGRAPH NO.: 20
FROM: Beaver Dam
LOOKING: Downstream

REACH 7

PHOTOGRAPH NO.: 21
FROM: Centre of Creek
LOOKING: Downstream

REACH 8

PHOTOGRAPH NO.: 22
FROM: Left bank
LOOKING: Onto left bank

PHOTOGRAPH NO.: 23
FROM: Centre of creek, close to road crossing
LOOKING: Downstream

REACH 9

PHOTOGRAPH NO.: 24
FROM: Confluence of all three reaches
LOOKING: Upstream

PHOTOGRAPH NO.: 25
FROM: Confluence of all three reaches
LOOKING: onto culvert

Nichol Drain No. 2 Erosion Potential Summary from Proposed HEC-RAS model

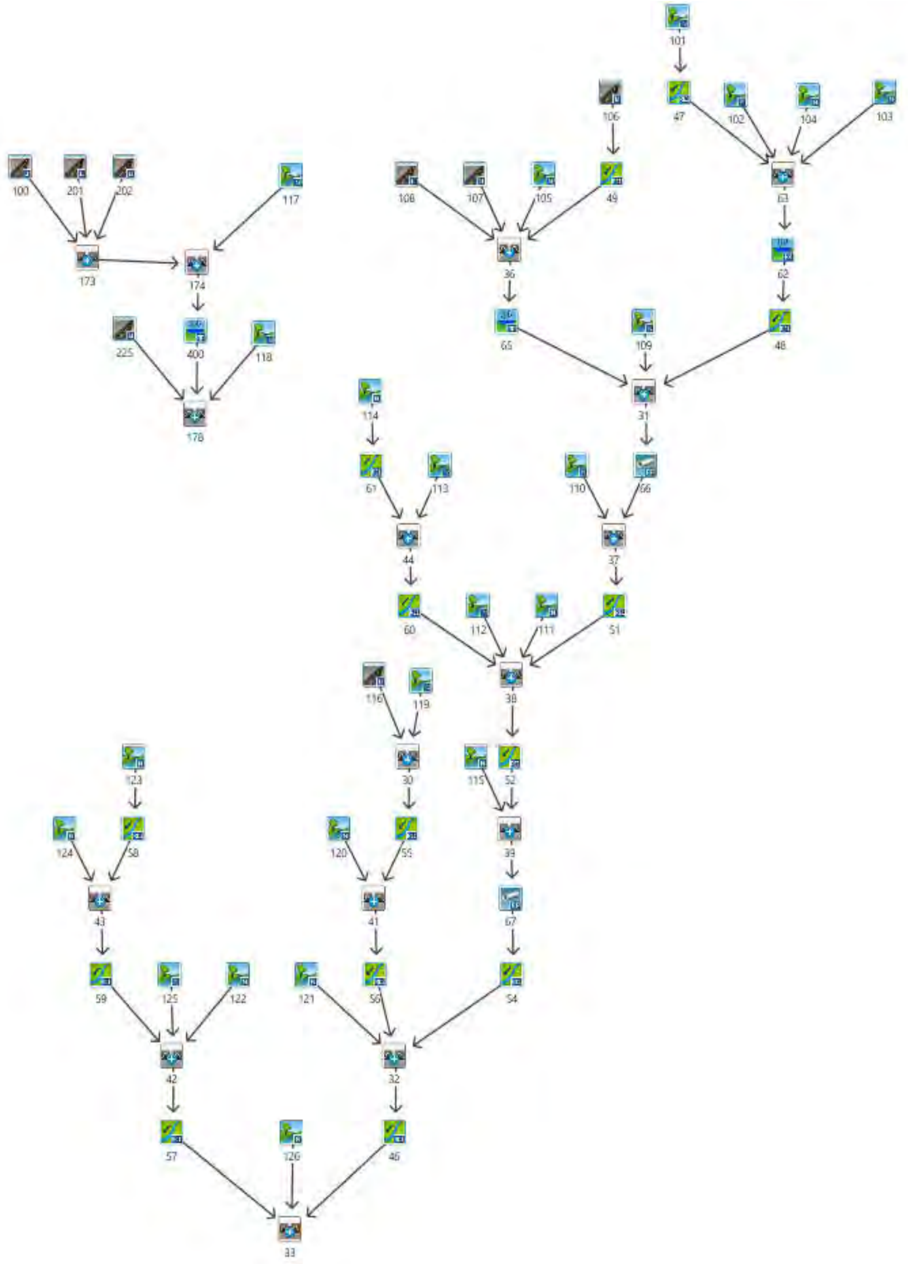
Reach	River Station	Profile	Total Flow (m^3/s)			Channel Velocity (m/s)			Shear Stress in Channel (N/m2)		
			Existing	Proposed	Difference	Existing	Proposed	Difference	Existing	Proposed	Difference
1	747	2nd Line	Culvert	Culvert							
1	738	2YR	3.16	1.77	-1.39	0.89	0.58	-0.31	17.36	7.79	-9.57
1	737		Lat Struct	Lat Struct							
1	728	2YR	3.16	1.77	-1.39	0.50	0.41	-0.09	5.77	3.87	-1.90
1	716	2YR	3.16	1.77	-1.39	0.50	0.37	-0.13	7.18	3.92	-3.26
1	695	2YR	3.16	1.77	-1.39	0.61	0.42	-0.19	8.35	4.07	-4.28
1	683	2YR	3.16	1.77	-1.39	0.57	0.40	-0.17	7.97	4.19	-3.78
1	618	2YR	3.16	1.77	-1.39	0.30	0.25	-0.05	3.14	2.39	-0.75
1	530	2YR	3.16	1.77	-1.39	1.29	1.10	-0.19	47.02	35.23	-11.79
1	448	2YR	4.40	2.04	-2.36	0.13	0.13	0.00	0.47	0.53	0.06
1	363	2YR	4.40	2.04	-2.36	0.35	0.41	0.06	2.78	3.94	1.16
1	261	2YR	4.40	2.04	-2.36	0.68	0.38	-0.30	10.00	3.19	-6.81
1	159	2YR	8.07	6.88	-1.19	1.19	1.14	-0.05	29.63	27.23	-2.40
1	68	2YR	8.07	6.88	-1.19	1.31	1.23	-0.08	36.73	33.24	-3.49
1	0	2YR	8.07	6.88	-1.19	0.99	0.94	-0.05	21.54	20.12	-1.42

Appendix D:

Existing Conditions Hydrologic Analysis

TATHAM ENGINEERING

PROJECT	South Fergus	FILE	120157
		DATE	2023-08-25
SUBJECT	VO6 Schematic	NAME	A. Trevers
		PAGE	1 OF 1



NASHYD	ROUTE PIPE	DUHYD
STANDHYD	ROUTE CHANNEL	DIVERT HYD
ADDHYD	ROUTE RESERVOIR	

O:\Collingwood\2020 Projects\120157 - South Fergus MESP and Secondary Plan\Design\Stormwater\VO\Data (Existing)\VO Schematic1

TATHAM
ENGINEERING

Visual OTTHYMO Model
Parameter Calculations (NasHYD)

Project Details

South Fergus	120157

Prepared By

A. Trevers	June 18, 2021

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Pre-Development Condition

Watershed:	Not within CA
Catchment ID:	101
Catchment Area (ha):	29.6
Impervious %:	4%

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol	**HI**	**M**	**Pal**	
Soil Series	Harriston	Muck	Parkhill	
Hydrologic Soils Group	BC	B	BC	
Soil Texture	Loam or Silt Loam	Muck	Loam or Silt Loam	
Runoff Coefficient Type	2	2	2	
Area (ha)	12.48		17.15	
Percentage of Catchment	42%		58%	

Land Cover Category	**IA**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**
Impervious	2	0.40	100	0.95		100	0.95	0.65	100	0.95			
Gravel	3	4.08	89	0.27		89	0.27	4.43	89	0.27			
Woodland	10		67	0.25		60	0.25		67	0.25			
Pasture/Lawns	5		74	0.28		69	0.28		74	0.28			
Meadows	8		71	0.27		65	0.27		71	0.27			
Cultivated	7	8.00	78	0.35		74	0.35	12.06	78	0.35			
Waterbody	12		50	0.05		50	0.05		50	0.05			

Average CN	82.30		81.68	
Average C	0.34		0.35	
Average IA	5.53		5.78	

Time to Peak Calculations

Max. Catchment Elev. (m):	
Min. Catchment Elev. (m):	
Catchment Length (m):	480
Catchment Slope (%):	1.16%
Method: Airport Method	
Time of Concentration (mins):	51.19

Summary

Catchment CN:	81.9
Catchment C:	0.35
Catchment IA (mm):	5.67
Time of Concentration (hrs):	0.85
Catchment Time to Peak (hrs):	0.57
Catchment Time Step (mins):	6.83

TATHAM
ENGINEERING

Visual OTTHYMO Model
Parameter Calculations (NasHYD)

Project Details

South Fergus	120157

Prepared By

A. Trevers	June 18, 2021

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Pre-Development Condition

Watershed:	Not within CA
Catchment ID:	102
Catchment Area (ha):	33.3
Impervious %:	8%

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol		**HI**			**M**			**Pal**					
Soil Series		Harriston			Muck			Parkhill					
Hydrologic Soils Group		BC			B			BC					
Soil Texture		Loam or Silt Loam			Muck			Loam or Silt Loam					
Runoff Coefficient Type		2			2			2					
Area (ha)		20.66						12.63					
Percentage of Catchment		62%						38%					
Land Cover Category	**IA**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**
Impervious	2	2.11	100	0.95		100	0.95	0.62	100	0.95			
Gravel	3	3.37	89	0.27		89	0.27	1.16	89	0.27			
Woodland	10	0.79	67	0.25		60	0.25		67	0.25			
Pasture/Lawns	5		74	0.28		69	0.28		74	0.28			
Meadows	8		71	0.27		65	0.27		71	0.27			
Cultivated	7	14.38	78	0.35		74	0.35	10.85	78	0.35			
Waterbody	12		50	0.05		50	0.05		50	0.05			
Average CN		81.62						80.09					
Average C		0.39						0.37					
Average IA		5.95						6.39					

Time to Peak Calculations

Max. Catchment Elev. (m):	
Min. Catchment Elev. (m):	
Catchment Length (m):	650
Catchment Slope (%):	0.89%
Method: Airport Method	
Time of Concentration (mins):	61.81

Summary

Catchment CN:	81.0
Catchment C:	0.39
Catchment IA (mm):	6.12
Time of Concentration (hrs):	1.03
Catchment Time to Peak (hrs):	0.69
Catchment Time Step (mins):	8.24

TATHAM
ENGINEERING

Visual OTTHYMO Model
Parameter Calculations (NasHYD)

Project Details

South Fergus	120157

Prepared By

A. Trevers	June 18, 2021

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Pre-Development Condition

Watershed:	Not within CA
Catchment ID:	103
Catchment Area (ha):	30.2
Impervious %:	3%

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol		**HI**			**M**			**Pal**					
Soil Series		Harriston			Muck			Parkhill					
Hydrologic Soils Group		BC			B			BC					
Soil Texture		Loam or Silt Loam			Muck			Loam or Silt Loam					
Runoff Coefficient Type		2			2			2					
Area (ha)		19.90						10.28					
Percentage of Catchment		66%						34%					
Land Cover Category	**IA**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**
Impervious	2	0.90	100	0.95		100	0.95	0.02	100	0.95			
Gravel	3	3.06	89	0.27		89	0.27	0.00	89	0.27			
Woodland	10		67	0.25		60	0.25	0.36	67	0.25			
Pasture/Lawns	5		74	0.28		69	0.28		74	0.28			
Meadows	8		71	0.27		65	0.27		71	0.27			
Cultivated	7	15.93	78	0.35		74	0.35	9.91	78	0.35			
Waterbody	12		50	0.05		50	0.05		50	0.05			
Average CN		80.69						77.66					
Average C		0.36						0.35					
Average IA		6.16						7.09					

Time to Peak Calculations

Max. Catchment Elev. (m):	
Min. Catchment Elev. (m):	
Catchment Length (m):	650
Catchment Slope (%):	1.02%
Method: Airport Method	
Time of Concentration (mins):	61.17

Summary

Catchment CN:	79.7
Catchment C:	0.36
Catchment IA (mm):	6.48
Time of Concentration (hrs):	1.02
Catchment Time to Peak (hrs):	0.68
Catchment Time Step (mins):	8.16

TATHAM
ENGINEERING

Visual OTTHYMO Model
Parameter Calculations (NasHYD)

Project Details

South Fergus	120157

Prepared By

A. Trevers	June 18, 2021

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Pre-Development Condition

Watershed:	Not within CA
Catchment ID:	104
Catchment Area (ha):	8.9
Impervious %:	

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol	**HI**	**M**	**Pal**	
Soil Series	Harriston	Muck	Parkhill	
Hydrologic Soils Group	BC	B	BC	
Soil Texture	Loam or Silt Loam	Muck	Loam or Silt Loam	
Runoff Coefficient Type	2	2	2	
Area (ha)	2.79		6.15	
Percentage of Catchment	31%		69%	

Land Cover Category	**IA**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**
Impervious	2	0.00	100	0.95		100	0.95	0.01	100	0.95			
Gravel	3	1.01	89	0.27		89	0.27	0.07	89	0.27			
Woodland	10	0.72	67	0.25		60	0.25	4.56	67	0.25			
Pasture/Lawns	5		74	0.28		69	0.28		74	0.28			
Meadows	8		71	0.27		65	0.27		71	0.27			
Cultivated	7	1.06	78	0.35		74	0.35	1.52	78	0.35			
Waterbody	12		50	0.05		50	0.05		50	0.05			
Average CN		79.14						70.00					
Average C		0.29						0.28					
Average IA		6.33						9.17					

Time to Peak Calculations

Max. Catchment Elev. (m):	
Min. Catchment Elev. (m):	
Catchment Length (m):	250
Catchment Slope (%):	1.53%
Method: Airport Method	
Time of Concentration (mins):	36.66

Summary

Catchment CN:	72.9
Catchment C:	0.28
Catchment IA (mm):	8.28
Time of Concentration (hrs):	0.61
Catchment Time to Peak (hrs):	0.41
Catchment Time Step (mins):	4.89

Visual OTTHYMO Model
Parameter Calculations (NasHYD)

Project Details

South Fergus	120157

Prepared By

A. Trevers	June 18, 2021

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Pre-Development Condition

Watershed:	Not within CA
Catchment ID:	105
Catchment Area (ha):	12.1
Impervious %:	6%

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol		**HI**			**M**			**Pal**					
Soil Series		Harriston			Muck			Parkhill					
Hydrologic Soils Group		BC			B			BC					
Soil Texture		Loam or Silt Loam			Muck			Loam or Silt Loam					
Runoff Coefficient Type		2			2			2					
Area (ha)		11.96						0.16					
Percentage of Catchment		99%						1%					
Land Cover Category	**IA**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**
Impervious	2	0.67	100	0.95		100	0.95	0.03	100	0.95			
Gravel	3	0.57	89	0.27		89	0.27	0.04	89	0.27			
Woodland	10	0.02	67	0.25		60	0.25	0.08	67	0.25			
Pasture/Lawns	5	1.14	74	0.28		69	0.28		74	0.28			
Meadows	8		71	0.27		65	0.27		71	0.27			
Cultivated	7	9.56	78	0.35		74	0.35		78	0.35			
Waterbody	12		50	0.05		50	0.05		50	0.05			
Average CN		79.36						80.31					
Average C		0.37						0.41					
Average IA		6.34						6.32					

Time to Peak Calculations

Max. Catchment Elev. (m):	
Min. Catchment Elev. (m):	
Catchment Length (m):	360
Catchment Slope (%):	2.42%
Method: Airport Method	
Time of Concentration (mins):	33.61

Summary

Catchment CN:	79.4
Catchment C:	0.37
Catchment IA (mm):	6.34
Time of Concentration (hrs):	0.56
Catchment Time to Peak (hrs):	0.37
Catchment Time Step (mins):	4.48

TATHAM
ENGINEERING

Visual OTTHYMO Model Parameter Calculations (NasHYD)

Project Details

South Fergus	120157

Prepared By

A. Trevers	June 18, 2021

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Pre-Development Condition

Watershed:	Not within CA
Catchment ID:	109
Catchment Area (ha):	9.7
Impervious %:	12%

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol		**HI**			**M**			**Pal**					
Soil Series		Harriston			Muck			Parkhill					
Hydrologic Soils Group		BC			B			BC					
Soil Texture		Loam or Silt Loam			Muck			Loam or Silt Loam					
Runoff Coefficient Type		2			2			2					
Area (ha)		6.23						3.52					
Percentage of Catchment		64%						36%					
Land Cover Category	**IA**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**
Impervious	2	0.96	100	0.95		100	0.95	0.29	100	0.95			
Gravel	3	0.18	89	0.33		89	0.33		89	0.33			
Woodland	10		67	0.30		60	0.30		67	0.30			
Pasture/Lawns	5		74	0.35		69	0.35		74	0.35			
Meadows	8		71	0.33		65	0.33		71	0.33			
Cultivated	7	5.09	78	0.45		74	0.45	3.23	78	0.45			
Waterbody	12		50	0.05		50	0.05		50	0.05			
Average CN		81.69						79.81					
Average C		0.52						0.49					
Average IA		6.12						6.59					

Time to Peak Calculations

Max. Catchment Elev. (m):	
Min. Catchment Elev. (m):	
Catchment Length (m):	230
Catchment Slope (%):	7.22%
Method: Bransby-Williams Formula	
Time of Concentration (mins):	7.03

Summary

Catchment CN:	81.0
Catchment C:	0.51
Catchment IA (mm):	6.29
Time of Concentration (hrs):	0.12
Catchment Time to Peak (hrs):	0.08
Catchment Time Step (mins):	0.94

Visual OTTHYMO Model
Parameter Calculations (NasHYD)

Project Details

South Fergus	120157

Prepared By

A. Trevers	June 18, 2021

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Pre-Development Condition

Watershed:	Not within CA
Catchment ID:	110
Catchment Area (ha):	3.8
Impervious %:	10%

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol		**Hl**			**M**			**Pal**					
Soil Series		Harriston			Muck			Parkhill					
Hydrologic Soils Group		BC			B			BC					
Soil Texture		Loam or Silt Loam			Muck			Loam or Silt Loam					
Runoff Coefficient Type		2			2			2					
Area (ha)		2.74						1.10					
Percentage of Catchment		71%						29%					
Land Cover Category	**IA**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**
Impervious	2	0.14	100	0.95		100	0.95	0.27	100	0.95			
Gravel	3	1.01	89	0.27		89	0.27	0.83	89	0.27			
Woodland	10		67	0.25		60	0.25		67	0.25			
Pasture/Lawns	5		74	0.28		69	0.28		74	0.28			
Meadows	8		71	0.27		65	0.27		71	0.27			
Cultivated	7	1.59	78	0.35		74	0.35		78	0.35			
Waterbody	12		50	0.05		50	0.05		50	0.05			
Average CN		83.18						91.68					
Average C		0.35						0.43					
Average IA		5.27						2.76					

Time to Peak Calculations

Max. Catchment Elev. (m):	
Min. Catchment Elev. (m):	
Catchment Length (m):	450
Catchment Slope (%):	4.56%
Method: Airport Method	
Time of Concentration (mins):	30.47

Summary

Catchment CN:	85.6
Catchment C:	0.37
Catchment IA (mm):	4.55
Time of Concentration (hrs):	0.51
Catchment Time to Peak (hrs):	0.34
Catchment Time Step (mins):	4.06

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Visual OTTHYMO Model
Parameter Calculations (NasHYD)

Project Details

South Fergus	120157

Prepared By

A. Trevers	June 18, 2021

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Pre-Development Condition

Watershed:	Not within CA
Catchment ID:	111
Catchment Area (ha):	15.2
Impervious %:	6%

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol	**Hl**	**M**	**Pal**	
Soil Series	Harriston	Muck	Parkhill	
Hydrologic Soils Group	BC	B	BC	
Soil Texture	Loam or Silt Loam	Muck	Loam or Silt Loam	
Runoff Coefficient Type	2	2	2	
Area (ha)	7.05	2.37	5.75	
Percentage of Catchment	46%	16%	38%	

Land Cover Category	**IA**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**
Impervious	2	0.87	100	0.95		100	0.95	0.07	100	0.95			
Gravel	3	3.37	89	0.27	0.75	89	0.27	4.34	89	0.27			
Woodland	10	0.03	67	0.25	0.63	60	0.25	0.86	67	0.25			
Pasture/Lawns	5		74	0.28		69	0.28		74	0.28			
Meadows	8		71	0.27		65	0.27		71	0.27			
Cultivated	7	2.78	78	0.35	1.00	74	0.35	0.48	78	0.35			
Waterbody	12		50	0.05		50	0.05		50	0.05			

Average CN	85.94	75.08	84.93	
Average C	0.38	0.30	0.28	
Average IA	4.48	6.52	4.37	

Time to Peak Calculations

Max. Catchment Elev. (m):	
Min. Catchment Elev. (m):	
Catchment Length (m):	460
Catchment Slope (%):	1.42%
Method: Airport Method	
Time of Concentration (mins):	48.01

Summary

Catchment CN:	83.9
Catchment C:	0.33
Catchment IA (mm):	4.76
Time of Concentration (hrs):	0.80
Catchment Time to Peak (hrs):	0.53
Catchment Time Step (mins):	6.40

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Visual OTTHYMO Model Parameter Calculations (NasHYD)

Project Details

South Fergus	120157

Prepared By

A. Trevers	June 18, 2021

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Pre-Development Condition

Watershed:	Not within CA
Catchment ID:	112
Catchment Area (ha):	10.1
Impervious %:	

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol		**Hl**			**M**			**Pal**					
Soil Series		Harriston			Muck			Parkhill					
Hydrologic Soils Group		BC			B			BC					
Soil Texture		Loam or Silt Loam			Muck			Loam or Silt Loam					
Runoff Coefficient Type		2			2			2					
Area (ha)		4.35			2.54			3.24					
Percentage of Catchment		43%			25%			32%					
Land Cover Category	**IA**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**
Impervious	2		100	0.95		100	0.95		100	0.95			
Gravel	3		89	0.27	0.07	89	0.27	0.34	89	0.27			
Woodland	10	0.34	67	0.25		60	0.25	0.21	67	0.25			
Pasture/Lawns	5		74	0.28		69	0.28		74	0.28			
Meadows	8		71	0.27		65	0.27		71	0.27			
Cultivated	7	4.02	78	0.35	2.46	74	0.35	2.69	78	0.35			
Waterbody	12		50	0.05		50	0.05		50	0.05			
Average CN		77.15			74.44			78.45					
Average C		0.34			0.35			0.33					
Average IA		7.23			6.88			6.77					

Time to Peak Calculations

Max. Catchment Elev. (m):	
Min. Catchment Elev. (m):	
Catchment Length (m):	100
Catchment Slope (%):	0.33%
Method: Airport Method	
Time of Concentration (mins):	35.70

Summary

Catchment CN:	76.9
Catchment C:	0.34
Catchment IA (mm):	7.00
Time of Concentration (hrs):	0.60
Catchment Time to Peak (hrs):	0.40
Catchment Time Step (mins):	4.76

Visual OTTHYMO Model
Parameter Calculations (NasHYD)

Project Details

South Fergus	120157

Prepared By

A. Trevers	June 18, 2021

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Pre-Development Condition

Watershed:	Not within CA
Catchment ID:	113
Catchment Area (ha):	13.2
Impervious %:	4%

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol		**HI**			**M**			**Pal**					
Soil Series		Harriston			Muck			Parkhill					
Hydrologic Soils Group		BC			B			BC					
Soil Texture		Loam or Silt Loam			Muck			Loam or Silt Loam					
Runoff Coefficient Type		2			2			2					
Area (ha)		6.65			2.80			3.74					
Percentage of Catchment		50%			21%			28%					
Land Cover Category	**IA**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**
Impervious	2	0.20	100	0.95	0.15	100	0.95	0.11	100	0.95			
Gravel	3	1.35	89	0.27	0.83	89	0.27	1.26	89	0.27			
Woodland	10	0.36	67	0.25	1.46	60	0.25	0.27	67	0.25			
Pasture/Lawns	5		74	0.28		69	0.28		74	0.28			
Meadows	8		71	0.27		65	0.27		71	0.27			
Cultivated	7	4.75	78	0.35	0.33	74	0.35	1.15	78	0.35			
Waterbody	12		50	0.05	0.03	50	0.05	0.96	50	0.05			
Average CN		80.29			72.21			74.36					
Average C		0.35			0.30			0.25					
Average IA		6.20			7.18			7.01					

Time to Peak Calculations

Max. Catchment Elev. (m):	
Min. Catchment Elev. (m):	
Catchment Length (m):	1220
Catchment Slope (%):	1.25%
Method: Airport Method	
Time of Concentration (mins):	83.58

Summary

Catchment CN:	76.9
Catchment C:	0.31
Catchment IA (mm):	6.64
Time of Concentration (hrs):	1.39
Catchment Time to Peak (hrs):	0.93
Catchment Time Step (mins):	11.14

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Visual OTTHYMO Model
Parameter Calculations (NasHYD)

Project Details

South Fergus	120157

Prepared By

A. Trevers	June 18, 2021

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Pre-Development Condition

Watershed:	Not within CA
Catchment ID:	114
Catchment Area (ha):	10.4
Impervious %:	6%

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol	**HI**	**M**	**Pal**	
Soil Series	Harriston	Muck	Parkhill	
Hydrologic Soils Group	BC	B	BC	
Soil Texture	Loam or Silt Loam	Muck	Loam or Silt Loam	
Runoff Coefficient Type	2	2	2	
Area (ha)	8.09	1.08	1.23	
Percentage of Catchment	78%	10%	12%	

Land Cover Category	**IA**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**
Impervious	2	0.31	100	0.95	0.16	100	0.95	0.17	100	0.95			
Gravel	3	0.69	89	0.27	0.02	89	0.27		89	0.27			
Woodland	10	0.05	67	0.25	0.90	60	0.25	0.87	67	0.25			
Pasture/Lawns	5	2.46	74	0.28		69	0.28	0.09	74	0.28			
Meadows	8		71	0.27		65	0.27		71	0.27			
Cultivated	7	4.58	78	0.35	0.00	74	0.35	0.10	78	0.35			
Waterbody	12		50	0.05		50	0.05		50	0.05			

Average CN	78.51	66.37	73.04	
Average C	0.34	0.35	0.36	
Average IA	5.88	8.70	8.28	

Time to Peak Calculations

Max. Catchment Elev. (m):	
Min. Catchment Elev. (m):	
Catchment Length (m):	1130
Catchment Slope (%):	0.89%
Method: Airport Method	
Time of Concentration (mins):	85.68

Summary

Catchment CN:	76.6
Catchment C:	0.35
Catchment IA (mm):	6.45
Time of Concentration (hrs):	1.43
Catchment Time to Peak (hrs):	0.95
Catchment Time Step (mins):	11.42

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Visual OTTHYMO Model
Parameter Calculations (NasHYD)

Project Details

South Fergus	120157

Prepared By

A. Trevers	June 18, 2021

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Pre-Development Condition

Watershed:	Not within CA
Catchment ID:	115
Catchment Area (ha):	5.2
Impervious %:	8%

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol		**HI**			**M**			**Pal**					
Soil Series		Harriston			Muck			Parkhill					
Hydrologic Soils Group		BC			B			BC					
Soil Texture		Loam or Silt Loam			Muck			Loam or Silt Loam					
Runoff Coefficient Type		2			2			2					
Area (ha)		5.25											
Percentage of Catchment		100%											
Land Cover Category	**IA**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**
Impervious	2	0.38	100	0.95		100	0.95		100	0.95			
Gravel	3		89	0.27		89	0.27		89	0.27			
Woodland	10		67	0.25		60	0.25		67	0.25			
Pasture/Lawns	5		74	0.28		69	0.28		74	0.28			
Meadows	8		71	0.27		65	0.27		71	0.27			
Cultivated	7	4.87	78	0.35		74	0.35		78	0.35			
Waterbody	12		50	0.05		50	0.05		50	0.05			
Average CN		79.58											
Average C		0.39											
Average IA		6.64											

Time to Peak Calculations

Max. Catchment Elev. (m):	
Min. Catchment Elev. (m):	
Catchment Length (m):	310
Catchment Slope (%):	0.68%
Method: Airport Method	
Time of Concentration (mins):	45.99

Summary

Catchment CN:	79.6
Catchment C:	0.39
Catchment IA (mm):	6.64
Time of Concentration (hrs):	0.77
Catchment Time to Peak (hrs):	0.51
Catchment Time Step (mins):	6.13

Visual OTTHYMO Model
Parameter Calculations (NasHYD)

Project Details

South Fergus	120157

Prepared By

A. Trevers	June 18, 2021

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Pre-Development Condition

Watershed:	Not within CA
Catchment ID:	117
Catchment Area (ha):	15.3
Impervious %:	4%

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol	**HI**	**M**	**Pal**	
Soil Series	Harriston	Muck	Parkhill	
Hydrologic Soils Group	BC	B	BC	
Soil Texture	Loam or Silt Loam	Muck	Loam or Silt Loam	
Runoff Coefficient Type	2	2	2	
Area (ha)	15.35			
Percentage of Catchment	100%			

Land Cover Category	**IA**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**
Impervious	2	0.60	100	0.95		100	0.95		100	0.95			
Gravel	3	3.90	89	0.27		89	0.27		89	0.27			
Woodland	10	0.70	67	0.25		60	0.25		67	0.25			
Pasture/Lawns	5		74	0.28		69	0.28		74	0.28			
Meadows	8		71	0.27		65	0.27		71	0.27			
Cultivated	7	10.14	78	0.35		74	0.35		78	0.35			
Waterbody	12		50	0.05		50	0.05		50	0.05			

Average CN	81.16			
Average C	0.35			
Average IA	5.92			

Time to Peak Calculations

Max. Catchment Elev. (m):	
Min. Catchment Elev. (m):	
Catchment Length (m):	440
Catchment Slope (%):	1.25%
Method: Airport Method	
Time of Concentration (mins):	47.85

Summary

Catchment CN:	81.2
Catchment C:	0.35
Catchment IA (mm):	5.92
Time of Concentration (hrs):	0.80
Catchment Time to Peak (hrs):	0.53
Catchment Time Step (mins):	6.38

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Visual OTTHYMO Model
Parameter Calculations (NasHYD)

Project Details

South Fergus	120157

Prepared By

A. Trevers	June 18, 2021

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Pre-Development Condition

Watershed:	Not within CA
Catchment ID:	118
Catchment Area (ha):	5.3
Impervious %:	17%

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol		**HI**			**M**			**Pal**					
Soil Series		Harriston			Muck			Parkhill					
Hydrologic Soils Group		BC			B			BC					
Soil Texture		Loam or Silt Loam			Muck			Loam or Silt Loam					
Runoff Coefficient Type		2			2			2					
Area (ha)		5.32						0.01					
Percentage of Catchment		100%						0%					
Land Cover Category	**IA**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**
Impervious	2	0.89	100	0.95		100	0.95		100	0.95			
Gravel	3		89	0.27		89	0.27		89	0.27			
Woodland	10	0.00	67	0.25		60	0.25	0.01	67	0.25			
Pasture/Lawns	5	1.32	74	0.28		69	0.28	0.00	74	0.28			
Meadows	8		71	0.27		65	0.27		71	0.27			
Cultivated	7	3.11	78	0.35		74	0.35		78	0.35			
Waterbody	12		50	0.05		50	0.05		50	0.05			
Average CN		80.68						68.98					
Average C		0.43						0.26					
Average IA		5.67						8.59					

Time to Peak Calculations

Max. Catchment Elev. (m):	
Min. Catchment Elev. (m):	
Catchment Length (m):	430
Catchment Slope (%):	1.02%
Method:	Bransby-Williams Formula
Time of Concentration (mins):	20.67

Summary

Catchment CN:	80.7
Catchment C:	0.43
Catchment IA (mm):	5.67
Time of Concentration (hrs):	0.34
Catchment Time to Peak (hrs):	0.23
Catchment Time Step (mins):	2.76

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Visual OTTHYMO Model
Parameter Calculations (NasHYD)

Project Details

South Fergus	120157

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A. Trevers	June 18, 2021

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Pre-Development Condition

Watershed:	Not within CA
Catchment ID:	119
Catchment Area (ha):	61.5
Impervious %:	3%

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol		**Hl**			**M**			**Pal**					
Soil Series		Harriston			Muck			Parkhill					
Hydrologic Soils Group		BC			B			BC					
Soil Texture		Loam or Silt Loam			Muck			Loam or Silt Loam					
Runoff Coefficient Type		2			2			2					
Area (ha)		22.86			7.54			31.13					
Percentage of Catchment		37%			12%			51%					
Land Cover Category	**IA**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**
Impervious	2	1.36	100	0.95	0.32	100	0.95	0.08	100	0.95			
Gravel	3	5.38	89	0.27	3.65	89	0.27	3.45	89	0.27			
Woodland	10	2.44	67	0.25	3.54	60	0.25	21.37	67	0.25			
Pasture/Lawns	5	0.69	74	0.28		69	0.28	0.13	74	0.28			
Meadows	8		71	0.27		65	0.27		71	0.27			
Cultivated	7	12.97	78	0.35	0.03	74	0.35	6.10	78	0.35			
Waterbody	12		50	0.05		50	0.05		50	0.05			
Average CN		80.60			75.80			71.71					
Average C		0.35			0.29			0.27					
Average IA		6.02			6.26			8.60					

Time to Peak Calculations

Max. Catchment Elev. (m):	
Min. Catchment Elev. (m):	
Catchment Length (m):	420
Catchment Slope (%):	0.49%
Method: Airport Method	
Time of Concentration (mins):	67.39

Summary

Catchment CN:	75.5
Catchment C:	0.30
Catchment IA (mm):	7.35
Time of Concentration (hrs):	1.12
Catchment Time to Peak (hrs):	0.75
Catchment Time Step (mins):	8.99

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Visual OTTHYMO Model
Parameter Calculations (NasHYD)

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South Fergus	120157

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A. Trevers	June 18, 2021

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Pre-Development Condition

Watershed:	Not within CA
Catchment ID:	120
Catchment Area (ha):	19.7
Impervious %:	5%

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol	**HI**	**M**	**Pal**	
Soil Series	Harriston	Muck	Parkhill	
Hydrologic Soils Group	BC	B	BC	
Soil Texture	Loam or Silt Loam	Muck	Loam or Silt Loam	
Runoff Coefficient Type	2	2	2	
Area (ha)	14.61	5.09	0.00	
Percentage of Catchment	74%	26%	0%	

Land Cover Category	**IA**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**
Impervious	2	0.47	100	0.95	0.42	100	0.95		100	0.95			
Gravel	3		89	0.27		89	0.27		89	0.27			
Woodland	10		67	0.25		60	0.25		67	0.25			
Pasture/Lawns	5		74	0.28		69	0.28		74	0.28			
Meadows	8		71	0.27		65	0.27		71	0.27			
Cultivated	7	14.14	78	0.35	4.66	74	0.35	0.00	78	0.35			
Waterbody	12		50	0.05		50	0.05		50	0.05			
Average CN		78.71			76.16			78.00					
Average C		0.37			0.40			0.35					
Average IA		6.84			6.58			7.00					

Time to Peak Calculations

Max. Catchment Elev. (m):	
Min. Catchment Elev. (m):	
Catchment Length (m):	380
Catchment Slope (%):	0.79%
Method: Airport Method	
Time of Concentration (mins):	49.74

Summary

Catchment CN:	78.0
Catchment C:	0.38
Catchment IA (mm):	6.77
Time of Concentration (hrs):	0.83
Catchment Time to Peak (hrs):	0.55
Catchment Time Step (mins):	6.63

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South Fergus	120157

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Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Pre-Development Condition

Watershed:	Not within CA
Catchment ID:	121
Catchment Area (ha):	23.8
Impervious %:	4%

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol		**Hl**			**M**			**Pal**					
Soil Series		Harriston			Muck			Parkhill					
Hydrologic Soils Group		BC			B			BC					
Soil Texture		Loam or Silt Loam			Muck			Loam or Silt Loam					
Runoff Coefficient Type		2			2			2					
Area (ha)		20.98			2.80								
Percentage of Catchment		88%			12%								
Land Cover Category	**IA**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**
Impervious	2	0.76	100	0.95	0.22	100	0.95		100	0.95			
Gravel	3	7.58	89	0.27	2.40	89	0.27		89	0.27			
Woodland	10		67	0.25		60	0.25		67	0.25			
Pasture/Lawns	5		74	0.28		69	0.28		74	0.28			
Meadows	8		71	0.27		65	0.27		71	0.27			
Cultivated	7	12.65	78	0.35	0.18	74	0.35		78	0.35			
Waterbody	12		50	0.05		50	0.05		50	0.05			
Average CN		82.77			88.90								
Average C		0.34			0.32								
Average IA		5.38			3.18								

Time to Peak Calculations

Max. Catchment Elev. (m):	
Min. Catchment Elev. (m):	
Catchment Length (m):	390
Catchment Slope (%):	2.52%
Method: Airport Method	
Time of Concentration (mins):	36.10

Summary

Catchment CN:	83.5
Catchment C:	0.34
Catchment IA (mm):	5.12
Time of Concentration (hrs):	0.60
Catchment Time to Peak (hrs):	0.40
Catchment Time Step (mins):	4.81

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Visual OTTHYMO Model
Parameter Calculations (NasHYD)

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South Fergus	120157

Prepared By

A. Trevers	June 18, 2021

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Pre-Development Condition

Watershed:	Not within CA
Catchment ID:	122
Catchment Area (ha):	47.1
Impervious %:	4%

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol		**HI**			**M**			**Pal**					
Soil Series		Harriston			Muck			Parkhill					
Hydrologic Soils Group		BC			B			BC					
Soil Texture		Loam or Silt Loam			Muck			Loam or Silt Loam					
Runoff Coefficient Type		2			2			2					
Area (ha)		46.45						0.68					
Percentage of Catchment		99%						1%					
Land Cover Category	**IA**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**
Impervious	2	1.83	100	0.95		100	0.95	0.13	100	0.95			
Gravel	3	12.26	89	0.27		89	0.27	0.55	89	0.27			
Woodland	10		67	0.25		60	0.25		67	0.25			
Pasture/Lawns	5		74	0.28		69	0.28		74	0.28			
Meadows	8		71	0.27		65	0.27		71	0.27			
Cultivated	7	32.37	78	0.35		74	0.35		78	0.35			
Waterbody	12		50	0.05		50	0.05		50	0.05			
Average CN		81.77						91.03					
Average C		0.35						0.39					
Average IA		5.75						2.82					

Time to Peak Calculations

Max. Catchment Elev. (m):	
Min. Catchment Elev. (m):	
Catchment Length (m):	600
Catchment Slope (%):	1.82%
Method: Airport Method	
Time of Concentration (mins):	49.03

Summary

Catchment CN:	81.9
Catchment C:	0.35
Catchment IA (mm):	5.71
Time of Concentration (hrs):	0.82
Catchment Time to Peak (hrs):	0.54
Catchment Time Step (mins):	6.54

TATHAM
ENGINEERING

Visual OTTHYMO Model
Parameter Calculations (NasHYD)

Project Details

South Fergus	120157

Prepared By

A. Trevers	June 18, 2021

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Pre-Development Condition

Watershed:	Not within CA
Catchment ID:	123
Catchment Area (ha):	27.6
Impervious %:	5%

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol		**HI**			**M**			**Pal**					
Soil Series		Harriston			Muck			Parkhill					
Hydrologic Soils Group		BC			B			BC					
Soil Texture		Loam or Silt Loam			Muck			Loam or Silt Loam					
Runoff Coefficient Type		2			2			2					
Area (ha)		27.62											
Percentage of Catchment		100%											
Land Cover Category	**IA**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**
Impervious	2	1.29	100	0.95		100	0.95		100	0.95			
Gravel	3	4.99	89	0.27		89	0.27		89	0.27			
Woodland	10		67	0.25		60	0.25		67	0.25			
Pasture/Lawns	5		74	0.28		69	0.28		74	0.28			
Meadows	8		71	0.27		65	0.27		71	0.27			
Cultivated	7	21.34	78	0.35		74	0.35		78	0.35			
Waterbody	12		50	0.05		50	0.05		50	0.05			
Average CN		81.02											
Average C		0.36											
Average IA		6.04											

Time to Peak Calculations

Max. Catchment Elev. (m):	
Min. Catchment Elev. (m):	
Catchment Length (m):	630
Catchment Slope (%):	1.02%
Method: Airport Method	
Time of Concentration (mins):	59.94

Summary

Catchment CN:	81.0
Catchment C:	0.36
Catchment IA (mm):	6.04
Time of Concentration (hrs):	1.00
Catchment Time to Peak (hrs):	0.67
Catchment Time Step (mins):	7.99

TATHAM
ENGINEERING

Visual OTTHYMO Model
Parameter Calculations (NasHYD)

Project Details

South Fergus	120157

Prepared By

A. Trevers	June 18, 2021

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Pre-Development Condition

Watershed:	Not within CA
Catchment ID:	124
Catchment Area (ha):	59.1
Impervious %:	2%

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol		**HI**			**M**			**Pal**					
Soil Series		Harriston			Muck			Parkhill					
Hydrologic Soils Group		BC			B			BC					
Soil Texture		Loam or Silt Loam			Muck			Loam or Silt Loam					
Runoff Coefficient Type		2			2			2					
Area (ha)		52.29						6.79					
Percentage of Catchment		89%						11%					
Land Cover Category	**IA**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**
Impervious	2	0.86	100	0.95		100	0.95		100	0.95			
Gravel	3	5.06	89	0.27		89	0.27	0.10	89	0.27			
Woodland	10	5.41	67	0.25		60	0.25	6.69	67	0.25			
Pasture/Lawns	5		74	0.28		69	0.28		74	0.28			
Meadows	8		71	0.27		65	0.27		71	0.27			
Cultivated	7	40.96	78	0.35		74	0.35	0.00	78	0.35			
Waterbody	12		50	0.05		50	0.05		50	0.05			
Average CN		78.29						67.32					
Average C		0.34						0.25					
Average IA		6.84						9.90					

Time to Peak Calculations

Max. Catchment Elev. (m):	
Min. Catchment Elev. (m):	
Catchment Length (m):	410
Catchment Slope (%):	1.35%
Method: Airport Method	
Time of Concentration (mins):	46.00

Summary

Catchment CN:	77.0
Catchment C:	0.33
Catchment IA (mm):	7.19
Time of Concentration (hrs):	0.77
Catchment Time to Peak (hrs):	0.51
Catchment Time Step (mins):	6.13

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Visual OTTHYMO Model
Parameter Calculations (NasHYD)

Project Details

South Fergus	120157

Prepared By

A. Trevers	June 18, 2021

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Pre-Development Condition

Watershed:	Not within CA
Catchment ID:	125
Catchment Area (ha):	50.7
Impervious %:	0%

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol	**HI**	**M**	**Pal**	
Soil Series	Harriston	Muck	Parkhill	
Hydrologic Soils Group	BC	B	BC	
Soil Texture	Loam or Silt Loam	Muck	Loam or Silt Loam	
Runoff Coefficient Type	2	2	2	
Area (ha)	42.18		8.48	
Percentage of Catchment	83%		17%	

Land Cover Category	**IA**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**
Impervious	2	0.16	100	0.95		100	0.95		100	0.95			
Gravel	3	6.43	89	0.27		89	0.27	0.65	89	0.27			
Woodland	10	6.20	67	0.25		60	0.25	7.53	67	0.25			
Pasture/Lawns	5		74	0.28		69	0.28		74	0.28			
Meadows	8		71	0.27		65	0.27		71	0.27			
Cultivated	7	29.40	78	0.35		74	0.35	0.30	78	0.35			
Waterbody	12		50	0.05		50	0.05		50	0.05			

Average CN	78.14		69.07	
Average C	0.32		0.25	
Average IA	6.81		9.36	

Time to Peak Calculations

Max. Catchment Elev. (m):	
Min. Catchment Elev. (m):	
Catchment Length (m):	460
Catchment Slope (%):	0.91%
Method: Airport Method	
Time of Concentration (mins):	56.73

Summary

Catchment CN:	76.6
Catchment C:	0.31
Catchment IA (mm):	7.24
Time of Concentration (hrs):	0.95
Catchment Time to Peak (hrs):	0.63
Catchment Time Step (mins):	7.56

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Visual OTTHYMO Model Parameter Calculations (NasHYD)

Project Details

South Fergus	120157

Prepared By

A. Trevers	June 18, 2021

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Pre-Development Condition

Watershed:	Not within CA
Catchment ID:	126
Catchment Area (ha):	34.0
Impervious %:	6%

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol	**HI**	**M**	**Pal**	
Soil Series	Harriston	Muck	Parkhill	
Hydrologic Soils Group	BC	B	BC	
Soil Texture	Loam or Silt Loam	Muck	Loam or Silt Loam	
Runoff Coefficient Type	2	2	2	
Area (ha)	28.43	1.66	3.90	
Percentage of Catchment	84%	5%	11%	

Land Cover Category	**IA**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**
Impervious	2	1.81	100	0.95		100	0.95	0.04	100	0.95			
Gravel	3	12.54	89	0.27	0.71	89	0.27	1.61	89	0.27			
Woodland	10		67	0.25		60	0.25		67	0.25			
Pasture/Lawns	5		74	0.28		69	0.28		74	0.28			
Meadows	8		71	0.27		65	0.27		71	0.27			
Cultivated	7	14.08	78	0.35	0.95	74	0.35	2.25	78	0.35			
Waterbody	12		50	0.05		50	0.05		50	0.05			
Average CN		84.25			80.44			82.76					
Average C		0.35			0.31			0.32					
Average IA		4.92			5.28			5.30					

Time to Peak Calculations

Max. Catchment Elev. (m):	
Min. Catchment Elev. (m):	
Catchment Length (m):	340
Catchment Slope (%):	1.63%
Method: Airport Method	
Time of Concentration (mins):	38.58

Summary

Catchment CN:	83.9
Catchment C:	0.35
Catchment IA (mm):	4.98
Time of Concentration (hrs):	0.64
Catchment Time to Peak (hrs):	0.43
Catchment Time Step (mins):	5.14

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Visual OTTHYMO Model
Parameter Calculations (StandHYD)

Project Details

South Fergus	120157

Prepared By

A. Trevers	June 18, 2021

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Pre-Development Condition

Watershed:	Not within CA
Catchment ID:	106
Catchment Area (ha):	26.50
Impervious %:	60%
Pervious Area (ha):	10.60

Average Curve Number (CN) and Initial Abstraction (IA) for Pervious Area

Soil Symbol		**Hl**		**M**		**Pal**		**Ll**	
Soil Series		Harriston		Muck		Parkhill		Lyons	
Hydrologic Soils Group		BC		B		BC		B	
Soil Texture		Loam or Silt Loam		Muck		Loam or Silt Loam		Loam or Silt Loam	
Runoff Coefficient Type		2		2		2		2	
Area (ha)		10.60							
Percentage of Catchment		100%							
Land Cover Category	**IA**	**A (ha)**	**CN**	**A (ha)**	**CN**	**A (ha)**	**CN**	**A (ha)**	**CN**
Impervious	2		100		100		100		100
Gravel	3		89		89		89		89
Woodland	10		67		60		67		60
Pasture/Lawns	5	10.41	74		69	3.69	74		69
Meadows	8		71		65		71		65
Cultivated	7	0.19	78		74	-3.69	78		74
Waterbody	12		50		50		50		50
Average CN		74.07							
Average IA		5.04							

Notes

CN and IA values have been calculated for the pervious area of the catchment only.

Summary

Catchment CN:	74.1
Catchment IA (mm):	5.04

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Visual OTTHYMO Model
Parameter Calculations (StandHYD)

Project Details

South Fergus	120157

Prepared By

A. Trevers	June 18, 2021

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Pre-Development Condition

Watershed:	Not within CA
Catchment ID:	107
Catchment Area (ha):	4.50
Impervious %:	86%
Pervious Area (ha):	0.63

Average Curve Number (CN) and Initial Abstraction (IA) for Pervious Area

Soil Symbol		**HI**		**M**		**Pal**		**LI**	
Soil Series		Harriston		Muck		Parkhill		Lyons	
Hydrologic Soils Group		BC		B		BC		B	
Soil Texture		Loam or Silt Loam		Muck		Loam or Silt Loam		Loam or Silt Loam	
Runoff Coefficient Type		2		2		2		2	
Area (ha)		0.63							
Percentage of Catchment		100%							
Land Cover Category	**IA**	**A (ha)**	**CN**	**A (ha)**	**CN**	**A (ha)**	**CN**	**A (ha)**	**CN**
Impervious	2		100		100		100		100
Gravel	3		89		89		89		89
Woodland	10		67		60		67		60
Pasture/Lawns	5	0.63	74		69	3.69	74		69
Meadows	8		71		65		71		65
Cultivated	7		78		74	-3.69	78		74
Waterbody	12		50		50		50		50
Average CN		74.00							
Average IA		5.00							

Notes

CN and IA values have been calculated for the pervious area of the catchment only.

Summary

Catchment CN:	74.0
Catchment IA (mm):	5.00

Visual OTTHYMO Model
Parameter Calculations (StandHYD)

Project Details

South Fergus	120157

Prepared By

A. Trevers	June 18, 2021

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Pre-Development Condition

Watershed:	Not within CA
Catchment ID:	108
Catchment Area (ha):	4.30
Impervious %:	67%
Pervious Area (ha):	1.42

Average Curve Number (CN) and Initial Abstraction (IA) for Pervious Area

Soil Symbol		**Hl**		**M**		**Pal**		**Ll**	
Soil Series		Harriston		Muck		Parkhill		Lyons	
Hydrologic Soils Group		BC		B		BC		B	
Soil Texture		Loam or Silt Loam		Muck		Loam or Silt Loam		Loam or Silt Loam	
Runoff Coefficient Type		2		2		2		2	
Area (ha)		1.42							
Percentage of Catchment		100%							
Land Cover Category	**IA**	**A (ha)**	**CN**	**A (ha)**	**CN**	**A (ha)**	**CN**	**A (ha)**	**CN**
Impervious	2		100		100		100		100
Gravel	3		89		89		89		89
Woodland	10	0.12	67		60		67		60
Pasture/Lawns	5	1.30	74		69		74		69
Meadows	8		71		65		71		65
Cultivated	7		78		74		78		74
Waterbody	12		50		50		50		50
Average CN		73.41							
Average IA		5.42							

Notes

CN and IA values have been calculated for the pervious area of the catchment only.

Summary

Catchment CN:	73.4
Catchment IA (mm):	5.42

Visual OTTHYMO Model
Parameter Calculations (StandHYD)

Project Details

South Fergus	120157

Prepared By

A. Trevers	June 18, 2021

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Pre-Development Condition

Watershed:	Not within CA
Catchment ID:	116
Catchment Area (ha):	2.10
Impervious %:	23%
Pervious Area (ha):	1.62

Average Curve Number (CN) and Initial Abstraction (IA) for Pervious Area

Soil Symbol	**HI**	**M**	**Pal**	**LI**
Soil Series	Harriston	Muck	Parkhill	Lyons
Hydrologic Soils Group	BC	B	BC	B
Soil Texture	Loam or Silt Loam	Muck	Loam or Silt Loam	Loam or Silt Loam
Runoff Coefficient Type	2	2	2	2
Area (ha)	1.62			
Percentage of Catchment	100%			

Land Cover Category	**IA**	**A (ha)**	**CN**	**A (ha)**	**CN**	**A (ha)**	**CN**	**A (ha)**	**CN**
Impervious	2		100		100		100		100
Gravel	3	0.03	89		89		89		89
Woodland	10		67		60		67		60
Pasture/Lawns	5		74		69		74		69
Meadows	8		71		65		71		65
Cultivated	7	1.59	78		74		78		74
Waterbody	12		50		50		50		50
Average CN		78.20							
Average IA		6.93							

Notes

CN and IA values have been calculated for the pervious area of the catchment only.

Summary

Catchment CN:	78.2
Catchment IA (mm):	6.93

Visual OTTHYMO Model
Parameter Calculations (StandHYD)

Project Details

South Fergus MESP	120157

Prepared By

Jonathan Paul	June 9, 2022

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Post Development Condition

Watershed:	Not within CA
Catchment ID:	225
Catchment Area (ha):	14.21
Impervious %:	24%
Pervious Area (ha):	10.80

Average Curve Number (CN) and Initial Abstraction (IA) for Pervious Area

Soil Symbol	**Lil**	**Hl**		
Soil Series	Listowel	Harriston		
Hydrologic Soils Group	BC	BC		
Soil Texture	Loam or Silt Loam	Loam or Silt Loam		
Runoff Coefficient Type	2	2		
Area (ha)	2.03	8.77		
Percentage of Catchment	19%	81%		

Land Cover Category	**IA**	**A (ha)**	**CN**	**A (ha)**	**CN**	**A (ha)**	**CN**	**A (ha)**	**CN**
Impervious	2		100		100				
Gravel	3		89		89				
Woodland	10		67		67				
Pasture/Lawns	5	2.03	74	8.77	74				
Meadows	8		71		71				
Cultivated	7		78		78				
Waterbody	12		50		50				
Average CN		74.00		74.00					
Average IA		5.00		5.00					

Notes

CN and IA values have been calculated for the pervious area of the catchment only.

Summary

Catchment CN:	74.0
Catchment IA (mm):	5.00

CN* And AMC Conversion Calculation

Project Details

South Fergus	120157

Prepared By

A. Trevers	June 18, 2021

Municipality

CN* Calculation Requirement

Yes

Precipitation threshold to create AMCIII soil moisture conditions (mm):	80.00
Initial Abstraction (Ia) (mm):	5.00

Catchment ID	AMC II CN	AMC I CN	AMC III CN	AMC III CN*	AMC II CN*	AMC I CN*
101	81.90	65.63	92.28	92.68	83.46	67.98
102	81.00	64.31	91.77	92.01	82.21	66.08
103	79.70	62.46	91.02	91.01	80.36	63.40
104	72.90	53.57	86.74	85.03	70.27	50.45
105	79.40	62.04	90.84	90.77	79.93	62.79
106	74.10	55.05	87.53	86.18	72.09	52.60
107	74.00	54.93	87.47	86.08	71.94	52.42
108	73.40	54.18	87.07	85.51	71.03	51.34
109	81.00	64.31	91.77	92.01	82.21	66.08
110	85.60	71.33	94.27	95.20	88.40	76.00
111	83.90	68.65	93.38	94.08	86.18	72.27
112	76.90	58.64	89.32	88.70	76.28	57.83
113	76.90	58.64	89.32	88.70	76.28	57.83
114	76.60	58.25	89.13	88.44	75.84	57.26

AMC Conversion is determined using equations derived from MTO Design Chart 1.10

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CN* And AMC Conversion Calculation

Project Details

South Fergus	120157

Prepared By

A. Trevers	June 18, 2021

Municipality

CN* Calculation Requirement

Yes

Precipitation threshold to create AMCIII soil moisture conditions (mm):	80.00
Initial Abstraction (Ia) (mm):	5.00

Catchment ID	AMC II CN	AMC I CN	AMC III CN	AMC III CN*	AMC II CN*	AMC I CN*
115	79.60	62.32	90.96	90.93	80.22	63.19
116	78.20	60.39	90.12	89.80	78.19	60.38
117	81.20	64.60	91.89	92.16	82.49	66.50
118	80.70	63.88	91.60	91.78	81.78	65.46
119	75.50	56.82	88.43	87.46	74.20	55.17
120	78.00	60.12	89.99	89.63	77.90	59.98
121	83.50	68.04	93.17	93.81	85.64	71.40
122	47.10	28.09	66.85	49.09	29.92	15.17
123	81.00	64.31	91.77	92.01	82.21	66.08
124	77.00	58.78	89.38	88.78	76.43	58.03
125	76.60	58.25	89.13	88.44	75.84	57.26
126	83.90	68.65	93.38	94.08	86.18	72.27
100	87.00	73.62	94.97	96.06	90.16	79.10
201	85.00	70.37	93.96	94.81	87.63	74.68
202	85.00	70.37	93.96	94.81	87.63	74.68
225	74.00	54.93	87.47	86.08	71.94	52.42

AMC Conversion is determined using equations derived from MTO Design Chart 1.10

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         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                   *****  D E T A I L E D   O U T P U T *****


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  Output      filename:    C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\ab1eb3c9-2daa-4fbc-afa3-d387de0de416\s
  Summary    filename:    C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\ab1eb3c9-2daa-4fbc-afa3-d387de0de416\s


DATE: 08-25-2023                           TIME: 02:35:18

USER:



COMMENTS: ______________________________________________________________


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  ************************************************
  ** SIMULATION : Hazel                         **
  ************************************************


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|    READ STORM    |    Filename: C:\Users\jmacdonald\AppD
|                  |              ata\Local\Temp\
|                  |              f071b233-8036-49e2-aaa2-34d2b0c23928\d32d31d1
| Ptotal=212.00 mm |    Comments: Hazel
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.00    6.00 |  3.00   13.00 |  6.00   23.00 |  9.00   53.00
                 1.00    4.00 |  4.00   17.00 |  7.00   13.00 | 10.00   38.00
                 2.00    6.00 |  5.00   13.00 |  8.00   13.00 | 11.00   13.00

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| CALIB            |
| NASHYD   (  0121)|   Area    (ha)=  23.78   Curve Number   (CN)= 93.2
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.12   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.40
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         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                             ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    6.00 | 3.083   13.00 | 6.083   23.00 |  9.08   53.00
                 0.167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
                 0.250    6.00 | 3.250   13.00 | 6.250   23.00 |  9.25   53.00
                 0.333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
                 0.417    6.00 | 3.417   13.00 | 6.417   23.00 |  9.42   53.00
                 0.500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
                 0.583    6.00 | 3.583   13.00 | 6.583   23.00 |  9.58   53.00
                 0.667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
                 0.750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
                 0.833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83   53.00
                 0.917    6.00 | 3.917   13.00 | 6.917   23.00 |  9.92   53.00
                 1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   53.00
                 1.083    4.00 | 4.083   17.00 | 7.083   13.00 | 10.08   38.00
                 1.167    4.00 | 4.167   17.00 | 7.167   13.00 | 10.17   38.00
                 1.250    4.00 | 4.250   17.00 | 7.250   13.00 | 10.25   38.00
                 1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
                 1.417    4.00 | 4.417   17.00 | 7.417   13.00 | 10.42   38.00
                 1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
                 1.583    4.00 | 4.583   17.00 | 7.583   13.00 | 10.58   38.00
                 1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
                 1.750    4.00 | 4.750   17.00 | 7.750   13.00 | 10.75   38.00
                 1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83   38.00
                 1.917    4.00 | 4.917   17.00 | 7.917   13.00 | 10.92   38.00
                 2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   38.00
                 2.083    6.00 | 5.083   13.00 | 8.083   13.00 | 11.08   13.00
                 2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17   13.00
                 2.250    6.00 | 5.250   13.00 | 8.250   13.00 | 11.25   13.00
                 2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
                 2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
                 2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
                 2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
                 2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
                 2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
                 2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
                 2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
                 3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

     Unit Hyd Qpeak  (cms)=   2.271

     PEAK FLOW       (cms)=   3.213 (i)
     TIME TO PEAK    (hrs)=  10.083
     RUNOFF VOLUME    (mm)= 189.774
     TOTAL RAINFALL   (mm)= 212.000
     RUNOFF COEFFICIENT   =   0.895

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
| NASHYD   (  0110)|   Area    (ha)=   3.84   Curve Number   (CN)= 94.3
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.55   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.34

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                             ---- TRANSFORMED HYETOGRAPH ----
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```
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    6.00 | 3.083   13.00 | 6.083   23.00 |  9.08   53.00
             0.167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
             0.250    6.00 | 3.250   13.00 | 6.250   23.00 |  9.25   53.00
             0.333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
             0.417    6.00 | 3.417   13.00 | 6.417   23.00 |  9.42   53.00
             0.500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
             0.583    6.00 | 3.583   13.00 | 6.583   23.00 |  9.58   53.00
             0.667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
             0.750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
             0.833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83   53.00
             0.917    6.00 | 3.917   13.00 | 6.917   23.00 |  9.92   53.00
             1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   53.00
             1.083    4.00 | 4.083   17.00 | 7.083   13.00 | 10.08   38.00
             1.167    4.00 | 4.167   17.00 | 7.167   13.00 | 10.17   38.00
             1.250    4.00 | 4.250   17.00 | 7.250   13.00 | 10.25   38.00
             1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
             1.417    4.00 | 4.417   17.00 | 7.417   13.00 | 10.42   38.00
             1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
             1.583    4.00 | 4.583   17.00 | 7.583   13.00 | 10.58   38.00
             1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
             1.750    4.00 | 4.750   17.00 | 7.750   13.00 | 10.75   38.00
             1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83   38.00
             1.917    4.00 | 4.917   17.00 | 7.917   13.00 | 10.92   38.00
             2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   38.00
             2.083    6.00 | 5.083   13.00 | 8.083   13.00 | 11.08   13.00
             2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17   13.00
             2.250    6.00 | 5.250   13.00 | 8.250   13.00 | 11.25   13.00
             2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
             2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
             2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
             2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
             2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
             2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
             2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
             2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
             3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

     Unit Hyd Qpeak  (cms)=   0.431

     PEAK FLOW       (cms)=   0.537 (i)
     TIME TO PEAK    (hrs)=  10.083
     RUNOFF VOLUME    (mm)= 193.035
     TOTAL RAINFALL   (mm)= 212.000
     RUNOFF COEFFICIENT   =   0.911

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB             |
| NASHYD   (  0105)|   Area    (ha)=  12.11   Curve Number   (CN)= 90.8
|ID= 1 DT= 5.0 min |   Ia      (mm)=   6.34   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.37

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    6.00 | 3.083   13.00 | 6.083   23.00 |  9.08   53.00
             0.167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
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             0.250    6.00 | 3.250   13.00 | 6.250   23.00 |  9.25   53.00
             0.333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
             0.417    6.00 | 3.417   13.00 | 6.417   23.00 |  9.42   53.00
             0.500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
             0.583    6.00 | 3.583   13.00 | 6.583   23.00 |  9.58   53.00
             0.667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
             0.750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
             0.833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83   53.00
             0.917    6.00 | 3.917   13.00 | 6.917   23.00 |  9.92   53.00
             1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   53.00
             1.083    4.00 | 4.083   17.00 | 7.083   13.00 | 10.08   38.00
             1.167    4.00 | 4.167   17.00 | 7.167   13.00 | 10.17   38.00
             1.250    4.00 | 4.250   17.00 | 7.250   13.00 | 10.25   38.00
             1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
             1.417    4.00 | 4.417   17.00 | 7.417   13.00 | 10.42   38.00
             1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
             1.583    4.00 | 4.583   17.00 | 7.583   13.00 | 10.58   38.00
             1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
             1.750    4.00 | 4.750   17.00 | 7.750   13.00 | 10.75   38.00
             1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83   38.00
             1.917    4.00 | 4.917   17.00 | 7.917   13.00 | 10.92   38.00
             2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   38.00
             2.083    6.00 | 5.083   13.00 | 8.083   13.00 | 11.08   13.00
             2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17   13.00
             2.250    6.00 | 5.250   13.00 | 8.250   13.00 | 11.25   13.00
             2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
             2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
             2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
             2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
             2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
             2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
             2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
             2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
             3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

     Unit Hyd Qpeak  (cms)=   1.250

     PEAK FLOW       (cms)=   1.645 (i)
     TIME TO PEAK    (hrs)=  10.083
     RUNOFF VOLUME    (mm)= 182.853
     TOTAL RAINFALL   (mm)= 212.000
     RUNOFF COEFFICIENT   =   0.863

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB             |
| STANDHYD (  0106)|   Area    (ha)=  26.47
|ID= 1 DT= 5.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  15.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      15.88        10.59
     Dep. Storage     (mm)=       0.23         5.04
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     420.08        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
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```
               0.083    6.00 | 3.083   13.00 | 6.083   23.00 |  9.08   53.00
               0.167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
               0.250    6.00 | 3.250   13.00 | 6.250   23.00 |  9.25   53.00
               0.333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
               0.417    6.00 | 3.417   13.00 | 6.417   23.00 |  9.42   53.00
               0.500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
               0.583    6.00 | 3.583   13.00 | 6.583   23.00 |  9.58   53.00
               0.667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
               0.750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
               0.833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83   53.00
               0.917    6.00 | 3.917   13.00 | 6.917   23.00 |  9.92   53.00
               1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   53.00
               1.083    4.00 | 4.083   17.00 | 7.083   13.00 | 10.08   38.00
               1.167    4.00 | 4.167   17.00 | 7.167   13.00 | 10.17   38.00
               1.250    4.00 | 4.250   17.00 | 7.250   13.00 | 10.25   38.00
               1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
               1.417    4.00 | 4.417   17.00 | 7.417   13.00 | 10.42   38.00
               1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
               1.583    4.00 | 4.583   17.00 | 7.583   13.00 | 10.58   38.00
               1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
               1.750    4.00 | 4.750   17.00 | 7.750   13.00 | 10.75   38.00
               1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83   38.00
               1.917    4.00 | 4.917   17.00 | 7.917   13.00 | 10.92   38.00
               2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   38.00
               2.083    6.00 | 5.083   13.00 | 8.083   13.00 | 11.08   13.00
               2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17   13.00
               2.250    6.00 | 5.250   13.00 | 8.250   13.00 | 11.25   13.00
               2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
               2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
               2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
               2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
               2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
               2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
               2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
               2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
               3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

     Max.Eff.Inten.(mm/hr)=      53.00       111.51
               over (min)        10.00        15.00
     Storage Coeff.  (min)=       7.79 (ii)   14.55 (ii)
     Unit Hyd. Tpeak (min)=      10.00        15.00
     Unit Hyd. peak  (cms)=       0.13         0.08
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.58         3.21        3.796 (iii)
     TIME TO PEAK    (hrs)=      10.00        10.00        10.00
     RUNOFF VOLUME    (mm)=     211.77       193.88       196.56
     TOTAL RAINFALL   (mm)=     212.00       212.00       212.00
     RUNOFF COEFFICIENT   =       1.00         0.91         0.93

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  87.5    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ROUTE CHN(  0049)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
              <------ DATA FOR SECTION (   1.1) ------>
```

```
                 Distance      Elevation       Manning
                     0.00         412.15        0.0500
                    40.00         412.05    0.0500 /0.0500  Main Channel
                    80.00         411.85        0.0500      Main Channel
                   120.00         412.08    0.0500 /0.0500  Main Channel
                   160.00         413.01        0.0500
                   200.00         413.28        0.0500

        <--------------------- TRAVEL TIME TABLE --------------------->
         DEPTH     ELEV       VOLUME    FLOW RATE    VELOCITY   TRAV.TIME
          (m)       (m)      (cu.m.)      (cms)        (m/s)      (min)
          0.01    411.86    .131E+02       0.0          0.01      727.53
          0.03    411.88    .524E+02       0.0          0.01      458.32
          0.04    411.89    .118E+03       0.0          0.02      349.76
          0.06    411.91    .209E+03       0.0          0.02      288.72
          0.07    411.92    .327E+03       0.0          0.02      248.81
          0.09    411.94    .471E+03       0.0          0.02      220.33
          0.10    411.95    .642E+03       0.1          0.03      198.82
          0.12    411.97    .838E+03       0.1          0.03      181.88
          0.13    411.98    .106E+04       0.1          0.03      168.15
          0.15    411.99    .131E+04       0.1          0.04      156.74
          0.16    412.01    .158E+04       0.2          0.04      147.09
          0.18    412.02    .189E+04       0.2          0.04      138.80
          0.19    412.04    .221E+04       0.3          0.04      131.59
          0.21    412.05    .257E+04       0.3          0.04      125.25
          0.22    412.07    .295E+04       0.4          0.05      117.51
          0.24    412.09    .350E+04       0.5          0.05      109.19
          0.26    412.11    .410E+04       0.7          0.05      101.58
          0.28    412.12    .476E+04       0.8          0.06       95.62
          0.29    412.14    .547E+04       1.0          0.06       90.76

     **** WARNING:  TRAVEL TIME TABLE EXCEEDED
                                        <---- hydrograph ---->   <-pipe / channel->
                                 AREA    QPEAK    TPEAK    R.V.   MAX DEPTH  MAX VEL
                                 (ha)    (cms)    (hrs)    (mm)      (m)      (m/s)
   INFLOW : ID= 2 (  0106)      26.47     3.80    10.00 196.56      0.29       0.06
   OUTFLOW: ID= 1 (  0049)      26.47     2.48    11.08 196.31      0.29       0.06


     **** WARNING:  COMPUTATIONS FAILED TO CONVERGE.

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--------------------
| CALIB            |
| STANDHYD (  0107)|   Area    (ha)=   4.51
|ID= 1 DT= 5.0 min |   Total Imp(%)=  86.00   Dir. Conn.(%)=  86.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.88         0.63
     Dep. Storage     (mm)=       5.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     173.40        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    6.00 | 3.083   13.00 | 6.083   23.00 |  9.08   53.00
                0.167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
                0.250    6.00 | 3.250   13.00 | 6.250   23.00 |  9.25   53.00
                0.333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
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                0.417    6.00 | 3.417   13.00 | 6.417   23.00 |  9.42   53.00
                0.500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
                0.583    6.00 | 3.583   13.00 | 6.583   23.00 |  9.58   53.00
                0.667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
                0.750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
                0.833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83   53.00
                0.917    6.00 | 3.917   13.00 | 6.917   23.00 |  9.92   53.00
                1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   53.00
                1.083    4.00 | 4.083   17.00 | 7.083   13.00 | 10.08   38.00
                1.167    4.00 | 4.167   17.00 | 7.167   13.00 | 10.17   38.00
                1.250    4.00 | 4.250   17.00 | 7.250   13.00 | 10.25   38.00
                1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
                1.417    4.00 | 4.417   17.00 | 7.417   13.00 | 10.42   38.00
                1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
                1.583    4.00 | 4.583   17.00 | 7.583   13.00 | 10.58   38.00
                1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
                1.750    4.00 | 4.750   17.00 | 7.750   13.00 | 10.75   38.00
                1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83   38.00
                1.917    4.00 | 4.917   17.00 | 7.917   13.00 | 10.92   38.00
                2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   38.00
                2.083    6.00 | 5.083   13.00 | 8.083   13.00 | 11.08   13.00
                2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17   13.00
                2.250    6.00 | 5.250   13.00 | 8.250   13.00 | 11.25   13.00
                2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
                2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
                2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
                2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
                2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
                2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
                2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
                2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
                3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

     Max.Eff.Inten.(mm/hr)=      53.00      ********
                over (min)        5.00       10.00
     Storage Coeff.  (min)=       4.58 (ii)    8.98 (ii)
     Unit Hyd. Tpeak (min)=       5.00       10.00
     Unit Hyd. peak  (cms)=       0.23        0.12
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.57        0.09          0.660 (iii)
     TIME TO PEAK    (hrs)=      10.00       10.00         10.00
     RUNOFF VOLUME    (mm)=     207.00      176.05        202.67
     TOTAL RAINFALL   (mm)=     212.00      212.00        212.00
     RUNOFF COEFFICIENT   =       0.98        0.83          0.96

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  87.5    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD (  0108)|   Area    (ha)=   4.35
|ID= 1 DT= 5.0 min |   Total Imp(%)=  67.00   Dir. Conn.(%)=  67.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.91        1.44
     Dep. Storage     (mm)=       5.00        5.42
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     170.29       40.00
```

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     Mannings n           =      0.013       0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN | TIME    RAIN |' TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |  hrs   mm/hr |'  hrs   mm/hr |   hrs   mm/hr
              0.083    6.00 | 3.083   13.00 | 6.083   23.00 |  9.08   53.00
              0.167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
              0.250    6.00 | 3.250   13.00 | 6.250   23.00 |  9.25   53.00
              0.333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
              0.417    6.00 | 3.417   13.00 | 6.417   23.00 |  9.42   53.00
              0.500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
              0.583    6.00 | 3.583   13.00 | 6.583   23.00 |  9.58   53.00
              0.667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
              0.750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
              0.833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83   53.00
              0.917    6.00 | 3.917   13.00 | 6.917   23.00 |  9.92   53.00
              1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   53.00
              1.083    4.00 | 4.083   17.00 | 7.083   13.00 | 10.08   38.00
              1.167    4.00 | 4.167   17.00 | 7.167   13.00 | 10.17   38.00
              1.250    4.00 | 4.250   17.00 | 7.250   13.00 | 10.25   38.00
              1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
              1.417    4.00 | 4.417   17.00 | 7.417   13.00 | 10.42   38.00
              1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
              1.583    4.00 | 4.583   17.00 | 7.583   13.00 | 10.58   38.00
              1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
              1.750    4.00 | 4.750   17.00 | 7.750   13.00 | 10.75   38.00
              1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83   38.00
              1.917    4.00 | 4.917   17.00 | 7.917   13.00 | 10.92   38.00
              2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   38.00
              2.083    6.00 | 5.083   13.00 | 8.083   13.00 | 11.08   13.00
              2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17   13.00
              2.250    6.00 | 5.250   13.00 | 8.250   13.00 | 11.25   13.00
              2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
              2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
              2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
              2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
              2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
              2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
              2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
              2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
              3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

     Max.Eff.Inten.(mm/hr)=      53.00       50.89
                over (min)        5.00       15.00
     Storage Coeff.  (min)=       4.53 (ii)   13.78 (ii)
     Unit Hyd. Tpeak (min)=       5.00       15.00
     Unit Hyd. peak  (cms)=       0.23        0.08
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.43        0.20          0.628 (iii)
     TIME TO PEAK    (hrs)=      10.00       10.00         10.00
     RUNOFF VOLUME    (mm)=     207.00      174.68        196.33
     TOTAL RAINFALL   (mm)=     212.00      212.00        212.00
     RUNOFF COEFFICIENT   =       0.98        0.82          0.93

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  87.1    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
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--------------------
| ADD HYD  (  0036)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK      R.V.
--------------------         (ha)    (cms)    (hrs)      (mm)
        ID1= 1 (  0105):    12.11    1.645    10.08    182.85
      + ID2= 2 (  0107):     4.51    0.660    10.00    202.67
        ==================================================
        ID = 3 (  0036):    16.62    2.288    10.00    188.23

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0036)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK      R.V.
--------------------         (ha)    (cms)    (hrs)      (mm)
        ID1= 3 (  0036):    16.62    2.288    10.00    188.23
      + ID2= 2 (  0108):     4.35    0.628    10.00    196.33
        ==================================================
        ID = 1 (  0036):    20.97    2.916    10.00    189.91

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| ADD HYD  (  0036)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK      R.V.
--------------------         (ha)    (cms)    (hrs)      (mm)
        ID1= 1 (  0036):    20.97    2.916    10.00    189.91
      + ID2= 2 (  0049):    26.47    2.478    11.08    196.31
        ==================================================
        ID = 3 (  0036):    47.44    4.870    10.00    193.48

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0065)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   2.8000      0.9524
                          0.0700     0.0553   |   7.0000      1.4097
                          0.0800     0.2284   |   8.5000      1.7444
                          0.0900     0.3148   |  10.8000      2.1032
                          1.2000     0.4083   |  13.0000      2.6865
                          1.8000     0.6175   |   0.0000      0.0000

                                 AREA     QPEAK     TPEAK        R.V.
                                 (ha)     (cms)     (hrs)        (mm)
   INFLOW : ID= 2 (  0036)     47.440      4.870     10.00      193.48
   OUTFLOW: ID= 1 (  0065)     47.440      4.663     11.00      193.48

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 95.75
                   TIME SHIFT OF PEAK FLOW         (min)= 60.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  1.1556

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--------------------
| CALIB            |
| NASHYD   (  0104)|   Area    (ha)=   8.95   Curve Number   (CN)= 86.7
|ID= 1 DT= 5.0 min |   Ia      (mm)=   8.28   # of Linear Res.(N)= 3.00
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--------------------   U.H. Tp(hrs)=   0.41

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                             ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    6.00 | 3.083   13.00 | 6.083   23.00 |  9.08   53.00
                0.167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
                0.250    6.00 | 3.250   13.00 | 6.250   23.00 |  9.25   53.00
                0.333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
                0.417    6.00 | 3.417   13.00 | 6.417   23.00 |  9.42   53.00
                0.500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
                0.583    6.00 | 3.583   13.00 | 6.583   23.00 |  9.58   53.00
                0.667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
                0.750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
                0.833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83   53.00
                0.917    6.00 | 3.917   13.00 | 6.917   23.00 |  9.92   53.00
                1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   53.00
                1.083    4.00 | 4.083   17.00 | 7.083   13.00 | 10.08   38.00
                1.167    4.00 | 4.167   17.00 | 7.167   13.00 | 10.17   38.00
                1.250    4.00 | 4.250   17.00 | 7.250   13.00 | 10.25   38.00
                1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
                1.417    4.00 | 4.417   17.00 | 7.417   13.00 | 10.42   38.00
                1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
                1.583    4.00 | 4.583   17.00 | 7.583   13.00 | 10.58   38.00
                1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
                1.750    4.00 | 4.750   17.00 | 7.750   13.00 | 10.75   38.00
                1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83   38.00
                1.917    4.00 | 4.917   17.00 | 7.917   13.00 | 10.92   38.00
                2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   38.00
                2.083    6.00 | 5.083   13.00 | 8.083   13.00 | 11.08   13.00
                2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17   13.00
                2.250    6.00 | 5.250   13.00 | 8.250   13.00 | 11.25   13.00
                2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
                2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
                2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
                2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
                2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
                2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
                2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
                2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
                3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

     Unit Hyd Qpeak  (cms)=   0.834

     PEAK FLOW       (cms)=   1.157 (i)
     TIME TO PEAK    (hrs)=  10.167
     RUNOFF VOLUME    (mm)= 171.088
     TOTAL RAINFALL   (mm)= 212.000
     RUNOFF COEFFICIENT   =   0.807

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| NASHYD   (  0101)|   Area    (ha)=  29.62   Curve Number   (CN)= 92.3
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.67   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.57

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

```
                    ---- TRANSFORMED HYETOGRAPH ----
       TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
        hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
      0.083    6.00 | 3.083   13.00 | 6.083   23.00 |  9.08   53.00
      0.167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
      0.250    6.00 | 3.250   13.00 | 6.250   23.00 |  9.25   53.00
      0.333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
      0.417    6.00 | 3.417   13.00 | 6.417   23.00 |  9.42   53.00
      0.500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
      0.583    6.00 | 3.583   13.00 | 6.583   23.00 |  9.58   53.00
      0.667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
      0.750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
      0.833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83   53.00
      0.917    6.00 | 3.917   13.00 | 6.917   23.00 |  9.92   53.00
      1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   53.00
      1.083    4.00 | 4.083   17.00 | 7.083   13.00 | 10.08   38.00
      1.167    4.00 | 4.167   17.00 | 7.167   13.00 | 10.17   38.00
      1.250    4.00 | 4.250   17.00 | 7.250   13.00 | 10.25   38.00
      1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
      1.417    4.00 | 4.417   17.00 | 7.417   13.00 | 10.42   38.00
      1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
      1.583    4.00 | 4.583   17.00 | 7.583   13.00 | 10.58   38.00
      1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
      1.750    4.00 | 4.750   17.00 | 7.750   13.00 | 10.75   38.00
      1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83   38.00
      1.917    4.00 | 4.917   17.00 | 7.917   13.00 | 10.92   38.00
      2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   38.00
      2.083    6.00 | 5.083   13.00 | 8.083   13.00 | 11.08   13.00
      2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17   13.00
      2.250    6.00 | 5.250   13.00 | 8.250   13.00 | 11.25   13.00
      2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
      2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
      2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
      2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
      2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
      2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
      2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
      2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
      3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

   Unit Hyd Qpeak  (cms)=   1.985

   PEAK FLOW       (cms)=   3.648 (i)
   TIME TO PEAK    (hrs)=  10.333
   RUNOFF VOLUME    (mm)= 187.059
   TOTAL RAINFALL   (mm)= 212.000
   RUNOFF COEFFICIENT   =   0.882

   (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ROUTE CHN(  0047)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
                <------ DATA FOR SECTION (   1.1) ------>
                Distance      Elevation       Manning
                    0.00         421.29        0.0500
                   40.00         420.98    0.0500 /0.0500  Main Channel
                   80.00         420.17        0.0500      Main Channel
                  120.00         420.54    0.0500 /0.0500  Main Channel
                  160.00         421.41        0.0500
                  200.00         421.88        0.0500
```

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        <--------------------- TRAVEL TIME TABLE ---------------------->
         DEPTH     ELEV       VOLUME    FLOW RATE    VELOCITY    TRAV.TIME
          (m)       (m)      (cu.m.)      (cms)        (m/s)       (min)
          0.05    420.22    .207E+03       0.0          0.13      118.83
          0.10    420.27    .827E+03       0.2          0.21       74.86
          0.16    420.33    .186E+04       0.5          0.28       57.13
          0.21    420.38    .331E+04       1.2          0.34       47.16
          0.26    420.43    .517E+04       2.1          0.39       40.64
          0.31    420.48    .745E+04       3.4          0.44       35.99
          0.37    420.54    .101E+05       5.2          0.49       32.47
          0.43    420.60    .138E+05       8.3          0.57       27.65
          0.49    420.66    .178E+05      12.1          0.65       24.51
          0.55    420.72    .221E+05      16.5          0.71       22.27
          0.62    420.79    .268E+05      21.7          0.77       20.55
          0.68    420.85    .319E+05      27.7          0.83       19.18
          0.74    420.91    .373E+05      34.4          0.88       18.05
          0.81    420.98    .430E+05      41.9          0.93       17.10
          0.87    421.04    .493E+05      51.3          0.99       16.00
          0.93    421.10    .562E+05      61.8          1.04       15.15
          0.99    421.16    .637E+05      73.4          1.09       14.47
          1.06    421.23    .719E+05      86.2          1.14       13.91
          1.12    421.29    .808E+05     100.4          1.18       13.42

                                     <---- hydrograph ---->   <-pipe / channel->
                               AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                               (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
     INFLOW : ID= 2 (  0101)   29.62     3.65   10.33 187.06      0.32      0.44
     OUTFLOW: ID= 1 (  0047)   29.62     3.31   11.00 187.04      0.31      0.43


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--------------------
| CALIB            |
| NASHYD   (  0102)|  Area    (ha)=  33.29   Curve Number   (CN)= 91.8
|ID= 1 DT= 5.0 min |  Ia      (mm)=   6.12   # of Linear Res.(N)= 3.00
--------------------  U.H. Tp(hrs)=   0.69

          NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                    ---- TRANSFORMED HYETOGRAPH ----
       TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
        hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
      0.083    6.00 | 3.083   13.00 | 6.083   23.00 |  9.08   53.00
      0.167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
      0.250    6.00 | 3.250   13.00 | 6.250   23.00 |  9.25   53.00
      0.333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
      0.417    6.00 | 3.417   13.00 | 6.417   23.00 |  9.42   53.00
      0.500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
      0.583    6.00 | 3.583   13.00 | 6.583   23.00 |  9.58   53.00
      0.667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
      0.750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
      0.833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83   53.00
      0.917    6.00 | 3.917   13.00 | 6.917   23.00 |  9.92   53.00
      1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   53.00
      1.083    4.00 | 4.083   17.00 | 7.083   13.00 | 10.08   38.00
      1.167    4.00 | 4.167   17.00 | 7.167   13.00 | 10.17   38.00
      1.250    4.00 | 4.250   17.00 | 7.250   13.00 | 10.25   38.00
      1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
      1.417    4.00 | 4.417   17.00 | 7.417   13.00 | 10.42   38.00
      1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
      1.583    4.00 | 4.583   17.00 | 7.583   13.00 | 10.58   38.00
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                 1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
                 1.750    4.00 | 4.750   17.00 | 7.750   13.00 | 10.75   38.00
                 1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83   38.00
                 1.917    4.00 | 4.917   17.00 | 7.917   13.00 | 10.92   38.00
                 2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   38.00
                 2.083    6.00 | 5.083   13.00 | 8.083   13.00 | 11.08   13.00
                 2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17   13.00
                 2.250    6.00 | 5.250   13.00 | 8.250   13.00 | 11.25   13.00
                 2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
                 2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
                 2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
                 2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
                 2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
                 2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
                 2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
                 2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
                 3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

      Unit Hyd Qpeak  (cms)=   1.843

      PEAK FLOW       (cms)=   3.882 (i)
      TIME TO PEAK    (hrs)=  10.583
      RUNOFF VOLUME    (mm)= 185.368
      TOTAL RAINFALL   (mm)= 212.000
      RUNOFF COEFFICIENT   =   0.874

      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 --------------------------------------------------------------------------------
 --------------------
 | CALIB            |
 | NASHYD   (  0103)|   Area    (ha)=  30.18   Curve Number   (CN)= 91.0
 |ID= 1 DT= 5.0 min |   Ia      (mm)=   6.48   # of Linear Res.(N)= 3.00
 --------------------   U.H. Tp(hrs)=   0.68

          NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                                 ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    6.00 | 3.083   13.00 | 6.083   23.00 |  9.08   53.00
                 0.167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
                 0.250    6.00 | 3.250   13.00 | 6.250   23.00 |  9.25   53.00
                 0.333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
                 0.417    6.00 | 3.417   13.00 | 6.417   23.00 |  9.42   53.00
                 0.500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
                 0.583    6.00 | 3.583   13.00 | 6.583   23.00 |  9.58   53.00
                 0.667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
                 0.750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
                 0.833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83   53.00
                 0.917    6.00 | 3.917   13.00 | 6.917   23.00 |  9.92   53.00
                 1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   53.00
                 1.083    4.00 | 4.083   17.00 | 7.083   13.00 | 10.08   38.00
                 1.167    4.00 | 4.167   17.00 | 7.167   13.00 | 10.17   38.00
                 1.250    4.00 | 4.250   17.00 | 7.250   13.00 | 10.25   38.00
                 1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
                 1.417    4.00 | 4.417   17.00 | 7.417   13.00 | 10.42   38.00
                 1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
                 1.583    4.00 | 4.583   17.00 | 7.583   13.00 | 10.58   38.00
                 1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
                 1.750    4.00 | 4.750   17.00 | 7.750   13.00 | 10.75   38.00
                 1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83   38.00
                 1.917    4.00 | 4.917   17.00 | 7.917   13.00 | 10.92   38.00
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                 2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   38.00
                 2.083    6.00 | 5.083   13.00 | 8.083   13.00 | 11.08   13.00
                 2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17   13.00
                 2.250    6.00 | 5.250   13.00 | 8.250   13.00 | 11.25   13.00
                 2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
                 2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
                 2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
                 2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
                 2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
                 2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
                 2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
                 2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
                 3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

      Unit Hyd Qpeak  (cms)=   1.695

      PEAK FLOW       (cms)=   3.519 (i)
      TIME TO PEAK    (hrs)=  10.583
      RUNOFF VOLUME    (mm)= 183.181
      TOTAL RAINFALL   (mm)= 212.000
      RUNOFF COEFFICIENT   =   0.864

      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 --------------------------------------------------------------------------------

 --------------------
 | ADD HYD  (  0063)|
 |   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
 --------------------         (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (  0102):    33.29    3.882    10.58   185.37
       + ID2= 2 (  0103):    30.18    3.519    10.58   183.18
         ==================================================
         ID = 3 (  0063):    63.47    7.401    10.58   184.33

      NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 --------------------------------------------------------------------------------

 --------------------
 | ADD HYD  (  0063)|
 |   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
 --------------------         (ha)    (cms)    (hrs)     (mm)
         ID1= 3 (  0063):    63.47    7.401    10.58   184.33
       + ID2= 2 (  0104):     8.95    1.157    10.17   171.09
         ==================================================
         ID = 1 (  0063):    72.42    8.450    10.50   182.69

      NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 --------------------------------------------------------------------------------

 --------------------
 | ADD HYD  (  0063)|
 |   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
 --------------------         (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (  0063):    72.42    8.450    10.50   182.69
       + ID2= 2 (  0047):    29.62    3.307    11.00   187.04
         ==================================================
         ID = 3 (  0063):   102.04   11.627    10.67   183.95

      NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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 --------------------
 | RESERVOIR(  0062)|     OVERFLOW IS OFF
 | IN= 2---> OUT= 1 |
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```
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   3.5000      1.2000
                          0.1500     0.1200   |   8.0000      2.0000
                          0.3500     0.2000   |  12.0000      6.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0063)    102.040     11.627     10.67     183.95
   OUTFLOW: ID= 1 (  0062)    102.040      9.172     11.58     183.95

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 78.88
                   TIME SHIFT OF PEAK FLOW         (min)= 55.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  3.1722

--------------------------------------------------------------------------------
--------------------
| ROUTE CHN(  0048)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
                   0.00        412.71        0.0500
                  40.00        412.40    0.0500 /0.0500  Main Channel
                  80.00        411.89        0.0500      Main Channel
                 120.00        411.75    0.0500 /0.0500  Main Channel
                 160.00        409.65        0.0500
                 200.00        412.15        0.0500

      <--------------------- TRAVEL TIME TABLE ---------------------->
       DEPTH    ELEV      VOLUME    FLOW RATE    VELOCITY    TRAV.TIME
        (m)      (m)     (cu.m.)      (cms)        (m/s)      (min)
       0.13   409.78    .964E+02       0.0          0.15      35.83
       0.26   409.91    .386E+03       0.3          0.24      22.57
       0.39   410.05    .868E+03       0.8          0.31      17.22
       0.52   410.18    .154E+04       1.8          0.38      14.22
       0.66   410.31    .241E+04       3.3          0.44      12.25
       0.79   410.44    .347E+04       5.3          0.49      10.85
       0.92   410.57    .472E+04       8.0          0.54       9.79
       1.05   410.70    .617E+04      11.5          0.60       8.96
       1.18   410.83    .781E+04      15.7          0.64       8.28
       1.31   410.96    .964E+04      20.8          0.69       7.72
       1.44   411.09    .117E+05      26.8          0.74       7.24
       1.57   411.23    .139E+05      33.9          0.78       6.84
       1.70   411.36    .163E+05      41.9          0.82       6.48
       1.84   411.49    .189E+05      51.1          0.86       6.17
       1.97   411.62    .217E+05      61.4          0.91       5.89
       2.10   411.75    .247E+05      72.9          0.95       5.64
       2.23   411.88    .286E+05      87.7          0.98       5.44
       2.36   412.02    .338E+05     105.7          1.00       5.34
       2.50   412.15    .396E+05     126.6          1.02       5.22

                                    <---- hydrograph ---->   <-pipe / channel->
                              AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                              (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
   INFLOW : ID= 2 (  0062)  102.04     9.17   11.58 183.95      0.96      0.56
   OUTFLOW: ID= 1 (  0048)  102.04     9.14   11.75 183.95      0.96      0.56


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0109)|   Area    (ha)=   9.74   Curve Number   (CN)= 91.8
```

```
|ID= 1 DT= 5.0 min |   Ia      (mm)=   6.29   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.08

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    6.00 | 3.083   13.00 | 6.083   23.00 |  9.08   53.00
                0.167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
                0.250    6.00 | 3.250   13.00 | 6.250   23.00 |  9.25   53.00
                0.333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
                0.417    6.00 | 3.417   13.00 | 6.417   23.00 |  9.42   53.00
                0.500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
                0.583    6.00 | 3.583   13.00 | 6.583   23.00 |  9.58   53.00
                0.667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
                0.750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
                0.833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83   53.00
                0.917    6.00 | 3.917   13.00 | 6.917   23.00 |  9.92   53.00
                1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   53.00
                1.083    4.00 | 4.083   17.00 | 7.083   13.00 | 10.08   38.00
                1.167    4.00 | 4.167   17.00 | 7.167   13.00 | 10.17   38.00
                1.250    4.00 | 4.250   17.00 | 7.250   13.00 | 10.25   38.00
                1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
                1.417    4.00 | 4.417   17.00 | 7.417   13.00 | 10.42   38.00
                1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
                1.583    4.00 | 4.583   17.00 | 7.583   13.00 | 10.58   38.00
                1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
                1.750    4.00 | 4.750   17.00 | 7.750   13.00 | 10.75   38.00
                1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83   38.00
                1.917    4.00 | 4.917   17.00 | 7.917   13.00 | 10.92   38.00
                2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   38.00
                2.083    6.00 | 5.083   13.00 | 8.083   13.00 | 11.08   13.00
                2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17   13.00
                2.250    6.00 | 5.250   13.00 | 8.250   13.00 | 11.25   13.00
                2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
                2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
                2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
                2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
                2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
                2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
                2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
                2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
                3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

     Unit Hyd Qpeak  (cms)=   4.650

     PEAK FLOW       (cms)=   1.329 (i)
     TIME TO PEAK    (hrs)=  10.000
     RUNOFF VOLUME    (mm)= 174.715
     TOTAL RAINFALL   (mm)= 212.000
     RUNOFF COEFFICIENT   =   0.824

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0031)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0109):     9.74    1.329    10.00    174.72
      + ID2= 2 (  0048):   102.04    9.142    11.75    183.95
```

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        ====================================================
        ID = 3 (  0031):   111.78   9.681    11.00   183.15

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0031)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0031):   111.78   9.681    11.00   183.15
      + ID2= 2 (  0065):    47.44   4.663    11.00   193.48
        ====================================================
        ID = 1 (  0031):   159.22  14.344    11.00   186.22

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| ROUTEPIPE(  0066)|     PIPE Number     =   1.00
| IN= 2---> OUT= 1 |     Width       (mm)=3000.00     Height   (mm)=2000.00
| DT=  5.0 min     |     Length       (m)=  39.00
--------------------     Slope      (m/m)=  0.005
                         Manning n       =  0.013

     <---------------- TRAVEL TIME TABLE -------------------->
       DEPTH       VOLUME     FLOW RATE     VELOCITY     TRAV.TIME
        (m)      (cu.m.)       (cms)         (m/s)         min
       0.11     .123E+02        0.4           1.16          0.56
       0.21     .246E+02        1.1           1.76          0.37
       0.32     .369E+02        2.1           2.22          0.29
       0.42     .493E+02        3.3           2.59          0.25
       0.53     .616E+02        4.6           2.90          0.22
       0.63     .739E+02        6.0           3.17          0.21
       0.74     .862E+02        7.5           3.40          0.19
       0.84     .985E+02        9.1           3.61          0.18
       0.95     .111E+03       10.8           3.79          0.17
       1.05     .123E+03       12.5           3.95          0.16
       1.16     .135E+03       14.2           4.10          0.16
       1.26     .148E+03       16.0           4.23          0.15
       1.37     .160E+03       17.9           4.35          0.15
       1.47     .172E+03       19.7           4.47          0.15
       1.58     .185E+03       21.6           4.57          0.14
       1.68     .197E+03       23.6           4.67          0.14
       1.79     .209E+03       25.5           4.75          0.14
       1.89     .222E+03       27.5           4.84          0.13
       2.00     .234E+03       29.5           4.91          0.13
                                     <---- hydrograph ---->  <-pipe / channel->
                              AREA    QPEAK    TPEAK   R.V.  MAX DEPTH  MAX VEL
                              (ha)    (cms)    (hrs)   (mm)     (m)      (m/s)
   INFLOW : ID= 2 (  0031)  159.22    14.34    11.00 186.22     1.16      4.11
   OUTFLOW: ID= 1 (  0066)  159.22    14.34    11.00 186.22     1.16      4.11


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| ADD HYD  (  0037)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0110):     3.84   0.537    10.08   193.03
      + ID2= 2 (  0066):   159.22  14.338    11.00   186.22
        ====================================================
        ID = 3 (  0037):   163.06  14.749    11.00   186.38
```

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     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| ROUTE CHN(  0051)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
                 0.00          410.33        0.0500
                40.00          409.37     0.0500 /0.0500  Main Channel
                80.00          408.89        0.0500       Main Channel
               120.00          409.11     0.0500 /0.0500  Main Channel
               160.00          409.15        0.0500
               200.00          410.76        0.0500

      <-------------------- TRAVEL TIME TABLE --------------------->
       DEPTH    ELEV       VOLUME     FLOW RATE    VELOCITY    TRAV.TIME
        (m)      (m)      (cu.m.)       (cms)        (m/s)       (min)
       0.06   408.94    .176E+03        0.0          0.11        65.30
       0.11   409.00    .704E+03        0.3          0.17        41.13
       0.17   409.06    .158E+04        0.8          0.22        31.39
       0.23   409.11    .282E+04        1.8          0.27        25.91
       0.31   409.20    .601E+04        4.8          0.33        21.07
       0.39   409.28    .979E+04        9.5          0.41        17.12
       0.47   409.36    .139E+05       15.9          0.48        14.53
       0.55   409.44    .182E+05       24.4          0.56        12.41
       0.63   409.52    .227E+05       34.7          0.64        10.92
       0.71   409.60    .274E+05       46.4          0.71         9.84
       0.80   409.68    .323E+05       59.8          0.78         9.01
       0.88   409.76    .374E+05       74.6          0.84         8.35
       0.96   409.84    .426E+05       91.0          0.90         7.81
       1.04   409.92    .481E+05      108.9          0.95         7.36
       1.12   410.01    .537E+05      128.3          1.00         6.97
       1.20   410.09    .595E+05      149.3          1.05         6.64
       1.28   410.17    .655E+05      171.8          1.10         6.35
       1.36   410.25    .716E+05      196.0          1.15         6.09
       1.44   410.33    .780E+05      221.7          1.19         5.86

                                     <---- hydrograph ---->   <-pipe / channel->
                              AREA    QPEAK    TPEAK   R.V.   MAX DEPTH  MAX VEL
                              (ha)    (cms)    (hrs)   (mm)      (m)      (m/s)
   INFLOW : ID= 2 (  0037)  163.06    14.75    11.00 186.38      0.46      0.47
   OUTFLOW: ID= 1 (  0051)  163.06    14.50    11.08 186.38      0.45      0.46


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--------------------
| CALIB            |
| NASHYD   (  0112)|   Area    (ha)=  10.13   Curve Number   (CN)= 89.3
|ID= 1 DT= 5.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.40

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                         ---- TRANSFORMED HYETOGRAPH ----
                TIME     RAIN |  TIME     RAIN |'  TIME     RAIN |  TIME     RAIN
                 hrs    mm/hr |   hrs    mm/hr |'   hrs    mm/hr |   hrs    mm/hr
               0.083     6.00 | 3.083    13.00 | 6.083    23.00 |  9.08    53.00
               0.167     6.00 | 3.167    13.00 | 6.167    23.00 |  9.17    53.00
               0.250     6.00 | 3.250    13.00 | 6.250    23.00 |  9.25    53.00
               0.333     6.00 | 3.333    13.00 | 6.333    23.00 |  9.33    53.00
```

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              0.417    6.00 | 3.417   13.00 | 6.417   23.00 |  9.42   53.00
              0.500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
              0.583    6.00 | 3.583   13.00 | 6.583   23.00 |  9.58   53.00
              0.667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
              0.750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
              0.833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83   53.00
              0.917    6.00 | 3.917   13.00 | 6.917   23.00 |  9.92   53.00
              1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   53.00
              1.083    4.00 | 4.083   17.00 | 7.083   13.00 | 10.08   38.00
              1.167    4.00 | 4.167   17.00 | 7.167   13.00 | 10.17   38.00
              1.250    4.00 | 4.250   17.00 | 7.250   13.00 | 10.25   38.00
              1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
              1.417    4.00 | 4.417   17.00 | 7.417   13.00 | 10.42   38.00
              1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
              1.583    4.00 | 4.583   17.00 | 7.583   13.00 | 10.58   38.00
              1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
              1.750    4.00 | 4.750   17.00 | 7.750   13.00 | 10.75   38.00
              1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83   38.00
              1.917    4.00 | 4.917   17.00 | 7.917   13.00 | 10.92   38.00
              2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   38.00
              2.083    6.00 | 5.083   13.00 | 8.083   13.00 | 11.08   13.00
              2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17   13.00
              2.250    6.00 | 5.250   13.00 | 8.250   13.00 | 11.25   13.00
              2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
              2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
              2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
              2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
              2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
              2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
              2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
              2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
              3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

     Unit Hyd Qpeak  (cms)=   0.967

     PEAK FLOW       (cms)=   1.340 (i)
     TIME TO PEAK    (hrs)=  10.083
     RUNOFF VOLUME    (mm)= 178.526
     TOTAL RAINFALL   (mm)= 212.000
     RUNOFF COEFFICIENT   =   0.842

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| NASHYD   (  0113)|   Area    (ha)=  13.19   Curve Number   (CN)= 89.3
|ID= 1 DT= 5.0 min |   Ia      (mm)=   6.64   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.93

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                                ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    6.00 | 3.083   13.00 | 6.083   23.00 |  9.08   53.00
              0.167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
              0.250    6.00 | 3.250   13.00 | 6.250   23.00 |  9.25   53.00
              0.333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
              0.417    6.00 | 3.417   13.00 | 6.417   23.00 |  9.42   53.00
              0.500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
              0.583    6.00 | 3.583   13.00 | 6.583   23.00 |  9.58   53.00
              0.667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
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              0.750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
              0.833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83   53.00
              0.917    6.00 | 3.917   13.00 | 6.917   23.00 |  9.92   53.00
              1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   53.00
              1.083    4.00 | 4.083   17.00 | 7.083   13.00 | 10.08   38.00
              1.167    4.00 | 4.167   17.00 | 7.167   13.00 | 10.17   38.00
              1.250    4.00 | 4.250   17.00 | 7.250   13.00 | 10.25   38.00
              1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
              1.417    4.00 | 4.417   17.00 | 7.417   13.00 | 10.42   38.00
              1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
              1.583    4.00 | 4.583   17.00 | 7.583   13.00 | 10.58   38.00
              1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
              1.750    4.00 | 4.750   17.00 | 7.750   13.00 | 10.75   38.00
              1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83   38.00
              1.917    4.00 | 4.917   17.00 | 7.917   13.00 | 10.92   38.00
              2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   38.00
              2.083    6.00 | 5.083   13.00 | 8.083   13.00 | 11.08   13.00
              2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17   13.00
              2.250    6.00 | 5.250   13.00 | 8.250   13.00 | 11.25   13.00
              2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
              2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
              2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
              2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
              2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
              2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
              2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
              2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
              3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

     Unit Hyd Qpeak  (cms)=   0.542

     PEAK FLOW       (cms)=   1.412 (i)
     TIME TO PEAK    (hrs)=  11.083
     RUNOFF VOLUME    (mm)= 178.901
     TOTAL RAINFALL   (mm)= 212.000
     RUNOFF COEFFICIENT   =   0.844

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| NASHYD   (  0114)|   Area    (ha)=  10.41   Curve Number   (CN)= 89.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   6.45   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.95

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                                ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    6.00 | 3.083   13.00 | 6.083   23.00 |  9.08   53.00
              0.167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
              0.250    6.00 | 3.250   13.00 | 6.250   23.00 |  9.25   53.00
              0.333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
              0.417    6.00 | 3.417   13.00 | 6.417   23.00 |  9.42   53.00
              0.500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
              0.583    6.00 | 3.583   13.00 | 6.583   23.00 |  9.58   53.00
              0.667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
              0.750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
              0.833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83   53.00
              0.917    6.00 | 3.917   13.00 | 6.917   23.00 |  9.92   53.00
              1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   53.00
```

```
                 1.083    4.00 | 4.083   17.00 | 7.083   13.00 | 10.08   38.00
                 1.167    4.00 | 4.167   17.00 | 7.167   13.00 | 10.17   38.00
                 1.250    4.00 | 4.250   17.00 | 7.250   13.00 | 10.25   38.00
                 1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
                 1.417    4.00 | 4.417   17.00 | 7.417   13.00 | 10.42   38.00
                 1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
                 1.583    4.00 | 4.583   17.00 | 7.583   13.00 | 10.58   38.00
                 1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
                 1.750    4.00 | 4.750   17.00 | 7.750   13.00 | 10.75   38.00
                 1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83   38.00
                 1.917    4.00 | 4.917   17.00 | 7.917   13.00 | 10.92   38.00
                 2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   38.00
                 2.083    6.00 | 5.083   13.00 | 8.083   13.00 | 11.08   13.00
                 2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17   13.00
                 2.250    6.00 | 5.250   13.00 | 8.250   13.00 | 11.25   13.00
                 2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
                 2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
                 2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
                 2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
                 2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
                 2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
                 2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
                 2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
                 3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

      Unit Hyd Qpeak  (cms)=   0.419

      PEAK FLOW       (cms)=   1.107 (i)
      TIME TO PEAK    (hrs)=  11.083
      RUNOFF VOLUME    (mm)= 178.629
      TOTAL RAINFALL   (mm)= 212.000
      RUNOFF COEFFICIENT   =   0.843

      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| ROUTE CHN(  0061)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
                <------ DATA FOR SECTION (   1.1) ------>
                Distance      Elevation       Manning
                    0.00        407.05         0.0500
                   40.00        407.32     0.0500 /0.0500   Main Channel
                   80.00        406.85         0.0500       Main Channel
                  120.00        406.99     0.0500 /0.0500   Main Channel
                  160.00        407.77         0.0500
                  200.00        408.32         0.0500

      <---------------------- TRAVEL TIME TABLE ---------------------->
       DEPTH     ELEV       VOLUME     FLOW RATE     VELOCITY   TRAV.TIME
        (m)       (m)      (cu.m.)       (cms)         (m/s)      (min)
       0.01   406.86    .647E+01        0.0           0.02      259.26
       0.02   406.87    .259E+02        0.0           0.03      163.33
       0.03   406.88    .582E+02        0.0           0.04      124.64
       0.04   406.89    .103E+03        0.0           0.05      102.89
       0.05   406.90    .162E+03        0.0           0.06       88.67
       0.06   406.91    .233E+03        0.0           0.07       78.52
       0.07   406.92    .317E+03        0.1           0.08       70.85
       0.08   406.93    .414E+03        0.1           0.08       64.82
       0.09   406.95    .524E+03        0.1           0.09       59.92
       0.10   406.96    .647E+03        0.2           0.10       55.86
       0.11   406.97    .782E+03        0.2           0.10       52.42
       0.12   406.98    .931E+03        0.3           0.11       49.46
```

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       0.13   406.99    .109E+04        0.4           0.11       46.89
       0.14   407.00    .127E+04        0.5           0.12       42.90
       0.15   407.01    .146E+04        0.6           0.13       39.75
       0.17   407.02    .165E+04        0.7           0.14       37.17
       0.18   407.03    .185E+04        0.9           0.15       35.02
       0.19   407.04    .205E+04        1.0           0.16       33.19
       0.20   407.05    .225E+04        1.2           0.17       31.61

                                      <---- hydrograph ---->   <-pipe / channel->
                               AREA    QPEAK    TPEAK   R.V.   MAX DEPTH  MAX VEL
                               (ha)    (cms)    (hrs)   (mm)      (m)      (m/s)
   INFLOW : ID= 2 (  0114)    10.41     1.11    11.08 178.63      0.19      0.16
   OUTFLOW: ID= 1 (  0061)    10.41     1.05    11.33 178.49      0.19      0.16


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--------------------
| ADD HYD  (  0044)|
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
        ID1= 1 (  0113):     13.19     1.412     11.08    178.90
      + ID2= 2 (  0061):     10.41     1.047     11.33    178.49
        ===================================================
        ID = 3 (  0044):     23.60     2.442     11.17    178.72

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| ROUTE CHN(  0060)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
                   0.00        409.04         0.0500
                  40.00        407.85         0.0500       Main Channel
                  80.00        407.42         0.0500       Main Channel
                 120.00        407.63     0.0500 /0.0500   Main Channel
                 160.00        408.37         0.0500
                 200.00        409.57         0.0500

      <---------------------- TRAVEL TIME TABLE ---------------------->
       DEPTH     ELEV       VOLUME     FLOW RATE     VELOCITY   TRAV.TIME
        (m)       (m)      (cu.m.)       (cms)         (m/s)      (min)
       0.07   407.49    .189E+03        0.0           0.05       93.75
       0.14   407.56    .755E+03        0.2           0.08       59.06
       0.21   407.63    .170E+04        0.6           0.10       45.07
       0.30   407.72    .327E+04        1.7           0.14       32.46
       0.39   407.80    .514E+04        3.2           0.17       26.65
       0.47   407.89    .731E+04        5.4           0.20       22.47
       0.56   407.98    .967E+04        8.3           0.23       19.34
       0.65   408.07    .122E+05       11.8           0.26       17.21
       0.74   408.16    .149E+05       15.9           0.29       15.63
       0.83   408.24    .179E+05       20.7           0.31       14.41
       0.91   408.33    .210E+05       26.0           0.33       13.43
       1.00   408.42    .242E+05       32.1           0.36       12.60
       1.09   408.51    .276E+05       38.8           0.38       11.88
       1.18   408.60    .312E+05       46.2           0.40       11.26
       1.27   408.68    .349E+05       54.2           0.42       10.73
       1.35   408.77    .387E+05       62.9           0.44       10.26
       1.44   408.86    .427E+05       72.3           0.46        9.85
       1.53   408.95    .468E+05       82.3           0.47        9.48
       1.62   409.04    .511E+05       93.1           0.49        9.15
```

```
                              <---- hydrograph ---->   <-pipe / channel->
                         AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                         (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
  INFLOW : ID= 2 (  0044)   23.60     2.44   11.17 178.72      0.34       0.15
  OUTFLOW: ID= 1 (  0060)   23.60     2.29   11.42 178.70      0.33       0.15



--------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD    (  0111)|   Area     (ha)=  15.18    Curve Number   (CN)= 93.4
|ID= 1 DT= 5.0 min |   Ia       (mm)=   4.76    # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.53

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                                ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    6.00 | 3.083   13.00 | 6.083   23.00 |  9.08   53.00
                 0.167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
                 0.250    6.00 | 3.250   13.00 | 6.250   23.00 |  9.25   53.00
                 0.333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
                 0.417    6.00 | 3.417   13.00 | 6.417   23.00 |  9.42   53.00
                 0.500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
                 0.583    6.00 | 3.583   13.00 | 6.583   23.00 |  9.58   53.00
                 0.667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
                 0.750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
                 0.833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83   53.00
                 0.917    6.00 | 3.917   13.00 | 6.917   23.00 |  9.92   53.00
                 1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   53.00
                 1.083    4.00 | 4.083   17.00 | 7.083   13.00 | 10.08   38.00
                 1.167    4.00 | 4.167   17.00 | 7.167   13.00 | 10.17   38.00
                 1.250    4.00 | 4.250   17.00 | 7.250   13.00 | 10.25   38.00
                 1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
                 1.417    4.00 | 4.417   17.00 | 7.417   13.00 | 10.42   38.00
                 1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
                 1.583    4.00 | 4.583   17.00 | 7.583   13.00 | 10.58   38.00
                 1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
                 1.750    4.00 | 4.750   17.00 | 7.750   13.00 | 10.75   38.00
                 1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83   38.00
                 1.917    4.00 | 4.917   17.00 | 7.917   13.00 | 10.92   38.00
                 2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   38.00
                 2.083    6.00 | 5.083   13.00 | 8.083   13.00 | 11.08   13.00
                 2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17   13.00
                 2.250    6.00 | 5.250   13.00 | 8.250   13.00 | 11.25   13.00
                 2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
                 2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
                 2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
                 2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
                 2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
                 2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
                 2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
                 2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
                 3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

    Unit Hyd Qpeak  (cms)=   1.094

    PEAK FLOW       (cms)=   1.916 (i)
    TIME TO PEAK    (hrs)=  10.333
    RUNOFF VOLUME    (mm)= 190.665
```

```
     TOTAL RAINFALL   (mm)= 212.000
     RUNOFF COEFFICIENT   =   0.899

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0038)|
|   1 +  2 =  3    |            AREA    QPEAK    TPEAK      R.V.
--------------------            (ha)    (cms)    (hrs)      (mm)
         ID1= 1 (  0111):    15.18    1.916    10.33    190.67
       + ID2= 2 (  0112):    10.13    1.340    10.08    178.53
         ===============================================
         ID = 3 (  0038):    25.31    3.236    10.17    185.81

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0038)|
|   3 +  2 =  1    |            AREA    QPEAK    TPEAK      R.V.
--------------------            (ha)    (cms)    (hrs)      (mm)
         ID1= 3 (  0038):    25.31    3.236    10.17    185.81
       + ID2= 2 (  0051):   163.06   14.497    11.08    186.38
         ===============================================
         ID = 1 (  0038):   188.37   17.293    11.00    186.31

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0038)|
|   1 +  2 =  3    |            AREA    QPEAK    TPEAK      R.V.
--------------------            (ha)    (cms)    (hrs)      (mm)
         ID1= 1 (  0038):   188.37   17.293    11.00    186.31
       + ID2= 2 (  0060):    23.60    2.295    11.42    178.70
         ===============================================
         ID = 3 (  0038):   211.97   19.463    11.00    185.46

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| ROUTE CHN(  0052)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
                  0.00         410.25         0.0500
                 40.00         409.28      0.0500 /0.0500  Main Channel
                 80.00         408.14         0.0500       Main Channel
                120.00         408.21      0.0500 /0.0500  Main Channel
                160.00         408.82         0.0500
                200.00         410.08         0.0500

      <-------------------- TRAVEL TIME TABLE --------------------->
       DEPTH     ELEV      VOLUME     FLOW RATE    VELOCITY    TRAV.TIME
        (m)       (m)     (cu.m.)       (cms)        (m/s)       (min)
       0.08    408.21    .400E+03        0.3          0.17        24.63
       0.17    408.31    .157E+04        2.4          0.38        11.06
       0.27    408.41    .299E+04        6.2          0.52         8.03
       0.37    408.51    .465E+04       11.8          0.63         6.59
       0.47    408.61    .656E+04       19.2          0.73         5.71
       0.57    408.71    .872E+04       28.5          0.82         5.10
```

```
       0.67   408.81    .111E+05      39.8         0.90       4.65
       0.76   408.90    .137E+05      53.7         0.98       4.26
       0.86   409.00    .165E+05      69.8         1.06       3.94
       0.96   409.10    .195E+05      88.1         1.13       3.68
       1.06   409.20    .226E+05     108.5         1.20       3.46
       1.16   409.30    .258E+05     131.7         1.28       3.27
       1.26   409.40    .292E+05     159.4         1.36       3.06
       1.35   409.49    .329E+05     189.6         1.44       2.89
       1.45   409.59    .366E+05     222.4         1.52       2.74
       1.55   409.69    .406E+05     258.0         1.59       2.62
       1.65   409.79    .447E+05     296.3         1.66       2.52
       1.75   409.89    .490E+05     337.5         1.72       2.42
       1.85   409.99    .535E+05     381.6         1.78       2.34

                                    <---- hydrograph ---->   <-pipe / channel->
                              AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                              (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
   INFLOW : ID= 2 (  0038)  211.97    19.46   11.00 185.46      0.47      0.73
   OUTFLOW: ID= 1 (  0052)  211.97    19.43   11.08 185.46      0.47      0.73



-------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD   (  0115)|   Area     (ha)=   5.25   Curve Number   (CN)= 91.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   6.65   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.51

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    6.00 | 3.083   13.00 | 6.083   23.00 |  9.08   53.00
                0.167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
                0.250    6.00 | 3.250   13.00 | 6.250   23.00 |  9.25   53.00
                0.333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
                0.417    6.00 | 3.417   13.00 | 6.417   23.00 |  9.42   53.00
                0.500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
                0.583    6.00 | 3.583   13.00 | 6.583   23.00 |  9.58   53.00
                0.667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
                0.750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
                0.833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83   53.00
                0.917    6.00 | 3.917   13.00 | 6.917   23.00 |  9.92   53.00
                1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   53.00
                1.083    4.00 | 4.083   17.00 | 7.083   13.00 | 10.08   38.00
                1.167    4.00 | 4.167   17.00 | 7.167   13.00 | 10.17   38.00
                1.250    4.00 | 4.250   17.00 | 7.250   13.00 | 10.25   38.00
                1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
                1.417    4.00 | 4.417   17.00 | 7.417   13.00 | 10.42   38.00
                1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
                1.583    4.00 | 4.583   17.00 | 7.583   13.00 | 10.58   38.00
                1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
                1.750    4.00 | 4.750   17.00 | 7.750   13.00 | 10.75   38.00
                1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83   38.00
                1.917    4.00 | 4.917   17.00 | 7.917   13.00 | 10.92   38.00
                2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   38.00
                2.083    6.00 | 5.083   13.00 | 8.083   13.00 | 11.08   13.00
                2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17   13.00
                2.250    6.00 | 5.250   13.00 | 8.250   13.00 | 11.25   13.00
                2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
                2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
```

```
                2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
                2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
                2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
                2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
                2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
                2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
                3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

     Unit Hyd Qpeak  (cms)=   0.393

     PEAK FLOW       (cms)=   0.662 (i)
     TIME TO PEAK    (hrs)=  10.250
     RUNOFF VOLUME    (mm)= 182.861
     TOTAL RAINFALL   (mm)= 212.000
     RUNOFF COEFFICIENT   =   0.863

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------


--------------------
| ADD HYD  (  0039)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0115):      5.25   0.662     10.25   182.86
      + ID2= 2 (  0052):    211.97  19.428     11.08   185.46
        ====================================================
        ID = 3 (  0039):    217.22  20.001     11.08   185.40

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| ROUTEPIPE(  0067)|       PIPE Number     =   1.00
| IN= 2---> OUT= 1 |       Width       (mm)=3000.00      Height   (mm)=2000.00
| DT=  5.0 min     |       Length       (m)=  17.00
--------------------       Slope      (m/m)=  0.005
                           Manning n       =  0.013

     <----------------- TRAVEL TIME TABLE -------------------->
       DEPTH      VOLUME     FLOW RATE    VELOCITY    TRAV.TIME
        (m)      (cu.m.)       (cms)        (m/s)        min
       0.11     .537E+01       0.4          1.16         0.24
       0.21     .107E+02       1.1          1.76         0.16
       0.32     .161E+02       2.1          2.22         0.13
       0.42     .215E+02       3.3          2.59         0.11
       0.53     .268E+02       4.6          2.90         0.10
       0.63     .322E+02       6.0          3.17         0.09
       0.74     .376E+02       7.5          3.40         0.08
       0.84     .429E+02       9.1          3.61         0.08
       0.95     .483E+02      10.8          3.79         0.07
       1.05     .537E+02      12.5          3.95         0.07
       1.16     .591E+02      14.2          4.10         0.07
       1.26     .644E+02      16.0          4.23         0.07
       1.37     .698E+02      17.9          4.35         0.07
       1.47     .752E+02      19.7          4.47         0.06
       1.58     .805E+02      21.6          4.57         0.06
       1.68     .859E+02      23.6          4.67         0.06
       1.79     .913E+02      25.5          4.75         0.06
       1.89     .966E+02      27.5          4.84         0.06
       2.00     .102E+03      29.5          4.91         0.06
                                    <---- hydrograph ---->   <-pipe / channel->
                              AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                              (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
   INFLOW : ID= 2 (  0039)  217.22    20.00   11.08 185.40      1.49      4.48
```

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   OUTFLOW: ID= 1 (  0067)  217.22    20.01   11.08 185.40      1.48      4.48



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 --------------------
 | ROUTE CHN(  0054)|
 | IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
 --------------------
                <------ DATA FOR SECTION (   1.1) ------>
                Distance      Elevation      Manning
                    0.00        409.72         0.0500
                   40.00        408.17     0.0500 /0.0500  Main Channel
                   80.00        407.19         0.0500      Main Channel
                  120.00        406.75     0.0500 /0.0500  Main Channel
                  160.00        408.01         0.0500
                  200.00        408.83         0.0500

      <--------------------- TRAVEL TIME TABLE ---------------------->
       DEPTH    ELEV      VOLUME    FLOW RATE    VELOCITY   TRAV.TIME
        (m)      (m)     (cu.m.)      (cms)        (m/s)      (min)
       0.11   406.86   .266E+03       0.1          0.18      33.79
       0.22   406.97   .106E+04       0.8          0.28      21.29
       0.33   407.08   .240E+04       2.5          0.37      16.25
       0.44   407.19   .426E+04       5.3          0.45      13.39
       0.55   407.30   .654E+04       9.9          0.54      11.01
       0.66   407.41   .913E+04      16.0          0.63       9.54
       0.77   407.52   .120E+05      23.6          0.70       8.52
       0.87   407.63   .153E+05      32.8          0.77       7.76
       0.98   407.73   .188E+05      43.7          0.84       7.16
       1.09   407.84   .226E+05      56.5          0.90       6.68
       1.20   407.95   .268E+05      71.1          0.96       6.27
       1.31   408.06   .312E+05      87.5          1.01       5.95
       1.42   408.17   .361E+05     105.7          1.05       5.69
       1.53   408.28   .413E+05     129.0          1.13       5.33
       1.64   408.39   .468E+05     154.9          1.19       5.04
       1.75   408.50   .526E+05     183.4          1.25       4.78
       1.86   408.61   .588E+05     214.6          1.31       4.57
       1.97   408.72   .653E+05     248.5          1.37       4.38
       2.08   408.83   .721E+05     285.3          1.42       4.21

                                     <---- hydrograph ---->   <-pipe / channel->
                              AREA    QPEAK   TPEAK   R.V.   MAX DEPTH   MAX VEL
                              (ha)    (cms)   (hrs)   (mm)      (m)       (m/s)
   INFLOW : ID= 2 (  0067)  217.22    20.01   11.08 185.40      0.71      0.67
   OUTFLOW: ID= 1 (  0054)  217.22    19.90   11.17 185.39      0.71      0.67



 --------------------------------------------------------------------------------
 --------------------
 | CALIB              |
 | NASHYD   (  0119)|   Area     (ha)=   61.53   Curve Number   (CN)= 88.4
 |ID= 1 DT= 5.0 min |   Ia       (mm)=    7.35   # of Linear Res.(N)= 3.00
 --------------------   U.H. Tp(hrs)=    0.75

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                                 ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    6.00 | 3.083   13.00 | 6.083   23.00 |   9.08   53.00
                 0.167    6.00 | 3.167   13.00 | 6.167   23.00 |   9.17   53.00
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                 0.250    6.00 | 3.250   13.00 | 6.250   23.00 |   9.25   53.00
                 0.333    6.00 | 3.333   13.00 | 6.333   23.00 |   9.33   53.00
                 0.417    6.00 | 3.417   13.00 | 6.417   23.00 |   9.42   53.00
                 0.500    6.00 | 3.500   13.00 | 6.500   23.00 |   9.50   53.00
                 0.583    6.00 | 3.583   13.00 | 6.583   23.00 |   9.58   53.00
                 0.667    6.00 | 3.667   13.00 | 6.667   23.00 |   9.67   53.00
                 0.750    6.00 | 3.750   13.00 | 6.750   23.00 |   9.75   53.00
                 0.833    6.00 | 3.833   13.00 | 6.833   23.00 |   9.83   53.00
                 0.917    6.00 | 3.917   13.00 | 6.917   23.00 |   9.92   53.00
                 1.000    6.00 | 4.000   13.00 | 7.000   23.00 |  10.00   53.00
                 1.083    4.00 | 4.083   17.00 | 7.083   13.00 |  10.08   38.00
                 1.167    4.00 | 4.167   17.00 | 7.167   13.00 |  10.17   38.00
                 1.250    4.00 | 4.250   17.00 | 7.250   13.00 |  10.25   38.00
                 1.333    4.00 | 4.333   17.00 | 7.333   13.00 |  10.33   38.00
                 1.417    4.00 | 4.417   17.00 | 7.417   13.00 |  10.42   38.00
                 1.500    4.00 | 4.500   17.00 | 7.500   13.00 |  10.50   38.00
                 1.583    4.00 | 4.583   17.00 | 7.583   13.00 |  10.58   38.00
                 1.667    4.00 | 4.667   17.00 | 7.667   13.00 |  10.67   38.00
                 1.750    4.00 | 4.750   17.00 | 7.750   13.00 |  10.75   38.00
                 1.833    4.00 | 4.833   17.00 | 7.833   13.00 |  10.83   38.00
                 1.917    4.00 | 4.917   17.00 | 7.917   13.00 |  10.92   38.00
                 2.000    4.00 | 5.000   17.00 | 8.000   13.00 |  11.00   38.00
                 2.083    6.00 | 5.083   13.00 | 8.083   13.00 |  11.08   13.00
                 2.167    6.00 | 5.167   13.00 | 8.167   13.00 |  11.17   13.00
                 2.250    6.00 | 5.250   13.00 | 8.250   13.00 |  11.25   13.00
                 2.333    6.00 | 5.333   13.00 | 8.333   13.00 |  11.33   13.00
                 2.417    6.00 | 5.417   13.00 | 8.417   13.00 |  11.42   13.00
                 2.500    6.00 | 5.500   13.00 | 8.500   13.00 |  11.50   13.00
                 2.583    6.00 | 5.583   13.00 | 8.583   13.00 |  11.58   13.00
                 2.667    6.00 | 5.667   13.00 | 8.667   13.00 |  11.67   13.00
                 2.750    6.00 | 5.750   13.00 | 8.750   13.00 |  11.75   13.00
                 2.833    6.00 | 5.833   13.00 | 8.833   13.00 |  11.83   13.00
                 2.917    6.00 | 5.917   13.00 | 8.917   13.00 |  11.92   13.00
                 3.000    6.00 | 6.000   13.00 | 9.000   13.00 |  12.00   13.00

      Unit Hyd Qpeak  (cms)=   3.134

      PEAK FLOW       (cms)=   6.891 (i)
      TIME TO PEAK    (hrs)=  10.750
      RUNOFF VOLUME    (mm)= 176.058
      TOTAL RAINFALL   (mm)= 212.000
      RUNOFF COEFFICIENT   =   0.830

      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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 --------------------
 | CALIB              |
 | STANDHYD (  0116)|   Area    (ha)=   2.14
 |ID= 1 DT= 5.0 min |   Total Imp(%)=  23.00   Dir. Conn.(%)=  23.00
 --------------------
                                IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=       0.49          1.65
      Dep. Storage     (mm)=       5.72          6.92
      Average Slope     (%)=       1.00          2.00
      Length            (m)=     119.44         15.00
      Mannings n          =       0.013         0.250

          NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                                 ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
```

```
             0.083    6.00 | 3.083   13.00 | 6.083   23.00 |  9.08   53.00
             0.167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
             0.250    6.00 | 3.250   13.00 | 6.250   23.00 |  9.25   53.00
             0.333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
             0.417    6.00 | 3.417   13.00 | 6.417   23.00 |  9.42   53.00
             0.500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
             0.583    6.00 | 3.583   13.00 | 6.583   23.00 |  9.58   53.00
             0.667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
             0.750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
             0.833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83   53.00
             0.917    6.00 | 3.917   13.00 | 6.917   23.00 |  9.92   53.00
             1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   53.00
             1.083    4.00 | 4.083   17.00 | 7.083   13.00 | 10.08   38.00
             1.167    4.00 | 4.167   17.00 | 7.167   13.00 | 10.17   38.00
             1.250    4.00 | 4.250   17.00 | 7.250   13.00 | 10.25   38.00
             1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
             1.417    4.00 | 4.417   17.00 | 7.417   13.00 | 10.42   38.00
             1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
             1.583    4.00 | 4.583   17.00 | 7.583   13.00 | 10.58   38.00
             1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
             1.750    4.00 | 4.750   17.00 | 7.750   13.00 | 10.75   38.00
             1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83   38.00
             1.917    4.00 | 4.917   17.00 | 7.917   13.00 | 10.92   38.00
             2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   38.00
             2.083    6.00 | 5.083   13.00 | 8.083   13.00 | 11.08   13.00
             2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17   13.00
             2.250    6.00 | 5.250   13.00 | 8.250   13.00 | 11.25   13.00
             2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
             2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
             2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
             2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
             2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
             2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
             2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
             2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
             3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

     Max.Eff.Inten.(mm/hr)=      53.00        51.69
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       3.66 (ii)    8.77 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.25         0.12
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.07         0.24        0.308 (iii)
     TIME TO PEAK    (hrs)=       9.92        10.00       10.00
     RUNOFF VOLUME    (mm)=     206.28       180.56      186.47
     TOTAL RAINFALL   (mm)=     212.00       212.00      212.00
     RUNOFF COEFFICIENT   =       0.97         0.85        0.88

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  90.1    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0030)|
|   1 +  2 =  3    |           AREA    QPEAK    TPEAK     R.V.
--------------------           (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0116):       2.14    0.308    10.00   186.47
```

```
      + ID2= 2 (  0119):    61.53   6.891    10.75   176.06
        =======================================================
        ID = 3 (  0030):    63.67   7.114    10.75   176.41

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| ROUTE CHN(  0055)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
                <------ DATA FOR SECTION (   1.1) ------>
                Distance      Elevation       Manning
                    0.00        407.05        0.0500
                   40.00        407.32    0.0500 /0.0500  Main Channel
                   80.00        406.85        0.0500      Main Channel
                  120.00        406.99    0.0500 /0.0500  Main Channel
                  160.00        407.77        0.0500
                  200.00        408.32        0.0500

       <--------------------- TRAVEL TIME TABLE ---------------------->
        DEPTH    ELEV      VOLUME    FLOW RATE    VELOCITY   TRAV.TIME
         (m)      (m)     (cu.m.)      (cms)        (m/s)      (min)
        0.01    406.86    .525E+01      0.0          0.01      421.30
        0.02    406.87    .210E+02      0.0          0.02      265.40
        0.03    406.88    .473E+02      0.0          0.02      202.54
        0.04    406.89    .841E+02      0.0          0.03      167.19
        0.05    406.90    .131E+03      0.0          0.03      144.08
        0.06    406.91    .189E+03      0.0          0.03      127.59
        0.07    406.92    .257E+03      0.0          0.04      115.13
        0.08    406.93    .336E+03      0.1          0.04      105.33
        0.09    406.95    .426E+03      0.1          0.04       97.37
        0.10    406.96    .525E+03      0.1          0.05       90.77
        0.11    406.97    .636E+03      0.1          0.05       85.18
        0.12    406.98    .757E+03      0.2          0.05       80.38
        0.13    406.99    .888E+03      0.2          0.06       76.20
        0.14    407.00    .103E+04      0.2          0.06       69.72
        0.15    407.01    .119E+04      0.3          0.07       64.59
        0.17    407.02    .134E+04      0.4          0.07       60.40
        0.18    407.03    .150E+04      0.4          0.08       56.90
        0.19    407.04    .166E+04      0.5          0.08       53.93
        0.20    407.05    .183E+04      0.6          0.08       51.36

     **** WARNING:  TRAVEL TIME TABLE EXCEEDED
                                      <---- hydrograph ---->   <-pipe / channel->
                              AREA    QPEAK    TPEAK    R.V.   MAX DEPTH  MAX VEL
                              (ha)    (cms)    (hrs)    (mm)      (m)      (m/s)
   INFLOW : ID= 2 (  0030)   63.67     7.11    10.75 176.41      0.19      0.08
   OUTFLOW: ID= 1 (  0055)   63.67     6.25    11.42 176.37      0.20      0.08


     **** WARNING:  COMPUTATIONS FAILED TO CONVERGE.

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0120)|   Area    (ha)=  19.69   Curve Number   (CN)= 90.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   6.77   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.55

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                             ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
```

```
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    6.00 | 3.083   13.00 | 6.083   23.00 |  9.08   53.00
               0.167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
               0.250    6.00 | 3.250   13.00 | 6.250   23.00 |  9.25   53.00
               0.333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
               0.417    6.00 | 3.417   13.00 | 6.417   23.00 |  9.42   53.00
               0.500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
               0.583    6.00 | 3.583   13.00 | 6.583   23.00 |  9.58   53.00
               0.667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
               0.750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
               0.833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83   53.00
               0.917    6.00 | 3.917   13.00 | 6.917   23.00 |  9.92   53.00
               1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   53.00
               1.083    4.00 | 4.083   17.00 | 7.083   13.00 | 10.08   38.00
               1.167    4.00 | 4.167   17.00 | 7.167   13.00 | 10.17   38.00
               1.250    4.00 | 4.250   17.00 | 7.250   13.00 | 10.25   38.00
               1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
               1.417    4.00 | 4.417   17.00 | 7.417   13.00 | 10.42   38.00
               1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
               1.583    4.00 | 4.583   17.00 | 7.583   13.00 | 10.58   38.00
               1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
               1.750    4.00 | 4.750   17.00 | 7.750   13.00 | 10.75   38.00
               1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83   38.00
               1.917    4.00 | 4.917   17.00 | 7.917   13.00 | 10.92   38.00
               2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   38.00
               2.083    6.00 | 5.083   13.00 | 8.083   13.00 | 11.08   13.00
               2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17   13.00
               2.250    6.00 | 5.250   13.00 | 8.250   13.00 | 11.25   13.00
               2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
               2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
               2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
               2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
               2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
               2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
               2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
               2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
               3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

     Unit Hyd Qpeak  (cms)=   1.367

     PEAK FLOW       (cms)=   2.419 (i)
     TIME TO PEAK    (hrs)=  10.333
     RUNOFF VOLUME    (mm)= 180.389
     TOTAL RAINFALL   (mm)= 212.000
     RUNOFF COEFFICIENT   =   0.851

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0120):    19.69   2.419    10.33   180.39
      + ID2= 2 (  0055):    63.67   6.247    11.42   176.37
        ====================================================
        ID = 3 (  0041):    83.36   8.243    11.17   177.32

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| ROUTE CHN(  0056)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
```

```
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
                  0.00         406.96        0.0500
                 40.00         406.80    0.0500 /0.0500  Main Channel
                 80.00         406.11        0.0500      Main Channel
                120.00         405.99    0.0500 /0.0500  Main Channel
                160.00         406.15        0.0500
                200.00         406.19        0.0500

      <--------------------- TRAVEL TIME TABLE --------------------->
       DEPTH     ELEV      VOLUME    FLOW RATE    VELOCITY   TRAV.TIME
        (m)      (m)      (cu.m.)      (cms)       (m/s)       (min)
       0.01    406.00    .789E+01       0.0         0.05       81.15
       0.02    406.01    .316E+02       0.0         0.08       51.12
       0.03    406.02    .710E+02       0.0         0.10       39.01
       0.04    406.03    .126E+03       0.1         0.12       32.20
       0.05    406.04    .197E+03       0.1         0.14       27.75
       0.06    406.05    .284E+03       0.2         0.16       24.58
       0.07    406.06    .387E+03       0.3         0.18       22.18
       0.08    406.08    .505E+03       0.4         0.20       20.29
       0.10    406.09    .639E+03       0.6         0.21       18.76
       0.11    406.10    .789E+03       0.8         0.23       17.48
       0.12    406.11    .955E+03       1.0         0.24       16.41
       0.13    406.12    .113E+04       1.2         0.26       15.16
       0.14    406.13    .132E+04       1.6         0.28       14.08
       0.15    406.14    .152E+04       1.9         0.30       13.19
       0.16    406.15    .172E+04       2.3         0.32       12.44
       0.17    406.16    .194E+04       2.6         0.33       12.24
       0.18    406.17    .219E+04       3.0         0.33       12.00
       0.19    406.18    .246E+04       3.5         0.34       11.72
       0.20    406.19    .276E+04       4.0         0.35       11.43

     **** WARNING:  TRAVEL TIME TABLE EXCEEDED
                                    <---- hydrograph ---->   <-pipe / channel->
                              AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                              (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
   INFLOW : ID= 2 (  0041)   83.36     8.24   11.17 177.32      0.20      0.35
   OUTFLOW: ID= 1 (  0056)   83.36     8.15   11.33 177.31      0.20      0.35



--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0121):    23.78   3.213    10.08   189.77
      + ID2= 2 (  0054):   217.22  19.897    11.17   185.39
        ====================================================
        ID = 3 (  0032):   241.00  22.356    11.08   185.83

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0032)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0032):   241.00  22.356    11.08   185.83
      + ID2= 2 (  0056):    83.36   8.148    11.33   177.31
        ====================================================
        ID = 1 (  0032):   324.36  30.376    11.17   183.64
```

```
     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| ROUTE CHN(  0046)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
                   0.00        408.76         0.0500
                  40.00        407.46    0.0500 /0.0500  Main Channel
                  80.00        406.33         0.0500     Main Channel
                 120.00        406.42    0.0500 /0.0500  Main Channel
                 160.00        407.97         0.0500
                 200.00        408.95         0.0500

      <--------------------- TRAVEL TIME TABLE ---------------------->
       DEPTH    ELEV      VOLUME    FLOW RATE     VELOCITY   TRAV.TIME
        (m)      (m)     (cu.m.)      (cms)        (m/s)       (min)
       0.08   406.42    .642E+03        0.2          0.12       49.09
       0.21   406.54    .271E+04        2.2          0.29       20.62
       0.33   406.66    .512E+04        5.8          0.41       14.76
       0.45   406.79    .786E+04       10.9          0.50       12.01
       0.58   406.91    .109E+05       17.6          0.58       10.36
       0.70   407.03    .144E+05       25.9          0.65        9.23
       0.82   407.16    .181E+05       35.9          0.71        8.40
       0.95   407.28    .222E+05       47.7          0.77        7.75
       1.07   407.40    .266E+05       61.3          0.83        7.23
       1.19   407.52    .313E+05       78.1          0.90        6.69
       1.31   407.65    .364E+05       97.9          0.97        6.20
       1.44   407.77    .418E+05      120.0          1.03        5.80
       1.56   407.89    .475E+05      144.4          1.10        5.48
       1.68   408.02    .534E+05      170.8          1.15        5.21
       1.81   408.14    .598E+05      199.3          1.20        5.00
       1.93   408.26    .666E+05      230.6          1.25        4.81
       2.05   408.39    .737E+05      264.6          1.29        4.64
       2.18   408.51    .813E+05      301.6          1.34        4.49
       2.30   408.63    .892E+05      341.5          1.38        4.35

                                     <---- hydrograph ---->   <-pipe / channel->
                              AREA    QPEAK    TPEAK   R.V.   MAX DEPTH  MAX VEL
                              (ha)    (cms)    (hrs)   (mm)      (m)      (m/s)
  INFLOW : ID= 2 (  0032)  324.36    30.38    11.17 183.64      0.75      0.68
  OUTFLOW: ID= 1 (  0046)  324.36    30.20    11.25 183.64      0.75      0.68


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0125)|   Area    (ha)=   50.67   Curve Number   (CN)= 89.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=    7.24   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    0.63

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                                ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    6.00 | 3.083   13.00 | 6.083   23.00 |  9.08   53.00
                0.167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
                0.250    6.00 | 3.250   13.00 | 6.250   23.00 |  9.25   53.00
                0.333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
```

```
                0.417    6.00 | 3.417   13.00 | 6.417   23.00 |  9.42   53.00
                0.500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
                0.583    6.00 | 3.583   13.00 | 6.583   23.00 |  9.58   53.00
                0.667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
                0.750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
                0.833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83   53.00
                0.917    6.00 | 3.917   13.00 | 6.917   23.00 |  9.92   53.00
                1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   53.00
                1.083    4.00 | 4.083   17.00 | 7.083   13.00 | 10.08   38.00
                1.167    4.00 | 4.167   17.00 | 7.167   13.00 | 10.17   38.00
                1.250    4.00 | 4.250   17.00 | 7.250   13.00 | 10.25   38.00
                1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
                1.417    4.00 | 4.417   17.00 | 7.417   13.00 | 10.42   38.00
                1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
                1.583    4.00 | 4.583   17.00 | 7.583   13.00 | 10.58   38.00
                1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
                1.750    4.00 | 4.750   17.00 | 7.750   13.00 | 10.75   38.00
                1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83   38.00
                1.917    4.00 | 4.917   17.00 | 7.917   13.00 | 10.92   38.00
                2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   38.00
                2.083    6.00 | 5.083   13.00 | 8.083   13.00 | 11.08   13.00
                2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17   13.00
                2.250    6.00 | 5.250   13.00 | 8.250   13.00 | 11.25   13.00
                2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
                2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
                2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
                2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
                2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
                2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
                2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
                2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
                3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

     Unit Hyd Qpeak  (cms)=   3.072

     PEAK FLOW       (cms)=   5.964 (i)
     TIME TO PEAK    (hrs)=  10.500
     RUNOFF VOLUME    (mm)= 177.850
     TOTAL RAINFALL   (mm)= 212.000
     RUNOFF COEFFICIENT   =   0.839

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| NASHYD   (  0122)|   Area    (ha)=   47.13   Curve Number   (CN)= 66.8
|ID= 1 DT= 5.0 min |   Ia      (mm)=    5.71   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    0.54

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                                ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    6.00 | 3.083   13.00 | 6.083   23.00 |  9.08   53.00
                0.167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
                0.250    6.00 | 3.250   13.00 | 6.250   23.00 |  9.25   53.00
                0.333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
                0.417    6.00 | 3.417   13.00 | 6.417   23.00 |  9.42   53.00
                0.500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
                0.583    6.00 | 3.583   13.00 | 6.583   23.00 |  9.58   53.00
                0.667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
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                 0.750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
                 0.833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83   53.00
                 0.917    6.00 | 3.917   13.00 | 6.917   23.00 |  9.92   53.00
                 1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   53.00
                 1.083    4.00 | 4.083   17.00 | 7.083   13.00 | 10.08   38.00
                 1.167    4.00 | 4.167   17.00 | 7.167   13.00 | 10.17   38.00
                 1.250    4.00 | 4.250   17.00 | 7.250   13.00 | 10.25   38.00
                 1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
                 1.417    4.00 | 4.417   17.00 | 7.417   13.00 | 10.42   38.00
                 1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
                 1.583    4.00 | 4.583   17.00 | 7.583   13.00 | 10.58   38.00
                 1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
                 1.750    4.00 | 4.750   17.00 | 7.750   13.00 | 10.75   38.00
                 1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83   38.00
                 1.917    4.00 | 4.917   17.00 | 7.917   13.00 | 10.92   38.00
                 2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   38.00
                 2.083    6.00 | 5.083   13.00 | 8.083   13.00 | 11.08   13.00
                 2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17   13.00
                 2.250    6.00 | 5.250   13.00 | 8.250   13.00 | 11.25   13.00
                 2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
                 2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
                 2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
                 2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
                 2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
                 2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
                 2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
                 2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
                 3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

      Unit Hyd Qpeak  (cms)=   3.334

      PEAK FLOW       (cms)=   4.600 (i)
      TIME TO PEAK    (hrs)=  10.417
      RUNOFF VOLUME    (mm)= 128.080
      TOTAL RAINFALL   (mm)= 212.000
      RUNOFF COEFFICIENT   =   0.604

      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| NASHYD   (  0124)|   Area    (ha)=  59.08   Curve Number   (CN)= 89.4
|ID= 1 DT= 5.0 min |   Ia      (mm)=   7.19   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.51

          NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                                 ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN | TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |  hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    6.00 | 3.083   13.00 | 6.083   23.00 |  9.08   53.00
                 0.167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
                 0.250    6.00 | 3.250   13.00 | 6.250   23.00 |  9.25   53.00
                 0.333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
                 0.417    6.00 | 3.417   13.00 | 6.417   23.00 |  9.42   53.00
                 0.500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
                 0.583    6.00 | 3.583   13.00 | 6.583   23.00 |  9.58   53.00
                 0.667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
                 0.750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
                 0.833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83   53.00
                 0.917    6.00 | 3.917   13.00 | 6.917   23.00 |  9.92   53.00
                 1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   53.00
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                 1.083    4.00 | 4.083   17.00 | 7.083   13.00 | 10.08   38.00
                 1.167    4.00 | 4.167   17.00 | 7.167   13.00 | 10.17   38.00
                 1.250    4.00 | 4.250   17.00 | 7.250   13.00 | 10.25   38.00
                 1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
                 1.417    4.00 | 4.417   17.00 | 7.417   13.00 | 10.42   38.00
                 1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
                 1.583    4.00 | 4.583   17.00 | 7.583   13.00 | 10.58   38.00
                 1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
                 1.750    4.00 | 4.750   17.00 | 7.750   13.00 | 10.75   38.00
                 1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83   38.00
                 1.917    4.00 | 4.917   17.00 | 7.917   13.00 | 10.92   38.00
                 2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   38.00
                 2.083    6.00 | 5.083   13.00 | 8.083   13.00 | 11.08   13.00
                 2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17   13.00
                 2.250    6.00 | 5.250   13.00 | 8.250   13.00 | 11.25   13.00
                 2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
                 2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
                 2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
                 2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
                 2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
                 2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
                 2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
                 2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
                 3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

      Unit Hyd Qpeak  (cms)=   4.425

      PEAK FLOW       (cms)=   7.380 (i)
      TIME TO PEAK    (hrs)=  10.250
      RUNOFF VOLUME    (mm)= 178.498
      TOTAL RAINFALL   (mm)= 212.000
      RUNOFF COEFFICIENT   =   0.842

      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| NASHYD   (  0123)|   Area    (ha)=  27.62   Curve Number   (CN)= 91.8
|ID= 1 DT= 5.0 min |   Ia      (mm)=   6.04   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.67

          NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                                 ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN | TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |  hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    6.00 | 3.083   13.00 | 6.083   23.00 |  9.08   53.00
                 0.167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
                 0.250    6.00 | 3.250   13.00 | 6.250   23.00 |  9.25   53.00
                 0.333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
                 0.417    6.00 | 3.417   13.00 | 6.417   23.00 |  9.42   53.00
                 0.500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
                 0.583    6.00 | 3.583   13.00 | 6.583   23.00 |  9.58   53.00
                 0.667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
                 0.750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
                 0.833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83   53.00
                 0.917    6.00 | 3.917   13.00 | 6.917   23.00 |  9.92   53.00
                 1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   53.00
                 1.083    4.00 | 4.083   17.00 | 7.083   13.00 | 10.08   38.00
                 1.167    4.00 | 4.167   17.00 | 7.167   13.00 | 10.17   38.00
                 1.250    4.00 | 4.250   17.00 | 7.250   13.00 | 10.25   38.00
                 1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
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              1.417    4.00 | 4.417   17.00 | 7.417   13.00 | 10.42   38.00
              1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
              1.583    4.00 | 4.583   17.00 | 7.583   13.00 | 10.58   38.00
              1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
              1.750    4.00 | 4.750   17.00 | 7.750   13.00 | 10.75   38.00
              1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83   38.00
              1.917    4.00 | 4.917   17.00 | 7.917   13.00 | 10.92   38.00
              2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   38.00
              2.083    6.00 | 5.083   13.00 | 8.083   13.00 | 11.08   13.00
              2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17   13.00
              2.250    6.00 | 5.250   13.00 | 8.250   13.00 | 11.25   13.00
              2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
              2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
              2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
              2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
              2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
              2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
              2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
              2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
              3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

     Unit Hyd Qpeak  (cms)=   1.575

     PEAK FLOW       (cms)=   3.245 (i)
     TIME TO PEAK    (hrs)=  10.583
     RUNOFF VOLUME    (mm)= 185.447
     TOTAL RAINFALL   (mm)= 212.000
     RUNOFF COEFFICIENT   =   0.875

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| ROUTE CHN(  0058)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
                   0.00         415.69        0.0500
                  40.00         414.82    0.0500 /0.0500   Main Channel
                  80.00         414.16        0.0500       Main Channel
                 120.00         412.49    0.0500 /0.0500   Main Channel
                 160.00         413.40        0.0500
                 200.00         413.56        0.0500

      <--------------------- TRAVEL TIME TABLE ---------------------->
       DEPTH     ELEV      VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
        (m)       (m)     (cu.m.)      (cms)         (m/s)       (min)
       0.06    412.54    .663E+02       0.0           0.19       53.44
       0.11    412.60    .265E+03       0.1           0.30       33.66
       0.17    412.66    .597E+03       0.4           0.40       25.69
       0.23    412.71    .106E+04       0.8           0.48       21.21
       0.28    412.77    .166E+04       1.5           0.56       18.28
       0.34    412.83    .239E+04       2.5           0.63       16.18
       0.40    412.88    .325E+04       3.7           0.70       14.60
       0.45    412.94    .425E+04       5.3           0.76       13.36
       0.51    413.00    .537E+04       7.3           0.82       12.35
       0.57    413.05    .663E+04       9.6           0.88       11.51
       0.62    413.11    .803E+04      12.4           0.94       10.80
       0.68    413.17    .955E+04      15.6           1.00       10.20
       0.74    413.22    .112E+05      19.3           1.05        9.67
       0.79    413.28    .130E+05      23.6           1.11        9.20
       0.85    413.34    .149E+05      28.3           1.16        8.79
       0.91    413.39    .170E+05      33.6           1.21        8.42
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       0.96    413.45    .193E+05      36.5           1.15        8.82
       1.02    413.51    .222E+05      41.2           1.13        8.99
       1.08    413.56    .256E+05      47.5           1.13        8.99

                                       <---- hydrograph ---->    <-pipe / channel->
                               AREA    QPEAK    TPEAK    R.V.   MAX DEPTH  MAX VEL
                               (ha)    (cms)    (hrs)    (mm)      (m)      (m/s)
     INFLOW : ID= 2 (  0123)   27.62     3.25    10.58 185.45      0.38       0.67
     OUTFLOW: ID= 1 (  0058)   27.62     3.19    10.83 185.44      0.37       0.67


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--------------------
| ADD HYD  (  0043)|
|   1 +  2 =  3    |         AREA     QPEAK     TPEAK      R.V.
--------------------         (ha)     (cms)     (hrs)      (mm)
        ID1= 1 (  0124):    59.08    7.380     10.25    178.50
      + ID2= 2 (  0058):    27.62    3.190     10.83    185.44
        ===================================================
        ID = 3 (  0043):    86.70   10.307     10.42    180.71

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| ROUTE CHN(  0059)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
                   0.00         412.53        0.0500
                  40.00         412.08    0.0500 /0.0500   Main Channel
                  80.00         411.53        0.0500       Main Channel
                 120.00         411.93    0.0500 /0.0500   Main Channel
                 160.00         412.26        0.0500
                 200.00         413.36        0.0500

      <--------------------- TRAVEL TIME TABLE ---------------------->
       DEPTH     ELEV      VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
        (m)       (m)     (cu.m.)      (cms)         (m/s)       (min)
       0.05    411.58    .190E+03       0.0           0.10      144.01
       0.10    411.63    .759E+03       0.1           0.17       90.72
       0.15    411.68    .171E+04       0.4           0.22       69.23
       0.20    411.73    .304E+04       0.9           0.26       57.15
       0.25    411.78    .475E+04       1.6           0.30       49.25
       0.29    411.83    .683E+04       2.6           0.34       43.61
       0.34    411.88    .930E+04       3.9           0.38       39.35
       0.39    411.93    .122E+05       5.6           0.42       36.00
       0.44    411.98    .154E+05       8.0           0.47       32.20
       0.50    412.03    .195E+05      11.1           0.51       29.30
       0.55    412.09    .242E+05      14.9           0.55       27.07
       0.61    412.14    .295E+05      19.8           0.61       24.78
       0.66    412.20    .353E+05      25.5           0.65       23.07
       0.72    412.25    .416E+05      32.0           0.69       21.72
       0.77    412.31    .485E+05      39.5           0.73       20.49
       0.83    412.36    .557E+05      47.8           0.77       19.41
       0.88    412.42    .633E+05      57.1           0.81       18.47
       0.94    412.47    .711E+05      67.2           0.85       17.64
       0.99    412.53    .794E+05      78.2           0.89       16.91

                                       <---- hydrograph ---->    <-pipe / channel->
                               AREA    QPEAK    TPEAK    R.V.   MAX DEPTH  MAX VEL
                               (ha)    (cms)    (hrs)    (mm)      (m)      (m/s)
```

```
  INFLOW : ID= 2 (  0043)   86.70    10.31    10.42 180.71      0.48      0.50
  OUTFLOW: ID= 1 (  0059)   86.70     9.61    11.00 180.70      0.47      0.49


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--------------------
| ADD HYD  (  0042)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK      R.V.
--------------------         (ha)    (cms)    (hrs)      (mm)
        ID1= 1 (  0122):    47.13   4.600    10.42    128.08
      + ID2= 2 (  0125):    50.67   5.964    10.50    177.85
        ====================================================
        ID = 3 (  0042):    97.80  10.557    10.42    153.87

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| ADD HYD  (  0042)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK      R.V.
--------------------         (ha)    (cms)    (hrs)      (mm)
        ID1= 3 (  0042):    97.80  10.557    10.42    153.87
      + ID2= 2 (  0059):    86.70   9.611    11.00    180.70
        ====================================================
        ID = 1 (  0042):   184.50  19.836    10.67    166.48

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| ROUTE CHN(  0057)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
                   0.00         408.12       0.0500
                  40.00         407.72    0.0500 /0.0500  Main Channel
                  80.00         406.92       0.0500       Main Channel
                 120.00         406.45    0.0500 /0.0500  Main Channel
                 160.00         407.75       0.0500
                 200.00         408.46       0.0500

      <--------------------- TRAVEL TIME TABLE ---------------------->
       DEPTH    ELEV      VOLUME    FLOW RATE    VELOCITY   TRAV.TIME
        (m)      (m)     (cu.m.)      (cms)        (m/s)      (min)
       0.09   406.53    .210E+03      0.1          0.29       26.58
       0.18   406.62    .838E+03      0.8          0.47       16.74
       0.27   406.71    .189E+04      2.5          0.61       12.78
       0.35   406.80    .335E+04      5.3          0.74       10.55
       0.44   406.89    .524E+04      9.6          0.86        9.09
       0.53   406.98    .752E+04     15.9          0.99        7.91
       0.62   407.06    .101E+05     24.1          1.12        7.01
       0.71   407.15    .130E+05     34.2          1.23        6.34
       0.80   407.24    .162E+05     46.3          1.34        5.83
       0.88   407.33    .197E+05     60.5          1.45        5.42
       0.97   407.42    .235E+05     77.0          1.54        5.08
       1.06   407.51    .275E+05     95.8          1.63        4.79
       1.15   407.59    .319E+05    117.0          1.72        4.54
       1.24   407.68    .366E+05    140.8          1.81        4.33
       1.33   407.77    .416E+05    169.3          1.91        4.09
       1.41   407.86    .471E+05    201.4          2.01        3.90
       1.50   407.95    .532E+05    237.2          2.10        3.74
       1.59   408.04    .599E+05    277.1          2.18        3.60
```

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       1.68   408.12    .671E+05     321.3          2.25       3.48

                                  <---- hydrograph ---->   <-pipe / channel->
                            AREA    QPEAK    TPEAK    R.V.   MAX DEPTH  MAX VEL
                            (ha)    (cms)    (hrs)    (mm)     (m)       (m/s)
    INFLOW : ID= 2 (  0042) 184.50   19.84   10.67 166.48      0.57       1.05
    OUTFLOW: ID= 1 (  0057) 184.50   19.81   10.83 166.47      0.57       1.05



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--------------------
| CALIB            |
| NASHYD   (  0126)|   Area     (ha)=  33.99   Curve Number   (CN)= 93.4
|ID= 1 DT= 5.0 min |   Ia       (mm)=   4.98   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.43

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    6.00 | 3.083   13.00 | 6.083   23.00 |  9.08   53.00
                0.167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
                0.250    6.00 | 3.250   13.00 | 6.250   23.00 |  9.25   53.00
                0.333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
                0.417    6.00 | 3.417   13.00 | 6.417   23.00 |  9.42   53.00
                0.500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
                0.583    6.00 | 3.583   13.00 | 6.583   23.00 |  9.58   53.00
                0.667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
                0.750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
                0.833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83   53.00
                0.917    6.00 | 3.917   13.00 | 6.917   23.00 |  9.92   53.00
                1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   53.00
                1.083    4.00 | 4.083   17.00 | 7.083   13.00 | 10.08   38.00
                1.167    4.00 | 4.167   17.00 | 7.167   13.00 | 10.17   38.00
                1.250    4.00 | 4.250   17.00 | 7.250   13.00 | 10.25   38.00
                1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
                1.417    4.00 | 4.417   17.00 | 7.417   13.00 | 10.42   38.00
                1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
                1.583    4.00 | 4.583   17.00 | 7.583   13.00 | 10.58   38.00
                1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
                1.750    4.00 | 4.750   17.00 | 7.750   13.00 | 10.75   38.00
                1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83   38.00
                1.917    4.00 | 4.917   17.00 | 7.917   13.00 | 10.92   38.00
                2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   38.00
                2.083    6.00 | 5.083   13.00 | 8.083   13.00 | 11.08   13.00
                2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17   13.00
                2.250    6.00 | 5.250   13.00 | 8.250   13.00 | 11.25   13.00
                2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
                2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
                2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
                2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
                2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
                2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
                2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
                2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
                3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

     Unit Hyd Qpeak  (cms)=   3.019

     PEAK FLOW       (cms)=   4.529 (i)
     TIME TO PEAK    (hrs)=  10.167
```

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     RUNOFF VOLUME    (mm)= 190.437
     TOTAL RAINFALL   (mm)= 212.000
     RUNOFF COEFFICIENT   =   0.898

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0033)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0126):    33.99   4.529    10.17   190.44
      + ID2= 2 (  0046):   324.36  30.195    11.25   183.64
        ===================================================
        ID = 3 (  0033):   358.35  33.662    11.17   184.28

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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| ADD HYD  (  0033)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0033):   358.35  33.662    11.17   184.28
      + ID2= 2 (  0057):   184.50  19.808    10.83   166.47
        ===================================================
        ID = 1 (  0033):   542.85  53.258    11.08   178.23

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| CALIB            |
| NASHYD   (  0118)|   Area    (ha)=    5.33   Curve Number   (CN)= 91.6
|ID= 1 DT= 5.0 min |   Ia      (mm)=    5.67   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    0.23

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                                 ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    6.00 | 3.083   13.00 | 6.083   23.00 |  9.08   53.00
                0.167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
                0.250    6.00 | 3.250   13.00 | 6.250   23.00 |  9.25   53.00
                0.333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
                0.417    6.00 | 3.417   13.00 | 6.417   23.00 |  9.42   53.00
                0.500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
                0.583    6.00 | 3.583   13.00 | 6.583   23.00 |  9.58   53.00
                0.667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
                0.750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
                0.833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83   53.00
                0.917    6.00 | 3.917   13.00 | 6.917   23.00 |  9.92   53.00
                1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   53.00
                1.083    4.00 | 4.083   17.00 | 7.083   13.00 | 10.08   38.00
                1.167    4.00 | 4.167   17.00 | 7.167   13.00 | 10.17   38.00
                1.250    4.00 | 4.250   17.00 | 7.250   13.00 | 10.25   38.00
                1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
                1.417    4.00 | 4.417   17.00 | 7.417   13.00 | 10.42   38.00
                1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
                1.583    4.00 | 4.583   17.00 | 7.583   13.00 | 10.58   38.00
                1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
                1.750    4.00 | 4.750   17.00 | 7.750   13.00 | 10.75   38.00
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                1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83   38.00
                1.917    4.00 | 4.917   17.00 | 7.917   13.00 | 10.92   38.00
                2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   38.00
                2.083    6.00 | 5.083   13.00 | 8.083   13.00 | 11.08   13.00
                2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17   13.00
                2.250    6.00 | 5.250   13.00 | 8.250   13.00 | 11.25   13.00
                2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
                2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
                2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
                2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
                2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
                2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
                2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
                2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
                3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

     Unit Hyd Qpeak  (cms)=   0.885

     PEAK FLOW       (cms)=   0.764 (i)
     TIME TO PEAK    (hrs)=  10.000
     RUNOFF VOLUME    (mm)= 185.196
     TOTAL RAINFALL   (mm)= 212.000
     RUNOFF COEFFICIENT   =   0.874

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| NASHYD   (  0117)|   Area    (ha)=  15.35   Curve Number   (CN)= 91.9
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.92   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.53

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                                 ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    6.00 | 3.083   13.00 | 6.083   23.00 |  9.08   53.00
                0.167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
                0.250    6.00 | 3.250   13.00 | 6.250   23.00 |  9.25   53.00
                0.333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
                0.417    6.00 | 3.417   13.00 | 6.417   23.00 |  9.42   53.00
                0.500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
                0.583    6.00 | 3.583   13.00 | 6.583   23.00 |  9.58   53.00
                0.667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
                0.750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
                0.833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83   53.00
                0.917    6.00 | 3.917   13.00 | 6.917   23.00 |  9.92   53.00
                1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   53.00
                1.083    4.00 | 4.083   17.00 | 7.083   13.00 | 10.08   38.00
                1.167    4.00 | 4.167   17.00 | 7.167   13.00 | 10.17   38.00
                1.250    4.00 | 4.250   17.00 | 7.250   13.00 | 10.25   38.00
                1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
                1.417    4.00 | 4.417   17.00 | 7.417   13.00 | 10.42   38.00
                1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
                1.583    4.00 | 4.583   17.00 | 7.583   13.00 | 10.58   38.00
                1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
                1.750    4.00 | 4.750   17.00 | 7.750   13.00 | 10.75   38.00
                1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83   38.00
                1.917    4.00 | 4.917   17.00 | 7.917   13.00 | 10.92   38.00
                2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   38.00
                2.083    6.00 | 5.083   13.00 | 8.083   13.00 | 11.08   13.00
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                  2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17   13.00
                  2.250    6.00 | 5.250   13.00 | 8.250   13.00 | 11.25   13.00
                  2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
                  2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
                  2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
                  2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
                  2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
                  2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
                  2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
                  2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
                  3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

       Unit Hyd Qpeak  (cms)=   1.106

       PEAK FLOW       (cms)=   1.924 (i)
       TIME TO PEAK    (hrs)=  10.333
       RUNOFF VOLUME    (mm)= 185.854
       TOTAL RAINFALL   (mm)= 212.000
       RUNOFF COEFFICIENT   =   0.877

       (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD (  0202)|   Area    (ha)=  11.74
|ID= 1 DT= 5.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  42.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
       Surface Area     (ha)=       7.04         4.70
       Dep. Storage     (mm)=       1.00         1.50
       Average Slope     (%)=       1.00         2.00
       Length            (m)=     279.76        40.00
       Mannings n           =      0.013        0.250

           NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                                ---- TRANSFORMED HYETOGRAPH ----
                   TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                    hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                  0.083    6.00 | 3.083   13.00 | 6.083   23.00 |  9.08   53.00
                  0.167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
                  0.250    6.00 | 3.250   13.00 | 6.250   23.00 |  9.25   53.00
                  0.333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
                  0.417    6.00 | 3.417   13.00 | 6.417   23.00 |  9.42   53.00
                  0.500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
                  0.583    6.00 | 3.583   13.00 | 6.583   23.00 |  9.58   53.00
                  0.667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
                  0.750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
                  0.833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83   53.00
                  0.917    6.00 | 3.917   13.00 | 6.917   23.00 |  9.92   53.00
                  1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   53.00
                  1.083    4.00 | 4.083   17.00 | 7.083   13.00 | 10.08   38.00
                  1.167    4.00 | 4.167   17.00 | 7.167   13.00 | 10.17   38.00
                  1.250    4.00 | 4.250   17.00 | 7.250   13.00 | 10.25   38.00
                  1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
                  1.417    4.00 | 4.417   17.00 | 7.417   13.00 | 10.42   38.00
                  1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
                  1.583    4.00 | 4.583   17.00 | 7.583   13.00 | 10.58   38.00
                  1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
                  1.750    4.00 | 4.750   17.00 | 7.750   13.00 | 10.75   38.00
                  1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83   38.00
                  1.917    4.00 | 4.917   17.00 | 7.917   13.00 | 10.92   38.00
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                  2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   38.00
                  2.083    6.00 | 5.083   13.00 | 8.083   13.00 | 11.08   13.00
                  2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17   13.00
                  2.250    6.00 | 5.250   13.00 | 8.250   13.00 | 11.25   13.00
                  2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
                  2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
                  2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
                  2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
                  2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
                  2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
                  2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
                  2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
                  3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

       Max.Eff.Inten.(mm/hr)=      53.00        76.50
                  over (min)       5.00        15.00
       Storage Coeff.  (min)=       6.11 (ii)   13.96 (ii)
       Unit Hyd. Tpeak (min)=       5.00        15.00
       Unit Hyd. peak  (cms)=       0.19         0.08
                                                           *TOTALS*
       PEAK FLOW       (cms)=       0.73         0.98         1.707 (iii)
       TIME TO PEAK    (hrs)=      10.00        10.00        10.00
       RUNOFF VOLUME    (mm)=     211.00       200.27       204.78
       TOTAL RAINFALL   (mm)=     212.00       212.00       212.00
       RUNOFF COEFFICIENT   =       1.00         0.94         0.97


         (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
              CN*  =  94.0    Ia = Dep. Storage  (Above)
        (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
       (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB              |
| STANDHYD (  0201)|   Area    (ha)=   2.75
|ID= 1 DT= 5.0 min |   Total Imp(%)=  40.00   Dir. Conn.(%)=  28.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
       Surface Area     (ha)=       1.10         1.65
       Dep. Storage     (mm)=       1.00         1.50
       Average Slope     (%)=       1.00         2.00
       Length            (m)=     135.40        40.00
       Mannings n           =      0.013        0.250

           NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                                ---- TRANSFORMED HYETOGRAPH ----
                   TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                    hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                  0.083    6.00 | 3.083   13.00 | 6.083   23.00 |  9.08   53.00
                  0.167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
                  0.250    6.00 | 3.250   13.00 | 6.250   23.00 |  9.25   53.00
                  0.333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
                  0.417    6.00 | 3.417   13.00 | 6.417   23.00 |  9.42   53.00
                  0.500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
                  0.583    6.00 | 3.583   13.00 | 6.583   23.00 |  9.58   53.00
                  0.667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
                  0.750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
                  0.833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83   53.00
                  0.917    6.00 | 3.917   13.00 | 6.917   23.00 |  9.92   53.00
                  1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   53.00
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                  1.083    4.00 | 4.083   17.00 | 7.083   13.00 | 10.08   38.00
                  1.167    4.00 | 4.167   17.00 | 7.167   13.00 | 10.17   38.00
                  1.250    4.00 | 4.250   17.00 | 7.250   13.00 | 10.25   38.00
                  1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
                  1.417    4.00 | 4.417   17.00 | 7.417   13.00 | 10.42   38.00
                  1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
                  1.583    4.00 | 4.583   17.00 | 7.583   13.00 | 10.58   38.00
                  1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
                  1.750    4.00 | 4.750   17.00 | 7.750   13.00 | 10.75   38.00
                  1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83   38.00
                  1.917    4.00 | 4.917   17.00 | 7.917   13.00 | 10.92   38.00
                  2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   38.00
                  2.083    6.00 | 5.083   13.00 | 8.083   13.00 | 11.08   13.00
                  2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17   13.00
                  2.250    6.00 | 5.250   13.00 | 8.250   13.00 | 11.25   13.00
                  2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
                  2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
                  2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
                  2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
                  2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
                  2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
                  2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
                  2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
                  3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

     Max.Eff.Inten.(mm/hr)=      53.00        63.19
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       3.95 (ii)   12.43 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.24         0.08
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.11         0.29        0.400 (iii)
     TIME TO PEAK    (hrs)=      10.00        10.00        10.00
     RUNOFF VOLUME    (mm)=     211.00       197.97       201.61
     TOTAL RAINFALL   (mm)=     212.00       212.00       212.00
     RUNOFF COEFFICIENT   =       1.00         0.93         0.95

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  94.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0100)|   Area    (ha)=   2.66
|ID= 1 DT= 5.0 min |   Total Imp(%)=  20.00   Dir. Conn.(%)=  20.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.53         2.13
     Dep. Storage     (mm)=       1.00         3.80
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     133.17        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                                 ---- TRANSFORMED HYETOGRAPH ----
                   TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                    hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
```

```
                  0.083    6.00 | 3.083   13.00 | 6.083   23.00 |  9.08   53.00
                  0.167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
                  0.250    6.00 | 3.250   13.00 | 6.250   23.00 |  9.25   53.00
                  0.333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
                  0.417    6.00 | 3.417   13.00 | 6.417   23.00 |  9.42   53.00
                  0.500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
                  0.583    6.00 | 3.583   13.00 | 6.583   23.00 |  9.58   53.00
                  0.667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
                  0.750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
                  0.833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83   53.00
                  0.917    6.00 | 3.917   13.00 | 6.917   23.00 |  9.92   53.00
                  1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   53.00
                  1.083    4.00 | 4.083   17.00 | 7.083   13.00 | 10.08   38.00
                  1.167    4.00 | 4.167   17.00 | 7.167   13.00 | 10.17   38.00
                  1.250    4.00 | 4.250   17.00 | 7.250   13.00 | 10.25   38.00
                  1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
                  1.417    4.00 | 4.417   17.00 | 7.417   13.00 | 10.42   38.00
                  1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
                  1.583    4.00 | 4.583   17.00 | 7.583   13.00 | 10.58   38.00
                  1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
                  1.750    4.00 | 4.750   17.00 | 7.750   13.00 | 10.75   38.00
                  1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83   38.00
                  1.917    4.00 | 4.917   17.00 | 7.917   13.00 | 10.92   38.00
                  2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   38.00
                  2.083    6.00 | 5.083   13.00 | 8.083   13.00 | 11.08   13.00
                  2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17   13.00
                  2.250    6.00 | 5.250   13.00 | 8.250   13.00 | 11.25   13.00
                  2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
                  2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
                  2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
                  2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
                  2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
                  2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
                  2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
                  2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
                  3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

     Max.Eff.Inten.(mm/hr)=      53.00        52.65
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       3.91 (ii)   13.03 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.25         0.08
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.08         0.31        0.385 (iii)
     TIME TO PEAK    (hrs)=       9.92        10.00        10.00
     RUNOFF VOLUME    (mm)=     211.00       195.57       198.65
     TOTAL RAINFALL   (mm)=     212.00       212.00       212.00
     RUNOFF COEFFICIENT   =       1.00         0.92         0.94

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  95.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0173)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
```

```
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0100):     2.66   0.385    10.00    198.65
      + ID2= 2 (  0201):     2.75   0.400    10.00    201.61
        ====================================================
        ID = 3 (  0173):     5.41   0.785    10.00    200.16

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0173)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0173):     5.41   0.785    10.00    200.16
      + ID2= 2 (  0202):    11.74   1.707    10.00    204.78
        ====================================================
        ID = 1 (  0173):    17.15   2.492    10.00    203.32

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0174)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0117):    15.35   1.924    10.33    185.85
      + ID2= 2 (  0173):    17.15   2.492    10.00    203.32
        ====================================================
        ID = 3 (  0174):    32.50   4.285    10.00    195.07

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0400)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)    |   (cms)     (ha.m.)
                          0.0000     0.0000    |   0.6190      0.7963
                          0.0070     0.0910    |   0.6300      0.9058
                          0.0130     0.1842    |   0.6350      1.0175
                          0.0170     0.2803    |   0.8210      1.1312
                          0.0200     0.3793    |   1.1600      1.2471
                          0.3600     0.4804    |   1.6080      1.3651
                          0.3840     0.5836    |   2.1500      1.4853
                          0.4070     0.6889    |   0.0000      0.0000

                                AREA     QPEAK     TPEAK        R.V.
                                (ha)     (cms)     (hrs)        (mm)
   INFLOW : ID= 2 (  0174)     32.500      4.285     10.00      195.07
   OUTFLOW: ID= 1 (  0400)     32.500      3.606     10.83      194.83

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 84.16
                   TIME SHIFT OF PEAK FLOW         (min)= 50.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  1.8083

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0225)|   Area    (ha)=  14.21
|ID= 1 DT= 5.0 min |   Total Imp(%)=  24.00   Dir. Conn.(%)=  17.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.41         10.80
     Dep. Storage     (mm)=       1.00          5.00
```

```
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    307.79        40.00
     Mannings n           =     0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME     RAIN |  TIME     RAIN |'  TIME     RAIN |  TIME     RAIN
                  hrs    mm/hr |   hrs    mm/hr |'   hrs    mm/hr |   hrs    mm/hr
                0.083     6.00 | 3.083    13.00 | 6.083    23.00 |  9.08    53.00
                0.167     6.00 | 3.167    13.00 | 6.167    23.00 |  9.17    53.00
                0.250     6.00 | 3.250    13.00 | 6.250    23.00 |  9.25    53.00
                0.333     6.00 | 3.333    13.00 | 6.333    23.00 |  9.33    53.00
                0.417     6.00 | 3.417    13.00 | 6.417    23.00 |  9.42    53.00
                0.500     6.00 | 3.500    13.00 | 6.500    23.00 |  9.50    53.00
                0.583     6.00 | 3.583    13.00 | 6.583    23.00 |  9.58    53.00
                0.667     6.00 | 3.667    13.00 | 6.667    23.00 |  9.67    53.00
                0.750     6.00 | 3.750    13.00 | 6.750    23.00 |  9.75    53.00
                0.833     6.00 | 3.833    13.00 | 6.833    23.00 |  9.83    53.00
                0.917     6.00 | 3.917    13.00 | 6.917    23.00 |  9.92    53.00
                1.000     6.00 | 4.000    13.00 | 7.000    23.00 | 10.00    53.00
                1.083     4.00 | 4.083    17.00 | 7.083    13.00 | 10.08    38.00
                1.167     4.00 | 4.167    17.00 | 7.167    13.00 | 10.17    38.00
                1.250     4.00 | 4.250    17.00 | 7.250    13.00 | 10.25    38.00
                1.333     4.00 | 4.333    17.00 | 7.333    13.00 | 10.33    38.00
                1.417     4.00 | 4.417    17.00 | 7.417    13.00 | 10.42    38.00
                1.500     4.00 | 4.500    17.00 | 7.500    13.00 | 10.50    38.00
                1.583     4.00 | 4.583    17.00 | 7.583    13.00 | 10.58    38.00
                1.667     4.00 | 4.667    17.00 | 7.667    13.00 | 10.67    38.00
                1.750     4.00 | 4.750    17.00 | 7.750    13.00 | 10.75    38.00
                1.833     4.00 | 4.833    17.00 | 7.833    13.00 | 10.83    38.00
                1.917     4.00 | 4.917    17.00 | 7.917    13.00 | 10.92    38.00
                2.000     4.00 | 5.000    17.00 | 8.000    13.00 | 11.00    38.00
                2.083     6.00 | 5.083    13.00 | 8.083    13.00 | 11.08    13.00
                2.167     6.00 | 5.167    13.00 | 8.167    13.00 | 11.17    13.00
                2.250     6.00 | 5.250    13.00 | 8.250    13.00 | 11.25    13.00
                2.333     6.00 | 5.333    13.00 | 8.333    13.00 | 11.33    13.00
                2.417     6.00 | 5.417    13.00 | 8.417    13.00 | 11.42    13.00
                2.500     6.00 | 5.500    13.00 | 8.500    13.00 | 11.50    13.00
                2.583     6.00 | 5.583    13.00 | 8.583    13.00 | 11.58    13.00
                2.667     6.00 | 5.667    13.00 | 8.667    13.00 | 11.67    13.00
                2.750     6.00 | 5.750    13.00 | 8.750    13.00 | 11.75    13.00
                2.833     6.00 | 5.833    13.00 | 8.833    13.00 | 11.83    13.00
                2.917     6.00 | 5.917    13.00 | 8.917    13.00 | 11.92    13.00
                3.000     6.00 | 6.000    13.00 | 9.000    13.00 | 12.00    13.00

     Max.Eff.Inten.(mm/hr)=     53.00        56.01
                over (min)       5.00        20.00
     Storage Coeff.  (min)=      6.47 (ii)   15.36 (ii)
     Unit Hyd. Tpeak (min)=      5.00        20.00
     Unit Hyd. peak  (cms)=      0.18         0.07
                                                          *TOTALS*
     PEAK FLOW       (cms)=      0.36         1.62          1.977 (iii)
     TIME TO PEAK    (hrs)=     10.00        10.00          10.00
     RUNOFF VOLUME    (mm)=    211.00       178.72         184.20
     TOTAL RAINFALL   (mm)=    212.00       212.00         212.00
     RUNOFF COEFFICIENT   =      1.00         0.84           0.87

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  87.5    Ia = Dep. Storage  (Above)
```

```
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0178)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0118):     5.33   0.764    10.00   185.20
      + ID2= 2 (  0225):    14.21   1.977    10.00   184.20
        ====================================================
        ID = 3 (  0178):    19.54   2.741    10.00   184.47

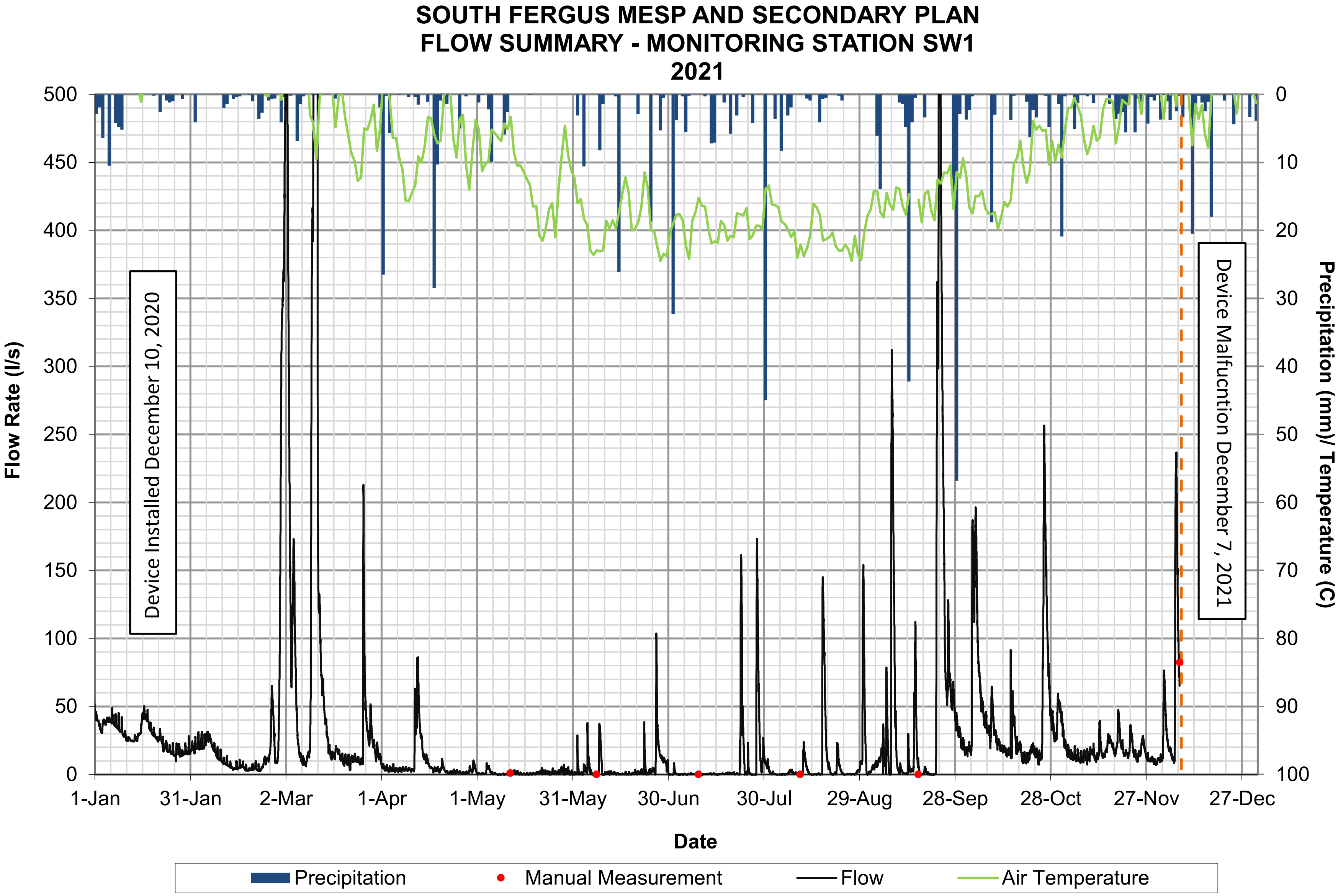
     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0178)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0178):    19.54   2.741    10.00   184.47
      + ID2= 2 (  0400):    32.50   3.606    10.83   194.83
        ====================================================
        ID = 1 (  0178):    52.04   5.885    10.17   190.94

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

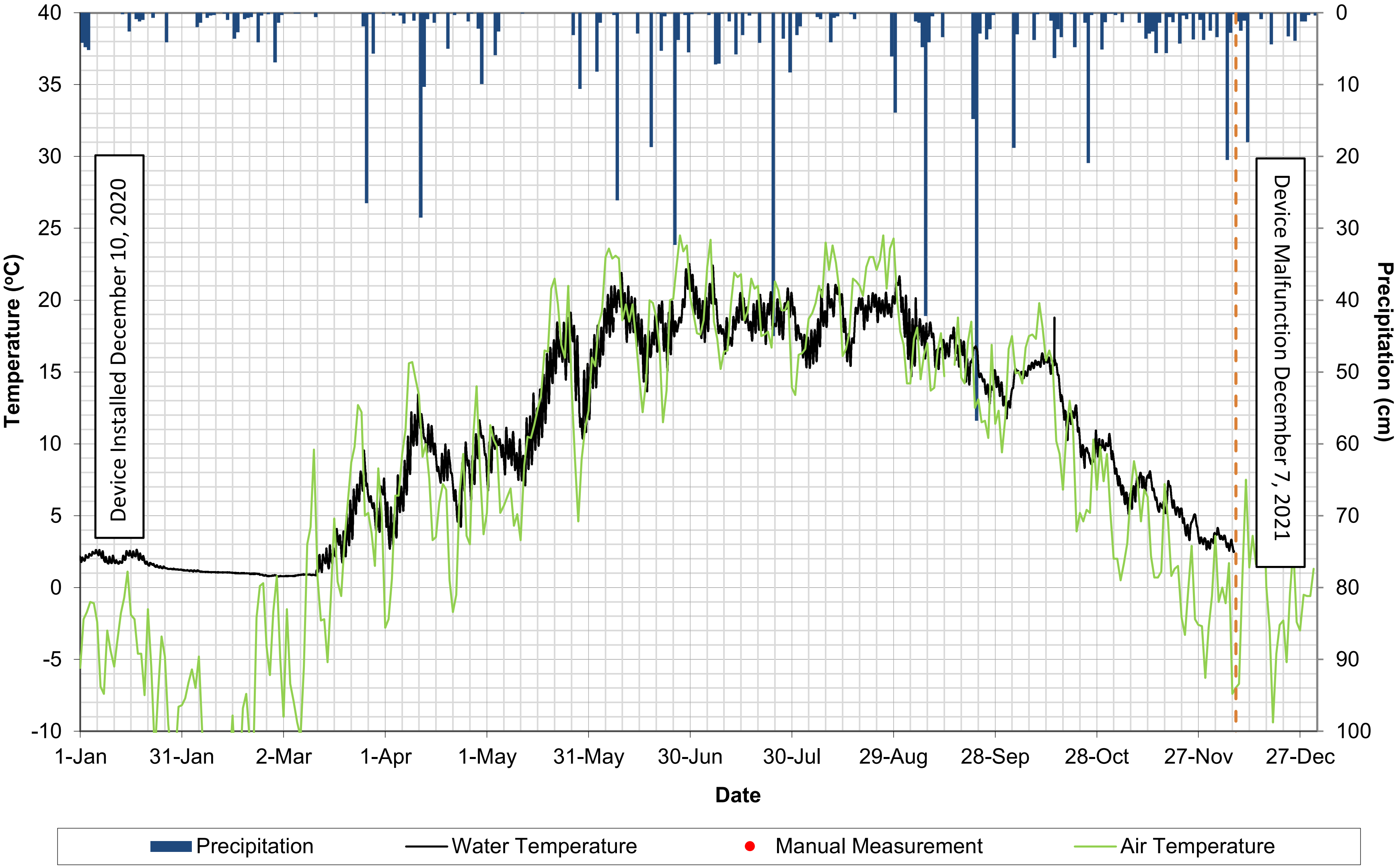
 FINISH
==================================================================================
==========================
```

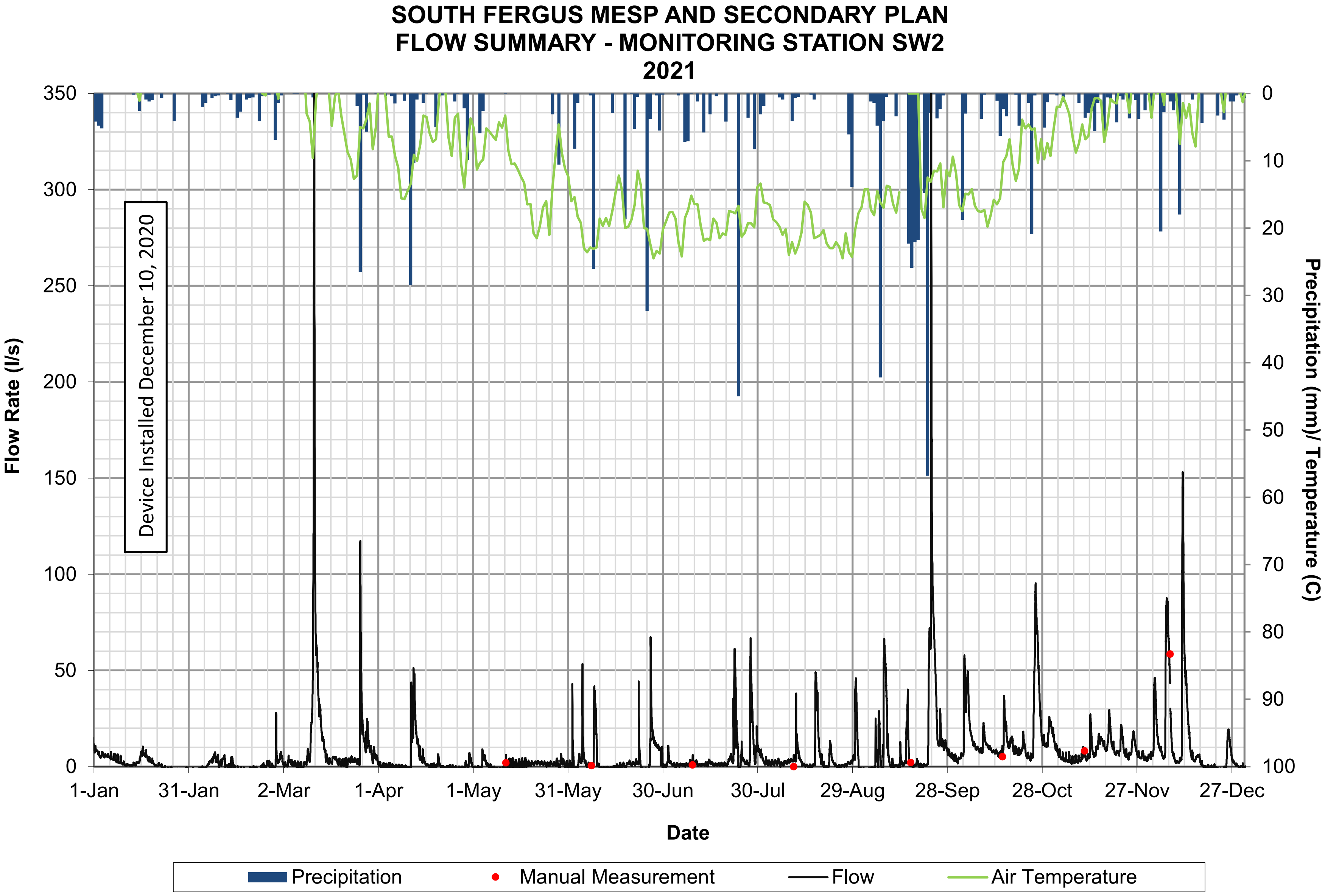
Appendix E:
Monitoring Data



SOUTH FERGUS MESP AND SECONDARY PLAN
FLOW SUMMARY - MONITORING STATION SW1
2021

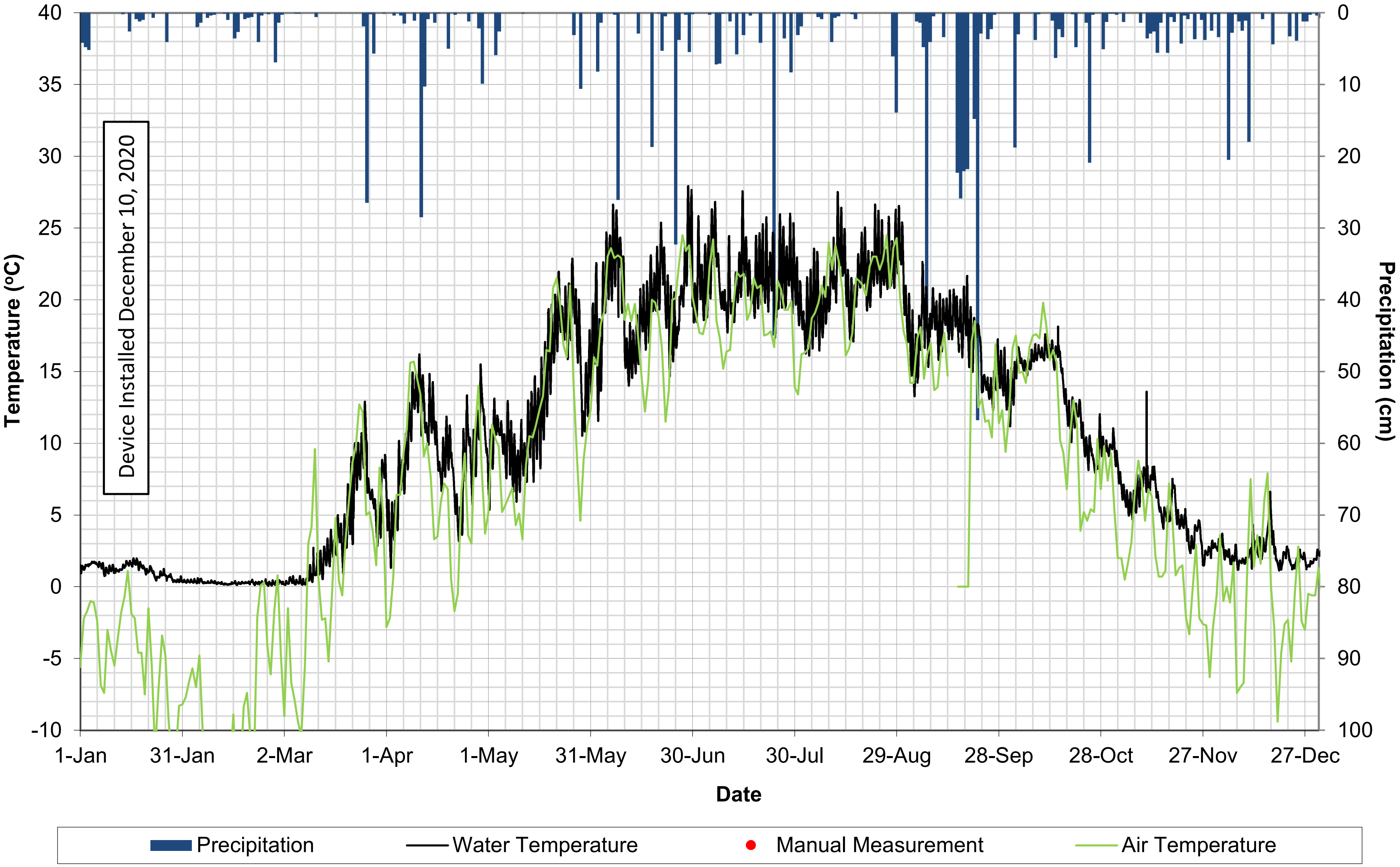
SOUTH FERGUS MESP AND SECONDARY PLAN
TEMPURATURE SUMMARY - MONITORING STATION SW1
2021



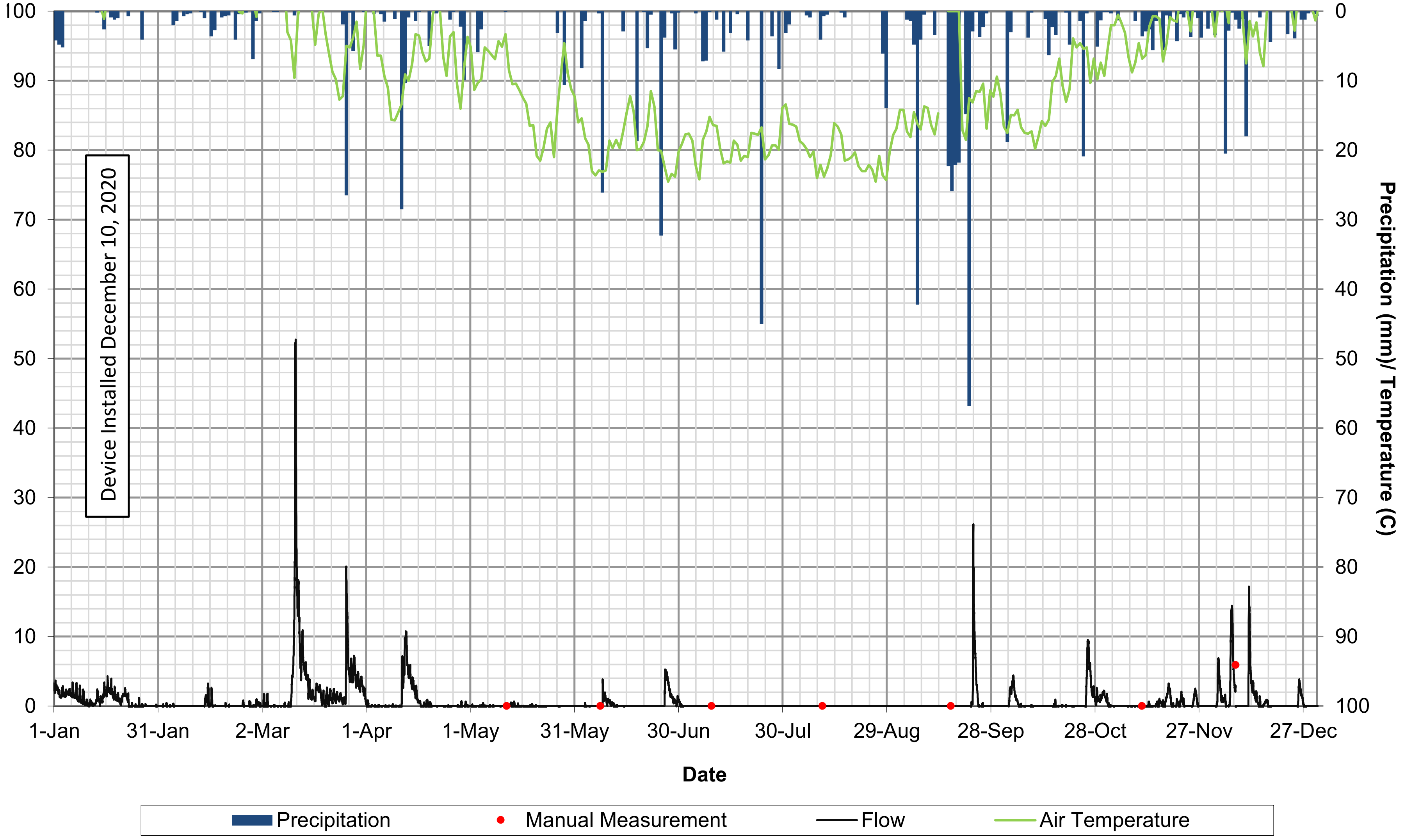


SOUTH FERGUS MESP AND SECONDARY PLAN
FLOW SUMMARY - MONITORING STATION SW2
2021

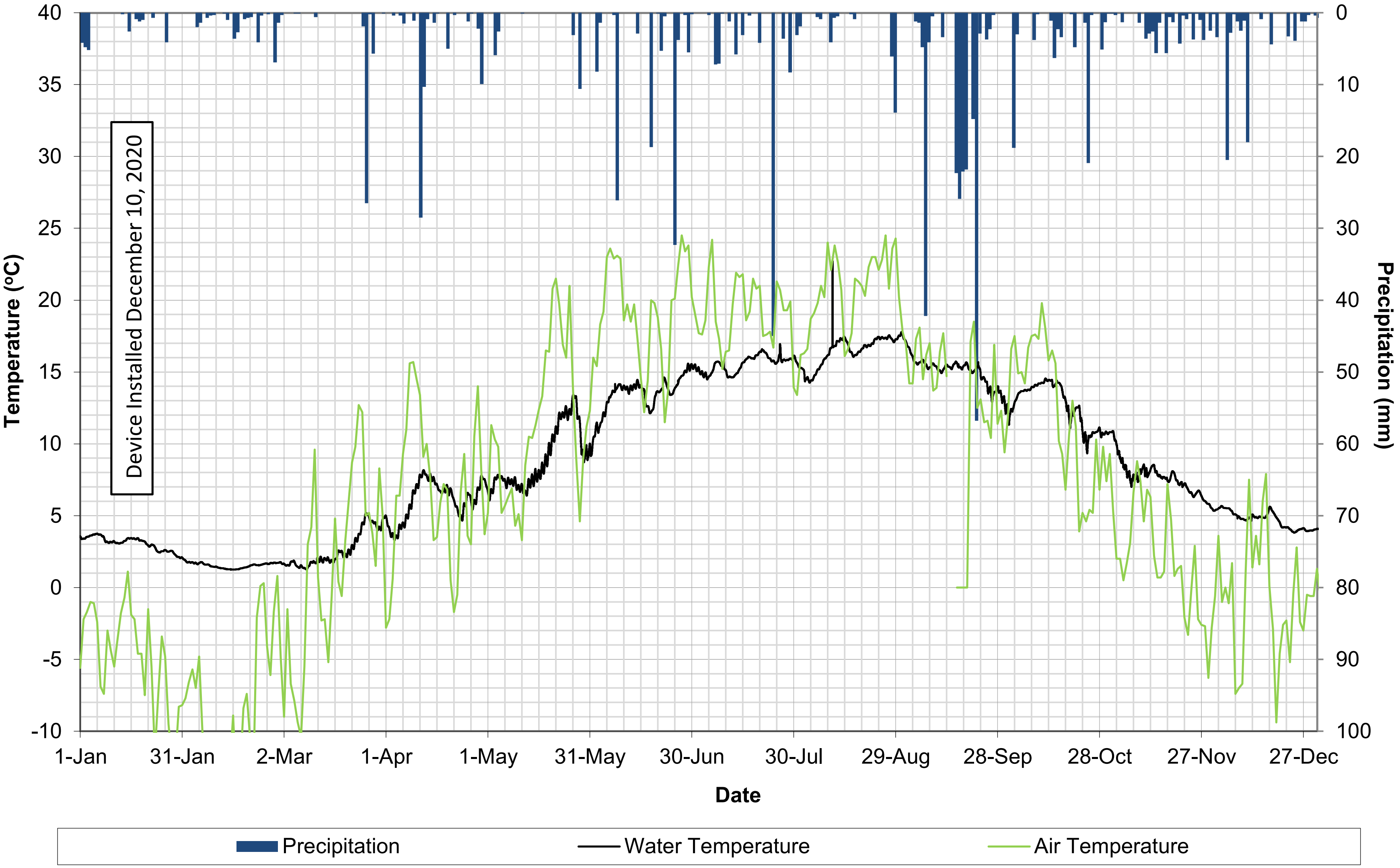
SOUTH FERGUS MESP AND SECONDARY PLAN
TEMPERATURE SUMMARY - MONITORING STATION SW2
2021



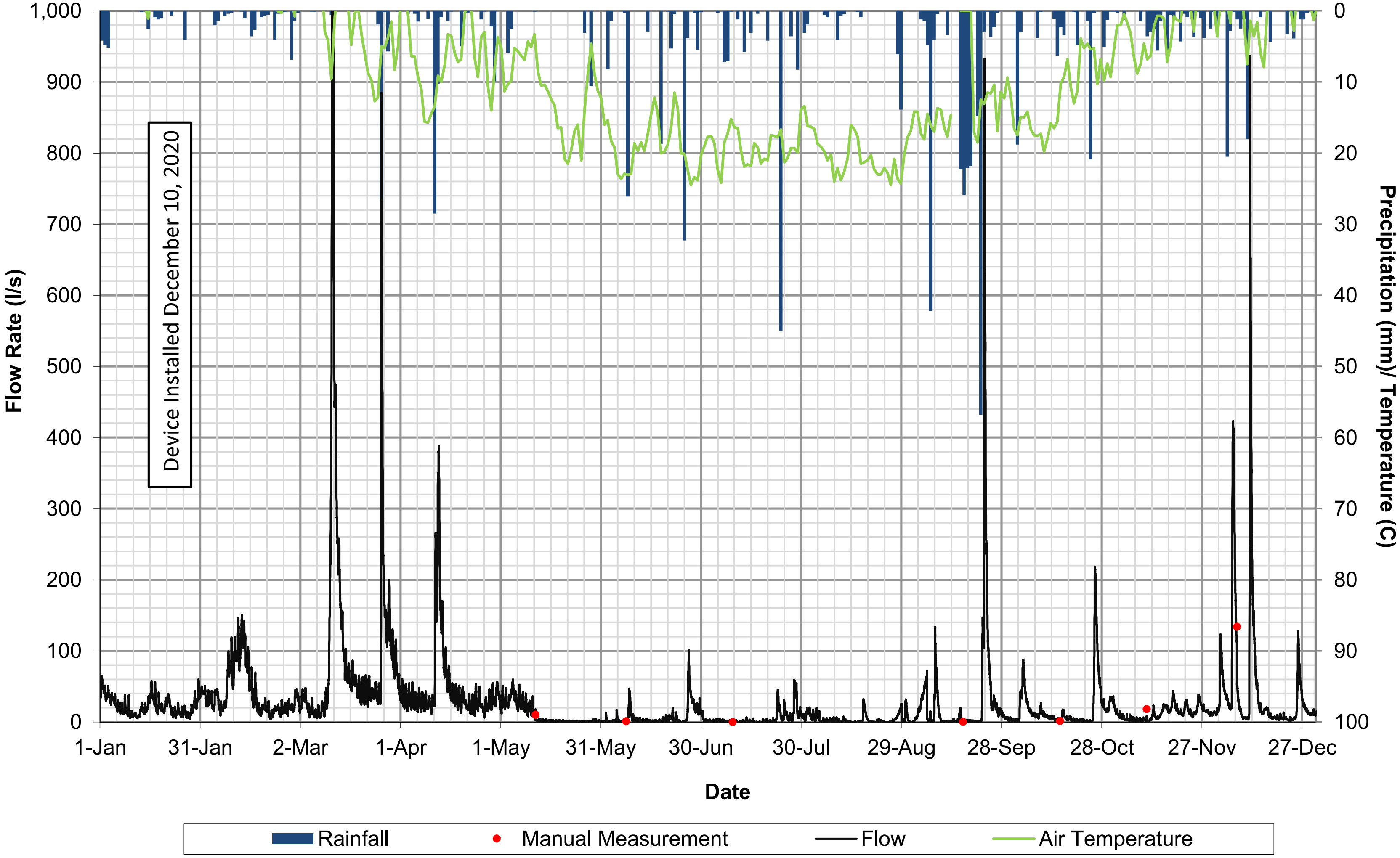
SOUTH FERGUS MESP AND SECONDARY PLAN
FLOW SUMMARY - MONITORING STATION SW3
2021



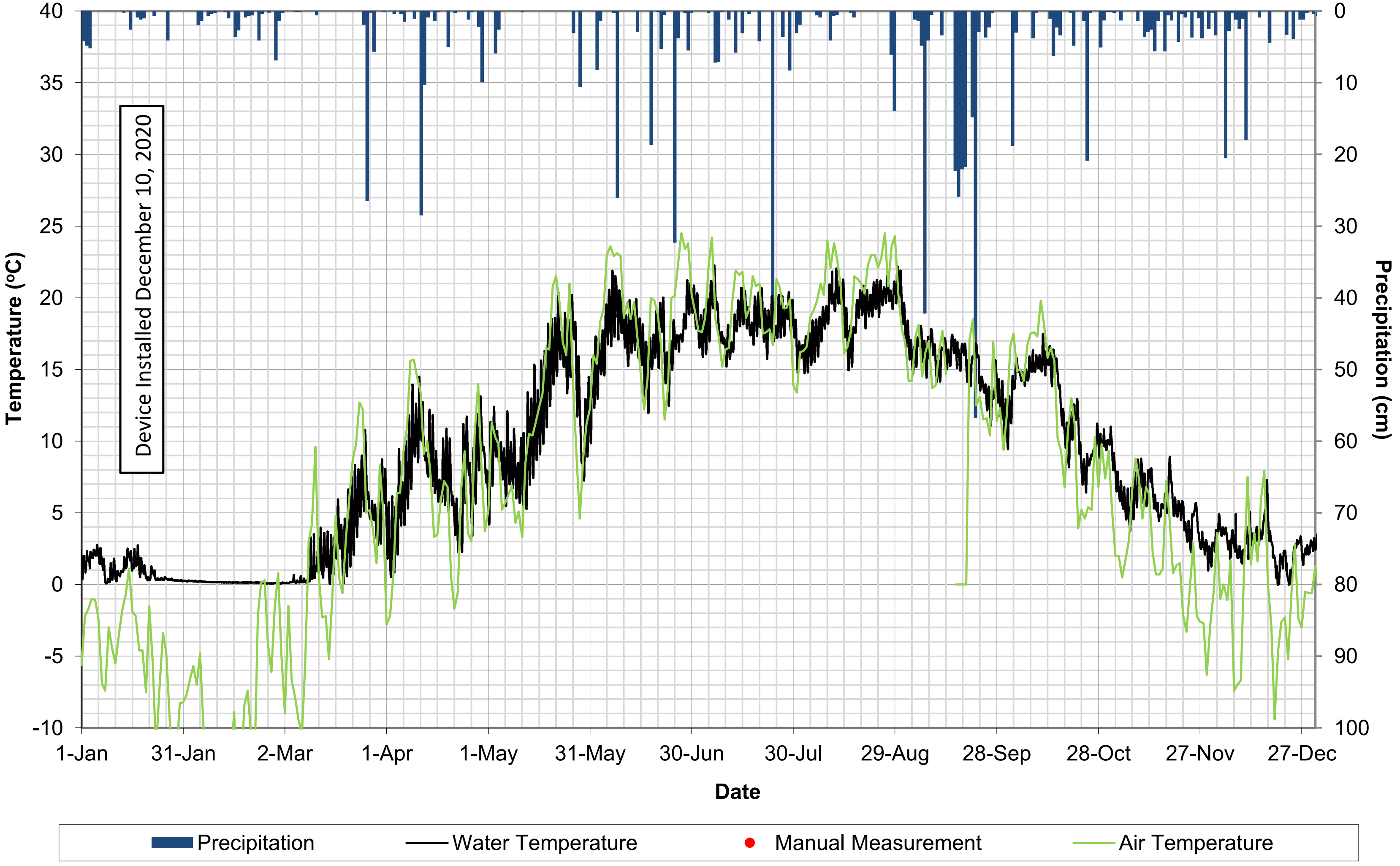
SOUTH FERGUS MESP AND SECONDARY PLAN
TEMPERATURE SUMMARY - MONITORING STATION SW3
2021



SOUTH FERGUS MESP AND SECONDARY PLAN
FLOW SUMMARY - MONITORING STATION SW4
2021



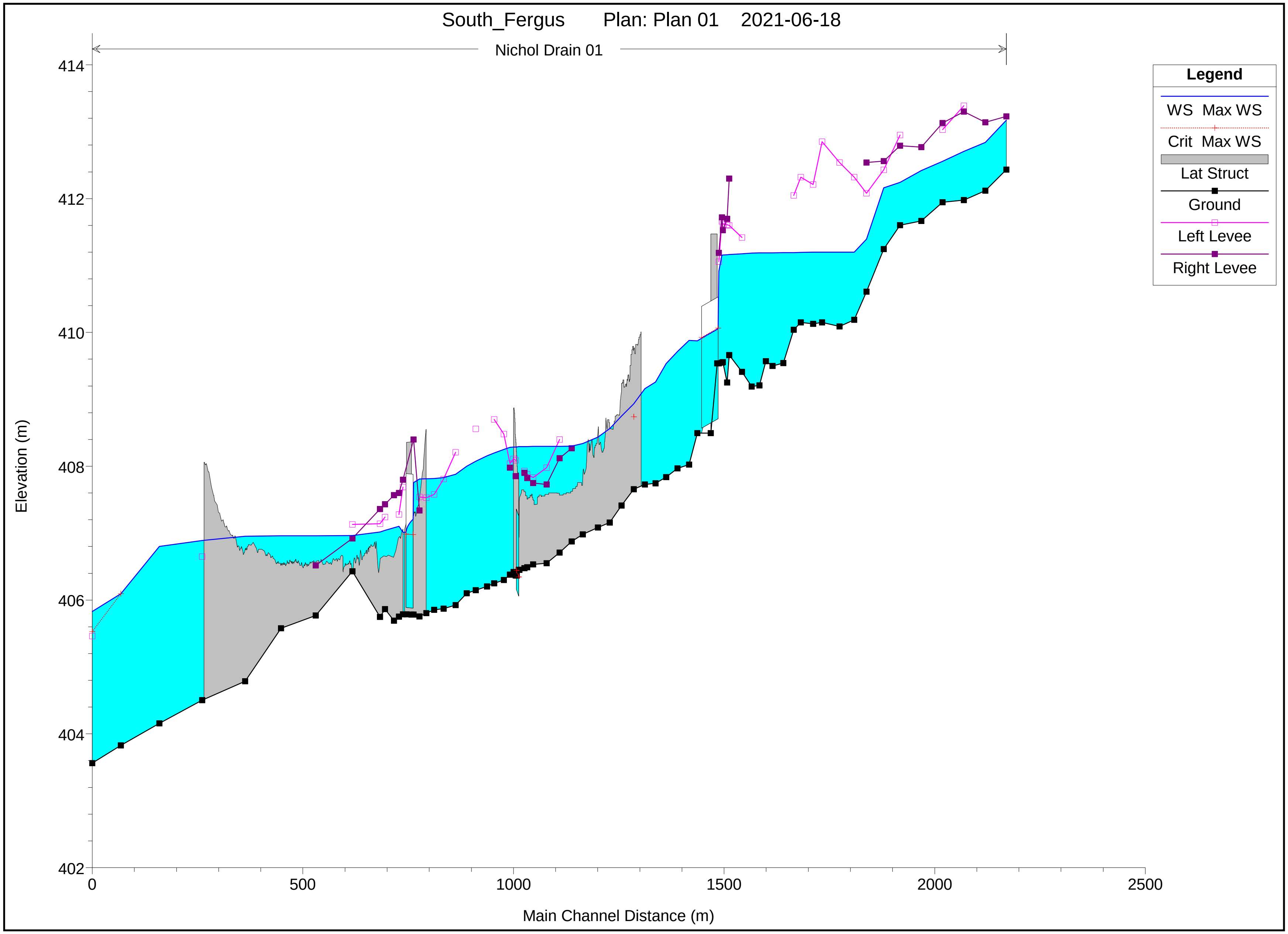
SOUTH FERGUS MESP AND SECONDARY PLAN
TEMPERATURE SUMMARY - MONITORING STATION SW4
2021

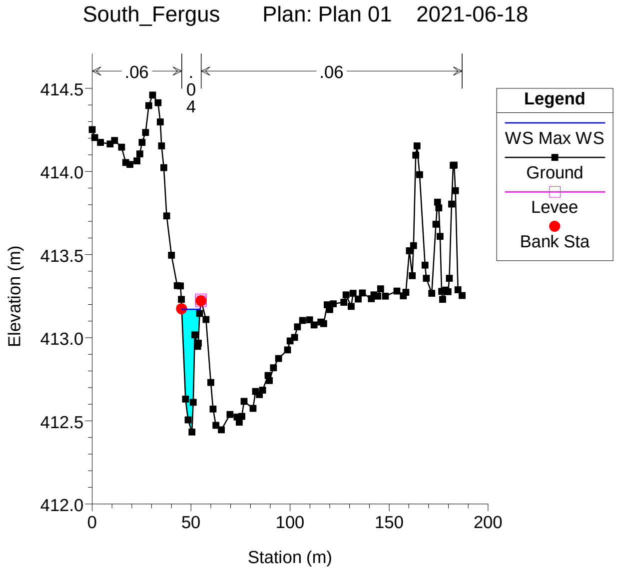


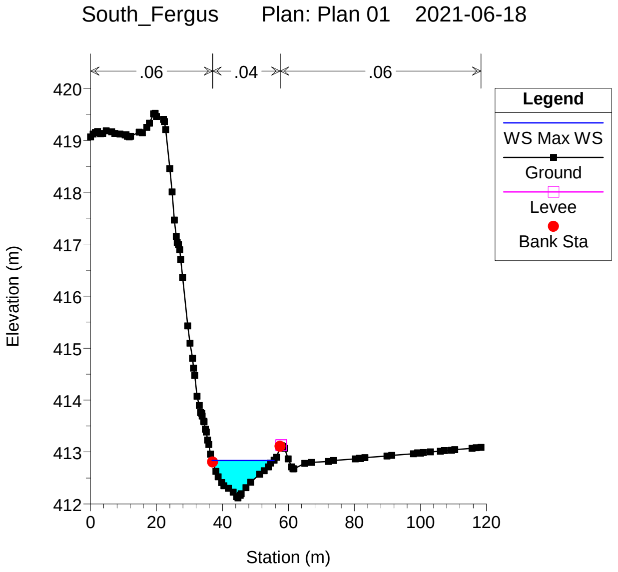
Appendix F:
Natural Hazards Hydraulic Analysis

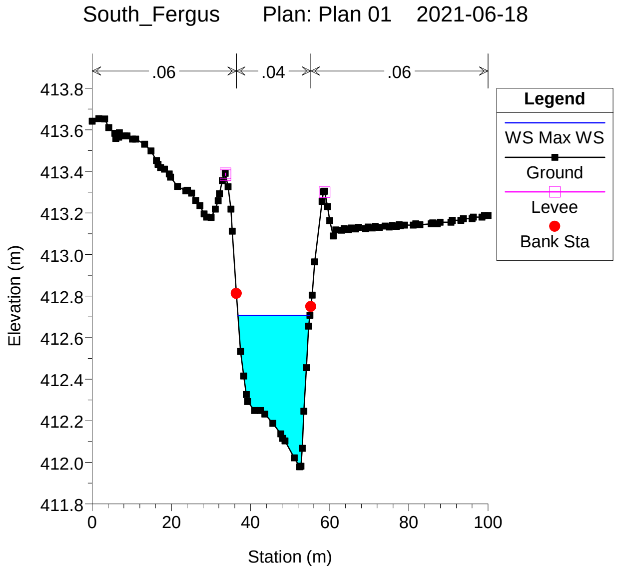
HEC-RAS Plan: Plan 01   Profile: Max WS

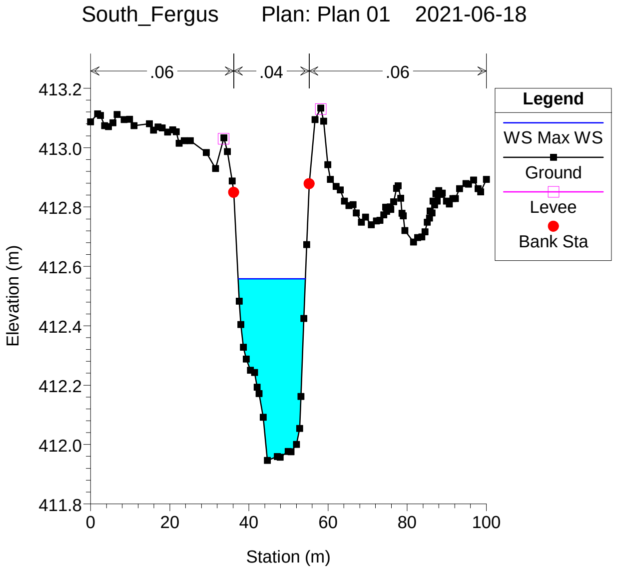
River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Nichol Drain	01	2170	Max WS	6.30	412.43	413.17		413.31	0.015191	1.66	3.78	9.29	0.83
Nichol Drain	01	2120	Max WS	6.29	412.12	412.84		412.88	0.004234	0.87	7.26	18.74	0.44
Nichol Drain	01	2069	Max WS	6.29	411.98	412.71		412.73	0.002210	0.72	8.75	18.12	0.33
Nichol Drain	01	2019	Max WS	6.28	411.95	412.56		412.59	0.003270	0.83	7.57	17.00	0.40
Nichol Drain	01	1968	Max WS	6.28	411.67	412.42		412.45	0.002456	0.75	8.57	21.92	0.35
Nichol Drain	01	1918	Max WS	6.01	411.60	412.24		412.28	0.003933	0.82	7.34	16.22	0.39
Nichol Drain	01	1879	Max WS	5.91	411.25	412.16		412.18	0.001243	0.57	10.38	16.63	0.23
Nichol Drain	01	1838	Max WS	5.07	410.61	411.39		411.48	0.016380	1.33	3.82	11.70	0.74
Nichol Drain	01	1809	Max WS	4.48	410.19	411.20		411.20	0.000052	0.13	33.66	44.29	0.05
Nichol Drain	01	1774	Max WS	4.42	410.09	411.20		411.20	0.000021	0.09	50.04	61.58	0.03
Nichol Drain	01	1733	Max WS	4.43	410.15	411.20		411.20	0.000019	0.08	57.74	80.25	0.03
Nichol Drain	01	1711	Max WS	4.42	410.13	411.20		411.20	0.000012	0.07	65.68	82.26	0.02
Nichol Drain	01	1682	Max WS	4.41	410.15	411.20		411.20	0.000010	0.06	72.97	91.02	0.02
Nichol Drain	01	1666	Max WS	15.10	410.04	411.19		411.20	0.000113	0.20	76.64	100.43	0.07
Nichol Drain	01	1641	Max WS	15.09	409.54	411.19		411.19	0.000072	0.17	88.61	102.96	0.06
Nichol Drain	01	1615	Max WS	15.09	409.50	411.19		411.19	0.000040	0.15	98.81	86.25	0.05
Nichol Drain	01	1599	Max WS	15.09	409.57	411.19		411.19	0.000070	0.20	74.41	64.59	0.06
Nichol Drain	01	1584	Max WS	15.09	409.21	411.19		411.19	0.000056	0.20	76.69	58.74	0.05
Nichol Drain	01	1566	Max WS	15.09	409.19	411.19		411.19	0.000115	0.25	60.51	55.94	0.08
Nichol Drain	01	1542	Max WS	15.09	409.41	411.17		411.18	0.000408	0.39	38.54	46.48	0.14
Nichol Drain	01	1512	Max WS	15.09	409.66	411.16		411.17	0.000395	0.37	40.80	51.71	0.13
Nichol Drain	01	1507	Max WS	15.09	409.25	411.16		411.17	0.000294	0.34	43.80	50.00	0.12
Nichol Drain	01	1497	Max WS	15.09	409.55	411.16		411.16	0.000441	0.40	38.14	48.18	0.14
Nichol Drain	01	1495	Max WS	15.09	409.55	411.15		411.16	0.000834	0.44	34.24	59.50	0.19
Nichol Drain	01	1488	Max WS	15.09	409.54	410.92		411.20	0.025473	2.37	6.36	58.28	1.00
Nichol Drain	01	1476		Culvert									
Nichol Drain	01	1436	Max WS	15.08	408.50	409.87		410.00	0.007265	1.58	9.60	80.41	0.56
Nichol Drain	01	1417	Max WS	15.08	408.02	409.88		409.91	0.000841	0.72	21.09	23.91	0.23
Nichol Drain	01	1390	Max WS	15.08	407.97	409.71		409.82	0.006097	1.48	10.59	17.23	0.52
Nichol Drain	01	1363	Max WS	15.08	407.84	409.53		409.65	0.006382	1.53	9.88	11.67	0.53
Nichol Drain	01	1337	Max WS	15.08	407.74	409.26		409.45	0.009461	1.94	7.76	8.38	0.65
Nichol Drain	01	1312	Max WS	15.08	407.73	409.16		409.25	0.005111	1.37	17.01	67.06	0.48
Nichol Drain	01	1305		Lat Struct									
Nichol Drain	01	1286	Max WS	15.08	407.66	408.93	408.74	409.08	0.008982	1.77	11.21	36.88	0.63
Nichol Drain	01	1256	Max WS	15.07	407.41	408.75		408.84	0.006269	1.57	21.55	89.45	0.53
Nichol Drain	01	1229	Max WS	15.03	407.16	408.56		408.64	0.007998	1.46	21.64	102.57	0.58
Nichol Drain	01	1200	Max WS	13.90	407.09	408.43		408.48	0.002569	0.96	24.59	96.81	0.34
Nichol Drain	01	1165	Max WS	10.42	406.98	408.34		408.37	0.004214	0.99	25.07	99.11	0.41
Nichol Drain	01	1138	Max WS	6.03	406.88	408.30		408.30	0.000204	0.30	53.01	107.83	0.10
Nichol Drain	01	1109	Max WS	5.98	406.71	408.30		408.30	0.000031	0.14	73.24	107.23	0.04
Nichol Drain	01	1079	Max WS	6.25	406.55	408.30		408.30	0.000027	0.12	84.74	131.24	0.04
Nichol Drain	01	1047	Max WS	7.07	406.53	408.30		408.30	0.000026	0.12	98.54	153.24	0.04
Nichol Drain	01	1033	Max WS	6.04	406.49	408.30		408.30	0.000024	0.11	92.87	157.80	0.04
Nichol Drain	01	1026	Max WS	5.57	406.48	408.29		408.30	0.000026	0.12	87.52	162.84	0.04
Nichol Drain	01	1014	Max WS	10.68	406.45	408.29		408.29	0.000074	0.24	95.03	168.18	0.07
Nichol Drain	01	1010		Culvert									
Nichol Drain	01	1005	Max WS	10.68	406.37	408.29		408.29	0.000194	0.35	65.62	167.01	0.11
Nichol Drain	01	1000	Max WS	10.67	406.42	408.29		408.29	0.000267	0.40	54.42	138.75	0.13
Nichol Drain	01	992	Max WS	10.67	406.38	408.28		408.29	0.000382	0.55	46.25	127.37	0.15
Nichol Drain	01	977	Max WS	10.67	406.30	408.25		408.29	0.001278	0.98	16.19	36.34	0.28
Nichol Drain	01	954	Max WS	10.67	406.25	408.20		408.26	0.002048	1.14	13.03	42.31	0.34
Nichol Drain	01	937	Max WS	10.67	406.20	408.15		408.22	0.002466	1.20	11.29	40.45	0.37
Nichol Drain	01	911	Max WS	10.67	406.15	408.08		408.16	0.002527	1.26	8.92	21.09	0.38
Nichol Drain	01	889	Max WS	10.66	406.10	408.00		408.09	0.003435	1.35	7.89	8.17	0.43
Nichol Drain	01	863	Max WS	10.63	405.93	407.88		407.99	0.004148	1.51	7.05	6.64	0.47
Nichol Drain	01	834	Max WS	10.63	405.87	407.83		407.88	0.002825	1.09	14.51	56.89	0.34
Nichol Drain	01	811	Max WS	10.63	405.85	407.82		407.83	0.000609	0.66	31.84	77.68	0.19
Nichol Drain	01	793	Max WS	10.62	405.80	407.81		407.82	0.000385	0.51	42.83	93.51	0.15
Nichol Drain	01	788		Lat Struct									
Nichol Drain	01	777	Max WS	10.58	405.75	407.81		407.81	0.000223	0.40	53.78	112.87	0.12
Nichol Drain	01	763	Max WS	10.79	405.78	407.76		407.84	0.002173	1.32	8.19	93.97	0.36
Nichol Drain	01	747		Culvert									
Nichol Drain	01	738	Max WS	10.27	405.79	407.01		407.35	0.014197	2.57	4.05	54.95	0.85
Nichol Drain	01	737		Lat Struct									
Nichol Drain	01	728	Max WS	9.98	405.75	407.10		407.12	0.001657	0.83	22.45	66.37	0.30
Nichol Drain	01	716	Max WS	9.52	405.69	407.08		407.10	0.002184	0.81	20.14	67.31	0.28
Nichol Drain	01	695	Max WS	8.53	405.86	407.04		407.07	0.001886	0.87	18.47	67.81	0.32
Nichol Drain	01	683	Max WS	8.03	405.75	407.02		407.05	0.002079	0.90	15.62	66.85	0.33
Nichol Drain	01	618	Max WS	1.64	406.43	406.96		406.96	0.000003	0.02	79.83	156.67	0.01
Nichol Drain	01	530	Max WS	6.84	405.77	406.96		406.96	0.000024	0.10	104.84	166.56	0.04
Nichol Drain	01	448	Max WS	12.75	405.58	406.96		406.96	0.000019	0.11	169.05	184.80	0.03
Nichol Drain	01	363	Max WS	23.25	404.79	406.95		406.95	0.000076	0.26	157.71	185.17	0.07
Nichol Drain	01	261	Max WS	23.47	404.50	406.89		406.92	0.000927	0.96	50.90	102.58	0.25
Nichol Drain	01	159	Max WS	14.89	404.16	406.80		406.82	0.000427	0.69	37.36	66.89	0.17
Nichol Drain	01	68	Max WS	35.45	403.83	406.09	406.09	406.42	0.009585	2.60	17.27	42.41	0.77
Nichol Drain	01	0	Max WS	35.45	403.56	405.83	405.53	405.94	0.003104	1.66	34.65	61.11	0.45
		road		Lat Struct									

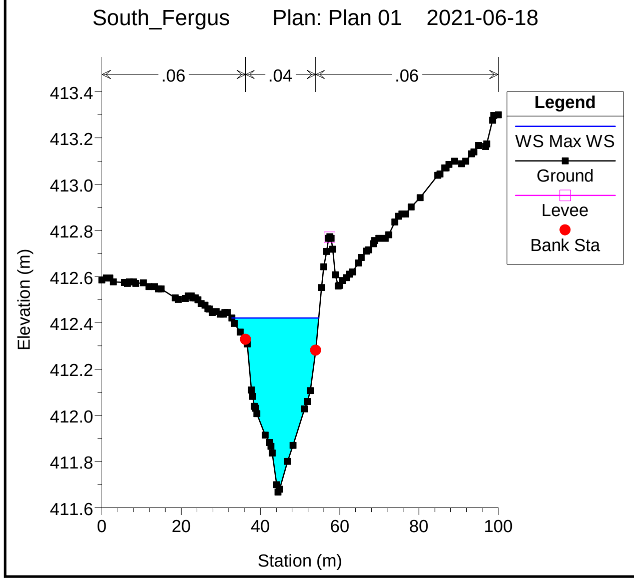

South_Fergus Plan: Plan 01 2021-06-18
Nichol Drain 01
Legend
WS Max WS
Crit Max WS
Lat Struct
Ground
Left Levee
Right Levee
Elevation (m)
414
412
410
408
406
404
402
0
500
1000
1500
2000
2500
Main Channel Distance (m)

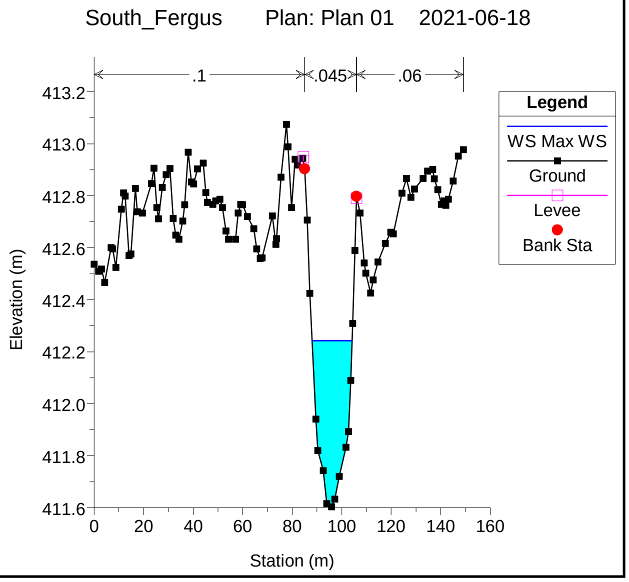

South_Fergus Plan: Plan 01 2021-06-18
.06
.
0
4
.06
Legend
WS Max WS
Ground
Levee
Bank Sta
Elevation (m)
414.5
414.0
413.5
413.0
412.5
412.0
0
50
100
150
200
Station (m)

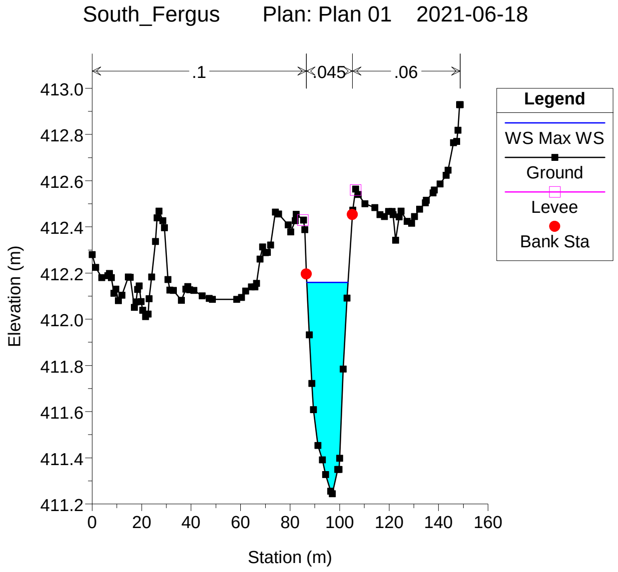

South_Fergus Plan: Plan 01 2021-06-18
.06
.04
.06
Legend
WS Max WS
Ground
Levee
Bank Sta
Elevation (m)
420
419
418
417
416
415
414
413
412
0
20
40
60
80
100
120
Station (m)

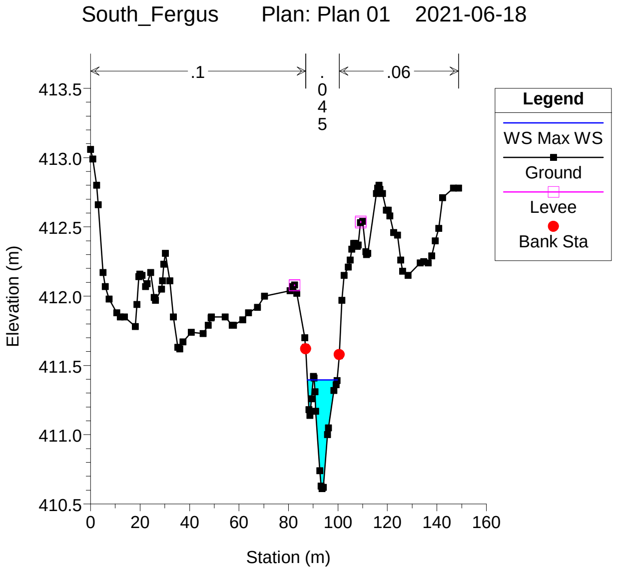

South_Fergus Plan: Plan 01 2021-06-18
.06
.04
.06
Legend
WS Max WS
Ground
Levee
Bank Sta
Elevation (m)
413.8
413.6
413.4
413.2
413.0
412.8
412.6
412.4
412.2
412.0
411.8
0
20
40
60
80
100
Station (m)

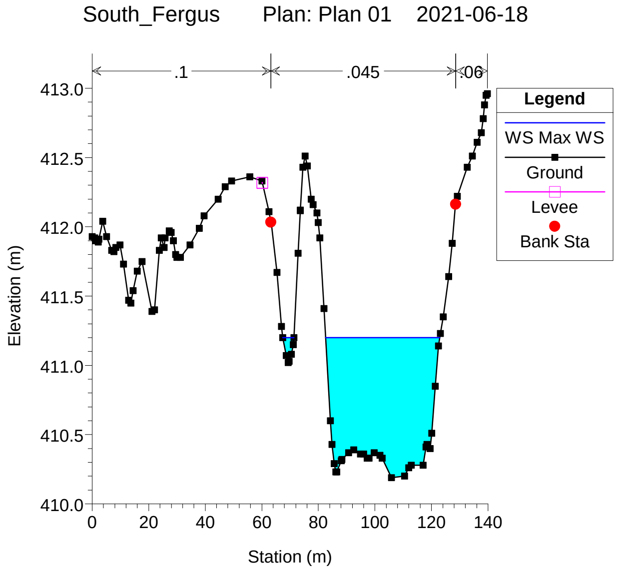

South_Fergus Plan: Plan 01 2021-06-18
.06
.04
.06
Legend
WS Max WS
Ground
Levee
Bank Sta
Elevation (m)
413.2
413.0
412.8
412.6
412.4
412.2
412.0
411.8
0
20
40
60
80
100
Station (m)

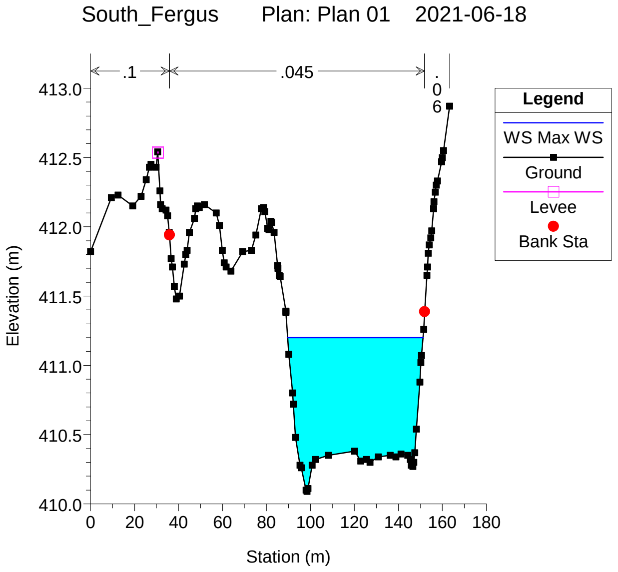

South_Fergus Plan: Plan 01 2021-06-18
.06
.04
.06
Legend
WS Max WS
Ground
Levee
Bank Sta
Elevation (m)
413.4
413.2
413.0
412.8
412.6
412.4
412.2
412.0
411.8
411.6
0
20
40
60
80
100
Station (m)

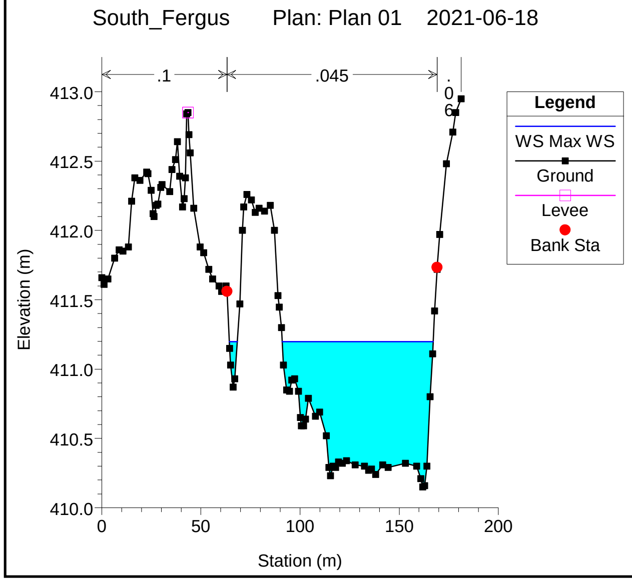

South_Fergus Plan: Plan 01 2021-06-18
.1
.045
.06
Legend
WS Max WS
Ground
Levee
Bank Sta
Elevation (m)
413.2
413.0
412.8
412.6
412.4
412.2
412.0
411.8
411.6
0
20
40
60
80
100
120
140
160
Station (m)

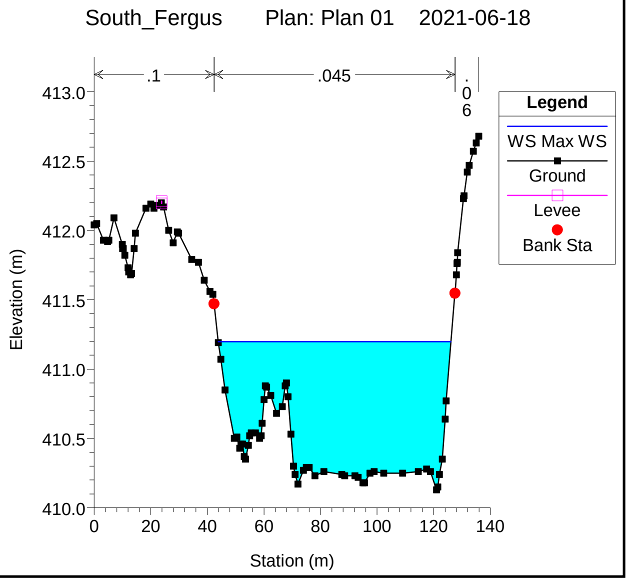

South_Fergus Plan: Plan 01 2021-06-18
.1
.045
.06
Legend
WS Max WS
Ground
Levee
Bank Sta
Elevation (m)
413.0
412.8
412.6
412.4
412.2
412.0
411.8
411.6
411.4
411.2
0
20
40
60
80
100
120
140
160
Station (m)


South_Fergus Plan: Plan 01 2021-06-18
.1
.045
.06
Legend
WS Max WS
Ground
Levee
Bank Sta
Elevation (m)
413.5
413.0
412.5
412.0
411.5
411.0
410.5
0
20
40
60
80
100
120
140
160
Station (m)

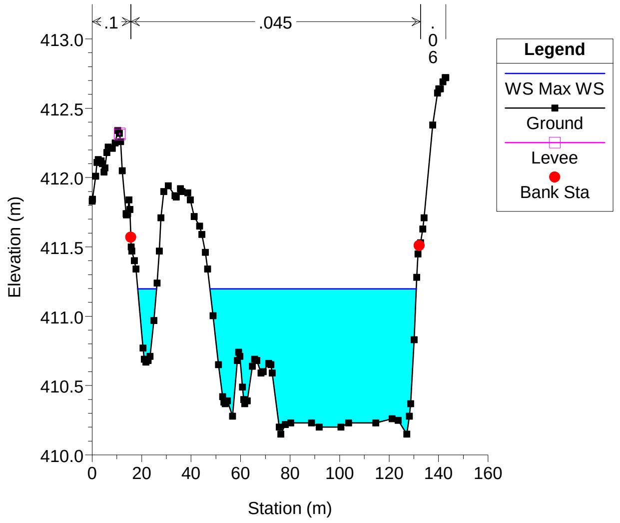

South_Fergus Plan: Plan 01 2021-06-18
.1
.045
.06
Legend
WS Max WS
Ground
Levee
Bank Sta
Elevation (m)
413.0
412.5
412.0
411.5
411.0
410.5
410.0
0
20
40
60
80
100
120
140
Station (m)


South_Fergus Plan: Plan 01 2021-06-18
.1
.045
.06
Legend
WS Max WS
Ground
Levee
Bank Sta
Elevation (m)
413.0
412.5
412.0
411.5
411.0
410.5
410.0
0
20
40
60
80
100
120
140
160
180
Station (m)

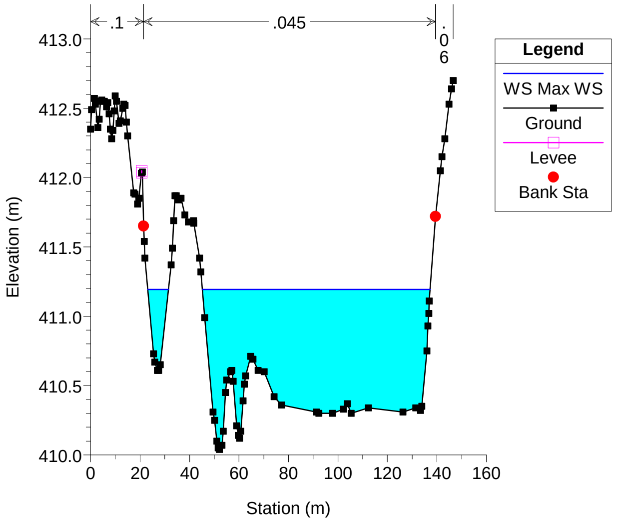

South_Fergus Plan: Plan 01 2021-06-18
.1
.045
.06
Legend
WS Max WS
Ground
Levee
Bank Sta
Elevation (m)
413.0
412.5
412.0
411.5
411.0
410.5
410.0
0
50
100
150
200
Station (m)


South_Fergus Plan: Plan 01 2021-06-18
.1
.045
.06
Legend
WS Max WS
Ground
Levee
Bank Sta
Elevation (m)
413.0
412.5
412.0
411.5
411.0
410.5
410.0
0
20
40
60
80
100
120
140
Station (m)

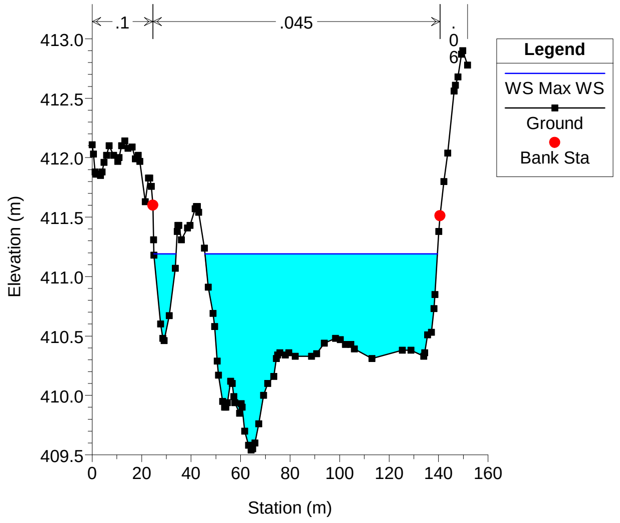
South_Fergus Plan: Plan 01 2021-06-18



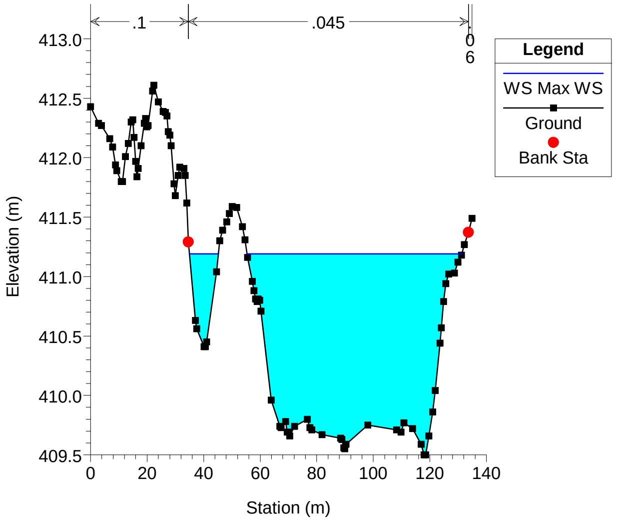
South_Fergus Plan: Plan 01 2021-06-18



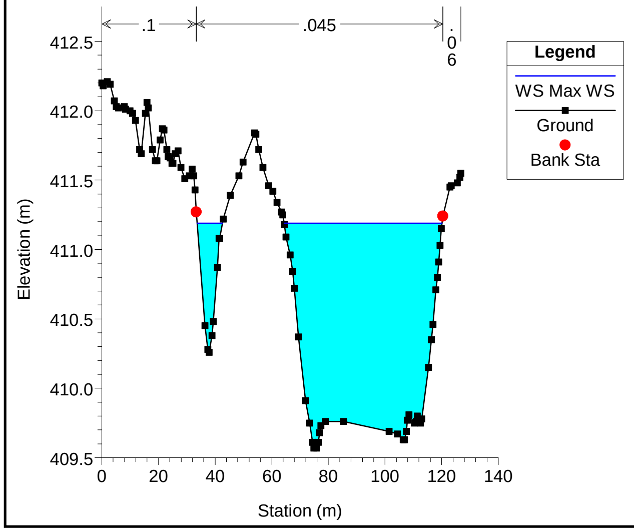
South_Fergus Plan: Plan 01 2021-06-18



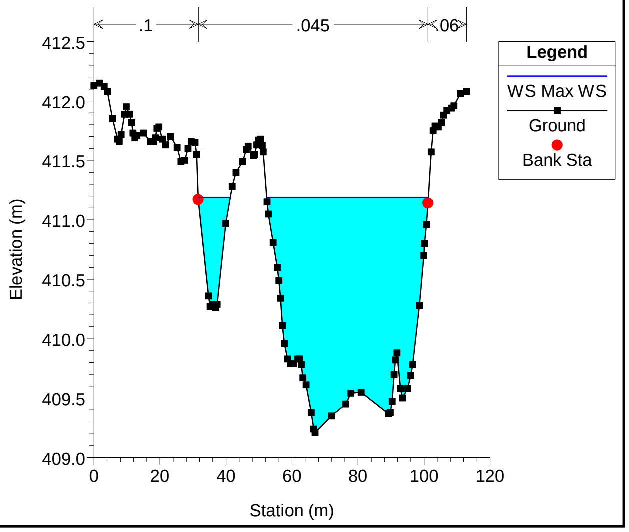
South_Fergus Plan: Plan 01 2021-06-18

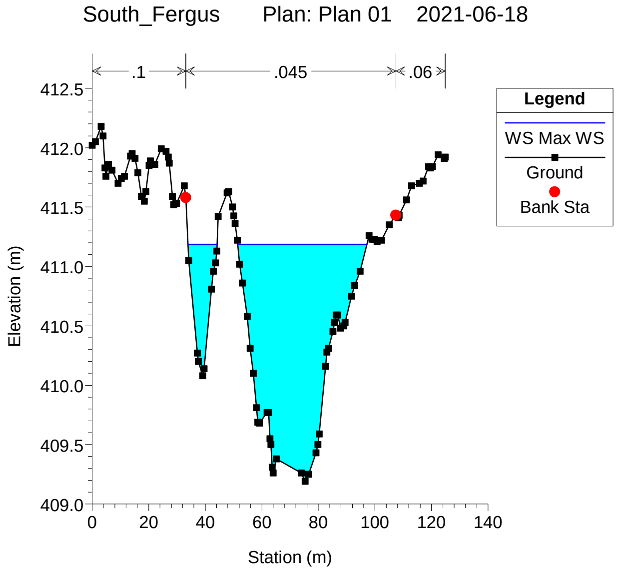


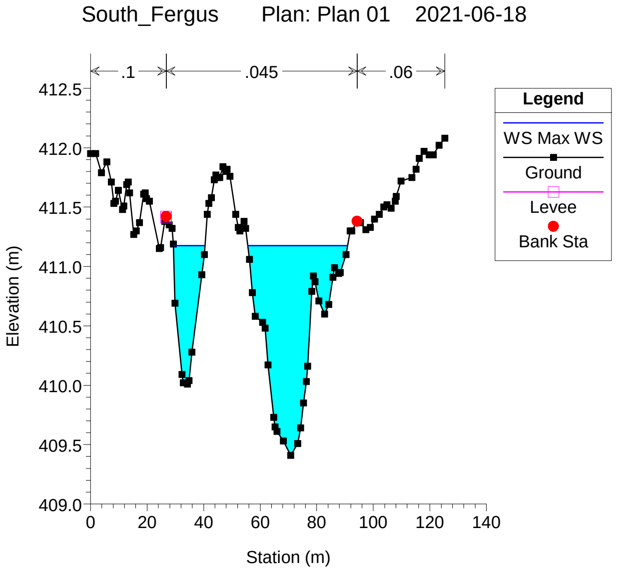
South_Fergus Plan: Plan 01 2021-06-18

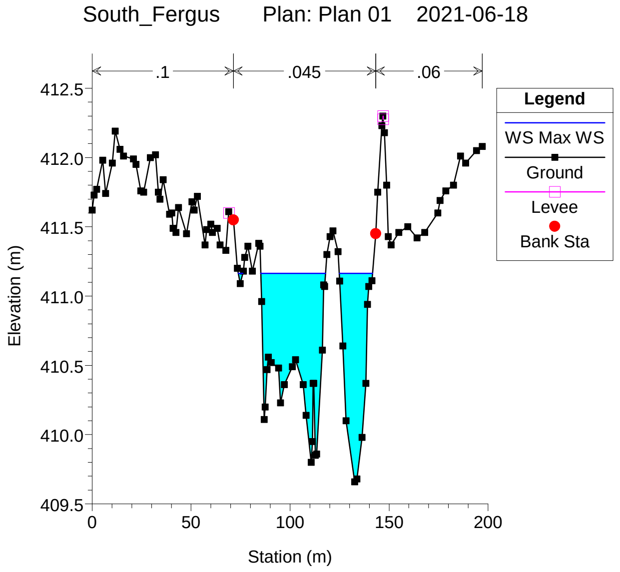


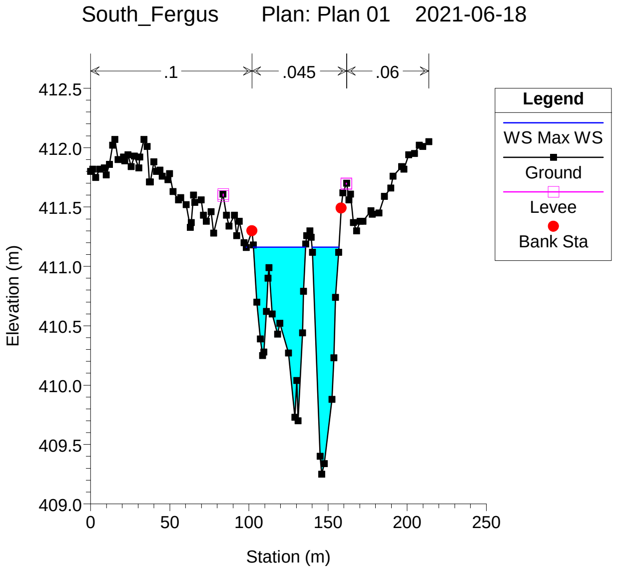
South_Fergus Plan: Plan 01 2021-06-18

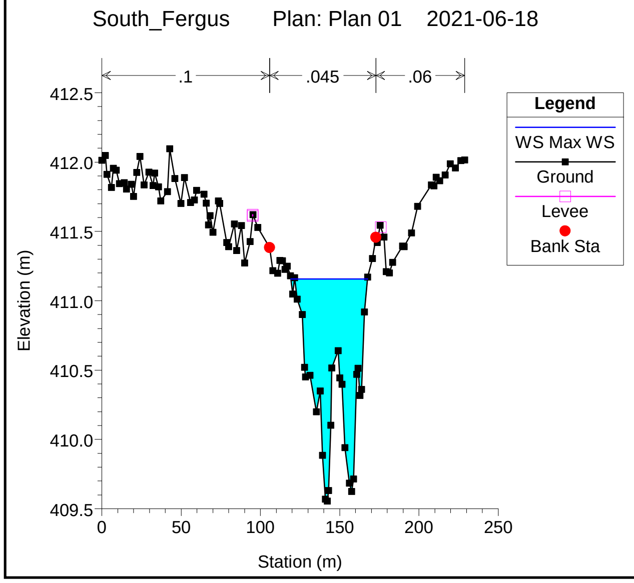


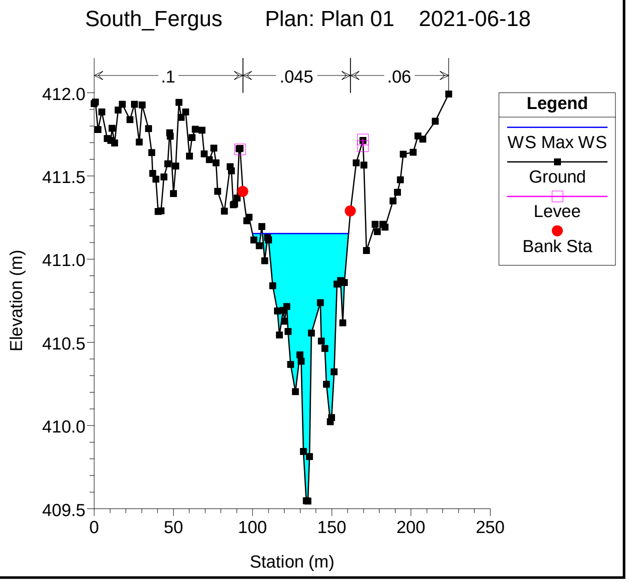

South_Fergus Plan: Plan 01 2021-06-18
.1
.045
.06
Legend
WS Max WS
Ground
Bank Sta
Elevation (m)
412.5
412.0
411.5
411.0
410.5
410.0
409.5
409.0
0
20
40
60
80
100
120
140
Station (m)


South_Fergus Plan: Plan 01 2021-06-18
.1
.045
.06
Legend
WS Max WS
Ground
Levee
Bank Sta
Elevation (m)
412.5
412.0
411.5
411.0
410.5
410.0
409.5
409.0
0
20
40
60
80
100
120
140
Station (m)


South_Fergus Plan: Plan 01 2021-06-18
.1
.045
.06
Legend
WS Max WS
Ground
Levee
Bank Sta
Elevation (m)
412.5
412.0
411.5
411.0
410.5
410.0
409.5
0
50
100
150
200
Station (m)


South_Fergus Plan: Plan 01 2021-06-18
.1
.045
.06
Legend
WS Max WS
Ground
Levee
Bank Sta
Elevation (m)
412.5
412.0
411.5
411.0
410.5
410.0
409.5
409.0
0
50
100
150
200
250
Station (m)


South_Fergus Plan: Plan 01 2021-06-18
.1
.045
.06
Legend
WS Max WS
Ground
Levee
Bank Sta
Elevation (m)
412.5
412.0
411.5
411.0
410.5
410.0
409.5
0
50
100
150
200
250
Station (m)


South_Fergus Plan: Plan 01 2021-06-18
.1
.045
.06
Legend
WS Max WS
Ground
Levee
Bank Sta
Elevation (m)
412.0
411.5
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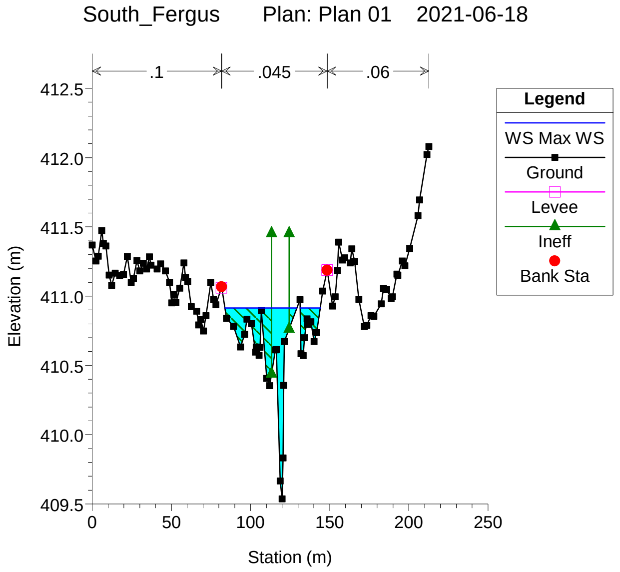
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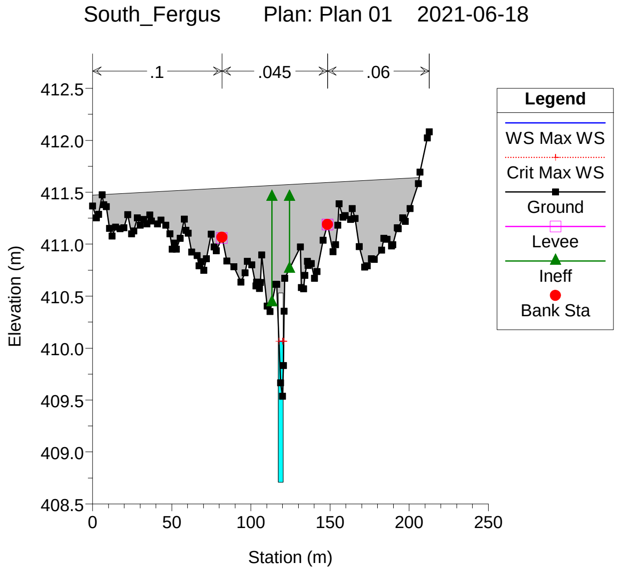
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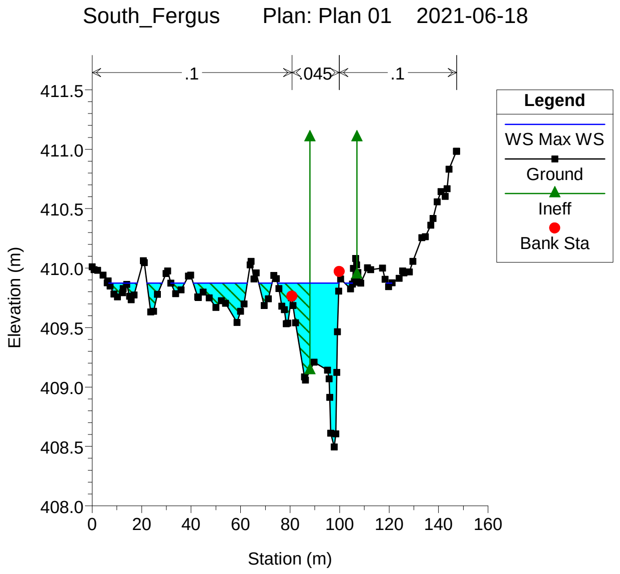
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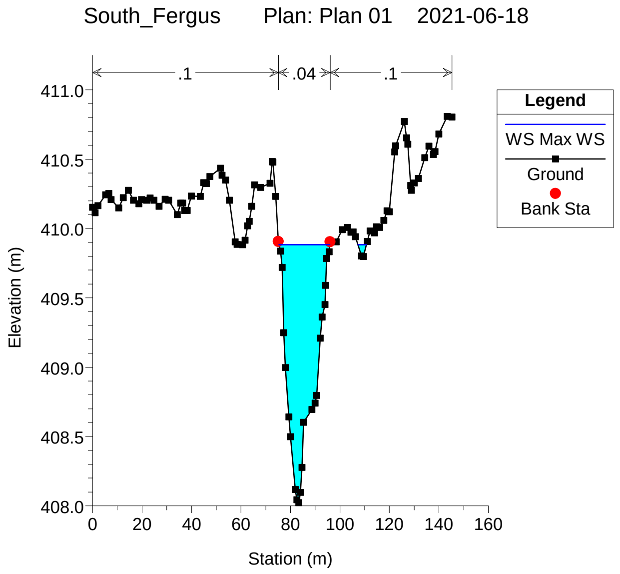
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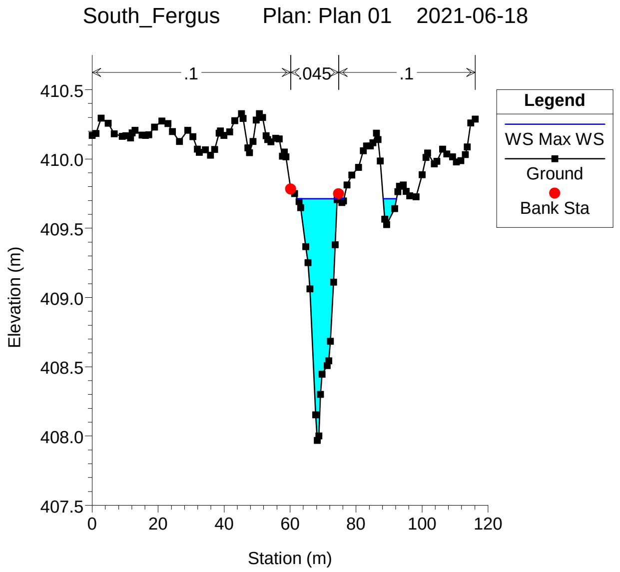
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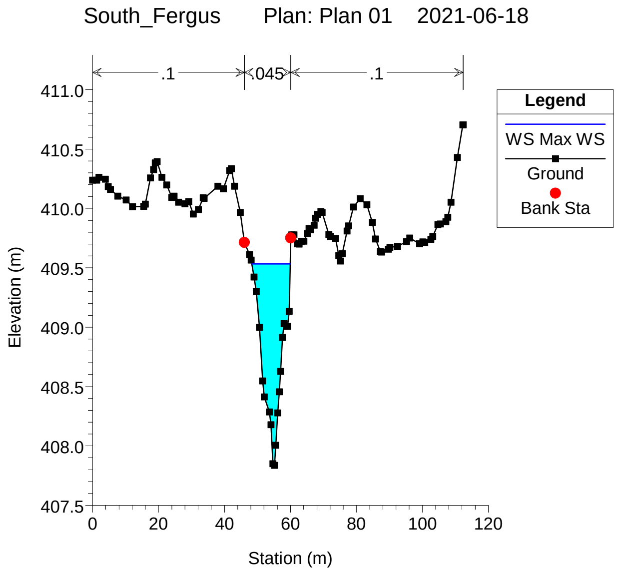
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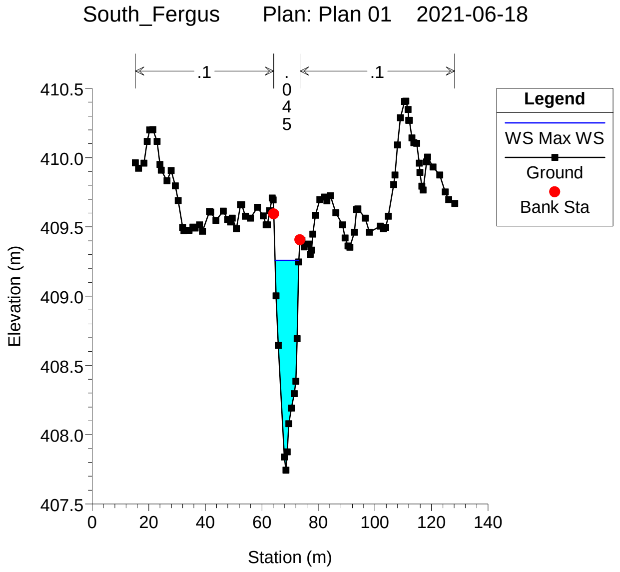
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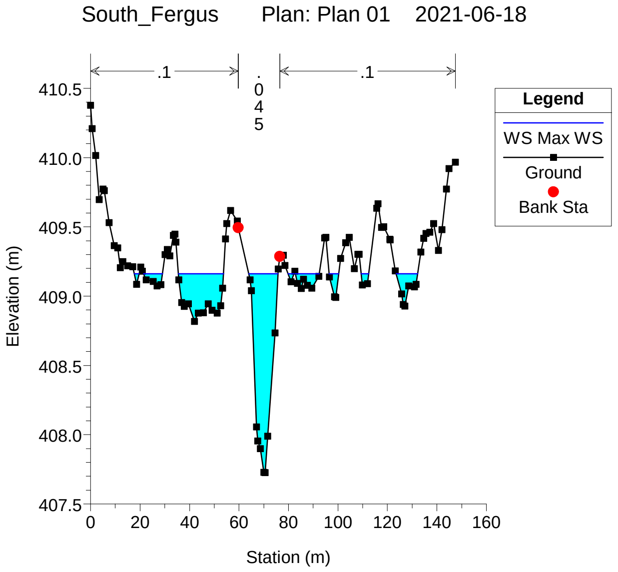
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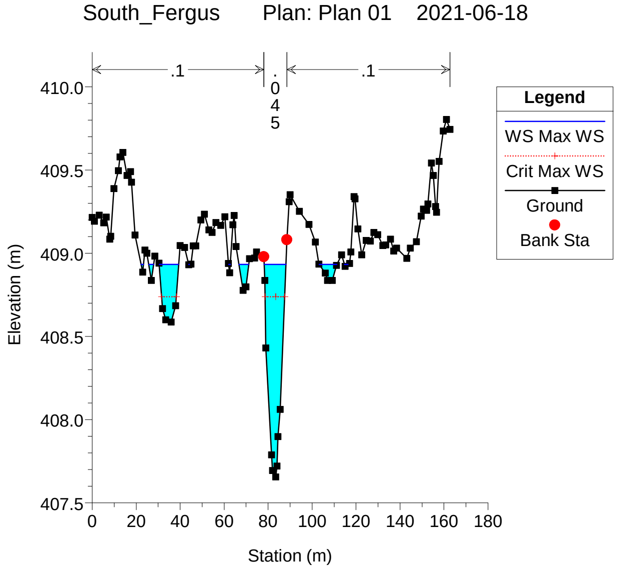
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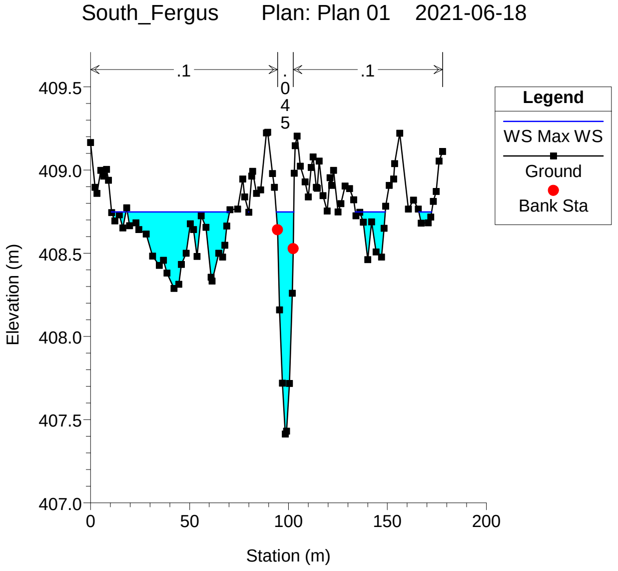
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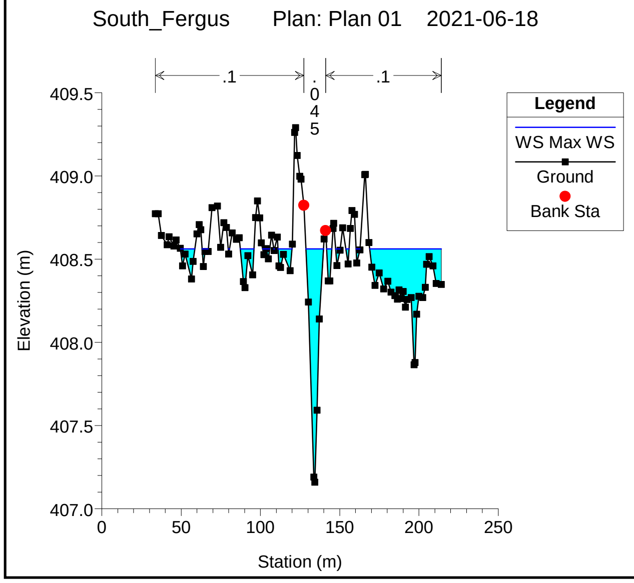
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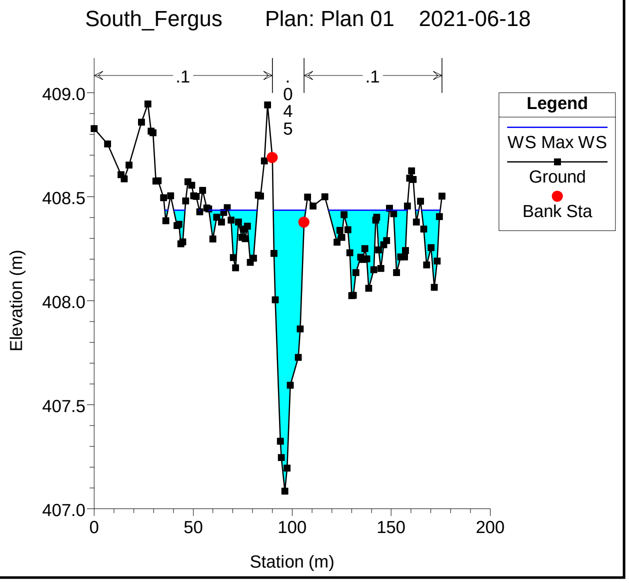
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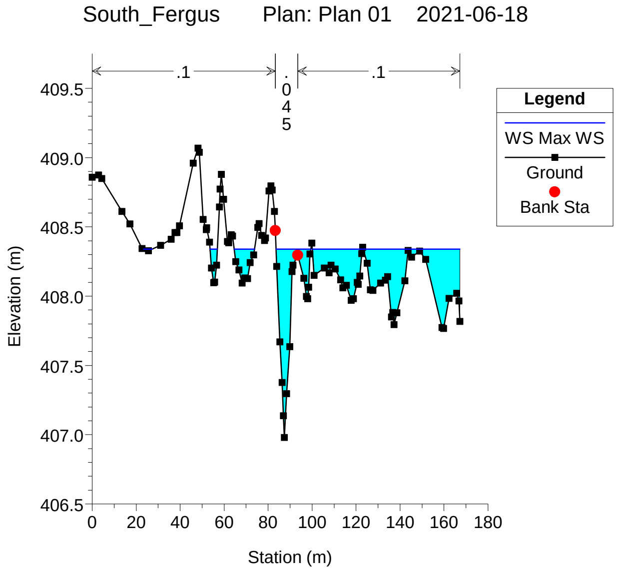
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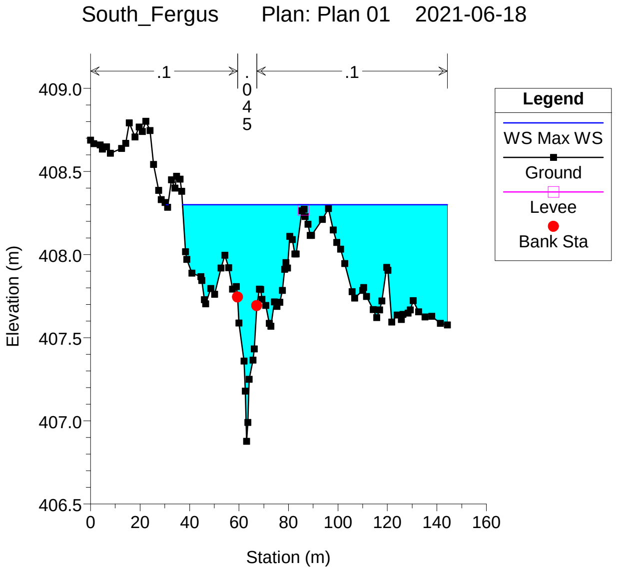
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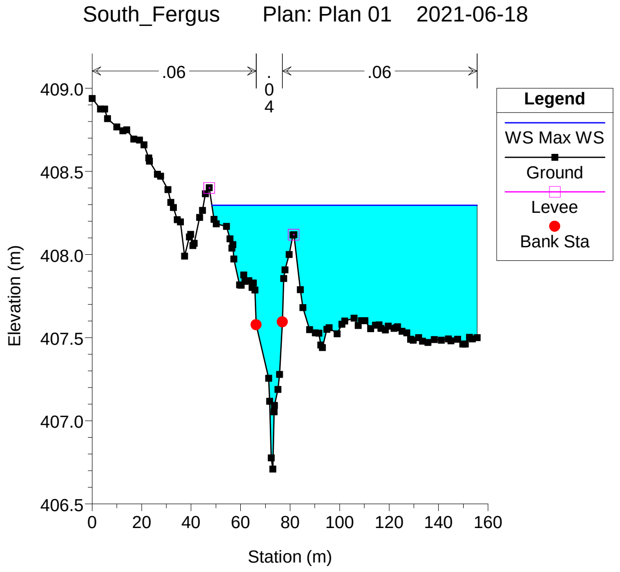
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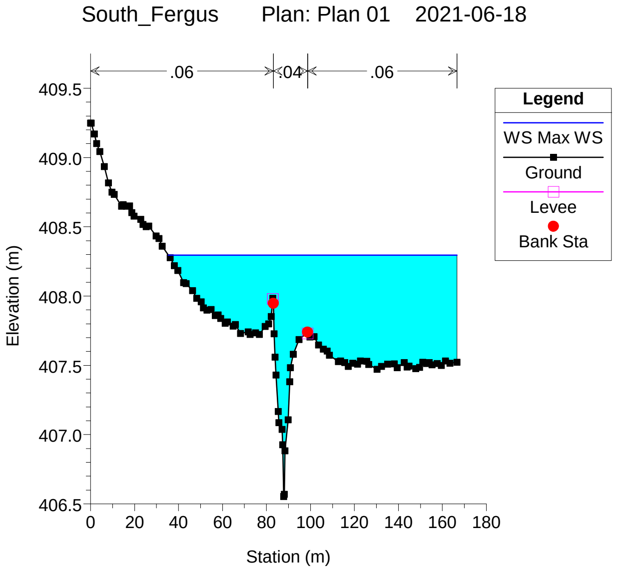
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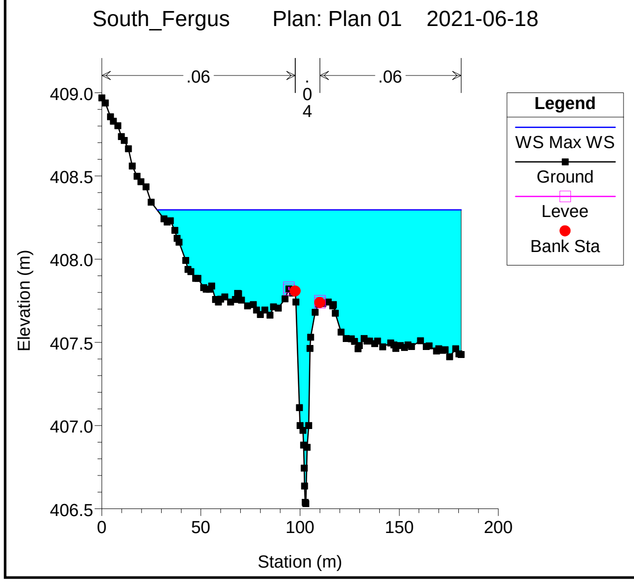
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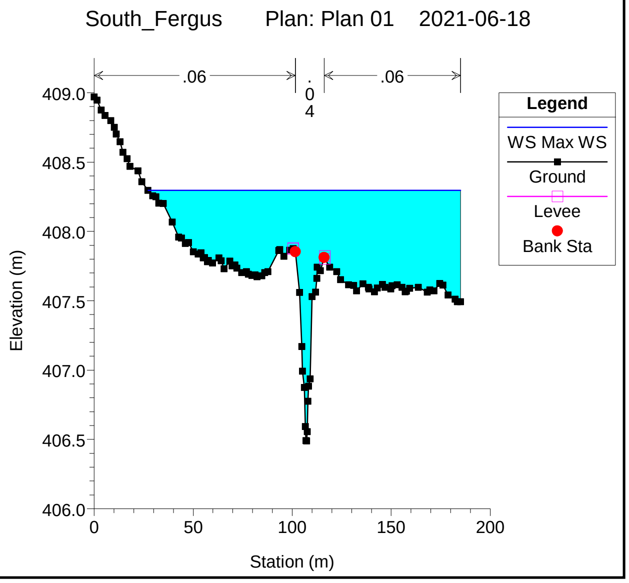
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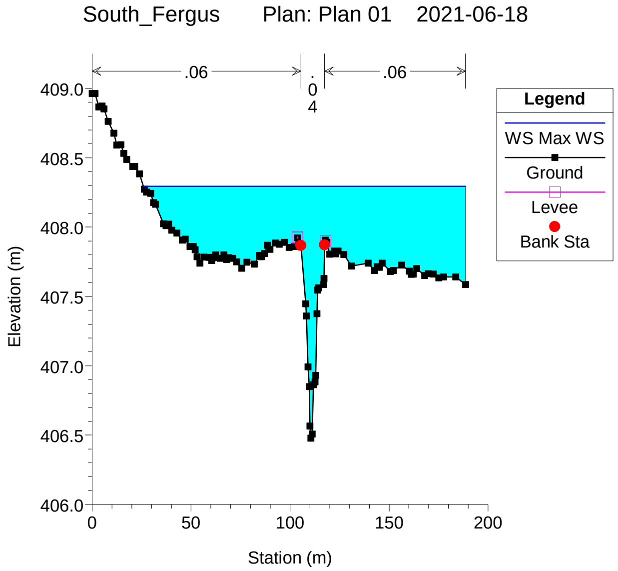
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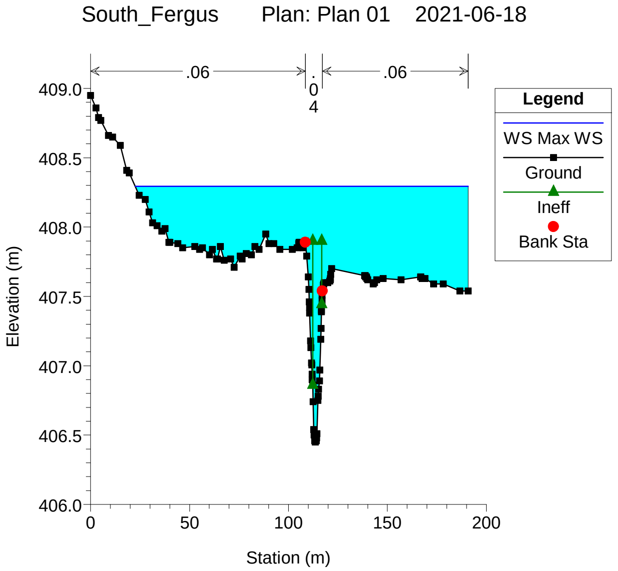
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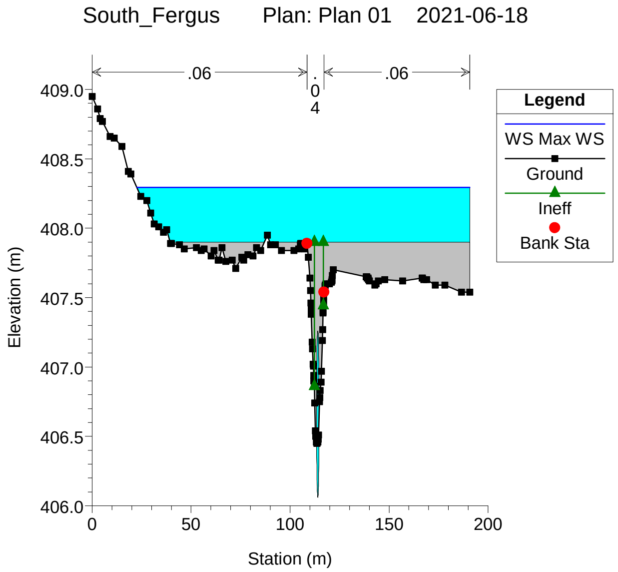
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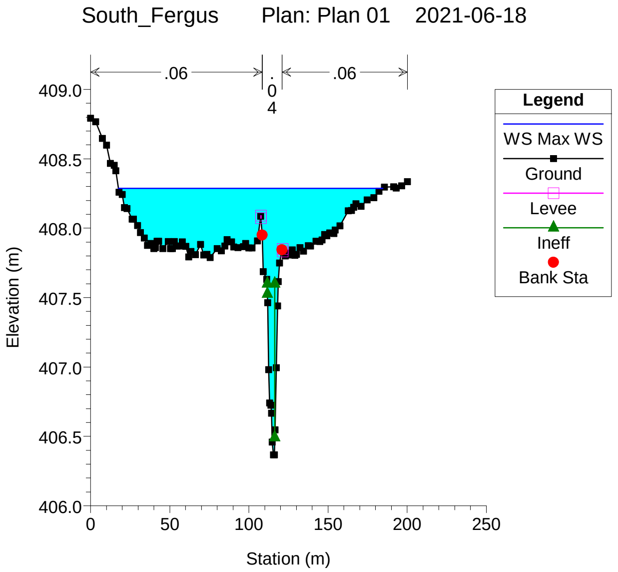
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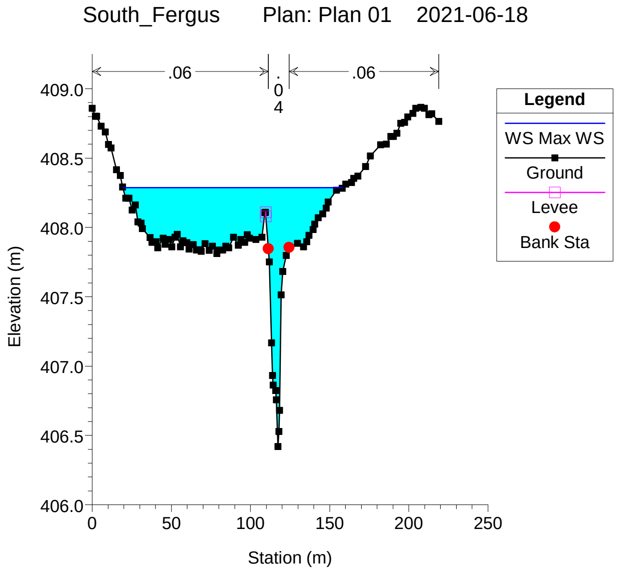
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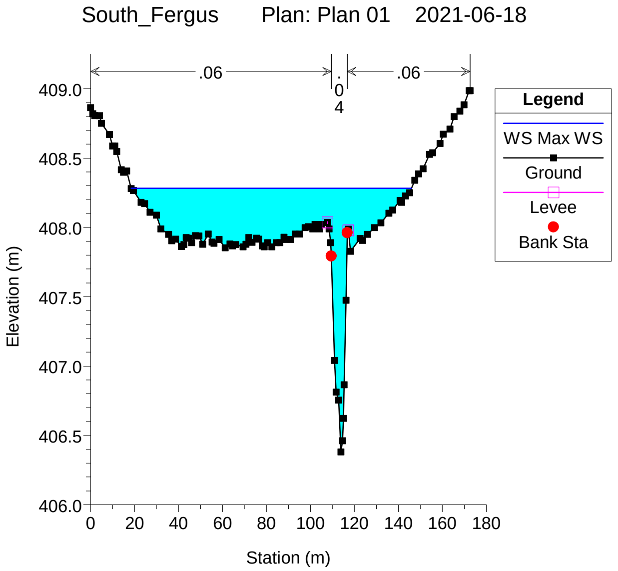
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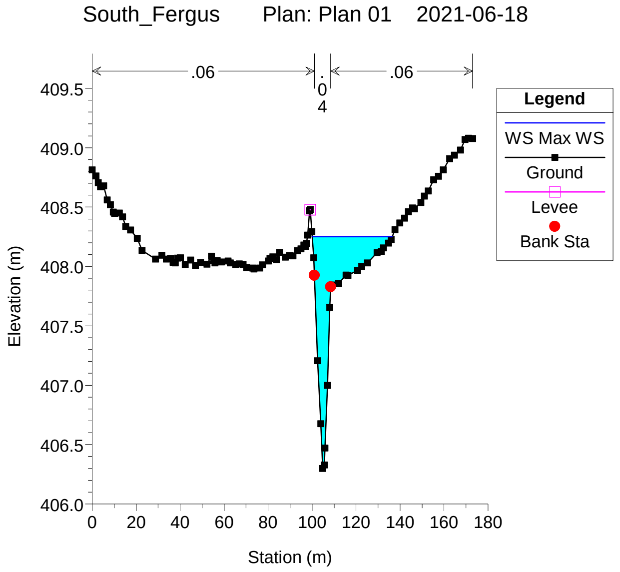
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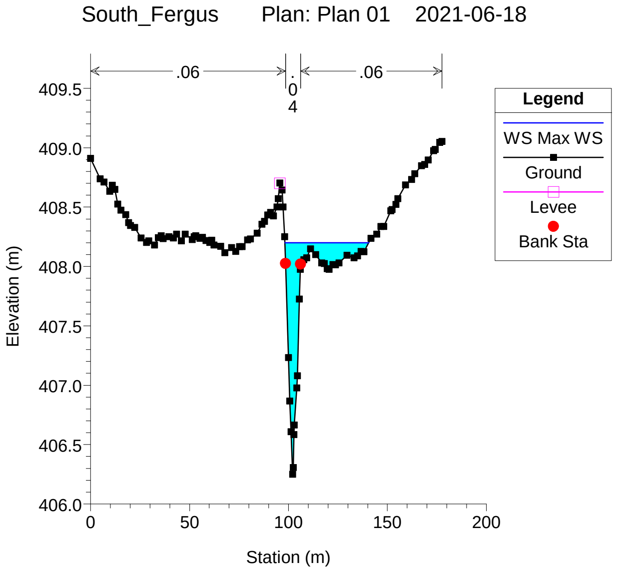
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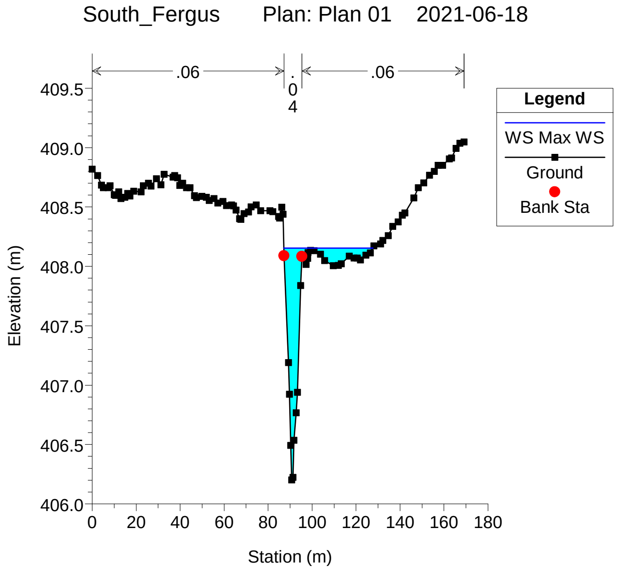
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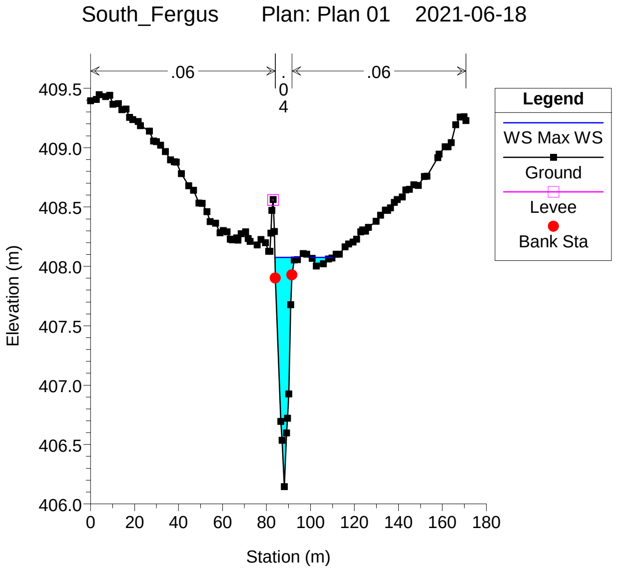
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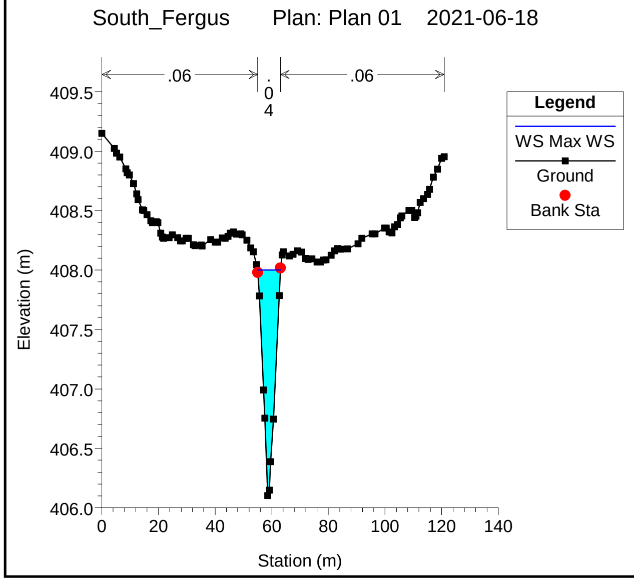
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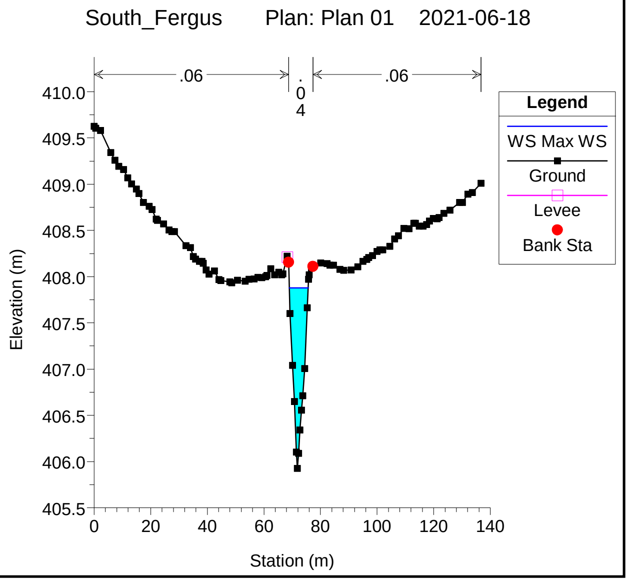
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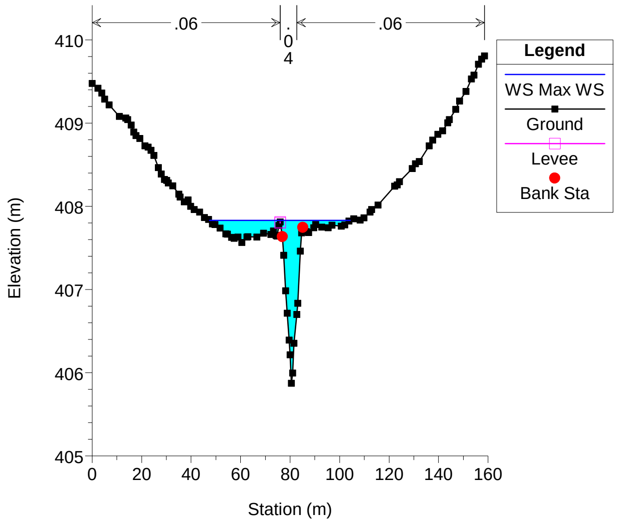

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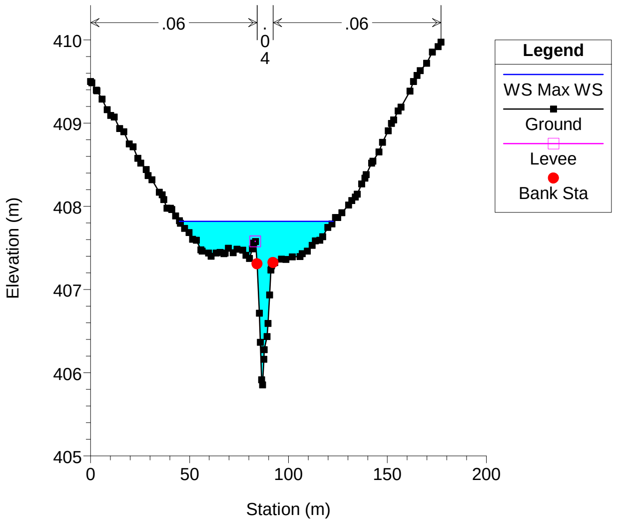

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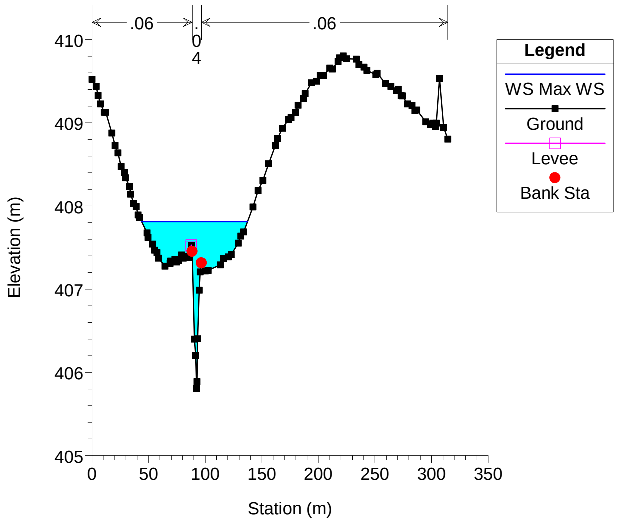

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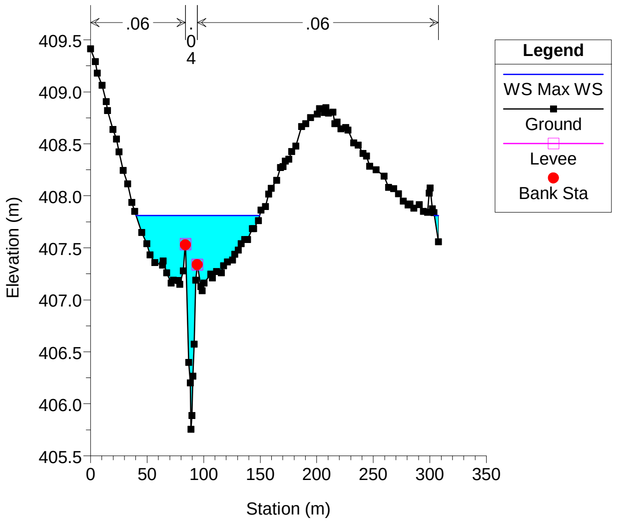

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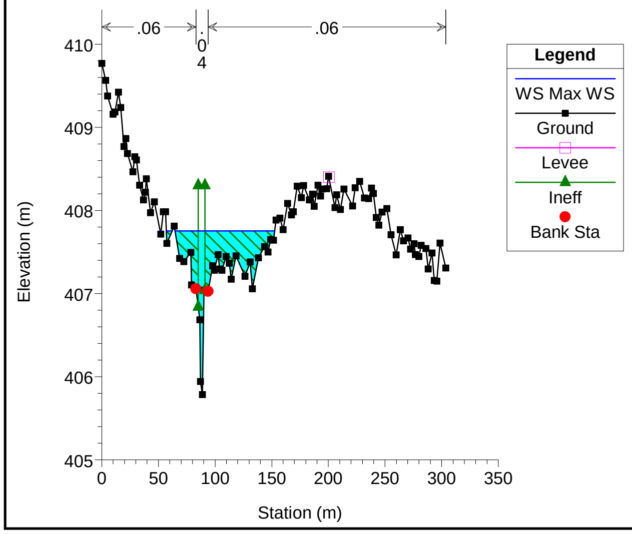

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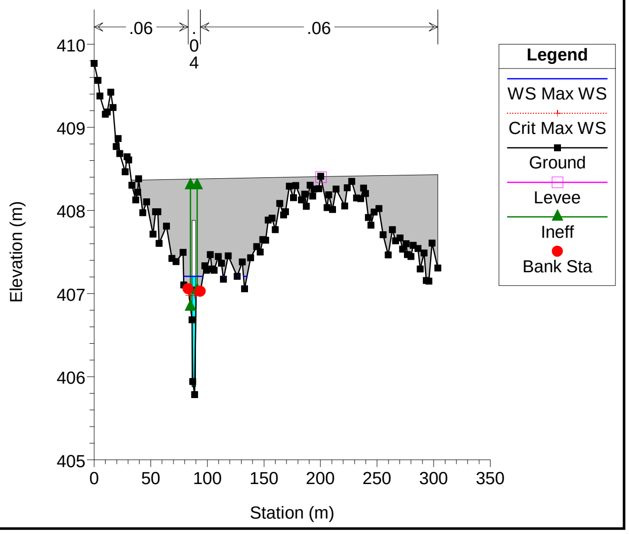

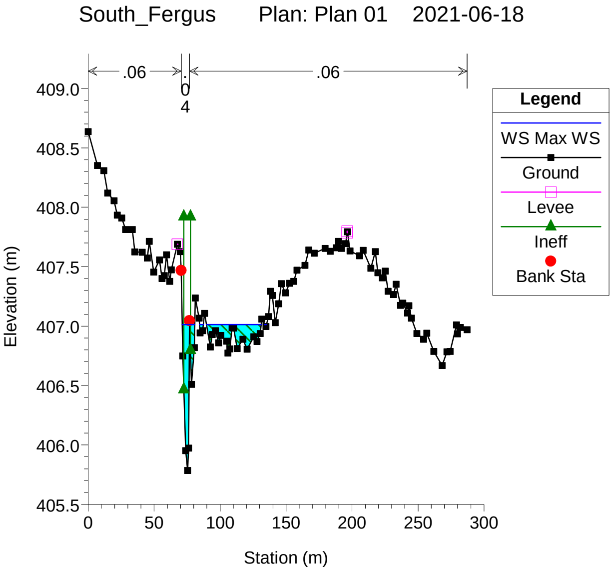
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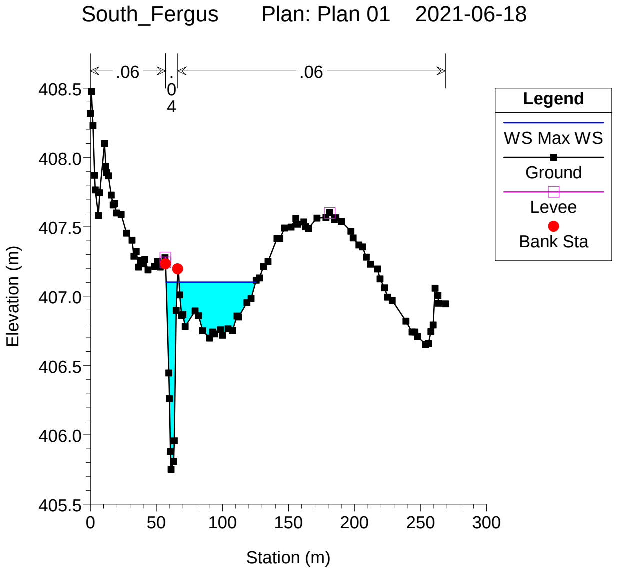
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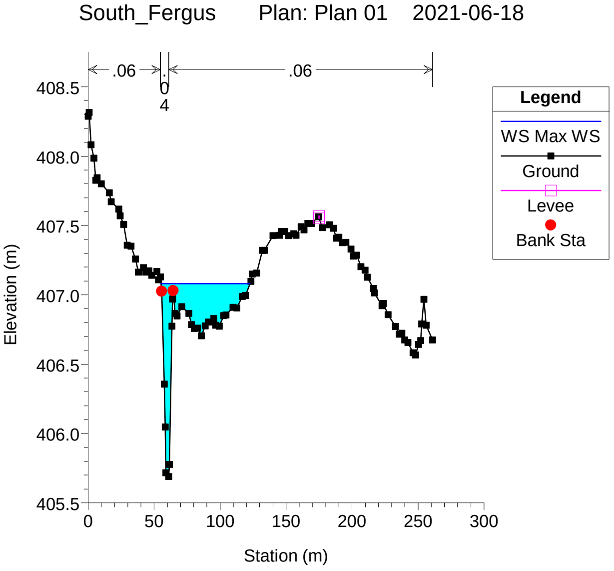
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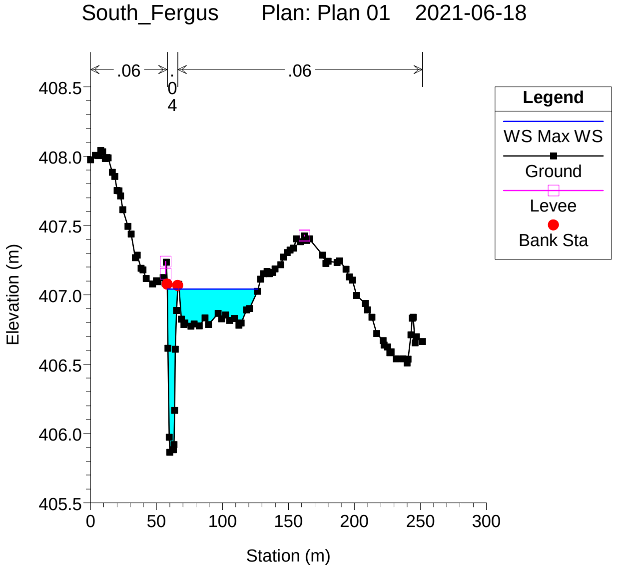
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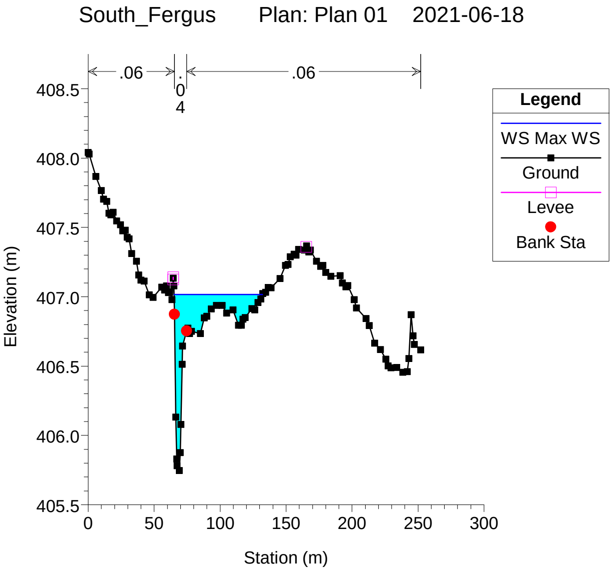
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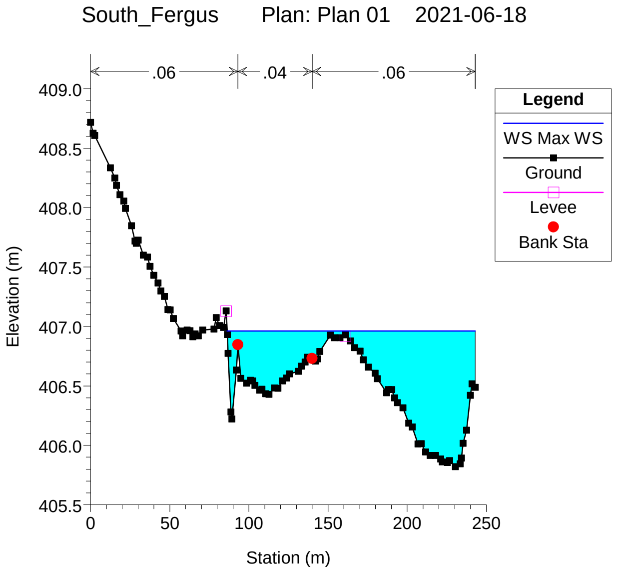
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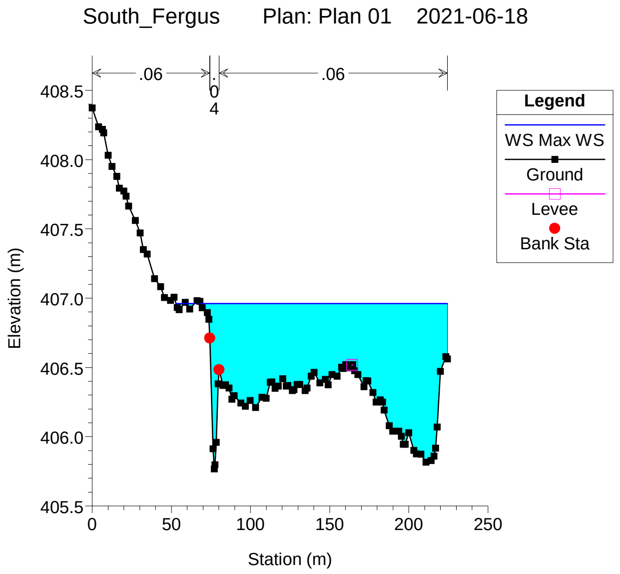
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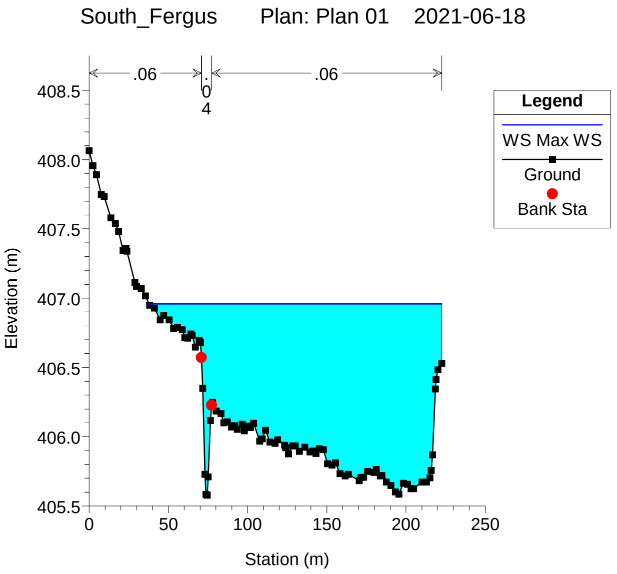
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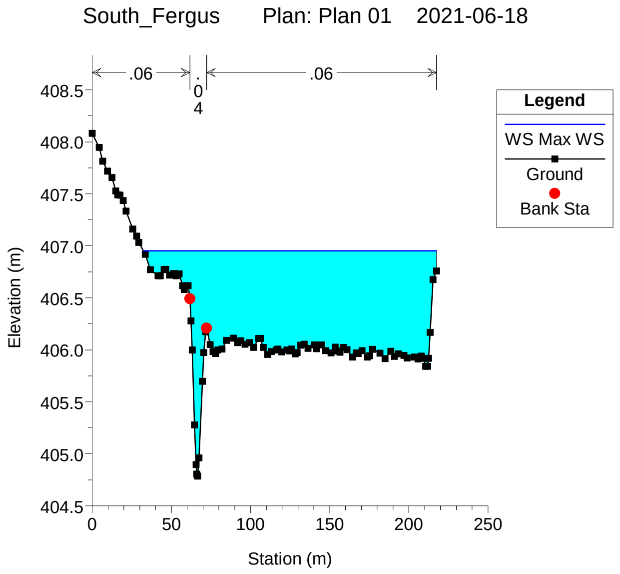
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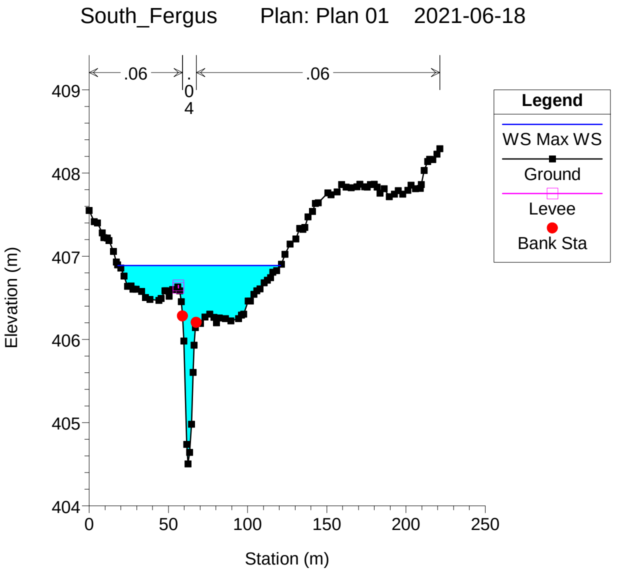
Station (m)
Legend
WS Max WS
Ground
Bank Sta


South_Fergus Plan: Plan 01 2021-06-18
.06
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0
4
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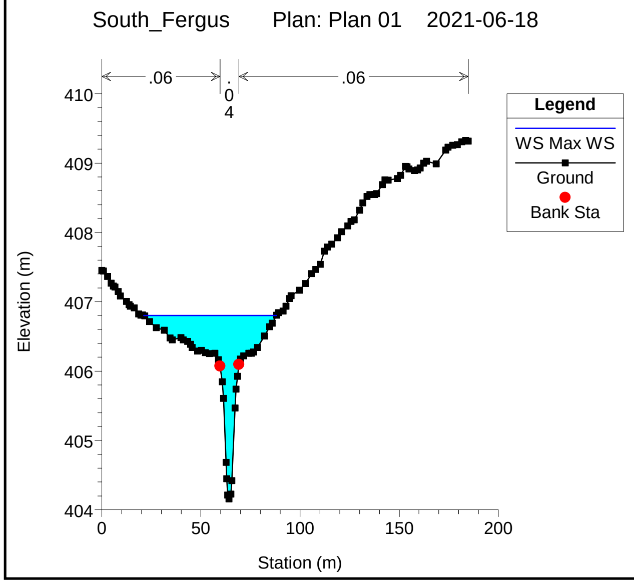
Elevation (m)
409
408
407
406
405
404
0
50
100
150
200
250
Station (m)
Legend
WS Max WS
Ground
Levee
Bank Sta


South_Fergus Plan: Plan 01 2021-06-18
.06
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Elevation (m)
410
409
408
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404
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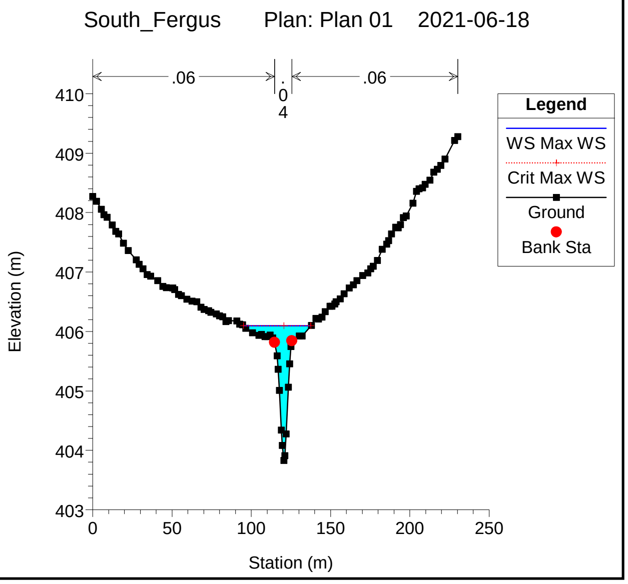
100
150
200
Station (m)
Legend
WS Max WS
Ground
Bank Sta


South_Fergus Plan: Plan 01 2021-06-18
.06
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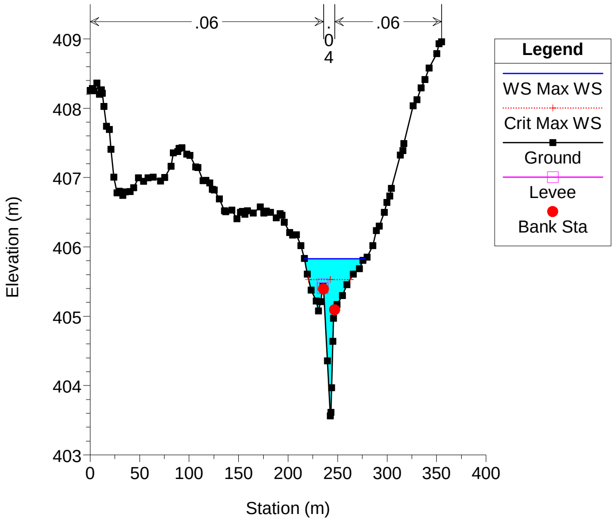
0
4
.06
Elevation (m)
410
409
408
407
406
405
404
403
0
50
100
150
200
250
Station (m)
Legend
WS Max WS
Crit Max WS
Ground
Bank Sta

South_Fergus Plan: Plan 01 2021-06-18



Appendix G:
Proposed Conditions Hydrologic Analysis

Impervious Percentage Justification

LAND USE	MAXIMUM LOT COVERAGE[1]	AERIAL ESTIMATE	IMPERVIOUS PERCENTAGE USED IN MODELLING[2]	DIRECTLY CONNECTED IMPERVIOUS PERCENTAGE
Low-Density Residential	40%	37%	40%	20%
Medium-Density Residential	40%	56% to 63%	70%	45%
Commercial/Mixed Use	80%	N/A	85%	85%
Institutional/School	40%	48%	60%	60%
Park/Lawn	0%	N/A	0%	0%

1. The Maximum lot coverage was referenced from the Township of Centre Wellington Comprehensive Zoning By-Law 2009-045 (2023).
2. The imperviousness percentage values used in modelling were rounded up to ensure a conservative modelling approach.

School
Total Area = 7.23 ha
Impervious Area = 3.42 ha

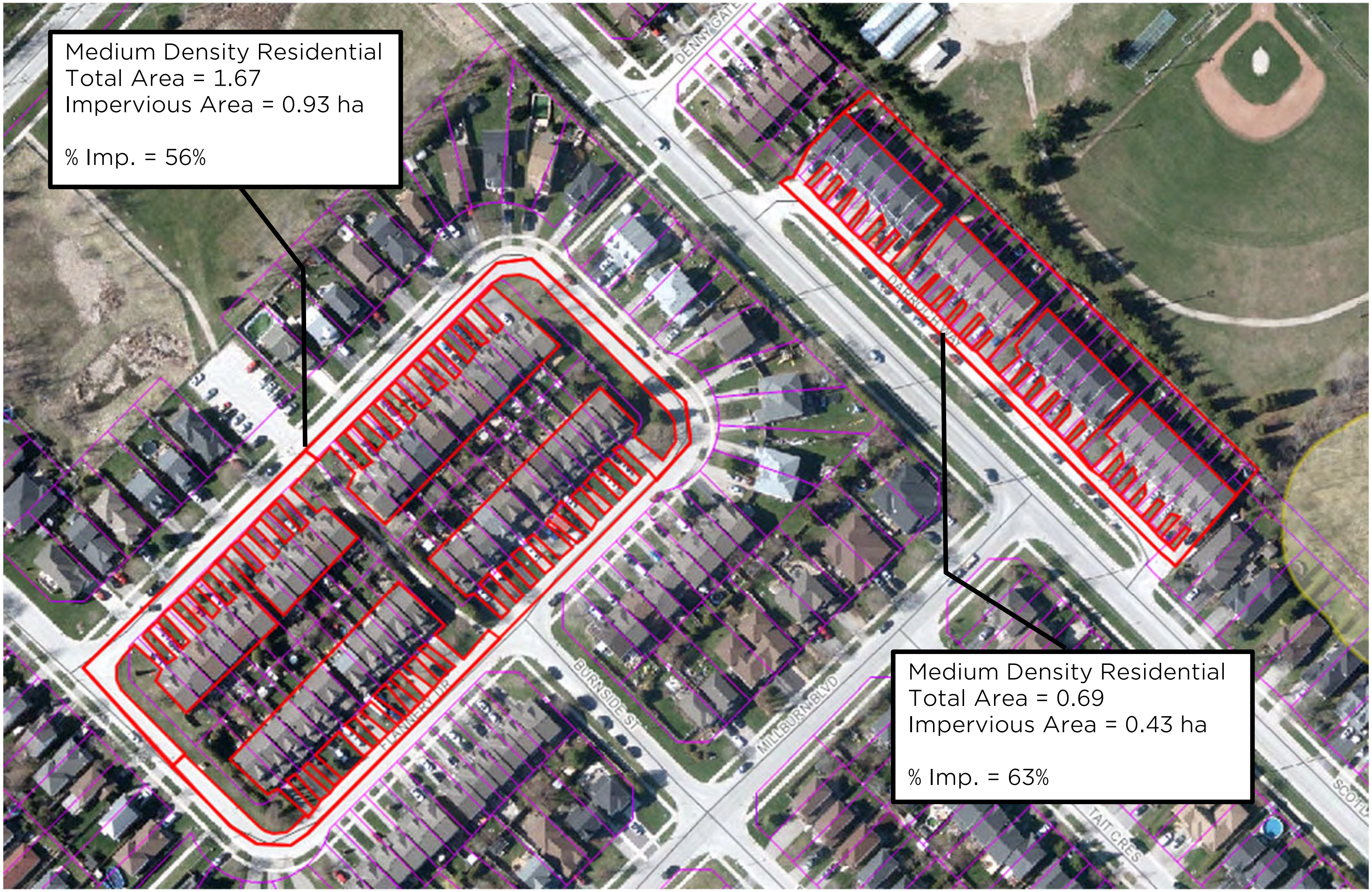
% Imp. = 48%

South Fergus MESP and Secondary Plan - 120157

Aerial Imperviousness Assessment

Low Density Residential
Total Area = 2.48
Impervious Area = 0.91 ha

% Imp. = 37%



Medium Density Residential
Total Area = 1.67
Impervious Area = 0.93 ha

% Imp. = 56%

Medium Density Residential
Total Area = 0.69
Impervious Area = 0.43 ha

% Imp. = 63%

South Fergus MESP and Secondary Plan - 120157

Aerial Imperviousness Assessment

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Visual OTTHYMO Model
Parameter Calculations (NasHYD)

Project Details

South Fergus MESP	120157

Prepared By

Jonathan Paul	June 9, 2022

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Pre-Development Condition

Watershed:	GRCA
Catchment ID:	207
Catchment Area (ha):	1.37
Impervious %:	

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol	**HI**			
Soil Series	Harriston			
Hydrologic Soils Group	BC			
Soil Texture	Loam or Silt Loam			
Runoff Coefficient Type	2			
Area (ha)	1.37			
Percentage of Catchment	100%			

Land Cover Category	**IA**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**
Impervious	2		100	0.95									
Gravel	3		89	0.27									
Woodland	10		67	0.25									
Pasture/Lawns	5	1.37	74	0.28									
Meadows	8		71	0.27									
Cultivated	7		78	0.35									
Waterbody	12		50	0.05									

Average CN	74.00			
Average C	0.28			
Average IA	5.00			

Time to Peak Calculations

Max. Catchment Elev. (m):	418.00
Min. Catchment Elev. (m):	416.00
Catchment Length (m):	120
Catchment Slope (%):	1.67%
Method:	Airport Method
Time of Concentration (mins):	24.74

Summary

Catchment CN:	74.0
Catchment C:	0.28
Catchment IA (mm):	5.00
Time of Concentration (hrs):	0.41
Catchment Time to Peak (hrs):	0.27
Catchment Time Step (mins):	3.30

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Visual OTTHYMO Model
Parameter Calculations (NasHYD)

Project Details

South Fergus MESP	120157

Prepared By

Jonathan Paul	June 9, 2022

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Pre-Development Condition

Watershed:	GRCA
Catchment ID:	208
Catchment Area (ha):	1.80
Impervious %:	

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol	**HI**			
Soil Series	Harriston			
Hydrologic Soils Group	BC			
Soil Texture	Loam or Silt Loam			
Runoff Coefficient Type	2			
Area (ha)	1.80			
Percentage of Catchment	100%			

Land Cover Category	**IA**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**
Impervious	2		100	0.95									
Gravel	3		89	0.27									
Woodland	10		67	0.25									
Pasture/Lawns	5		74	0.28									
Meadows	8		71	0.27									
Cultivated	7	0.79	78	0.35									
Waterbody	12	1.01	50	0.05									

Average CN	62.29			
Average C	0.18			
Average IA	9.81			

Time to Peak Calculations

Max. Catchment Elev. (m):	418.50
Min. Catchment Elev. (m):	416.00
Catchment Length (m):	254
Catchment Slope (%):	0.98%
Method:	Airport Method
Time of Concentration (mins):	47.96

Summary

Catchment CN:	62.3
Catchment C:	0.18
Catchment IA (mm):	9.81
Time of Concentration (hrs):	0.80
Catchment Time to Peak (hrs):	0.53
Catchment Time Step (mins):	6.40

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Visual OTTHYMO Model
Parameter Calculations (NasHYD)

Project Details

South Fergus MESP	120157

Prepared By

Jonathan Paul	June 9, 2022

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Pre-Development Condition

Watershed:	GRCA
Catchment ID:	215
Catchment Area (ha):	2.06
Impervious %:	60%

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol	**HI**			
Soil Series	Harriston			
Hydrologic Soils Group	BC			
Soil Texture	Loam or Silt Loam			
Runoff Coefficient Type	2			
Area (ha)	2.06			
Percentage of Catchment	100%			

Land Cover Category	**IA**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**
Impervious	2	0.27	100	0.95									
Gravel	3		89	0.27									
Woodland	10		67	0.25									
Pasture/Lawns	5	1.80	74	0.28									
Meadows	8		71	0.27									
Cultivated	7		78	0.35									
Waterbody	12		50	0.05									

Average CN	77.77			
Average C	0.37			
Average IA	4.63			

Time to Peak Calculations

Max. Catchment Elev. (m):	418.00
Min. Catchment Elev. (m):	417.50
Catchment Length (m):	65
Catchment Slope (%):	0.77%
Method: Airport Method	
Time of Concentration (mins):	20.95

Summary

Catchment CN:	77.8
Catchment C:	0.37
Catchment IA (mm):	4.63
Time of Concentration (hrs):	0.35
Catchment Time to Peak (hrs):	0.23
Catchment Time Step (mins):	2.79

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Visual OTTHYMO Model
Parameter Calculations (NasHYD)

Project Details

South Fergus MESP	120157

Prepared By

Jonathan Paul	June 9, 2022

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Pre-Development Condition

Watershed:	GRCA
Catchment ID:	216
Catchment Area (ha):	11.42
Impervious %:	

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol	**Hl**	**Pal**	**Lil**	
Soil Series	Harriston	Parkhill	Listowel	
Hydrologic Soils Group	BC	BC	BC	
Soil Texture	Loam or Silt Loam	Loam or Silt Loam	Loam or Silt Loam	
Runoff Coefficient Type	2	2	2	
Area (ha)	6.95	3.23	1.24	
Percentage of Catchment	61%	28%	11%	

Land Cover Category	**IA**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**
Impervious	2		100	0.95		100	0.95		100	0.95			
Gravel	3		89	0.27		89	0.27		89	0.27			
Woodland	10		67	0.25		67	0.25		67	0.25			
Pasture/Lawns	5		74	0.28		74	0.28		74	0.28			
Meadows	8		71	0.27		71	0.27		71	0.27			
Cultivated	7		78	0.35		78	0.35		78	0.35			
Waterbody	12	6.95	50	0.05	3.23	50	0.05	1.24	50	0.05			

Average CN	50.00	50.00	50.00	
Average C	0.05	0.05	0.05	
Average IA	12.00	12.00	12.00	

Time to Peak Calculations

Max. Catchment Elev. (m):	418.00
Min. Catchment Elev. (m):	410.00
Catchment Length (m):	762
Catchment Slope (%):	1.05%
Method: Airport Method	
Time of Concentration (mins):	92.98

Summary

Catchment CN:	50.0
Catchment C:	0.05
Catchment IA (mm):	12.00
Time of Concentration (hrs):	1.55
Catchment Time to Peak (hrs):	1.03
Catchment Time Step (mins):	12.40

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Visual OTTHYMO Model
Parameter Calculations (NasHYD)

Project Details

South Fergus MESP	120157

Prepared By

Jonathan Paul	June 9, 2022

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Pre-Development Condition

Watershed:	GRCA
Catchment ID:	217
Catchment Area (ha):	8.74
Impervious %:	

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol	**Hl**	**Pal**	**Lil**	**M**
Soil Series	Harriston	Parkhill	Listowel	Muck
Hydrologic Soils Group	BC	BC	BC	B
Soil Texture	Loam or Silt Loam	Loam or Silt Loam	Loam or Silt Loam	Muck
Runoff Coefficient Type	2	2	2	2
Area (ha)	0.94	3.70	2.42	1.68
Percentage of Catchment	11%	42%	28%	19%

Land Cover Category	**IA**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**
Impervious	2		100	0.95		100	0.95		100	0.95		100	0.95
Gravel	3		89	0.27		89	0.27		89	0.27		89	0.27
Woodland	10		67	0.25		67	0.25		67	0.25		60	0.25
Pasture/Lawns	5		74	0.28		74	0.28		74	0.28		69	0.28
Meadows	8		71	0.27		71	0.27		71	0.27		65	0.27
Cultivated	7		78	0.35		78	0.35		78	0.35		74	0.35
Waterbody	12	0.94	50	0.05	3.70	50	0.05	2.42	50	0.05	1.68	50	0.05

Average CN	50.00	50.00	50.00	50.00
Average C	0.05	0.05	0.05	0.05
Average IA	12.00	12.00	12.00	12.00

Time to Peak Calculations

Max. Catchment Elev. (m):	408.60
Min. Catchment Elev. (m):	406.29
Catchment Length (m):	419
Catchment Slope (%):	0.55%
Method: Airport Method	
Time of Concentration (mins):	85.28

Summary

Catchment CN:	50.0
Catchment C:	0.05
Catchment IA (mm):	12.00
Time of Concentration (hrs):	1.42
Catchment Time to Peak (hrs):	0.95
Catchment Time Step (mins):	11.37

Visual OTTHYMO Model
Parameter Calculations (NasHYD)

Project Details

South Fergus MESP	120157

Prepared By

Jonathan Paul	June 9, 2022

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Pre-Development Condition

Watershed:	GRCA
Catchment ID:	218
Catchment Area (ha):	10.21
Impervious %:	

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol	**Hl**	**Pal**	**Lil**	**M**
Soil Series	Harriston	Parkhill	Listowel	Muck
Hydrologic Soils Group	BC	BC	BC	B
Soil Texture	Loam or Silt Loam	Loam or Silt Loam	Loam or Silt Loam	Muck
Runoff Coefficient Type	2	2	2	2
Area (ha)	1.00	4.75	0.09	4.36
Percentage of Catchment	10%	47%	1%	43%

Land Cover Category	**IA**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**
Impervious	2		100	0.95		100	0.95		100	0.95		100	0.95
Gravel	3		89	0.27		89	0.27		89	0.27		89	0.27
Woodland	10		67	0.25		67	0.25		67	0.25		60	0.25
Pasture/Lawns	5		74	0.28		74	0.28		74	0.28		69	0.28
Meadows	8		71	0.27		71	0.27		71	0.27		65	0.27
Cultivated	7		78	0.35		78	0.35		78	0.35		74	0.35
Waterbody	12	1.00	50	0.05	4.75	50	0.05	0.09	50	0.05	4.36	50	0.05

Average CN	50.00	50.00	50.00	50.00
Average C	0.05	0.05	0.05	0.05
Average IA	12.00	12.00	12.00	12.00

Time to Peak Calculations

Max. Catchment Elev. (m):	408.00
Min. Catchment Elev. (m):	406.29
Catchment Length (m):	665
Catchment Slope (%):	0.26%
Method: Airport Method	
Time of Concentration (mins):	138.18

Summary

Catchment CN:	50.0
Catchment C:	0.05
Catchment IA (mm):	12.00
Time of Concentration (hrs):	2.30
Catchment Time to Peak (hrs):	1.54
Catchment Time Step (mins):	18.42

Visual OTTHYMO Model
Parameter Calculations (NasHYD)

Project Details

South Fergus MESP	120157

Prepared By

Jonathan Paul	June 9, 2022

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Pre-Development Condition

Watershed:	GRCA
Catchment ID:	219
Catchment Area (ha):	2.06
Impervious %:	

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol	**HI**			
Soil Series	Harriston			
Hydrologic Soils Group	BC			
Soil Texture	Loam or Silt Loam			
Runoff Coefficient Type	2			
Area (ha)	2.06			
Percentage of Catchment	100%			

Land Cover Category	**IA**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**
Impervious	2		100	0.95									
Gravel	3		89	0.27									
Woodland	10		67	0.25									
Pasture/Lawns	5		74	0.28									
Meadows	8		71	0.27									
Cultivated	7		78	0.35									
Waterbody	12	2.06	50	0.05									
Average CN		50.00											
Average C		0.05											
Average IA		12.00											

Time to Peak Calculations

Max. Catchment Elev. (m):	406.29
Min. Catchment Elev. (m):	405.59
Catchment Length (m):	245
Catchment Slope (%):	0.29%
Method: Airport Method	
Time of Concentration (mins):	81.01

Summary

Catchment CN:	50.0
Catchment C:	0.05
Catchment IA (mm):	12.00
Time of Concentration (hrs):	1.35
Catchment Time to Peak (hrs):	0.90
Catchment Time Step (mins):	10.80

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Visual OTTHYMO Model
Parameter Calculations (NasHYD)

Project Details

South Fergus MESP	120157

Prepared By

Jonathan Paul	June 9, 2022

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Post Development Condition

Watershed:	Not within CA
Catchment ID:	220
Catchment Area (ha):	5.14
Impervious %:	11%

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol	**Hl**	**Lil**	**M**	
Soil Series	Harriston	Listowel	Muck	
Hydrologic Soils Group	BC	BC	B	
Soil Texture	Loam or Silt Loam	Loam or Silt Loam	Muck	
Runoff Coefficient Type	2	2	2	
Area (ha)	1.48	3.20	0.45	
Percentage of Catchment	29%	62%	9%	

Land Cover Category	**IA**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**
Impervious	2	0.43	100	0.95	0.06	100	0.95	0.04	100	0.95			
Gravel	3		89	0.27	0.06	89	0.27		89	0.27			
Woodland	10	0.78	67	0.25	2.44	67	0.25	0.41	60	0.25			
Pasture/Lawns	5	0.27	74	0.28	0.65	74	0.28		69	0.28			
Meadows	8		71	0.27		71	0.27		65	0.27			
Cultivated	7		78	0.35		78	0.35		74	0.35			
Waterbody	12		50	0.05		50	0.05		50	0.05			
Average CN		77.80			69.43			63.92					
Average C		0.46			0.27			0.32					
Average IA		6.78			8.72			9.22					

Time to Peak Calculations

Max. Catchment Elev. (m):	411.85
Min. Catchment Elev. (m):	408.00
Catchment Length (m):	500
Catchment Slope (%):	0.77%
Method: Airport Method	
Time of Concentration (mins):	61.36

Summary

Catchment CN:	71.4
Catchment C:	0.33
Catchment IA (mm):	8.20
Time of Concentration (hrs):	1.02
Catchment Time to Peak (hrs):	0.68
Catchment Time Step (mins):	8.18

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Visual OTTHYMO Model Parameter Calculations (NasHYD)

Project Details

South Fergus	120157

Prepared By

A. Trevers	June 9, 2022

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Pre-Development Condition

Watershed:	Not within CA
Catchment ID:	227
Catchment Area (ha):	1.44
Impervious %:	17%

Average Curve Number (CN), Runoff Coefficient (C) and Initial Abstraction (IA)

Soil Symbol		**HI**											
Soil Series		Harriston											
Hydrologic Soils Group		BC											
Soil Texture		Loam or Silt Loam											
Runoff Coefficient Type		2											
Area (ha)		1.44											
Percentage of Catchment		100%											
Land Cover Category	**IA**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**	**A (ha)**	**CN**	**C**
Impervious	2	0.24	100	0.95									
Gravel	3		89	0.27									
Woodland	10		67	0.25									
Pasture/Lawns	5	0.38	74	0.28									
Meadows	8		71	0.27									
Cultivated	7	0.82	78	0.35									
Waterbody	12		50	0.05									
Average CN		80.70											
Average C		0.43											
Average IA		5.63											

Time to Peak Calculations

Max. Catchment Elev. (m):	
Min. Catchment Elev. (m):	
Catchment Length (m):	430
Catchment Slope (%):	1.02%
Method:	Bransby-Williams Formula
Time of Concentration (mins):	23.54

Summary

Catchment CN:	80.7
Catchment C:	0.43
Catchment IA (mm):	5.63
Time of Concentration (hrs):	0.39
Catchment Time to Peak (hrs):	0.26
Catchment Time Step (mins):	3.14

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Visual OTTHYMO Model
Parameter Calculations (StandHYD)

Project Details

South Fergus MESP	120157

Prepared By

Jonathan Paul	June 9, 2022

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Post Development Condition

Watershed:	Not within CA
Catchment ID:	203
Catchment Area (ha):	8.59
Impervious %:	49%
Pervious Area (ha):	4.38

Average Curve Number (CN) and Initial Abstraction (IA) for Pervious Area

Soil Symbol		**Hl**		**Lil**					
Soil Series		Harriston		Listowel					
Hydrologic Soils Group		BC		BC					
Soil Texture		Loam or Silt Loam		Loam or Silt Loam					
Runoff Coefficient Type		2		2					
Area (ha)		3.07		1.31					
Percentage of Catchment		70%		30%					
Land Cover Category	**IA**	**A (ha)**	**CN**	**A (ha)**	**CN**	**A (ha)**	**CN**	**A (ha)**	**CN**
Impervious	2		100		100				
Gravel	3		89		89				
Woodland	10		67		67				
Pasture/Lawns	5	3.07	74	1.31	74				
Meadows	8		71		71				
Cultivated	7		78		78				
Waterbody	12		50		50				
Average CN		74.00		74.00					
Average IA		5.00		5.00					

Notes

CN and IA values have been calculated for the pervious area of the catchment only.

Summary

Catchment CN:	74.0
Catchment IA (mm):	5.00

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Visual OTTHYMO Model
Parameter Calculations (StandHYD)

Project Details

South Fergus MESP	120157

Prepared By

Jonathan Paul	June 9, 2022

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Post Development Condition

Watershed:	Not within CA
Catchment ID:	204
Catchment Area (ha):	11.25
Impervious %:	48%
Pervious Area (ha):	5.85

Average Curve Number (CN) and Initial Abstraction (IA) for Pervious Area

Soil Symbol	**Hl**	**Lil**		
Soil Series	Harriston	Listowel		
Hydrologic Soils Group	BC	BC		
Soil Texture	Loam or Silt Loam	Loam or Silt Loam		
Runoff Coefficient Type	2	2		
Area (ha)	2.05	3.80		
Percentage of Catchment	35%	65%		

Land Cover Category	**IA**	**A (ha)**	**CN**	**A (ha)**	**CN**	**A (ha)**	**CN**	**A (ha)**	**CN**
Impervious	2		100		100				
Gravel	3		89		89				
Woodland	10		67		67				
Pasture/Lawns	5	2.05	74	3.80	74				
Meadows	8		71		71				
Cultivated	7		78		78				
Waterbody	12		50		50				
Average CN		74.00		74.00					
Average IA		5.00		5.00					

Notes

CN and IA values have been calculated for the pervious area of the catchment only.

Summary

Catchment CN:	74.0
Catchment IA (mm):	5.00

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Visual OTTHYMO Model
Parameter Calculations (StandHYD)

Project Details

South Fergus MESP	120157

Prepared By

Jonathan Paul	March 3, 2023

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Post Development Condition

Watershed:	Not within CA
Catchment ID:	205
Catchment Area (ha):	10.19
Impervious %:	66%
Pervious Area (ha):	3.46

Average Curve Number (CN) and Initial Abstraction (IA) for Pervious Area

Soil Symbol	**Hl**	**Lil**	**Pal**	
Soil Series	Harriston	Listowel	Parkhill	
Hydrologic Soils Group	BC	BC	BC	
Soil Texture	Loam or Silt Loam	Loam or Silt Loam	Loam or Silt Loam	
Runoff Coefficient Type	2	2	2	
Area (ha)	0.66	2.56	0.24	
Percentage of Catchment	19%	74%	7%	

Land Cover Category	**IA**	**A (ha)**	**CN**	**A (ha)**	**CN**	**A (ha)**	**CN**	**A (ha)**	**CN**
Impervious	2		100		100		100		
Gravel	3		89		89		89		
Woodland	10		67		67		67		
Pasture/Lawns	5	0.66	74	2.56	74	0.24	74		
Meadows	8		71		71		71		
Cultivated	7		78		78		78		
Waterbody	12		50		50		50		

Average CN	74.00	74.00	74.00	
Average IA	5.00	5.00	5.00	

Notes

CN and IA values have been calculated for the pervious area of the catchment only.

Summary

Catchment CN:	74.0
Catchment IA (mm):	5.00

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Visual OTTHYMO Model Parameter Calculations (StandHYD)

Project Details

South Fergus MESP	120157

Prepared By

Jonathan Paul	June 9, 2022

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Post Development Condition

Watershed:	Not within CA
Catchment ID:	206
Catchment Area (ha):	28.45
Impervious %:	62%
Pervious Area (ha):	10.81

Average Curve Number (CN) and Initial Abstraction (IA) for Pervious Area

Soil Symbol	**Hl**	**Lil**		
Soil Series	Harriston	Listowel		
Hydrologic Soils Group	BC	BC		
Soil Texture	Loam or Silt Loam	Loam or Silt Loam		
Runoff Coefficient Type	2	2		
Area (ha)	4.32	6.49		
Percentage of Catchment	40%	60%		

Land Cover Category	**IA**	**A (ha)**	**CN**	**A (ha)**	**CN**	**A (ha)**	**CN**	**A (ha)**	**CN**
Impervious	2		100		100				
Gravel	3		89		89				
Woodland	10		67		67				
Pasture/Lawns	5	4.32	74	4.70	74				
Meadows	8		71		71				
Cultivated	7		78		78				
Waterbody	12		50	1.79	50				
Average CN		74.00		67.38					
Average IA		5.00		6.93					

Notes

CN and IA values have been calculated for the pervious area of the catchment only.

Summary

Catchment CN:	70.0
Catchment IA (mm):	6.16

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Visual OTTHYMO Model
Parameter Calculations (StandHYD)

Project Details

South Fergus MESP	120157

Prepared By

Jonathan Paul	June 9, 2022

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Post Development Condition

Watershed:	Not within CA
Catchment ID:	209
Catchment Area (ha):	10.31
Impervious %:	61%
Pervious Area (ha):	4.02

Average Curve Number (CN) and Initial Abstraction (IA) for Pervious Area

Soil Symbol	**HI**			
Soil Series	Harriston			
Hydrologic Soils Group	BC			
Soil Texture	Loam or Silt Loam			
Runoff Coefficient Type	2			
Area (ha)	4.02			
Percentage of Catchment	100%			

Land Cover Category	**IA**	**A (ha)**	**CN**	**A (ha)**	**CN**	**A (ha)**	**CN**	**A (ha)**	**CN**
Impervious	2		100						
Gravel	3		89						
Woodland	10		67						
Pasture/Lawns	5	4.02	74						
Meadows	8		71						
Cultivated	7		78						
Waterbody	12		50						
Average CN		74.00							
Average IA		5.00							

Notes

CN and IA values have been calculated for the pervious area of the catchment only.

Summary

Catchment CN:	74.0
Catchment IA (mm):	5.00

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Visual OTTHYMO Model
Parameter Calculations (StandHYD)

Project Details

South Fergus MESP	120157

Prepared By

Jonathan Paul	June 9, 2022

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Post Development Condition

Watershed:	Not within CA
Catchment ID:	210
Catchment Area (ha):	7.08
Impervious %:	83%
Pervious Area (ha):	1.20

Average Curve Number (CN) and Initial Abstraction (IA) for Pervious Area

Soil Symbol		**HI**							
Soil Series		Harriston							
Hydrologic Soils Group		BC							
Soil Texture		Loam or Silt Loam							
Runoff Coefficient Type		2							
Area (ha)		1.20							
Percentage of Catchment		100%							
Land Cover Category	**IA**	**A (ha)**	**CN**	**A (ha)**	**CN**	**A (ha)**	**CN**	**A (ha)**	**CN**
Impervious	2		100						
Gravel	3		89						
Woodland	10		67						
Pasture/Lawns	5	1.20	74						
Meadows	8		71						
Cultivated	7		78						
Waterbody	12		50						
Average CN		74.00							
Average IA		5.00							

Notes

CN and IA values have been calculated for the pervious area of the catchment only.

Summary

Catchment CN:	74.0
Catchment IA (mm):	5.00

TATHAM
ENGINEERING

Visual OTTHYMO Model
Parameter Calculations (StandHYD)

Project Details

South Fergus MESP	120157

Prepared By

Jonathan Paul	June 9, 2022

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Post Development Condition

Watershed:	Not within CA
Catchment ID:	211
Catchment Area (ha):	8.86
Impervious %:	52%
Pervious Area (ha):	4.25

Average Curve Number (CN) and Initial Abstraction (IA) for Pervious Area

Soil Symbol	**Hl**	**Pal**		
Soil Series	Harriston	Parkhill		
Hydrologic Soils Group	BC	BC		
Soil Texture	Loam or Silt Loam	Loam or Silt Loam		
Runoff Coefficient Type	2	2		
Area (ha)	3.83	0.43		
Percentage of Catchment	90%	10%		

Land Cover Category	**IA**	**A (ha)**	**CN**	**A (ha)**	**CN**	**A (ha)**	**CN**	**A (ha)**	**CN**
Impervious	2		100		100				
Gravel	3		89		89				
Woodland	10		67		67				
Pasture/Lawns	5	3.83	74	0.43	74				
Meadows	8		71		71				
Cultivated	7		78		78				
Waterbody	12		50		50				
Average CN		74.00		74.00					
Average IA		5.00		5.00					

Notes

CN and IA values have been calculated for the pervious area of the catchment only.

Summary

Catchment CN:	74.0
Catchment IA (mm):	5.00

Visual OTTHYMO Model
Parameter Calculations (StandHYD)

Project Details

South Fergus MESP	120157

Prepared By

Jonathan Paul	March 3, 2023

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Post Development Condition

Watershed:	Not within CA
Catchment ID:	212
Catchment Area (ha):	8.34
Impervious %:	40%
Pervious Area (ha):	5.01

Average Curve Number (CN) and Initial Abstraction (IA) for Pervious Area

Soil Symbol	**HI**	**M**		
Soil Series	Harriston	Muck		
Hydrologic Soils Group	BC	B		
Soil Texture	Loam or Silt Loam	Muck		
Runoff Coefficient Type	2	2		
Area (ha)	4.87	0.13		
Percentage of Catchment	97%	3%		

Land Cover Category	**IA**	**A (ha)**	**CN**	**A (ha)**	**CN**	**A (ha)**	**CN**	**A (ha)**	**CN**
Impervious	2		100		100				
Gravel	3		89		89				
Woodland	10		67		60				
Pasture/Lawns	5	4.87	74	0.13	69				
Meadows	8		71		65				
Cultivated	7		78		74				
Waterbody	12		50		50				
Average CN		74.00		69.00					
Average IA		5.00		5.00					

Notes

CN and IA values have been calculated for the pervious area of the catchment only.

Summary

Catchment CN:	73.9
Catchment IA (mm):	5.00

Visual OTTHYMO Model
Parameter Calculations (StandHYD)

Project Details

South Fergus MESP	120157

Prepared By

Jonathan Paul	March 3, 2023

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Post Development Condition

Watershed:	Not within CA
Catchment ID:	214
Catchment Area (ha):	6.35
Impervious %:	76%
Pervious Area (ha):	1.53

Average Curve Number (CN) and Initial Abstraction (IA) for Pervious Area

Soil Symbol		**Hl**		**M**		**Pal**		**Lil**	
Soil Series		Harriston		Muck		Parkhill		Listowel	
Hydrologic Soils Group		BC		B		BC		BC	
Soil Texture		Loam or Silt Loam		Muck		Loam or Silt Loam		Loam or Silt Loam	
Runoff Coefficient Type		2		2		2		2	
Area (ha)		0.92		0.37		0.10		0.14	
Percentage of Catchment		60%		24%		7%		9%	
Land Cover Category	**IA**	**A (ha)**	**CN**	**A (ha)**	**CN**	**A (ha)**	**CN**	**A (ha)**	**CN**
Impervious	2		100		100		100		100
Gravel	3		89		89		89		89
Woodland	10		67		60		67		67
Pasture/Lawns	5	0.92	74	0.37	69	0.10	74	0.14	74
Meadows	8		71		65		71		71
Cultivated	7		78		74		78		78
Waterbody	12		50		50		50		50
Average CN		74.00		69.00		74.00		74.00	
Average IA		5.00		5.00		5.00		5.00	

Notes

CN and IA values have been calculated for the pervious area of the catchment only.

Summary

Catchment CN:	72.8
Catchment IA (mm):	5.00

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Visual OTTHYMO Model
Parameter Calculations (StandHYD)

Project Details

South Fergus MESP	120157

Prepared By

Jonathan Paul	June 9, 2022

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Post Development Condition

Watershed:	Not within CA
Catchment ID:	221
Catchment Area (ha):	2.42
Impervious %:	77%
Pervious Area (ha):	0.56

Average Curve Number (CN) and Initial Abstraction (IA) for Pervious Area

Soil Symbol		**Hl**		**Lil**					
Soil Series		Harriston		Listowel					
Hydrologic Soils Group		BC		BC					
Soil Texture		Loam or Silt Loam		Loam or Silt Loam					
Runoff Coefficient Type		2		2					
Area (ha)		0.55		0.01					
Percentage of Catchment		98%		2%					
Land Cover Category	**IA**	**A (ha)**	**CN**	**A (ha)**	**CN**	**A (ha)**	**CN**	**A (ha)**	**CN**
Impervious	2		100		100				
Gravel	3	0.09	89		89				
Woodland	10		67		67				
Pasture/Lawns	5	0.46	74	0.01	74				
Meadows	8		71		71				
Cultivated	7		78		78				
Waterbody	12		50		50				
Average CN		76.48		74.00					
Average IA		4.67		5.00					

Notes

CN and IA values have been calculated for the pervious area of the catchment only.

Summary

Catchment CN:	76.4
Catchment IA (mm):	4.68

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Visual OTTHYMO Model
Parameter Calculations (StandHYD)

Project Details

South Fergus MESP	120157

Prepared By

Jonathan Paul	June 9, 2022

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Post Development Condition

Watershed:	Not within CA
Catchment ID:	222
Catchment Area (ha):	14.26
Impervious %:	66%
Pervious Area (ha):	4.85

Average Curve Number (CN) and Initial Abstraction (IA) for Pervious Area

Soil Symbol	**Hl**	**Lil**		
Soil Series	Harriston	Listowel		
Hydrologic Soils Group	BC	BC		
Soil Texture	Loam or Silt Loam	Loam or Silt Loam		
Runoff Coefficient Type	2	2		
Area (ha)	4.58	0.27		
Percentage of Catchment	95%	6%		

Land Cover Category	**IA**	**A (ha)**	**CN**	**A (ha)**	**CN**	**A (ha)**	**CN**	**A (ha)**	**CN**
Impervious	2		100		100				
Gravel	3		89		89				
Woodland	10		67		67				
Pasture/Lawns	5	4.58	74	0.27	74				
Meadows	8		71		71				
Cultivated	7		78		78				
Waterbody	12		50		50				
Average CN		74.00		74.00					
Average IA		5.00		5.00					

Notes

CN and IA values have been calculated for the pervious area of the catchment only.

Summary

Catchment CN:	74.0
Catchment IA (mm):	5.00

Visual OTTHYMO Model
Parameter Calculations (StandHYD)

Project Details

South Fergus MESP	120157

Prepared By

Jonathan Paul	June 9, 2022

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Post Development Condition

Watershed:	GRCA
Catchment ID:	223
Catchment Area (ha):	1.91
Impervious %:	40%
Pervious Area (ha):	1.15

Average Curve Number (CN) and Initial Abstraction (IA) for Pervious Area

Soil Symbol		**Hl**		**Lil**					
Soil Series		Harriston		Listowel					
Hydrologic Soils Group		BC		BC					
Soil Texture		Loam or Silt Loam		Loam or Silt Loam					
Runoff Coefficient Type		2		2					
Area (ha)		0.36		0.79					
Percentage of Catchment		31%		69%					
Land Cover Category	**IA**	**A (ha)**	**CN**	**A (ha)**	**CN**	**A (ha)**	**CN**	**A (ha)**	**CN**
Impervious	2		100		100				
Gravel	3		89	0.12	89				
Woodland	10		67		67				
Pasture/Lawns	5	0.36	74	0.68	74				
Meadows	8		71		71				
Cultivated	7		78		78				
Waterbody	12		50		50				
Average CN		74.00		76.18					
Average IA		5.00		4.71					

Notes

CN and IA values have been calculated for the pervious area of the catchment only.

Summary

Catchment CN:	75.5
Catchment IA (mm):	4.80

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Visual OTTHYMO Model
Parameter Calculations (StandHYD)

Project Details

South Fergus MESP	120157

Prepared By

Jonathan Paul	June 9, 2022

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Post Development Condition

Watershed:	GRCA
Catchment ID:	224
Catchment Area (ha):	2.58
Impervious %:	44%
Pervious Area (ha):	1.44

Average Curve Number (CN) and Initial Abstraction (IA) for Pervious Area

Soil Symbol		**HI**							
Soil Series		Harriston							
Hydrologic Soils Group		BC							
Soil Texture		Loam or Silt Loam							
Runoff Coefficient Type		2							
Area (ha)		1.44							
Percentage of Catchment		100%							
Land Cover Category	**IA**	**A (ha)**	**CN**	**A (ha)**	**CN**	**A (ha)**	**CN**	**A (ha)**	**CN**
Impervious	2		100						
Gravel	3		89						
Woodland	10	0.19	67						
Pasture/Lawns	5	1.25	74						
Meadows	8		71						
Cultivated	7		78						
Waterbody	12		50						
Average CN		73.08							
Average IA		5.66							

Notes

CN and IA values have been calculated for the pervious area of the catchment only.

Summary

Catchment CN:	73.1
Catchment IA (mm):	5.66

Visual OTTHYMO Model
Parameter Calculations (StandHYD)

Project Details

South Fergus MESP	120157

Prepared By

Jonathan Paul	June 9, 2022

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Post Development Condition

Watershed:	Not within CA
Catchment ID:	225
Catchment Area (ha):	14.21
Impervious %:	24%
Pervious Area (ha):	10.80

Average Curve Number (CN) and Initial Abstraction (IA) for Pervious Area

Soil Symbol	**Lil**	**Hl**		
Soil Series	Listowel	Harriston		
Hydrologic Soils Group	BC	BC		
Soil Texture	Loam or Silt Loam	Loam or Silt Loam		
Runoff Coefficient Type	2	2		
Area (ha)	2.03	8.77		
Percentage of Catchment	19%	81%		

Land Cover Category	**IA**	**A (ha)**	**CN**	**A (ha)**	**CN**	**A (ha)**	**CN**	**A (ha)**	**CN**
Impervious	2		100		100				
Gravel	3		89		89				
Woodland	10		67		67				
Pasture/Lawns	5	2.03	74	8.77	74				
Meadows	8		71		71				
Cultivated	7		78		78				
Waterbody	12		50		50				
Average CN		74.00		74.00					
Average IA		5.00		5.00					

Notes

CN and IA values have been calculated for the pervious area of the catchment only.

Summary

Catchment CN:	74.0
Catchment IA (mm):	5.00

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Visual OTTHYMO Model
Parameter Calculations (StandHYD)

Project Details

South Fergus MESP	120157

Prepared By

Jonathan Paul	June 9, 2022

Data Sources

Detailed Soil Survey Reports for Ontario, MTO Drainage Management Manual (1997)

Post Development Condition

Watershed:	GRCA
Catchment ID:	226
Catchment Area (ha):	8.53
Impervious %:	53%
Pervious Area (ha):	4.01

Average Curve Number (CN) and Initial Abstraction (IA) for Pervious Area

Soil Symbol		**HI**							
Soil Series		Harriston							
Hydrologic Soils Group		BC							
Soil Texture		Loam or Silt Loam							
Runoff Coefficient Type		2							
Area (ha)		4.01							
Percentage of Catchment		100%							
Land Cover Category	**IA**	**A (ha)**	**CN**	**A (ha)**	**CN**	**A (ha)**	**CN**	**A (ha)**	**CN**
Impervious	2		100						
Gravel	3		89						
Woodland	10		67						
Pasture/Lawns	5	4.01	74						
Meadows	8		71						
Cultivated	7		78						
Waterbody	12		50						
Average CN		74.00							
Average IA		5.00							

Notes

CN and IA values have been calculated for the pervious area of the catchment only.

Summary

Catchment CN:	74.0
Catchment IA (mm):	5.00

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CN* And AMC Conversion Calculation

Project Details

South Fergus - Prop. Conditions	120157

Prepared By

A. Trevers	June 18, 2021

Municipality

CN* Calculation Requirement

Yes

Precipitation threshold to create AMCIII soil moisture conditions (mm):	80.00
Initial Abstraction (Ia) (mm):	5.00

Catchment ID	AMC II CN	AMC I CN	AMC III CN	AMC III CN*	AMC II CN*	AMC I CN*
100	87.00	73.62	94.97	96.06	90.16	79.10
101	81.90	65.63	92.28	92.68	83.46	67.98
106	74.10	55.05	87.53	86.18	72.09	52.60
107	74.00	54.93	87.47	86.08	71.94	52.42
108	73.40	54.18	87.07	85.51	71.03	51.34
201	85.00	70.37	93.96	94.81	87.63	74.68
202	85.00	70.37	93.96	94.81	87.63	74.68
203	74.00	54.93	87.47	86.08	71.94	52.42
204	74.00	54.93	87.47	86.08	71.94	52.42
205	74.00	54.93	87.47	86.08	71.94	52.42
206	70.00	50.14	84.78	82.09	65.82	45.52
207	74.00	54.93	87.47	86.08	71.94	52.42
208	62.30	41.87	79.23	73.07	53.86	33.88
209	74.00	54.93	87.47	86.08	71.94	52.42
210	74.00	54.93	87.47	86.08	71.94	52.42

AMC Conversion is determined using equations derived from MTO Design Chart 1.10

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CN* And AMC Conversion Calculation

Project Details

South Fergus - Prop. Conditions	120157

Prepared By

A. Trevers	June 18, 2021

Municipality

CN* Calculation Requirement

Yes

Precipitation threshold to create AMCIII soil moisture conditions (mm): 80.00

Initial Abstraction (Ia) (mm): 5.00

Catchment ID	AMC II CN	AMC I CN	AMC III CN	AMC III CN*	AMC II CN*	AMC I CN*
211	74.00	54.93	87.47	86.08	71.94	52.42
212	73.90	54.80	87.40	85.99	71.79	52.23
214	72.80	53.45	86.68	84.93	70.12	50.28
215	77.80	59.85	89.87	89.46	77.61	59.59
216	50.00	30.52	69.37	54.39	34.56	18.43
217	50.00	30.52	69.37	54.39	34.56	18.43
218	50.00	30.52	69.37	54.39	34.56	18.43
219	50.00	30.52	69.37	54.39	34.56	18.43
220	71.40	51.77	85.74	83.54	67.98	47.86
221	76.40	57.99	89.00	88.26	75.54	56.87
222	74.00	54.93	87.47	86.08	71.94	52.42
223	75.50	56.82	88.43	87.46	74.20	55.17
224	73.10	53.82	86.87	85.22	70.57	50.81
225	74.00	54.93	87.47	86.08	71.94	52.42
226	74.00	54.93	87.47	86.08	71.94	52.42
227	80.70	63.88	91.60	91.78	81.78	65.46

AMC Conversion is determined using equations derived from MTO Design Chart 1.10

TATHAM
ENGINEERING

PROJECT	South Fergus MESP & Secondary Plan	FILE	120157
		DATE	3/3/2023
SUBJECT	Preliminary Stage-Storage SWM Pond 401	NAME	J. Paul
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Volume calculated using Average End Area Method

Top Elevation	409.00 m
Bottom Elevation	406.00 m
Permanent Pool	407.30 m

Stage	Depth (m)	Area (m^2)	Average Area (m^2)	Incremental Volume (m^3)	Cumulative Volume (m^3)	Active Storage (m^3)	
406.00	0.00	**1166**				0	
406.50	0.50	**1638**	1402	701	701	0	
407.00	1.00	**2232**	1935	968	1669	0	
407.10	1.10	2352	2292	229	1898	0	
407.20	1.20	2472	2412	241	2139	0	
407.30	1.30	2593	2533	253	2392	0	Perm pool (dead vol.)
407.40	1.40	2713	2653	265	2657	265	
407.50	1.50	**2833**	2773	277	2935	543	
407.60	1.60	2960	2897	290	3224	832	
407.70	1.70	3088	3024	302	3527	1135	
407.80	1.80	3215	3152	315	3842	1450	
407.90	1.90	3343	3279	328	4170	1778	Extended Detention
408.00	2.00	**3470**	3406	341	4511	2118	
408.10	2.10	3550	3510	351	4862	2469	Overflow Weir Sill
408.20	2.20	3630	3590	359	5221	2828	
408.30	2.30	3710	3670	367	5588	3195	
408.40	2.40	3790	3750	375	5963	3570	
408.50	2.50	**3870**	3830	383	6346	3953	
408.60	2.60	3953	3911	391	6737	4344	
408.70	2.70	4035	3994	399	7136	4744	
408.80	2.80	4118	4077	408	7544	5151	
408.90	2.90	4200	4159	416	7960	5567	
409.00	3.00	**4283**	4242	424	8384	5992	Top of Bank

Project:	South Fergus MESP & Secondary Plan
File No.:	120157
Date:	March 3, 2023
Designed By	JP
Checked By:	ARO
Subject:	Stage-Discharge Table SWM Pond 401

SWMF - Stage-Discharge Table

Primary Low Flow Outlet

Type	Orifice	Pipe
Diameter (mm)	125	750
Area (sq.m)	0.012272	0.441786
Coefficient	0.63	0.80
Invert (m)	407.3	407.3

Secondary Outlet/Overflow Spillway

Type	DICB	Spillway
Weir Length (m)	1.2	10
Sill Elevation (m)	407.9	408.1
Coefficient	1.70	1.63
Side Slope (H:V)	3	10

STAGE-DISCHARGE TABLE

Pond	Primary Low Flow Discharge				Secondary Outlet/Overflow Spillway Dischar				Total	OUTLET CONTROL
Water	Orifice		Pipe		DICB		Overflow Spillway		Pond	
Level	Head	Discharge	Head	Discharge	Head	Discharge	Head	Discharge	Discharge	
(m)	(m)	(cms)	(m)	(cms)	(m)	(cms)	(m)	(cms)	(cms)	
407.30	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.000	Orifice
407.40	0.04	0.007	0.10	0.018	0.00	0.000	0.00	0.000	0.007	Orifice
407.50	0.14	0.013	0.20	0.070	0.00	0.000	0.00	0.000	0.013	Orifice
407.60	0.24	0.017	0.30	0.149	0.00	0.000	0.00	0.000	0.017	Orifice
407.70	0.34	0.020	0.03	0.247	0.00	0.000	0.00	0.000	0.020	Orifice
407.80	0.44	0.023	0.13	0.553	0.00	0.000	0.00	0.000	0.023	Orifice
407.90	0.54	0.025	0.23	0.742	0.00	0.000	0.00	0.000	0.025	DICB
408.00	0.64	0.027	0.33	0.892	0.10	0.098	0.00	0.000	0.125	DICB
408.10	0.74	0.029	0.43	1.020	0.20	0.306	0.00	0.000	0.336	verflow Spillwa
408.20	0.84	0.031	0.53	1.134	0.30	0.630	0.10	0.567	1.229	verflow Spillwa
408.30	0.94	0.033	0.63	1.237	0.40	1.070	0.20	1.749	2.853	verflow Spillwa
408.40	1.04	0.035	0.73	1.332	0.50	1.625	0.30	3.482	4.814	verflow Spillwa
408.50	1.14	0.037	0.83	1.421	0.60	2.296	0.40	5.773	7.194	verflow Spillwa
408.60	1.24	0.038	0.93	1.505	0.70	3.083	0.50	8.644	10.149	verflow Spillwa
408.70	1.34	0.040	1.03	1.584	0.80	3.986	0.60	12.121	13.705	verflow Spillwa
408.80	1.44	0.041	1.13	1.660	0.90	5.004	0.70	16.229	17.888	verflow Spillwa
408.90	1.54	0.042	1.23	1.732	1.00	6.138	0.80	20.994	22.726	verflow Spillwa
409.00	1.64	0.044	1.33	1.801	1.10	7.387	0.90	26.443	28.244	verflow Spillwa

TATHAM ENGINEERING

PROJECT South Fergus MESP & Secondary Plan
SUBJECT Stage-Storage-Discharge Table - SWM Pond 401
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SWM Pond 401: Stage-Storage-Discharge Table

Elevation (m)	Outlet Structure Design Discharge (m^3/s)	Overflow Weir Design Discharge (m^3/s)	Total Discharge (m^3/s)	Storage m^3
407.30	0.000	0.000	0.000	0
407.40	0.007	0.000	0.007	265
407.50	0.013	0.000	0.013	543
407.60	0.017	0.000	0.017	832
407.70	0.020	0.000	0.020	1,135
407.80	0.023	0.000	0.023	1,450
407.90	0.025	0.000	0.025	1,778
408.00	0.125	0.000	0.125	2,118
408.10	0.336	0.000	0.336	2,469
408.20	0.662	0.567	1.229	2,828
408.30	1.103	1.749	2.853	3,195
408.40	1.332	3.482	4.814	3,570
408.50	1.421	5.773	7.194	3,953
408.60	1.505	8.644	10.149	4,344
408.70	1.584	12.121	13.705	4,744
408.80	1.660	16.229	17.888	5,151
408.90	1.732	20.994	22.726	5,567
409.00	1.801	26.443	28.244	5,992

Notes: (1) Pond dead storage (permanent pool) volume = 2,392 m^3

TATHAM ENGINEERING	PROJECT	South Fergus MESP & Secondary Plan	FILE 120157
			DATE 3/3/2023
	SUBJECT	Proposed Pond Operating Conditions	NAME Jonathan Paul
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SWM Pond 401: Proposed Operating Conditions

24-Hour SCS Design Storms

Design Storm	Discharge (m^3/s)	Stage (m)	Storage (m^3)
2-year	0.057	407.93	1888
5-year	0.217	408.04	2272
10-year	0.449	408.11	2518
25-year	1.005	408.18	2742
50-year	1.421	408.23	2922
100-year	1.785	408.26	3042

12-Hour SCS & Hazel Design Storms

Design Storm	Discharge (m^3/s)	Stage (m)	Storage (m^3)
2-year	0.029	407.90	1790
5-year	0.134	408.01	2136
10-year	0.256	408.06	2338
25-year	0.592	408.13	2584
50-year	0.966	408.17	2723
100-year	1.309	408.21	2882
Hazel	0.894	408.16	2695

4-Hour Chicago Design Storms

Design Storm	Discharge (m^3/s)	Stage (m)	Storage (m^3)
25mm	0.018	407.63	921
2-year	0.022	407.78	1379
5-year	0.053	407.93	1872
10-year	0.088	407.96	1993
25-year	0.150	408.01	2160
50-year	0.218	408.04	2274
100-year	0.294	408.08	2402

TATHAM ENGINEERING

PROJECT South Fergus MESP & Secondary Plan

SUBJECT Preliminary Stage-Storage SWM Pond 402

FILE 120157

DATE 3/3/2023

NAME J. Paul

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Volume calculated using Average End Area Method

Top Elevation	408.30	m
Bottom Elevation	406.00	m
Permanent Pool	407.30	m

Stage	Depth (m)	Area (m^2)	Average Area (m^2)	Incremental Volume (m^3)	Cumulative Volume (m^3)	Active Storage (m^3)	
406.00	0.00	**1373**				0	
406.50	0.50	**1580**	1477	738	738	0	
407.00	1.00	**3451**	2516	1258	1996	0	
407.10	1.10	3675	3563	356	2352	0	
407.20	1.20	3900	3788	379	2731	0	
407.30	1.30	4124	4012	401	3132	0	Perm pool (dead vol.)
407.40	1.40	4349	4236	424	3556	424	
407.50	1.50	**4573**	4461	446	4002	870	
407.60	1.60	4788	4681	468	4470	1338	Extended Detention (407.55
407.70	1.70	5003	4896	490	4960	1827	
407.80	1.80	5218	5111	511	5471	2338	
407.90	1.90	5433	5326	533	6003	2871	Overflow Weir Sill
408.00	2.00	**5648**	5541	554	6557	3425	
408.10	2.10	5781	5715	571	7129	3996	
408.20	2.20	5914	5848	585	7713	4581	
408.30	2.30	6047	5981	598	8312	5179	
408.40	2.40	6180	6114	611	8923	5791	
408.50	2.50	**6313**	6247	625	9548	6415	Top of Bank

TATHAM ENGINEERING

Project:	South Fergus MESP & Secondary Plan
File No.:	120157
Date:	March 3, 2023
Designed By	JP
Checked By:	ARO
Subject:	Stage-Discharge Table SWM Pond 402

SWMF - Stage-Discharge Table

Primary Low Flow Outlet

Type	Orifice	Pipe
Diameter (mm)	100	750
Area (sq.m)	0.007854	0.441786
Coefficient	0.63	0.80
Invert (m)	407.3	407.3

Secondary Outlet/Overflow Spillway

Type	DICB	Spillway
Weir Length (m)	1.2	10
Sill Elevation (m)	407.55	407.9
Coefficient	1.70	1.63
Side Slope (H:V)	3	10

STAGE-DISCHARGE TABLE

Pond	Primary Low Flow Discharge				Secondary Outlet/Overflow Spillway Discha				Total	OUTLET CONTROL
Water	Orifice		Pipe		DICB		Overflow Spillway		Pond	
Level	Head	Discharge	Head	Discharge	Head	Discharge	Head	Discharge	Discharge	
(m)	(m)	(cms)	(m)	(cms)	(m)	(cms)	(m)	(cms)	(cms)	
407.30	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.000	Orifice
407.40	0.05	0.005	0.10	0.018	0.00	0.000	0.00	0.000	0.005	Orifice
407.50	0.15	0.008	0.20	0.070	0.00	0.000	0.00	0.000	0.008	Orifice
407.60	0.25	0.011	0.30	0.149	0.05	0.023	0.00	0.000	0.034	DICB
407.70	0.35	0.013	0.03	0.247	0.15	0.130	0.00	0.000	0.143	DICB
407.80	0.45	0.015	0.13	0.553	0.25	0.297	0.00	0.000	0.312	DICB
407.90	0.55	0.016	0.23	0.742	0.35	0.521	0.00	0.000	0.537	Overflow Spillway
408.00	0.65	0.018	0.33	0.892	0.45	0.800	0.10	0.534	1.352	Overflow Spillway
408.10	0.75	0.019	0.43	1.020	0.55	1.137	0.20	1.661	2.681	Overflow Spillway
408.20	0.85	0.020	0.53	1.134	0.65	1.532	0.30	3.306	4.440	Overflow Spillway
408.30	0.95	0.021	0.63	1.237	0.75	1.986	0.40	5.475	6.712	Overflow Spillway
408.40	1.05	0.022	0.73	1.332	0.85	2.503	0.50	8.190	9.522	Overflow Spillway
408.50	1.15	0.023	0.83	1.421	0.95	3.083	0.60	11.435	12.856	Overflow Spillway

TATHAM ENGINEERING

PROJECT	South Fergus MESP & Secondary Plan	FILE	120157
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SUBJECT	Stage-Storage-Discharge Table - SWM Pond 402	NAME	Jonathan Paul
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SWM Pond 402: Stage-Storage-Discharge Table

Elevation (m)	Outlet Structure Design Discharge (m^3/s)	Overflow Weir Design Discharge (m^3/s)	Total Discharge (m^3/s)	Storage m^3
407.30	0.000	0.000	0.000	0
407.40	0.005	0.000	0.005	424
407.50	0.008	0.000	0.008	870
407.60	0.011	0.000	0.034	1,338
407.70	0.013	0.000	0.143	1,827
407.80	0.015	0.000	0.312	2,338
407.90	0.537	0.000	0.537	2,871
408.00	0.818	0.534	1.352	3,425
408.10	1.020	1.661	2.681	3,996
408.20	1.134	3.306	4.440	4,581
408.30	1.237	5.475	6.712	5,179
408.40	1.332	8.190	9.522	5,791
408.50	1.421	11.435	12.856	6,415

Notes: (1) Pond dead storage (permanent pool) volume = 3,132 m^3

TATHAM ENGINEERING

PROJECT South Fergus MESP & Secondary Plan
SUBJECT Stage-Storage-Discharge Table - SWM Pond 402
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NAME Jonathan Paul
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SWM Pond 402: Proposed Operating Conditions

24-Hour SCS Design Storms

Design Storm	Discharge (m^3/s)	Stage (m)	Storage (m^3)
2-year	0.084	407.65	1561
5-year	0.221	407.75	2065
10-year	0.337	407.81	2399
25-year	0.510	407.89	2809
50-year	0.817	407.94	3071
100-year	1.125	407.97	3279

12-Hour SCS & Hazel Design Storms

Design Storm	Discharge (m^3/s)	Stage (m)	Storage (m^3)
2-year	0.047	407.61	1396
5-year	0.142	407.70	1824
10-year	0.236	407.76	2111
25-year	0.367	407.83	2472
50-year	0.479	407.88	2739
100-year	0.689	407.92	2985
Hazel	1.055	407.96	3223

4-Hour Chicago Design Storms

Design Storm	Discharge (m^3/s)	Stage (m)	Storage (m^3)
25mm	0.007	407.30	676
2-year	0.021	407.62	1095
5-year	0.061	407.79	1457
10-year	0.096	407.66	1615
25-year	0.148	407.70	1842
50-year	0.203	407.74	2009
100-year	0.261	407.77	2186

TATHAM ENGINEERING

PROJECT	South Fergus MESP & Secondary Plan	FILE	120157
		DATE	6/9/2022
SUBJECT	Preliminary Stage-Storage SWM Pond 403	NAME	J. Paul
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Volume calculated using Average End Area Method

Top Elevation	410.20 m
Bottom Elevation	407.00 m
Permanent Pool	408.30 m

Stage	Depth (m)	Area (m^2)	Average Area (m^2)	Incremental Volume (m^3)	Cumulative Volume (m^3)	Active Storage (m^3)	
407.00	0.00	**3576**				0	
407.50	0.50	**4753**	4165	2082	2082	0	
408.00	1.00	**6017**	5385	2693	4775	0	
408.10	1.10	6273	6145	615	5389	0	
408.20	1.20	6529	6401	640	6029	0	
408.30	1.30	6786	6658	666	6695	0	Perm pool (dead vol.)
408.40	1.40	7042	6914	691	7387	691	
408.50	1.50	**7298**	7170	717	8104	1408	
408.60	1.60	7551	7424	742	8846	2151	
408.70	1.70	7804	7677	768	9614	2919	
408.80	1.80	8056	7930	793	10407	3712	Extended Detention (408.85
408.90	1.90	8309	8183	818	11225	4530	ED Volume 4121
409.00	2.00	**8562**	8436	844	12069	5373	
409.10	2.10	8740	8651	865	12934	6238	
409.20	2.20	8918	8829	883	13817	7121	
409.30	2.30	9097	9008	901	14717	8022	
409.40	2.40	9275	9186	919	15636	8941	
409.50	2.50	**9453**	9364	936	16572	9877	Overflow Weir Sill
409.60	2.60	9580	9516	952	17524	10829	
409.70	2.70	9706	9643	964	18488	11793	
409.80	2.80	9833	9770	977	19465	12770	
409.90	2.90	9959	9896	990	20455	13760	
410.00	3.00	**10086**	10023	1002	21457	14762	
410.10	3.10	10215	10151	1015	22472	15777	
410.20	3.20	10345	10280	1028	23500	16805	
410.30	3.30	10474	10410	1041	24541	17846	
410.40	3.40	10604	10539	1054	25595	18900	
410.50	3.50	**10733**	10668	1067	26662	19967	Top of Bank

Notes:

TATHAM ENGINEERING	**Project:**	South Fergus MESP & Secondary Plan
	File No.:	120157
	Date:	June 9, 2022
	Designed By	JP
	Checked By:	ARO
	Subject:	Stage-Discharge Table SWM Pond 403

SWMF - Stage-Discharge Table

Primary Low Flow Outlet		
Type	Orifice	Pipe
Diameter (mm)	175	900
Area (sq.m)	0.024053	0.636173
Coefficient	0.63	0.80
Invert (m)	408.3	408.3

Secondary Outlet/Overflow Spillway		
Type	DICB	Spillway
Weir Length (m)	1.2	18
Sill Elevation (m)	408.85	409.5
Coefficient	1.70	1.63
Side Slope (H:V)	3	10

STAGE-DISCHARGE TABLE

Pond Water Level (m)	Primary Low Flow Discharge				Secondary Outlet/Overflow Spillway Discha				Total Pond Discharge (cms)	OUTLET CONTROL
	Orifice		Pipe		DICB		Overflow Spillway			
	Head (m)	Discharge (cms)	Head (m)	Discharge (cms)	Head (m)	Discharge (cms)	Head (m)	Discharge (cms)		
408.30	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.000	Orifice
408.40	0.01	0.008	0.10	0.020	0.00	0.000	0.00	0.000	0.008	Orifice
408.50	0.11	0.023	0.20	0.078	0.00	0.000	0.00	0.000	0.023	Orifice
408.60	0.21	0.031	0.30	0.168	0.00	0.000	0.00	0.000	0.031	Orifice
408.70	0.31	0.038	0.40	0.285	0.00	0.000	0.00	0.000	0.038	Orifice
408.80	0.41	0.043	0.05	0.504	0.00	0.000	0.00	0.000	0.043	Orifice
408.90	0.51	0.048	0.15	0.873	0.05	0.037	0.00	0.000	0.085	DICB
409.00	0.61	0.053	0.25	1.127	0.15	0.188	0.00	0.000	0.240	DICB
409.10	0.71	0.057	0.35	1.333	0.25	0.454	0.00	0.000	0.510	DICB
409.20	0.81	0.060	0.45	1.511	0.35	0.836	0.00	0.000	0.896	DICB
409.30	0.91	0.064	0.55	1.671	0.45	1.333	0.00	0.000	1.397	DICB
409.40	1.01	0.068	0.65	1.817	0.55	1.946	0.00	0.000	1.817	Pipe
409.50	1.11	0.071	0.75	1.951	0.65	2.675	0.00	0.000	1.951	verflow Spillwa
409.60	1.21	0.074	0.85	2.077	0.75	3.520	0.10	0.979	3.057	verflow Spillwa
409.70	1.31	0.077	0.95	2.196	0.85	4.480	0.20	2.916	5.112	verflow Spillwa
409.80	1.41	0.080		2.309	0.95	5.556	0.30	5.625	7.933	verflow Spillwa
409.90	1.51	0.083	1.15		1.05	6.748	0.40	9.072	15.902	verflow Spillwa
410.00	1.61	0.085	1.25	2.519	1.15	8.055	0.50	13.255	15.774	verflow Spillwa
410.10	1.71	0.088	1.35	2.618	1.25	9.478	0.60	18.181	20.799	verflow Spillwa
410.20	1.81	0.090	1.45	2.713	1.35	11.017	0.70	23.866	26.579	verflow Spillwa
410.30	1.91	0.093	1.55	2.805	1.45	12.672	0.80	30.325	33.130	verflow Spillwa
410.40	2.01	0.095	1.65	2.894	1.55	14.442	0.90	37.576	40.471	verflow Spillwa
410.50	2.11	0.098	1.75	2.981	1.65	16.328	1.00	45.640	48.621	verflow Spillwa

TATHAM ENGINEERING

PROJECT	South Fergus MESP and Secondary Plan	FILE	120157
		DATE	6/9/2022
SUBJECT	Stage-Storage-Discharge Table SWMF 403	NAME	J. Paul
		PAGE	1 OF 1

SWM Pond 403: Stage-Storage-Discharge Table

Elevation (m)	Outlet Structure Design Discharge (m^3/s)	Overflow Weir Design Discharge (m^3/s)	Total Discharge (m^3/s)	Storage m^3
408.30	0.000	0.000	0.000	0
408.40	0.008	0.000	0.008	691
408.50	0.023	0.000	0.023	1,408
408.60	0.031	0.000	0.031	2,151
408.70	0.038	0.000	0.038	2,919
408.80	0.043	0.000	0.043	3,712
408.90	0.085	0.000	0.085	4,530
409.00	0.240	0.000	0.240	5,373
409.10	0.510	0.000	0.510	6,238
409.20	0.896	0.000	0.896	7,121
409.30	1.397	0.000	1.397	8,022
409.40	1.817	0.000	1.817	8,941
409.50	1.951	0.000	1.951	9,877
409.60	2.077	0.979	3.057	10,829
409.70	2.196	2.916	5.112	11,793
409.80	2.309	5.625	7.933	12,770
409.90	6.830	9.072	15.902	13,760
410.00	2.519	13.255	15.774	14,762
410.10	2.618	18.181	20.799	15,777
410.20	2.713	23.866	26.579	16,805
410.30	2.805	30.325	33.130	17,846
410.40	2.894	37.576	40.471	18,900
410.50	2.981	45.640	48.621	19,967

Notes:

TATHAM
ENGINEERING

PROJECT	South Fergus MESP and Secondary Plan	FILE	120157
		DATE	6/9/2022
SUBJECT	Proposed Pond Operating Conditions	NAME	Jonathan Paul
		PAGE	1 OF 1

SWM Pond 403: Proposed Operating Conditions

24-Hour SCS Design Storms

Design Storm	Discharge (m^3/s)	Stage (m)	Storage (m^3)
2-year	0.125	408.93	4746
5-year	0.393	409.06	5866
10-year	0.645	409.14	6549
25-year	1.057	409.23	7415
50-year	1.409	409.31	8078
100-year	1.769	409.39	8852

12-Hour SCS & Hazel Design Storms

Design Storm	Discharge (m^3/s)	Stage (m)	Storage (m^3)
2-year	0.076	408.88	4363
5-year	0.243	409	5385
10-year	0.445	409.08	6034
25-year	0.739	409.16	6765
50-year	1.005	409.22	7326
100-year	1.319	409.29	7891
Hazel	1.823	409.4	8987

4-Hour Chicago Design Storms

Design Storm	Discharge (m^3/s)	Stage (m)	Storage (m^3)
25mm	0.032	408.62	2332
2-year	0.041	408.77	3465
5-year	0.103	408.91	4633
10-year	0.178	408.96	5035
25-year	0.287	409.02	5524
50-year	0.395	409.06	5871
100-year	0.511	409.1	6245

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PROJECT South Fergus MESP & Secondary Plan
SUBJECT Preliminary Stage-Storage SWM Pond 404
FILE 120157
DATE 3/3/2023
NAME J. Paul
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Volume calculated using Average End Area Method

Top Elevation	413.30	m
Bottom Elevation	409.80	m
Permanent Pool	410.90	m

Stage	**Depth (m)**	**Area (m^2)**	**Average Area (m^2)**	**Incremental Volume (m^3)**	**Cumulative Volume (m^3)**	**Active Storage (m^3)**	
409.80	0.00	**7612**				0	
410.30	0.50	**9472**	8542	4271	4271	0	
410.80	1.00	**11464**	10468	5234	9505	0	
410.90	1.10	11870	11667	1167	10672	0	Perm pool (dead vol.)
411.00	1.20	12276	12073	1207	11879	1207	
411.10	1.30	12683	12480	1248	13127	2455	
411.20	1.40	13089	12886	1289	14416	3744	
411.30	1.50	**13495**	13292	1329	15745	5073	
411.40	1.60	13905	13700	1370	17115	6443	Extended Detention
411.50	1.70	14315	14110	1411	18526	7854	
411.60	1.80	14724	14520	1452	19978	9306	
411.70	1.90	15134	14929	1493	21471	10799	
411.80	2.00	**15544**	15339	1534	23005	12333	
411.90	2.10	15707	15626	1563	24567	13895	
412.00	2.20	15870	15789	1579	26146	15474	
412.10	2.30	16033	15952	1595	27741	17069	
412.20	2.40	16196	16115	1611	29353	18681	
412.30	2.50	**16359**	16278	1628	30980	20309	
412.40	2.60	16524	16442	1644	32624	21953	
412.50	2.70	16690	16607	1661	34285	23613	
412.60	2.80	16855	16773	1677	35962	25291	Overflow Weir Sill (412.55)
412.70	2.90	17021	16938	1694	37656	26984	
412.80	3.00	**17186**	17103	1710	39367	28695	
412.90	3.10	17354	17270	1727	41093	30422	
413.00	3.20	17522	17438	1744	42837	32166	
413.10	3.30	17689	17606	1761	44598	33926	
413.20	3.40	17857	17773	1777	46375	35703	
413.30	3.50	**18025**	17941	1794	48169	37498	

Notes:

TATHAM ENGINEERING

Project: South Fergus MESP & Secondary Plan
File No.: 120157
Date: March 3, 2023
Designed By JP
Checked By: ARO
Subject: Stage-Discharge Table SWM Pond 404

SWMF - Stage-Discharge Table

Primary Low Flow Outlet

Type	Orifice	Pipe
Diameter (mm)	203.2	750
Area (sq.m)	0.032429	0.441786
Coefficient	0.63	0.80
Invert (m)	410.9	410.9

Secondary Outlet/Overflow Spillway

Type	DICB	Spillway
Weir Length (m)	1.2	25
Sill Elevation (m)	411.4	412.55
Coefficient	1.70	1.63
Side Slope (H:V)	3	10

STAGE-DISCHARGE TABLE

Pond Water Level (m)	Primary Low Flow Discharge				Secondary Outlet/Overflow Spillway Dischar				Total Pond Discharge (cms)	OUTLET CONTROL
	Orifice		Pipe		DICB		Overflow Spillway			
	Head (m)	Discharge (cms)	Head (m)	Discharge (cms)	Head (m)	Discharge (cms)	Head (m)	Discharge (cms)		
410.90	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.000	Orifice
411.00	0.10	0.008	0.10	0.018	0.00	0.000	0.00	0.000	0.008	Orifice
411.10	0.10	0.028	0.20	0.070	0.00	0.000	0.00	0.000	0.028	Orifice
411.20	0.20	0.040	0.30	0.149	0.00	0.000	0.00	0.000	0.040	Orifice
411.30	0.30	0.049	0.03	0.247	0.00	0.000	0.00	0.000	0.049	Orifice
411.40	0.40	0.057	0.13	0.553	0.00	0.000	0.00	0.000	0.057	DICB
411.50	0.50	0.064	0.23	0.742	0.10	0.098	0.00	0.000	0.162	DICB
411.60	0.60	0.070	0.33	0.892	0.20	0.306	0.00	0.000	0.376	DICB
411.70	0.70	0.076	0.43	1.020	0.30	0.630	0.00	0.000	0.706	DICB
411.80	0.80	0.081	0.53	1.134	0.40	1.070	0.00	0.000	1.134	Pipe
411.90	0.90	0.086	0.63	1.237	0.50	1.625	0.00	0.000	1.237	Pipe
412.00	1.00	0.090	0.73	1.332	0.60	2.296	0.00	0.000	1.332	Pipe
412.10	1.10	0.095	0.83	1.421	0.70	3.083	0.00	0.000	1.421	Pipe
412.20	1.20	0.099	0.93	1.505	0.80	3.986	0.00	0.000	1.505	Pipe
412.30	1.30	0.103	1.03	1.584	0.90	5.004	0.00	0.000	1.584	Pipe
412.40	1.40	0.107	1.13	1.660	1.00	6.138	0.00	0.000	1.660	Pipe
412.50	1.50	0.111	1.23	1.732	1.10	7.387	0.00	0.000	1.732	Pipe
412.60	1.60	0.114	1.33	1.801	1.20	8.752	0.05	0.465	2.266	verflow Spillwa
412.70	1.70	0.118	1.43	1.868	1.30	10.233	0.15	2.509	4.377	verflow Spillwa
412.80	1.80	0.121	1.53	1.932	1.40	11.830	0.25	5.603	7.535	verflow Spillwa
412.90	1.90	0.125	1.63	1.995	1.50	13.542	0.35	9.619	11.614	verflow Spillwa
413.00	2.00	0.128	1.73	2.055	1.60	15.370	0.45	14.515	16.570	verflow Spillwa
413.10	2.10	0.131	1.83	2.114	1.70	17.314	0.55	20.278	22.392	verflow Spillwa
413.20	2.20	0.134	1.93	2.171	1.80	19.373	0.65	26.907	29.078	verflow Spillwa
413.30	2.30	0.137	2.03	2.227	1.90	21.548	0.75	34.408	36.635	verflow Spillwa

TATHAM ENGINEERING

PROJECT	South Fergus MESP and Secondary Plan	FILE	120157
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SUBJECT	Stage-Storage-Discharge Table SWMF 404	NAME	J. Paul
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SWM Pond 404: Stage-Storage-Discharge Table

Elevation (m)	Outlet Structure Design Discharge (m^3/s)	Overflow Weir Design Discharge (m^3/s)	Total Discharge (m^3/s)	Storage m^3
410.90	0.000	0.000	0.000	0
411.00	0.008	0.000	0.008	1,207
411.10	0.028	0.000	0.028	2,455
411.20	0.040	0.000	0.040	3,744
411.30	0.049	0.000	0.049	5,073
411.40	0.057	0.000	0.057	6,443
411.50	0.162	0.000	0.162	7,854
411.60	0.376	0.000	0.376	9,306
411.70	0.706	0.000	0.706	10,799
411.80	1.134	0.000	1.134	12,333
411.90	1.237	0.000	1.237	13,895
412.00	1.332	0.000	1.332	15,474
412.10	1.421	0.000	1.421	17,069
412.20	1.505	0.000	1.505	18,681
412.30	1.584	0.000	1.584	20,309
412.40	1.660	0.000	1.660	21,953
412.50	1.732	0.000	1.732	23,613
412.60	1.801	0.465	2.266	25,291
412.70	1.868	2.509	4.377	26,984
412.80	1.932	5.603	7.535	28,695
412.90	1.995	9.619	11.614	30,422
413.00	2.055	14.515	16.570	32,166
413.10	2.114	20.278	22.392	33,926
413.20	2.171	26.907	29.078	35,703
413.30	2.227	34.408	36.635	37,498

Notes: (1) Pond dead storage (permanent pool) volume = 10,672 m^3

TATHAM ENGINEERING

PROJECT	South Fergus MESP and Secondary Plan	FILE	120157
		DATE	3/3/2023
SUBJECT	Proposed Pond Operating Conditions	NAME	J. Paul
		PAGE	1 OF 1

SWM Pond 404: Proposed Operating Conditions

24-Hour SCS Design Storms

Design Storm	Discharge (m^3/s)	Stage (m)	Storage (m^3)
2-year	0.342	411.68	10563
5-year	0.963	411.86	13280
10-year	1.226	411.99	15309
25-year	1.402	412.18	18356
50-year	1.527	412.33	20783
100-year	1.641	412.48	23226

12-Hour SCS & Hazel Design Storms

Design Storm	Discharge (m^3/s)	Stage (m)	Storage (m^3)
2-year	0.207	411.62	9619
5-year	0.615	411.77	11914
10-year	1.023	411.87	13502
25-year	1.257	412.02	15831
50-year	1.374	412.15	17883
100-year	1.488	412.28	20004
Hazel	4.005	412.77	28120

4-Hour Chicago Design Storms

Design Storm	Discharge (m^3/s)	Stage (m)	Storage (m^3)
25mm	0.040	411.30	5115
2-year	0.057	411.50	7785
5-year	0.267	411.65	10047
10-year	0.420	411.71	11003
25-year	0.664	411.79	12138
50-year	0.896	411.84	13025
100-year	1.138	411.90	13959

TATHAM ENGINEERING

PROJECT	South Fergus MESP & Secondary Plan	FILE	120157
		DATE	3/3/2023
SUBJECT	Preliminary Stage-Storage SWM Pond 405	NAME	J. Paul
		PAGE	1 OF 1

Volume calculated using Average End Area Method

Top Elevation	419.70	m
Bottom Elevation	416.20	m
Permanent Pool	417.50	m

Stage	**Depth (m)**	**Area (m^2)**	**Average Area (m^2)**	**Incremental Volume (m^3)**	**Cumulative Volume (m^3)**	**Active Storage (m^3)**	
416.20	0.00	**3450**				0	
416.70	0.50	**4545**	3998	1999	1999	0	
417.20	1.00	**4643**	4594	2297	4296	0	
417.30	1.10	5100	4871	487	4783	0	
417.40	1.20	5557	5328	533	5316	0	
417.50	1.30	6013	5785	579	5894	0	Perm pool (dead vol.)
417.60	1.40	6470	6242	624	6518	624	
417.70	1.50	**6927**	6699	670	7188	1294	
417.80	1.60	7145	7036	704	7892	1998	
417.90	1.70	7364	7255	725	8617	2723	
418.00	1.80	7582	7473	747	9365	3470	
418.10	1.90	7801	7691	769	10134	4240	
418.20	2.00	**8019**	7910	791	10925	5031	
418.30	2.10	8190	8105	810	11735	5841	
418.40	2.20	8361	8276	828	12563	6669	Extended Detention
418.50	2.30	8533	8447	845	13407	7513	
418.60	2.40	8704	8618	862	14269	8375	
418.70	2.50	**8875**	8789	879	15148	9254	Overflow Weir Sill
418.80	2.60	9004	8940	894	16042	10148	
418.90	2.70	9134	9069	907	16949	11055	
419.00	2.80	9263	9199	920	17869	11975	
419.10	2.90	9393	9328	933	18802	12908	100yr WL (419.05)
419.20	3.00	**9522**	9457	946	19748	13853	
419.30	3.10	9654	9588	959	20706	14812	
419.40	3.20	9787	9721	972	21678	15784	
419.50	3.30	9919	9853	985	22664	16769	
419.60	3.40	10052	9985	999	23662	17768	
419.70	3.50	**10184**	10118	1012	24674	18780	Top of Berm

Notes:

TATHAM ENGINEERING		
	Project:	South Fergus MESP & Secondary Plan
	File No.:	120157
	Date:	Friday, March 3, 2023
	Designed By	JP
	Checked By:	ARO
	Subject:	Stage-Discharge Table SWM Pond 405

SWMF - Stage-Discharge Table

Primary Low Flow Outlet

Type	Orifice	Pipe
Diameter (mm)	203.2	700
Area (sq.m)	0.032429	0.384845
Coefficient	0.63	0.80
Invert (m)	417.5	417.5

Secondary Outlet/Overflow Spillway

Type	DICB	Spillway
Weir Length (m)	1.2	18
Sill Elevation (m)	418.4	418.7
Coefficient	1.70	1.63
Side Slope (H:V)	3	10

STAGE-DISCHARGE TABLE

Pond	Primary Low Flow Discharge				Secondary Outlet/Overflow Spillway Dischar				Total	OUTLET CONTROL
Water	Orifice		Pipe		Manhole Weir		Overflow Spillway		Pond	
Level	Head	Discharge	Head	Discharge	Head	Discharge	Head	Discharge	Discharge	
(m)	(m)	(cms)	(m)	(cms)	(m)	(cms)	(m)	(cms)	(cms)	
417.50	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.000	Orifice
417.60	0.10	0.008	0.10	0.018	0.00	0.000	0.00	0.000	0.008	Orifice
417.70	0.10	0.028	0.20	0.067	0.00	0.000	0.00	0.000	0.028	Orifice
417.80	0.20	0.040	0.30	0.142	0.00	0.000	0.00	0.000	0.040	Orifice
417.90	0.30	0.049	0.05	0.305	0.00	0.000	0.00	0.000	0.049	Orifice
418.00	0.40	0.057	0.15	0.528	0.00	0.000	0.00	0.000	0.057	Orifice
418.10	0.50	0.064	0.25	0.682	0.00	0.000	0.00	0.000	0.064	Orifice
418.20	0.60	0.070	0.35	0.806	0.00	0.000	0.00	0.000	0.070	Orifice
418.30	0.70	0.076	0.45	0.914	0.00	0.000	0.00	0.000	0.076	Orifice
418.40	0.80	0.081	0.55	1.011	0.00	0.000	0.00	0.000	0.081	Manhole Weir
418.50	0.90	0.086	0.65	1.099	0.10	0.098	0.00	0.000	0.184	Manhole Weir
418.60	1.00	0.090	0.75	1.180	0.20	0.306	0.00	0.000	0.397	Manhole Weir
418.70	1.10	0.095	0.85	1.257	0.30	0.630	0.00	0.000	0.725	Overflow Spillwa
418.80	1.20	0.099	0.95	1.329	0.40	1.070	0.10	0.979	2.148	Overflow Spillwa
418.90	1.30	0.103	1.05	1.397	0.50	1.625	0.20	2.916	4.313	Overflow Spillwa
419.00	1.40	0.107	1.15	1.462	0.60	2.296	0.30	5.625	7.086	Overflow Spillwa
419.10	1.50	0.111	1.25	1.524	0.70	3.083	0.40	9.072	10.596	Overflow Spillwa
419.20	1.60	0.114	1.35	1.584	0.80	3.986	0.50	13.255	14.838	Overflow Spillwa
419.30	1.70	0.118	1.45	1.641	0.90	5.004	0.60	18.181	19.823	Overflow Spillwa
419.40	1.80	0.121	1.55	1.697	1.00	6.138	0.70	23.866	25.563	Overflow Spillwa
419.50	1.90	0.125	1.65	1.751	1.10	7.387	0.80	30.325	32.075	Overflow Spillwa
419.60	2.00	0.128	1.75	1.803	1.20	8.752	0.90	37.576	39.380	Overflow Spillwa
419.70	2.10	0.131	1.85	1.854	1.30	10.233	1.00	45.640	47.494	Overflow Spillwa

TATHAM ENGINEERING

PROJECT South Fergus MESP and Secondary Plan
SUBJECT Stage-Storage-Discharge Table SWMF 405
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NAME J. Paul
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SWM Pond 405: Stage-Storage-Discharge Table

Elevation (m)	Outlet Structure Design Discharge (m^3/s)	Overflow Weir Design Discharge (m^3/s)	Total Discharge (m^3/s)	Storage m^3
417.50	0.000	0.000	0.000	0
417.60	0.008	0.000	0.008	624
417.70	0.028	0.000	0.028	1,294
417.80	0.040	0.000	0.040	1,998
417.90	0.049	0.000	0.049	2,723
418.00	0.057	0.000	0.057	3,470
418.10	0.064	0.000	0.064	4,240
418.20	0.070	0.000	0.070	5,031
418.30	0.076	0.000	0.076	5,841
418.40	0.081	0.000	0.081	6,669
418.50	0.184	0.000	0.184	7,513
418.60	0.397	0.000	0.397	8,375
418.70	0.725	0.000	0.725	9,254
418.80	1.169	0.979	2.148	10,148
418.90	1.397	2.916	4.313	11,055
419.00	1.462	5.625	7.086	11,975
419.10	1.524	9.072	10.596	12,908
419.20	1.584	13.255	14.838	13,853
419.30	1.641	18.181	19.823	14,812
419.40	1.697	23.866	25.563	15,784
419.50	1.751	30.325	32.075	16,769
419.60	1.803	37.576	39.380	17,768
419.70	1.854	45.640	47.494	18,780

Notes:

TATHAM
ENGINEERING

PROJECT	South Fergus MESP and Secondary Plan	FILE	120157
		DATE	3/3/2023
SUBJECT	Proposed Pond Operating Conditions	NAME	J. Paul
		PAGE	1 OF 1

SWM Pond 405: Proposed Operating Conditions

24-Hour SCS Design Storms

Design Storm	Discharge (m^3/s)	Stage (m)	Storage (m^3)
2-year	0.917	418.71	9376
5-year	2.356	418.81	10236
10-year	3.279	418.85	10630
25-year	4.800	418.92	11261
50-year	6.480	418.98	11784
100-year	8.353	419.05	12442

12-Hour SCS & Hazel Design Storms

Design Storm	Discharge (m^3/s)	Stage (m)	Storage (m^3)
2-year	0.509	418.63	8674
5-year	1.687	418.77	9864
10-year	2.566	418.82	10328
25-year	3.581	418.87	10752
50-year	4.529	418.91	11128
100-year	5.648	418.95	11528
Hazel	6.733	418.99	11861

4-Hour Chicago Design Storms

Design Storm	Discharge (m^3/s)	Stage (m)	Storage (m^3)
25mm	0.064	418.10	4208
2-year	0.145	418.46	7190
5-year	0.585	418.66	8879
10-year	1.08	418.73	9481
25-year	1.764	418.77	9909
50-year	2.288	418.81	10210
100-year	2.823	418.83	10434

TATHAM
ENGINEERING

PROJECT South Fergus MESP & Secondary Plan
SUBJECT Preliminary Stage-Storage SWM Pond 406
FILE 120157
DATE 6/9/2022
NAME J. Paul
PAGE 1 OF 1

Volume calculated using Average End Area Method

Top Elevation 412.75 m
Bottom Elevation 409.25 m
Permanent Pool 410.55 m

Stage	Depth (m)	Area (m^2)	Average Area (m^2)	Incremental Volume (m^3)	Cumulative Volume (m^3)	Active Storage (m^3)	
409.25	0.00	**2863**				0	
409.75	0.50	**3740**	3302	1651	1651	0	
410.25	1.00	**4723**	4232	2116	3767	0	
410.35	1.10	4940	4832	483	4250	0	
410.45	1.20	5157	5049	505	4755	0	
410.55	1.30	5375	5266	527	5281	0	Perm pool (dead vol.)
410.65	1.40	5592	5483	548	5829	548	
410.75	1.50	**5809**	5700	570	6400	1118	
410.85	1.60	5987	5898	590	6989	1708	
410.95	1.70	6164	6075	608	7597	2316	
411.05	1.80	6342	6253	625	8222	2941	
411.15	1.90	6519	6431	643	8865	3584	
411.25	2.00	**6697**	6608	661	9526	4245	
411.35	2.10	6835	6766	677	10203	4921	
411.45	2.20	6973	6904	690	10893	5612	Extended Detention
411.55	2.30	7110	7042	704	11597	6316	
411.65	2.40	7248	7179	718	12315	7034	
411.75	2.50	**7386**	7317	732	13047	7766	
411.85	2.60	7492	7439	744	13791	8510	
411.95	2.70	7599	7546	755	14545	9264	
412.05	2.80	7705	7652	765	15310	10029	
412.15	2.90	7812	7758	776	16086	10805	
412.25	3.00	**7918**	7865	786	16873	11592	Overflow Weir Sill
412.35	3.10	8027	7973	797	17670	12389	
412.45	3.20	8136	8082	808	18478	13197	
412.55	3.30	8246	8191	819	19297	14016	
412.65	3.40	8355	8300	830	20127	14846	
412.75	3.50	**8464**	8409	841	20968	15687	

TATHAM
ENGINEERING

Project:	South Fergus MESP & Secondary Plan
File No.:	120157
Date:	Thursday, June 9, 2022
Designed By	JP
Checked By:	ARO
Subject:	Stage-Discharge Table SWM Pond 406

SWMF - Stage-Discharge Table

Primary Low Flow Outlet

Type	Orifice	Pipe
Diameter (mm)	177.8	600
Area (sq.m)	0.024829	0.282753
Coefficient	0.63	0.80
Invert (m)	410.55	410.55

Secondary Outlet/Overflow Spillway

Type	DICB	Spillway
Weir Length (m)	1.2	22
Sill Elevation (m)	411.45	412.15
Coefficient	1.70	1.63
Side Slope (H:V)	3	10

STAGE-DISCHARGE TABLE

Pond	Primary Low Flow Discharge				Secondary Outlet/Overflow Spillway Discha				Total	OUTLET CONTROL
Water	Orifice		Pipe		DICB		Overflow Spillway		Pond	
Level	Head	Discharge	Head	Discharge	Head	Discharge	Head	Discharge	Discharge	
(m)	(m)	(cms)	(m)	(cms)	(m)	(cms)	(m)	(cms)	(cms)	
410.55	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.000	Orifice
410.65	0.01	0.007	0.10	0.016	0.00	0.000	0.00	0.000	0.007	Orifice
410.75	0.11	0.023	0.20	0.061	0.00	0.000	0.00	0.000	0.023	Orifice
410.85	0.21	0.032	0.30	0.549	0.00	0.000	0.00	0.000	0.032	Orifice
410.95	0.31	0.039	0.10	0.317	0.00	0.000	0.00	0.000	0.039	Orifice
411.05	0.41	0.044	0.20	0.448	0.00	0.000	0.00	0.000	0.044	Orifice
411.15	0.51	0.050	0.30	0.549	0.00	0.000	0.00	0.000	0.050	Orifice
411.25	0.61	0.054	0.40	0.633	0.00	0.000	0.00	0.000	0.054	Orifice
411.35	0.71	0.058	0.50	0.708	0.00	0.000	0.00	0.000	0.058	Orifice
411.45	0.81	0.062	0.60	0.776	0.00	0.000	0.00	0.000	0.062	DICB
411.55	0.91	0.066	0.70	0.838	0.10	0.098	0.00	0.000	0.164	DICB
411.65	1.01	0.070	0.80	0.896	0.20	0.306	0.00	0.000	0.376	DICB
411.75	1.11	0.073	0.90	0.950	0.30	0.630	0.00	0.000	0.703	DICB
411.85	1.21	0.076	1.00	1.001	0.40	1.070	0.00	0.000	1.001	Pipe
411.95	1.31	0.079	1.10	1.050	0.50	1.625	0.00	0.000	1.050	Pipe
412.05	1.41	0.082	1.20	1.097	0.60	2.296	0.00	0.000	1.097	Pipe
412.15	1.51	0.085	1.30	1.142	0.70	3.083	0.00	0.000	1.142	verflow Spillwa
412.25	1.61	0.088	1.40	1.185	0.80	3.986	0.10	1.186	2.370	verflow Spillwa
412.35	1.71	0.091	1.50	1.227	0.90	5.004	0.20	3.499	4.726	verflow Spillwa
412.45	1.81	0.093	1.60	1.267	1.00	6.138	0.30	6.696	7.963	verflow Spillwa
412.55	1.91	0.096	1.70	1.306	1.10	7.387	0.40	10.721	12.027	verflow Spillwa
412.65	2.01	0.098	1.80	1.344	1.20	8.752	0.50	15.560	16.903	verflow Spillwa
412.75	2.11	0.101	1.90	1.380	1.30	10.233	0.60	21.212	22.592	verflow Spillwa

TATHAM ENGINEERING

PROJECT	South Fergus MESP and Secondary Plan	FILE	120141
		DATE	6/9/2022
SUBJECT	Stage-Storage-Discharge Tables	NAME	J. Paul
		PAGE	1 OF 1

SWM Pond No. 406: Stage-Storage-Discharge Table

Elevation (m)	Outlet Structure Design Discharge (m^3/s)	Overflow Weir Design Discharge (m^3/s)	Total Discharge (m^3/s)	Storage m^3
410.55	0.000	0.000	0.000	0
410.65	0.007	0.000	0.007	548
410.75	0.023	0.000	0.023	1,118
410.85	0.032	0.000	0.032	1,708
410.95	0.039	0.000	0.039	2,316
411.05	0.044	0.000	0.044	2,941
411.15	0.050	0.000	0.050	3,584
411.25	0.054	0.000	0.054	4,245
411.35	0.058	0.000	0.058	4,921
411.45	0.062	0.000	0.062	5,612
411.55	0.066	0.000	0.164	6,316
411.65	0.070	0.000	0.376	7,034
411.75	0.073	0.000	0.703	7,766
411.85	0.076	0.000	1.001	8,510
411.95	0.079	0.000	1.050	9,264
412.05	0.082	0.000	1.097	10,029
412.15	0.085	0.000	1.142	10,805
412.25	0.088	1.186	2.370	11,592
412.35	0.091	3.499	4.726	12,389
412.45	0.093	6.696	7.963	13,197
412.55	0.096	10.721	12.027	14,016
412.65	0.098	15.560	16.903	14,846
412.75	0.101	21.212	22.592	15,687

TATHAM ENGINEERING

PROJECT	South Fergus MESP and Secondary Plan	FILE	120157
		DATE	6/9/2022
SUBJECT	Proposed Pond Operating Conditions	NAME	J. Paul
		PAGE	1 OF 1

SWM Pond 406: Proposed Operating Conditions

24-Hour SCS Design Storms

Design Storm	Discharge (m^3/s)	Stage (m)	Storage (m^3)
2-year	0.069	411.46	5668
5-year	0.313	411.62	6831
10-year	0.615	411.72	7583
25-year	0.9	411.86	8625
50-year	1.071	412	9620
100-year	1.137	412.14	10738

12-Hour SCS & Hazel Design Storms

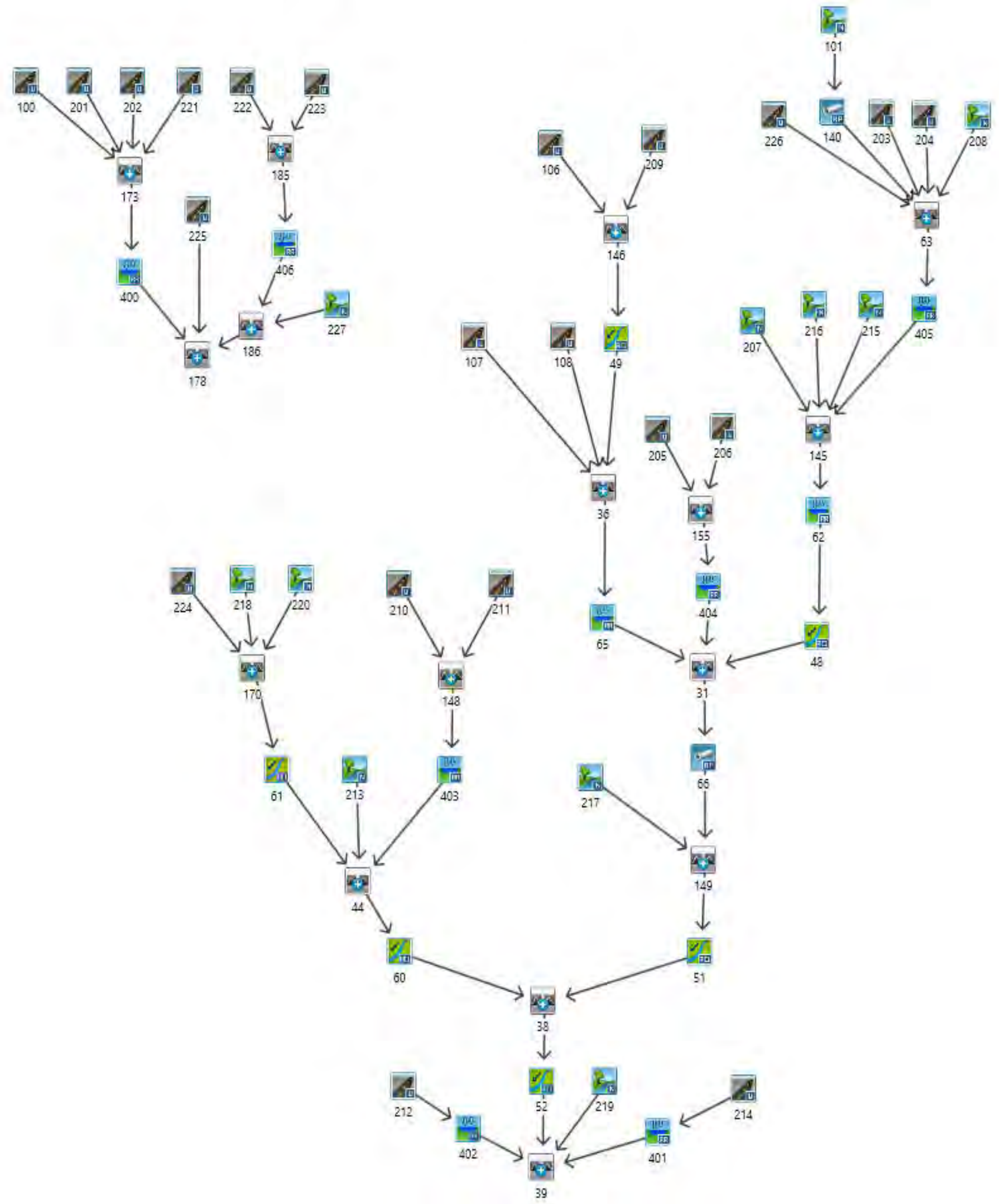
Design Storm	Discharge (m^3/s)	Stage (m)	Storage (m^3)
2-year	0.058	411.36	4973
5-year	0.171	411.55	6349
10-year	0.368	411.65	7016
25-year	0.716	411.76	7842
50-year	0.884	411.86	8570
100-year	1.057	411.97	9392
Hazel	2.255	412.24	11532

4-Hour Chicago Design Storms

Design Storm	Discharge (m^3/s)	Stage (m)	Storage (m^3)
25mm	0.04	410.97	2428
2-year	0.051	411.16	3677
5-year	0.06	411.4	5253
10-year	0.135	411.52	6131
25-year	0.26	411.6	6648
50-year	0.363	411.64	6999
100-year	0.509	411.69	7342

TATHAM ENGINEERING

PROJECT	South Fergus	FILE	120157
		DATE	2023-08-28
SUBJECT	VO6 Schematic - Proposed Conditions	NAME	A. Trevers
		PAGE	1 OF 1



N	NASHYD	RP	ROUTE PIPE		DUHYD
U	STANDHYD	RC1	ROUTE CHANNEL		DIVERT HYD
+	ADDHYD	RR	ROUTE RESERVOIR		

O:\Collingwood\2020 Projects\120157 - South Fergus MESP and Secondary Plan\Design\Stormwater\VO\Data (Existing)\VO Schematic1

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        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


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DATE: 08-28-2023                          TIME: 10:52:24

USER:


COMMENTS: ____________________________________________________________


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  ************************************************
  ** SIMULATION : 100yr 4hr 10min Chicago       **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 892.273
| Ptotal= 77.38 mm |                          B=   0.000
--------------------                          C=   0.699
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  4.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33

                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.00    6.51 |  1.00   30.79 |  2.00   12.86 |  3.00    7.50
                 0.17    7.27 |  1.17  178.44 |  2.17   11.36 |  3.17    7.06
                 0.33    8.30 |  1.33   37.79 |  2.33   10.23 |  3.33    6.68
                 0.50    9.77 |  1.50   23.83 |  2.50    9.33 |  3.50    6.35
                 0.67   12.10 |  1.67   18.17 |  2.67    8.61 |  3.67    6.05
                 0.83   16.55 |  1.83   14.97 |  2.83    8.00 |  3.83    5.79


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--------------------
| CALIB            |
| NASHYD   (  0101)|   Area    (ha)=  29.62   Curve Number   (CN)= 81.9
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.67   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.57

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    6.51 | 1.083   30.79 | 2.083   12.86 |  3.08    7.50
                0.167    6.51 | 1.167   30.79 | 2.167   12.86 |  3.17    7.50
                0.250    7.27 | 1.250  178.44 | 2.250   11.36 |  3.25    7.06
                0.333    7.27 | 1.333  178.44 | 2.333   11.36 |  3.33    7.06
                0.417    8.30 | 1.417   37.79 | 2.417   10.23 |  3.42    6.68
                0.500    8.30 | 1.500   37.79 | 2.500   10.23 |  3.50    6.68
                0.583    9.77 | 1.583   23.83 | 2.583    9.33 |  3.58    6.35
                0.667    9.77 | 1.667   23.83 | 2.667    9.33 |  3.67    6.35
                0.750   12.10 | 1.750   18.17 | 2.750    8.61 |  3.75    6.05
                0.833   12.10 | 1.833   18.17 | 2.833    8.61 |  3.83    6.05
                0.917   16.55 | 1.917   14.97 | 2.917    8.00 |  3.92    5.79
                1.000   16.55 | 2.000   14.97 | 3.000    8.00 |  4.00    5.79

     Unit Hyd Qpeak  (cms)=   1.985

     PEAK FLOW       (cms)=   1.792 (i)
     TIME TO PEAK    (hrs)=   2.000
     RUNOFF VOLUME    (mm)=  40.222
     TOTAL RAINFALL   (mm)=  77.380
     RUNOFF COEFFICIENT   =   0.520

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| ROUTEPIPE(  0140)|     PIPE Number     =   1.00
| IN= 2---> OUT= 1 |     Diameter    (mm)=1000.00
| DT=  5.0 min     |     Length       (m)=1000.00
--------------------     Slope      (m/m)=  0.005
                         Manning n       =  0.013

     **** WARNING: MINIMUM PIPE SIZE REQUIRED =  1021.07   (mm)FOR FREE FLOW.
                   THIS SIZE WAS USED IN THE ROUTING.
                   THE CAPACITY OF THIS PIPE  =     1.79  (cms)

     <----------------- TRAVEL TIME TABLE -------------------->
       DEPTH      VOLUME    FLOW RATE    VELOCITY    TRAV.TIME
        (m)      (cu.m.)      (cms)        (m/s)        min
        0.05     .165E+02      0.0          0.58        28.65
        0.11     .459E+02      0.0          0.91        18.36
        0.16     .830E+02      0.1          1.17        14.27
        0.21     .125E+03      0.2          1.39        12.00
        0.27     .172E+03      0.3          1.58        10.55
        0.32     .222E+03      0.4          1.75         9.53
        0.38     .274E+03      0.5          1.90         8.79
        0.43     .327E+03      0.7          2.03         8.23
        0.48     .382E+03      0.8          2.14         7.79
        0.54     .437E+03      1.0          2.24         7.45
        0.59     .491E+03      1.1          2.32         7.18
        0.64     .545E+03      1.3          2.39         6.98
        0.70     .597E+03      1.5          2.44         6.83
        0.75     .647E+03      1.6          2.48         6.73
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      0.81     .693E+03       1.7          2.50         6.68
      0.86     .736E+03       1.8          2.49         6.68
      0.91     .773E+03       1.9          2.47         6.76
      0.97     .802E+03       1.9          2.40         6.94
      1.02     .819E+03       1.8          2.19         7.61
                                    <---- hydrograph ---->   <-pipe / channel->
                              AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                              (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
  INFLOW : ID= 2 (  0101)    29.62     1.79    2.00  40.22      0.84      2.49
  OUTFLOW: ID= 1 (  0140)    29.62     1.76    2.08  40.22      0.81      2.49


--------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD   (  0208)|   Area    (ha)=   1.80   Curve Number   (CN)= 62.3
|ID= 1 DT= 5.0 min |   Ia      (mm)=   9.81   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.53

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                                ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    6.51 | 1.083   30.79 | 2.083   12.86 |  3.08    7.50
                 0.167    6.51 | 1.167   30.79 | 2.167   12.86 |  3.17    7.50
                 0.250    7.27 | 1.250  178.44 | 2.250   11.36 |  3.25    7.06
                 0.333    7.27 | 1.333  178.44 | 2.333   11.36 |  3.33    7.06
                 0.417    8.30 | 1.417   37.79 | 2.417   10.23 |  3.42    6.68
                 0.500    8.30 | 1.500   37.79 | 2.500   10.23 |  3.50    6.68
                 0.583    9.77 | 1.583   23.83 | 2.583    9.33 |  3.58    6.35
                 0.667    9.77 | 1.667   23.83 | 2.667    9.33 |  3.67    6.35
                 0.750   12.10 | 1.750   18.17 | 2.750    8.61 |  3.75    6.05
                 0.833   12.10 | 1.833   18.17 | 2.833    8.61 |  3.83    6.05
                 0.917   16.55 | 1.917   14.97 | 2.917    8.00 |  3.92    5.79
                 1.000   16.55 | 2.000   14.97 | 3.000    8.00 |  4.00    5.79

     Unit Hyd Qpeak  (cms)=   0.130

     PEAK FLOW       (cms)=   0.053 (i)
     TIME TO PEAK    (hrs)=   2.000
     RUNOFF VOLUME    (mm)=  20.632
     TOTAL RAINFALL   (mm)=  77.380
     RUNOFF COEFFICIENT   =   0.267

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0203)|   Area    (ha)=   8.59
|ID= 1 DT= 5.0 min |   Total Imp(%)=  49.00   Dir. Conn.(%)=  36.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.21          4.38
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     239.30         40.00
     Mannings n           =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
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                                ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    6.51 | 1.083   30.79 | 2.083   12.86 |  3.08    7.50
                 0.167    6.51 | 1.167   30.79 | 2.167   12.86 |  3.17    7.50
                 0.250    7.27 | 1.250  178.44 | 2.250   11.36 |  3.25    7.06
                 0.333    7.27 | 1.333  178.44 | 2.333   11.36 |  3.33    7.06
                 0.417    8.30 | 1.417   37.79 | 2.417   10.23 |  3.42    6.68
                 0.500    8.30 | 1.500   37.79 | 2.500   10.23 |  3.50    6.68
                 0.583    9.77 | 1.583   23.83 | 2.583    9.33 |  3.58    6.35
                 0.667    9.77 | 1.667   23.83 | 2.667    9.33 |  3.67    6.35
                 0.750   12.10 | 1.750   18.17 | 2.750    8.61 |  3.75    6.05
                 0.833   12.10 | 1.833   18.17 | 2.833    8.61 |  3.83    6.05
                 0.917   16.55 | 1.917   14.97 | 2.917    8.00 |  3.92    5.79
                 1.000   16.55 | 2.000   14.97 | 3.000    8.00 |  4.00    5.79

     Max.Eff.Inten.(mm/hr)=     178.44       101.23
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       3.42 (ii)   10.44 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.26         0.09
                                                        *TOTALS*
     PEAK FLOW       (cms)=       1.46         0.69        1.833 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.50         1.33
     RUNOFF VOLUME    (mm)=      76.38        37.28        51.35
     TOTAL RAINFALL   (mm)=      77.38        77.38        77.38
     RUNOFF COEFFICIENT   =       0.99         0.48         0.66

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  74.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0204)|   Area    (ha)=  11.24
|ID= 1 DT= 5.0 min |   Total Imp(%)=  49.00   Dir. Conn.(%)=  37.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.51          5.73
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     273.80         40.00
     Mannings n           =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                                ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    6.51 | 1.083   30.79 | 2.083   12.86 |  3.08    7.50
                 0.167    6.51 | 1.167   30.79 | 2.167   12.86 |  3.17    7.50
                 0.250    7.27 | 1.250  178.44 | 2.250   11.36 |  3.25    7.06
                 0.333    7.27 | 1.333  178.44 | 2.333   11.36 |  3.33    7.06
                 0.417    8.30 | 1.417   37.79 | 2.417   10.23 |  3.42    6.68
                 0.500    8.30 | 1.500   37.79 | 2.500   10.23 |  3.50    6.68
                 0.583    9.77 | 1.583   23.83 | 2.583    9.33 |  3.58    6.35
                 0.667    9.77 | 1.667   23.83 | 2.667    9.33 |  3.67    6.35
```

```
                0.750   12.10 | 1.750   18.17 | 2.750    8.61 |  3.75    6.05
                0.833   12.10 | 1.833   18.17 | 2.833    8.61 |  3.83    6.05
                0.917   16.55 | 1.917   14.97 | 2.917    8.00 |  3.92    5.79
                1.000   16.55 | 2.000   14.97 | 3.000    8.00 |  4.00    5.79

     Max.Eff.Inten.(mm/hr)=     178.44        98.53
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       3.71 (ii)   10.81 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.25         0.09
                                                           *TOTALS*
     PEAK FLOW       (cms)=       1.95         0.87          2.407 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.50           1.33
     RUNOFF VOLUME    (mm)=      76.38        36.94          51.53
     TOTAL RAINFALL   (mm)=      77.38        77.38          77.38
     RUNOFF COEFFICIENT   =       0.99         0.48           0.67

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  74.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0226)|   Area    (ha)=   8.53
|ID= 1 DT= 5.0 min |   Total Imp(%)=  53.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.52         4.01
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     238.47        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |   TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |    hrs   mm/hr
                0.083    6.51 | 1.083   30.79 | 2.083   12.86 |  3.08    7.50
                0.167    6.51 | 1.167   30.79 | 2.167   12.86 |  3.17    7.50
                0.250    7.27 | 1.250  178.44 | 2.250   11.36 |  3.25    7.06
                0.333    7.27 | 1.333  178.44 | 2.333   11.36 |  3.33    7.06
                0.417    8.30 | 1.417   37.79 | 2.417   10.23 |  3.42    6.68
                0.500    8.30 | 1.500   37.79 | 2.500   10.23 |  3.50    6.68
                0.583    9.77 | 1.583   23.83 | 2.583    9.33 |  3.58    6.35
                0.667    9.77 | 1.667   23.83 | 2.667    9.33 |  3.67    6.35
                0.750   12.10 | 1.750   18.17 | 2.750    8.61 |  3.75    6.05
                0.833   12.10 | 1.833   18.17 | 2.833    8.61 |  3.83    6.05
                0.917   16.55 | 1.917   14.97 | 2.917    8.00 |  3.92    5.79
                1.000   16.55 | 2.000   14.97 | 3.000    8.00 |  4.00    5.79

     Max.Eff.Inten.(mm/hr)=     178.44       104.23
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       3.41 (ii)   10.36 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.26         0.09
                                                           *TOTALS*
     PEAK FLOW       (cms)=       1.62         0.65          1.966 (iii)
```

```
     TIME TO PEAK    (hrs)=       1.33         1.50           1.33
     RUNOFF VOLUME    (mm)=      76.38        37.64          53.14
     TOTAL RAINFALL   (mm)=      77.38        77.38          77.38
     RUNOFF COEFFICIENT   =       0.99         0.49           0.69

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  74.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0063)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK      R.V.
--------------------         (ha)    (cms)    (hrs)      (mm)
        ID1= 1 (  0140):    29.62    1.761     2.08    40.22
      + ID2= 2 (  0203):     8.59    1.833     1.33    51.35
        ====================================================
        ID = 3 (  0063):    38.21    2.099     2.00    42.72

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0063)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK      R.V.
--------------------         (ha)    (cms)    (hrs)      (mm)
        ID1= 3 (  0063):    38.21    2.099     2.00    42.72
      + ID2= 2 (  0204):    11.24    2.407     1.33    51.53
        ====================================================
        ID = 1 (  0063):    49.45    4.325     1.33    44.73

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0063)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK      R.V.
--------------------         (ha)    (cms)    (hrs)      (mm)
        ID1= 1 (  0063):    49.45    4.325     1.33    44.73
      + ID2= 2 (  0208):     1.80    0.053     2.00    20.63
        ====================================================
        ID = 3 (  0063):    51.25    4.332     1.33    43.88

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0063)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK      R.V.
--------------------         (ha)    (cms)    (hrs)      (mm)
        ID1= 3 (  0063):    51.25    4.332     1.33    43.88
      + ID2= 2 (  0226):     8.53    1.966     1.33    53.14
        ====================================================
        ID = 1 (  0063):    59.78    6.298     1.33    45.20

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0405)|     OVERFLOW IS OFF
```

```
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000     0.0000   |   0.1840      0.7513
                           0.0080     0.0624   |   0.3970      0.8375
                           0.0280     0.1294   |   0.7250      0.9254
                           0.0400     0.1998   |   2.1480      1.0148
                           0.0490     0.2723   |   4.3130      1.1055
                           0.0570     0.3470   |   7.0860      1.1975
                           0.0640     0.4240   |  10.5960      1.2908
                           0.0700     0.5031   |  14.8380      1.3853
                           0.0760     0.5841   |  19.8230      1.4812
                           0.0810     0.6669   |  25.5630      1.5784

                                 AREA     QPEAK      TPEAK        R.V.
                                 (ha)     (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0063)     59.785      6.298      1.33       45.20
   OUTFLOW: ID= 1 (  0405)     59.785      2.823      2.08       45.17

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 44.83
                   TIME SHIFT OF PEAK FLOW         (min)= 45.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  1.0434

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0216)|   Area    (ha)=  11.42   Curve Number   (CN)= 50.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  12.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.03

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                                ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    6.51 | 1.083   30.79 | 2.083   12.86 |  3.08    7.50
                 0.167    6.51 | 1.167   30.79 | 2.167   12.86 |  3.17    7.50
                 0.250    7.27 | 1.250  178.44 | 2.250   11.36 |  3.25    7.06
                 0.333    7.27 | 1.333  178.44 | 2.333   11.36 |  3.33    7.06
                 0.417    8.30 | 1.417   37.79 | 2.417   10.23 |  3.42    6.68
                 0.500    8.30 | 1.500   37.79 | 2.500   10.23 |  3.50    6.68
                 0.583    9.77 | 1.583   23.83 | 2.583    9.33 |  3.58    6.35
                 0.667    9.77 | 1.667   23.83 | 2.667    9.33 |  3.67    6.35
                 0.750   12.10 | 1.750   18.17 | 2.750    8.61 |  3.75    6.05
                 0.833   12.10 | 1.833   18.17 | 2.833    8.61 |  3.83    6.05
                 0.917   16.55 | 1.917   14.97 | 2.917    8.00 |  3.92    5.79
                 1.000   16.55 | 2.000   14.97 | 3.000    8.00 |  4.00    5.79

     Unit Hyd Qpeak  (cms)=   0.423

     PEAK FLOW      (cms)=   0.140 (i)
     TIME TO PEAK   (hrs)=   2.833
     RUNOFF VOLUME    (mm)=  13.384
     TOTAL RAINFALL   (mm)=  77.380
     RUNOFF COEFFICIENT   =   0.173

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0215)|   Area    (ha)=   2.06   Curve Number   (CN)= 77.8
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.63   # of Linear Res.(N)= 3.00
```

```
--------------------   U.H. Tp(hrs)=   0.33

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                                ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    6.51 | 1.083   30.79 | 2.083   12.86 |  3.08    7.50
                 0.167    6.51 | 1.167   30.79 | 2.167   12.86 |  3.17    7.50
                 0.250    7.27 | 1.250  178.44 | 2.250   11.36 |  3.25    7.06
                 0.333    7.27 | 1.333  178.44 | 2.333   11.36 |  3.33    7.06
                 0.417    8.30 | 1.417   37.79 | 2.417   10.23 |  3.42    6.68
                 0.500    8.30 | 1.500   37.79 | 2.500   10.23 |  3.50    6.68
                 0.583    9.77 | 1.583   23.83 | 2.583    9.33 |  3.58    6.35
                 0.667    9.77 | 1.667   23.83 | 2.667    9.33 |  3.67    6.35
                 0.750   12.10 | 1.750   18.17 | 2.750    8.61 |  3.75    6.05
                 0.833   12.10 | 1.833   18.17 | 2.833    8.61 |  3.83    6.05
                 0.917   16.55 | 1.917   14.97 | 2.917    8.00 |  3.92    5.79
                 1.000   16.55 | 2.000   14.97 | 3.000    8.00 |  4.00    5.79

     Unit Hyd Qpeak  (cms)=   0.238

     PEAK FLOW      (cms)=   0.163 (i)
     TIME TO PEAK   (hrs)=   1.667
     RUNOFF VOLUME    (mm)=  36.433
     TOTAL RAINFALL   (mm)=  77.380
     RUNOFF COEFFICIENT   =   0.471

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0207)|   Area    (ha)=   1.37   Curve Number   (CN)= 74.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.27

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                                ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    6.51 | 1.083   30.79 | 2.083   12.86 |  3.08    7.50
                 0.167    6.51 | 1.167   30.79 | 2.167   12.86 |  3.17    7.50
                 0.250    7.27 | 1.250  178.44 | 2.250   11.36 |  3.25    7.06
                 0.333    7.27 | 1.333  178.44 | 2.333   11.36 |  3.33    7.06
                 0.417    8.30 | 1.417   37.79 | 2.417   10.23 |  3.42    6.68
                 0.500    8.30 | 1.500   37.79 | 2.500   10.23 |  3.50    6.68
                 0.583    9.77 | 1.583   23.83 | 2.583    9.33 |  3.58    6.35
                 0.667    9.77 | 1.667   23.83 | 2.667    9.33 |  3.67    6.35
                 0.750   12.10 | 1.750   18.17 | 2.750    8.61 |  3.75    6.05
                 0.833   12.10 | 1.833   18.17 | 2.833    8.61 |  3.83    6.05
                 0.917   16.55 | 1.917   14.97 | 2.917    8.00 |  3.92    5.79
                 1.000   16.55 | 2.000   14.97 | 3.000    8.00 |  4.00    5.79

     Unit Hyd Qpeak  (cms)=   0.194

     PEAK FLOW      (cms)=   0.108 (i)
     TIME TO PEAK   (hrs)=   1.583
     RUNOFF VOLUME    (mm)=  32.395
     TOTAL RAINFALL   (mm)=  77.380
     RUNOFF COEFFICIENT   =   0.419
```

```
     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 --------------------------------------------------------------------------------

 --------------------
 | ADD HYD  (  0145)|
 |   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
 --------------------         (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (  0207):     1.37   0.108     1.58    32.39
       + ID2= 2 (  0215):     2.06   0.163     1.67    36.43
         ===============================================
         ID = 3 (  0145):     3.43   0.269     1.58    34.82

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 --------------------------------------------------------------------------------

 --------------------
 | ADD HYD  (  0145)|
 |   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
 --------------------         (ha)    (cms)    (hrs)     (mm)
         ID1= 3 (  0145):     3.43   0.269     1.58    34.82
       + ID2= 2 (  0216):    11.42   0.140     2.83    13.38
         ===============================================
         ID = 1 (  0145):    14.85   0.311     1.67    18.34

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 --------------------------------------------------------------------------------

 --------------------
 | ADD HYD  (  0145)|
 |   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
 --------------------         (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (  0145):    14.85   0.311     1.67    18.34
       + ID2= 2 (  0405):    59.78   2.823     2.08    45.17
         ===============================================
         ID = 3 (  0145):    74.64   3.082     2.08    39.83

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 --------------------------------------------------------------------------------
 --------------------
 | RESERVOIR(  0062)|     OVERFLOW IS OFF
 | IN= 2---> OUT= 1 |
 | DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
 --------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000     0.0000   |   3.5000     1.2000
                           0.1500     0.1200   |   8.0000     2.0000
                           0.3500     0.2000   |  12.0000     6.0000

                                 AREA      QPEAK     TPEAK        R.V.
                                 (ha)      (cms)     (hrs)        (mm)
    INFLOW : ID= 2 (  0145)     74.635      3.082      2.08       39.83
    OUTFLOW: ID= 1 (  0062)     74.635      1.876      3.08       39.83

                     PEAK   FLOW   REDUCTION [Qout/Qin](%)= 60.88
                     TIME SHIFT OF PEAK FLOW          (min)= 60.00
                     MAXIMUM  STORAGE   USED       (ha.m.)=  0.6847

 --------------------------------------------------------------------------------
 --------------------
 | ROUTE CHN(  0048)|
 | IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
 --------------------
                 <------ DATA FOR SECTION (   1.1) ------>
```

```
                 Distance      Elevation       Manning
                     0.00         412.71        0.0500
                    40.00         412.40    0.0500 /0.0500  Main Channel
                    80.00         411.89        0.0500      Main Channel
                   120.00         411.75    0.0500 /0.0500  Main Channel
                   160.00         409.65        0.0500
                   200.00         412.15        0.0500

         <--------------------- TRAVEL TIME TABLE ---------------------->
          DEPTH     ELEV      VOLUME     FLOW RATE    VELOCITY    TRAV.TIME
           (m)       (m)     (cu.m.)      (cms)        (m/s)        (min)
          0.13    409.78    .964E+02       0.0          0.15        35.83
          0.26    409.91    .386E+03       0.3          0.24        22.57
          0.39    410.05    .868E+03       0.8          0.31        17.22
          0.52    410.18    .154E+04       1.8          0.38        14.22
          0.66    410.31    .241E+04       3.3          0.44        12.25
          0.79    410.44    .347E+04       5.3          0.49        10.85
          0.92    410.57    .472E+04       8.0          0.54         9.79
          1.05    410.70    .617E+04      11.5          0.60         8.96
          1.18    410.83    .781E+04      15.7          0.64         8.28
          1.31    410.96    .964E+04      20.8          0.69         7.72
          1.44    411.09    .117E+05      26.8          0.74         7.24
          1.57    411.23    .139E+05      33.9          0.78         6.84
          1.70    411.36    .163E+05      41.9          0.82         6.48
          1.84    411.49    .189E+05      51.1          0.86         6.17
          1.97    411.62    .217E+05      61.4          0.91         5.89
          2.10    411.75    .247E+05      72.9          0.95         5.64
          2.23    411.88    .286E+05      87.7          0.98         5.44
          2.36    412.02    .338E+05     105.7          1.00         5.34
          2.50    412.15    .396E+05     126.6          1.02         5.22

                                      <---- hydrograph ---->   <-pipe / channel->
                              AREA    QPEAK    TPEAK    R.V.   MAX DEPTH  MAX VEL
                              (ha)    (cms)    (hrs)    (mm)      (m)      (m/s)
      INFLOW : ID= 2 (  0062)  74.64    1.88     3.08   39.83     0.53      0.38
      OUTFLOW: ID= 1 (  0048)  74.64    1.84     3.33   39.83     0.53      0.38


 --------------------------------------------------------------------------------
 --------------------
 | CALIB            |
 | STANDHYD (  0108)|   Area    (ha)=   3.97
 |ID= 1 DT= 5.0 min |   Total Imp(%)=  67.00   Dir. Conn.(%)=  67.00
 --------------------
                              IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=       2.66          1.31
      Dep. Storage     (mm)=       1.00          5.42
      Average Slope     (%)=       1.00          2.00
      Length            (m)=     162.69         40.00
      Mannings n          =      0.013         0.250

          NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                           ---- TRANSFORMED HYETOGRAPH ----
             TIME     RAIN |  TIME     RAIN |'  TIME     RAIN |  TIME     RAIN
              hrs    mm/hr |   hrs    mm/hr |'   hrs    mm/hr |   hrs    mm/hr
            0.083     6.51 | 1.083    30.79 | 2.083    12.86 |  3.08     7.50
            0.167     6.51 | 1.167    30.79 | 2.167    12.86 |  3.17     7.50
            0.250     7.27 | 1.250   178.44 | 2.250    11.36 |  3.25     7.06
            0.333     7.27 | 1.333   178.44 | 2.333    11.36 |  3.33     7.06
            0.417     8.30 | 1.417    37.79 | 2.417    10.23 |  3.42     6.68
            0.500     8.30 | 1.500    37.79 | 2.500    10.23 |  3.50     6.68
```

```
                0.583    9.77 | 1.583   23.83 | 2.583    9.33 |  3.58    6.35
                0.667    9.77 | 1.667   23.83 | 2.667    9.33 |  3.67    6.35
                0.750   12.10 | 1.750   18.17 | 2.750    8.61 |  3.75    6.05
                0.833   12.10 | 1.833   18.17 | 2.833    8.61 |  3.83    6.05
                0.917   16.55 | 1.917   14.97 | 2.917    8.00 |  3.92    5.79
                1.000   16.55 | 2.000   14.97 | 3.000    8.00 |  4.00    5.79

     Max.Eff.Inten.(mm/hr)=     178.44     ********
                over (min)        5.00       10.00
     Storage Coeff.  (min)=       2.71 (ii)   6.93 (ii)
     Unit Hyd. Tpeak (min)=       5.00       10.00
     Unit Hyd. peak  (cms)=       0.29        0.14
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.29        0.17          1.432 (iii)
     TIME TO PEAK    (hrs)=       1.33        1.42           1.33
     RUNOFF VOLUME    (mm)=      76.38       31.57          61.59
     TOTAL RAINFALL   (mm)=      77.38       77.38          77.38
     RUNOFF COEFFICIENT   =       0.99        0.41           0.80

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  73.4    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0107)|   Area    (ha)=   4.81
|ID= 1 DT= 5.0 min |   Total Imp(%)=  86.00   Dir. Conn.(%)=  86.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.14        0.67
     Dep. Storage     (mm)=       1.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     179.07       40.00
     Mannings n          =       0.013       0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                                ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    6.51 | 1.083   30.79 | 2.083   12.86 |  3.08    7.50
                0.167    6.51 | 1.167   30.79 | 2.167   12.86 |  3.17    7.50
                0.250    7.27 | 1.250  178.44 | 2.250   11.36 |  3.25    7.06
                0.333    7.27 | 1.333  178.44 | 2.333   11.36 |  3.33    7.06
                0.417    8.30 | 1.417   37.79 | 2.417   10.23 |  3.42    6.68
                0.500    8.30 | 1.500   37.79 | 2.500   10.23 |  3.50    6.68
                0.583    9.77 | 1.583   23.83 | 2.583    9.33 |  3.58    6.35
                0.667    9.77 | 1.667   23.83 | 2.667    9.33 |  3.67    6.35
                0.750   12.10 | 1.750   18.17 | 2.750    8.61 |  3.75    6.05
                0.833   12.10 | 1.833   18.17 | 2.833    8.61 |  3.83    6.05
                0.917   16.55 | 1.917   14.97 | 2.917    8.00 |  3.92    5.79
                1.000   16.55 | 2.000   14.97 | 3.000    8.00 |  4.00    5.79

     Max.Eff.Inten.(mm/hr)=     178.44     ********
                over (min)        5.00       10.00
     Storage Coeff.  (min)=       2.87 (ii)   5.58 (ii)
     Unit Hyd. Tpeak (min)=       5.00       10.00
     Unit Hyd. peak  (cms)=       0.28        0.16
```

```
                                                          *TOTALS*
     PEAK FLOW       (cms)=       2.00        0.10          2.081 (iii)
     TIME TO PEAK    (hrs)=       1.33        1.42           1.33
     RUNOFF VOLUME    (mm)=      76.38       32.41          70.22
     TOTAL RAINFALL   (mm)=      77.38       77.38          77.38
     RUNOFF COEFFICIENT   =       0.99        0.42           0.91

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  74.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0106)|   Area    (ha)=  26.74
|ID= 1 DT= 5.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  15.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      16.04       10.70
     Dep. Storage     (mm)=       1.00        5.04
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     422.22       40.00
     Mannings n          =       0.013       0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                                ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    6.51 | 1.083   30.79 | 2.083   12.86 |  3.08    7.50
                0.167    6.51 | 1.167   30.79 | 2.167   12.86 |  3.17    7.50
                0.250    7.27 | 1.250  178.44 | 2.250   11.36 |  3.25    7.06
                0.333    7.27 | 1.333  178.44 | 2.333   11.36 |  3.33    7.06
                0.417    8.30 | 1.417   37.79 | 2.417   10.23 |  3.42    6.68
                0.500    8.30 | 1.500   37.79 | 2.500   10.23 |  3.50    6.68
                0.583    9.77 | 1.583   23.83 | 2.583    9.33 |  3.58    6.35
                0.667    9.77 | 1.667   23.83 | 2.667    9.33 |  3.67    6.35
                0.750   12.10 | 1.750   18.17 | 2.750    8.61 |  3.75    6.05
                0.833   12.10 | 1.833   18.17 | 2.833    8.61 |  3.83    6.05
                0.917   16.55 | 1.917   14.97 | 2.917    8.00 |  3.92    5.79
                1.000   16.55 | 2.000   14.97 | 3.000    8.00 |  4.00    5.79

     Max.Eff.Inten.(mm/hr)=     178.44      235.55
                over (min)        5.00       10.00
     Storage Coeff.  (min)=       4.81 (ii)   9.82 (ii)
     Unit Hyd. Tpeak (min)=       5.00       10.00
     Unit Hyd. peak  (cms)=       0.22        0.11
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.78        4.31          5.382 (iii)
     TIME TO PEAK    (hrs)=       1.33        1.42           1.33
     RUNOFF VOLUME    (mm)=      76.38       48.18          52.41
     TOTAL RAINFALL   (mm)=      77.38       77.38          77.38
     RUNOFF COEFFICIENT   =       0.99        0.62           0.68

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
```

```
            CN*  =  74.1    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0209)|   Area    (ha)=  10.31
|ID= 1 DT= 5.0 min |   Total Imp(%)=  61.00   Dir. Conn.(%)=  39.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.29          4.02
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     262.17         40.00
     Mannings n          =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                                ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    6.51 | 1.083   30.79 | 2.083   12.86 |  3.08    7.50
                0.167    6.51 | 1.167   30.79 | 2.167   12.86 |  3.17    7.50
                0.250    7.27 | 1.250  178.44 | 2.250   11.36 |  3.25    7.06
                0.333    7.27 | 1.333  178.44 | 2.333   11.36 |  3.33    7.06
                0.417    8.30 | 1.417   37.79 | 2.417   10.23 |  3.42    6.68
                0.500    8.30 | 1.500   37.79 | 2.500   10.23 |  3.50    6.68
                0.583    9.77 | 1.583   23.83 | 2.583    9.33 |  3.58    6.35
                0.667    9.77 | 1.667   23.83 | 2.667    9.33 |  3.67    6.35
                0.750   12.10 | 1.750   18.17 | 2.750    8.61 |  3.75    6.05
                0.833   12.10 | 1.833   18.17 | 2.833    8.61 |  3.83    6.05
                0.917   16.55 | 1.917   14.97 | 2.917    8.00 |  3.92    5.79
                1.000   16.55 | 2.000   14.97 | 3.000    8.00 |  4.00    5.79

     Max.Eff.Inten.(mm/hr)=     178.44       145.98
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       3.61 (ii)    9.68 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.25         0.11
                                                         *TOTALS*
     PEAK FLOW       (cms)=       1.89         1.02        2.719 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42         1.33
     RUNOFF VOLUME    (mm)=      76.38        41.93        55.37
     TOTAL RAINFALL   (mm)=      77.38        77.38        77.38
     RUNOFF COEFFICIENT   =       0.99         0.54         0.72

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  74.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0146)|
|  1 +  2 =  3     |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0106):    26.74   5.382     1.33    52.41
```

```
      + ID2= 2 (  0209):    10.31   2.719     1.33    55.37
        ==================================================
        ID = 3 (  0146):    37.05   8.101     1.33    53.23

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| ROUTE CHN(  0049)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
                   0.00         412.15        0.0500
                  40.00         412.05    0.0500 /0.0500  Main Channel
                  80.00         411.85        0.0500      Main Channel
                 120.00         412.08    0.0500 /0.0500  Main Channel
                 160.00         413.01        0.0500
                 200.00         413.28        0.0500

        <--------------------- TRAVEL TIME TABLE ---------------------->
         DEPTH    ELEV      VOLUME     FLOW RATE    VELOCITY    TRAV.TIME
          (m)      (m)      (cu.m.)      (cms)        (m/s)       (min)
         0.01   411.86    .131E+02       0.0          0.01      727.53
         0.03   411.88    .524E+02       0.0          0.01      458.32
         0.04   411.89    .118E+03       0.0          0.02      349.76
         0.06   411.91    .209E+03       0.0          0.02      288.72
         0.07   411.92    .327E+03       0.0          0.02      248.81
         0.09   411.94    .471E+03       0.0          0.02      220.33
         0.10   411.95    .642E+03       0.1          0.03      198.82
         0.12   411.97    .838E+03       0.1          0.03      181.88
         0.13   411.98    .106E+04       0.1          0.03      168.15
         0.15   411.99    .131E+04       0.1          0.04      156.74
         0.16   412.01    .158E+04       0.2          0.04      147.09
         0.18   412.02    .189E+04       0.2          0.04      138.80
         0.19   412.04    .221E+04       0.3          0.04      131.59
         0.21   412.05    .257E+04       0.3          0.04      125.25
         0.22   412.07    .295E+04       0.4          0.05      117.51
         0.24   412.09    .350E+04       0.5          0.05      109.19
         0.26   412.11    .410E+04       0.7          0.05      101.58
         0.28   412.12    .476E+04       0.8          0.06       95.62
         0.29   412.14    .547E+04       1.0          0.06       90.76

     **** WARNING:  TRAVEL TIME TABLE EXCEEDED
                                     <---- hydrograph ---->   <-pipe / channel->
                               AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                               (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
   INFLOW : ID= 2 (  0146)    37.05     8.10    1.33  53.23      0.29      0.06
   OUTFLOW: ID= 1 (  0049)    37.05     2.22    1.83  53.05      0.29      0.06


     **** WARNING:  COMPUTATIONS FAILED TO CONVERGE.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0036)|
|  1 +  2 =  3     |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0107):     4.81   2.081     1.33    70.22
      + ID2= 2 (  0108):     3.97   1.432     1.33    61.59
        ==================================================
        ID = 3 (  0036):     8.78   3.513     1.33    66.32

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
```

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--------------------
| ADD HYD  (  0036)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0036):     8.78   3.513     1.33    66.32
      + ID2= 2 (  0049):    37.05   2.225     1.83    53.05
        ===================================================
        ID = 1 (  0036):    45.83   4.465     1.33    55.59

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0065)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   2.8000      0.9524
                          0.0700     0.0553   |   7.0000      1.4097
                          0.0800     0.2284   |   8.5000      1.7444
                          0.0900     0.3148   |  10.8000      2.1032
                          1.2000     0.4083   |  13.0000      2.6865
                          1.8000     0.6175   |   0.0000      0.0000

                                AREA      QPEAK      TPEAK        R.V.
                                (ha)      (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0036)     45.830      4.465      1.33       55.59
   OUTFLOW: ID= 1 (  0065)     45.830      1.990      2.42       55.59

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 44.57
                   TIME SHIFT OF PEAK FLOW         (min)= 65.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.6827

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0206)|   Area    (ha)=  28.45
|ID= 1 DT= 5.0 min |   Total Imp(%)=  62.00   Dir. Conn.(%)=  53.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     17.64        10.81
     Dep. Storage     (mm)=      1.00         6.16
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    435.51        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                                 ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    6.51 | 1.083   30.79 | 2.083   12.86 |  3.08    7.50
                 0.167    6.51 | 1.167   30.79 | 2.167   12.86 |  3.17    7.50
                 0.250    7.27 | 1.250  178.44 | 2.250   11.36 |  3.25    7.06
                 0.333    7.27 | 1.333  178.44 | 2.333   11.36 |  3.33    7.06
                 0.417    8.30 | 1.417   37.79 | 2.417   10.23 |  3.42    6.68
                 0.500    8.30 | 1.500   37.79 | 2.500   10.23 |  3.50    6.68
                 0.583    9.77 | 1.583   23.83 | 2.583    9.33 |  3.58    6.35
                 0.667    9.77 | 1.667   23.83 | 2.667    9.33 |  3.67    6.35
                 0.750   12.10 | 1.750   18.17 | 2.750    8.61 |  3.75    6.05
                 0.833   12.10 | 1.833   18.17 | 2.833    8.61 |  3.83    6.05
                 0.917   16.55 | 1.917   14.97 | 2.917    8.00 |  3.92    5.79
```

```
                 1.000   16.55 | 2.000   14.97 | 3.000    8.00 |  4.00    5.79

     Max.Eff.Inten.(mm/hr)=     178.44      ********
               over (min)         5.00        10.00
     Storage Coeff.  (min)=       4.90 (ii)    9.80 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.22         0.11
                                                         *TOTALS*
     PEAK FLOW       (cms)=       6.66         1.59        7.907 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42         1.33
     RUNOFF VOLUME    (mm)=      76.38        32.68        55.84
     TOTAL RAINFALL   (mm)=      77.38        77.38        77.38
     RUNOFF COEFFICIENT   =       0.99         0.42         0.72

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0205)|   Area    (ha)=  10.19
|ID= 1 DT= 5.0 min |   Total Imp(%)=  66.00   Dir. Conn.(%)=  53.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      6.73         3.46
     Dep. Storage     (mm)=      5.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    260.64        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                                 ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    6.51 | 1.083   30.79 | 2.083   12.86 |  3.08    7.50
                 0.167    6.51 | 1.167   30.79 | 2.167   12.86 |  3.17    7.50
                 0.250    7.27 | 1.250  178.44 | 2.250   11.36 |  3.25    7.06
                 0.333    7.27 | 1.333  178.44 | 2.333   11.36 |  3.33    7.06
                 0.417    8.30 | 1.417   37.79 | 2.417   10.23 |  3.42    6.68
                 0.500    8.30 | 1.500   37.79 | 2.500   10.23 |  3.50    6.68
                 0.583    9.77 | 1.583   23.83 | 2.583    9.33 |  3.58    6.35
                 0.667    9.77 | 1.667   23.83 | 2.667    9.33 |  3.67    6.35
                 0.750   12.10 | 1.750   18.17 | 2.750    8.61 |  3.75    6.05
                 0.833   12.10 | 1.833   18.17 | 2.833    8.61 |  3.83    6.05
                 0.917   16.55 | 1.917   14.97 | 2.917    8.00 |  3.92    5.79
                 1.000   16.55 | 2.000   14.97 | 3.000    8.00 |  4.00    5.79

     Max.Eff.Inten.(mm/hr)=     178.44      ********
               over (min)         5.00        10.00
     Storage Coeff.  (min)=       3.60 (ii)    8.29 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.26         0.13
                                                         *TOTALS*
     PEAK FLOW       (cms)=       2.54         0.77        3.171 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42         1.33
     RUNOFF VOLUME    (mm)=      72.38        39.34        56.85
     TOTAL RAINFALL   (mm)=      77.38        77.38        77.38
```

```
    RUNOFF COEFFICIENT   =       0.94         0.51          0.73

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  74.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0155)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0205):    10.19   3.171     1.33    56.85
      + ID2= 2 (  0206):    28.45   7.907     1.33    55.84
        ==================================================
        ID = 3 (  0155):    38.64  11.078     1.33    56.11

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0404)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.1207   |   1.2370      1.5474
                          0.0080     0.2455   |   1.4210      1.8681
                          0.0280     0.3744   |   1.5050      2.0309
                          0.0400     0.5073   |   1.6600      2.3613
                          0.0490     0.6443   |   1.7320      2.5291
                          0.0570     0.7854   |   2.2660      2.6984
                          0.1620     0.9306   |   7.5350      3.0422
                          0.3760     1.0799   |  11.6140      3.2166
                          0.7060     1.2333   |  22.3920      3.5703
                          1.1340     1.3895   |  29.0780      3.7498

                               AREA      QPEAK      TPEAK        R.V.
                               (ha)      (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0155)     38.640     11.078       1.33       56.11
   OUTFLOW: ID= 1 (  0404)     38.640      1.138       2.25       52.71

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 10.27
                   TIME SHIFT OF PEAK FLOW         (min)= 55.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  1.3954

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0031)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0404):    38.64   1.138     2.25    52.71
      + ID2= 2 (  0048):    74.64   1.837     3.33    39.83
        ==================================================
        ID = 3 (  0031):   113.28   2.796     3.08    44.22

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0031)|
```

```
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0031):   113.28   2.796     3.08    44.22
      + ID2= 2 (  0065):    45.83   1.990     2.42    55.59
        ==================================================
        ID = 1 (  0031):   159.11   4.506     2.83    47.49

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| ROUTEPIPE(  0066)|     PIPE Number     =   1.00
| IN= 2---> OUT= 1 |     Width       (mm)=3000.00     Height   (mm)=2000.00
| DT=  5.0 min     |     Length       (m)=  39.00
--------------------     Slope      (m/m)=  0.005
                         Manning n       =  0.013

     <----------------- TRAVEL TIME TABLE -------------------->
       DEPTH       VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
        (m)       (cu.m.)       (cms)        (m/s)        min
       0.11      .123E+02       0.4          1.16         0.56
       0.21      .246E+02       1.1          1.76         0.37
       0.32      .369E+02       2.1          2.22         0.29
       0.42      .493E+02       3.3          2.59         0.25
       0.53      .616E+02       4.6          2.90         0.22
       0.63      .739E+02       6.0          3.17         0.21
       0.74      .862E+02       7.5          3.40         0.19
       0.84      .985E+02       9.1          3.61         0.18
       0.95      .111E+03      10.8          3.79         0.17
       1.05      .123E+03      12.5          3.95         0.16
       1.16      .135E+03      14.2          4.10         0.16
       1.26      .148E+03      16.0          4.23         0.15
       1.37      .160E+03      17.9          4.35         0.15
       1.47      .172E+03      19.7          4.47         0.15
       1.58      .185E+03      21.6          4.57         0.14
       1.68      .197E+03      23.6          4.67         0.14
       1.79      .209E+03      25.5          4.75         0.14
       1.89      .222E+03      27.5          4.84         0.13
       2.00      .234E+03      29.5          4.91         0.13
                                      <---- hydrograph ---->   <-pipe / channel->
                                AREA    QPEAK   TPEAK   R.V.   MAX DEPTH   MAX VEL
                                (ha)    (cms)   (hrs)   (mm)      (m)       (m/s)
   INFLOW : ID= 2 (  0031)    159.11     4.51     2.83  47.49     0.52       2.88
   OUTFLOW: ID= 1 (  0066)    159.11     4.51     2.83  47.49     0.52       2.88



--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0217)|   Area    (ha)=   8.74   Curve Number   (CN)= 50.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  12.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.95

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                                ---- TRANSFORMED HYETOGRAPH ----
                TIME     RAIN |  TIME     RAIN |'  TIME     RAIN |  TIME     RAIN
                 hrs    mm/hr |   hrs    mm/hr |'   hrs    mm/hr |   hrs    mm/hr
               0.083     6.51 | 1.083    30.79 | 2.083    12.86 |  3.08     7.50
               0.167     6.51 | 1.167    30.79 | 2.167    12.86 |  3.17     7.50
               0.250     7.27 | 1.250   178.44 | 2.250    11.36 |  3.25     7.06
               0.333     7.27 | 1.333   178.44 | 2.333    11.36 |  3.33     7.06
               0.417     8.30 | 1.417    37.79 | 2.417    10.23 |  3.42     6.68
```

```
            0.500    8.30 | 1.500   37.79 | 2.500   10.23 |  3.50     6.68
            0.583    9.77 | 1.583   23.83 | 2.583    9.33 |  3.58     6.35
            0.667    9.77 | 1.667   23.83 | 2.667    9.33 |  3.67     6.35
            0.750   12.10 | 1.750   18.17 | 2.750    8.61 |  3.75     6.05
            0.833   12.10 | 1.833   18.17 | 2.833    8.61 |  3.83     6.05
            0.917   16.55 | 1.917   14.97 | 2.917    8.00 |  3.92     5.79
            1.000   16.55 | 2.000   14.97 | 3.000    8.00 |  4.00     5.79

     Unit Hyd Qpeak  (cms)=   0.351

     PEAK FLOW       (cms)=   0.113 (i)
     TIME TO PEAK    (hrs)=   2.667
     RUNOFF VOLUME    (mm)=  13.384
     TOTAL RAINFALL   (mm)=  77.380
     RUNOFF COEFFICIENT   =   0.173

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0149)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0217):     8.74   0.113     2.67    13.38
      + ID2= 2 (  0066):   159.11   4.507     2.83    47.49
        ==================================================
        ID = 3 (  0149):   167.85   4.619     2.83    45.72

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| ROUTE CHN(  0051)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
                  0.00         410.33         0.0500
                 40.00         409.37      0.0500 /0.0500   Main Channel
                 80.00         408.89         0.0500        Main Channel
                120.00         409.11      0.0500 /0.0500   Main Channel
                160.00         409.15         0.0500
                200.00         410.76         0.0500

      <--------------------- TRAVEL TIME TABLE --------------------->
       DEPTH     ELEV      VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
        (m)      (m)      (cu.m.)       (cms)         (m/s)       (min)
       0.06    408.94    .176E+03        0.0          0.11        65.30
       0.11    409.00    .704E+03        0.3          0.17        41.13
       0.17    409.06    .158E+04        0.8          0.22        31.39
       0.23    409.11    .282E+04        1.8          0.27        25.91
       0.31    409.20    .601E+04        4.8          0.33        21.07
       0.39    409.28    .979E+04        9.5          0.41        17.12
       0.47    409.36    .139E+05       15.9          0.48        14.53
       0.55    409.44    .182E+05       24.4          0.56        12.41
       0.63    409.52    .227E+05       34.7          0.64        10.92
       0.71    409.60    .274E+05       46.4          0.71         9.84
       0.80    409.68    .323E+05       59.8          0.78         9.01
       0.88    409.76    .374E+05       74.6          0.84         8.35
       0.96    409.84    .426E+05       91.0          0.90         7.81
       1.04    409.92    .481E+05      108.9          0.95         7.36
       1.12    410.01    .537E+05      128.3          1.00         6.97
       1.20    410.09    .595E+05      149.3          1.05         6.64
       1.28    410.17    .655E+05      171.8          1.10         6.35
```

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       1.36    410.25    .716E+05      196.0          1.15         6.09
       1.44    410.33    .780E+05      221.7          1.19         5.86

                                     <---- hydrograph ---->   <-pipe / channel->
                               AREA    QPEAK   TPEAK    R.V.  MAX DEPTH  MAX VEL
                               (ha)    (cms)   (hrs)    (mm)     (m)      (m/s)
     INFLOW : ID= 2 (  0149)  167.85    4.62    2.83   45.72     0.31      0.33
     OUTFLOW: ID= 1 (  0051)  167.85    4.46    3.25   45.72     0.30      0.32


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0220)|   Area    (ha)=   5.14   Curve Number   (CN)= 71.4
|ID= 1 DT= 5.0 min |   Ia      (mm)=   8.20   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.68

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN | TIME    RAIN |' TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |  hrs   mm/hr |'  hrs   mm/hr |   hrs   mm/hr
                 0.083    6.51 | 1.083   30.79 | 2.083   12.86 |  3.08    7.50
                 0.167    6.51 | 1.167   30.79 | 2.167   12.86 |  3.17    7.50
                 0.250    7.27 | 1.250  178.44 | 2.250   11.36 |  3.25    7.06
                 0.333    7.27 | 1.333  178.44 | 2.333   11.36 |  3.33    7.06
                 0.417    8.30 | 1.417   37.79 | 2.417   10.23 |  3.42    6.68
                 0.500    8.30 | 1.500   37.79 | 2.500   10.23 |  3.50    6.68
                 0.583    9.77 | 1.583   23.83 | 2.583    9.33 |  3.58    6.35
                 0.667    9.77 | 1.667   23.83 | 2.667    9.33 |  3.67    6.35
                 0.750   12.10 | 1.750   18.17 | 2.750    8.61 |  3.75    6.05
                 0.833   12.10 | 1.833   18.17 | 2.833    8.61 |  3.83    6.05
                 0.917   16.55 | 1.917   14.97 | 2.917    8.00 |  3.92    5.79
                 1.000   16.55 | 2.000   14.97 | 3.000    8.00 |  4.00    5.79

     Unit Hyd Qpeak  (cms)=   0.289

     PEAK FLOW       (cms)=   0.182 (i)
     TIME TO PEAK    (hrs)=   2.167
     RUNOFF VOLUME    (mm)=  28.000
     TOTAL RAINFALL   (mm)=  77.380
     RUNOFF COEFFICIENT   =   0.362

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0218)|   Area    (ha)=  10.21   Curve Number   (CN)= 50.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  12.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.54

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN | TIME    RAIN |' TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |  hrs   mm/hr |'  hrs   mm/hr |   hrs   mm/hr
                 0.083    6.51 | 1.083   30.79 | 2.083   12.86 |  3.08    7.50
                 0.167    6.51 | 1.167   30.79 | 2.167   12.86 |  3.17    7.50
                 0.250    7.27 | 1.250  178.44 | 2.250   11.36 |  3.25    7.06
                 0.333    7.27 | 1.333  178.44 | 2.333   11.36 |  3.33    7.06
```

```
                 0.417    8.30 | 1.417   37.79 | 2.417   10.23 |  3.42    6.68
                 0.500    8.30 | 1.500   37.79 | 2.500   10.23 |  3.50    6.68
                 0.583    9.77 | 1.583   23.83 | 2.583    9.33 |  3.58    6.35
                 0.667    9.77 | 1.667   23.83 | 2.667    9.33 |  3.67    6.35
                 0.750   12.10 | 1.750   18.17 | 2.750    8.61 |  3.75    6.05
                 0.833   12.10 | 1.833   18.17 | 2.833    8.61 |  3.83    6.05
                 0.917   16.55 | 1.917   14.97 | 2.917    8.00 |  3.92    5.79
                 1.000   16.55 | 2.000   14.97 | 3.000    8.00 |  4.00    5.79

     Unit Hyd Qpeak  (cms)=   0.253

     PEAK FLOW       (cms)=   0.099 (i)
     TIME TO PEAK    (hrs)=   3.667
     RUNOFF VOLUME    (mm)=  13.384
     TOTAL RAINFALL   (mm)=  77.380
     RUNOFF COEFFICIENT   =   0.173

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0224)|   Area    (ha)=   2.58
|ID= 1 DT= 5.0 min |   Total Imp(%)=  44.00   Dir. Conn.(%)=  31.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        1.14          1.44
     Dep. Storage     (mm)=        1.00          5.64
     Average Slope     (%)=        1.00          2.00
     Length            (m)=      131.15         40.00
     Mannings n          =       0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                                 ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    6.51 | 1.083   30.79 | 2.083   12.86 |  3.08    7.50
                 0.167    6.51 | 1.167   30.79 | 2.167   12.86 |  3.17    7.50
                 0.250    7.27 | 1.250  178.44 | 2.250   11.36 |  3.25    7.06
                 0.333    7.27 | 1.333  178.44 | 2.333   11.36 |  3.33    7.06
                 0.417    8.30 | 1.417   37.79 | 2.417   10.23 |  3.42    6.68
                 0.500    8.30 | 1.500   37.79 | 2.500   10.23 |  3.50    6.68
                 0.583    9.77 | 1.583   23.83 | 2.583    9.33 |  3.58    6.35
                 0.667    9.77 | 1.667   23.83 | 2.667    9.33 |  3.67    6.35
                 0.750   12.10 | 1.750   18.17 | 2.750    8.61 |  3.75    6.05
                 0.833   12.10 | 1.833   18.17 | 2.833    8.61 |  3.83    6.05
                 0.917   16.55 | 1.917   14.97 | 2.917    8.00 |  3.92    5.79
                 1.000   16.55 | 2.000   14.97 | 3.000    8.00 |  4.00    5.79

     Max.Eff.Inten.(mm/hr)=      178.44         94.02
                over (min)         5.00         10.00
     Storage Coeff.  (min)=        2.38 (ii)     9.62 (ii)
     Unit Hyd. Tpeak (min)=        5.00         10.00
     Unit Hyd. peak  (cms)=        0.30          0.11
                                                            *TOTALS*
     PEAK FLOW       (cms)=        0.39          0.24         0.580 (iii)
     TIME TO PEAK    (hrs)=        1.33          1.42          1.33
     RUNOFF VOLUME    (mm)=       76.38         35.65         48.28
     TOTAL RAINFALL   (mm)=       77.38         77.38         77.38
     RUNOFF COEFFICIENT   =        0.99          0.46          0.62

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
```

```

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  73.1    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0170)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0218):   10.21    0.099     3.67    13.38
      + ID2= 2 (  0220):    5.14    0.182     2.17    28.00
        ===================================================
        ID = 3 (  0170):   15.35    0.240     2.42    18.28

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0170)|
|   3 +  2 =  1    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0170):   15.35    0.240     2.42    18.28
      + ID2= 2 (  0224):    2.58    0.580     1.33    48.28
        ===================================================
        ID = 1 (  0170):   17.93    0.601     1.33    22.59

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| ROUTE CHN(  0061)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
                   0.00        407.05        0.0500
                  40.00        407.32     0.0500 /0.0500   Main Channel
                  80.00        406.85        0.0500        Main Channel
                 120.00        406.99     0.0500 /0.0500   Main Channel
                 160.00        407.77        0.0500
                 200.00        408.32        0.0500

          <-------------------- TRAVEL TIME TABLE --------------------->
          DEPTH     ELEV     VOLUME     FLOW RATE    VELOCITY    TRAV.TIME
           (m)       (m)    (cu.m.)       (cms)        (m/s)       (min)
           0.01    406.86   .647E+01       0.0          0.02      259.26
           0.02    406.87   .259E+02       0.0          0.03      163.33
           0.03    406.88   .582E+02       0.0          0.04      124.64
           0.04    406.89   .103E+03       0.0          0.05      102.89
           0.05    406.90   .162E+03       0.0          0.06       88.67
           0.06    406.91   .233E+03       0.0          0.07       78.52
           0.07    406.92   .317E+03       0.1          0.08       70.85
           0.08    406.93   .414E+03       0.1          0.08       64.82
           0.09    406.95   .524E+03       0.1          0.09       59.92
           0.10    406.96   .647E+03       0.2          0.10       55.86
           0.11    406.97   .782E+03       0.2          0.10       52.42
           0.12    406.98   .931E+03       0.3          0.11       49.46
           0.13    406.99   .109E+04       0.4          0.11       46.89
           0.14    407.00   .127E+04       0.5          0.12       42.90
           0.15    407.01   .146E+04       0.6          0.13       39.75
           0.17    407.02   .165E+04       0.7          0.14       37.17
```

```
        0.18   407.03    .185E+04       0.9           0.15       35.02
        0.19   407.04    .205E+04       1.0           0.16       33.19
        0.20   407.05    .225E+04       1.2           0.17       31.61

                                      <---- hydrograph ---->   <-pipe / channel->
                               AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                               (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
    INFLOW : ID= 2 (  0170)   17.93     0.60    1.33  22.59      0.15      0.13
    OUTFLOW: ID= 1 (  0061)   17.93     0.27    2.83  22.51      0.12      0.10


 --------------------------------------------------------------------------------
 --------------------
 | CALIB              |
 | STANDHYD (  0210)|   Area    (ha)=   7.09
 |ID= 1 DT= 5.0 min |   Total Imp(%)=  83.00   Dir. Conn.(%)=  83.00
 --------------------
                               IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=       5.88          1.21
      Dep. Storage     (mm)=       1.00          5.00
      Average Slope     (%)=       1.00          2.00
      Length            (m)=     217.41         40.00
      Mannings n          =      0.013         0.250

          NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                                 ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    6.51 | 1.083   30.79 | 2.083   12.86 |  3.08    7.50
                0.167    6.51 | 1.167   30.79 | 2.167   12.86 |  3.17    7.50
                0.250    7.27 | 1.250  178.44 | 2.250   11.36 |  3.25    7.06
                0.333    7.27 | 1.333  178.44 | 2.333   11.36 |  3.33    7.06
                0.417    8.30 | 1.417   37.79 | 2.417   10.23 |  3.42    6.68
                0.500    8.30 | 1.500   37.79 | 2.500   10.23 |  3.50    6.68
                0.583    9.77 | 1.583   23.83 | 2.583    9.33 |  3.58    6.35
                0.667    9.77 | 1.667   23.83 | 2.667    9.33 |  3.67    6.35
                0.750   12.10 | 1.750   18.17 | 2.750    8.61 |  3.75    6.05
                0.833   12.10 | 1.833   18.17 | 2.833    8.61 |  3.83    6.05
                0.917   16.55 | 1.917   14.97 | 2.917    8.00 |  3.92    5.79
                1.000   16.55 | 2.000   14.97 | 3.000    8.00 |  4.00    5.79

      Max.Eff.Inten.(mm/hr)=     178.44      ********
                 over (min)        5.00        10.00
      Storage Coeff.  (min)=       3.23 (ii)    6.20 (ii)
      Unit Hyd. Tpeak (min)=       5.00        10.00
      Unit Hyd. peak  (cms)=       0.27         0.15
                                                            *TOTALS*
      PEAK FLOW       (cms)=       2.81         0.17          2.950 (iii)
      TIME TO PEAK    (hrs)=       1.33         1.42           1.33
      RUNOFF VOLUME    (mm)=      76.38        32.41          68.91
      TOTAL RAINFALL   (mm)=      77.38        77.38          77.38
      RUNOFF COEFFICIENT   =       0.99         0.42           0.89

 ***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  74.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

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 --------------------------------------------------------------------------------
 --------------------
 | CALIB              |
 | STANDHYD (  0211)|   Area    (ha)=   8.86
 |ID= 1 DT= 5.0 min |   Total Imp(%)=  52.00   Dir. Conn.(%)=  43.00
 --------------------
                               IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=       4.61          4.25
      Dep. Storage     (mm)=       1.00          5.00
      Average Slope     (%)=       1.00          2.00
      Length            (m)=     243.04         40.00
      Mannings n          =      0.013         0.250

          NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                                 ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    6.51 | 1.083   30.79 | 2.083   12.86 |  3.08    7.50
                0.167    6.51 | 1.167   30.79 | 2.167   12.86 |  3.17    7.50
                0.250    7.27 | 1.250  178.44 | 2.250   11.36 |  3.25    7.06
                0.333    7.27 | 1.333  178.44 | 2.333   11.36 |  3.33    7.06
                0.417    8.30 | 1.417   37.79 | 2.417   10.23 |  3.42    6.68
                0.500    8.30 | 1.500   37.79 | 2.500   10.23 |  3.50    6.68
                0.583    9.77 | 1.583   23.83 | 2.583    9.33 |  3.58    6.35
                0.667    9.77 | 1.667   23.83 | 2.667    9.33 |  3.67    6.35
                0.750   12.10 | 1.750   18.17 | 2.750    8.61 |  3.75    6.05
                0.833   12.10 | 1.833   18.17 | 2.833    8.61 |  3.83    6.05
                0.917   16.55 | 1.917   14.97 | 2.917    8.00 |  3.92    5.79
                1.000   16.55 | 2.000   14.97 | 3.000    8.00 |  4.00    5.79

      Max.Eff.Inten.(mm/hr)=     178.44        92.04
                 over (min)        5.00        15.00
      Storage Coeff.  (min)=       3.45 (ii)   10.75 (ii)
      Unit Hyd. Tpeak (min)=       5.00        15.00
      Unit Hyd. peak  (cms)=       0.26         0.09
                                                            *TOTALS*
      PEAK FLOW       (cms)=       1.80         0.60          2.120 (iii)
      TIME TO PEAK    (hrs)=       1.33         1.50           1.33
      RUNOFF VOLUME    (mm)=      76.38        36.10          53.42
      TOTAL RAINFALL   (mm)=      77.38        77.38          77.38
      RUNOFF COEFFICIENT   =       0.99         0.47           0.69

 ***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  74.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 --------------------------------------------------------------------------------

 --------------------
 | ADD HYD  (  0148)|
 |   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
 --------------------          (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (  0210):      7.09    2.950     1.33    68.91
       + ID2= 2 (  0211):      8.86    2.120     1.33    53.42
         ====================================================
         ID = 3 (  0148):     15.95    5.070     1.33    60.30

      NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
```

```
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0403)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   1.8170      0.8941
                          0.0080     0.0691   |   1.9510      0.9877
                          0.0230     0.1408   |   3.0570      1.0829
                          0.0380     0.2919   |   7.9330      1.2770
                          0.0430     0.3712   |  11.4880      1.3760
                          0.0850     0.4530   |  15.7740      1.4762
                          0.2400     0.5373   |  20.7990      1.5777
                          0.5100     0.6238   |  26.5790      1.6805
                          0.8960     0.7121   |  40.4710      1.8900
                          1.3970     0.8022   |  48.6210      1.9967

                               AREA     QPEAK      TPEAK        R.V.
                               (ha)     (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0148)    15.950      5.070      1.33        60.30
   OUTFLOW: ID= 1 (  0403)    15.950      0.511      2.25        60.16

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 10.08
                  TIME SHIFT OF PEAK FLOW         (min)= 55.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.6245

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0213)|   Area    (ha)=   0.39   Curve Number   (CN)= 69.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.05

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                                ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    6.51 | 1.083   30.79 | 2.083   12.86 |  3.08    7.50
                0.167    6.51 | 1.167   30.79 | 2.167   12.86 |  3.17    7.50
                0.250    7.27 | 1.250  178.44 | 2.250   11.36 |  3.25    7.06
                0.333    7.27 | 1.333  178.44 | 2.333   11.36 |  3.33    7.06
                0.417    8.30 | 1.417   37.79 | 2.417   10.23 |  3.42    6.68
                0.500    8.30 | 1.500   37.79 | 2.500   10.23 |  3.50    6.68
                0.583    9.77 | 1.583   23.83 | 2.583    9.33 |  3.58    6.35
                0.667    9.77 | 1.667   23.83 | 2.667    9.33 |  3.67    6.35
                0.750   12.10 | 1.750   18.17 | 2.750    8.61 |  3.75    6.05
                0.833   12.10 | 1.833   18.17 | 2.833    8.61 |  3.83    6.05
                0.917   16.55 | 1.917   14.97 | 2.917    8.00 |  3.92    5.79
                1.000   16.55 | 2.000   14.97 | 3.000    8.00 |  4.00    5.79

     Unit Hyd Qpeak  (cms)=   0.298

     PEAK FLOW       (cms)=   0.055 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=  21.433
     TOTAL RAINFALL   (mm)=  77.380
     RUNOFF COEFFICIENT   =   0.277

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
```

```
--------------------
| ADD HYD  (  0044)|
|   1 +  2 =  3    |             AREA    QPEAK    TPEAK      R.V.
--------------------             (ha)    (cms)    (hrs)      (mm)
        ID1= 1 (  0213):         0.39    0.055     1.33     21.43
      + ID2= 2 (  0403):        15.95    0.511     2.25     60.16
        ==================================================
        ID = 3 (  0044):        16.34    0.517     2.17     59.24

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0044)|
|   3 +  2 =  1    |             AREA    QPEAK    TPEAK      R.V.
--------------------             (ha)    (cms)    (hrs)      (mm)
        ID1= 3 (  0044):        16.34    0.517     2.17     59.24
      + ID2= 2 (  0061):        17.93    0.270     2.83     22.51
        ==================================================
        ID = 1 (  0044):        34.27    0.769     2.33     40.02

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| ROUTE CHN(  0060)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
                  0.00         409.04         0.0500
                 40.00         407.85         0.0500       Main Channel
                 80.00         407.42         0.0500       Main Channel
                120.00         407.63     0.0500 /0.0500   Main Channel
                160.00         408.37         0.0500
                200.00         409.57         0.0500

        <--------------------- TRAVEL TIME TABLE ---------------------->
         DEPTH    ELEV      VOLUME     FLOW RATE    VELOCITY    TRAV.TIME
          (m)      (m)     (cu.m.)       (cms)        (m/s)       (min)
          0.07   407.49   .189E+03        0.0          0.05       93.75
          0.14   407.56   .755E+03        0.2          0.08       59.06
          0.21   407.63   .170E+04        0.6          0.10       45.07
          0.30   407.72   .327E+04        1.7          0.14       32.46
          0.39   407.80   .514E+04        3.2          0.17       26.65
          0.47   407.89   .731E+04        5.4          0.20       22.47
          0.56   407.98   .967E+04        8.3          0.23       19.34
          0.65   408.07   .122E+05       11.8          0.26       17.21
          0.74   408.16   .149E+05       15.9          0.29       15.63
          0.83   408.24   .179E+05       20.7          0.31       14.41
          0.91   408.33   .210E+05       26.0          0.33       13.43
          1.00   408.42   .242E+05       32.1          0.36       12.60
          1.09   408.51   .276E+05       38.8          0.38       11.88
          1.18   408.60   .312E+05       46.2          0.40       11.26
          1.27   408.68   .349E+05       54.2          0.42       10.73
          1.35   408.77   .387E+05       62.9          0.44       10.26
          1.44   408.86   .427E+05       72.3          0.46        9.85
          1.53   408.95   .468E+05       82.3          0.47        9.48
          1.62   409.04   .511E+05       93.1          0.49        9.15

                                  <---- hydrograph ---->   <-pipe / channel->
                            AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                            (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
    INFLOW : ID= 2 (  0044)  34.27    0.77    2.33  40.02      0.22      0.10
    OUTFLOW: ID= 1 (  0060)  34.27    0.64    3.25  40.02      0.21      0.10
```

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---------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0038)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0051):   167.85   4.464     3.25    45.72
      + ID2= 2 (  0060):    34.27   0.641     3.25    40.02
        ==================================================
        ID = 3 (  0038):   202.11   5.105     3.25    44.75

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------------
--------------------
| ROUTE CHN(  0052)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
                   0.00         410.25        0.0500
                  40.00         409.28    0.0500 /0.0500   Main Channel
                  80.00         408.14        0.0500       Main Channel
                 120.00         408.21    0.0500 /0.0500   Main Channel
                 160.00         408.82        0.0500
                 200.00         410.08        0.0500

      <--------------------- TRAVEL TIME TABLE ---------------------->
       DEPTH    ELEV      VOLUME    FLOW RATE    VELOCITY    TRAV.TIME
        (m)      (m)     (cu.m.)      (cms)        (m/s)       (min)
       0.08   408.21    .400E+03       0.3          0.17       24.63
       0.17   408.31    .157E+04       2.4          0.38       11.06
       0.27   408.41    .299E+04       6.2          0.52        8.03
       0.37   408.51    .465E+04      11.8          0.63        6.59
       0.47   408.61    .656E+04      19.2          0.73        5.71
       0.57   408.71    .872E+04      28.5          0.82        5.10
       0.67   408.81    .111E+05      39.8          0.90        4.65
       0.76   408.90    .137E+05      53.7          0.98        4.26
       0.86   409.00    .165E+05      69.8          1.06        3.94
       0.96   409.10    .195E+05      88.1          1.13        3.68
       1.06   409.20    .226E+05     108.5          1.20        3.46
       1.16   409.30    .258E+05     131.7          1.28        3.27
       1.26   409.40    .292E+05     159.4          1.36        3.06
       1.35   409.49    .329E+05     189.6          1.44        2.89
       1.45   409.59    .366E+05     222.4          1.52        2.74
       1.55   409.69    .406E+05     258.0          1.59        2.62
       1.65   409.79    .447E+05     296.3          1.66        2.52
       1.75   409.89    .490E+05     337.5          1.72        2.42
       1.85   409.99    .535E+05     381.6          1.78        2.34

                                    <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK    TPEAK   R.V.   MAX DEPTH   MAX VEL
                             (ha)    (cms)    (hrs)   (mm)      (m)       (m/s)
   INFLOW : ID= 2 (  0038)  202.11     5.11     3.25  44.75     0.24        0.47
   OUTFLOW: ID= 1 (  0052)  202.11     5.10     3.33  44.75     0.24        0.47


---------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0219)|   Area    (ha)=   2.06   Curve Number   (CN)= 50.0
```

```
|ID= 1 DT= 5.0 min |    Ia      (mm)=  12.00   # of Linear Res.(N)= 3.00
--------------------    U.H. Tp(hrs)=   0.90

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                            ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    6.51 | 1.083   30.79 | 2.083   12.86 |  3.08    7.50
               0.167    6.51 | 1.167   30.79 | 2.167   12.86 |  3.17    7.50
               0.250    7.27 | 1.250  178.44 | 2.250   11.36 |  3.25    7.06
               0.333    7.27 | 1.333  178.44 | 2.333   11.36 |  3.33    7.06
               0.417    8.30 | 1.417   37.79 | 2.417   10.23 |  3.42    6.68
               0.500    8.30 | 1.500   37.79 | 2.500   10.23 |  3.50    6.68
               0.583    9.77 | 1.583   23.83 | 2.583    9.33 |  3.58    6.35
               0.667    9.77 | 1.667   23.83 | 2.667    9.33 |  3.67    6.35
               0.750   12.10 | 1.750   18.17 | 2.750    8.61 |  3.75    6.05
               0.833   12.10 | 1.833   18.17 | 2.833    8.61 |  3.83    6.05
               0.917   16.55 | 1.917   14.97 | 2.917    8.00 |  3.92    5.79
               1.000   16.55 | 2.000   14.97 | 3.000    8.00 |  4.00    5.79

     Unit Hyd Qpeak  (cms)=   0.087

     PEAK FLOW       (cms)=   0.027 (i)
     TIME TO PEAK    (hrs)=   2.583
     RUNOFF VOLUME    (mm)=  13.383
     TOTAL RAINFALL   (mm)=  77.380
     RUNOFF COEFFICIENT   =   0.173

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0214)|    Area    (ha)=   6.35
|ID= 1 DT= 5.0 min |    Total Imp(%)=  76.00   Dir. Conn.(%)=  60.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      4.83         1.52
     Dep. Storage     (mm)=      1.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    205.75        40.00
     Mannings n          =     0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                            ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    6.51 | 1.083   30.79 | 2.083   12.86 |  3.08    7.50
               0.167    6.51 | 1.167   30.79 | 2.167   12.86 |  3.17    7.50
               0.250    7.27 | 1.250  178.44 | 2.250   11.36 |  3.25    7.06
               0.333    7.27 | 1.333  178.44 | 2.333   11.36 |  3.33    7.06
               0.417    8.30 | 1.417   37.79 | 2.417   10.23 |  3.42    6.68
               0.500    8.30 | 1.500   37.79 | 2.500   10.23 |  3.50    6.68
               0.583    9.77 | 1.583   23.83 | 2.583    9.33 |  3.58    6.35
               0.667    9.77 | 1.667   23.83 | 2.667    9.33 |  3.67    6.35
               0.750   12.10 | 1.750   18.17 | 2.750    8.61 |  3.75    6.05
               0.833   12.10 | 1.833   18.17 | 2.833    8.61 |  3.83    6.05
               0.917   16.55 | 1.917   14.97 | 2.917    8.00 |  3.92    5.79
               1.000   16.55 | 2.000   14.97 | 3.000    8.00 |  4.00    5.79
```

```
     Max.Eff.Inten.(mm/hr)=     178.44     ********
               over (min)        5.00       10.00
     Storage Coeff.  (min)=      3.12 (ii)   7.00 (ii)
     Unit Hyd. Tpeak (min)=      5.00       10.00
     Unit Hyd. peak  (cms)=      0.27        0.14
                                                     *TOTALS*
     PEAK FLOW       (cms)=      1.82        0.47       2.226 (iii)
     TIME TO PEAK    (hrs)=      1.33        1.42        1.33
     RUNOFF VOLUME    (mm)=     76.38       42.13       62.68
     TOTAL RAINFALL   (mm)=     77.38       77.38       77.38
     RUNOFF COEFFICIENT   =      0.99        0.54        0.81

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  72.8    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0401)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   1.2290      0.2828
                          0.0070     0.0265   |   2.8530      0.3195
                          0.0130     0.0543   |   4.8140      0.3570
                          0.0170     0.0832   |   7.1940      0.3953
                          0.0200     0.1135   |  10.1490      0.4344
                          0.0230     0.1450   |  13.7050      0.4744
                          0.0250     0.1778   |  17.8880      0.5151
                          0.1250     0.2118   |  22.7260      0.5567
                          0.3360     0.2469   |  28.2440      0.5992

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0214)      6.350     2.226      1.33       62.68
   OUTFLOW: ID= 1 (  0401)      6.350     0.294      1.83       62.53

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 13.19
                    TIME SHIFT OF PEAK FLOW         (min)= 30.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.2402

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0212)|   Area    (ha)=   8.34
|ID= 1 DT= 5.0 min |   Total Imp(%)=  40.00   Dir. Conn.(%)=  20.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.34        5.00
     Dep. Storage     (mm)=       1.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     235.80       40.00
     Mannings n          =       0.013       0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                                ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
```

```
                 0.083    6.51 | 1.083   30.79 | 2.083   12.86 |  3.08    7.50
                 0.167    6.51 | 1.167   30.79 | 2.167   12.86 |  3.17    7.50
                 0.250    7.27 | 1.250  178.44 | 2.250   11.36 |  3.25    7.06
                 0.333    7.27 | 1.333  178.44 | 2.333   11.36 |  3.33    7.06
                 0.417    8.30 | 1.417   37.79 | 2.417   10.23 |  3.42    6.68
                 0.500    8.30 | 1.500   37.79 | 2.500   10.23 |  3.50    6.68
                 0.583    9.77 | 1.583   23.83 | 2.583    9.33 |  3.58    6.35
                 0.667    9.77 | 1.667   23.83 | 2.667    9.33 |  3.67    6.35
                 0.750   12.10 | 1.750   18.17 | 2.750    8.61 |  3.75    6.05
                 0.833   12.10 | 1.833   18.17 | 2.833    8.61 |  3.83    6.05
                 0.917   16.55 | 1.917   14.97 | 2.917    8.00 |  3.92    5.79
                 1.000   16.55 | 2.000   14.97 | 3.000    8.00 |  4.00    5.79

     Max.Eff.Inten.(mm/hr)=     178.44      111.85
               over (min)        5.00       15.00
     Storage Coeff.  (min)=      3.39 (ii)  10.14 (ii)
     Unit Hyd. Tpeak (min)=      5.00       15.00
     Unit Hyd. peak  (cms)=      0.26        0.10
                                                     *TOTALS*
     PEAK FLOW       (cms)=      0.79        0.88       1.267 (iii)
     TIME TO PEAK    (hrs)=      1.33        1.50        1.33
     RUNOFF VOLUME    (mm)=     76.38       38.47       46.05
     TOTAL RAINFALL   (mm)=     77.38       77.38       77.38
     RUNOFF COEFFICIENT   =      0.99        0.50        0.60

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  73.9    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0402)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   1.3520      0.3425
                          0.0050     0.0424   |   2.6810      0.3996
                          0.0080     0.0870   |   4.4400      0.4581
                          0.0340     0.1338   |   6.7120      0.5179
                          0.1430     0.1827   |   9.5220      0.5791
                          0.3120     0.2338   |  12.8560      0.6415
                          0.5370     0.2871   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0212)      8.340     1.267      1.33       46.05
   OUTFLOW: ID= 1 (  0402)      8.340     0.261      2.25       45.80

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 20.62
                    TIME SHIFT OF PEAK FLOW         (min)= 55.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.2186

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0039)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
```

```
          ID1= 1 (  0219):     2.06   0.027     2.58    13.38
        + ID2= 2 (  0401):     6.35   0.294     1.83    62.53
          ===================================================
          ID = 3 (  0039):     8.41   0.312     1.92    50.49

       NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0039)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 3 (  0039):     8.41   0.312     1.92    50.49
        + ID2= 2 (  0402):     8.34   0.261     2.25    45.80
          ===================================================
          ID = 1 (  0039):    16.75   0.560     2.08    48.15

       NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0039)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (  0039):    16.75   0.560     2.08    48.15
        + ID2= 2 (  0052):   202.11   5.096     3.33    44.75
          ===================================================
          ID = 3 (  0039):   218.87   5.464     3.25    45.01

       NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0227)|   Area    (ha)=   1.44   Curve Number   (CN)= 80.7
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.67   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.23

           NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                                ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    6.51 | 1.083   30.79 | 2.083   12.86 |  3.08    7.50
                 0.167    6.51 | 1.167   30.79 | 2.167   12.86 |  3.17    7.50
                 0.250    7.27 | 1.250  178.44 | 2.250   11.36 |  3.25    7.06
                 0.333    7.27 | 1.333  178.44 | 2.333   11.36 |  3.33    7.06
                 0.417    8.30 | 1.417   37.79 | 2.417   10.23 |  3.42    6.68
                 0.500    8.30 | 1.500   37.79 | 2.500   10.23 |  3.50    6.68
                 0.583    9.77 | 1.583   23.83 | 2.583    9.33 |  3.58    6.35
                 0.667    9.77 | 1.667   23.83 | 2.667    9.33 |  3.67    6.35
                 0.750   12.10 | 1.750   18.17 | 2.750    8.61 |  3.75    6.05
                 0.833   12.10 | 1.833   18.17 | 2.833    8.61 |  3.83    6.05
                 0.917   16.55 | 1.917   14.97 | 2.917    8.00 |  3.92    5.79
                 1.000   16.55 | 2.000   14.97 | 3.000    8.00 |  4.00    5.79

       Unit Hyd Qpeak  (cms)=   0.239

       PEAK FLOW       (cms)=   0.157 (i)
       TIME TO PEAK    (hrs)=   1.500
       RUNOFF VOLUME    (mm)=  38.780
       TOTAL RAINFALL   (mm)=  77.380
       RUNOFF COEFFICIENT   =   0.501
```

```
      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0223)|   Area    (ha)=   1.91
|ID= 1 DT= 5.0 min |   Total Imp(%)=  40.00   Dir. Conn.(%)=  30.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.76         1.15
     Dep. Storage     (mm)=       1.00         4.81
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     112.84        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    6.51 | 1.083   30.79 | 2.083   12.86 |  3.08    7.50
               0.167    6.51 | 1.167   30.79 | 2.167   12.86 |  3.17    7.50
               0.250    7.27 | 1.250  178.44 | 2.250   11.36 |  3.25    7.06
               0.333    7.27 | 1.333  178.44 | 2.333   11.36 |  3.33    7.06
               0.417    8.30 | 1.417   37.79 | 2.417   10.23 |  3.42    6.68
               0.500    8.30 | 1.500   37.79 | 2.500   10.23 |  3.50    6.68
               0.583    9.77 | 1.583   23.83 | 2.583    9.33 |  3.58    6.35
               0.667    9.77 | 1.667   23.83 | 2.667    9.33 |  3.67    6.35
               0.750   12.10 | 1.750   18.17 | 2.750    8.61 |  3.75    6.05
               0.833   12.10 | 1.833   18.17 | 2.833    8.61 |  3.83    6.05
               0.917   16.55 | 1.917   14.97 | 2.917    8.00 |  3.92    5.79
               1.000   16.55 | 2.000   14.97 | 3.000    8.00 |  4.00    5.79

     Max.Eff.Inten.(mm/hr)=     178.44        94.15
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       2.18 (ii)    9.41 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.31         0.12
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.28         0.19         0.434 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42          1.33
     RUNOFF VOLUME    (mm)=      76.38        37.29         49.02
     TOTAL RAINFALL   (mm)=      77.38        77.38         77.38
     RUNOFF COEFFICIENT   =       0.99         0.48          0.63

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  75.5    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0222)|   Area    (ha)=  14.26
|ID= 1 DT= 5.0 min |   Total Imp(%)=  66.00   Dir. Conn.(%)=  59.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       9.41         4.85
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
```

```
     Length           (m)=     308.33        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    6.51 | 1.083   30.79 | 2.083   12.86 |  3.08    7.50
             0.167    6.51 | 1.167   30.79 | 2.167   12.86 |  3.17    7.50
             0.250    7.27 | 1.250  178.44 | 2.250   11.36 |  3.25    7.06
             0.333    7.27 | 1.333  178.44 | 2.333   11.36 |  3.33    7.06
             0.417    8.30 | 1.417   37.79 | 2.417   10.23 |  3.42    6.68
             0.500    8.30 | 1.500   37.79 | 2.500   10.23 |  3.50    6.68
             0.583    9.77 | 1.583   23.83 | 2.583    9.33 |  3.58    6.35
             0.667    9.77 | 1.667   23.83 | 2.667    9.33 |  3.67    6.35
             0.750   12.10 | 1.750   18.17 | 2.750    8.61 |  3.75    6.05
             0.833   12.10 | 1.833   18.17 | 2.833    8.61 |  3.83    6.05
             0.917   16.55 | 1.917   14.97 | 2.917    8.00 |  3.92    5.79
             1.000   16.55 | 2.000   14.97 | 3.000    8.00 |  4.00    5.79

     Max.Eff.Inten.(mm/hr)=     178.44      ********
               over (min)         5.00        10.00
     Storage Coeff.  (min)=       3.98 (ii)    8.47 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.24         0.12
                                                          *TOTALS*
     PEAK FLOW       (cms)=       3.89         0.85         4.575 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42          1.33
     RUNOFF VOLUME    (mm)=      76.38        36.42         60.00
     TOTAL RAINFALL   (mm)=      77.38        77.38         77.38
     RUNOFF COEFFICIENT   =       0.99         0.47          0.78

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  74.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0185)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0222):    14.26   4.575     1.33    60.00
      + ID2= 2 (  0223):     1.91   0.434     1.33    49.02
        ===================================================
        ID = 3 (  0185):    16.17   5.009     1.33    58.70

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0406)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3760      0.7042
                          0.0070     0.0554   |   0.7030      0.7774
                          0.0320     0.1716   |   1.0500      0.9272
                          0.0390     0.2324   |   1.0970      1.0037
```

```
                          0.0440     0.2949   |   1.1420      1.0813
                          0.0500     0.3592   |   2.3700      1.1600
                          0.0540     0.4253   |   4.7260      1.2397
                          0.0580     0.4930   |  12.0270      1.4024
                          0.0620     0.5620   |  16.9030      1.4854
                          0.1640     0.6324   |  22.5920      1.5695

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0185)     16.170     5.009      1.33       58.70
   OUTFLOW: ID= 1 (  0406)     16.170     0.350      2.83       58.58

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=  6.99
                    TIME SHIFT OF PEAK FLOW         (min)= 90.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.6954

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--------------------
| ADD HYD  (  0186)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0227):     1.44   0.157     1.50    38.78
      + ID2= 2 (  0406):    16.17   0.350     2.83    58.58
        ===================================================
        ID = 3 (  0186):    17.61   0.381     2.67    56.96

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0201)|   Area    (ha)=   2.75
|ID= 1 DT= 5.0 min |   Total Imp(%)=  40.00   Dir. Conn.(%)=  28.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.10         1.65
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     135.40        40.00
     Mannings n          =       0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    6.51 | 1.083   30.79 | 2.083   12.86 |  3.08    7.50
             0.167    6.51 | 1.167   30.79 | 2.167   12.86 |  3.17    7.50
             0.250    7.27 | 1.250  178.44 | 2.250   11.36 |  3.25    7.06
             0.333    7.27 | 1.333  178.44 | 2.333   11.36 |  3.33    7.06
             0.417    8.30 | 1.417   37.79 | 2.417   10.23 |  3.42    6.68
             0.500    8.30 | 1.500   37.79 | 2.500   10.23 |  3.50    6.68
             0.583    9.77 | 1.583   23.83 | 2.583    9.33 |  3.58    6.35
             0.667    9.77 | 1.667   23.83 | 2.667    9.33 |  3.67    6.35
             0.750   12.10 | 1.750   18.17 | 2.750    8.61 |  3.75    6.05
             0.833   12.10 | 1.833   18.17 | 2.833    8.61 |  3.83    6.05
             0.917   16.55 | 1.917   14.97 | 2.917    8.00 |  3.92    5.79
             1.000   16.55 | 2.000   14.97 | 3.000    8.00 |  4.00    5.79

     Max.Eff.Inten.(mm/hr)=     178.44       142.31
               over (min)         5.00        10.00
     Storage Coeff.  (min)=       2.43 (ii)    8.56 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
```

```
     Unit Hyd. peak  (cms)=       0.30         0.12
                                                       *TOTALS*
     PEAK FLOW       (cms)=       0.38         0.42         0.743 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42          1.33
     RUNOFF VOLUME    (mm)=      76.38        51.07         58.16
     TOTAL RAINFALL   (mm)=      77.38        77.38         77.38
     RUNOFF COEFFICIENT   =       0.99         0.66          0.75

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0202)|   Area    (ha)=  11.74
|ID= 1 DT= 5.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  42.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      7.04         4.70
     Dep. Storage     (mm)=      1.00         1.50
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    279.76        40.00
     Mannings n           =     0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    6.51 | 1.083   30.79 | 2.083    12.86 | 3.08    7.50
                0.167    6.51 | 1.167   30.79 | 2.167    12.86 | 3.17    7.50
                0.250    7.27 | 1.250  178.44 | 2.250    11.36 | 3.25    7.06
                0.333    7.27 | 1.333  178.44 | 2.333    11.36 | 3.33    7.06
                0.417    8.30 | 1.417   37.79 | 2.417    10.23 | 3.42    6.68
                0.500    8.30 | 1.500   37.79 | 2.500    10.23 | 3.50    6.68
                0.583    9.77 | 1.583   23.83 | 2.583     9.33 | 3.58    6.35
                0.667    9.77 | 1.667   23.83 | 2.667     9.33 | 3.67    6.35
                0.750   12.10 | 1.750   18.17 | 2.750     8.61 | 3.75    6.05
                0.833   12.10 | 1.833   18.17 | 2.833     8.61 | 3.83    6.05
                0.917   16.55 | 1.917   14.97 | 2.917     8.00 | 3.92    5.79
                1.000   16.55 | 2.000   14.97 | 3.000     8.00 | 4.00    5.79

     Max.Eff.Inten.(mm/hr)=    178.44       185.47
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       3.76 (ii)    9.27 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.25         0.12
                                                       *TOTALS*
     PEAK FLOW       (cms)=       2.30         1.52         3.617 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42          1.33
     RUNOFF VOLUME    (mm)=      76.38        54.34         63.60
     TOTAL RAINFALL   (mm)=      77.38        77.38         77.38
     RUNOFF COEFFICIENT   =       0.99         0.70          0.82

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  85.0    Ia = Dep. Storage  (Above)
```

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      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0100)|   Area    (ha)=   2.66
|ID= 1 DT= 5.0 min |   Total Imp(%)=  20.00   Dir. Conn.(%)=  20.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.53         2.13
     Dep. Storage     (mm)=      1.00         3.80
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    133.17        40.00
     Mannings n           =     0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    6.51 | 1.083   30.79 | 2.083    12.86 | 3.08    7.50
                0.167    6.51 | 1.167   30.79 | 2.167    12.86 | 3.17    7.50
                0.250    7.27 | 1.250  178.44 | 2.250    11.36 | 3.25    7.06
                0.333    7.27 | 1.333  178.44 | 2.333    11.36 | 3.33    7.06
                0.417    8.30 | 1.417   37.79 | 2.417    10.23 | 3.42    6.68
                0.500    8.30 | 1.500   37.79 | 2.500    10.23 | 3.50    6.68
                0.583    9.77 | 1.583   23.83 | 2.583     9.33 | 3.58    6.35
                0.667    9.77 | 1.667   23.83 | 2.667     9.33 | 3.67    6.35
                0.750   12.10 | 1.750   18.17 | 2.750     8.61 | 3.75    6.05
                0.833   12.10 | 1.833   18.17 | 2.833     8.61 | 3.83    6.05
                0.917   16.55 | 1.917   14.97 | 2.917     8.00 | 3.92    5.79
                1.000   16.55 | 2.000   14.97 | 3.000     8.00 | 4.00    5.79

     Max.Eff.Inten.(mm/hr)=    178.44       112.64
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       2.41 (ii)    9.14 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.30         0.12
                                                       *TOTALS*
     PEAK FLOW       (cms)=       0.26         0.42         0.615 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42          1.33
     RUNOFF VOLUME    (mm)=      76.38        48.55         54.11
     TOTAL RAINFALL   (mm)=      77.38        77.38         77.38
     RUNOFF COEFFICIENT   =       0.99         0.63          0.70

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  87.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0221)|   Area    (ha)=   2.42
|ID= 1 DT= 5.0 min |   Total Imp(%)=  77.00   Dir. Conn.(%)=  77.00
--------------------
```

```
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.86          0.56
     Dep. Storage     (mm)=       6.65          4.68
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     127.02         40.00
     Mannings n          =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    6.51 | 1.083   30.79 | 2.083   12.86 |  3.08    7.50
               0.167    6.51 | 1.167   30.79 | 2.167   12.86 |  3.17    7.50
               0.250    7.27 | 1.250  178.44 | 2.250   11.36 |  3.25    7.06
               0.333    7.27 | 1.333  178.44 | 2.333   11.36 |  3.33    7.06
               0.417    8.30 | 1.417   37.79 | 2.417   10.23 |  3.42    6.68
               0.500    8.30 | 1.500   37.79 | 2.500   10.23 |  3.50    6.68
               0.583    9.77 | 1.583   23.83 | 2.583    9.33 |  3.58    6.35
               0.667    9.77 | 1.667   23.83 | 2.667    9.33 |  3.67    6.35
               0.750   12.10 | 1.750   18.17 | 2.750    8.61 |  3.75    6.05
               0.833   12.10 | 1.833   18.17 | 2.833    8.61 |  3.83    6.05
               0.917   16.55 | 1.917   14.97 | 2.917    8.00 |  3.92    5.79
               1.000   16.55 | 2.000   14.97 | 3.000    8.00 |  4.00    5.79

     Max.Eff.Inten.(mm/hr)=     178.44     ********
               over (min)         5.00        10.00
     Storage Coeff.  (min)=       2.34 (ii)    5.79 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.30         0.15
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.91         0.09         0.988 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42          1.33
     RUNOFF VOLUME    (mm)=      70.73        34.96         62.50
     TOTAL RAINFALL   (mm)=      77.38        77.38         77.38
     RUNOFF COEFFICIENT   =       0.91         0.45          0.81

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  76.4    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0173)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0100):      2.66    0.615     1.33    54.11
      + ID2= 2 (  0201):      2.75    0.743     1.33    58.16
        ====================================================
        ID = 3 (  0173):      5.41    1.358     1.33    56.17

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0173)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
```

```
        ID1= 3 (  0173):      5.41    1.358     1.33    56.17
      + ID2= 2 (  0202):     11.74    3.617     1.33    63.60
        ====================================================
        ID = 1 (  0173):     17.15    4.975     1.33    61.25

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0173)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0173):     17.15    4.975     1.33    61.25
      + ID2= 2 (  0221):      2.42    0.988     1.33    62.50
        ====================================================
        ID = 3 (  0173):     19.57    5.963     1.33    61.41

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0400)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.6190     0.7963
                          0.0070     0.0910   |   0.6300     0.9058
                          0.0130     0.1842   |   0.6350     1.0175
                          0.0170     0.2803   |   0.8210     1.1312
                          0.0200     0.3793   |   1.1600     1.2471
                          0.3600     0.4804   |   1.6080     1.3651
                          0.3840     0.5836   |   2.1500     1.4853
                          0.4070     0.6889   |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0173)    19.570     5.963      1.33      61.41
   OUTFLOW: ID= 1 (  0400)    19.570     0.576      2.42      61.11

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)=  9.65
                 TIME SHIFT OF PEAK FLOW        (min)= 65.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  0.7744

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0225)|   Area    (ha)=  14.21
|ID= 1 DT= 5.0 min |   Total Imp(%)=  24.00   Dir. Conn.(%)=  17.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.41         10.80
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     307.79         40.00
     Mannings n          =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    6.51 | 1.083   30.79 | 2.083   12.86 |  3.08    7.50
               0.167    6.51 | 1.167   30.79 | 2.167   12.86 |  3.17    7.50
               0.250    7.27 | 1.250  178.44 | 2.250   11.36 |  3.25    7.06
```

```
                0.333    7.27 | 1.333  178.44 | 2.333   11.36 |  3.33    7.06
                0.417    8.30 | 1.417   37.79 | 2.417   10.23 |  3.42    6.68
                0.500    8.30 | 1.500   37.79 | 2.500   10.23 |  3.50    6.68
                0.583    9.77 | 1.583   23.83 | 2.583    9.33 |  3.58    6.35
                0.667    9.77 | 1.667   23.83 | 2.667    9.33 |  3.67    6.35
                0.750   12.10 | 1.750   18.17 | 2.750    8.61 |  3.75    6.05
                0.833   12.10 | 1.833   18.17 | 2.833    8.61 |  3.83    6.05
                0.917   16.55 | 1.917   14.97 | 2.917    8.00 |  3.92    5.79
                1.000   16.55 | 2.000   14.97 | 3.000    8.00 |  4.00    5.79

     Max.Eff.Inten.(mm/hr)=     178.44        79.47
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       3.98 (ii)   11.72 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.24         0.09
                                                           *TOTALS*
     PEAK FLOW       (cms)=       1.12         1.28          1.776 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.50           1.33
     RUNOFF VOLUME    (mm)=      76.38        34.30          41.45
     TOTAL RAINFALL   (mm)=      77.38        77.38          77.38
     RUNOFF COEFFICIENT   =       0.99         0.44           0.54

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  74.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0178)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0186):    17.61   0.381     2.67    56.96
      + ID2= 2 (  0225):    14.21   1.776     1.33    41.45
        ====================================================
        ID = 3 (  0178):    31.82   1.918     1.33    50.03

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0178)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0178):    31.82   1.918     1.33    50.03
      + ID2= 2 (  0400):    19.57   0.576     2.42    61.11
        ====================================================
        ID = 1 (  0178):    51.39   2.197     1.50    54.25

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
```

```
==================================================================================
==========================


      V    V   I    SSSSS  U   U    A    L              (v 6.2.2008)
      V    V   I    SS     U   U   A A   L
       V  V    I     SS    U   U  AAAAA  L
       V  V    I      SS   U   U  A   A  L
        VV     I    SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O
       OOO     T      T    H   H    Y    M   M   OOO
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                   *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output      filename:   C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\7948d673-8d99-448e-bf99-763f0ae7379f\s
  Summary    filename:    C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\7948d673-8d99-448e-bf99-763f0ae7379f\s


DATE: 08-28-2023                           TIME: 10:52:25

USER:


COMMENTS: ______________________________________________________________


  ************************************************
  ** SIMULATION : 100yr 12hr 15min SCS          **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min    ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                   15.0
    [ Ptot=107.75 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\46922b13-f5cc-43c0-8b2c-
    remark: 100yr 12hr 15min SCS
*
 ** CALIB NASHYD         0101  1  5.0   29.62    2.87  6.67  65.86 0.61   0.000
    [CN=81.9          ]
    [ N = 3.0:Tp 0.57]
*
    PIPE   [ 2:  0101]   0140  1  5.0   29.62    2.82  6.83  65.86  n/a   0.000
*
    READ STORM                   15.0
    [ Ptot=107.75 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\46922b13-f5cc-43c0-8b2c-
    remark: 100yr 12hr 15min SCS
*
```

```
 *  CALIB NASHYD         0208  1  5.0    1.80    0.10  6.67  38.12 0.35   0.000
    [CN=62.3          ]
    [ N = 3.0:Tp 0.53]
*
    READ STORM                   15.0
    [ Ptot=107.75 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\46922b13-f5cc-43c0-8b2c-
    remark: 100yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0203  1  5.0    8.59    2.14  6.25  77.83 0.72   0.000
    [I%=36.0:S%= 2.00]
*
    READ STORM                   15.0
    [ Ptot=107.75 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\46922b13-f5cc-43c0-8b2c-
    remark: 100yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0204  1  5.0   11.24    2.79  6.25  78.00 0.72   0.000
    [I%=37.0:S%= 2.00]
*
    READ STORM                   15.0
    [ Ptot=107.75 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\46922b13-f5cc-43c0-8b2c-
    remark: 100yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0226  1  5.0    8.53    2.21  6.25  79.93 0.74   0.000
    [I%=40.0:S%= 2.00]
*
    ADD [  0140+  0203]  0063  3  5.0   38.21    3.30  6.75  68.55  n/a   0.000
*
    ADD [  0063+  0204]  0063  1  5.0   49.45    5.92  6.25  70.70  n/a   0.000
*
    ADD [  0063+  0208]  0063  3  5.0   51.25    5.97  6.25  69.56  n/a   0.000
*
    ADD [  0063+  0226]  0063  1  5.0   59.78    8.18  6.25  71.04  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0405  1  5.0   59.78    5.65  6.42  71.00  n/a   0.000
*
    READ STORM                   15.0
    [ Ptot=107.75 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\46922b13-f5cc-43c0-8b2c-
    remark: 100yr 12hr 15min SCS
*
 *  CALIB NASHYD         0216  1  5.0   11.42    0.27  7.33  26.21 0.24   0.000
    [CN=50.0          ]
    [ N = 3.0:Tp 1.03]
*
    READ STORM                   15.0
    [ Ptot=107.75 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\46922b13-f5cc-43c0-8b2c-
    remark: 100yr 12hr 15min SCS
*
 *  CALIB NASHYD         0215  1  5.0    2.06    0.27  6.42  60.54 0.56   0.000
    [CN=77.8          ]
    [ N = 3.0:Tp 0.33]
*
    READ STORM                   15.0
    [ Ptot=107.75 mm ]
```

```
    fname                 :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\46922b13-f5cc-43c0-8b2c-
    remark: 100yr 12hr 15min SCS
*
 *  CALIB NASHYD        0207  1  5.0    1.37    0.18  6.42  54.96 0.51   0.000
    [CN=74.0          ]
    [ N = 3.0:Tp 0.27]
*
    ADD [  0207+  0215]  0145  3  5.0    3.43    0.45  6.42  58.31  n/a   0.000
*
    ADD [  0145+  0216]  0145  1  5.0   14.85    0.56  6.50  33.63  n/a   0.000
*
    ADD [  0145+  0405]  0145  3  5.0   74.64    6.20  6.42  63.57  n/a   0.000
*
 ** Reservoir
    OUTFLOW:            0062  1  5.0   74.64    3.25  7.33  63.56  n/a   0.000
*
    CHANNEL[ 2:  0062]   0048  1  5.0   74.64    3.17  7.50  63.56  n/a   0.000
*
    READ STORM                15.0
    [ Ptot=107.75 mm ]
    fname                 :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\46922b13-f5cc-43c0-8b2c-
    remark: 100yr 12hr 15min SCS
*
 *  CALIB STANDHYD      0108  1  5.0    3.97    1.30  6.25  89.30 0.83   0.000
    [I%=67.0:S%= 2.00]
*
    READ STORM                15.0
    [ Ptot=107.75 mm ]
    fname                 :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\46922b13-f5cc-43c0-8b2c-
    remark: 100yr 12hr 15min SCS
*
 *  CALIB STANDHYD      0107  1  5.0    4.81    1.77  6.25  99.50 0.92   0.000
    [I%=86.0:S%= 2.00]
*
    READ STORM                15.0
    [ Ptot=107.75 mm ]
    fname                 :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\46922b13-f5cc-43c0-8b2c-
    remark: 100yr 12hr 15min SCS
*
 *  CALIB STANDHYD      0106  1  5.0   26.74    6.31  6.25  80.15 0.74   0.000
    [I%=15.0:S%= 2.00]
*
    READ STORM                15.0
    [ Ptot=107.75 mm ]
    fname                 :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\46922b13-f5cc-43c0-8b2c-
    remark: 100yr 12hr 15min SCS
*
 *  CALIB STANDHYD      0209  1  5.0   10.31    2.97  6.25  82.89 0.77   0.000
    [I%=39.0:S%= 2.00]
*
    ADD [  0106+  0209]  0146  3  5.0   37.05    9.29  6.25  80.92  n/a   0.000
*
    CHANNEL[ 2:  0146]   0049  1  5.0   37.05    2.97  6.67  80.74  n/a   0.000
*
    ADD [  0107+  0108]  0036  3  5.0    8.78    3.07  6.25  94.89  n/a   0.000
*
    ADD [  0036+  0049]  0036  1  5.0   45.83    4.95  6.25  83.45  n/a   0.000
*
 ** Reservoir
```

```
    OUTFLOW:            0065  1  5.0   45.83    2.65  7.08  83.44  n/a   0.000
*
    READ STORM                15.0
    [ Ptot=107.75 mm ]
    fname                 :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\46922b13-f5cc-43c0-8b2c-
    remark: 100yr 12hr 15min SCS
*
 ** CALIB STANDHYD      0206  1  5.0   28.45    7.59  6.25  82.60 0.77   0.000
    [I%=53.0:S%= 2.00]
*
    READ STORM                15.0
    [ Ptot=107.75 mm ]
    fname                 :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\46922b13-f5cc-43c0-8b2c-
    remark: 100yr 12hr 15min SCS
*
 *  CALIB STANDHYD      0205  1  5.0   10.19    2.96  6.25  84.67 0.79   0.000
    [I%=53.0:S%= 2.00]
*
    ADD [  0205+  0206]  0155  3  5.0   38.64   10.54  6.25  83.14  n/a   0.000
*
 ** Reservoir
    OUTFLOW:            0404  1  5.0   38.64    1.49  6.92  79.69  n/a   0.000
*
    ADD [  0404+  0048]  0031  3  5.0  113.28    4.60  7.50  69.07  n/a   0.000
*
    ADD [  0031+  0065]  0031  1  5.0  159.11    7.05  7.25  73.21  n/a   0.000
*
    PIPE   [ 2:  0031]   0066  1  5.0  159.11    7.05  7.33  73.21  n/a   0.000
*
    READ STORM                15.0
    [ Ptot=107.75 mm ]
    fname                 :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\46922b13-f5cc-43c0-8b2c-
    remark: 100yr 12hr 15min SCS
*
 *  CALIB NASHYD        0217  1  5.0    8.74    0.22  7.25  26.21 0.24   0.000
    [CN=50.0          ]
    [ N = 3.0:Tp 0.95]
*
    ADD [  0217+  0066]  0149  3  5.0  167.85    7.26  7.33  70.76  n/a   0.000
*
    CHANNEL[ 2:  0149]   0051  1  5.0  167.85    6.92  7.58  70.76  n/a   0.000
*
    READ STORM                15.0
    [ Ptot=107.75 mm ]
    fname                 :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\46922b13-f5cc-43c0-8b2c-
    remark: 100yr 12hr 15min SCS
*
 *  CALIB NASHYD        0220  1  5.0    5.14    0.32  6.83  49.23 0.46   0.000
    [CN=71.4          ]
    [ N = 3.0:Tp 0.68]
*
    READ STORM                15.0
    [ Ptot=107.75 mm ]
    fname                 :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\46922b13-f5cc-43c0-8b2c-
    remark: 100yr 12hr 15min SCS
*
 *  CALIB NASHYD        0218  1  5.0   10.21    0.17  7.92  26.21 0.24   0.000
    [CN=50.0          ]
    [ N = 3.0:Tp 1.54]
```

```
*
    READ STORM                 15.0
    [ Ptot=107.75 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\46922b13-f5cc-43c0-8b2c-
    remark: 100yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0224  1  5.0    2.58    0.67  6.25  74.11 0.69   0.000
    [I%=31.0:S%= 2.00]
*
    ADD [  0218+  0220]  0170  3  5.0   15.35    0.43  7.00  33.92  n/a   0.000
*
    ADD [  0170+  0224]  0170  1  5.0   17.93    0.81  6.25  39.70  n/a   0.000
*
    CHANNEL[ 2:  0170]   0061  1  5.0   17.93    0.45  7.25  39.62  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=107.75 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\46922b13-f5cc-43c0-8b2c-
    remark: 100yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0210  1  5.0    7.09    2.55  6.25  97.95 0.91   0.000
    [I%=83.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot=107.75 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\46922b13-f5cc-43c0-8b2c-
    remark: 100yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0211  1  5.0    8.86    2.31  6.25  80.10 0.74   0.000
    [I%=43.0:S%= 2.00]
*
    ADD [  0210+  0211]  0148  3  5.0   15.95    4.86  6.25  88.03  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0403  1  5.0   15.95    1.32  6.50  87.90  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=107.75 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\46922b13-f5cc-43c0-8b2c-
    remark: 100yr 12hr 15min SCS
*
 *  CALIB NASHYD         0213  1  5.0    0.39    0.07  6.25  37.14 0.34   0.000
    [CN=69.0         ]
    [ N = 3.0:Tp 0.05]
*
    ADD [  0213+  0403]  0044  3  5.0   16.34    1.33  6.50  86.68  n/a   0.000
*
    ADD [  0044+  0061]  0044  1  5.0   34.27    1.68  6.50  62.06  n/a   0.000
*
    CHANNEL[ 2:  0044]   0060  1  5.0   34.27    1.16  6.92  62.06  n/a   0.000
*
    ADD [  0051+  0060]  0038  3  5.0  202.11    7.97  7.58  69.28  n/a   0.000
*
    CHANNEL[ 2:  0038]   0052  1  5.0  202.11    7.93  7.67  69.28  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=107.75 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\46922b13-f5cc-43c0-8b2c-
    remark: 100yr 12hr 15min SCS
```

```
*
 *  CALIB NASHYD         0219  1  5.0    2.06    0.05  7.17  26.21 0.24   0.000
    [CN=50.0         ]
    [ N = 3.0:Tp 0.90]
*
    READ STORM                 15.0
    [ Ptot=107.75 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\46922b13-f5cc-43c0-8b2c-
    remark: 100yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0214  1  5.0    6.35    2.11  6.25  91.19 0.85   0.000
    [I%=60.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:             0401  1  5.0    6.35    1.31  6.33  91.04  n/a   0.000
    OVERFLOW:            0401  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=107.75 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\46922b13-f5cc-43c0-8b2c-
    remark: 100yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0212  1  5.0    8.34    2.03  6.25  71.87 0.67   0.000
    [I%=20.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:             0402  1  5.0    8.34    0.69  6.50  71.61  n/a   0.000
    OVERFLOW:            0402  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    ADD [  0219+  0401]  0039  3  5.0    8.41    1.33  6.33  75.16  n/a   0.000
*
    ADD [  0039+  0402]  0039  1  5.0   16.75    1.77  6.33  73.39  n/a   0.000
*
    ADD [  0039+  0052]  0039  3  5.0  218.87    8.43  7.58  69.60  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=107.75 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\46922b13-f5cc-43c0-8b2c-
    remark: 100yr 12hr 15min SCS
*
 *  CALIB NASHYD         0227  1  5.0    1.44    0.25  6.33  63.93 0.59   0.000
    [CN=80.7         ]
    [ N = 3.0:Tp 0.23]
*
    READ STORM                 15.0
    [ Ptot=107.75 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\46922b13-f5cc-43c0-8b2c-
    remark: 100yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0223  1  5.0    1.91    0.51  6.25  75.16 0.70   0.000
    [I%=30.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot=107.75 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\46922b13-f5cc-43c0-8b2c-
    remark: 100yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0222  1  5.0   14.26    4.44  6.25  87.76 0.81   0.000
    [I%=59.0:S%= 2.00]
```

```
*
    ADD [  0222+  0223]  0185  3  5.0   16.17    4.95  6.25  86.27  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0406  1  5.0   16.17    0.87  6.75  86.15  n/a   0.000
*
    ADD [  0227+  0406]  0186  3  5.0   17.61    1.04  6.50  84.33  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=107.75 mm ]
    fname            :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\46922b13-f5cc-43c0-8b2c-
    remark: 100yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0201  1  5.0    2.75    0.83  6.25  86.66 0.80   0.000
    [I%=28.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot=107.75 mm ]
    fname            :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\46922b13-f5cc-43c0-8b2c-
    remark: 100yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0202  1  5.0   11.74    3.75  6.25  92.83 0.86   0.000
    [I%=42.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot=107.75 mm ]
    fname            :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\46922b13-f5cc-43c0-8b2c-
    remark: 100yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0100  1  5.0    2.66    0.76  6.25  82.27 0.76   0.000
    [I%=20.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot=107.75 mm ]
    fname            :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\46922b13-f5cc-43c0-8b2c-
    remark: 100yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0221  1  5.0    2.42    0.86  6.25  91.30 0.85   0.000
    [I%=77.0:S%= 2.00]
*
    ADD [  0100+  0201]  0173  3  5.0    5.41    1.59  6.25  84.50  n/a   0.000
*
    ADD [  0173+  0202]  0173  1  5.0   17.15    5.34  6.25  90.20  n/a   0.000
*
    ADD [  0173+  0221]  0173  3  5.0   19.57    6.20  6.25  90.34  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0400  1  5.0   19.57    0.80  6.83  89.98  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=107.75 mm ]
    fname            :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\46922b13-f5cc-43c0-8b2c-
    remark: 100yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0225  1  5.0   14.21    2.71  6.25  65.93 0.61   0.000
    [I%=17.0:S%= 2.00]
*
    ADD [  0186+  0225]  0178  3  5.0   31.82    3.32  6.33  76.11  n/a   0.000
*
```

```
    ADD [  0178+  0400]  0178  1  5.0   51.39    3.95  6.33  81.39  n/a   0.000
*
==================================================================================
==========================


      V    V   I    SSSSS  U   U    A    L              (v 6.2.2008)
      V    V   I    SS     U   U   A A   L
       V  V    I     SS    U   U  AAAAA  L
       V  V    I      SS   U   U  A   A  L
        VV     I    SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O
       OOO     T      T    H   H    Y    M   M   OOO
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                   *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output      filename:   C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\92e41f17-720e-4c16-9351-1074ddd64267\s
  Summary    filename:    C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\92e41f17-720e-4c16-9351-1074ddd64267\s


DATE: 08-28-2023                           TIME: 10:52:26

USER:


COMMENTS: ______________________________________________________________


  ************************************************
  ** SIMULATION : 100yr 24hr 15min SCS          **
  ************************************************

  W/E COMMAND            HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min    ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                 15.0
    [ Ptot=132.74 mm ]
    fname            :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1fef970a-1e71-41bd-8f82-
    remark: 100yr 24hr 15min SCS
*
 ** CALIB NASHYD         0101  1  5.0   29.62    3.28 12.67  88.13 0.66   0.000
    [CN=81.9         ]
    [ N = 3.0:Tp 0.57]
*
    PIPE   [ 2:  0101]   0140  1  5.0   29.62    3.22 12.83  88.13  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=132.74 mm ]
    fname            :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1fef970a-1e71-41bd-8f82-
```

```
    remark: 100yr 24hr 15min SCS
*
 *  CALIB NASHYD         0208  1  5.0    1.80    0.13 12.67  54.62 0.41   0.000
    [CN=62.3          ]
    [ N = 3.0:Tp 0.53]
*
    READ STORM                 15.0
    [ Ptot=132.74 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1fef970a-1e71-41bd-8f82-
    remark: 100yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0203  1  5.0    8.59    2.72 12.25 100.51 0.76   0.000
    [I%=36.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot=132.74 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1fef970a-1e71-41bd-8f82-
    remark: 100yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0204  1  5.0   11.24    3.54 12.25 100.67 0.76   0.000
    [I%=37.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot=132.74 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1fef970a-1e71-41bd-8f82-
    remark: 100yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0226  1  5.0    8.53    2.79 12.25 102.80 0.77   0.000
    [I%=40.0:S%= 2.00]
*
    ADD [  0140+  0203]  0063  3  5.0   38.21    3.86 12.25  90.91  n/a   0.000
*
    ADD [  0063+  0204]  0063  1  5.0   49.45    7.40 12.25  93.13  n/a   0.000
*
    ADD [  0063+  0208]  0063  3  5.0   51.25    7.46 12.25  91.78  n/a   0.000
*
    ADD [  0063+  0226]  0063  1  5.0   59.78   10.25 12.25  93.35  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0405  1  5.0   59.78    8.35 12.33  93.32  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=132.74 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1fef970a-1e71-41bd-8f82-
    remark: 100yr 24hr 15min SCS
*
 *  CALIB NASHYD         0216  1  5.0   11.42    0.34 13.25  38.90 0.29   0.000
    [CN=50.0          ]
    [ N = 3.0:Tp 1.03]
*
    READ STORM                 15.0
    [ Ptot=132.74 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1fef970a-1e71-41bd-8f82-
    remark: 100yr 24hr 15min SCS
*
 *  CALIB NASHYD         0215  1  5.0    2.06    0.31 12.42  81.80 0.62   0.000
    [CN=77.8          ]
    [ N = 3.0:Tp 0.33]
*
```

```
    READ STORM                 15.0
    [ Ptot=132.74 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1fef970a-1e71-41bd-8f82-
    remark: 100yr 24hr 15min SCS
*
 *  CALIB NASHYD         0207  1  5.0    1.37    0.22 12.42  75.16 0.57   0.000
    [CN=74.0          ]
    [ N = 3.0:Tp 0.27]
*
    ADD [  0207+  0215]  0145  3  5.0    3.43    0.53 12.42  79.15  n/a   0.000
*
    ADD [  0145+  0216]  0145  1  5.0   14.85    0.68 12.50  48.20  n/a   0.000
*
    ADD [  0145+  0405]  0145  3  5.0   74.64    8.96 12.33  84.34  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0062  1  5.0   74.64    4.19 13.17  84.34  n/a   0.000
*
    CHANNEL[ 2:  0062]   0048  1  5.0   74.64    4.06 13.33  84.34  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=132.74 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1fef970a-1e71-41bd-8f82-
    remark: 100yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0108  1  5.0    3.97    1.51 12.25 112.65 0.85   0.000
    [I%=67.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot=132.74 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1fef970a-1e71-41bd-8f82-
    remark: 100yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0107  1  5.0    4.81    2.03 12.25 123.82 0.93   0.000
    [I%=86.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot=132.74 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1fef970a-1e71-41bd-8f82-
    remark: 100yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0106  1  5.0   26.74    8.32 12.25 103.68 0.78   0.000
    [I%=15.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot=132.74 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1fef970a-1e71-41bd-8f82-
    remark: 100yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0209  1  5.0   10.31    3.49 12.25 106.24 0.80   0.000
    [I%=39.0:S%= 2.00]
*
    ADD [  0106+  0209]  0146  3  5.0   37.05   11.81 12.25 104.39  n/a   0.000
*
    CHANNEL[ 2:  0146]   0049  1  5.0   37.05    3.36 12.58 104.21  n/a   0.000
*
    ADD [  0107+  0108]  0036  3  5.0    8.78    3.55 12.25 118.77  n/a   0.000
*
    ADD [  0036+  0049]  0036  1  5.0   45.83    5.82 12.25 107.00  n/a   0.000
```

```
*
 ** Reservoir
    OUTFLOW:             0065  1  5.0   45.83    3.11 13.00 107.00  n/a   0.000
*
    READ STORM                   15.0
    [ Ptot=132.74 mm ]
    fname                :                  C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1fef970a-1e71-41bd-8f82-
    remark: 100yr 24hr 15min SCS
*
 ** CALIB STANDHYD       0206  1  5.0   28.45    8.83 12.25 105.38 0.79   0.000
    [I%=53.0:S%= 2.00]
*
    READ STORM                   15.0
    [ Ptot=132.74 mm ]
    fname                :                  C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1fef970a-1e71-41bd-8f82-
    remark: 100yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0205  1  5.0   10.19    3.67 12.25 108.16 0.81   0.000
    [I%=53.0:S%= 2.00]
*
    ADD [  0205+  0206]  0155  3  5.0   38.64   12.50 12.25 106.11  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0404  1  5.0   38.64    1.64 12.83 102.57  n/a   0.000
*
    ADD [  0404+  0048]  0031  3  5.0  113.28    5.66 13.33  90.56  n/a   0.000
*
    ADD [  0031+  0065]  0031  1  5.0  159.11    8.62 13.17  95.29  n/a   0.000
*
    PIPE   [ 2:  0031]   0066  1  5.0  159.11    8.62 13.17  95.29  n/a   0.000
*
    READ STORM                   15.0
    [ Ptot=132.74 mm ]
    fname                :                  C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1fef970a-1e71-41bd-8f82-
    remark: 100yr 24hr 15min SCS
*
 *  CALIB NASHYD         0217  1  5.0    8.74    0.27 13.17  38.90 0.29   0.000
    [CN=50.0          ]
    [ N = 3.0:Tp 0.95]
*
    ADD [  0217+  0066]  0149  3  5.0  167.85    8.89 13.17  92.36  n/a   0.000
*
    CHANNEL[ 2:  0149]   0051  1  5.0  167.85    8.44 13.42  92.35  n/a   0.000
*
    READ STORM                   15.0
    [ Ptot=132.74 mm ]
    fname                :                  C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1fef970a-1e71-41bd-8f82-
    remark: 100yr 24hr 15min SCS
*
 *  CALIB NASHYD         0220  1  5.0    5.14    0.38 12.83  68.54 0.52   0.000
    [CN=71.4          ]
    [ N = 3.0:Tp 0.68]
*
    READ STORM                   15.0
    [ Ptot=132.74 mm ]
    fname                :                  C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1fef970a-1e71-41bd-8f82-
    remark: 100yr 24hr 15min SCS
*
 *  CALIB NASHYD         0218  1  5.0   10.21    0.22 13.92  38.90 0.29   0.000
    [CN=50.0          ]
    [ N = 3.0:Tp 1.54]
*
    READ STORM                   15.0
    [ Ptot=132.74 mm ]
    fname                :                  C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1fef970a-1e71-41bd-8f82-
    remark: 100yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0224  1  5.0    2.58    0.80 12.25  96.39 0.73   0.000
    [I%=31.0:S%= 2.00]
*
    ADD [  0218+  0220]  0170  3  5.0   15.35    0.53 13.00  48.83  n/a   0.000
*
    ADD [  0170+  0224]  0170  1  5.0   17.93    0.98 12.25  55.67  n/a   0.000
*
    CHANNEL[ 2:  0170]   0061  1  5.0   17.93    0.55 13.25  55.59  n/a   0.000
*
    READ STORM                   15.0
    [ Ptot=132.74 mm ]
    fname                :                  C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1fef970a-1e71-41bd-8f82-
    remark: 100yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0210  1  5.0    7.09    2.94 12.25 122.13 0.92   0.000
    [I%=83.0:S%= 2.00]
*
    READ STORM                   15.0
    [ Ptot=132.74 mm ]
    fname                :                  C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1fef970a-1e71-41bd-8f82-
    remark: 100yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0211  1  5.0    8.86    2.90 12.25 102.88 0.78   0.000
    [I%=43.0:S%= 2.00]
*
    ADD [  0210+  0211]  0148  3  5.0   15.95    5.83 12.25 111.44  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0403  1  5.0   15.95    1.77 12.42 111.30  n/a   0.000
*
    READ STORM                   15.0
    [ Ptot=132.74 mm ]
    fname                :                  C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1fef970a-1e71-41bd-8f82-
    remark: 100yr 24hr 15min SCS
*
 *  CALIB NASHYD         0213  1  5.0    0.39    0.08 12.25  51.48 0.39   0.000
    [CN=69.0          ]
    [ N = 3.0:Tp 0.05]
*
    ADD [  0213+  0403]  0044  3  5.0   16.34    1.78 12.42 109.87  n/a   0.000
*
    ADD [  0044+  0061]  0044  1  5.0   34.27    2.20 12.42  81.47  n/a   0.000
*
    CHANNEL[ 2:  0044]   0060  1  5.0   34.27    1.54 12.92  81.47  n/a   0.000
*
    ADD [  0051+  0060]  0038  3  5.0  202.11    9.77 13.42  90.51  n/a   0.000
*
    CHANNEL[ 2:  0038]   0052  1  5.0  202.11    9.73 13.50  90.51  n/a   0.000
*
    READ STORM                   15.0
    [ Ptot=132.74 mm ]
    fname                :                  C:\Users\jmacdonald\AppData\Local\Temp
```

```
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1fef970a-1e71-41bd-8f82-
    remark: 100yr 24hr 15min SCS
*
 *  CALIB NASHYD         0219  1  5.0    2.06    0.07 13.17  38.90 0.29   0.000
    [CN=50.0         ]
    [ N = 3.0:Tp 0.90]
*
    READ STORM                 15.0
    [ Ptot=132.74 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1fef970a-1e71-41bd-8f82-
    remark: 100yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0214  1  5.0    6.35    2.45 12.25 115.11 0.87   0.000
    [I%=60.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:             0401  1  5.0    6.35    1.79 12.33 114.96  n/a   0.000
    OVERFLOW:            0401  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=132.74 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1fef970a-1e71-41bd-8f82-
    remark: 100yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0212  1  5.0    8.34    2.43 12.25  94.17 0.71   0.000
    [I%=20.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:             0402  1  5.0    8.34    1.12 12.42  93.91  n/a   0.000
    OVERFLOW:            0402  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    ADD [  0219+  0401]  0039  3  5.0    8.41    1.81 12.33  96.33  n/a   0.000
*
    ADD [  0039+  0402]  0039  1  5.0   16.75    2.71 12.33  95.12  n/a   0.000
*
    ADD [  0039+  0052]  0039  3  5.0  218.87   10.35 13.42  90.86  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=132.74 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1fef970a-1e71-41bd-8f82-
    remark: 100yr 24hr 15min SCS
*
 *  CALIB NASHYD         0227  1  5.0    1.44    0.30 12.33  85.88 0.65   0.000
    [CN=80.7         ]
    [ N = 3.0:Tp 0.23]
*
    READ STORM                 15.0
    [ Ptot=132.74 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1fef970a-1e71-41bd-8f82-
    remark: 100yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0223  1  5.0    1.91    0.60 12.25  97.63 0.74   0.000
    [I%=30.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot=132.74 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1fef970a-1e71-41bd-8f82-
    remark: 100yr 24hr 15min SCS
*
```

```
 *  CALIB STANDHYD       0222  1  5.0   14.26    5.17 12.25 111.19 0.84   0.000
    [I%=59.0:S%= 2.00]
*
    ADD [  0222+  0223]  0185  3  5.0   16.17    5.77 12.25 109.59  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0406  1  5.0   16.17    1.06 12.58 109.46  n/a   0.000
*
    ADD [  0227+  0406]  0186  3  5.0   17.61    1.33 12.42 107.54  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=132.74 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1fef970a-1e71-41bd-8f82-
    remark: 100yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0201  1  5.0    2.75    0.97 12.25 110.61 0.83   0.000
    [I%=28.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot=132.74 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1fef970a-1e71-41bd-8f82-
    remark: 100yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0202  1  5.0   11.74    4.33 12.25 117.20 0.88   0.000
    [I%=42.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot=132.74 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1fef970a-1e71-41bd-8f82-
    remark: 100yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0100  1  5.0    2.66    0.89 12.25 106.04 0.80   0.000
    [I%=20.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot=132.74 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1fef970a-1e71-41bd-8f82-
    remark: 100yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0221  1  5.0    2.42    0.99 12.25 115.35 0.87   0.000
    [I%=77.0:S%= 2.00]
*
    ADD [  0100+  0201]  0173  3  5.0    5.41    1.86 12.25 108.37  n/a   0.000
*
    ADD [  0173+  0202]  0173  1  5.0   17.15    6.19 12.25 114.41  n/a   0.000
*
    ADD [  0173+  0221]  0173  3  5.0   19.57    7.18 12.25 114.53  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0400  1  5.0   19.57    1.13 12.75 114.04  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=132.74 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1fef970a-1e71-41bd-8f82-
    remark: 100yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0225  1  5.0   14.21    3.24 12.25  87.35 0.66   0.000
    [I%=17.0:S%= 2.00]
*
```

```
    ADD [  0186+  0225]  0178  3  5.0   31.82    4.17 12.25  98.52  n/a    0.000
*
    ADD [  0178+  0400]  0178  1  5.0   51.39    4.86 12.33 104.43  n/a    0.000
*
=================================================================================
==========================


       V    V   I    SSSSS  U   U    A    L              (v 6.2.2008)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M  OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M  OOO
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                   *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output       filename:    C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\5e0fd334-96e3-4f59-9b9f-1047fcf1251b\s
  Summary     filename:     C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\5e0fd334-96e3-4f59-9b9f-1047fcf1251b\s


DATE: 08-28-2023                           TIME: 10:52:24

USER:


COMMENTS: ______________________________________________________________________


  ************************************************
  ** SIMULATION : 100yr 4hr 10min Chicago      **
  ************************************************

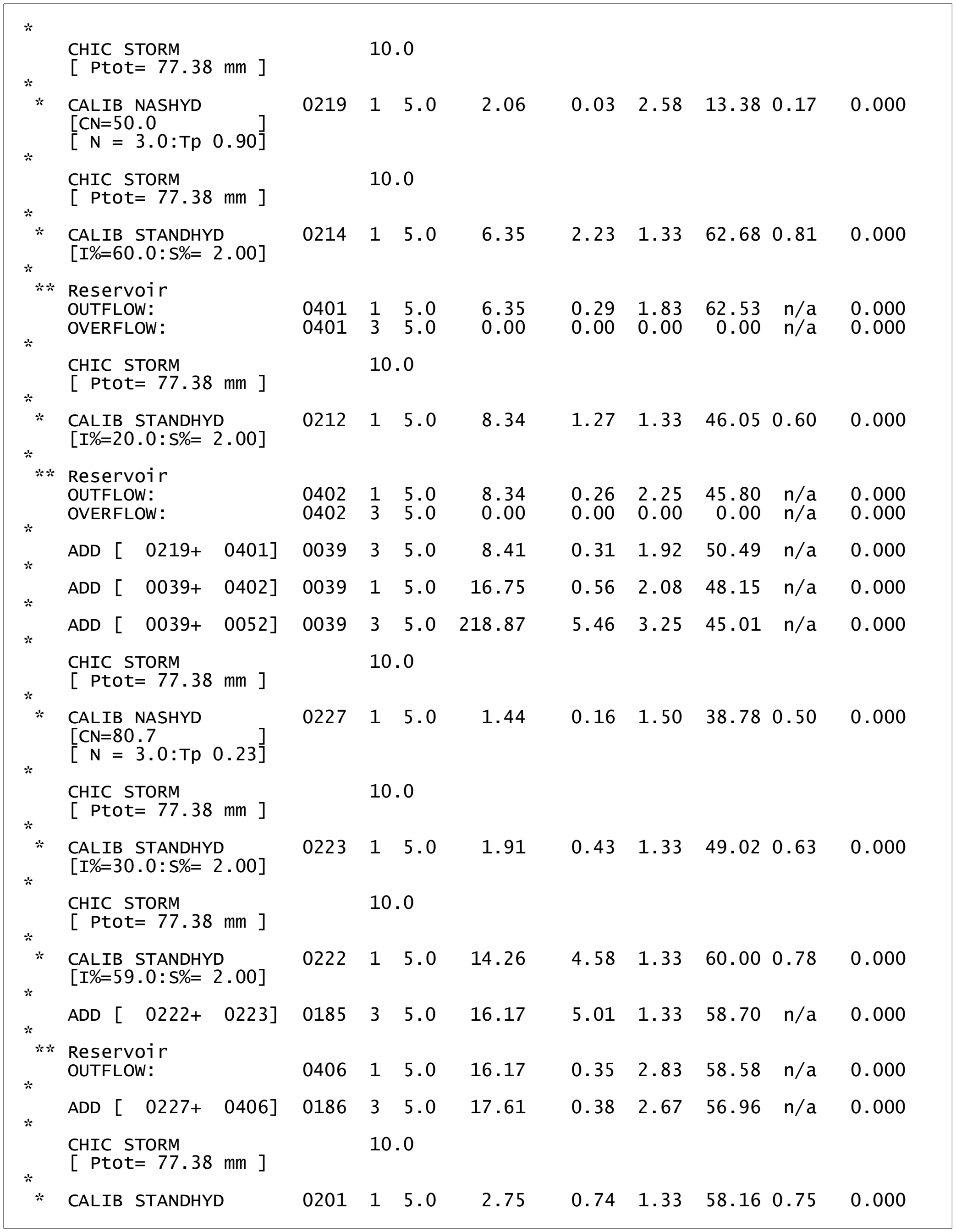
  W/E COMMAND              HYD ID   DT     AREA  ' Qpeak Tpeak    R.V. R.C.    Qbase
                                   min      ha   '  cms   hrs      mm           cms

      START @  0.00 hrs
      --------------------
    CHIC STORM                   10.0
    [ Ptot= 77.38 mm ]
*
 ** CALIB NASHYD           0101  1  5.0   29.62    1.79  2.00  40.22 0.52   0.000
    [CN=81.9         ]
    [ N = 3.0:Tp 0.57]
*
    PIPE   [ 2:  0101]     0140  1  5.0   29.62    1.76  2.08  40.22  n/a   0.000
*
    CHIC STORM                   10.0
    [ Ptot= 77.38 mm ]
*
 *  CALIB NASHYD           0208  1  5.0    1.80    0.05  2.00  20.63 0.27   0.000
    [CN=62.3         ]
```

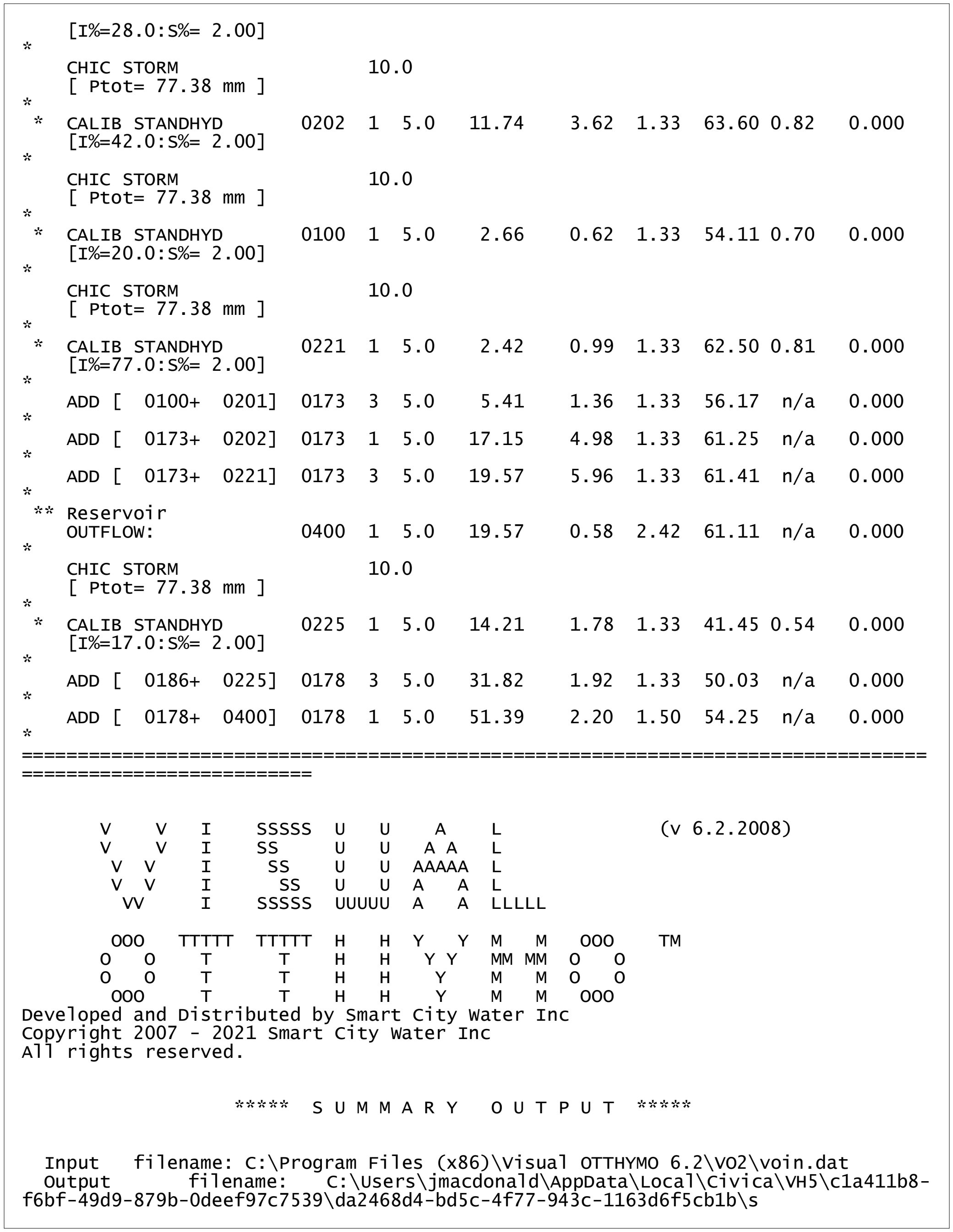
```
    [ N = 3.0:Tp 0.53]
*
    CHIC STORM                   10.0
    [ Ptot= 77.38 mm ]
*
 *  CALIB STANDHYD         0203  1  5.0    8.59    1.83  1.33  51.35 0.66   0.000
    [I%=36.0:S%= 2.00]
*
    CHIC STORM                   10.0
    [ Ptot= 77.38 mm ]
*
 *  CALIB STANDHYD         0204  1  5.0   11.24    2.41  1.33  51.53 0.67   0.000
    [I%=37.0:S%= 2.00]
*
    CHIC STORM                   10.0
    [ Ptot= 77.38 mm ]
*
 *  CALIB STANDHYD         0226  1  5.0    8.53    1.97  1.33  53.14 0.69   0.000
    [I%=40.0:S%= 2.00]
*
    ADD [  0140+  0203]    0063  3  5.0   38.21    2.10  2.00  42.72  n/a   0.000
*
    ADD [  0063+  0204]    0063  1  5.0   49.45    4.32  1.33  44.73  n/a   0.000
*
    ADD [  0063+  0208]    0063  3  5.0   51.25    4.33  1.33  43.88  n/a   0.000
*
    ADD [  0063+  0226]    0063  1  5.0   59.78    6.30  1.33  45.20  n/a   0.000
*
 ** Reservoir
    OUTFLOW:               0405  1  5.0   59.78    2.82  2.08  45.17  n/a   0.000
*
    CHIC STORM                   10.0
    [ Ptot= 77.38 mm ]
*
 *  CALIB NASHYD           0216  1  5.0   11.42    0.14  2.83  13.38 0.17   0.000
    [CN=50.0         ]
    [ N = 3.0:Tp 1.03]
*
    CHIC STORM                   10.0
    [ Ptot= 77.38 mm ]
*
 *  CALIB NASHYD           0215  1  5.0    2.06    0.16  1.67  36.43 0.47   0.000
    [CN=77.8         ]
    [ N = 3.0:Tp 0.33]
*
    CHIC STORM                   10.0
    [ Ptot= 77.38 mm ]
*
 *  CALIB NASHYD           0207  1  5.0    1.37    0.11  1.58  32.39 0.42   0.000
    [CN=74.0         ]
    [ N = 3.0:Tp 0.27]
*
    ADD [  0207+  0215]    0145  3  5.0    3.43    0.27  1.58  34.82  n/a   0.000
*
    ADD [  0145+  0216]    0145  1  5.0   14.85    0.31  1.67  18.34  n/a   0.000
*
    ADD [  0145+  0405]    0145  3  5.0   74.64    3.08  2.08  39.83  n/a   0.000
*
 ** Reservoir
    OUTFLOW:               0062  1  5.0   74.64    1.88  3.08  39.83  n/a   0.000
*
    CHANNEL[ 2:  0062]     0048  1  5.0   74.64    1.84  3.33  39.83  n/a   0.000
*
    CHIC STORM                   10.0
```

```
    [ Ptot= 77.38 mm ]
*
 *  CALIB STANDHYD        0108  1  5.0    3.97    1.43  1.33  61.59 0.80    0.000
    [I%=67.0:S%= 2.00]
*
    CHIC STORM                  10.0
    [ Ptot= 77.38 mm ]
*
 *  CALIB STANDHYD        0107  1  5.0    4.81    2.08  1.33  70.22 0.91    0.000
    [I%=86.0:S%= 2.00]
*
    CHIC STORM                  10.0
    [ Ptot= 77.38 mm ]
*
 *  CALIB STANDHYD        0106  1  5.0   26.74    5.38  1.33  52.41 0.68    0.000
    [I%=15.0:S%= 2.00]
*
    CHIC STORM                  10.0
    [ Ptot= 77.38 mm ]
*
 *  CALIB STANDHYD        0209  1  5.0   10.31    2.72  1.33  55.37 0.72    0.000
    [I%=39.0:S%= 2.00]
*
    ADD [  0106+  0209]   0146  3  5.0   37.05    8.10  1.33  53.23  n/a    0.000
*
    CHANNEL[ 2:  0146]    0049  1  5.0   37.05    2.22  1.83  53.05  n/a    0.000
*
    ADD [  0107+  0108]   0036  3  5.0    8.78    3.51  1.33  66.32  n/a    0.000
*
    ADD [  0036+  0049]   0036  1  5.0   45.83    4.46  1.33  55.59  n/a    0.000
*
 ** Reservoir
    OUTFLOW:              0065  1  5.0   45.83    1.99  2.42  55.59  n/a    0.000
*
    CHIC STORM                  10.0
    [ Ptot= 77.38 mm ]
*
 *  CALIB STANDHYD        0206  1  5.0   28.45    7.91  1.33  55.84 0.72    0.000
    [I%=53.0:S%= 2.00]
*
    CHIC STORM                  10.0
    [ Ptot= 77.38 mm ]
*
 *  CALIB STANDHYD        0205  1  5.0   10.19    3.17  1.33  56.85 0.73    0.000
    [I%=53.0:S%= 2.00]
*
    ADD [  0205+  0206]   0155  3  5.0   38.64   11.08  1.33  56.11  n/a    0.000
*
 ** Reservoir
    OUTFLOW:              0404  1  5.0   38.64    1.14  2.25  52.71  n/a    0.000
*
    ADD [  0404+  0048]   0031  3  5.0  113.28    2.80  3.08  44.22  n/a    0.000
*
    ADD [  0031+  0065]   0031  1  5.0  159.11    4.51  2.83  47.49  n/a    0.000
*
    PIPE   [ 2:  0031]    0066  1  5.0  159.11    4.51  2.83  47.49  n/a    0.000
*
    CHIC STORM                  10.0
    [ Ptot= 77.38 mm ]
*
 *  CALIB NASHYD          0217  1  5.0    8.74    0.11  2.67  13.38 0.17    0.000
    [CN=50.0          ]
    [ N = 3.0:Tp 0.95]
*
```

```
    ADD [  0217+  0066]   0149  3  5.0  167.85    4.62  2.83  45.72  n/a    0.000
*
    CHANNEL[ 2:  0149]    0051  1  5.0  167.85    4.46  3.25  45.72  n/a    0.000
*
    CHIC STORM                  10.0
    [ Ptot= 77.38 mm ]
*
 *  CALIB NASHYD          0220  1  5.0    5.14    0.18  2.17  28.00 0.36    0.000
    [CN=71.4          ]
    [ N = 3.0:Tp 0.68]
*
    CHIC STORM                  10.0
    [ Ptot= 77.38 mm ]
*
 *  CALIB NASHYD          0218  1  5.0   10.21    0.10  3.67  13.38 0.17    0.000
    [CN=50.0          ]
    [ N = 3.0:Tp 1.54]
*
    CHIC STORM                  10.0
    [ Ptot= 77.38 mm ]
*
 *  CALIB STANDHYD        0224  1  5.0    2.58    0.58  1.33  48.28 0.62    0.000
    [I%=31.0:S%= 2.00]
*
    ADD [  0218+  0220]   0170  3  5.0   15.35    0.24  2.42  18.28  n/a    0.000
*
    ADD [  0170+  0224]   0170  1  5.0   17.93    0.60  1.33  22.59  n/a    0.000
*
    CHANNEL[ 2:  0170]    0061  1  5.0   17.93    0.27  2.83  22.51  n/a    0.000
*
    CHIC STORM                  10.0
    [ Ptot= 77.38 mm ]
*
 *  CALIB STANDHYD        0210  1  5.0    7.09    2.95  1.33  68.91 0.89    0.000
    [I%=83.0:S%= 2.00]
*
    CHIC STORM                  10.0
    [ Ptot= 77.38 mm ]
*
 *  CALIB STANDHYD        0211  1  5.0    8.86    2.12  1.33  53.42 0.69    0.000
    [I%=43.0:S%= 2.00]
*
    ADD [  0210+  0211]   0148  3  5.0   15.95    5.07  1.33  60.30  n/a    0.000
*
 ** Reservoir
    OUTFLOW:              0403  1  5.0   15.95    0.51  2.25  60.16  n/a    0.000
    OVERFLOW:             0403  3  5.0    0.00    0.00  0.00   0.00  n/a    0.000
*
    CHIC STORM                  10.0
    [ Ptot= 77.38 mm ]
*
 *  CALIB NASHYD          0213  1  5.0    0.39    0.05  1.33  21.43 0.28    0.000
    [CN=69.0          ]
    [ N = 3.0:Tp 0.05]
*
    ADD [  0213+  0403]   0044  3  5.0   16.34    0.52  2.17  59.24  n/a    0.000
*
    ADD [  0044+  0061]   0044  1  5.0   34.27    0.77  2.33  40.02  n/a    0.000
*
    CHANNEL[ 2:  0044]    0060  1  5.0   34.27    0.64  3.25  40.02  n/a    0.000
*
    ADD [  0051+  0060]   0038  3  5.0  202.11    5.11  3.25  44.75  n/a    0.000
*
    CHANNEL[ 2:  0038]    0052  1  5.0  202.11    5.10  3.33  44.75  n/a    0.000
```



```
*
    CHIC STORM                10.0
    [ Ptot= 77.38 mm ]
*
 *  CALIB NASHYD        0219  1  5.0    2.06    0.03  2.58  13.38 0.17    0.000
    [CN=50.0         ]
    [ N = 3.0:Tp 0.90]
*
    CHIC STORM                10.0
    [ Ptot= 77.38 mm ]
*
 *  CALIB STANDHYD      0214  1  5.0    6.35    2.23  1.33  62.68 0.81    0.000
    [I%=60.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:            0401  1  5.0    6.35    0.29  1.83  62.53  n/a    0.000
    OVERFLOW:           0401  3  5.0    0.00    0.00  0.00   0.00  n/a    0.000
*
    CHIC STORM                10.0
    [ Ptot= 77.38 mm ]
*
 *  CALIB STANDHYD      0212  1  5.0    8.34    1.27  1.33  46.05 0.60    0.000
    [I%=20.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:            0402  1  5.0    8.34    0.26  2.25  45.80  n/a    0.000
    OVERFLOW:           0402  3  5.0    0.00    0.00  0.00   0.00  n/a    0.000
*
    ADD [  0219+  0401] 0039  3  5.0    8.41    0.31  1.92  50.49  n/a    0.000
*
    ADD [  0039+  0402] 0039  1  5.0   16.75    0.56  2.08  48.15  n/a    0.000
*
    ADD [  0039+  0052] 0039  3  5.0  218.87    5.46  3.25  45.01  n/a    0.000
*
    CHIC STORM                10.0
    [ Ptot= 77.38 mm ]
*
 *  CALIB NASHYD        0227  1  5.0    1.44    0.16  1.50  38.78 0.50    0.000
    [CN=80.7         ]
    [ N = 3.0:Tp 0.23]
*
    CHIC STORM                10.0
    [ Ptot= 77.38 mm ]
*
 *  CALIB STANDHYD      0223  1  5.0    1.91    0.43  1.33  49.02 0.63    0.000
    [I%=30.0:S%= 2.00]
*
    CHIC STORM                10.0
    [ Ptot= 77.38 mm ]
*
 *  CALIB STANDHYD      0222  1  5.0   14.26    4.58  1.33  60.00 0.78    0.000
    [I%=59.0:S%= 2.00]
*
    ADD [  0222+  0223] 0185  3  5.0   16.17    5.01  1.33  58.70  n/a    0.000
*
 ** Reservoir
    OUTFLOW:            0406  1  5.0   16.17    0.35  2.83  58.58  n/a    0.000
*
    ADD [  0227+  0406] 0186  3  5.0   17.61    0.38  2.67  56.96  n/a    0.000
*
    CHIC STORM                10.0
    [ Ptot= 77.38 mm ]
*
 *  CALIB STANDHYD      0201  1  5.0    2.75    0.74  1.33  58.16 0.75    0.000
```



```
    [I%=28.0:S%= 2.00]
*
    CHIC STORM                10.0
    [ Ptot= 77.38 mm ]
*
 *  CALIB STANDHYD      0202  1  5.0   11.74    3.62  1.33  63.60 0.82    0.000
    [I%=42.0:S%= 2.00]
*
    CHIC STORM                10.0
    [ Ptot= 77.38 mm ]
*
 *  CALIB STANDHYD      0100  1  5.0    2.66    0.62  1.33  54.11 0.70    0.000
    [I%=20.0:S%= 2.00]
*
    CHIC STORM                10.0
    [ Ptot= 77.38 mm ]
*
 *  CALIB STANDHYD      0221  1  5.0    2.42    0.99  1.33  62.50 0.81    0.000
    [I%=77.0:S%= 2.00]
*
    ADD [  0100+  0201] 0173  3  5.0    5.41    1.36  1.33  56.17  n/a    0.000
*
    ADD [  0173+  0202] 0173  1  5.0   17.15    4.98  1.33  61.25  n/a    0.000
*
    ADD [  0173+  0221] 0173  3  5.0   19.57    5.96  1.33  61.41  n/a    0.000
*
 ** Reservoir
    OUTFLOW:            0400  1  5.0   19.57    0.58  2.42  61.11  n/a    0.000
*
    CHIC STORM                10.0
    [ Ptot= 77.38 mm ]
*
 *  CALIB STANDHYD      0225  1  5.0   14.21    1.78  1.33  41.45 0.54    0.000
    [I%=17.0:S%= 2.00]
*
    ADD [  0186+  0225] 0178  3  5.0   31.82    1.92  1.33  50.03  n/a    0.000
*
    ADD [  0178+  0400] 0178  1  5.0   51.39    2.20  1.50  54.25  n/a    0.000
*
=================================================================================
==========================


       V    V   I    SSSSS  U   U    A    L              (v 6.2.2008)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                   *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output       filename:   C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\da2468d4-bd5c-4f77-943c-1163d6f5cb1b\s
```

```
  Summary     filename:     C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\da2468d4-bd5c-4f77-943c-1163d6f5cb1b\s


DATE: 08-28-2023                            TIME: 10:52:27

USER:


COMMENTS: ____________________________________________________________


  **************************************************
  ** SIMULATION : 10yr 12hr 15min SCS           **
  **************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min    ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                 15.0
    [ Ptot= 75.42 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\91a2a654-eae0-4812-b7a9-
    remark: 10yr 12hr 15min SCS
*
 ** CALIB NASHYD         0101  1  5.0   29.62    1.67  6.75  38.65 0.51   0.000
    [CN=81.9         ]
    [ N = 3.0:Tp 0.57]
*
    PIPE   [ 2:  0101]   0140  1  5.0   29.62    1.64  6.83  38.64  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 75.42 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\91a2a654-eae0-4812-b7a9-
    remark: 10yr 12hr 15min SCS
*
 ** CALIB NASHYD         0208  1  5.0    1.80    0.05  6.75  19.63 0.26   0.000
    [CN=62.3         ]
    [ N = 3.0:Tp 0.53]
*
    READ STORM                 15.0
    [ Ptot= 75.42 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\91a2a654-eae0-4812-b7a9-
    remark: 10yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0203  1  5.0    8.59    1.33  6.25  49.70 0.66   0.000
    [I%=36.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 75.42 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\91a2a654-eae0-4812-b7a9-
    remark: 10yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0204  1  5.0   11.24    1.73  6.25  49.88 0.66   0.000
    [I%=37.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 75.42 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
```

```
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\91a2a654-eae0-4812-b7a9-
    remark: 10yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0226  1  5.0    8.53    1.39  6.25  51.46 0.68   0.000
    [I%=40.0:S%= 2.00]
*
    ADD [  0140+  0203]  0063  3  5.0   38.21    1.95  6.75  41.13  n/a   0.000
*
    ADD [  0063+  0204]  0063  1  5.0   49.45    3.56  6.25  43.12  n/a   0.000
*
    ADD [  0063+  0208]  0063  3  5.0   51.25    3.58  6.25  42.29  n/a   0.000
*
    ADD [  0063+  0226]  0063  1  5.0   59.78    4.97  6.25  43.60  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0405  1  5.0   59.78    2.57  6.83  43.57  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 75.42 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\91a2a654-eae0-4812-b7a9-
    remark: 10yr 12hr 15min SCS
*
 *  CALIB NASHYD         0216  1  5.0   11.42    0.12  7.33  12.67 0.17   0.000
    [CN=50.0         ]
    [ N = 3.0:Tp 1.03]
*
    READ STORM                 15.0
    [ Ptot= 75.42 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\91a2a654-eae0-4812-b7a9-
    remark: 10yr 12hr 15min SCS
*
 *  CALIB NASHYD         0215  1  5.0    2.06    0.15  6.42  34.97 0.46   0.000
    [CN=77.8         ]
    [ N = 3.0:Tp 0.33]
*
    READ STORM                 15.0
    [ Ptot= 75.42 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\91a2a654-eae0-4812-b7a9-
    remark: 10yr 12hr 15min SCS
*
 *  CALIB NASHYD         0207  1  5.0    1.37    0.10  6.42  31.04 0.41   0.000
    [CN=74.0         ]
    [ N = 3.0:Tp 0.27]
*
    ADD [  0207+  0215]  0145  3  5.0    3.43    0.25  6.42  33.40  n/a   0.000
*
    ADD [  0145+  0216]  0145  1  5.0   14.85    0.30  6.50  17.46  n/a   0.000
*
    ADD [  0145+  0405]  0145  3  5.0   74.64    2.81  6.83  38.37  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0062  1  5.0   74.64    1.56  7.67  38.37  n/a   0.000
*
    CHANNEL[ 2:  0062]   0048  1  5.0   74.64    1.50  7.92  38.37  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 75.42 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\91a2a654-eae0-4812-b7a9-
    remark: 10yr 12hr 15min SCS
*
```

```
 *  CALIB STANDHYD       0108  1  5.0    3.97    0.82  6.25  59.84 0.79   0.000
    [I%=67.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 75.42 mm ]
    fname              :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\91a2a654-eae0-4812-b7a9-
    remark: 10yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0107  1  5.0    4.81    1.21  6.25  68.35 0.91   0.000
    [I%=86.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 75.42 mm ]
    fname              :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\91a2a654-eae0-4812-b7a9-
    remark: 10yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0106  1  5.0   26.74    3.78  6.25  50.66 0.67   0.000
    [I%=15.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 75.42 mm ]
    fname              :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\91a2a654-eae0-4812-b7a9-
    remark: 10yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0209  1  5.0   10.31    1.74  6.25  53.64 0.71   0.000
    [I%=39.0:S%= 2.00]
*
    ADD [  0106+  0209]  0146  3  5.0   37.05    5.52  6.25  51.49  n/a   0.000
*
    CHANNEL[ 2:  0146]   0049  1  5.0   37.05    1.84  6.67  51.31  n/a   0.000
*
    ADD [  0107+  0108]  0036  3  5.0    8.78    2.03  6.25  64.50  n/a   0.000
*
    ADD [  0036+  0049]  0036  1  5.0   45.83    3.15  6.25  53.84  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0065  1  5.0   45.83    1.69  7.00  53.83  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 75.42 mm ]
    fname              :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\91a2a654-eae0-4812-b7a9-
    remark: 10yr 12hr 15min SCS
*
 ** CALIB STANDHYD       0206  1  5.0   28.45    4.86  6.25  54.16 0.72   0.000
    [I%=53.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 75.42 mm ]
    fname              :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\91a2a654-eae0-4812-b7a9-
    remark: 10yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0205  1  5.0   10.19    1.91  6.25  55.09 0.73   0.000
    [I%=53.0:S%= 2.00]
*
    ADD [  0205+  0206]  0155  3  5.0   38.64    6.78  6.25  54.41  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0404  1  5.0   38.64    1.02  6.92  50.96  n/a   0.000
*
```

```
    ADD [  0404+  0048]  0031  3  5.0  113.28    2.24  7.75  42.67  n/a   0.000
*
    ADD [  0031+  0065]  0031  1  5.0  159.11    3.78  7.58  45.88  n/a   0.000
*
    PIPE   [ 2:  0031]   0066  1  5.0  159.11    3.78  7.50  45.88  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 75.42 mm ]
    fname              :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\91a2a654-eae0-4812-b7a9-
    remark: 10yr 12hr 15min SCS
*
 *  CALIB NASHYD         0217  1  5.0    8.74    0.10  7.25  12.67 0.17   0.000
    [CN=50.0         ]
    [ N = 3.0:Tp 0.95]
*
    ADD [  0217+  0066]  0149  3  5.0  167.85    3.88  7.50  44.15  n/a   0.000
*
    CHANNEL[ 2:  0149]   0051  1  5.0  167.85    3.71  7.92  44.15  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 75.42 mm ]
    fname              :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\91a2a654-eae0-4812-b7a9-
    remark: 10yr 12hr 15min SCS
*
 *  CALIB NASHYD         0220  1  5.0    5.14    0.17  6.92  26.74 0.35   0.000
    [CN=71.4         ]
    [ N = 3.0:Tp 0.68]
*
    READ STORM                 15.0
    [ Ptot= 75.42 mm ]
    fname              :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\91a2a654-eae0-4812-b7a9-
    remark: 10yr 12hr 15min SCS
*
 *  CALIB NASHYD         0218  1  5.0   10.21    0.08  8.00  12.67 0.17   0.000
    [CN=50.0         ]
    [ N = 3.0:Tp 1.54]
*
    READ STORM                 15.0
    [ Ptot= 75.42 mm ]
    fname              :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\91a2a654-eae0-4812-b7a9-
    remark: 10yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0224  1  5.0    2.58    0.38  6.25  46.67 0.62   0.000
    [I%=31.0:S%= 2.00]
*
    ADD [  0218+  0220]  0170  3  5.0   15.35    0.22  7.00  17.38  n/a   0.000
*
    ADD [  0170+  0224]  0170  1  5.0   17.93    0.44  6.25  21.60  n/a   0.000
*
    CHANNEL[ 2:  0170]   0061  1  5.0   17.93    0.23  7.33  21.51  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 75.42 mm ]
    fname              :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\91a2a654-eae0-4812-b7a9-
    remark: 10yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0210  1  5.0    7.09    1.73  6.25  67.05 0.89   0.000
    [I%=83.0:S%= 2.00]
*
```

```
    READ STORM                  15.0
    [ Ptot= 75.42 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\91a2a654-eae0-4812-b7a9-
    remark: 10yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0211  1  5.0    8.86    1.46  6.25  51.75 0.69   0.000
    [I%=43.0:S%= 2.00]
*
    ADD [  0210+  0211]  0148  3  5.0   15.95    3.19  6.25  58.55  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0403  1  5.0   15.95    0.44  6.83  58.41  n/a   0.000
*
    READ STORM                  15.0
    [ Ptot= 75.42 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\91a2a654-eae0-4812-b7a9-
    remark: 10yr 12hr 15min SCS
*
 *  CALIB NASHYD         0213  1  5.0    0.39    0.04  6.25  20.50 0.27   0.000
    [CN=69.0         ]
    [ N = 3.0:Tp 0.05]
*
    ADD [  0213+  0403]  0044  3  5.0   16.34    0.45  6.83  57.51  n/a   0.000
*
    ADD [  0044+  0061]  0044  1  5.0   34.27    0.67  6.83  38.68  n/a   0.000
*
    CHANNEL[ 2:  0044]   0060  1  5.0   34.27    0.50  7.58  38.67  n/a   0.000
*
    ADD [  0051+  0060]  0038  3  5.0  202.11    4.19  7.83  43.22  n/a   0.000
*
    CHANNEL[ 2:  0038]   0052  1  5.0  202.11    4.17  8.00  43.22  n/a   0.000
*
    READ STORM                  15.0
    [ Ptot= 75.42 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\91a2a654-eae0-4812-b7a9-
    remark: 10yr 12hr 15min SCS
*
 *  CALIB NASHYD         0219  1  5.0    2.06    0.02  7.17  12.67 0.17   0.000
    [CN=50.0         ]
    [ N = 3.0:Tp 0.90]
*
    READ STORM                  15.0
    [ Ptot= 75.42 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\91a2a654-eae0-4812-b7a9-
    remark: 10yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0214  1  5.0    6.35    1.39  6.25  60.87 0.81   0.000
    [I%=60.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:             0401  1  5.0    6.35    0.26  6.58  60.72  n/a   0.000
    OVERFLOW:            0401  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    READ STORM                  15.0
    [ Ptot= 75.42 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\91a2a654-eae0-4812-b7a9-
    remark: 10yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0212  1  5.0    8.34    1.07  6.25  44.46 0.59   0.000
```

```
    [I%=20.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:             0402  1  5.0    8.34    0.24  6.92  44.20  n/a   0.000
    OVERFLOW:            0402  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    ADD [  0219+  0401]  0039  3  5.0    8.41    0.27  6.67  48.95  n/a   0.000
*
    ADD [  0039+  0402]  0039  1  5.0   16.75    0.50  6.75  46.58  n/a   0.000
*
    ADD [  0039+  0052]  0039  3  5.0  218.87    4.44  7.92  43.48  n/a   0.000
*
    READ STORM                  15.0
    [ Ptot= 75.42 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\91a2a654-eae0-4812-b7a9-
    remark: 10yr 12hr 15min SCS
*
 *  CALIB NASHYD         0227  1  5.0    1.44    0.15  6.33  37.24 0.49   0.000
    [CN=80.7         ]
    [ N = 3.0:Tp 0.23]
*
    READ STORM                  15.0
    [ Ptot= 75.42 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\91a2a654-eae0-4812-b7a9-
    remark: 10yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0223  1  5.0    1.91    0.28  6.25  47.39 0.63   0.000
    [I%=30.0:S%= 2.00]
*
    READ STORM                  15.0
    [ Ptot= 75.42 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\91a2a654-eae0-4812-b7a9-
    remark: 10yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0222  1  5.0   14.26    2.74  6.25  58.24 0.77   0.000
    [I%=59.0:S%= 2.00]
*
    ADD [  0222+  0223]  0185  3  5.0   16.17    3.02  6.25  56.96  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0406  1  5.0   16.17    0.22  7.33  56.84  n/a   0.000
*
    ADD [  0227+  0406]  0186  3  5.0   17.61    0.24  7.25  55.23  n/a   0.000
*
    READ STORM                  15.0
    [ Ptot= 75.42 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\91a2a654-eae0-4812-b7a9-
    remark: 10yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0201  1  5.0    2.75    0.48  6.25  56.35 0.75   0.000
    [I%=28.0:S%= 2.00]
*
    READ STORM                  15.0
    [ Ptot= 75.42 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\91a2a654-eae0-4812-b7a9-
    remark: 10yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0202  1  5.0   11.74    2.27  6.25  61.73 0.82   0.000
    [I%=42.0:S%= 2.00]
```

```
*
    READ STORM                 15.0
    [ Ptot= 75.42 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\91a2a654-eae0-4812-b7a9-
    remark: 10yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0100  1  5.0    2.66    0.42  6.25  52.33 0.69   0.000
    [I%=20.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 75.42 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\91a2a654-eae0-4812-b7a9-
    remark: 10yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0221  1  5.0    2.42    0.58  6.25  60.66 0.80   0.000
    [I%=77.0:S%= 2.00]
*
    ADD [  0100+  0201]  0173  3  5.0    5.41    0.90  6.25  54.38  n/a   0.000
*
    ADD [  0173+  0202]  0173  1  5.0   17.15    3.17  6.25  59.41  n/a   0.000
*
    ADD [  0173+  0221]  0173  3  5.0   19.57    3.75  6.25  59.57  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0400  1  5.0   19.57    0.51  6.92  59.22  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 75.42 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\91a2a654-eae0-4812-b7a9-
    remark: 10yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0225  1  5.0   14.21    1.55  6.25  39.95 0.53   0.000
    [I%=17.0:S%= 2.00]
*
    ADD [  0186+  0225]  0178  3  5.0   31.82    1.73  6.25  48.41  n/a   0.000
*
    ADD [  0178+  0400]  0178  1  5.0   51.39    2.09  6.25  52.53  n/a   0.000
*
=================================================================================
==========================


       V    V   I    SSSSS  U   U    A    L              (v 6.2.2008)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO     TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  S U M M A R Y  O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
```

```
  Output      filename:   C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\2b74e1db-fad1-40e0-b907-77a6dabd5887\s
  Summary    filename:    C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\2b74e1db-fad1-40e0-b907-77a6dabd5887\s


DATE: 08-28-2023                           TIME: 10:52:23

USER:


COMMENTS: ____________________________________________________________


  ************************************************
  ** SIMULATION : 10yr 24hr 15min SCS           **
  ************************************************

  W/E COMMAND              HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                 15.0
    [ Ptot= 92.92 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4ddd28f2-dd5d-411f-8885-
    remark: 10yr 24hr 15min SCS
*
 ** CALIB NASHYD         0101  1  5.0   29.62    1.96 12.75  53.09 0.57   0.000
    [CN=81.9         ]
    [ N = 3.0:Tp 0.57]
*
    PIPE   [ 2:  0101]   0140  1  5.0   29.62    1.92 12.83  53.09  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 92.92 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4ddd28f2-dd5d-411f-8885-
    remark: 10yr 24hr 15min SCS
*
 *  CALIB NASHYD         0208  1  5.0    1.80    0.07 12.67  29.17 0.31   0.000
    [CN=62.3         ]
    [ N = 3.0:Tp 0.53]
*
    READ STORM                 15.0
    [ Ptot= 92.92 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4ddd28f2-dd5d-411f-8885-
    remark: 10yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0203  1  5.0    8.59    1.57 12.25  64.72 0.70   0.000
    [I%=36.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 92.92 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4ddd28f2-dd5d-411f-8885-
    remark: 10yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0204  1  5.0   11.24    2.04 12.25  64.89 0.70   0.000
    [I%=37.0:S%= 2.00]
*
    READ STORM                 15.0
```

```
    [ Ptot= 92.92 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4ddd28f2-dd5d-411f-8885-
    remark: 10yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0226  1  5.0    8.53    1.63 12.25  66.68 0.72   0.000
    [I%=40.0:S%= 2.00]
*
    ADD [  0140+  0203]  0063  3  5.0   38.21    2.26 12.75  55.70  n/a   0.000
*
    ADD [  0063+  0204]  0063  1  5.0   49.45    4.22 12.25  57.79  n/a   0.000
*
    ADD [  0063+  0208]  0063  3  5.0   51.25    4.25 12.25  56.79  n/a   0.000
*
    ADD [  0063+  0226]  0063  1  5.0   59.78    5.88 12.25  58.20  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0405  1  5.0   59.78    3.28 12.67  58.17  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 92.92 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4ddd28f2-dd5d-411f-8885-
    remark: 10yr 24hr 15min SCS
*
 *  CALIB NASHYD         0216  1  5.0   11.42    0.16 13.33  19.55 0.21   0.000
    [CN=50.0         ]
    [ N = 3.0:Tp 1.03]
*
    READ STORM                 15.0
    [ Ptot= 92.92 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4ddd28f2-dd5d-411f-8885-
    remark: 10yr 24hr 15min SCS
*
 *  CALIB NASHYD         0215  1  5.0    2.06    0.18 12.42  48.47 0.52   0.000
    [CN=77.8         ]
    [ N = 3.0:Tp 0.33]
*
    READ STORM                 15.0
    [ Ptot= 92.92 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4ddd28f2-dd5d-411f-8885-
    remark: 10yr 24hr 15min SCS
*
 *  CALIB NASHYD         0207  1  5.0    1.37    0.12 12.42  43.61 0.47   0.000
    [CN=74.0         ]
    [ N = 3.0:Tp 0.27]
*
    ADD [  0207+  0215]  0145  3  5.0    3.43    0.31 12.42  46.53  n/a   0.000
*
    ADD [  0145+  0216]  0145  1  5.0   14.85    0.37 12.50  25.78  n/a   0.000
*
    ADD [  0145+  0405]  0145  3  5.0   74.64    3.63 12.58  51.72  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0062  1  5.0   74.64    2.05 13.50  51.72  n/a   0.000
*
    CHANNEL[ 2:  0062]   0048  1  5.0   74.64    1.98 13.75  51.72  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 92.92 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4ddd28f2-dd5d-411f-8885-
```

```
    remark: 10yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0108  1  5.0    3.97    0.96 12.25  75.66 0.81   0.000
    [I%=67.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 92.92 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4ddd28f2-dd5d-411f-8885-
    remark: 10yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0107  1  5.0    4.81    1.39 12.25  85.16 0.92   0.000
    [I%=86.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 92.92 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4ddd28f2-dd5d-411f-8885-
    remark: 10yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0106  1  5.0   26.74    4.45 12.25  66.45 0.72   0.000
    [I%=15.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 92.92 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4ddd28f2-dd5d-411f-8885-
    remark: 10yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0209  1  5.0   10.31    2.04 12.25  69.30 0.75   0.000
    [I%=39.0:S%= 2.00]
*
    ADD [  0106+  0209]  0146  3  5.0   37.05    6.49 12.25  67.25  n/a   0.000
*
    CHANNEL[ 2:  0146]   0049  1  5.0   37.05    2.06 12.67  67.07  n/a   0.000
*
    ADD [  0107+  0108]  0036  3  5.0    8.78    2.35 12.25  80.86  n/a   0.000
*
    ADD [  0036+  0049]  0036  1  5.0   45.83    3.56 12.25  69.71  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0065  1  5.0   45.83    1.90 13.00  69.71  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 92.92 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4ddd28f2-dd5d-411f-8885-
    remark: 10yr 24hr 15min SCS
*
 ** CALIB STANDHYD       0206  1  5.0   28.45    5.67 12.25  69.37 0.75   0.000
    [I%=53.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 92.92 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4ddd28f2-dd5d-411f-8885-
    remark: 10yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0205  1  5.0   10.19    2.23 12.25  70.96 0.76   0.000
    [I%=53.0:S%= 2.00]
*
    ADD [  0205+  0206]  0155  3  5.0   38.64    7.90 12.25  69.79  n/a   0.000
*
 ** Reservoir
```

```
    OUTFLOW:              0404  1  5.0   38.64    1.23 12.83  66.26  n/a   0.000
*
    ADD [  0404+  0048]   0031  3  5.0  113.28    3.11 13.67  56.68  n/a   0.000
*
    ADD [  0031+  0065]   0031  1  5.0  159.11    4.74 13.42  60.43  n/a   0.000
*
    PIPE   [ 2:  0031]    0066  1  5.0  159.11    4.74 13.42  60.43  n/a   0.000
*
    READ STORM                  15.0
    [ Ptot= 92.92 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4ddd28f2-dd5d-411f-8885-
    remark: 10yr 24hr 15min SCS
*
 *  CALIB NASHYD          0217  1  5.0    8.74    0.13 13.25  19.55 0.21   0.000
    [CN=50.0         ]
    [ N = 3.0:Tp 0.95]
*
    ADD [  0217+  0066]   0149  3  5.0  167.85    4.87 13.42  58.30  n/a   0.000
*
    CHANNEL[ 2:  0149]    0051  1  5.0  167.85    4.69 13.75  58.30  n/a   0.000
*
    READ STORM                  15.0
    [ Ptot= 92.92 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4ddd28f2-dd5d-411f-8885-
    remark: 10yr 24hr 15min SCS
*
 *  CALIB NASHYD          0220  1  5.0    5.14    0.21 12.83  38.49 0.41   0.000
    [CN=71.4         ]
    [ N = 3.0:Tp 0.68]
*
    READ STORM                  15.0
    [ Ptot= 92.92 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4ddd28f2-dd5d-411f-8885-
    remark: 10yr 24hr 15min SCS
*
 *  CALIB NASHYD          0218  1  5.0   10.21    0.11 13.92  19.55 0.21   0.000
    [CN=50.0         ]
    [ N = 3.0:Tp 1.54]
*
    READ STORM                  15.0
    [ Ptot= 92.92 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4ddd28f2-dd5d-411f-8885-
    remark: 10yr 24hr 15min SCS
*
 *  CALIB STANDHYD        0224  1  5.0    2.58    0.45 12.25  61.29 0.66   0.000
    [I%=31.0:S%= 2.00]
*
    ADD [  0218+  0220]   0170  3  5.0   15.35    0.28 13.00  25.89  n/a   0.000
*
    ADD [  0170+  0224]   0170  1  5.0   17.93    0.54 12.25  30.99  n/a   0.000
*
    CHANNEL[ 2:  0170]    0061  1  5.0   17.93    0.29 13.33  30.90  n/a   0.000
*
    READ STORM                  15.0
    [ Ptot= 92.92 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4ddd28f2-dd5d-411f-8885-
    remark: 10yr 24hr 15min SCS
*
 *  CALIB STANDHYD        0210  1  5.0    7.09    2.00 12.25  83.71 0.90   0.000
```

```
    [I%=83.0:S%= 2.00]
*
    READ STORM                  15.0
    [ Ptot= 92.92 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4ddd28f2-dd5d-411f-8885-
    remark: 10yr 24hr 15min SCS
*
 *  CALIB STANDHYD        0211  1  5.0    8.86    1.71 12.25  66.90 0.72   0.000
    [I%=43.0:S%= 2.00]
*
    ADD [  0210+  0211]   0148  3  5.0   15.95    3.71 12.25  74.37  n/a   0.000
*
 ** Reservoir
    OUTFLOW:              0403  1  5.0   15.95    0.64 12.67  74.23  n/a   0.000
*
    READ STORM                  15.0
    [ Ptot= 92.92 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4ddd28f2-dd5d-411f-8885-
    remark: 10yr 24hr 15min SCS
*
 *  CALIB NASHYD          0213  1  5.0    0.39    0.05 12.25  29.19 0.31   0.000
    [CN=69.0         ]
    [ N = 3.0:Tp 0.05]
*
    ADD [  0213+  0403]   0044  3  5.0   16.34    0.65 12.67  73.16  n/a   0.000
*
    ADD [  0044+  0061]   0044  1  5.0   34.27    0.91 12.75  51.05  n/a   0.000
*
    CHANNEL[ 2:  0044]    0060  1  5.0   34.27    0.67 13.50  51.05  n/a   0.000
*
    ADD [  0051+  0060]   0038  3  5.0  202.11    5.34 13.75  57.07  n/a   0.000
*
    CHANNEL[ 2:  0038]    0052  1  5.0  202.11    5.32 13.83  57.07  n/a   0.000
*
    READ STORM                  15.0
    [ Ptot= 92.92 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4ddd28f2-dd5d-411f-8885-
    remark: 10yr 24hr 15min SCS
*
 *  CALIB NASHYD          0219  1  5.0    2.06    0.03 13.17  19.55 0.21   0.000
    [CN=50.0         ]
    [ N = 3.0:Tp 0.90]
*
    READ STORM                  15.0
    [ Ptot= 92.92 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4ddd28f2-dd5d-411f-8885-
    remark: 10yr 24hr 15min SCS
*
 *  CALIB STANDHYD        0214  1  5.0    6.35    1.62 12.25  77.17 0.83   0.000
    [I%=60.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:              0401  1  5.0    6.35    0.45 12.42  77.02  n/a   0.000
    OVERFLOW:             0401  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    READ STORM                  15.0
    [ Ptot= 92.92 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4ddd28f2-dd5d-411f-8885-
    remark: 10yr 24hr 15min SCS
```

```
*
 *  CALIB STANDHYD       0212  1  5.0    8.34    1.29 12.25  59.04 0.64   0.000
    [I%=20.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:             0402  1  5.0    8.34    0.34 12.75  58.78  n/a   0.000
    OVERFLOW:            0402  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    ADD [  0219+  0401]  0039  3  5.0    8.41    0.46 12.42  62.94  n/a   0.000
*
    ADD [  0039+  0402]  0039  1  5.0   16.75    0.73 12.50  60.87  n/a   0.000
*
    ADD [  0039+  0052]  0039  3  5.0  218.87    5.67 13.75  57.36  n/a   0.000
*
    READ STORM                   15.0
    [ Ptot= 92.92 mm ]
    fname              :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4ddd28f2-dd5d-411f-8885-
    remark: 10yr 24hr 15min SCS
*
 *  CALIB NASHYD         0227  1  5.0    1.44    0.18 12.33  51.38 0.55   0.000
    [CN=80.7          ]
    [ N = 3.0:Tp 0.23]
*
    READ STORM                   15.0
    [ Ptot= 92.92 mm ]
    fname              :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4ddd28f2-dd5d-411f-8885-
    remark: 10yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0223  1  5.0    1.91    0.34 12.25  62.19 0.67   0.000
    [I%=30.0:S%= 2.00]
*
    READ STORM                   15.0
    [ Ptot= 92.92 mm ]
    fname              :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4ddd28f2-dd5d-411f-8885-
    remark: 10yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0222  1  5.0   14.26    3.18 12.25  74.08 0.80   0.000
    [I%=59.0:S%= 2.00]
*
    ADD [  0222+  0223]  0185  3  5.0   16.17    3.52 12.25  72.68  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0406  1  5.0   16.17    0.38 13.00  72.55  n/a   0.000
*
    ADD [  0227+  0406]  0186  3  5.0   17.61    0.43 12.83  70.82  n/a   0.000
*
    READ STORM                   15.0
    [ Ptot= 92.92 mm ]
    fname              :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4ddd28f2-dd5d-411f-8885-
    remark: 10yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0201  1  5.0    2.75    0.62 12.25  72.63 0.78   0.000
    [I%=28.0:S%= 2.00]
*
    READ STORM                   15.0
    [ Ptot= 92.92 mm ]
    fname              :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4ddd28f2-dd5d-411f-8885-
    remark: 10yr 24hr 15min SCS
*
```

```
 *  CALIB STANDHYD       0202  1  5.0   11.74    2.62 12.25  78.48 0.84   0.000
    [I%=42.0:S%= 2.00]
*
    READ STORM                   15.0
    [ Ptot= 92.92 mm ]
    fname              :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4ddd28f2-dd5d-411f-8885-
    remark: 10yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0100  1  5.0    2.66    0.49 12.25  68.39 0.74   0.000
    [I%=20.0:S%= 2.00]
*
    READ STORM                   15.0
    [ Ptot= 92.92 mm ]
    fname              :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4ddd28f2-dd5d-411f-8885-
    remark: 10yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0221  1  5.0    2.42    0.67 12.25  77.17 0.83   0.000
    [I%=77.0:S%= 2.00]
*
    ADD [  0100+  0201]  0173  3  5.0    5.41    1.11 12.25  70.54  n/a   0.000
*
    ADD [  0173+  0202]  0173  1  5.0   17.15    3.73 12.25  75.98  n/a   0.000
*
    ADD [  0173+  0221]  0173  3  5.0   19.57    4.40 12.25  76.13  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0400  1  5.0   19.57    0.62 12.83  75.64  n/a   0.000
*
    READ STORM                   15.0
    [ Ptot= 92.92 mm ]
    fname              :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4ddd28f2-dd5d-411f-8885-
    remark: 10yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0225  1  5.0   14.21    1.88 12.25  53.72 0.58   0.000
    [I%=17.0:S%= 2.00]
*
    ADD [  0186+  0225]  0178  3  5.0   31.82    2.09 12.25  63.18  n/a   0.000
*
    ADD [  0178+  0400]  0178  1  5.0   51.39    2.48 12.25  67.93  n/a   0.000
*
================================================================================
==========================


       V    V   I    SSSSS  U   U    A    L              (v 6.2.2008)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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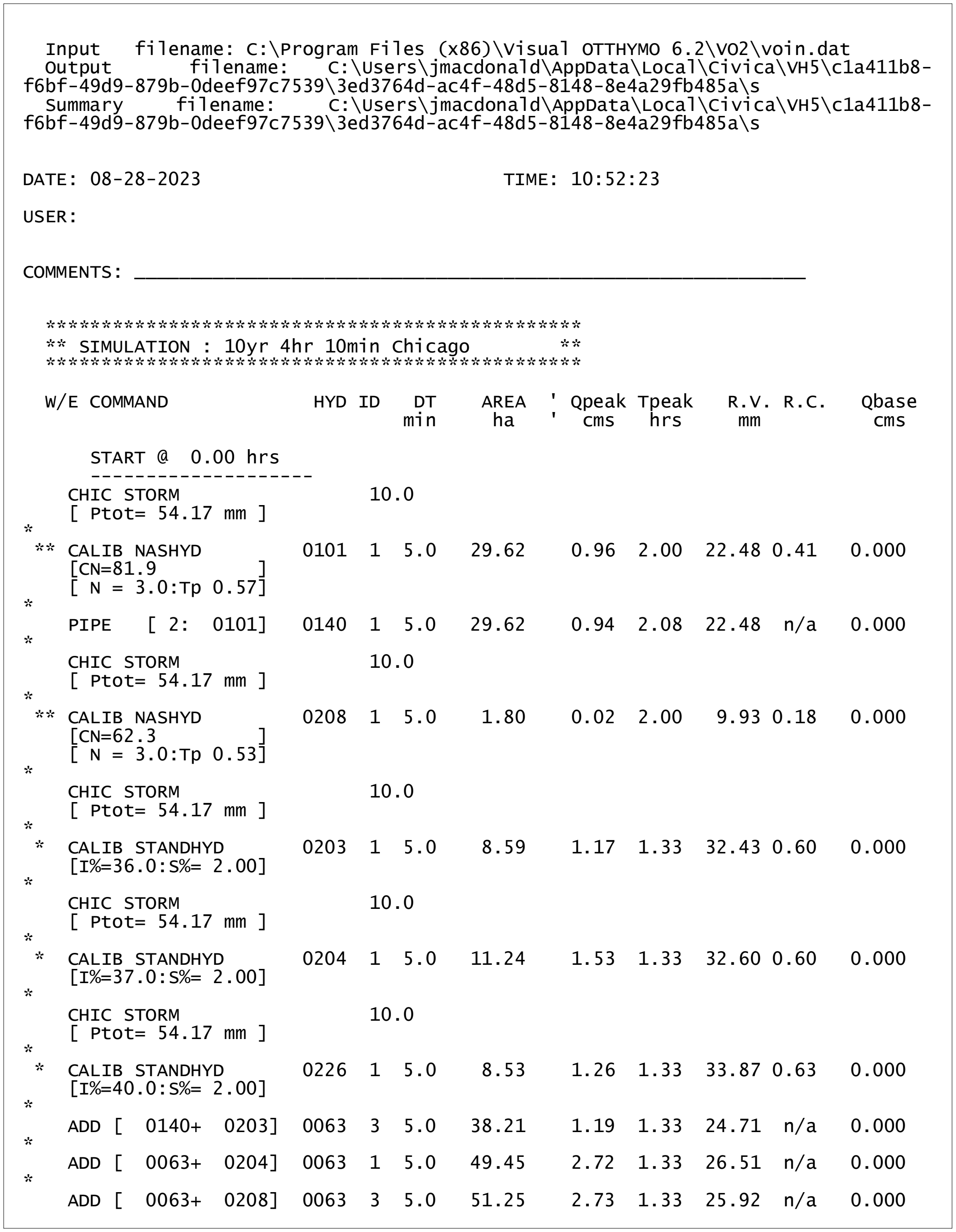
                   *****  S U M M A R Y   O U T P U T  *****
```



```
  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output      filename:   C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\3ed3764d-ac4f-48d5-8148-8e4a29fb485a\s
  Summary    filename:    C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\3ed3764d-ac4f-48d5-8148-8e4a29fb485a\s


DATE: 08-28-2023                           TIME: 10:52:23

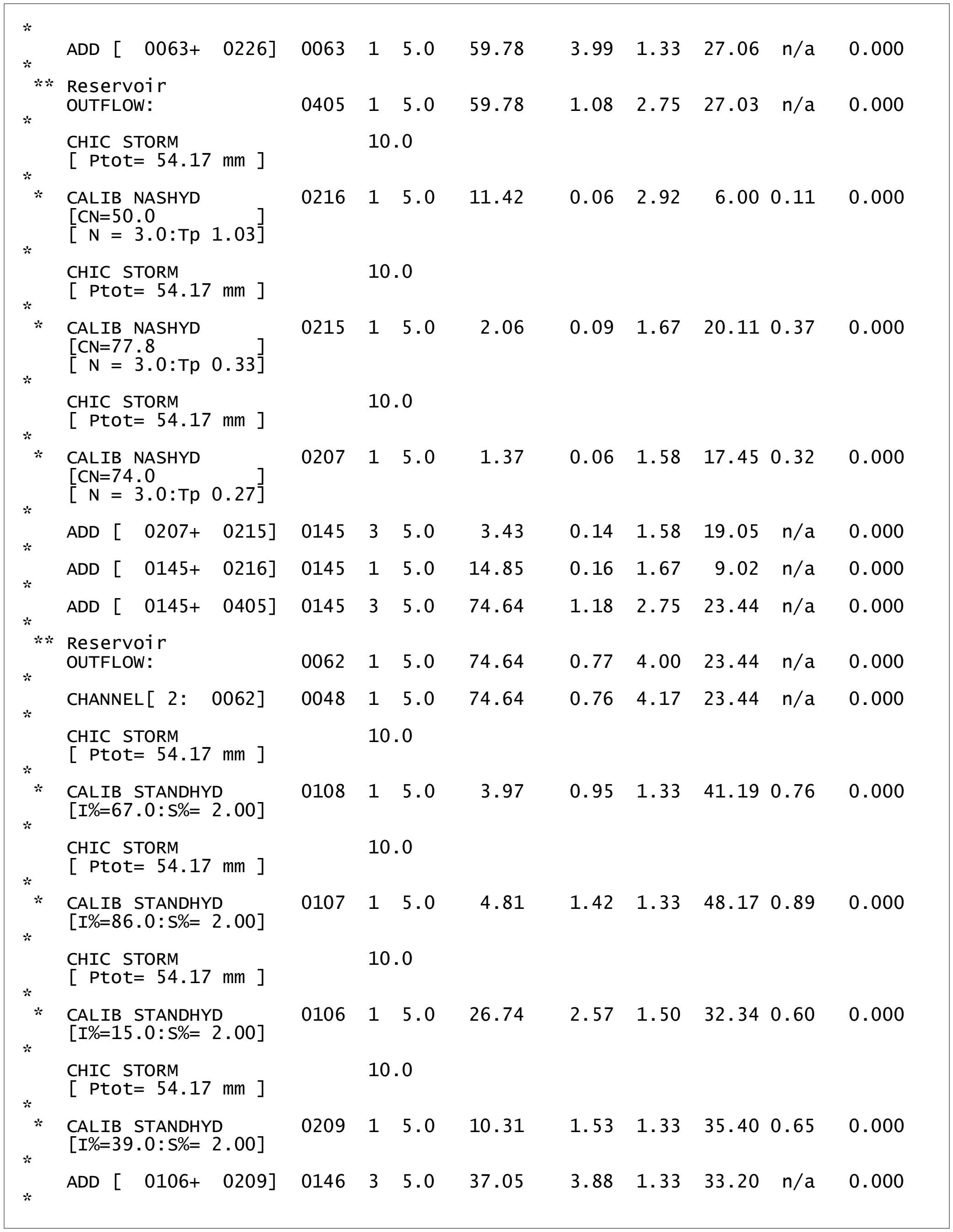
USER:


COMMENTS: ____________________________________________________________


  ************************************************
  ** SIMULATION : 10yr 4hr 10min Chicago       **
  ************************************************

  W/E COMMAND            HYD ID   DT    AREA  ' Qpeak Tpeak    R.V. R.C.    Qbase
                                 min     ha   '  cms   hrs      mm           cms

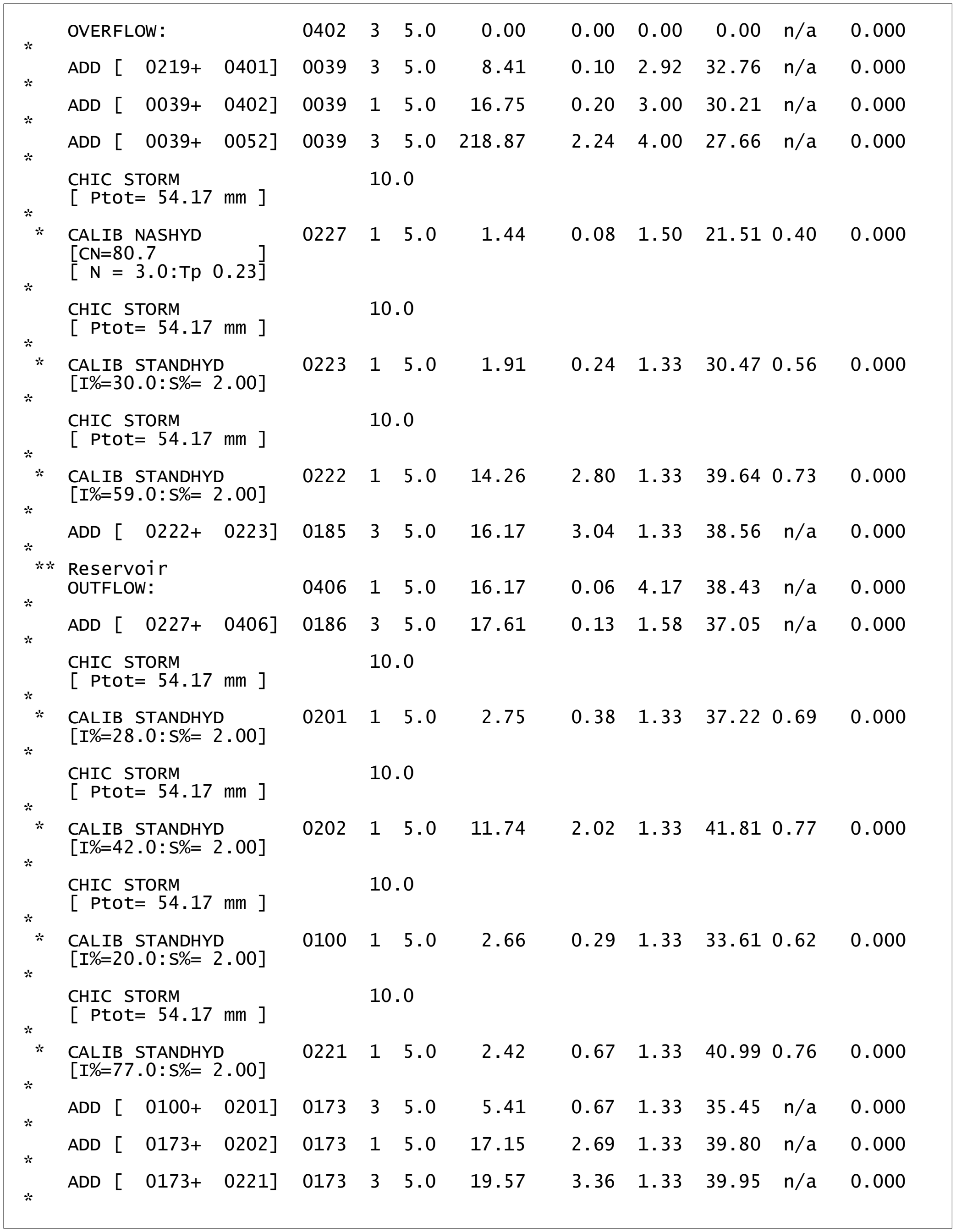
      START @  0.00 hrs
      --------------------
    CHIC STORM                 10.0
    [ Ptot= 54.17 mm ]
*
 ** CALIB NASHYD         0101  1  5.0   29.62    0.96  2.00  22.48 0.41   0.000
    [CN=81.9        ]
    [ N = 3.0:Tp 0.57]
*
    PIPE   [ 2:  0101]   0140  1  5.0   29.62    0.94  2.08  22.48  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 54.17 mm ]
*
 ** CALIB NASHYD         0208  1  5.0    1.80    0.02  2.00   9.93 0.18   0.000
    [CN=62.3        ]
    [ N = 3.0:Tp 0.53]
*
    CHIC STORM                 10.0
    [ Ptot= 54.17 mm ]
*
 *  CALIB STANDHYD       0203  1  5.0    8.59    1.17  1.33  32.43 0.60   0.000
    [I%=36.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 54.17 mm ]
*
 *  CALIB STANDHYD       0204  1  5.0   11.24    1.53  1.33  32.60 0.60   0.000
    [I%=37.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 54.17 mm ]
*
 *  CALIB STANDHYD       0226  1  5.0    8.53    1.26  1.33  33.87 0.63   0.000
    [I%=40.0:S%= 2.00]
*
    ADD [  0140+  0203]  0063  3  5.0   38.21    1.19  1.33  24.71  n/a   0.000
*
    ADD [  0063+  0204]  0063  1  5.0   49.45    2.72  1.33  26.51  n/a   0.000
*
    ADD [  0063+  0208]  0063  3  5.0   51.25    2.73  1.33  25.92  n/a   0.000
```



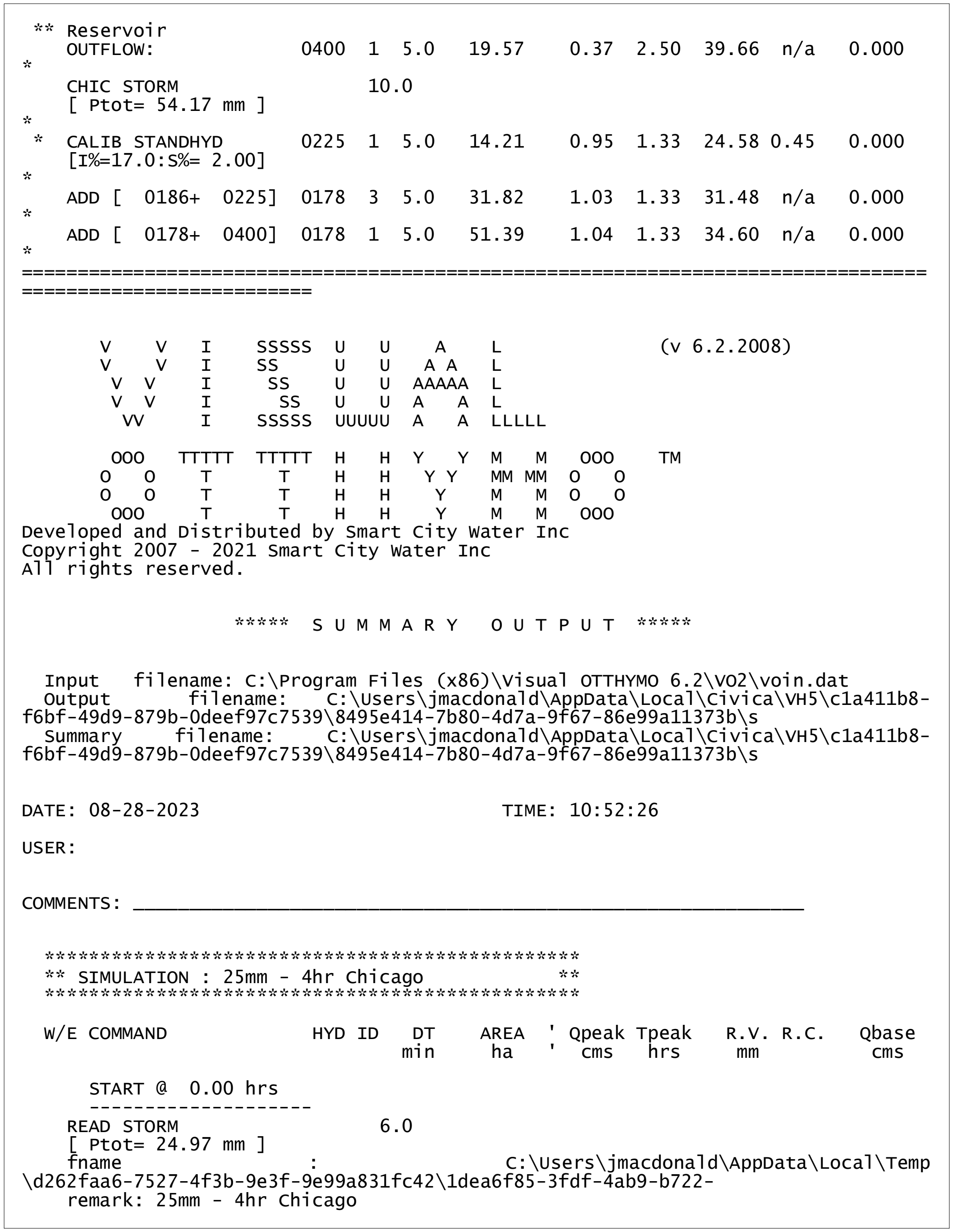
```
*
    ADD [  0063+  0226]  0063  1  5.0   59.78    3.99  1.33  27.06  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0405  1  5.0   59.78    1.08  2.75  27.03  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 54.17 mm ]
*
 *  CALIB NASHYD         0216  1  5.0   11.42    0.06  2.92   6.00 0.11   0.000
    [CN=50.0        ]
    [ N = 3.0:Tp 1.03]
*
    CHIC STORM                 10.0
    [ Ptot= 54.17 mm ]
*
 *  CALIB NASHYD         0215  1  5.0    2.06    0.09  1.67  20.11 0.37   0.000
    [CN=77.8        ]
    [ N = 3.0:Tp 0.33]
*
    CHIC STORM                 10.0
    [ Ptot= 54.17 mm ]
*
 *  CALIB NASHYD         0207  1  5.0    1.37    0.06  1.58  17.45 0.32   0.000
    [CN=74.0        ]
    [ N = 3.0:Tp 0.27]
*
    ADD [  0207+  0215]  0145  3  5.0    3.43    0.14  1.58  19.05  n/a   0.000
*
    ADD [  0145+  0216]  0145  1  5.0   14.85    0.16  1.67   9.02  n/a   0.000
*
    ADD [  0145+  0405]  0145  3  5.0   74.64    1.18  2.75  23.44  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0062  1  5.0   74.64    0.77  4.00  23.44  n/a   0.000
*
    CHANNEL[ 2:  0062]   0048  1  5.0   74.64    0.76  4.17  23.44  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 54.17 mm ]
*
 *  CALIB STANDHYD       0108  1  5.0    3.97    0.95  1.33  41.19 0.76   0.000
    [I%=67.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 54.17 mm ]
*
 *  CALIB STANDHYD       0107  1  5.0    4.81    1.42  1.33  48.17 0.89   0.000
    [I%=86.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 54.17 mm ]
*
 *  CALIB STANDHYD       0106  1  5.0   26.74    2.57  1.50  32.34 0.60   0.000
    [I%=15.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 54.17 mm ]
*
 *  CALIB STANDHYD       0209  1  5.0   10.31    1.53  1.33  35.40 0.65   0.000
    [I%=39.0:S%= 2.00]
*
    ADD [  0106+  0209]  0146  3  5.0   37.05    3.88  1.33  33.20  n/a   0.000
*
```

```
    CHANNEL[ 2:  0146]   0049  1  5.0   37.05    1.26  1.92  33.02  n/a   0.000
 *
    ADD [  0107+  0108]  0036  3  5.0    8.78    2.37  1.33  45.01  n/a   0.000
 *
    ADD [  0036+  0049]  0036  1  5.0   45.83    2.83  1.33  35.31  n/a   0.000
 *
 ** Reservoir
    OUTFLOW:             0065  1  5.0   45.83    1.27  2.17  35.31  n/a   0.000
 *
    CHIC STORM                 10.0
    [ Ptot= 54.17 mm ]
 *
 ** CALIB STANDHYD       0206  1  5.0   28.45    4.68  1.33  36.47 0.67   0.000
    [I%=53.0:S%= 2.00]
 *
    CHIC STORM                 10.0
    [ Ptot= 54.17 mm ]
 *
  * CALIB STANDHYD       0205  1  5.0   10.19    1.89  1.33  36.49 0.67   0.000
    [I%=53.0:S%= 2.00]
 *
    ADD [  0205+  0206]  0155  3  5.0   38.64    6.57  1.33  36.47  n/a   0.000
 *
 ** Reservoir
    OUTFLOW:             0404  1  5.0   38.64    0.42  3.50  33.08  n/a   0.000
 *
    ADD [  0404+  0048]  0031  3  5.0  113.28    1.16  4.00  26.73  n/a   0.000
 *
    ADD [  0031+  0065]  0031  1  5.0  159.11    1.78  3.83  29.20  n/a   0.000
 *
    PIPE   [ 2:  0031]   0066  1  5.0  159.11    1.78  3.83  29.20  n/a   0.000
 *
    CHIC STORM                 10.0
    [ Ptot= 54.17 mm ]
 *
  * CALIB NASHYD         0217  1  5.0    8.74    0.05  2.83   6.00 0.11   0.000
    [CN=50.0         ]
    [ N = 3.0:Tp 0.95]
 *
    ADD [  0217+  0066]  0149  3  5.0  167.85    1.82  3.83  27.99  n/a   0.000
 *
    CHANNEL[ 2:  0149]   0051  1  5.0  167.85    1.79  4.08  27.99  n/a   0.000
 *
    CHIC STORM                 10.0
    [ Ptot= 54.17 mm ]
 *
  * CALIB NASHYD         0220  1  5.0    5.14    0.09  2.25  14.30 0.26   0.000
    [CN=71.4         ]
    [ N = 3.0:Tp 0.68]
 *
    CHIC STORM                 10.0
    [ Ptot= 54.17 mm ]
 *
  * CALIB NASHYD         0218  1  5.0   10.21    0.04  3.83   6.00 0.11   0.000
    [CN=50.0         ]
    [ N = 3.0:Tp 1.54]
 *
    CHIC STORM                 10.0
    [ Ptot= 54.17 mm ]
 *
  * CALIB STANDHYD       0224  1  5.0    2.58    0.32  1.33  30.00 0.55   0.000
    [I%=31.0:S%= 2.00]
 *
    ADD [  0218+  0220]  0170  3  5.0   15.35    0.11  2.42   8.78  n/a   0.000
```

```
 *
    ADD [  0170+  0224]  0170  1  5.0   17.93    0.33  1.33  11.84  n/a   0.000
 *
    CHANNEL[ 2:  0170]   0061  1  5.0   17.93    0.14  2.83  11.75  n/a   0.000
 *
    CHIC STORM                 10.0
    [ Ptot= 54.17 mm ]
 *
  * CALIB STANDHYD       0210  1  5.0    7.09    1.99  1.33  47.10 0.87   0.000
    [I%=83.0:S%= 2.00]
 *
    CHIC STORM                 10.0
    [ Ptot= 54.17 mm ]
 *
  * CALIB STANDHYD       0211  1  5.0    8.86    1.37  1.33  34.23 0.63   0.000
    [I%=43.0:S%= 2.00]
 *
    ADD [  0210+  0211]  0148  3  5.0   15.95    3.36  1.33  39.95  n/a   0.000
 *
 ** Reservoir
    OUTFLOW:             0403  1  5.0   15.95    0.18  3.50  39.81  n/a   0.000
 *
    CHIC STORM                 10.0
    [ Ptot= 54.17 mm ]
 *
  * CALIB NASHYD         0213  1  5.0    0.39    0.03  1.33  11.30 0.21   0.000
    [CN=69.0         ]
    [ N = 3.0:Tp 0.05]
 *
    ADD [  0213+  0403]  0044  3  5.0   16.34    0.18  3.50  39.13  n/a   0.000
 *
    ADD [  0044+  0061]  0044  1  5.0   34.27    0.31  3.25  24.81  n/a   0.000
 *
    CHANNEL[ 2:  0044]   0060  1  5.0   34.27    0.27  4.08  24.80  n/a   0.000
 *
    ADD [  0051+  0060]  0038  3  5.0  202.11    2.06  4.08  27.45  n/a   0.000
 *
    CHANNEL[ 2:  0038]   0052  1  5.0  202.11    2.07  4.08  27.45  n/a   0.000
 *
    CHIC STORM                 10.0
    [ Ptot= 54.17 mm ]
 *
  * CALIB NASHYD         0219  1  5.0    2.06    0.01  2.75   6.00 0.11   0.000
    [CN=50.0         ]
    [ N = 3.0:Tp 0.90]
 *
    CHIC STORM                 10.0
    [ Ptot= 54.17 mm ]
 *
  * CALIB STANDHYD       0214  1  5.0    6.35    1.45  1.33  41.59 0.77   0.000
    [I%=60.0:S%= 2.00]
 *
 ** Reservoir
    OUTFLOW:             0401  1  5.0    6.35    0.09  3.00  41.43  n/a   0.000
    OVERFLOW:            0401  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
 *
    CHIC STORM                 10.0
    [ Ptot= 54.17 mm ]
 *
  * CALIB STANDHYD       0212  1  5.0    8.34    0.76  1.33  27.91 0.52   0.000
    [I%=20.0:S%= 2.00]
 *
 ** Reservoir
    OUTFLOW:             0402  1  5.0    8.34    0.10  3.08  27.65  n/a   0.000
```



```
    OVERFLOW:            0402  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    ADD [  0219+  0401]  0039  3  5.0    8.41    0.10  2.92  32.76  n/a   0.000
*
    ADD [  0039+  0402]  0039  1  5.0   16.75    0.20  3.00  30.21  n/a   0.000
*
    ADD [  0039+  0052]  0039  3  5.0  218.87    2.24  4.00  27.66  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 54.17 mm ]
*
 *  CALIB NASHYD         0227  1  5.0    1.44    0.08  1.50  21.51 0.40   0.000
    [CN=80.7         ]
    [ N = 3.0:Tp 0.23]
*
    CHIC STORM                 10.0
    [ Ptot= 54.17 mm ]
*
 *  CALIB STANDHYD       0223  1  5.0    1.91    0.24  1.33  30.47 0.56   0.000
    [I%=30.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 54.17 mm ]
*
 *  CALIB STANDHYD       0222  1  5.0   14.26    2.80  1.33  39.64 0.73   0.000
    [I%=59.0:S%= 2.00]
*
    ADD [  0222+  0223]  0185  3  5.0   16.17    3.04  1.33  38.56  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0406  1  5.0   16.17    0.06  4.17  38.43  n/a   0.000
*
    ADD [  0227+  0406]  0186  3  5.0   17.61    0.13  1.58  37.05  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 54.17 mm ]
*
 *  CALIB STANDHYD       0201  1  5.0    2.75    0.38  1.33  37.22 0.69   0.000
    [I%=28.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 54.17 mm ]
*
 *  CALIB STANDHYD       0202  1  5.0   11.74    2.02  1.33  41.81 0.77   0.000
    [I%=42.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 54.17 mm ]
*
 *  CALIB STANDHYD       0100  1  5.0    2.66    0.29  1.33  33.61 0.62   0.000
    [I%=20.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 54.17 mm ]
*
 *  CALIB STANDHYD       0221  1  5.0    2.42    0.67  1.33  40.99 0.76   0.000
    [I%=77.0:S%= 2.00]
*
    ADD [  0100+  0201]  0173  3  5.0    5.41    0.67  1.33  35.45  n/a   0.000
*
    ADD [  0173+  0202]  0173  1  5.0   17.15    2.69  1.33  39.80  n/a   0.000
*
    ADD [  0173+  0221]  0173  3  5.0   19.57    3.36  1.33  39.95  n/a   0.000
*
```



```
 ** Reservoir
    OUTFLOW:             0400  1  5.0   19.57    0.37  2.50  39.66  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 54.17 mm ]
*
 *  CALIB STANDHYD       0225  1  5.0   14.21    0.95  1.33  24.58 0.45   0.000
    [I%=17.0:S%= 2.00]
*
    ADD [  0186+  0225]  0178  3  5.0   31.82    1.03  1.33  31.48  n/a   0.000
*
    ADD [  0178+  0400]  0178  1  5.0   51.39    1.04  1.33  34.60  n/a   0.000
*
=================================================================================
==========================


       V    V   I    SSSSS  U   U    A    L              (v 6.2.2008)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M  OOO     TM
       O   O    T      T    H   H   Y Y   MM MM O   O
       O   O    T      T    H   H    Y    M   M O   O
        OOO     T      T    H   H    Y    M   M  OOO
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                   *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output       filename:   C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\8495e414-7b80-4d7a-9f67-86e99a11373b\s
  Summary     filename:    C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\8495e414-7b80-4d7a-9f67-86e99a11373b\s


DATE: 08-28-2023                           TIME: 10:52:26

USER:


COMMENTS: ____________________________________________________________


  ************************************************
  ** SIMULATION : 25mm - 4hr Chicago            **
  ************************************************

  W/E COMMAND            HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min    ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                  6.0
    [ Ptot= 24.97 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
```

```
*
 ** CALIB NASHYD        0101  1  5.0   29.62    0.26  2.58   4.94 0.20   0.000
    [CN=81.9          ]
    [ N = 3.0:Tp 0.57]
*
    PIPE   [ 2:  0101]  0140  1  5.0   29.62    0.25  2.75   4.94  n/a   0.000
*
    READ STORM                  6.0
    [ Ptot= 24.97 mm ]
    fname               :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 ** CALIB NASHYD        0208  1  5.0    1.80    0.00  2.67   1.36 0.05   0.000
    [CN=62.3          ]
    [ N = 3.0:Tp 0.53]
*
    READ STORM                  6.0
    [ Ptot= 24.97 mm ]
    fname               :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 ** CALIB STANDHYD      0203  1  5.0    8.59    0.46  1.92  11.69 0.47   0.000
    [I%=36.0:S%= 2.00]
*
    READ STORM                  6.0
    [ Ptot= 24.97 mm ]
    fname               :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 ** CALIB STANDHYD      0204  1  5.0   11.24    0.60  1.92  11.83 0.47   0.000
    [I%=37.0:S%= 2.00]
*
    READ STORM                  6.0
    [ Ptot= 24.97 mm ]
    fname               :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 ** CALIB STANDHYD      0226  1  5.0    8.53    0.51  1.92  12.51 0.50   0.000
    [I%=40.0:S%= 2.00]
*
    ADD [  0140+  0203]  0063  3  5.0   38.21    0.46  1.92   6.45  n/a   0.000
*
    ADD [  0063+  0204]  0063  1  5.0   49.45    1.07  1.92   7.68  n/a   0.000
*
    ADD [  0063+  0208]  0063  3  5.0   51.25    1.07  1.92   7.45  n/a   0.000
*
    ADD [  0063+  0226]  0063  1  5.0   59.78    1.58  1.92   8.18  n/a   0.000
*
 ** Reservoir
    OUTFLOW:            0405  1  5.0   59.78    0.06  4.58   8.14  n/a   0.000
*
    READ STORM                  6.0
    [ Ptot= 24.97 mm ]
    fname               :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 ** CALIB NASHYD        0216  1  5.0   11.42    0.01  3.50   0.63 0.03   0.000
    [CN=50.0          ]
    [ N = 3.0:Tp 1.03]
```

```
*
    READ STORM                  6.0
    [ Ptot= 24.97 mm ]
    fname               :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 ** CALIB NASHYD        0215  1  5.0    2.06    0.02  2.25   4.46 0.18   0.000
    [CN=77.8          ]
    [ N = 3.0:Tp 0.33]
*
    READ STORM                  6.0
    [ Ptot= 24.97 mm ]
    fname               :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 ** CALIB NASHYD        0207  1  5.0    1.37    0.01  2.17   3.65 0.15   0.000
    [CN=74.0          ]
    [ N = 3.0:Tp 0.27]
*
    ADD [  0207+  0215]  0145  3  5.0    3.43    0.04  2.25   4.13  n/a   0.000
*
    ADD [  0145+  0216]  0145  1  5.0   14.85    0.04  2.25   1.44  n/a   0.000
*
    ADD [  0145+  0405]  0145  3  5.0   74.64    0.08  2.33   6.81  n/a   0.000
*
 ** Reservoir
    OUTFLOW:            0062  1  5.0   74.64    0.06  7.17   6.81  n/a   0.000
*
    CHANNEL[ 2:  0062]  0048  1  5.0   74.64    0.06  7.83   6.81  n/a   0.000
*
    READ STORM                  6.0
    [ Ptot= 24.97 mm ]
    fname               :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 *  CALIB STANDHYD      0108  1  5.0    3.97    0.41  1.92  17.19 0.69   0.000
    [I%=67.0:S%= 2.00]
*
    READ STORM                  6.0
    [ Ptot= 24.97 mm ]
    fname               :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 *  CALIB STANDHYD      0107  1  5.0    4.81    0.64  1.92  21.13 0.85   0.000
    [I%=86.0:S%= 2.00]
*
    READ STORM                  6.0
    [ Ptot= 24.97 mm ]
    fname               :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 *  CALIB STANDHYD      0106  1  5.0   26.74    0.80  2.08  10.34 0.41   0.000
    [I%=15.0:S%= 2.00]
*
    READ STORM                  6.0
    [ Ptot= 24.97 mm ]
    fname               :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
```

```
*
 *  CALIB STANDHYD       0209  1  5.0   10.31    0.61  1.92  13.02 0.52   0.000
    [I%=39.0:S%= 2.00]
*
    ADD [  0106+  0209]  0146  3  5.0   37.05    1.25  2.00  11.08  n/a   0.000
*
    CHANNEL[ 2:  0146]   0049  1  5.0   37.05    0.45  2.33  10.90  n/a   0.000
*
    ADD [  0107+  0108]  0036  3  5.0    8.78    1.05  1.92  19.34  n/a   0.000
*
    ADD [  0036+  0049]  0036  1  5.0   45.83    1.20  1.92  12.52  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0065  1  5.0   45.83    0.11  4.92  12.52  n/a   0.000
*
    READ STORM                  6.0
    [ Ptot= 24.97 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 ** CALIB STANDHYD       0206  1  5.0   28.45    1.77  2.00  14.44 0.58   0.000
    [I%=53.0:S%= 2.00]
*
    READ STORM                  6.0
    [ Ptot= 24.97 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 ** CALIB STANDHYD       0205  1  5.0   10.19    0.78  1.92  13.08 0.52   0.000
    [I%=53.0:S%= 2.00]
*
    ADD [  0205+  0206]  0155  3  5.0   38.64    2.34  2.00  14.08  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0404  1  5.0   38.64    0.04  4.25  10.79  n/a   0.000
    OVERFLOW:            0404  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    ADD [  0404+  0048]  0031  3  5.0  113.28    0.10  7.08   8.17  n/a   0.000
*
    ADD [  0031+  0065]  0031  1  5.0  159.11    0.20  5.00   9.42  n/a   0.000
*
    PIPE   [ 2:  0031]   0066  1  5.0  159.11    0.20  5.00   9.42  n/a   0.000
*
    READ STORM                  6.0
    [ Ptot= 24.97 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 ** CALIB NASHYD         0217  1  5.0    8.74    0.01  3.33   0.63 0.03   0.000
    [CN=50.0          ]
    [ N = 3.0:Tp 0.95]
*
    ADD [  0217+  0066]  0149  3  5.0  167.85    0.21  5.00   8.96  n/a   0.000
*
    CHANNEL[ 2:  0149]   0051  1  5.0  167.85    0.19  5.67   8.96  n/a   0.000
*
    READ STORM                  6.0
    [ Ptot= 24.97 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
```

```
*
 ** CALIB NASHYD         0220  1  5.0    5.14    0.02  2.83   2.37 0.10   0.000
    [CN=71.4          ]
    [ N = 3.0:Tp 0.68]
*
    READ STORM                  6.0
    [ Ptot= 24.97 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 ** CALIB NASHYD         0218  1  5.0   10.21    0.01  4.17   0.63 0.03   0.000
    [CN=50.0          ]
    [ N = 3.0:Tp 1.54]
*
    READ STORM                  6.0
    [ Ptot= 24.97 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 *  CALIB STANDHYD       0224  1  5.0    2.58    0.13  1.92  10.41 0.42   0.000
    [I%=31.0:S%= 2.00]
*
    ADD [  0218+  0220]  0170  3  5.0   15.35    0.02  2.92   1.21  n/a   0.000
*
    ADD [  0170+  0224]  0170  1  5.0   17.93    0.13  1.92   2.54  n/a   0.000
*
    CHANNEL[ 2:  0170]   0061  1  5.0   17.93    0.03  3.00   2.45  n/a   0.000
*
    READ STORM                  6.0
    [ Ptot= 24.97 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 *  CALIB STANDHYD       0210  1  5.0    7.09    0.88  1.92  20.52 0.82   0.000
    [I%=83.0:S%= 2.00]
*
    READ STORM                  6.0
    [ Ptot= 24.97 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 *  CALIB STANDHYD       0211  1  5.0    8.86    0.56  1.92  12.87 0.52   0.000
    [I%=43.0:S%= 2.00]
*
    ADD [  0210+  0211]  0148  3  5.0   15.95    1.44  1.92  16.27  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0403  1  5.0   15.95    0.03  4.08  16.13  n/a   0.000
*
    READ STORM                  6.0
    [ Ptot= 24.97 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 *  CALIB NASHYD         0213  1  5.0    0.39    0.01  1.92   2.27 0.09   0.000
    [CN=69.0          ]
    [ N = 3.0:Tp 0.05]
*
    ADD [  0213+  0403]  0044  3  5.0   16.34    0.03  4.00  15.80  n/a   0.000
```

```
*
    ADD [  0044+  0061]  0044  1  5.0   34.27    0.06  3.08   8.82  n/a   0.000
*
    CHANNEL[ 2:  0044]   0060  1  5.0   34.27    0.05  4.83   8.81  n/a   0.000
*
    ADD [  0051+  0060]  0038  3  5.0  202.11    0.24  5.58   8.94  n/a   0.000
*
    CHANNEL[ 2:  0038]   0052  1  5.0  202.11    0.24  6.08   8.93  n/a   0.000
*
    READ STORM                 6.0
    [ Ptot= 24.97 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 *  CALIB NASHYD         0219  1  5.0    2.06    0.00  3.33   0.63 0.03   0.000
    [CN=50.0          ]
    [ N = 3.0:Tp 0.90]
*
    READ STORM                 6.0
    [ Ptot= 24.97 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 *  CALIB STANDHYD       0214  1  5.0    6.35    0.58  1.92  16.83 0.67   0.000
    [I%=60.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:             0401  1  5.0    6.35    0.02  4.00  16.68  n/a   0.000
    OVERFLOW:            0401  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    READ STORM                 6.0
    [ Ptot= 24.97 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 *  CALIB STANDHYD       0212  1  5.0    8.34    0.26  1.92   8.86 0.35   0.000
    [I%=20.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:             0402  1  5.0    8.34    0.01  4.42   8.61  n/a   0.000
    OVERFLOW:            0402  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    ADD [  0219+  0401]  0039  3  5.0    8.41    0.02  3.50  12.75  n/a   0.000
*
    ADD [  0039+  0402]  0039  1  5.0   16.75    0.03  3.83  10.68  n/a   0.000
*
    ADD [  0039+  0052]  0039  3  5.0  218.87    0.26  6.00   9.07  n/a   0.000
*
    READ STORM                 6.0
    [ Ptot= 24.97 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 *  CALIB NASHYD         0227  1  5.0    1.44    0.02  2.17   4.65 0.19   0.000
    [CN=80.7          ]
    [ N = 3.0:Tp 0.23]
*
    READ STORM                 6.0
    [ Ptot= 24.97 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
```

```
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 *  CALIB STANDHYD       0223  1  5.0    1.91    0.10  1.92  10.51 0.42   0.000
    [I%=30.0:S%= 2.00]
*
    READ STORM                 6.0
    [ Ptot= 24.97 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 *  CALIB STANDHYD       0222  1  5.0   14.26    1.18  1.92  16.02 0.64   0.000
    [I%=59.0:S%= 2.00]
*
    ADD [  0222+  0223]  0185  3  5.0   16.17    1.27  1.92  15.37  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0406  1  5.0   16.17    0.04  4.00  15.24  n/a   0.000
*
    ADD [  0227+  0406]  0186  3  5.0   17.61    0.05  2.25  14.38  n/a   0.000
*
    READ STORM                 6.0
    [ Ptot= 24.97 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 *  CALIB STANDHYD       0201  1  5.0    2.75    0.14  1.92  13.34 0.53   0.000
    [I%=28.0:S%= 2.00]
*
    READ STORM                 6.0
    [ Ptot= 24.97 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 *  CALIB STANDHYD       0202  1  5.0   11.74    0.78  1.92  16.13 0.65   0.000
    [I%=42.0:S%= 2.00]
*
    READ STORM                 6.0
    [ Ptot= 24.97 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 *  CALIB STANDHYD       0100  1  5.0    2.66    0.10  1.92  10.86 0.43   0.000
    [I%=20.0:S%= 2.00]
*
    READ STORM                 6.0
    [ Ptot= 24.97 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 *  CALIB STANDHYD       0221  1  5.0    2.42    0.29  1.92  15.06 0.60   0.000
    [I%=77.0:S%= 2.00]
*
    ADD [  0100+  0201]  0173  3  5.0    5.41    0.24  1.92  12.12  n/a   0.000
*
    ADD [  0173+  0202]  0173  1  5.0   17.15    1.02  1.92  14.86  n/a   0.000
*
    ADD [  0173+  0221]  0173  3  5.0   19.57    1.31  1.92  14.89  n/a   0.000
*
```

```
 ** Reservoir
    OUTFLOW:            0400  1  5.0   19.57    0.02  4.33  14.71  n/a   0.000
*
    READ STORM                  6.0
    [ Ptot= 24.97 mm ]
    fname               :                  C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 *  CALIB STANDHYD      0225  1  5.0   14.21    0.35  1.92   7.45 0.30   0.000
    [I%=17.0:S%= 2.00]
*
    ADD [  0186+  0225] 0178  3  5.0   31.82    0.37  1.92  11.28  n/a   0.000
*
    ADD [  0178+  0400] 0178  1  5.0   51.39    0.38  1.92  12.59  n/a   0.000
*
==================================================================================
==========================


       V    V   I    SSSSS  U   U    A    L              (v 6.2.2008)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                   *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output       filename:    C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\20eda445-3b93-4222-b9a7-0ccc21fd5abc\s
  Summary    filename:    C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\20eda445-3b93-4222-b9a7-0ccc21fd5abc\s


DATE: 08-28-2023                           TIME: 10:52:27

USER:


COMMENTS: ____________________________________________________________


  ************************************************
  ** SIMULATION : 25mm - 4hr Chicago           **
  ************************************************

  W/E COMMAND            HYD ID   DT     AREA  ' Qpeak Tpeak    R.V. R.C.    Qbase
                                  min     ha   '  cms   hrs     mm            cms

      START @  0.00 hrs
      --------------------
    READ STORM                  6.0
    [ Ptot= 24.97 mm ]
```

```
    fname               :                  C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 ** CALIB NASHYD        0101  1  5.0   29.62    0.26  2.58   4.94 0.20   0.000
    [CN=81.9          ]
    [ N = 3.0:Tp 0.57]
*
    PIPE   [ 2:  0101]  0140  1  5.0   29.62    0.25  2.75   4.94  n/a   0.000
*
    READ STORM                  6.0
    [ Ptot= 24.97 mm ]
    fname               :                  C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 ** CALIB NASHYD        0208  1  5.0    1.80    0.00  2.67   1.36 0.05   0.000
    [CN=62.3          ]
    [ N = 3.0:Tp 0.53]
*
    READ STORM                  6.0
    [ Ptot= 24.97 mm ]
    fname               :                  C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 ** CALIB STANDHYD      0203  1  5.0    8.59    0.46  1.92  11.69 0.47   0.000
    [I%=36.0:S%= 2.00]
*
    READ STORM                  6.0
    [ Ptot= 24.97 mm ]
    fname               :                  C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 ** CALIB STANDHYD      0204  1  5.0   11.24    0.60  1.92  11.83 0.47   0.000
    [I%=37.0:S%= 2.00]
*
    READ STORM                  6.0
    [ Ptot= 24.97 mm ]
    fname               :                  C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 ** CALIB STANDHYD      0226  1  5.0    8.53    0.51  1.92  12.51 0.50   0.000
    [I%=40.0:S%= 2.00]
*
    ADD [  0140+  0203]  0063  3  5.0   38.21    0.46  1.92   6.45  n/a   0.000
*
    ADD [  0063+  0204]  0063  1  5.0   49.45    1.07  1.92   7.68  n/a   0.000
*
    ADD [  0063+  0208]  0063  3  5.0   51.25    1.07  1.92   7.45  n/a   0.000
*
    ADD [  0063+  0226]  0063  1  5.0   59.78    1.58  1.92   8.18  n/a   0.000
*
 ** Reservoir
    OUTFLOW:            0405  1  5.0   59.78    0.06  4.58   8.14  n/a   0.000
*
    READ STORM                  6.0
    [ Ptot= 24.97 mm ]
    fname               :                  C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
```

```
 ** CALIB NASHYD        0216  1  5.0   11.42    0.01  3.50   0.63 0.03   0.000
    [CN=50.0         ]
    [ N = 3.0:Tp 1.03]
*
    READ STORM                 6.0
    [ Ptot= 24.97 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 ** CALIB NASHYD        0215  1  5.0    2.06    0.02  2.25   4.46 0.18   0.000
    [CN=77.8         ]
    [ N = 3.0:Tp 0.33]
*
    READ STORM                 6.0
    [ Ptot= 24.97 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 ** CALIB NASHYD        0207  1  5.0    1.37    0.01  2.17   3.65 0.15   0.000
    [CN=74.0         ]
    [ N = 3.0:Tp 0.27]
*
    ADD [  0207+  0215]  0145  3  5.0    3.43    0.04  2.25   4.13  n/a   0.000
*
    ADD [  0145+  0216]  0145  1  5.0   14.85    0.04  2.25   1.44  n/a   0.000
*
    ADD [  0145+  0405]  0145  3  5.0   74.64    0.08  2.33   6.81  n/a   0.000
*
 ** Reservoir
    OUTFLOW:            0062  1  5.0   74.64    0.06  7.17   6.81  n/a   0.000
*
    CHANNEL[ 2:  0062]   0048  1  5.0   74.64    0.06  7.83   6.81  n/a   0.000
*
    READ STORM                 6.0
    [ Ptot= 24.97 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 *  CALIB STANDHYD      0108  1  5.0    3.97    0.41  1.92  17.19 0.69   0.000
    [I%=67.0:S%= 2.00]
*
    READ STORM                 6.0
    [ Ptot= 24.97 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 *  CALIB STANDHYD      0107  1  5.0    4.81    0.64  1.92  21.13 0.85   0.000
    [I%=86.0:S%= 2.00]
*
    READ STORM                 6.0
    [ Ptot= 24.97 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 *  CALIB STANDHYD      0106  1  5.0   26.74    0.80  2.08  10.34 0.41   0.000
    [I%=15.0:S%= 2.00]
*
    READ STORM                 6.0
    [ Ptot= 24.97 mm ]
```

```
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 *  CALIB STANDHYD      0209  1  5.0   10.31    0.61  1.92  13.02 0.52   0.000
    [I%=39.0:S%= 2.00]
*
    ADD [  0106+  0209]  0146  3  5.0   37.05    1.25  2.00  11.08  n/a   0.000
*
    CHANNEL[ 2:  0146]   0049  1  5.0   37.05    0.45  2.33  10.90  n/a   0.000
*
    ADD [  0107+  0108]  0036  3  5.0    8.78    1.05  1.92  19.34  n/a   0.000
*
    ADD [  0036+  0049]  0036  1  5.0   45.83    1.20  1.92  12.52  n/a   0.000
*
 ** Reservoir
    OUTFLOW:            0065  1  5.0   45.83    0.11  4.92  12.52  n/a   0.000
*
    READ STORM                 6.0
    [ Ptot= 24.97 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 ** CALIB STANDHYD      0206  1  5.0   28.45    1.77  2.00  14.44 0.58   0.000
    [I%=53.0:S%= 2.00]
*
    READ STORM                 6.0
    [ Ptot= 24.97 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 ** CALIB STANDHYD      0205  1  5.0   10.19    0.78  1.92  13.08 0.52   0.000
    [I%=53.0:S%= 2.00]
*
    ADD [  0205+  0206]  0155  3  5.0   38.64    2.34  2.00  14.08  n/a   0.000
*
 ** Reservoir
    OUTFLOW:            0404  1  5.0   38.64    0.04  4.25  10.79  n/a   0.000
*
    ADD [  0404+  0048]  0031  3  5.0  113.28    0.10  7.08   8.17  n/a   0.000
*
    ADD [  0031+  0065]  0031  1  5.0  159.11    0.20  5.00   9.42  n/a   0.000
*
    PIPE   [ 2:  0031]   0066  1  5.0  159.11    0.20  5.00   9.42  n/a   0.000
*
    READ STORM                 6.0
    [ Ptot= 24.97 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 ** CALIB NASHYD        0217  1  5.0    8.74    0.01  3.33   0.63 0.03   0.000
    [CN=50.0         ]
    [ N = 3.0:Tp 0.95]
*
    ADD [  0217+  0066]  0149  3  5.0  167.85    0.21  5.00   8.96  n/a   0.000
*
    CHANNEL[ 2:  0149]   0051  1  5.0  167.85    0.19  5.67   8.96  n/a   0.000
*
    READ STORM                 6.0
    [ Ptot= 24.97 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
```

```
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 ** CALIB NASHYD         0220  1  5.0    5.14    0.02  2.83   2.37 0.10   0.000
    [CN=71.4          ]
    [ N = 3.0:Tp 0.68]
*
    READ STORM                 6.0
    [ Ptot= 24.97 mm ]
    fname               :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 ** CALIB NASHYD         0218  1  5.0   10.21    0.01  4.17   0.63 0.03   0.000
    [CN=50.0          ]
    [ N = 3.0:Tp 1.54]
*
    READ STORM                 6.0
    [ Ptot= 24.97 mm ]
    fname               :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 *  CALIB STANDHYD       0224  1  5.0    2.58    0.13  1.92  10.41 0.42   0.000
    [I%=31.0:S%= 2.00]
*
    ADD [  0218+  0220]  0170  3  5.0   15.35    0.02  2.92   1.21  n/a   0.000
*
    ADD [  0170+  0224]  0170  1  5.0   17.93    0.13  1.92   2.54  n/a   0.000
*
    CHANNEL[ 2:  0170]   0061  1  5.0   17.93    0.03  3.00   2.45  n/a   0.000
*
    READ STORM                 6.0
    [ Ptot= 24.97 mm ]
    fname               :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 *  CALIB STANDHYD       0210  1  5.0    7.09    0.88  1.92  20.52 0.82   0.000
    [I%=83.0:S%= 2.00]
*
    READ STORM                 6.0
    [ Ptot= 24.97 mm ]
    fname               :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 *  CALIB STANDHYD       0211  1  5.0    8.86    0.56  1.92  12.87 0.52   0.000
    [I%=43.0:S%= 2.00]
*
    ADD [  0210+  0211]  0148  3  5.0   15.95    1.44  1.92  16.27  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0403  1  5.0   15.95    0.03  4.08  16.13  n/a   0.000
*
    READ STORM                 6.0
    [ Ptot= 24.97 mm ]
    fname               :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 *  CALIB NASHYD         0213  1  5.0    0.39    0.01  1.92   2.27 0.09   0.000
    [CN=69.0          ]
    [ N = 3.0:Tp 0.05]
```

```
*
    ADD [  0213+  0403]  0044  3  5.0   16.34    0.03  4.00  15.80  n/a   0.000
*
    ADD [  0044+  0061]  0044  1  5.0   34.27    0.06  3.08   8.82  n/a   0.000
*
    CHANNEL[ 2:  0044]   0060  1  5.0   34.27    0.05  4.83   8.81  n/a   0.000
*
    ADD [  0051+  0060]  0038  3  5.0  202.11    0.24  5.58   8.94  n/a   0.000
*
    CHANNEL[ 2:  0038]   0052  1  5.0  202.11    0.24  6.08   8.93  n/a   0.000
*
    READ STORM                 6.0
    [ Ptot= 24.97 mm ]
    fname               :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 *  CALIB NASHYD         0219  1  5.0    2.06    0.00  3.33   0.63 0.03   0.000
    [CN=50.0          ]
    [ N = 3.0:Tp 0.90]
*
    READ STORM                 6.0
    [ Ptot= 24.97 mm ]
    fname               :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 *  CALIB STANDHYD       0214  1  5.0    6.35    0.58  1.92  16.83 0.67   0.000
    [I%=60.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:             0401  1  5.0    6.35    0.02  4.00  16.68  n/a   0.000
    OVERFLOW:            0401  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    READ STORM                 6.0
    [ Ptot= 24.97 mm ]
    fname               :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 *  CALIB STANDHYD       0212  1  5.0    8.34    0.26  1.92   8.86 0.35   0.000
    [I%=20.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:             0402  1  5.0    8.34    0.01  4.42   8.61  n/a   0.000
    OVERFLOW:            0402  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    ADD [  0219+  0401]  0039  3  5.0    8.41    0.02  3.50  12.75  n/a   0.000
*
    ADD [  0039+  0402]  0039  1  5.0   16.75    0.03  3.83  10.68  n/a   0.000
*
    ADD [  0039+  0052]  0039  3  5.0  218.87    0.26  6.00   9.07  n/a   0.000
*
    READ STORM                 6.0
    [ Ptot= 24.97 mm ]
    fname               :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 *  CALIB NASHYD         0227  1  5.0    1.44    0.02  2.17   4.65 0.19   0.000
    [CN=80.7          ]
    [ N = 3.0:Tp 0.23]
*
    READ STORM                 6.0
```

```
    [ Ptot= 24.97 mm ]
    fname                 :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 *  CALIB STANDHYD       0223  1  5.0    1.91    0.10  1.92  10.51 0.42   0.000
    [I%=30.0:S%= 2.00]
*
    READ STORM                 6.0
    [ Ptot= 24.97 mm ]
    fname                 :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 *  CALIB STANDHYD       0222  1  5.0   14.26    1.18  1.92  16.02 0.64   0.000
    [I%=59.0:S%= 2.00]
*
    ADD [  0222+  0223]  0185  3  5.0   16.17    1.27  1.92  15.37  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0406  1  5.0   16.17    0.04  4.00  15.24  n/a   0.000
*
    ADD [  0227+  0406]  0186  3  5.0   17.61    0.05  2.25  14.38  n/a   0.000
*
    READ STORM                 6.0
    [ Ptot= 24.97 mm ]
    fname                 :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 *  CALIB STANDHYD       0201  1  5.0    2.75    0.14  1.92  13.34 0.53   0.000
    [I%=28.0:S%= 2.00]
*
    READ STORM                 6.0
    [ Ptot= 24.97 mm ]
    fname                 :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 *  CALIB STANDHYD       0202  1  5.0   11.74    0.78  1.92  16.13 0.65   0.000
    [I%=42.0:S%= 2.00]
*
    READ STORM                 6.0
    [ Ptot= 24.97 mm ]
    fname                 :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 *  CALIB STANDHYD       0100  1  5.0    2.66    0.10  1.92  10.86 0.43   0.000
    [I%=20.0:S%= 2.00]
*
    READ STORM                 6.0
    [ Ptot= 24.97 mm ]
    fname                 :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 *  CALIB STANDHYD       0221  1  5.0    2.42    0.29  1.92  15.06 0.60   0.000
    [I%=77.0:S%= 2.00]
*
    ADD [  0100+  0201]  0173  3  5.0    5.41    0.24  1.92  12.12  n/a   0.000
*
    ADD [  0173+  0202]  0173  1  5.0   17.15    1.02  1.92  14.86  n/a   0.000
*
```

```
    ADD [  0173+  0221]  0173  3  5.0   19.57    1.31  1.92  14.89  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0400  1  5.0   19.57    0.02  4.33  14.71  n/a   0.000
*
    READ STORM                 6.0
    [ Ptot= 24.97 mm ]
    fname                 :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\1dea6f85-3fdf-4ab9-b722-
    remark: 25mm - 4hr Chicago
*
 *  CALIB STANDHYD       0225  1  5.0   14.21    0.35  1.92   7.45 0.30   0.000
    [I%=17.0:S%= 2.00]
*
    ADD [  0186+  0225]  0178  3  5.0   31.82    0.37  1.92  11.28  n/a   0.000
*
    ADD [  0178+  0400]  0178  1  5.0   51.39    0.38  1.92  12.59  n/a   0.000
*
 FINISH

=================================================================================
==========================

=================================================================================
==========================


       V    V   I    SSSSS  U   U    A    L              (v 6.2.2008)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                   *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output       filename:   C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\6ed99de0-b8c4-456c-9e61-1c25f54ba307\s
  Summary     filename:    C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\6ed99de0-b8c4-456c-9e61-1c25f54ba307\s


DATE: 08-28-2023                           TIME: 10:52:24

USER:


COMMENTS: ____________________________________________________________


  ************************************************
  ** SIMULATION : 25yr 12hr 15min SCS           **
  ************************************************
```

```
  W/E COMMAND              HYD  ID   DT     AREA  ' Qpeak Tpeak   R.V.  R.C.     Qbase
                                     min     ha   '  cms   hrs     mm             cms

      START @  0.00 hrs
      --------------------
    READ STORM                   15.0
    [ Ptot= 88.31 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\543fa7a0-7d43-4c5b-b8e6-
    remark: 25yr 12hr 15min SCS
*
 ** CALIB NASHYD         0101  1  5.0   29.62    2.14  6.75  49.21 0.56   0.000
    [CN=81.9         ]
    [ N = 3.0:Tp 0.57]
*
    PIPE   [ 2:  0101]   0140  1  5.0   29.62    2.10  6.83  49.21  n/a   0.000
*
    READ STORM                   15.0
    [ Ptot= 88.31 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\543fa7a0-7d43-4c5b-b8e6-
    remark: 25yr 12hr 15min SCS
*
 *  CALIB NASHYD         0208  1  5.0    1.80    0.07  6.75  26.54 0.30   0.000
    [CN=62.3         ]
    [ N = 3.0:Tp 0.53]
*
    READ STORM                   15.0
    [ Ptot= 88.31 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\543fa7a0-7d43-4c5b-b8e6-
    remark: 25yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0203  1  5.0    8.59    1.64  6.25  60.71 0.69   0.000
    [I%=36.0:S%= 2.00]
*
    READ STORM                   15.0
    [ Ptot= 88.31 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\543fa7a0-7d43-4c5b-b8e6-
    remark: 25yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0204  1  5.0   11.24    2.14  6.25  60.88 0.69   0.000
    [I%=37.0:S%= 2.00]
*
    READ STORM                   15.0
    [ Ptot= 88.31 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\543fa7a0-7d43-4c5b-b8e6-
    remark: 25yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0226  1  5.0    8.53    1.71  6.25  62.62 0.71   0.000
    [I%=40.0:S%= 2.00]
*
    ADD [  0140+  0203]  0063  3  5.0   38.21    2.48  6.75  51.79  n/a   0.000
*
    ADD [  0063+  0204]  0063  1  5.0   49.45    4.47  6.25  53.86  n/a   0.000
*
    ADD [  0063+  0208]  0063  3  5.0   51.25    4.50  6.25  52.90  n/a   0.000
*
    ADD [  0063+  0226]  0063  1  5.0   59.78    6.21  6.25  54.29  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0405  1  5.0   59.78    3.58  6.67  54.25  n/a   0.000
```

```
*
    READ STORM                   15.0
    [ Ptot= 88.31 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\543fa7a0-7d43-4c5b-b8e6-
    remark: 25yr 12hr 15min SCS
*
 *  CALIB NASHYD         0216  1  5.0   11.42    0.18  7.33  17.63 0.20   0.000
    [CN=50.0         ]
    [ N = 3.0:Tp 1.03]
*
    READ STORM                   15.0
    [ Ptot= 88.31 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\543fa7a0-7d43-4c5b-b8e6-
    remark: 25yr 12hr 15min SCS
*
 *  CALIB NASHYD         0215  1  5.0    2.06    0.20  6.42  44.83 0.51   0.000
    [CN=77.8         ]
    [ N = 3.0:Tp 0.33]
*
    READ STORM                   15.0
    [ Ptot= 88.31 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\543fa7a0-7d43-4c5b-b8e6-
    remark: 25yr 12hr 15min SCS
*
 *  CALIB NASHYD         0207  1  5.0    1.37    0.13  6.42  40.20 0.46   0.000
    [CN=74.0         ]
    [ N = 3.0:Tp 0.27]
*
    ADD [  0207+  0215]  0145  3  5.0    3.43    0.33  6.42  42.98  n/a   0.000
*
    ADD [  0145+  0216]  0145  1  5.0   14.85    0.40  6.50  23.48  n/a   0.000
*
    ADD [  0145+  0405]  0145  3  5.0   74.64    3.94  6.67  48.13  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0062  1  5.0   74.64    2.20  7.50  48.13  n/a   0.000
*
    CHANNEL[ 2:  0062]   0048  1  5.0   74.64    2.13  7.75  48.13  n/a   0.000
*
    READ STORM                   15.0
    [ Ptot= 88.31 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\543fa7a0-7d43-4c5b-b8e6-
    remark: 25yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0108  1  5.0    3.97    0.99  6.25  71.46 0.81   0.000
    [I%=67.0:S%= 2.00]
*
    READ STORM                   15.0
    [ Ptot= 88.31 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\543fa7a0-7d43-4c5b-b8e6-
    remark: 25yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0107  1  5.0    4.81    1.43  6.25  80.72 0.91   0.000
    [I%=86.0:S%= 2.00]
*
    READ STORM                   15.0
    [ Ptot= 88.31 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\543fa7a0-7d43-4c5b-b8e6-
```

```
    remark: 25yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0106  1  5.0   26.74    4.76  6.25  62.25 0.70   0.000
    [I%=15.0:S%= 2.00]
*
    READ STORM                15.0
    [ Ptot= 88.31 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\543fa7a0-7d43-4c5b-b8e6-
    remark: 25yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0209  1  5.0   10.31    2.14  6.25  65.13 0.74   0.000
    [I%=39.0:S%= 2.00]
*
    ADD [  0106+  0209]  0146  3  5.0   37.05    6.90  6.25  63.05  n/a   0.000
*
    CHANNEL[ 2:  0146]   0049  1  5.0   37.05    2.15  6.67  62.87  n/a   0.000
*
    ADD [  0107+  0108]  0036  3  5.0    8.78    2.42  6.25  76.53  n/a   0.000
*
    ADD [  0036+  0049]  0036  1  5.0   45.83    3.71  6.25  65.49  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0065  1  5.0   45.83    1.99  7.00  65.48  n/a   0.000
*
    READ STORM                15.0
    [ Ptot= 88.31 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\543fa7a0-7d43-4c5b-b8e6-
    remark: 25yr 12hr 15min SCS
*
 ** CALIB STANDHYD       0206  1  5.0   28.45    5.92  6.25  65.32 0.74   0.000
    [I%=53.0:S%= 2.00]
*
    READ STORM                15.0
    [ Ptot= 88.31 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\543fa7a0-7d43-4c5b-b8e6-
    remark: 25yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0205  1  5.0   10.19    2.32  6.25  66.74 0.76   0.000
    [I%=53.0:S%= 2.00]
*
    ADD [  0205+  0206]  0155  3  5.0   38.64    8.24  6.25  65.70  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0404  1  5.0   38.64    1.26  6.83  62.25  n/a   0.000
*
    ADD [  0404+  0048]  0031  3  5.0  113.28    3.30  7.67  52.95  n/a   0.000
*
    ADD [  0031+  0065]  0031  1  5.0  159.11    5.00  7.42  56.56  n/a   0.000
*
    PIPE   [ 2:  0031]   0066  1  5.0  159.11    5.00  7.42  56.56  n/a   0.000
*
    READ STORM                15.0
    [ Ptot= 88.31 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\543fa7a0-7d43-4c5b-b8e6-
    remark: 25yr 12hr 15min SCS
*
 *  CALIB NASHYD         0217  1  5.0    8.74    0.14  7.25  17.63 0.20   0.000
    [CN=50.0          ]
    [ N = 3.0:Tp 0.95]
*
```

```
    ADD [  0217+  0066]  0149  3  5.0  167.85    5.14  7.42  54.53  n/a   0.000
*
    CHANNEL[ 2:  0149]   0051  1  5.0  167.85    4.94  7.83  54.53  n/a   0.000
*
    READ STORM                15.0
    [ Ptot= 88.31 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\543fa7a0-7d43-4c5b-b8e6-
    remark: 25yr 12hr 15min SCS
*
 *  CALIB NASHYD         0220  1  5.0    5.14    0.23  6.83  35.29 0.40   0.000
    [CN=71.4          ]
    [ N = 3.0:Tp 0.68]
*
    READ STORM                15.0
    [ Ptot= 88.31 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\543fa7a0-7d43-4c5b-b8e6-
    remark: 25yr 12hr 15min SCS
*
 *  CALIB NASHYD         0218  1  5.0   10.21    0.12  8.00  17.63 0.20   0.000
    [CN=50.0          ]
    [ N = 3.0:Tp 1.54]
*
    READ STORM                15.0
    [ Ptot= 88.31 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\543fa7a0-7d43-4c5b-b8e6-
    remark: 25yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0224  1  5.0    2.58    0.47  6.25  57.38 0.65   0.000
    [I%=31.0:S%= 2.00]
*
    ADD [  0218+  0220]  0170  3  5.0   15.35    0.30  7.00  23.54  n/a   0.000
*
    ADD [  0170+  0224]  0170  1  5.0   17.93    0.56  6.25  28.41  n/a   0.000
*
    CHANNEL[ 2:  0170]   0061  1  5.0   17.93    0.31  7.33  28.33  n/a   0.000
*
    READ STORM                15.0
    [ Ptot= 88.31 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\543fa7a0-7d43-4c5b-b8e6-
    remark: 25yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0210  1  5.0    7.09    2.06  6.25  79.30 0.90   0.000
    [I%=83.0:S%= 2.00]
*
    READ STORM                15.0
    [ Ptot= 88.31 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\543fa7a0-7d43-4c5b-b8e6-
    remark: 25yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0211  1  5.0    8.86    1.79  6.25  62.86 0.71   0.000
    [I%=43.0:S%= 2.00]
*
    ADD [  0210+  0211]  0148  3  5.0   15.95    3.85  6.25  70.17  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0403  1  5.0   15.95    0.74  6.67  70.03  n/a   0.000
*
    READ STORM                15.0
    [ Ptot= 88.31 mm ]
```

```
   fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\543fa7a0-7d43-4c5b-b8e6-
   remark: 25yr 12hr 15min SCS
*
 *  CALIB NASHYD         0213  1  5.0    0.39    0.05  6.25  26.82 0.30   0.000
   [CN=69.0          ]
   [ N = 3.0:Tp 0.05]
*
   ADD [  0213+  0403]  0044  3  5.0   16.34    0.75  6.67  69.00  n/a   0.000
*
   ADD [  0044+  0061]  0044  1  5.0   34.27    1.03  6.75  47.72  n/a   0.000
*
   CHANNEL[ 2:  0044]   0060  1  5.0   34.27    0.73  7.42  47.72  n/a   0.000
*
   ADD [  0051+  0060]  0038  3  5.0  202.11    5.66  7.75  53.37  n/a   0.000
*
   CHANNEL[ 2:  0038]   0052  1  5.0  202.11    5.64  7.83  53.37  n/a   0.000
*
   READ STORM                15.0
   [ Ptot= 88.31 mm ]
   fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\543fa7a0-7d43-4c5b-b8e6-
   remark: 25yr 12hr 15min SCS
*
 *  CALIB NASHYD         0219  1  5.0    2.06    0.04  7.17  17.63 0.20   0.000
   [CN=50.0          ]
   [ N = 3.0:Tp 0.90]
*
   READ STORM                15.0
   [ Ptot= 88.31 mm ]
   fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\543fa7a0-7d43-4c5b-b8e6-
   remark: 25yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0214  1  5.0    6.35    1.67  6.25  72.85 0.82   0.000
   [I%=60.0:S%= 2.00]
*
 ** Reservoir
   OUTFLOW:             0401  1  5.0    6.35    0.59  6.42  72.70  n/a   0.000
   OVERFLOW:            0401  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
   READ STORM                15.0
   [ Ptot= 88.31 mm ]
   fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\543fa7a0-7d43-4c5b-b8e6-
   remark: 25yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0212  1  5.0    8.34    1.36  6.25  55.13 0.62   0.000
   [I%=20.0:S%= 2.00]
*
 ** Reservoir
   OUTFLOW:             0402  1  5.0    8.34    0.37  6.75  54.88  n/a   0.000
   OVERFLOW:            0402  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
   ADD [  0219+  0401]  0039  3  5.0    8.41    0.61  6.42  59.21  n/a   0.000
*
   ADD [  0039+  0402]  0039  1  5.0   16.75    0.85  6.42  57.05  n/a   0.000
*
   ADD [  0039+  0052]  0039  3  5.0  218.87    6.01  7.75  53.65  n/a   0.000
*
   READ STORM                15.0
   [ Ptot= 88.31 mm ]
   fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\543fa7a0-7d43-4c5b-b8e6-
```

```
   remark: 25yr 12hr 15min SCS
*
 *  CALIB NASHYD         0227  1  5.0    1.44    0.19  6.33  47.58 0.54   0.000
   [CN=80.7          ]
   [ N = 3.0:Tp 0.23]
*
   READ STORM                15.0
   [ Ptot= 88.31 mm ]
   fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\543fa7a0-7d43-4c5b-b8e6-
   remark: 25yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0223  1  5.0    1.91    0.35  6.25  58.23 0.66   0.000
   [I%=30.0:S%= 2.00]
*
   READ STORM                15.0
   [ Ptot= 88.31 mm ]
   fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\543fa7a0-7d43-4c5b-b8e6-
   remark: 25yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0222  1  5.0   14.26    3.31  6.25  69.87 0.79   0.000
   [I%=59.0:S%= 2.00]
*
   ADD [  0222+  0223]  0185  3  5.0   16.17    3.66  6.25  68.50  n/a   0.000
*
 ** Reservoir
   OUTFLOW:             0406  1  5.0   16.17    0.48  6.92  68.37  n/a   0.000
*
   ADD [  0227+  0406]  0186  3  5.0   17.61    0.54  6.83  66.67  n/a   0.000
*
   READ STORM                15.0
   [ Ptot= 88.31 mm ]
   fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\543fa7a0-7d43-4c5b-b8e6-
   remark: 25yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0201  1  5.0    2.75    0.65  6.25  68.31 0.77   0.000
   [I%=28.0:S%= 2.00]
*
   READ STORM                15.0
   [ Ptot= 88.31 mm ]
   fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\543fa7a0-7d43-4c5b-b8e6-
   remark: 25yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0202  1  5.0   11.74    2.76  6.25  74.05 0.84   0.000
   [I%=42.0:S%= 2.00]
*
   READ STORM                15.0
   [ Ptot= 88.31 mm ]
   fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\543fa7a0-7d43-4c5b-b8e6-
   remark: 25yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0100  1  5.0    2.66    0.52  6.25  64.12 0.73   0.000
   [I%=20.0:S%= 2.00]
*
   READ STORM                15.0
   [ Ptot= 88.31 mm ]
   fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\543fa7a0-7d43-4c5b-b8e6-
   remark: 25yr 12hr 15min SCS
*
```

```
 *  CALIB STANDHYD       0221  1  5.0    2.42    0.69  6.25  72.80 0.82   0.000
    [I%=77.0:S%= 2.00]
*
    ADD [  0100+  0201]  0173  3  5.0    5.41    1.17  6.25  66.25  n/a   0.000
*
    ADD [  0173+  0202]  0173  1  5.0   17.15    3.93  6.25  71.59  n/a   0.000
*
    ADD [  0173+  0221]  0173  3  5.0   19.57    4.62  6.25  71.74  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0400  1  5.0   19.57    0.63  6.92  71.38  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 88.31 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\543fa7a0-7d43-4c5b-b8e6-
    remark: 25yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0225  1  5.0   14.21    1.99  6.25  50.01 0.57   0.000
    [I%=17.0:S%= 2.00]
*
    ADD [  0186+  0225]  0178  3  5.0   31.82    2.22  6.25  59.23  n/a   0.000
*
    ADD [  0178+  0400]  0178  1  5.0   51.39    2.60  6.25  63.86  n/a   0.000
*
=================================================================================
==========================


       V    V   I    SSSSS  U   U    A    L              (v 6.2.2008)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M  OOO     TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                   *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output       filename:    C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\5498efea-105a-433c-b0c6-af02c822049a\s
  Summary     filename:     C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\5498efea-105a-433c-b0c6-af02c822049a\s


DATE: 08-28-2023                           TIME: 10:52:24

USER:


COMMENTS: ____________________________________________________________


  ************************************************
  ** SIMULATION : 25yr 24hr 15min SCS           **
```

```
   ************************************************

   W/E COMMAND              HYD ID   DT     AREA  '  Qpeak Tpeak   R.V. R.C.    Qbase
                                     min     ha   '   cms   hrs     mm           cms

       START @  0.00 hrs
       --------------------
     READ STORM                 15.0
     [ Ptot=108.80 mm ]
     fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\c72c521b-8651-4359-9607-
     remark: 25yr 24hr 15min SCS
*
 ** CALIB NASHYD          0101  1  5.0   29.62    2.48 12.67  66.78 0.61   0.000
     [CN=81.9         ]
     [ N = 3.0:Tp 0.57]
*
     PIPE   [ 2:  0101]   0140  1  5.0   29.62    2.43 12.83  66.78  n/a   0.000
*
     READ STORM                 15.0
     [ Ptot=108.80 mm ]
     fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\c72c521b-8651-4359-9607-
     remark: 25yr 24hr 15min SCS
*
 *  CALIB NASHYD          0208  1  5.0    1.80    0.09 12.67  38.78 0.36   0.000
     [CN=62.3         ]
     [ N = 3.0:Tp 0.53]
*
     READ STORM                 15.0
     [ Ptot=108.80 mm ]
     fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\c72c521b-8651-4359-9607-
     remark: 25yr 24hr 15min SCS
*
 *  CALIB STANDHYD        0203  1  5.0    8.59    1.93 12.25  78.77 0.72   0.000
     [I%=36.0:S%= 2.00]
*
     READ STORM                 15.0
     [ Ptot=108.80 mm ]
     fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\c72c521b-8651-4359-9607-
     remark: 25yr 24hr 15min SCS
*
 *  CALIB STANDHYD        0204  1  5.0   11.24    2.52 12.25  78.94 0.73   0.000
     [I%=37.0:S%= 2.00]
*
     READ STORM                 15.0
     [ Ptot=108.80 mm ]
     fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\c72c521b-8651-4359-9607-
     remark: 25yr 24hr 15min SCS
*
 *  CALIB STANDHYD        0226  1  5.0    8.53    2.00 12.25  80.88 0.74   0.000
     [I%=40.0:S%= 2.00]
*
     ADD [  0140+  0203]  0063  3  5.0   38.21    2.83 12.75  69.47  n/a   0.000
*
     ADD [  0063+  0204]  0063  1  5.0   49.45    5.26 12.25  71.63  n/a   0.000
*
     ADD [  0063+  0208]  0063  3  5.0   51.25    5.30 12.25  70.47  n/a   0.000
*
     ADD [  0063+  0226]  0063  1  5.0   59.78    7.31 12.25  71.96  n/a   0.000
*
```

```
 ** Reservoir
    OUTFLOW:             0405  1  5.0   59.78    4.80 12.42  71.93  n/a   0.000
    OVERFLOW:            0405  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=108.80 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\c72c521b-8651-4359-9607-
    remark: 25yr 24hr 15min SCS
*
 *  CALIB NASHYD         0216  1  5.0   11.42    0.23 13.33  26.71 0.25   0.000
    [CN=50.0         ]
    [ N = 3.0:Tp 1.03]
*
    READ STORM                 15.0
    [ Ptot=108.80 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\c72c521b-8651-4359-9607-
    remark: 25yr 24hr 15min SCS
*
 *  CALIB NASHYD         0215  1  5.0    2.06    0.23 12.42  61.41 0.56   0.000
    [CN=77.8         ]
    [ N = 3.0:Tp 0.33]
*
    READ STORM                 15.0
    [ Ptot=108.80 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\c72c521b-8651-4359-9607-
    remark: 25yr 24hr 15min SCS
*
 *  CALIB NASHYD         0207  1  5.0    1.37    0.16 12.42  55.78 0.51   0.000
    [CN=74.0         ]
    [ N = 3.0:Tp 0.27]
*
    ADD [  0207+  0215]  0145  3  5.0    3.43    0.39 12.42  59.16  n/a   0.000
*
    ADD [  0145+  0216]  0145  1  5.0   14.85    0.49 12.50  34.21  n/a   0.000
*
    ADD [  0145+  0405]  0145  3  5.0   74.64    5.29 12.42  64.42  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0062  1  5.0   74.64    2.81 13.33  64.42  n/a   0.000
*
    CHANNEL[ 2:  0062]   0048  1  5.0   74.64    2.73 13.58  64.42  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=108.80 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\c72c521b-8651-4359-9607-
    remark: 25yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0108  1  5.0    3.97    1.20 12.25  90.27 0.83   0.000
    [I%=67.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot=108.80 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\c72c521b-8651-4359-9607-
    remark: 25yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0107  1  5.0    4.81    1.65 12.25 100.52 0.92   0.000
    [I%=86.0:S%= 2.00]
*
    READ STORM                 15.0
```

```
    [ Ptot=108.80 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\c72c521b-8651-4359-9607-
    remark: 25yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0106  1  5.0   26.74    5.57 12.25  81.13 0.75   0.000
    [I%=15.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot=108.80 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\c72c521b-8651-4359-9607-
    remark: 25yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0209  1  5.0   10.31    2.71 12.25  83.86 0.77   0.000
    [I%=39.0:S%= 2.00]
*
    ADD [  0106+  0209]  0146  3  5.0   37.05    8.28 12.25  81.89  n/a   0.000
*
    CHANNEL[ 2:  0146]   0049  1  5.0   37.05    2.44 12.67  81.71  n/a   0.000
*
    ADD [  0107+  0108]  0036  3  5.0    8.78    2.85 12.25  95.89  n/a   0.000
*
    ADD [  0036+  0049]  0036  1  5.0   45.83    4.32 12.25  84.43  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0065  1  5.0   45.83    2.25 13.08  84.42  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=108.80 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\c72c521b-8651-4359-9607-
    remark: 25yr 24hr 15min SCS
*
 ** CALIB STANDHYD       0206  1  5.0   28.45    6.90 12.25  83.54 0.77   0.000
    [I%=53.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot=108.80 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\c72c521b-8651-4359-9607-
    remark: 25yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0205  1  5.0   10.19    2.70 12.25  85.65 0.79   0.000
    [I%=53.0:S%= 2.00]
*
    ADD [  0205+  0206]  0155  3  5.0   38.64    9.60 12.25  84.10  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0404  1  5.0   38.64    1.40 12.83  80.56  n/a   0.000
*
    ADD [  0404+  0048]  0031  3  5.0  113.28    4.06 13.50  69.92  n/a   0.000
*
    ADD [  0031+  0065]  0031  1  5.0  159.11    6.09 13.33  74.10  n/a   0.000
*
    PIPE   [ 2:  0031]   0066  1  5.0  159.11    6.09 13.33  74.10  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=108.80 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\c72c521b-8651-4359-9607-
    remark: 25yr 24hr 15min SCS
*
 *  CALIB NASHYD         0217  1  5.0    8.74    0.19 13.17  26.71 0.25   0.000
```

```
    [CN=50.0         ]
    [ N = 3.0:Tp 0.95]
*
    ADD [  0217+  0066]  0149  3  5.0  167.85    6.28 13.33  71.63  n/a   0.000
*
    CHANNEL[ 2:  0149]   0051  1  5.0  167.85    6.00 13.67  71.63  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=108.80 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\c72c521b-8651-4359-9607-
    remark: 25yr 24hr 15min SCS
*
 *  CALIB NASHYD        0220  1  5.0    5.14    0.28 12.83  50.02 0.46   0.000
    [CN=71.4         ]
    [ N = 3.0:Tp 0.68]
*
    READ STORM                 15.0
    [ Ptot=108.80 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\c72c521b-8651-4359-9607-
    remark: 25yr 24hr 15min SCS
*
 *  CALIB NASHYD        0218  1  5.0   10.21    0.15 13.92  26.71 0.25   0.000
    [CN=50.0         ]
    [ N = 3.0:Tp 1.54]
*
    READ STORM                 15.0
    [ Ptot=108.80 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\c72c521b-8651-4359-9607-
    remark: 25yr 24hr 15min SCS
*
 *  CALIB STANDHYD      0224  1  5.0    2.58    0.61 12.25  75.04 0.69   0.000
    [I%=31.0:S%= 2.00]
*
    ADD [  0218+  0220]  0170  3  5.0   15.35    0.38 13.00  34.51  n/a   0.000
*
    ADD [  0170+  0224]  0170  1  5.0   17.93    0.74 12.25  40.35  n/a   0.000
*
    CHANNEL[ 2:  0170]   0061  1  5.0   17.93    0.38 13.25  40.26  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=108.80 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\c72c521b-8651-4359-9607-
    remark: 25yr 24hr 15min SCS
*
 *  CALIB STANDHYD      0210  1  5.0    7.09    2.37 12.25  98.96 0.91   0.000
    [I%=83.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot=108.80 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\c72c521b-8651-4359-9607-
    remark: 25yr 24hr 15min SCS
*
 *  CALIB STANDHYD      0211  1  5.0    8.86    2.10 12.25  81.04 0.74   0.000
    [I%=43.0:S%= 2.00]
*
    ADD [  0210+  0211]  0148  3  5.0   15.95    4.47 12.25  89.01  n/a   0.000
*
 ** Reservoir
    OUTFLOW:            0403  1  5.0   15.95    1.06 12.50  88.87  n/a   0.000
```

```
*
    READ STORM                 15.0
    [ Ptot=108.80 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\c72c521b-8651-4359-9607-
    remark: 25yr 24hr 15min SCS
*
 *  CALIB NASHYD        0213  1  5.0    0.39    0.06 12.25  37.72 0.35   0.000
    [CN=69.0         ]
    [ N = 3.0:Tp 0.05]
*
    ADD [  0213+  0403]  0044  3  5.0   16.34    1.06 12.50  87.65  n/a   0.000
*
    ADD [  0044+  0061]  0044  1  5.0   34.27    1.37 12.58  62.86  n/a   0.000
*
    CHANNEL[ 2:  0044]   0060  1  5.0   34.27    0.95 13.17  62.85  n/a   0.000
*
    ADD [  0051+  0060]  0038  3  5.0  202.11    6.90 13.58  70.14  n/a   0.000
*
    CHANNEL[ 2:  0038]   0052  1  5.0  202.11    6.87 13.75  70.14  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=108.80 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\c72c521b-8651-4359-9607-
    remark: 25yr 24hr 15min SCS
*
 *  CALIB NASHYD        0219  1  5.0    2.06    0.05 13.17  26.71 0.25   0.000
    [CN=50.0         ]
    [ N = 3.0:Tp 0.90]
*
    READ STORM                 15.0
    [ Ptot=108.80 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\c72c521b-8651-4359-9607-
    remark: 25yr 24hr 15min SCS
*
 *  CALIB STANDHYD      0214  1  5.0    6.35    1.95 12.25  92.19 0.85   0.000
    [I%=60.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:            0401  1  5.0    6.35    1.00 12.33  92.04  n/a   0.000
    OVERFLOW:           0401  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=108.80 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\c72c521b-8651-4359-9607-
    remark: 25yr 24hr 15min SCS
*
 *  CALIB STANDHYD      0212  1  5.0    8.34    1.62 12.25  72.79 0.67   0.000
    [I%=20.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:            0402  1  5.0    8.34    0.51 12.67  72.53  n/a   0.000
    OVERFLOW:           0402  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    ADD [  0219+  0401]  0039  3  5.0    8.41    1.02 12.33  76.04  n/a   0.000
*
    ADD [  0039+  0402]  0039  1  5.0   16.75    1.32 12.33  74.29  n/a   0.000
*
    ADD [  0039+  0052]  0039  3  5.0  218.87    7.32 13.67  70.46  n/a   0.000
*
    READ STORM                 15.0
```

```
    [ Ptot=108.80 mm ]
    fname                 :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\c72c521b-8651-4359-9607-
    remark: 25yr 24hr 15min SCS
*
 *  CALIB NASHYD         0227  1  5.0    1.44    0.23 12.33  64.83 0.60   0.000
    [CN=80.7         ]
    [ N = 3.0:Tp 0.23]
*
    READ STORM                 15.0
    [ Ptot=108.80 mm ]
    fname                 :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\c72c521b-8651-4359-9607-
    remark: 25yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0223  1  5.0    1.91    0.46 12.25  76.08 0.70   0.000
    [I%=30.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot=108.80 mm ]
    fname                 :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\c72c521b-8651-4359-9607-
    remark: 25yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0222  1  5.0   14.26    3.84 12.25  88.74 0.82   0.000
    [I%=59.0:S%= 2.00]
*
    ADD [  0222+  0223]  0185  3  5.0   16.17    4.30 12.25  87.24  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0406  1  5.0   16.17    0.72 12.75  87.12  n/a   0.000
*
    ADD [  0227+  0406]  0186  3  5.0   17.61    0.84 12.58  85.29  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=108.80 mm ]
    fname                 :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\c72c521b-8651-4359-9607-
    remark: 25yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0201  1  5.0    2.75    0.76 12.25  87.66 0.81   0.000
    [I%=28.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot=108.80 mm ]
    fname                 :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\c72c521b-8651-4359-9607-
    remark: 25yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0202  1  5.0   11.74    3.42 12.25  93.85 0.86   0.000
    [I%=42.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot=108.80 mm ]
    fname                 :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\c72c521b-8651-4359-9607-
    remark: 25yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0100  1  5.0    2.66    0.69 12.25  83.26 0.77   0.000
    [I%=20.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot=108.80 mm ]
    fname                 :                C:\Users\jmacdonald\AppData\Local\Temp
```

```
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\c72c521b-8651-4359-9607-
    remark: 25yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0221  1  5.0    2.42    0.80 12.25  92.31 0.85   0.000
    [I%=77.0:S%= 2.00]
*
    ADD [  0100+  0201]  0173  3  5.0    5.41    1.44 12.25  85.50  n/a   0.000
*
    ADD [  0173+  0202]  0173  1  5.0   17.15    4.86 12.25  91.21  n/a   0.000
*
    ADD [  0173+  0221]  0173  3  5.0   19.57    5.66 12.25  91.35  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0400  1  5.0   19.57    0.65 12.92  90.86  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=108.80 mm ]
    fname                 :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\c72c521b-8651-4359-9607-
    remark: 25yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0225  1  5.0   14.21    2.40 12.25  66.81 0.61   0.000
    [I%=17.0:S%= 2.00]
*
    ADD [  0186+  0225]  0178  3  5.0   31.82    2.70 12.25  77.04  n/a   0.000
*
    ADD [  0178+  0400]  0178  1  5.0   51.39    3.30 12.33  82.30  n/a   0.000
*
=================================================================================
==========================


       V    V   I    SSSSS  U   U    A    L              (v 6.2.2008)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                   *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output       filename:   C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\7dfc10c2-a7b1-48cc-8e92-45052f579466\s
  Summary     filename:    C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\7dfc10c2-a7b1-48cc-8e92-45052f579466\s


DATE: 08-28-2023                           TIME: 10:52:25

USER:


COMMENTS: ____________________________________________________________
```

```
  ************************************************
  ** SIMULATION : 25yr 4hr 10min Chicago        **
  ************************************************

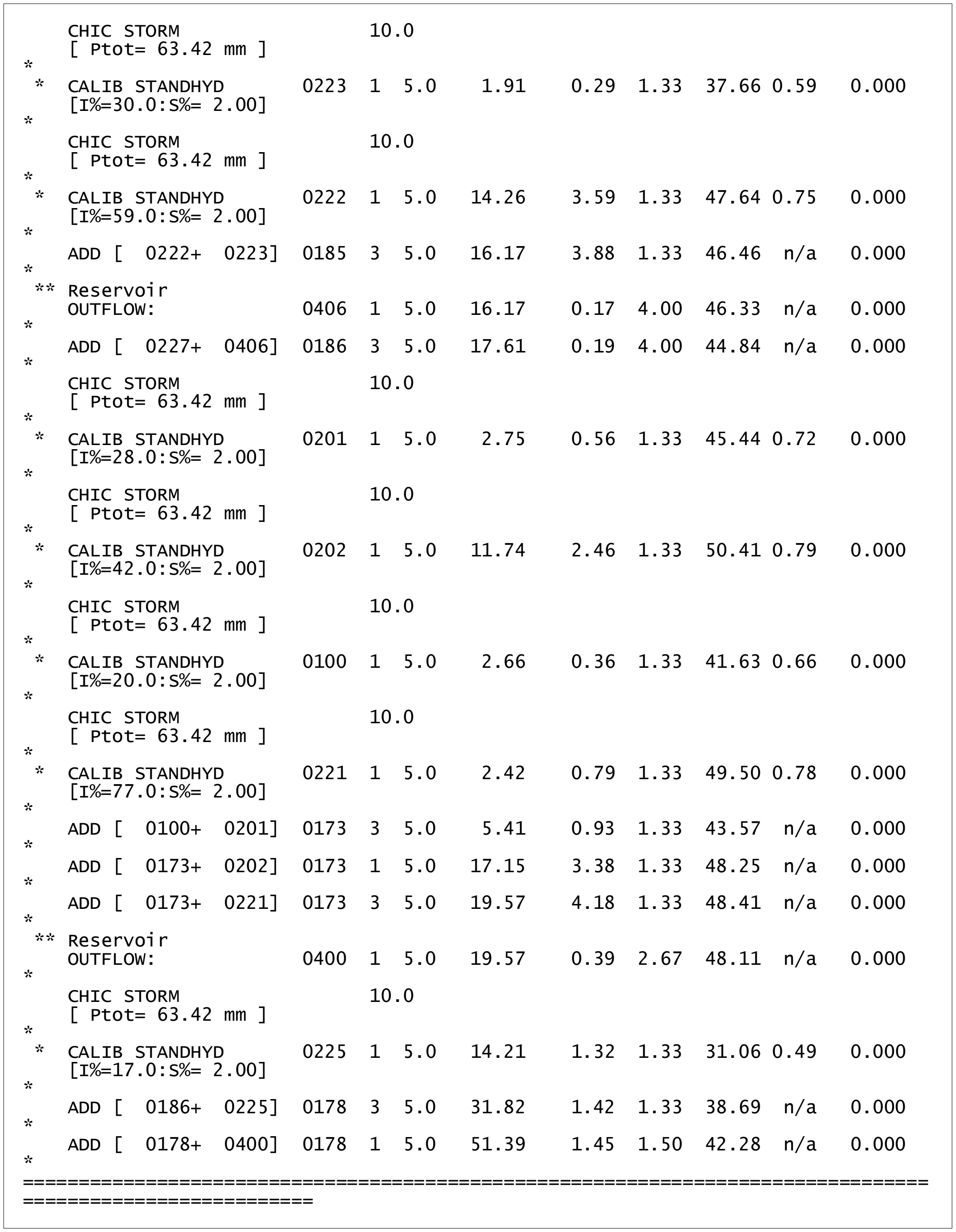
  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    CHIC STORM                  10.0
    [ Ptot= 63.42 mm ]
*
 ** CALIB NASHYD         0101  1  5.0   29.62    1.28  2.00  29.28 0.46    0.000
    [CN=81.9         ]
    [ N = 3.0:Tp 0.57]
*
    PIPE   [ 2:  0101]   0140  1  5.0   29.62    1.26  2.08  29.28  n/a    0.000
*
    CHIC STORM                  10.0
    [ Ptot= 63.42 mm ]
*
 ** CALIB NASHYD         0208  1  5.0    1.80    0.03  2.00  13.86 0.22    0.000
    [CN=62.3         ]
    [ N = 3.0:Tp 0.53]
*
    CHIC STORM                  10.0
    [ Ptot= 63.42 mm ]
*
 *  CALIB STANDHYD       0203  1  5.0    8.59    1.42  1.33  39.79 0.63    0.000
    [I%=36.0:S%= 2.00]
*
    CHIC STORM                  10.0
    [ Ptot= 63.42 mm ]
*
 *  CALIB STANDHYD       0204  1  5.0   11.24    1.87  1.33  39.97 0.63    0.000
    [I%=37.0:S%= 2.00]
*
    CHIC STORM                  10.0
    [ Ptot= 63.42 mm ]
*
 *  CALIB STANDHYD       0226  1  5.0    8.53    1.54  1.33  41.38 0.65    0.000
    [I%=40.0:S%= 2.00]
*
    ADD [  0140+  0203]  0063  3  5.0   38.21    1.52  2.00  31.65  n/a    0.000
*
    ADD [  0063+  0204]  0063  1  5.0   49.45    3.34  1.33  33.54  n/a    0.000
*
    ADD [  0063+  0208]  0063  3  5.0   51.25    3.34  1.33  32.85  n/a    0.000
*
    ADD [  0063+  0226]  0063  1  5.0   59.78    4.88  1.33  34.06  n/a    0.000
*
 ** Reservoir
    OUTFLOW:             0405  1  5.0   59.78    1.76  2.42  34.03  n/a    0.000
*
    CHIC STORM                  10.0
    [ Ptot= 63.42 mm ]
*
 *  CALIB NASHYD         0216  1  5.0   11.42    0.09  2.92   8.66 0.14    0.000
    [CN=50.0         ]
    [ N = 3.0:Tp 1.03]
*
    CHIC STORM                  10.0
    [ Ptot= 63.42 mm ]
```

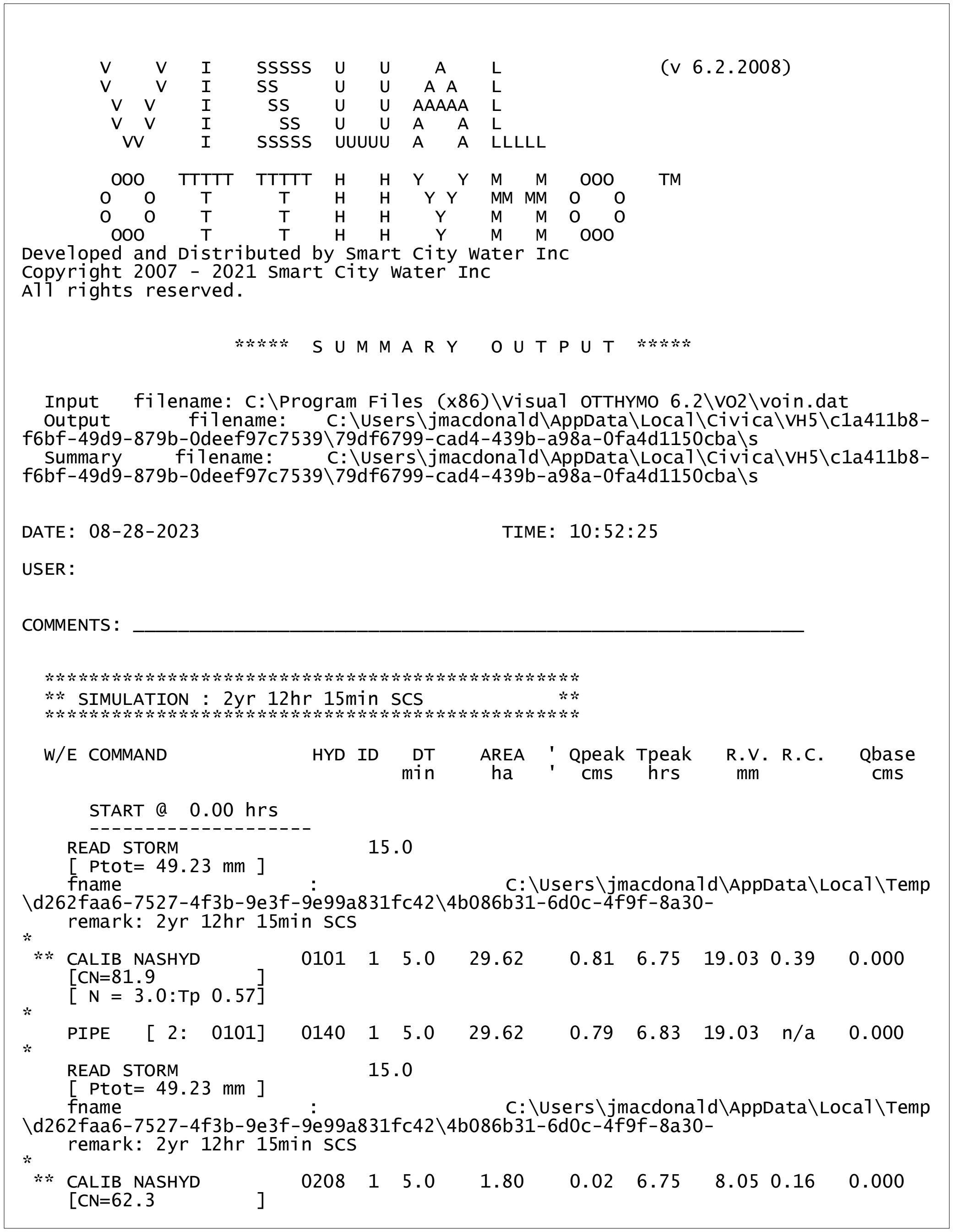
```
*
 *  CALIB NASHYD         0215  1  5.0    2.06    0.11  1.67  26.32 0.42    0.000
    [CN=77.8         ]
    [ N = 3.0:Tp 0.33]
*
    CHIC STORM                  10.0
    [ Ptot= 63.42 mm ]
*
 *  CALIB NASHYD         0207  1  5.0    1.37    0.07  1.58  23.10 0.36    0.000
    [CN=74.0         ]
    [ N = 3.0:Tp 0.27]
*
    ADD [  0207+  0215]  0145  3  5.0    3.43    0.19  1.58  25.04  n/a    0.000
*
    ADD [  0145+  0216]  0145  1  5.0   14.85    0.21  1.67  12.44  n/a    0.000
*
    ADD [  0145+  0405]  0145  3  5.0   74.64    1.92  2.42  29.74  n/a    0.000
*
 ** Reservoir
    OUTFLOW:             0062  1  5.0   74.64    1.19  3.33  29.73  n/a    0.000
*
    CHANNEL[ 2:  0062]   0048  1  5.0   74.64    1.16  3.67  29.73  n/a    0.000
*
    CHIC STORM                  10.0
    [ Ptot= 63.42 mm ]
*
 *  CALIB STANDHYD       0108  1  5.0    3.97    1.14  1.33  49.22 0.78    0.000
    [I%=67.0:S%= 2.00]
*
    CHIC STORM                  10.0
    [ Ptot= 63.42 mm ]
*
 *  CALIB STANDHYD       0107  1  5.0    4.81    1.68  1.33  56.92 0.90    0.000
    [I%=86.0:S%= 2.00]
*
    CHIC STORM                  10.0
    [ Ptot= 63.42 mm ]
*
 *  CALIB STANDHYD       0106  1  5.0   26.74    3.32  1.50  40.17 0.63    0.000
    [I%=15.0:S%= 2.00]
*
    CHIC STORM                  10.0
    [ Ptot= 63.42 mm ]
*
 *  CALIB STANDHYD       0209  1  5.0   10.31    1.87  1.33  43.21 0.68    0.000
    [I%=39.0:S%= 2.00]
*
    ADD [  0106+  0209]  0146  3  5.0   37.05    4.87  1.33  41.02  n/a    0.000
*
    CHANNEL[ 2:  0146]   0049  1  5.0   37.05    1.67  1.92  40.84  n/a    0.000
*
    ADD [  0107+  0108]  0036  3  5.0    8.78    2.82  1.33  53.44  n/a    0.000
*
    ADD [  0036+  0049]  0036  1  5.0   45.83    3.45  1.33  43.25  n/a    0.000
*
 ** Reservoir
    OUTFLOW:             0065  1  5.0   45.83    1.52  2.25  43.25  n/a    0.000
*
    CHIC STORM                  10.0
    [ Ptot= 63.42 mm ]
*
 ** CALIB STANDHYD       0206  1  5.0   28.45    5.76  1.33  44.04 0.69    0.000
    [I%=53.0:S%= 2.00]
*
```

```
    CHIC STORM                  10.0
    [ Ptot= 63.42 mm ]
*
 *  CALIB STANDHYD       0205  1  5.0   10.19    2.28  1.33  44.48 0.70   0.000
    [I%=53.0:S%= 2.00]
*
    ADD [  0205+  0206]  0155  3  5.0   38.64    8.05  1.33  44.16  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0404  1  5.0   38.64    0.66  2.83  40.76  n/a   0.000
*
    ADD [  0404+  0048]  0031  3  5.0  113.28    1.78  3.50  33.49  n/a   0.000
*
    ADD [  0031+  0065]  0031  1  5.0  159.11    2.94  3.25  36.30  n/a   0.000
*
    PIPE   [ 2:  0031]   0066  1  5.0  159.11    2.94  3.25  36.30  n/a   0.000
*
    CHIC STORM                  10.0
    [ Ptot= 63.42 mm ]
*
 *  CALIB NASHYD         0217  1  5.0    8.74    0.07  2.75   8.66 0.14   0.000
    [CN=50.0         ]
    [ N = 3.0:Tp 0.95]
*
    ADD [  0217+  0066]  0149  3  5.0  167.85    3.00  3.25  34.86  n/a   0.000
*
    CHANNEL[ 2:  0149]   0051  1  5.0  167.85    2.85  3.42  34.86  n/a   0.000
*
    CHIC STORM                  10.0
    [ Ptot= 63.42 mm ]
*
 *  CALIB NASHYD         0220  1  5.0    5.14    0.12  2.17  19.43 0.31   0.000
    [CN=71.4         ]
    [ N = 3.0:Tp 0.68]
*
    CHIC STORM                  10.0
    [ Ptot= 63.42 mm ]
*
 *  CALIB NASHYD         0218  1  5.0   10.21    0.06  3.75   8.66 0.14   0.000
    [CN=50.0         ]
    [ N = 3.0:Tp 1.54]
*
    CHIC STORM                  10.0
    [ Ptot= 63.42 mm ]
*
 *  CALIB STANDHYD       0224  1  5.0    2.58    0.39  1.33  37.09 0.58   0.000
    [I%=31.0:S%= 2.00]
*
    ADD [  0218+  0220]  0170  3  5.0   15.35    0.16  2.42  12.26  n/a   0.000
*
    ADD [  0170+  0224]  0170  1  5.0   17.93    0.41  1.33  15.84  n/a   0.000
*
    CHANNEL[ 2:  0170]   0061  1  5.0   17.93    0.19  2.83  15.75  n/a   0.000
*
    CHIC STORM                  10.0
    [ Ptot= 63.42 mm ]
*
 *  CALIB STANDHYD       0210  1  5.0    7.09    2.37  1.33  55.74 0.88   0.000
    [I%=83.0:S%= 2.00]
*
    CHIC STORM                  10.0
    [ Ptot= 63.42 mm ]
*
 *  CALIB STANDHYD       0211  1  5.0    8.86    1.66  1.33  41.71 0.66   0.000
```

```
    [I%=43.0:S%= 2.00]
*
    ADD [  0210+  0211]  0148  3  5.0   15.95    4.03  1.33  47.95  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0403  1  5.0   15.95    0.29  2.75  47.81  n/a   0.000
*
    CHIC STORM                  10.0
    [ Ptot= 63.42 mm ]
*
 *  CALIB NASHYD         0213  1  5.0    0.39    0.04  1.33  15.09 0.24   0.000
    [CN=69.0         ]
    [ N = 3.0:Tp 0.05]
*
    ADD [  0213+  0403]  0044  3  5.0   16.34    0.29  2.75  47.03  n/a   0.000
*
    ADD [  0044+  0061]  0044  1  5.0   34.27    0.48  2.75  30.67  n/a   0.000
*
    CHANNEL[ 2:  0044]   0060  1  5.0   34.27    0.40  3.67  30.66  n/a   0.000
*
    ADD [  0051+  0060]  0038  3  5.0  202.11    3.25  3.42  34.15  n/a   0.000
*
    CHANNEL[ 2:  0038]   0052  1  5.0  202.11    3.23  3.67  34.15  n/a   0.000
*
    CHIC STORM                  10.0
    [ Ptot= 63.42 mm ]
*
 *  CALIB NASHYD         0219  1  5.0    2.06    0.02  2.67   8.66 0.14   0.000
    [CN=50.0         ]
    [ N = 3.0:Tp 0.90]
*
    CHIC STORM                  10.0
    [ Ptot= 63.42 mm ]
*
 *  CALIB STANDHYD       0214  1  5.0    6.35    1.76  1.33  49.90 0.79   0.000
    [I%=60.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:             0401  1  5.0    6.35    0.15  2.33  49.74  n/a   0.000
    OVERFLOW:            0401  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    CHIC STORM                  10.0
    [ Ptot= 63.42 mm ]
*
 *  CALIB STANDHYD       0212  1  5.0    8.34    0.95  1.33  34.92 0.55   0.000
    [I%=20.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:             0402  1  5.0    8.34    0.15  2.67  34.66  n/a   0.000
    OVERFLOW:            0402  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    ADD [  0219+  0401]  0039  3  5.0    8.41    0.17  2.33  39.68  n/a   0.000
*
    ADD [  0039+  0402]  0039  1  5.0   16.75    0.31  2.50  37.18  n/a   0.000
*
    ADD [  0039+  0052]  0039  3  5.0  218.87    3.48  3.58  34.38  n/a   0.000
*
    CHIC STORM                  10.0
    [ Ptot= 63.42 mm ]
*
 *  CALIB NASHYD         0227  1  5.0    1.44    0.11  1.50  28.11 0.44   0.000
    [CN=80.7         ]
    [ N = 3.0:Tp 0.23]
*
```



```
    CHIC STORM                 10.0
    [ Ptot= 63.42 mm ]
*
 *  CALIB STANDHYD       0223  1  5.0    1.91    0.29  1.33  37.66 0.59   0.000
    [I%=30.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 63.42 mm ]
*
 *  CALIB STANDHYD       0222  1  5.0   14.26    3.59  1.33  47.64 0.75   0.000
    [I%=59.0:S%= 2.00]
*
    ADD [  0222+  0223]  0185  3  5.0   16.17    3.88  1.33  46.46  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0406  1  5.0   16.17    0.17  4.00  46.33  n/a   0.000
*
    ADD [  0227+  0406]  0186  3  5.0   17.61    0.19  4.00  44.84  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 63.42 mm ]
*
 *  CALIB STANDHYD       0201  1  5.0    2.75    0.56  1.33  45.44 0.72   0.000
    [I%=28.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 63.42 mm ]
*
 *  CALIB STANDHYD       0202  1  5.0   11.74    2.46  1.33  50.41 0.79   0.000
    [I%=42.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 63.42 mm ]
*
 *  CALIB STANDHYD       0100  1  5.0    2.66    0.36  1.33  41.63 0.66   0.000
    [I%=20.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 63.42 mm ]
*
 *  CALIB STANDHYD       0221  1  5.0    2.42    0.79  1.33  49.50 0.78   0.000
    [I%=77.0:S%= 2.00]
*
    ADD [  0100+  0201]  0173  3  5.0    5.41    0.93  1.33  43.57  n/a   0.000
*
    ADD [  0173+  0202]  0173  1  5.0   17.15    3.38  1.33  48.25  n/a   0.000
*
    ADD [  0173+  0221]  0173  3  5.0   19.57    4.18  1.33  48.41  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0400  1  5.0   19.57    0.39  2.67  48.11  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 63.42 mm ]
*
 *  CALIB STANDHYD       0225  1  5.0   14.21    1.32  1.33  31.06 0.49   0.000
    [I%=17.0:S%= 2.00]
*
    ADD [  0186+  0225]  0178  3  5.0   31.82    1.42  1.33  38.69  n/a   0.000
*
    ADD [  0178+  0400]  0178  1  5.0   51.39    1.45  1.50  42.28  n/a   0.000
*
=================================================================================
==========================
```



```
       V    V   I    SSSSS  U   U    A    L              (v 6.2.2008)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                   *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output       filename:   C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\79df6799-cad4-439b-a98a-0fa4d1150cba\s
  Summary     filename:    C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\79df6799-cad4-439b-a98a-0fa4d1150cba\s


DATE: 08-28-2023                           TIME: 10:52:25

USER:


COMMENTS: ____________________________________________________________


  ************************************************
  ** SIMULATION : 2yr 12hr 15min SCS            **
  ************************************************

  W/E COMMAND               HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                    min     ha   '  cms   hrs     mm           cms

      START @  0.00 hrs
      --------------------
    READ STORM                 15.0
    [ Ptot= 49.23 mm ]
    fname                 :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4b086b31-6d0c-4f9f-8a30-
    remark: 2yr 12hr 15min SCS
*
 ** CALIB NASHYD         0101  1  5.0   29.62    0.81  6.75  19.03 0.39   0.000
    [CN=81.9         ]
    [ N = 3.0:Tp 0.57]
*
    PIPE   [ 2:  0101]   0140  1  5.0   29.62    0.79  6.83  19.03  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 49.23 mm ]
    fname                 :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4b086b31-6d0c-4f9f-8a30-
    remark: 2yr 12hr 15min SCS
*
 ** CALIB NASHYD         0208  1  5.0    1.80    0.02  6.75   8.05 0.16   0.000
    [CN=62.3         ]
```

```
    [ N = 3.0:Tp 0.53]
*
    READ STORM                15.0
    [ Ptot= 49.23 mm ]
    fname               :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4b086b31-6d0c-4f9f-8a30-
    remark: 2yr 12hr 15min SCS
*
 ** CALIB STANDHYD       0203  1  5.0    8.59    0.70  6.25  28.62 0.58   0.000
    [I%=36.0:S%= 2.00]
*
    READ STORM                15.0
    [ Ptot= 49.23 mm ]
    fname               :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4b086b31-6d0c-4f9f-8a30-
    remark: 2yr 12hr 15min SCS
*
 ** CALIB STANDHYD       0204  1  5.0   11.24    0.91  6.25  28.80 0.58   0.000
    [I%=37.0:S%= 2.00]
*
    READ STORM                15.0
    [ Ptot= 49.23 mm ]
    fname               :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4b086b31-6d0c-4f9f-8a30-
    remark: 2yr 12hr 15min SCS
*
 ** CALIB STANDHYD       0226  1  5.0    8.53    0.74  6.25  29.98 0.61   0.000
    [I%=40.0:S%= 2.00]
*
    ADD [  0140+  0203]  0063  3  5.0   38.21    0.98  6.75  21.19  n/a   0.000
*
    ADD [  0063+  0204]  0063  1  5.0   49.45    1.79  6.25  22.92  n/a   0.000
*
    ADD [  0063+  0208]  0063  3  5.0   51.25    1.80  6.25  22.39  n/a   0.000
*
    ADD [  0063+  0226]  0063  1  5.0   59.78    2.55  6.25  23.48  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0405  1  5.0   59.78    0.51  7.92  23.44  n/a   0.000
*
    READ STORM                15.0
    [ Ptot= 49.23 mm ]
    fname               :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4b086b31-6d0c-4f9f-8a30-
    remark: 2yr 12hr 15min SCS
*
 ** CALIB NASHYD         0216  1  5.0   11.42    0.04  7.42   4.76 0.10   0.000
    [CN=50.0          ]
    [ N = 3.0:Tp 1.03]
*
    READ STORM                15.0
    [ Ptot= 49.23 mm ]
    fname               :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4b086b31-6d0c-4f9f-8a30-
    remark: 2yr 12hr 15min SCS
*
 ** CALIB NASHYD         0215  1  5.0    2.06    0.07  6.42  16.99 0.35   0.000
    [CN=77.8          ]
    [ N = 3.0:Tp 0.33]
*
    READ STORM                15.0
    [ Ptot= 49.23 mm ]
    fname               :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4b086b31-6d0c-4f9f-8a30-
```

```
    remark: 2yr 12hr 15min SCS
*
 ** CALIB NASHYD         0207  1  5.0    1.37    0.05  6.42  14.65 0.30   0.000
    [CN=74.0          ]
    [ N = 3.0:Tp 0.27]
*
    ADD [  0207+  0215]  0145  3  5.0    3.43    0.12  6.42  16.05  n/a   0.000
*
    ADD [  0145+  0216]  0145  1  5.0   14.85    0.13  6.50   7.37  n/a   0.000
*
    ADD [  0145+  0405]  0145  3  5.0   74.64    0.57  7.92  20.25  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0062  1  5.0   74.64    0.41  9.08  20.24  n/a   0.000
*
    CHANNEL[ 2:  0062]   0048  1  5.0   74.64    0.40  9.42  20.24  n/a   0.000
*
    READ STORM                15.0
    [ Ptot= 49.23 mm ]
    fname               :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4b086b31-6d0c-4f9f-8a30-
    remark: 2yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0108  1  5.0    3.97    0.50  6.25  36.97 0.75   0.000
    [I%=67.0:S%= 2.00]
*
    READ STORM                15.0
    [ Ptot= 49.23 mm ]
    fname               :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4b086b31-6d0c-4f9f-8a30-
    remark: 2yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0107  1  5.0    4.81    0.77  6.25  43.53 0.88   0.000
    [I%=86.0:S%= 2.00]
*
    READ STORM                15.0
    [ Ptot= 49.23 mm ]
    fname               :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4b086b31-6d0c-4f9f-8a30-
    remark: 2yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0106  1  5.0   26.74    1.95  6.25  28.29 0.57   0.000
    [I%=15.0:S%= 2.00]
*
    READ STORM                15.0
    [ Ptot= 49.23 mm ]
    fname               :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4b086b31-6d0c-4f9f-8a30-
    remark: 2yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0209  1  5.0   10.31    0.99  6.25  31.35 0.64   0.000
    [I%=39.0:S%= 2.00]
*
    ADD [  0106+  0209]  0146  3  5.0   37.05    2.94  6.25  29.14  n/a   0.000
*
    CHANNEL[ 2:  0146]   0049  1  5.0   37.05    1.09  6.75  28.96  n/a   0.000
*
    ADD [  0107+  0108]  0036  3  5.0    8.78    1.27  6.25  40.57  n/a   0.000
*
    ADD [  0036+  0049]  0036  1  5.0   45.83    1.93  6.25  31.18  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0065  1  5.0   45.83    1.07  6.83  31.18  n/a   0.000
*
```

```
    READ STORM                 15.0
    [ Ptot= 49.23 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4b086b31-6d0c-4f9f-8a30-
    remark: 2yr 12hr 15min SCS
*
 ** CALIB STANDHYD       0206  1  5.0   28.45    2.77  6.25  32.52 0.66   0.000
    [I%=53.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 49.23 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4b086b31-6d0c-4f9f-8a30-
    remark: 2yr 12hr 15min SCS
*
 ** CALIB STANDHYD       0205  1  5.0   10.19    1.09  6.25  32.32 0.66   0.000
    [I%=53.0:S%= 2.00]
*
    ADD [  0205+  0206]  0155  3  5.0   38.64    3.86  6.25  32.47  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0404  1  5.0   38.64    0.21  8.33  29.03  n/a   0.000
*
    ADD [  0404+  0048]  0031  3  5.0  113.28    0.59  9.25  23.24  n/a   0.000
*
    ADD [  0031+  0065]  0031  1  5.0  159.11    1.22  6.83  25.53  n/a   0.000
*
    PIPE   [ 2:  0031]   0066  1  5.0  159.11    1.21  6.83  25.53  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 49.23 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4b086b31-6d0c-4f9f-8a30-
    remark: 2yr 12hr 15min SCS
*
 ** CALIB NASHYD         0217  1  5.0    8.74    0.04  7.33   4.76 0.10   0.000
    [CN=50.0          ]
    [ N = 3.0:Tp 0.95]
*
    ADD [  0217+  0066]  0149  3  5.0  167.85    1.24  6.83  24.45  n/a   0.000
*
    CHANNEL[ 2:  0149]   0051  1  5.0  167.85    0.99  9.08  24.44  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 49.23 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4b086b31-6d0c-4f9f-8a30-
    remark: 2yr 12hr 15min SCS
*
 ** CALIB NASHYD         0220  1  5.0    5.14    0.07  6.92  11.79 0.24   0.000
    [CN=71.4          ]
    [ N = 3.0:Tp 0.68]
*
    READ STORM                 15.0
    [ Ptot= 49.23 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4b086b31-6d0c-4f9f-8a30-
    remark: 2yr 12hr 15min SCS
*
 ** CALIB NASHYD         0218  1  5.0   10.21    0.03  8.17   4.76 0.10   0.000
    [CN=50.0          ]
    [ N = 3.0:Tp 1.54]
*
    READ STORM                 15.0
```

```
    [ Ptot= 49.23 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4b086b31-6d0c-4f9f-8a30-
    remark: 2yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0224  1  5.0    2.58    0.21  6.25  26.36 0.54   0.000
    [I%=31.0:S%= 2.00]
*
    ADD [  0218+  0220]  0170  3  5.0   15.35    0.09  7.08   7.11  n/a   0.000
*
    ADD [  0170+  0224]  0170  1  5.0   17.93    0.23  6.25   9.88  n/a   0.000
*
    CHANNEL[ 2:  0170]   0061  1  5.0   17.93    0.10  7.33   9.80  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 49.23 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4b086b31-6d0c-4f9f-8a30-
    remark: 2yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0210  1  5.0    7.09    1.09  6.25  42.52 0.86   0.000
    [I%=83.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 49.23 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4b086b31-6d0c-4f9f-8a30-
    remark: 2yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0211  1  5.0    8.86    0.80  6.25  30.35 0.62   0.000
    [I%=43.0:S%= 2.00]
*
    ADD [  0210+  0211]  0148  3  5.0   15.95    1.89  6.25  35.76  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0403  1  5.0   15.95    0.08  8.42  35.62  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 49.23 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4b086b31-6d0c-4f9f-8a30-
    remark: 2yr 12hr 15min SCS
*
 *  CALIB NASHYD         0213  1  5.0    0.39    0.02  6.25   9.43 0.19   0.000
    [CN=69.0          ]
    [ N = 3.0:Tp 0.05]
*
    ADD [  0213+  0403]  0044  3  5.0   16.34    0.08  8.25  35.00  n/a   0.000
*
    ADD [  0044+  0061]  0044  1  5.0   34.27    0.17  7.50  21.82  n/a   0.000
*
    CHANNEL[ 2:  0044]   0060  1  5.0   34.27    0.14  8.75  21.81  n/a   0.000
*
    ADD [  0051+  0060]  0038  3  5.0  202.11    1.13  9.00  24.00  n/a   0.000
*
    CHANNEL[ 2:  0038]   0052  1  5.0  202.11    1.13  9.25  24.00  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 49.23 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4b086b31-6d0c-4f9f-8a30-
    remark: 2yr 12hr 15min SCS
*
 *  CALIB NASHYD         0219  1  5.0    2.06    0.01  7.25   4.76 0.10   0.000
```

```
    [CN=50.0          ]
    [ N = 3.0:Tp 0.90]
*
    READ STORM                 15.0
    [ Ptot= 49.23 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4b086b31-6d0c-4f9f-8a30-
    remark: 2yr 12hr 15min SCS
*
 *  CALIB STANDHYD        0214  1  5.0    6.35    0.79  6.25  37.22 0.76   0.000
    [I%=60.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:              0401  1  5.0    6.35    0.03  8.58  37.07  n/a   0.000
    OVERFLOW:             0401  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 49.23 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4b086b31-6d0c-4f9f-8a30-
    remark: 2yr 12hr 15min SCS
*
 *  CALIB STANDHYD        0212  1  5.0    8.34    0.49  6.25  24.32 0.49   0.000
    [I%=20.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:              0402  1  5.0    8.34    0.05  8.25  24.06  n/a   0.000
    OVERFLOW:             0402  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    ADD [  0219+  0401]   0039  3  5.0    8.41    0.03  8.42  29.16  n/a   0.000
*
    ADD [  0039+  0402]   0039  1  5.0   16.75    0.08  8.33  26.62  n/a   0.000
*
    ADD [  0039+  0052]   0039  3  5.0  218.87    1.20  9.17  24.20  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 49.23 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4b086b31-6d0c-4f9f-8a30-
    remark: 2yr 12hr 15min SCS
*
 *  CALIB NASHYD          0227  1  5.0    1.44    0.07  6.33  18.17 0.37   0.000
    [CN=80.7          ]
    [ N = 3.0:Tp 0.23]
*
    READ STORM                 15.0
    [ Ptot= 49.23 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4b086b31-6d0c-4f9f-8a30-
    remark: 2yr 12hr 15min SCS
*
 *  CALIB STANDHYD        0223  1  5.0    1.91    0.15  6.25  26.77 0.54   0.000
    [I%=30.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 49.23 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4b086b31-6d0c-4f9f-8a30-
    remark: 2yr 12hr 15min SCS
*
 *  CALIB STANDHYD        0222  1  5.0   14.26    1.59  6.25  35.45 0.72   0.000
    [I%=59.0:S%= 2.00]
*
    ADD [  0222+  0223]   0185  3  5.0   16.17    1.75  6.25  34.43  n/a   0.000
```

```
*
 ** Reservoir
    OUTFLOW:              0406  1  5.0   16.17    0.05 10.33  34.30  n/a   0.000
    OVERFLOW:             0406  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    ADD [  0227+  0406]   0186  3  5.0   17.61    0.11  6.33  32.98  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 49.23 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4b086b31-6d0c-4f9f-8a30-
    remark: 2yr 12hr 15min SCS
*
 *  CALIB STANDHYD        0201  1  5.0    2.75    0.27  6.25  32.92 0.67   0.000
    [I%=28.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 49.23 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4b086b31-6d0c-4f9f-8a30-
    remark: 2yr 12hr 15min SCS
*
 *  CALIB STANDHYD        0202  1  5.0   11.74    1.33  6.25  37.29 0.76   0.000
    [I%=42.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 49.23 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4b086b31-6d0c-4f9f-8a30-
    remark: 2yr 12hr 15min SCS
*
 *  CALIB STANDHYD        0100  1  5.0    2.66    0.22  6.25  29.45 0.60   0.000
    [I%=20.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 49.23 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4b086b31-6d0c-4f9f-8a30-
    remark: 2yr 12hr 15min SCS
*
 *  CALIB STANDHYD        0221  1  5.0    2.42    0.35  6.25  36.49 0.74   0.000
    [I%=77.0:S%= 2.00]
*
    ADD [  0100+  0201]   0173  3  5.0    5.41    0.49  6.25  31.21  n/a   0.000
*
    ADD [  0173+  0202]   0173  1  5.0   17.15    1.82  6.25  35.37  n/a   0.000
*
    ADD [  0173+  0221]   0173  3  5.0   19.57    2.16  6.25  35.51  n/a   0.000
*
 ** Reservoir
    OUTFLOW:              0400  1  5.0   19.57    0.29  7.00  35.16  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 49.23 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\4b086b31-6d0c-4f9f-8a30-
    remark: 2yr 12hr 15min SCS
*
 *  CALIB STANDHYD        0225  1  5.0   14.21    0.69  6.25  21.29 0.43   0.000
    [I%=17.0:S%= 2.00]
*
    ADD [  0186+  0225]   0178  3  5.0   31.82    0.79  6.25  27.76  n/a   0.000
*
    ADD [  0178+  0400]   0178  1  5.0   51.39    0.81  6.25  30.58  n/a   0.000
```

```
*
==================================================================================
==========================


       V    V   I    SSSSS  U   U    A    L             (v 6.2.2008)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                   *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output     filename:    C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\e63c15bb-fe48-461a-8d58-04426e3ef830\s
  Summary    filename:    C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\e63c15bb-fe48-461a-8d58-04426e3ef830\s


DATE: 08-28-2023                           TIME: 10:52:27

USER:


COMMENTS: ____________________________________________________________


  ************************************************
  ** SIMULATION : 2yr 24hr 15min SCS            **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min    ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                 15.0
    [ Ptot= 60.65 mm ]
    fname              :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\9d3aff08-f349-4cac-a309-
    remark: 2yr 24hr 15min SCS
*
 ** CALIB NASHYD         0101  1  5.0   29.62    0.99 12.75  27.20 0.45   0.000
    [CN=81.9         ]
    [ N = 3.0:Tp 0.57]
*
    PIPE   [ 2:  0101]   0140  1  5.0   29.62    0.97 12.83  27.20  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 60.65 mm ]
    fname              :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\9d3aff08-f349-4cac-a309-
    remark: 2yr 24hr 15min SCS
```

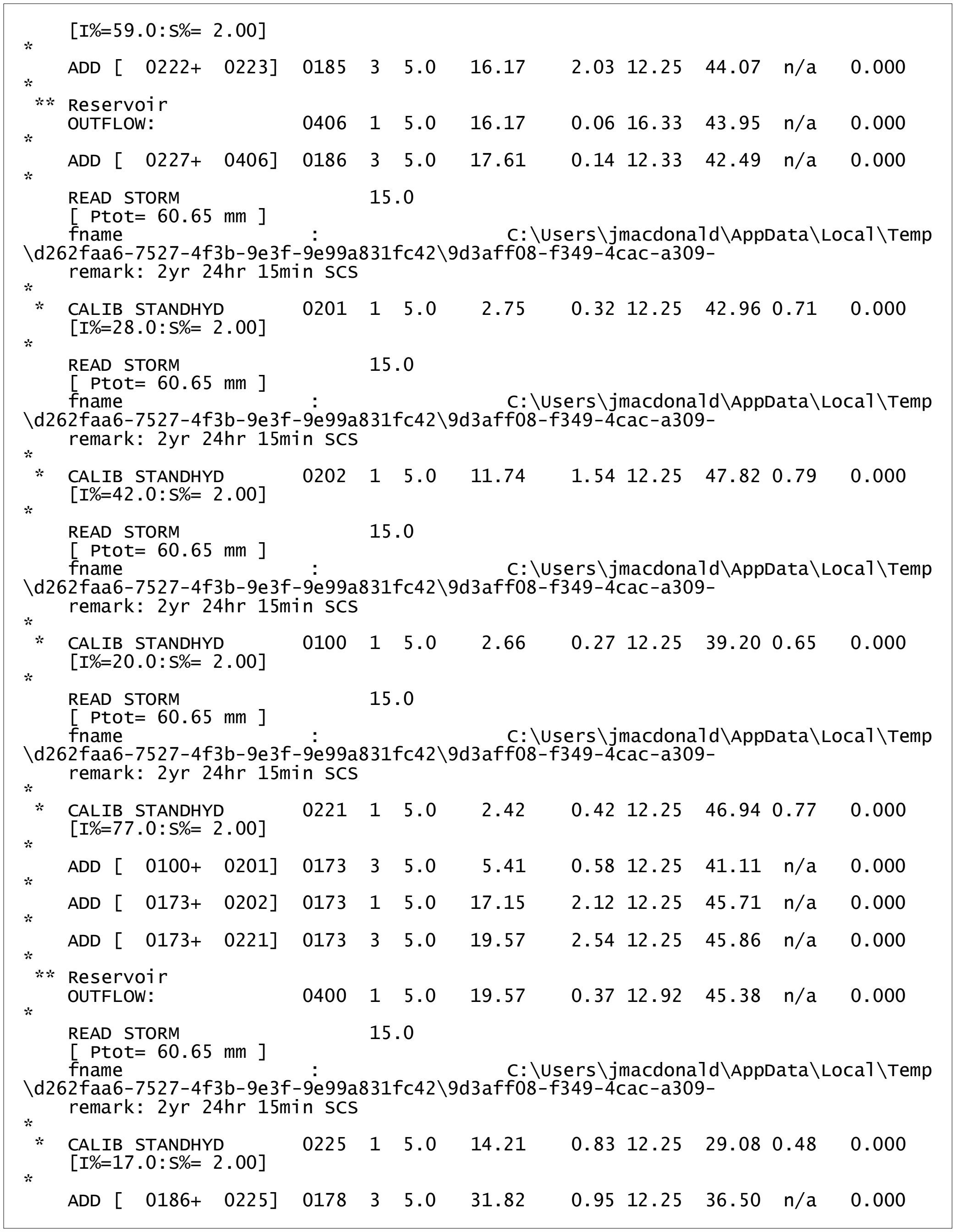
```
*
 ** CALIB NASHYD         0208  1  5.0    1.80    0.03 12.75  12.64 0.21   0.000
    [CN=62.3         ]
    [ N = 3.0:Tp 0.53]
*
    READ STORM                 15.0
    [ Ptot= 60.65 mm ]
    fname              :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\9d3aff08-f349-4cac-a309-
    remark: 2yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0203  1  5.0    8.59    0.88 12.25  37.56 0.62   0.000
    [I%=36.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 60.65 mm ]
    fname              :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\9d3aff08-f349-4cac-a309-
    remark: 2yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0204  1  5.0   11.24    1.15 12.25  37.73 0.62   0.000
    [I%=37.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 60.65 mm ]
    fname              :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\9d3aff08-f349-4cac-a309-
    remark: 2yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0226  1  5.0    8.53    0.93 12.25  39.11 0.64   0.000
    [I%=40.0:S%= 2.00]
*
    ADD [  0140+  0203]  0063  3  5.0   38.21    1.17 12.75  29.53  n/a   0.000
*
    ADD [  0063+  0204]  0063  1  5.0   49.45    2.29 12.25  31.40  n/a   0.000
*
    ADD [  0063+  0208]  0063  3  5.0   51.25    2.30 12.25  30.74  n/a   0.000
*
    ADD [  0063+  0226]  0063  1  5.0   59.78    3.23 12.25  31.93  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0405  1  5.0   59.78    0.92 13.42  31.90  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 60.65 mm ]
    fname              :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\9d3aff08-f349-4cac-a309-
    remark: 2yr 24hr 15min SCS
*
 *  CALIB NASHYD         0216  1  5.0   11.42    0.06 13.42   7.82 0.13   0.000
    [CN=50.0         ]
    [ N = 3.0:Tp 1.03]
*
    READ STORM                 15.0
    [ Ptot= 60.65 mm ]
    fname              :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\9d3aff08-f349-4cac-a309-
    remark: 2yr 24hr 15min SCS
*
 *  CALIB NASHYD         0215  1  5.0    2.06    0.09 12.42  24.42 0.40   0.000
    [CN=77.8         ]
    [ N = 3.0:Tp 0.33]
*
    READ STORM                 15.0
```

```
    [ Ptot= 60.65 mm ]
    fname            :               C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\9d3aff08-f349-4cac-a309-
    remark: 2yr 24hr 15min SCS
*
 *  CALIB NASHYD        0207  1  5.0    1.37    0.06 12.42  21.36 0.35   0.000
    [CN=74.0         ]
    [ N = 3.0:Tp 0.27]
*
    ADD [  0207+  0215]  0145  3  5.0    3.43    0.15 12.42  23.20  n/a   0.000
*
    ADD [  0145+  0216]  0145  1  5.0   14.85    0.17 12.50  11.37  n/a   0.000
*
    ADD [  0145+  0405]  0145  3  5.0   74.64    1.01 13.42  27.81  n/a   0.000
*
 ** Reservoir
    OUTFLOW:            0062  1  5.0   74.64    0.64 14.42  27.81  n/a   0.000
*
    CHANNEL[ 2:  0062]  0048  1  5.0   74.64    0.62 14.75  27.81  n/a   0.000
*
    READ STORM                15.0
    [ Ptot= 60.65 mm ]
    fname            :               C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\9d3aff08-f349-4cac-a309-
    remark: 2yr 24hr 15min SCS
*
 *  CALIB STANDHYD      0108  1  5.0    3.97    0.58 12.25  46.80 0.77   0.000
    [I%=67.0:S%= 2.00]
*
    READ STORM                15.0
    [ Ptot= 60.65 mm ]
    fname            :               C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\9d3aff08-f349-4cac-a309-
    remark: 2yr 24hr 15min SCS
*
 *  CALIB STANDHYD      0107  1  5.0    4.81    0.88 12.25  54.29 0.90   0.000
    [I%=86.0:S%= 2.00]
*
    READ STORM                15.0
    [ Ptot= 60.65 mm ]
    fname            :               C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\9d3aff08-f349-4cac-a309-
    remark: 2yr 24hr 15min SCS
*
 *  CALIB STANDHYD      0106  1  5.0   26.74    2.34 12.25  37.80 0.62   0.000
    [I%=15.0:S%= 2.00]
*
    READ STORM                15.0
    [ Ptot= 60.65 mm ]
    fname            :               C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\9d3aff08-f349-4cac-a309-
    remark: 2yr 24hr 15min SCS
*
 *  CALIB STANDHYD      0209  1  5.0   10.31    1.16 12.25  40.85 0.67   0.000
    [I%=39.0:S%= 2.00]
*
    ADD [  0106+  0209]  0146  3  5.0   37.05    3.51 12.25  38.65  n/a   0.000
*
    CHANNEL[ 2:  0146]  0049  1  5.0   37.05    1.20 12.67  38.47  n/a   0.000
*
    ADD [  0107+  0108]  0036  3  5.0    8.78    1.46 12.25  50.90  n/a   0.000
*
    ADD [  0036+  0049]  0036  1  5.0   45.83    2.17 12.25  40.85  n/a   0.000
*
```

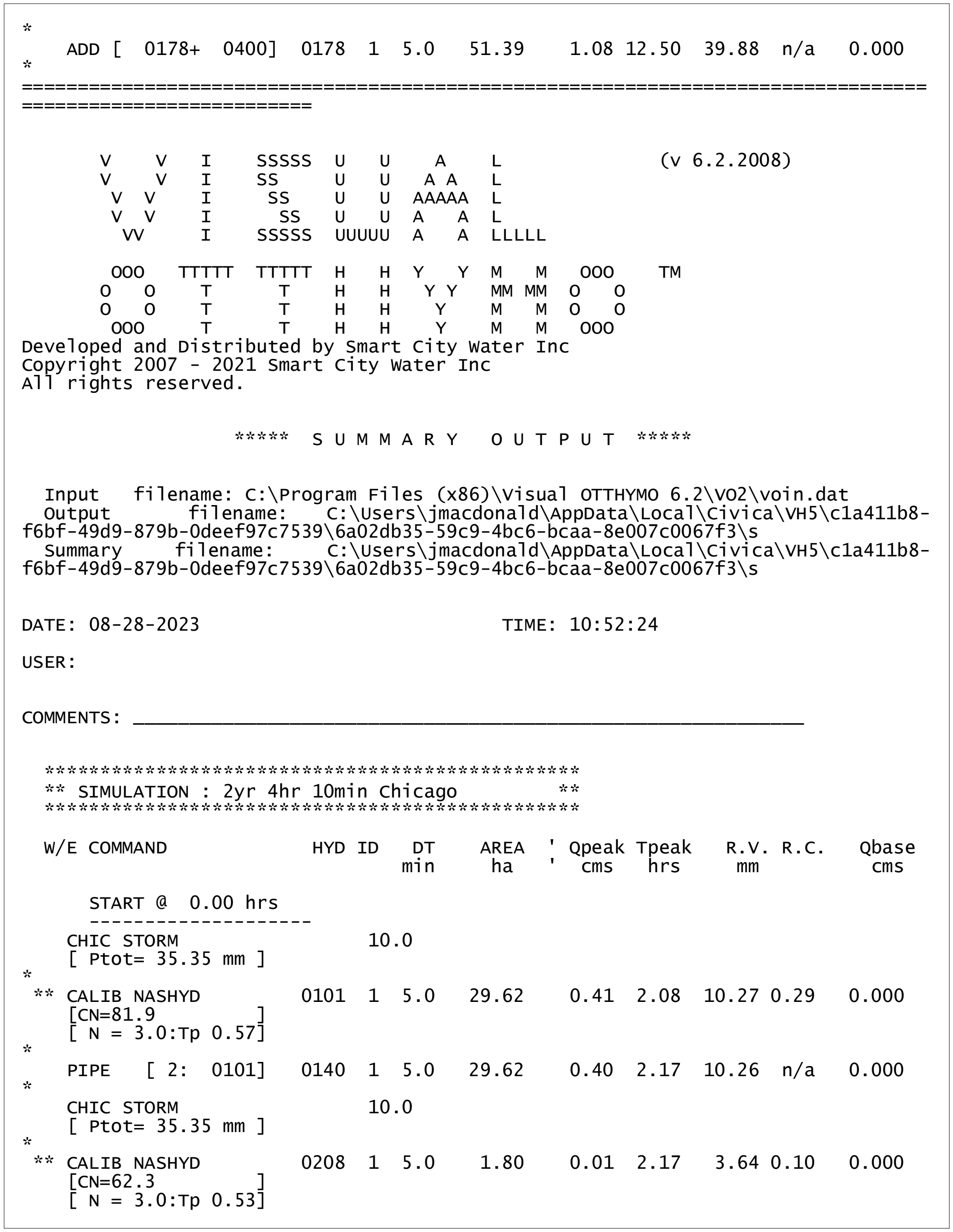
```
 ** Reservoir
    OUTFLOW:            0065  1  5.0   45.83    1.22 12.83  40.85  n/a   0.000
*
    READ STORM                15.0
    [ Ptot= 60.65 mm ]
    fname            :               C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\9d3aff08-f349-4cac-a309-
    remark: 2yr 24hr 15min SCS
*
 ** CALIB STANDHYD      0206  1  5.0   28.45    3.20 12.25  41.75 0.69   0.000
    [I%=53.0:S%= 2.00]
*
    READ STORM                15.0
    [ Ptot= 60.65 mm ]
    fname            :               C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\9d3aff08-f349-4cac-a309-
    remark: 2yr 24hr 15min SCS
*
 ** CALIB STANDHYD      0205  1  5.0   10.19    1.32 12.25  42.07 0.69   0.000
    [I%=53.0:S%= 2.00]
*
    ADD [  0205+  0206]  0155  3  5.0   38.64    4.52 12.25  41.83  n/a   0.000
*
 ** Reservoir
    OUTFLOW:            0404  1  5.0   38.64    0.34 13.50  38.32  n/a   0.000
*
    ADD [  0404+  0048]  0031  3  5.0  113.28    0.91 14.58  31.39  n/a   0.000
*
    ADD [  0031+  0065]  0031  1  5.0  159.11    1.57 12.92  34.12  n/a   0.000
*
    PIPE   [ 2:  0031]  0066  1  5.0  159.11    1.57 12.92  34.12  n/a   0.000
*
    READ STORM                15.0
    [ Ptot= 60.65 mm ]
    fname            :               C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\9d3aff08-f349-4cac-a309-
    remark: 2yr 24hr 15min SCS
*
 ** CALIB NASHYD        0217  1  5.0    8.74    0.05 13.25   7.82 0.13   0.000
    [CN=50.0         ]
    [ N = 3.0:Tp 0.95]
*
    ADD [  0217+  0066]  0149  3  5.0  167.85    1.62 12.92  32.75  n/a   0.000
*
    CHANNEL[ 2:  0149]  0051  1  5.0  167.85    1.45 14.50  32.74  n/a   0.000
*
    READ STORM                15.0
    [ Ptot= 60.65 mm ]
    fname            :               C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\9d3aff08-f349-4cac-a309-
    remark: 2yr 24hr 15min SCS
*
 ** CALIB NASHYD        0220  1  5.0    5.14    0.09 12.92  17.84 0.29   0.000
    [CN=71.4         ]
    [ N = 3.0:Tp 0.68]
*
    READ STORM                15.0
    [ Ptot= 60.65 mm ]
    fname            :               C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\9d3aff08-f349-4cac-a309-
    remark: 2yr 24hr 15min SCS
*
 ** CALIB NASHYD        0218  1  5.0   10.21    0.04 14.08   7.82 0.13   0.000
    [CN=50.0         ]
```

```
    [ N = 3.0:Tp 1.54]
*
    READ STORM                 15.0
    [ Ptot= 60.65 mm ]
    fname                :                   C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\9d3aff08-f349-4cac-a309-
    remark: 2yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0224  1  5.0    2.58    0.25 12.25  34.93 0.58   0.000
    [I%=31.0:S%= 2.00]
*
    ADD [  0218+  0220]  0170  3  5.0   15.35    0.12 13.00  11.18  n/a   0.000
*
    ADD [  0170+  0224]  0170  1  5.0   17.93    0.28 12.25  14.59  n/a   0.000
*
    CHANNEL[ 2:  0170]   0061  1  5.0   17.93    0.13 13.33  14.51  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 60.65 mm ]
    fname                :                   C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\9d3aff08-f349-4cac-a309-
    remark: 2yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0210  1  5.0    7.09    1.25 12.25  53.14 0.88   0.000
    [I%=83.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 60.65 mm ]
    fname                :                   C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\9d3aff08-f349-4cac-a309-
    remark: 2yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0211  1  5.0    8.86    0.99 12.25  39.45 0.65   0.000
    [I%=43.0:S%= 2.00]
*
    ADD [  0210+  0211]  0148  3  5.0   15.95    2.24 12.25  45.53  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0403  1  5.0   15.95    0.12 13.75  45.40  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 60.65 mm ]
    fname                :                   C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\9d3aff08-f349-4cac-a309-
    remark: 2yr 24hr 15min SCS
*
 *  CALIB NASHYD         0213  1  5.0    0.39    0.02 12.25  13.92 0.23   0.000
    [CN=69.0          ]
    [ N = 3.0:Tp 0.05]
*
    ADD [  0213+  0403]  0044  3  5.0   16.34    0.13 13.75  44.65  n/a   0.000
*
    ADD [  0044+  0061]  0044  1  5.0   34.27    0.25 13.42  28.88  n/a   0.000
*
    CHANNEL[ 2:  0044]   0060  1  5.0   34.27    0.21 14.42  28.88  n/a   0.000
*
    ADD [  0051+  0060]  0038  3  5.0  202.11    1.66 14.50  32.09  n/a   0.000
*
    CHANNEL[ 2:  0038]   0052  1  5.0  202.11    1.66 14.58  32.09  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 60.65 mm ]
    fname                :                   C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\9d3aff08-f349-4cac-a309-
```

```
    remark: 2yr 24hr 15min SCS
*
 *  CALIB NASHYD         0219  1  5.0    2.06    0.01 13.25   7.82 0.13   0.000
    [CN=50.0          ]
    [ N = 3.0:Tp 0.90]
*
    READ STORM                 15.0
    [ Ptot= 60.65 mm ]
    fname                :                   C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\9d3aff08-f349-4cac-a309-
    remark: 2yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0214  1  5.0    6.35    0.92 12.25  47.39 0.78   0.000
    [I%=60.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:             0401  1  5.0    6.35    0.06 13.42  47.24  n/a   0.000
    OVERFLOW:            0401  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 60.65 mm ]
    fname                :                   C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\9d3aff08-f349-4cac-a309-
    remark: 2yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0212  1  5.0    8.34    0.67 12.25  32.79 0.54   0.000
    [I%=20.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:             0402  1  5.0    8.34    0.08 13.33  32.53  n/a   0.000
    OVERFLOW:            0402  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    ADD [  0219+  0401]  0039  3  5.0    8.41    0.07 13.42  37.58  n/a   0.000
*
    ADD [  0039+  0402]  0039  1  5.0   16.75    0.15 13.33  35.07  n/a   0.000
*
    ADD [  0039+  0052]  0039  3  5.0  218.87    1.77 14.50  32.32  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 60.65 mm ]
    fname                :                   C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\9d3aff08-f349-4cac-a309-
    remark: 2yr 24hr 15min SCS
*
 *  CALIB NASHYD         0227  1  5.0    1.44    0.09 12.33  26.09 0.43   0.000
    [CN=80.7          ]
    [ N = 3.0:Tp 0.23]
*
    READ STORM                 15.0
    [ Ptot= 60.65 mm ]
    fname                :                   C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\9d3aff08-f349-4cac-a309-
    remark: 2yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0223  1  5.0    1.91    0.19 12.25  35.48 0.58   0.000
    [I%=30.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 60.65 mm ]
    fname                :                   C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\9d3aff08-f349-4cac-a309-
    remark: 2yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0222  1  5.0   14.26    1.84 12.25  45.22 0.75   0.000
```



```
    [I%=59.0:S%= 2.00]
*
    ADD [  0222+  0223]  0185  3  5.0   16.17    2.03 12.25  44.07  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0406  1  5.0   16.17    0.06 16.33  43.95  n/a   0.000
*
    ADD [  0227+  0406]  0186  3  5.0   17.61    0.14 12.33  42.49  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 60.65 mm ]
    fname               :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\9d3aff08-f349-4cac-a309-
    remark: 2yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0201  1  5.0    2.75    0.32 12.25  42.96 0.71   0.000
    [I%=28.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 60.65 mm ]
    fname               :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\9d3aff08-f349-4cac-a309-
    remark: 2yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0202  1  5.0   11.74    1.54 12.25  47.82 0.79   0.000
    [I%=42.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 60.65 mm ]
    fname               :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\9d3aff08-f349-4cac-a309-
    remark: 2yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0100  1  5.0    2.66    0.27 12.25  39.20 0.65   0.000
    [I%=20.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 60.65 mm ]
    fname               :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\9d3aff08-f349-4cac-a309-
    remark: 2yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0221  1  5.0    2.42    0.42 12.25  46.94 0.77   0.000
    [I%=77.0:S%= 2.00]
*
    ADD [  0100+  0201]  0173  3  5.0    5.41    0.58 12.25  41.11  n/a   0.000
*
    ADD [  0173+  0202]  0173  1  5.0   17.15    2.12 12.25  45.71  n/a   0.000
*
    ADD [  0173+  0221]  0173  3  5.0   19.57    2.54 12.25  45.86  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0400  1  5.0   19.57    0.37 12.92  45.38  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 60.65 mm ]
    fname               :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\9d3aff08-f349-4cac-a309-
    remark: 2yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0225  1  5.0   14.21    0.83 12.25  29.08 0.48   0.000
    [I%=17.0:S%= 2.00]
*
    ADD [  0186+  0225]  0178  3  5.0   31.82    0.95 12.25  36.50  n/a   0.000
```



```
*
    ADD [  0178+  0400]  0178  1  5.0   51.39    1.08 12.50  39.88  n/a   0.000
*
=================================================================================
==========================


       V    V   I    SSSSS  U   U    A    L              (v 6.2.2008)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                   *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output       filename:   C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\6a02db35-59c9-4bc6-bcaa-8e007c0067f3\s
  Summary     filename:    C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\6a02db35-59c9-4bc6-bcaa-8e007c0067f3\s


DATE: 08-28-2023                           TIME: 10:52:24

USER:


COMMENTS: ____________________________________________________________


  ************************************************
  ** SIMULATION : 2yr 4hr 10min Chicago         **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    CHIC STORM                 10.0
    [ Ptot= 35.35 mm ]
*
 ** CALIB NASHYD         0101  1  5.0   29.62    0.41  2.08  10.27 0.29   0.000
    [CN=81.9         ]
    [ N = 3.0:Tp 0.57]
*
    PIPE   [ 2:  0101]   0140  1  5.0   29.62    0.40  2.17  10.26  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 35.35 mm ]
*
 ** CALIB NASHYD         0208  1  5.0    1.80    0.01  2.17   3.64 0.10   0.000
    [CN=62.3         ]
    [ N = 3.0:Tp 0.53]
```

```
*
    CHIC STORM                 10.0
    [ Ptot= 35.35 mm ]
*
 *  CALIB STANDHYD       0203  1  5.0    8.59    0.67  1.33  18.51 0.52   0.000
    [I%=36.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 35.35 mm ]
*
 *  CALIB STANDHYD       0204  1  5.0   11.24    0.88  1.33  18.67 0.53   0.000
    [I%=37.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 35.35 mm ]
*
 *  CALIB STANDHYD       0226  1  5.0    8.53    0.73  1.33  19.59 0.55   0.000
    [I%=40.0:S%= 2.00]
*
    ADD [  0140+  0203]  0063  3  5.0   38.21    0.67  1.33  12.12  n/a   0.000
*
    ADD [  0063+  0204]  0063  1  5.0   49.45    1.55  1.33  13.61  n/a   0.000
*
    ADD [  0063+  0208]  0063  3  5.0   51.25    1.55  1.33  13.26  n/a   0.000
*
    ADD [  0063+  0226]  0063  1  5.0   59.78    2.28  1.33  14.16  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0405  1  5.0   59.78    0.14  4.50  14.13  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 35.35 mm ]
*
 *  CALIB NASHYD         0216  1  5.0   11.42    0.02  3.25   1.97 0.06   0.000
    [CN=50.0          ]
    [ N = 3.0:Tp 1.03]
*
    CHIC STORM                 10.0
    [ Ptot= 35.35 mm ]
*
 *  CALIB NASHYD         0215  1  5.0    2.06    0.04  1.67   9.14 0.26   0.000
    [CN=77.8          ]
    [ N = 3.0:Tp 0.33]
*
    CHIC STORM                 10.0
    [ Ptot= 35.35 mm ]
*
 *  CALIB NASHYD         0207  1  5.0    1.37    0.02  1.58   7.70 0.22   0.000
    [CN=74.0          ]
    [ N = 3.0:Tp 0.27]
*
    ADD [  0207+  0215]  0145  3  5.0    3.43    0.06  1.67   8.57  n/a   0.000
*
    ADD [  0145+  0216]  0145  1  5.0   14.85    0.06  1.67   3.49  n/a   0.000
*
    ADD [  0145+  0405]  0145  3  5.0   74.64    0.17  4.25  12.01  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0062  1  5.0   74.64    0.12  5.67  12.01  n/a   0.000
*
    CHANNEL[ 2:  0062]   0048  1  5.0   74.64    0.11  6.17  12.01  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 35.35 mm ]
```

```
*
 *  CALIB STANDHYD       0108  1  5.0    3.97    0.57  1.33  25.44 0.72   0.000
    [I%=67.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 35.35 mm ]
*
 *  CALIB STANDHYD       0107  1  5.0    4.81    0.89  1.33  30.62 0.87   0.000
    [I%=86.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 35.35 mm ]
*
 *  CALIB STANDHYD       0106  1  5.0   26.74    1.22  1.50  17.52 0.50   0.000
    [I%=15.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 35.35 mm ]
*
 *  CALIB STANDHYD       0209  1  5.0   10.31    0.87  1.33  20.47 0.58   0.000
    [I%=39.0:S%= 2.00]
*
    ADD [  0106+  0209]  0146  3  5.0   37.05    2.06  1.33  18.34  n/a   0.000
*
    CHANNEL[ 2:  0146]   0049  1  5.0   37.05    0.66  1.83  18.16  n/a   0.000
*
    ADD [  0107+  0108]  0036  3  5.0    8.78    1.46  1.33  28.28  n/a   0.000
*
    ADD [  0036+  0049]  0036  1  5.0   45.83    1.67  1.33  20.10  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0065  1  5.0   45.83    0.47  2.67  20.09  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 35.35 mm ]
*
 ** CALIB STANDHYD       0206  1  5.0   28.45    2.80  1.33  21.87 0.62   0.000
    [I%=53.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 35.35 mm ]
*
 *  CALIB STANDHYD       0205  1  5.0   10.19    1.12  1.33  21.00 0.59   0.000
    [I%=53.0:S%= 2.00]
*
    ADD [  0205+  0206]  0155  3  5.0   38.64    3.92  1.33  21.64  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0404  1  5.0   38.64    0.06  4.33  18.28  n/a   0.000
*
    ADD [  0404+  0048]  0031  3  5.0  113.28    0.17  6.08  14.15  n/a   0.000
*
    ADD [  0031+  0065]  0031  1  5.0  159.11    0.56  2.67  15.86  n/a   0.000
*
    PIPE   [ 2:  0031]   0066  1  5.0  159.11    0.56  2.67  15.86  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 35.35 mm ]
*
 *  CALIB NASHYD         0217  1  5.0    8.74    0.02  3.08   1.97 0.06   0.000
    [CN=50.0          ]
    [ N = 3.0:Tp 0.95]
*
    ADD [  0217+  0066]  0149  3  5.0  167.85    0.57  2.67  15.14  n/a   0.000
```

```
*
   CHANNEL[ 2:  0149]   0051  1  5.0  167.85    0.49  3.67  15.13  n/a   0.000
*
   CHIC STORM                 10.0
   [ Ptot= 35.35 mm ]
*
 * CALIB NASHYD         0220  1  5.0    5.14    0.03  2.33   5.72 0.16   0.000
   [CN=71.4          ]
   [ N = 3.0:Tp 0.68]
*
   CHIC STORM                 10.0
   [ Ptot= 35.35 mm ]
*
 * CALIB NASHYD         0218  1  5.0   10.21    0.01  4.17   1.97 0.06   0.000
   [CN=50.0          ]
   [ N = 3.0:Tp 1.54]
*
   CHIC STORM                 10.0
   [ Ptot= 35.35 mm ]
*
 * CALIB STANDHYD       0224  1  5.0    2.58    0.18  1.33  16.77 0.47   0.000
   [I%=31.0:S%= 2.00]
*
   ADD [  0218+  0220]  0170  3  5.0   15.35    0.04  2.58   3.22  n/a   0.000
*
   ADD [  0170+  0224]  0170  1  5.0   17.93    0.19  1.33   5.17  n/a   0.000
*
   CHANNEL[ 2:  0170]   0061  1  5.0   17.93    0.06  2.92   5.09  n/a   0.000
*
   CHIC STORM                 10.0
   [ Ptot= 35.35 mm ]
*
 * CALIB STANDHYD       0210  1  5.0    7.09    1.24  1.33  29.82 0.84   0.000
   [I%=83.0:S%= 2.00]
*
   CHIC STORM                 10.0
   [ Ptot= 35.35 mm ]
*
 * CALIB STANDHYD       0211  1  5.0    8.86    0.80  1.33  19.97 0.56   0.000
   [I%=43.0:S%= 2.00]
*
   ADD [  0210+  0211]  0148  3  5.0   15.95    2.04  1.33  24.35  n/a   0.000
*
 ** Reservoir
   OUTFLOW:             0403  1  5.0   15.95    0.04  4.08  24.21  n/a   0.000
*
   CHIC STORM                 10.0
   [ Ptot= 35.35 mm ]
*
 * CALIB NASHYD         0213  1  5.0    0.39    0.01  1.33   4.86 0.14   0.000
   [CN=69.0          ]
   [ N = 3.0:Tp 0.05]
*
   ADD [  0213+  0403]  0044  3  5.0   16.34    0.04  4.00  23.75  n/a   0.000
*
   ADD [  0044+  0061]  0044  1  5.0   34.27    0.10  3.17  13.99  n/a   0.000
*
   CHANNEL[ 2:  0044]   0060  1  5.0   34.27    0.08  4.42  13.98  n/a   0.000
*
   ADD [  0051+  0060]  0038  3  5.0  202.11    0.56  3.75  14.94  n/a   0.000
*
   CHANNEL[ 2:  0038]   0052  1  5.0  202.11    0.55  4.17  14.94  n/a   0.000
*
   CHIC STORM                 10.0
```

```
   [ Ptot= 35.35 mm ]
*
 * CALIB NASHYD         0219  1  5.0    2.06    0.00  3.00   1.97 0.06   0.000
   [CN=50.0          ]
   [ N = 3.0:Tp 0.90]
*
   CHIC STORM                 10.0
   [ Ptot= 35.35 mm ]
*
 * CALIB STANDHYD       0214  1  5.0    6.35    0.82  1.33  25.30 0.72   0.000
   [I%=60.0:S%= 2.00]
*
 ** Reservoir
   OUTFLOW:             0401  1  5.0    6.35    0.02  4.08  25.15  n/a   0.000
   OVERFLOW:            0401  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
   CHIC STORM                 10.0
   [ Ptot= 35.35 mm ]
*
 * CALIB STANDHYD       0212  1  5.0    8.34    0.39  1.33  14.95 0.42   0.000
   [I%=20.0:S%= 2.00]
*
 ** Reservoir
   OUTFLOW:             0402  1  5.0    8.34    0.02  4.25  14.69  n/a   0.000
   OVERFLOW:            0402  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
   ADD [  0219+  0401]  0039  3  5.0    8.41    0.03  3.83  19.47  n/a   0.000
*
   ADD [  0039+  0402]  0039  1  5.0   16.75    0.05  4.17  17.09  n/a   0.000
*
   ADD [  0039+  0052]  0039  3  5.0  218.87    0.60  4.17  15.10  n/a   0.000
*
   CHIC STORM                 10.0
   [ Ptot= 35.35 mm ]
*
 * CALIB NASHYD         0227  1  5.0    1.44    0.03  1.50   9.73 0.28   0.000
   [CN=80.7          ]
   [ N = 3.0:Tp 0.23]
*
   CHIC STORM                 10.0
   [ Ptot= 35.35 mm ]
*
 * CALIB STANDHYD       0223  1  5.0    1.91    0.13  1.33  17.00 0.48   0.000
   [I%=30.0:S%= 2.00]
*
   CHIC STORM                 10.0
   [ Ptot= 35.35 mm ]
*
 * CALIB STANDHYD       0222  1  5.0   14.26    1.67  1.33  24.06 0.68   0.000
   [I%=59.0:S%= 2.00]
*
   ADD [  0222+  0223]  0185  3  5.0   16.17    1.81  1.33  23.23  n/a   0.000
*
 ** Reservoir
   OUTFLOW:             0406  1  5.0   16.17    0.05  4.08  23.10  n/a   0.000
*
   ADD [  0227+  0406]  0186  3  5.0   17.61    0.07  1.58  22.01  n/a   0.000
*
   CHIC STORM                 10.0
   [ Ptot= 35.35 mm ]
*
 * CALIB STANDHYD       0201  1  5.0    2.75    0.22  1.33  21.33 0.60   0.000
   [I%=28.0:S%= 2.00]
*
```

```
    CHIC STORM                  10.0
    [ Ptot= 35.35 mm ]
*
 *  CALIB STANDHYD       0202  1  5.0   11.74    1.18  1.33  24.90 0.70   0.000
    [I%=42.0:S%= 2.00]
*
    CHIC STORM                  10.0
    [ Ptot= 35.35 mm ]
*
 *  CALIB STANDHYD       0100  1  5.0    2.66    0.14  1.33  18.33 0.52   0.000
    [I%=20.0:S%= 2.00]
*
    CHIC STORM                  10.0
    [ Ptot= 35.35 mm ]
*
 *  CALIB STANDHYD       0221  1  5.0    2.42    0.42  1.33  24.08 0.68   0.000
    [I%=77.0:S%= 2.00]
*
    ADD [  0100+  0201]  0173  3  5.0    5.41    0.36  1.33  19.86  n/a   0.000
*
    ADD [  0173+  0202]  0173  1  5.0   17.15    1.54  1.33  23.31  n/a   0.000
*
    ADD [  0173+  0221]  0173  3  5.0   19.57    1.95  1.33  23.40  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0400  1  5.0   19.57    0.11  4.00  23.12  n/a   0.000
*
    CHIC STORM                  10.0
    [ Ptot= 35.35 mm ]
*
 *  CALIB STANDHYD       0225  1  5.0   14.21    0.51  1.33  12.83 0.36   0.000
    [I%=17.0:S%= 2.00]
*
    ADD [  0186+  0225]  0178  3  5.0   31.82    0.55  1.33  17.91  n/a   0.000
*
    ADD [  0178+  0400]  0178  1  5.0   51.39    0.56  1.33  19.89  n/a   0.000
*
=================================================================================
==========================


       V    V   I    SSSSS  U   U    A    L              (v 6.2.2008)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                   *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output      filename:   C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\52738e49-d48b-4d67-aacb-653cbdce83e7\s
  Summary    filename:    C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\52738e49-d48b-4d67-aacb-653cbdce83e7\s
```

```

DATE: 08-28-2023                           TIME: 10:52:23

USER:


COMMENTS: ____________________________________________________________


  ************************************************
  ** SIMULATION : 50yr 12hr 15min SCS           **
  ************************************************

  W/E COMMAND                HYD ID   DT    AREA  '  Qpeak Tpeak   R.V. R.C.   Qbase
                                      min    ha   '   cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                  15.0
    [ Ptot= 98.03 mm ]
    fname          :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\92702317-39d0-4849-b528-
    remark: 50yr 12hr 15min SCS
*
 ** CALIB NASHYD         0101  1  5.0   29.62    2.50  6.75  57.44 0.59   0.000
    [CN=81.9        ]
    [ N = 3.0:Tp 0.57]
*
    PIPE   [ 2:  0101]   0140  1  5.0   29.62    2.45  6.83  57.44  n/a   0.000
*
    READ STORM                  15.0
    [ Ptot= 98.03 mm ]
    fname          :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\92702317-39d0-4849-b528-
    remark: 50yr 12hr 15min SCS
*
 *  CALIB NASHYD         0208  1  5.0    1.80    0.09  6.67  32.17 0.33   0.000
    [CN=62.3        ]
    [ N = 3.0:Tp 0.53]
*
    READ STORM                  15.0
    [ Ptot= 98.03 mm ]
    fname          :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\92702317-39d0-4849-b528-
    remark: 50yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0203  1  5.0    8.59    1.89  6.25  69.20 0.71   0.000
    [I%=36.0:S%= 2.00]
*
    READ STORM                  15.0
    [ Ptot= 98.03 mm ]
    fname          :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\92702317-39d0-4849-b528-
    remark: 50yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0204  1  5.0   11.24    2.46  6.25  69.38 0.71   0.000
    [I%=37.0:S%= 2.00]
*
    READ STORM                  15.0
    [ Ptot= 98.03 mm ]
    fname          :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\92702317-39d0-4849-b528-
    remark: 50yr 12hr 15min SCS
```

```
*
 *  CALIB STANDHYD       0226  1  5.0    8.53    1.95  6.25  71.21 0.73   0.000
    [I%=40.0:S%= 2.00]
*
    ADD [  0140+  0203]  0063  3  5.0   38.21    2.89  6.75  60.09  n/a   0.000
*
    ADD [  0063+  0204]  0063  1  5.0   49.45    5.19  6.25  62.20  n/a   0.000
*
    ADD [  0063+  0208]  0063  3  5.0   51.25    5.23  6.25  61.14  n/a   0.000
*
    ADD [  0063+  0226]  0063  1  5.0   59.78    7.18  6.25  62.58  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0405  1  5.0   59.78    4.53  6.50  62.55  n/a   0.000
*
    READ STORM                    15.0
    [ Ptot= 98.03 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\92702317-39d0-4849-b528-
    remark: 50yr 12hr 15min SCS
*
 *  CALIB NASHYD         0216  1  5.0   11.42    0.22  7.33  21.77 0.22   0.000
    [CN=50.0         ]
    [ N = 3.0:Tp 1.03]
*
    READ STORM                    15.0
    [ Ptot= 98.03 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\92702317-39d0-4849-b528-
    remark: 50yr 12hr 15min SCS
*
 *  CALIB NASHYD         0215  1  5.0    2.06    0.23  6.42  52.58 0.54   0.000
    [CN=77.8         ]
    [ N = 3.0:Tp 0.33]
*
    READ STORM                    15.0
    [ Ptot= 98.03 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\92702317-39d0-4849-b528-
    remark: 50yr 12hr 15min SCS
*
 *  CALIB NASHYD         0207  1  5.0    1.37    0.16  6.42  47.45 0.48   0.000
    [CN=74.0         ]
    [ N = 3.0:Tp 0.27]
*
    ADD [  0207+  0215]  0145  3  5.0    3.43    0.39  6.42  50.53  n/a   0.000
*
    ADD [  0145+  0216]  0145  1  5.0   14.85    0.47  6.50  28.41  n/a   0.000
*
    ADD [  0145+  0405]  0145  3  5.0   74.64    5.00  6.50  55.76  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0062  1  5.0   74.64    2.72  7.42  55.75  n/a   0.000
*
    CHANNEL[ 2:  0062]   0048  1  5.0   74.64    2.64  7.58  55.75  n/a   0.000
*
    READ STORM                    15.0
    [ Ptot= 98.03 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\92702317-39d0-4849-b528-
    remark: 50yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0108  1  5.0    3.97    1.17  6.25  80.34 0.82   0.000
    [I%=67.0:S%= 2.00]
```

```
*
    READ STORM                    15.0
    [ Ptot= 98.03 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\92702317-39d0-4849-b528-
    remark: 50yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0107  1  5.0    4.81    1.60  6.25  90.09 0.92   0.000
    [I%=86.0:S%= 2.00]
*
    READ STORM                    15.0
    [ Ptot= 98.03 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\92702317-39d0-4849-b528-
    remark: 50yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0106  1  5.0   26.74    5.53  6.25  71.15 0.73   0.000
    [I%=15.0:S%= 2.00]
*
    READ STORM                    15.0
    [ Ptot= 98.03 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\92702317-39d0-4849-b528-
    remark: 50yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0209  1  5.0   10.31    2.45  6.25  73.96 0.75   0.000
    [I%=39.0:S%= 2.00]
*
    ADD [  0106+  0209]  0146  3  5.0   37.05    7.98  6.25  71.93  n/a   0.000
*
    CHANNEL[ 2:  0146]   0049  1  5.0   37.05    2.55  6.67  71.75  n/a   0.000
*
    ADD [  0107+  0108]  0036  3  5.0    8.78    2.77  6.25  85.68  n/a   0.000
*
    ADD [  0036+  0049]  0036  1  5.0   45.83    4.31  6.25  74.42  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0065  1  5.0   45.83    2.31  7.08  74.41  n/a   0.000
*
    READ STORM                    15.0
    [ Ptot= 98.03 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\92702317-39d0-4849-b528-
    remark: 50yr 12hr 15min SCS
*
 ** CALIB STANDHYD       0206  1  5.0   28.45    6.75  6.25  73.90 0.75   0.000
    [I%=53.0:S%= 2.00]
*
    READ STORM                    15.0
    [ Ptot= 98.03 mm ]
    fname                :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\92702317-39d0-4849-b528-
    remark: 50yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0205  1  5.0   10.19    2.64  6.25  75.66 0.77   0.000
    [I%=53.0:S%= 2.00]
*
    ADD [  0205+  0206]  0155  3  5.0   38.64    9.38  6.25  74.36  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0404  1  5.0   38.64    1.37  6.83  70.92  n/a   0.000
*
    ADD [  0404+  0048]  0031  3  5.0  113.28    3.94  7.58  60.92  n/a   0.000
*
```

```
    ADD [  0031+  0065]  0031  1  5.0  159.11    5.99  7.33  64.81  n/a   0.000
*
    PIPE   [ 2:  0031]   0066  1  5.0  159.11    5.99  7.33  64.81  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 98.03 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\92702317-39d0-4849-b528-
    remark: 50yr 12hr 15min SCS
*
 *  CALIB NASHYD         0217  1  5.0    8.74    0.18  7.25  21.77 0.22   0.000
    [CN=50.0        ]
    [ N = 3.0:Tp 0.95]
*
    ADD [  0217+  0066]  0149  3  5.0  167.85    6.16  7.33  62.57  n/a   0.000
*
    CHANNEL[ 2:  0149]   0051  1  5.0  167.85    5.90  7.67  62.57  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 98.03 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\92702317-39d0-4849-b528-
    remark: 50yr 12hr 15min SCS
*
 *  CALIB NASHYD         0220  1  5.0    5.14    0.27  6.83  42.12 0.43   0.000
    [CN=71.4        ]
    [ N = 3.0:Tp 0.68]
*
    READ STORM                 15.0
    [ Ptot= 98.03 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\92702317-39d0-4849-b528-
    remark: 50yr 12hr 15min SCS
*
 *  CALIB NASHYD         0218  1  5.0   10.21    0.14  8.00  21.77 0.22   0.000
    [CN=50.0        ]
    [ N = 3.0:Tp 1.54]
*
    READ STORM                 15.0
    [ Ptot= 98.03 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\92702317-39d0-4849-b528-
    remark: 50yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0224  1  5.0    2.58    0.59  6.25  65.67 0.67   0.000
    [I%=31.0:S%= 2.00]
*
    ADD [  0218+  0220]  0170  3  5.0   15.35    0.37  7.00  28.58  n/a   0.000
*
    ADD [  0170+  0224]  0170  1  5.0   17.93    0.71  6.25  33.92  n/a   0.000
*
    CHANNEL[ 2:  0170]   0061  1  5.0   17.93    0.38  7.25  33.84  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 98.03 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\92702317-39d0-4849-b528-
    remark: 50yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0210  1  5.0    7.09    2.30  6.25  88.61 0.90   0.000
    [I%=83.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 98.03 mm ]
```

```
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\92702317-39d0-4849-b528-
    remark: 50yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0211  1  5.0    8.86    2.05  6.25  71.41 0.73   0.000
    [I%=43.0:S%= 2.00]
*
    ADD [  0210+  0211]  0148  3  5.0   15.95    4.35  6.25  79.06  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0403  1  5.0   15.95    1.01  6.58  78.92  n/a   0.000
    OVERFLOW:            0403  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 98.03 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\92702317-39d0-4849-b528-
    remark: 50yr 12hr 15min SCS
*
 *  CALIB NASHYD         0213  1  5.0    0.39    0.06  6.25  31.88 0.33   0.000
    [CN=69.0        ]
    [ N = 3.0:Tp 0.05]
*
    ADD [  0213+  0403]  0044  3  5.0   16.34    1.01  6.58  77.80  n/a   0.000
*
    ADD [  0044+  0061]  0044  1  5.0   34.27    1.32  6.58  54.80  n/a   0.000
*
    CHANNEL[ 2:  0044]   0060  1  5.0   34.27    0.93  7.17  54.79  n/a   0.000
*
    ADD [  0051+  0060]  0038  3  5.0  202.11    6.77  7.67  61.25  n/a   0.000
*
    CHANNEL[ 2:  0038]   0052  1  5.0  202.11    6.74  7.75  61.25  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 98.03 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\92702317-39d0-4849-b528-
    remark: 50yr 12hr 15min SCS
*
 *  CALIB NASHYD         0219  1  5.0    2.06    0.04  7.17  21.77 0.22   0.000
    [CN=50.0        ]
    [ N = 3.0:Tp 0.90]
*
    READ STORM                 15.0
    [ Ptot= 98.03 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\92702317-39d0-4849-b528-
    remark: 50yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0214  1  5.0    6.35    1.89  6.25  81.99 0.84   0.000
    [I%=60.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:             0401  1  5.0    6.35    0.97  6.33  81.84  n/a   0.000
    OVERFLOW:            0401  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 98.03 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\92702317-39d0-4849-b528-
    remark: 50yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0212  1  5.0    8.34    1.59  6.25  63.42 0.65   0.000
    [I%=20.0:S%= 2.00]
```

```
*
 ** Reservoir
    OUTFLOW:             0402  1  5.0    8.34    0.48  6.75  63.16  n/a   0.000
    OVERFLOW:            0402  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    ADD [  0219+  0401]  0039  3  5.0    8.41    0.98  6.33  67.12  n/a   0.000
*
    ADD [  0039+  0402]  0039  1  5.0   16.75    1.24  6.42  65.15  n/a   0.000
*
    ADD [  0039+  0052]  0039  3  5.0  218.87    7.17  7.67  61.55  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 98.03 mm ]
    fname                 :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\92702317-39d0-4849-b528-
    remark: 50yr 12hr 15min SCS
*
 *  CALIB NASHYD         0227  1  5.0    1.44    0.22  6.33  55.65 0.57   0.000
    [CN=80.7         ]
    [ N = 3.0:Tp 0.23]
*
    READ STORM                 15.0
    [ Ptot= 98.03 mm ]
    fname                 :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\92702317-39d0-4849-b528-
    remark: 50yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0223  1  5.0    1.91    0.44  6.25  66.62 0.68   0.000
    [I%=30.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 98.03 mm ]
    fname                 :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\92702317-39d0-4849-b528-
    remark: 50yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0222  1  5.0   14.26    3.75  6.25  78.77 0.80   0.000
    [I%=59.0:S%= 2.00]
*
    ADD [  0222+  0223]  0185  3  5.0   16.17    4.19  6.25  77.34  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0406  1  5.0   16.17    0.71  6.83  77.21  n/a   0.000
*
    ADD [  0227+  0406]  0186  3  5.0   17.61    0.81  6.67  75.45  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 98.03 mm ]
    fname                 :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\92702317-39d0-4849-b528-
    remark: 50yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0201  1  5.0    2.75    0.74  6.25  77.44 0.79   0.000
    [I%=28.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 98.03 mm ]
    fname                 :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\92702317-39d0-4849-b528-
    remark: 50yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0202  1  5.0   11.74    3.13  6.25  83.41 0.85   0.000
    [I%=42.0:S%= 2.00]
*
```

```
    READ STORM                 15.0
    [ Ptot= 98.03 mm ]
    fname                 :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\92702317-39d0-4849-b528-
    remark: 50yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0100  1  5.0    2.66    0.67  6.25  73.15 0.75   0.000
    [I%=20.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 98.03 mm ]
    fname                 :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\92702317-39d0-4849-b528-
    remark: 50yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0221  1  5.0    2.42    0.77  6.25  82.03 0.84   0.000
    [I%=77.0:S%= 2.00]
*
    ADD [  0100+  0201]  0173  3  5.0    5.41    1.41  6.25  75.33  n/a   0.000
*
    ADD [  0173+  0202]  0173  1  5.0   17.15    4.54  6.25  80.86  n/a   0.000
*
    ADD [  0173+  0221]  0173  3  5.0   19.57    5.32  6.25  81.01  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0400  1  5.0   19.57    0.63  6.92  80.65  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 98.03 mm ]
    fname                 :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\92702317-39d0-4849-b528-
    remark: 50yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0225  1  5.0   14.21    2.34  6.25  57.88 0.59   0.000
    [I%=17.0:S%= 2.00]
*
    ADD [  0186+  0225]  0178  3  5.0   31.82    2.62  6.25  67.60  n/a   0.000
*
    ADD [  0178+  0400]  0178  1  5.0   51.39    3.18  6.33  72.57  n/a   0.000
*
=================================================================================
==========================


       V    V   I    SSSSS  U   U    A    L              (v 6.2.2008)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                   *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output       filename:   C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
```

```
f6bf-49d9-879b-0deef97c7539\41ce3b7e-f63f-41a0-b28b-04638714a80c\s
  Summary     filename:     C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\41ce3b7e-f63f-41a0-b28b-04638714a80c\s


DATE: 08-28-2023                            TIME: 10:52:23

USER:


COMMENTS: ___________________________________________________________


  ************************************************
  ** SIMULATION : 50yr 24hr 15min SCS           **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                   min    ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                 15.0
    [ Ptot=120.77 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\f435b299-b236-4ed7-bbc1-
    remark: 50yr 24hr 15min SCS
*
 ** CALIB NASHYD         0101  1  5.0   29.62    2.87 12.67  77.37 0.64   0.000
    [CN=81.9         ]
    [ N = 3.0:Tp 0.57]
*
    PIPE   [ 2:  0101]   0140  1  5.0   29.62    2.82 12.83  77.36  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=120.77 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\f435b299-b236-4ed7-bbc1-
    remark: 50yr 24hr 15min SCS
*
 *  CALIB NASHYD         0208  1  5.0    1.80    0.11 12.67  46.52 0.39   0.000
    [CN=62.3         ]
    [ N = 3.0:Tp 0.53]
*
    READ STORM                 15.0
    [ Ptot=120.77 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\f435b299-b236-4ed7-bbc1-
    remark: 50yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0203  1  5.0    8.59    2.41 12.25  89.57 0.74   0.000
    [I%=36.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot=120.77 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\f435b299-b236-4ed7-bbc1-
    remark: 50yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0204  1  5.0   11.24    2.89 12.25  89.74 0.74   0.000
    [I%=37.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot=120.77 mm ]
```

```
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\f435b299-b236-4ed7-bbc1-
    remark: 50yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0226  1  5.0    8.53    2.47 12.25  91.78 0.76   0.000
    [I%=40.0:S%= 2.00]
*
    ADD [  0140+  0203]  0063  3  5.0   38.21    3.37 12.25  80.11  n/a   0.000
*
    ADD [  0063+  0204]  0063  1  5.0   49.45    6.27 12.25  82.30  n/a   0.000
*
    ADD [  0063+  0208]  0063  3  5.0   51.25    6.32 12.25  81.04  n/a   0.000
*
    ADD [  0063+  0226]  0063  1  5.0   59.78    8.78 12.25  82.57  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0405  1  5.0   59.78    6.48 12.33  82.54  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=120.77 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\f435b299-b236-4ed7-bbc1-
    remark: 50yr 24hr 15min SCS
*
 *  CALIB NASHYD         0216  1  5.0   11.42    0.28 13.33  32.61 0.27   0.000
    [CN=50.0         ]
    [ N = 3.0:Tp 1.03]
*
    READ STORM                 15.0
    [ Ptot=120.77 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\f435b299-b236-4ed7-bbc1-
    remark: 50yr 24hr 15min SCS
*
 *  CALIB NASHYD         0215  1  5.0    2.06    0.27 12.42  71.49 0.59   0.000
    [CN=77.8         ]
    [ N = 3.0:Tp 0.33]
*
    READ STORM                 15.0
    [ Ptot=120.77 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\f435b299-b236-4ed7-bbc1-
    remark: 50yr 24hr 15min SCS
*
 *  CALIB NASHYD         0207  1  5.0    1.37    0.19 12.42  65.34 0.54   0.000
    [CN=74.0         ]
    [ N = 3.0:Tp 0.27]
*
    ADD [  0207+  0215]  0145  3  5.0    3.43    0.46 12.42  69.03  n/a   0.000
*
    ADD [  0145+  0216]  0145  1  5.0   14.85    0.58 12.50  41.02  n/a   0.000
*
    ADD [  0145+  0405]  0145  3  5.0   74.64    7.00 12.33  74.28  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0062  1  5.0   74.64    3.39 13.33  74.28  n/a   0.000
*
    CHANNEL[ 2:  0062]   0048  1  5.0   74.64    3.31 13.50  74.28  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=120.77 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\f435b299-b236-4ed7-bbc1-
    remark: 50yr 24hr 15min SCS
```

```
*
 *  CALIB STANDHYD       0108  1  5.0    3.97    1.36 12.25 101.42 0.84   0.000
    [I%=67.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot=120.77 mm ]
    fname                 :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\f435b299-b236-4ed7-bbc1-
    remark: 50yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0107  1  5.0    4.81    1.84 12.25 112.15 0.93   0.000
    [I%=86.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot=120.77 mm ]
    fname                 :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\f435b299-b236-4ed7-bbc1-
    remark: 50yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0106  1  5.0   26.74    7.32 12.25  92.35 0.76   0.000
    [I%=15.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot=120.77 mm ]
    fname                 :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\f435b299-b236-4ed7-bbc1-
    remark: 50yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0209  1  5.0   10.31    3.09 12.25  95.00 0.79   0.000
    [I%=39.0:S%= 2.00]
*
    ADD [  0106+  0209]  0146  3  5.0   37.05   10.41 12.25  93.09  n/a   0.000
*
    CHANNEL[ 2:  0146]   0049  1  5.0   37.05    2.91 12.58  92.91  n/a   0.000
*
    ADD [  0107+  0108]  0036  3  5.0    8.78    3.20 12.25 107.30  n/a   0.000
*
    ADD [  0036+  0049]  0036  1  5.0   45.83    5.14 12.25  95.67  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0065  1  5.0   45.83    2.62 13.08  95.66  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=120.77 mm ]
    fname                 :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\f435b299-b236-4ed7-bbc1-
    remark: 50yr 24hr 15min SCS
*
 ** CALIB STANDHYD       0206  1  5.0   28.45    7.86 12.25  94.40 0.78   0.000
    [I%=53.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot=120.77 mm ]
    fname                 :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\f435b299-b236-4ed7-bbc1-
    remark: 50yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0205  1  5.0   10.19    3.23 12.25  96.86 0.80   0.000
    [I%=53.0:S%= 2.00]
*
    ADD [  0205+  0206]  0155  3  5.0   38.64   11.09 12.25  95.05  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0404  1  5.0   38.64    1.53 12.83  91.51  n/a   0.000
```

```
*
    ADD [  0404+  0048]  0031  3  5.0  113.28    4.78 13.42  80.15  n/a   0.000
*
    ADD [  0031+  0065]  0031  1  5.0  159.11    7.24 13.25  84.62  n/a   0.000
*
    PIPE   [ 2:  0031]   0066  1  5.0  159.11    7.24 13.25  84.62  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=120.77 mm ]
    fname                 :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\f435b299-b236-4ed7-bbc1-
    remark: 50yr 24hr 15min SCS
*
 *  CALIB NASHYD         0217  1  5.0    8.74    0.23 13.17  32.61 0.27   0.000
    [CN=50.0         ]
    [ N = 3.0:Tp 0.95]
*
    ADD [  0217+  0066]  0149  3  5.0  167.85    7.47 13.25  81.91  n/a   0.000
*
    CHANNEL[ 2:  0149]   0051  1  5.0  167.85    7.13 13.58  81.91  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=120.77 mm ]
    fname                 :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\f435b299-b236-4ed7-bbc1-
    remark: 50yr 24hr 15min SCS
*
 *  CALIB NASHYD         0220  1  5.0    5.14    0.33 12.83  59.13 0.49   0.000
    [CN=71.4         ]
    [ N = 3.0:Tp 0.68]
*
    READ STORM                 15.0
    [ Ptot=120.77 mm ]
    fname                 :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\f435b299-b236-4ed7-bbc1-
    remark: 50yr 24hr 15min SCS
*
 *  CALIB NASHYD         0218  1  5.0   10.21    0.18 13.92  32.61 0.27   0.000
    [CN=50.0         ]
    [ N = 3.0:Tp 1.54]
*
    READ STORM                 15.0
    [ Ptot=120.77 mm ]
    fname                 :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\f435b299-b236-4ed7-bbc1-
    remark: 50yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0224  1  5.0    2.58    0.71 12.25  85.63 0.71   0.000
    [I%=31.0:S%= 2.00]
*
    ADD [  0218+  0220]  0170  3  5.0   15.35    0.45 13.00  41.49  n/a   0.000
*
    ADD [  0170+  0224]  0170  1  5.0   17.93    0.86 12.25  47.84  n/a   0.000
*
    CHANNEL[ 2:  0170]   0061  1  5.0   17.93    0.47 13.25  47.76  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot=120.77 mm ]
    fname                 :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\f435b299-b236-4ed7-bbc1-
    remark: 50yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0210  1  5.0    7.09    2.65 12.25 110.52 0.92   0.000
    [I%=83.0:S%= 2.00]
```

```
*
    READ STORM                  15.0
    [ Ptot=120.77 mm ]
    fname              :                  C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\f435b299-b236-4ed7-bbc1-
    remark: 50yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0211  1  5.0    8.86    2.40 12.25  91.89 0.76   0.000
    [I%=43.0:S%= 2.00]
*
    ADD [  0210+  0211]  0148  3  5.0   15.95    5.05 12.25 100.18  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0403  1  5.0   15.95    1.41 12.50 100.04  n/a   0.000
*
    READ STORM                  15.0
    [ Ptot=120.77 mm ]
    fname              :                  C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\f435b299-b236-4ed7-bbc1-
    remark: 50yr 24hr 15min SCS
*
 *  CALIB NASHYD         0213  1  5.0    0.39    0.07 12.25  44.48 0.37   0.000
    [CN=69.0         ]
    [ N = 3.0:Tp 0.05]
*
    ADD [  0213+  0403]  0044  3  5.0   16.34    1.42 12.50  98.71  n/a   0.000
*
    ADD [  0044+  0061]  0044  1  5.0   34.27    1.78 12.50  72.05  n/a   0.000
*
    CHANNEL[ 2:  0044]   0060  1  5.0   34.27    1.22 12.92  72.05  n/a   0.000
*
    ADD [  0051+  0060]  0038  3  5.0  202.11    8.23 13.50  80.24  n/a   0.000
*
    CHANNEL[ 2:  0038]   0052  1  5.0  202.11    8.19 13.58  80.24  n/a   0.000
*
    READ STORM                  15.0
    [ Ptot=120.77 mm ]
    fname              :                  C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\f435b299-b236-4ed7-bbc1-
    remark: 50yr 24hr 15min SCS
*
 *  CALIB NASHYD         0219  1  5.0    2.06    0.06 13.17  32.61 0.27   0.000
    [CN=50.0         ]
    [ N = 3.0:Tp 0.90]
*
    READ STORM                  15.0
    [ Ptot=120.77 mm ]
    fname              :                  C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\f435b299-b236-4ed7-bbc1-
    remark: 50yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0214  1  5.0    6.35    2.20 12.25 103.62 0.86   0.000
    [I%=60.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:             0401  1  5.0    6.35    1.42 12.33 103.47  n/a   0.000
    OVERFLOW:            0401  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    READ STORM                  15.0
    [ Ptot=120.77 mm ]
    fname              :                  C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\f435b299-b236-4ed7-bbc1-
    remark: 50yr 24hr 15min SCS
*
```

```
 *  CALIB STANDHYD       0212  1  5.0    8.34    2.12 12.25  83.39 0.69   0.000
    [I%=20.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:             0402  1  5.0    8.34    0.82 12.50  83.14  n/a   0.000
    OVERFLOW:            0402  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    ADD [  0219+  0401]  0039  3  5.0    8.41    1.44 12.33  86.11  n/a   0.000
*
    ADD [  0039+  0402]  0039  1  5.0   16.75    1.96 12.33  84.63  n/a   0.000
*
    ADD [  0039+  0052]  0039  3  5.0  218.87    8.71 13.58  80.57  n/a   0.000
*
    READ STORM                  15.0
    [ Ptot=120.77 mm ]
    fname              :                  C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\f435b299-b236-4ed7-bbc1-
    remark: 50yr 24hr 15min SCS
*
 *  CALIB NASHYD         0227  1  5.0    1.44    0.26 12.33  75.26 0.62   0.000
    [CN=80.7         ]
    [ N = 3.0:Tp 0.23]
*
    READ STORM                  15.0
    [ Ptot=120.77 mm ]
    fname              :                  C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\f435b299-b236-4ed7-bbc1-
    remark: 50yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0223  1  5.0    1.91    0.53 12.25  86.78 0.72   0.000
    [I%=30.0:S%= 2.00]
*
    READ STORM                  15.0
    [ Ptot=120.77 mm ]
    fname              :                  C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\f435b299-b236-4ed7-bbc1-
    remark: 50yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0222  1  5.0   14.26    4.62 12.25  99.92 0.83   0.000
    [I%=59.0:S%= 2.00]
*
    ADD [  0222+  0223]  0185  3  5.0   16.17    5.15 12.25  98.37  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0406  1  5.0   16.17    0.90 12.58  98.24  n/a   0.000
*
    ADD [  0227+  0406]  0186  3  5.0   17.61    1.09 12.42  96.36  n/a   0.000
*
    READ STORM                  15.0
    [ Ptot=120.77 mm ]
    fname              :                  C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\f435b299-b236-4ed7-bbc1-
    remark: 50yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0201  1  5.0    2.75    0.86 12.25  99.10 0.82   0.000
    [I%=28.0:S%= 2.00]
*
    READ STORM                  15.0
    [ Ptot=120.77 mm ]
    fname              :                  C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\f435b299-b236-4ed7-bbc1-
    remark: 50yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0202  1  5.0   11.74    3.87 12.25 105.50 0.87   0.000
```

```
    [I%=42.0:S%= 2.00]
*
    READ STORM             15.0
    [ Ptot=120.77 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\f435b299-b236-4ed7-bbc1-
    remark: 50yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0100  1  5.0    2.66    0.79 12.25  94.61 0.78   0.000
    [I%=20.0:S%= 2.00]
*
    READ STORM             15.0
    [ Ptot=120.77 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\f435b299-b236-4ed7-bbc1-
    remark: 50yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0221  1  5.0    2.42    0.90 12.25 103.80 0.86   0.000
    [I%=77.0:S%= 2.00]
*
    ADD [  0100+  0201]  0173  3  5.0    5.41    1.65 12.25  96.89  n/a   0.000
*
    ADD [  0173+  0202]  0173  1  5.0   17.15    5.52 12.25 102.78  n/a   0.000
*
    ADD [  0173+  0221]  0173  3  5.0   19.57    6.42 12.25 102.91  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0400  1  5.0   19.57    0.86 12.83 102.42  n/a   0.000
*
    READ STORM             15.0
    [ Ptot=120.77 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\f435b299-b236-4ed7-bbc1-
    remark: 50yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0225  1  5.0   14.21    2.81 12.25  76.98 0.64   0.000
    [I%=17.0:S%= 2.00]
*
    ADD [  0186+  0225]  0178  3  5.0   31.82    3.50 12.33  87.71  n/a   0.000
*
    ADD [  0178+  0400]  0178  1  5.0   51.39    4.13 12.33  93.31  n/a   0.000
*
=================================================================================
==========================


       V    V   I    SSSSS  U   U    A    L              (v 6.2.2008)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                   *****  S U M M A R Y   O U T P U T  *****
```

```
  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output      filename:   C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\95833d12-d97b-4b2d-9b4f-bdd8ac3bdf17\s
  Summary    filename:    C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\95833d12-d97b-4b2d-9b4f-bdd8ac3bdf17\s


DATE: 08-28-2023                           TIME: 10:52:26

USER:


COMMENTS: ____________________________________________________________


  ************************************************
  ** SIMULATION : 50yr 4hr 10min Chicago       **
  ************************************************

  W/E COMMAND              HYD ID   DT     AREA  ' Qpeak Tpeak   R.V. R.C.    Qbase
                                    min      ha  '  cms   hrs     mm           cms

      START @  0.00 hrs
      --------------------
    CHIC STORM                 10.0
    [ Ptot= 70.40 mm ]
*
 ** CALIB NASHYD         0101  1  5.0   29.62    1.53  2.00  34.67 0.49   0.000
    [CN=81.9         ]
    [ N = 3.0:Tp 0.57]
*
    PIPE   [ 2:  0101]   0140  1  5.0   29.62    1.50  2.08  34.66  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 70.40 mm ]
*
 ** CALIB NASHYD         0208  1  5.0    1.80    0.04  2.00  17.13 0.24   0.000
    [CN=62.3         ]
    [ N = 3.0:Tp 0.53]
*
    CHIC STORM                 10.0
    [ Ptot= 70.40 mm ]
*
 *  CALIB STANDHYD       0203  1  5.0    8.59    1.63  1.33  45.51 0.65   0.000
    [I%=36.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 70.40 mm ]
*
 *  CALIB STANDHYD       0204  1  5.0   11.24    2.13  1.33  45.69 0.65   0.000
    [I%=37.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 70.40 mm ]
*
 *  CALIB STANDHYD       0226  1  5.0    8.53    1.75  1.33  47.20 0.67   0.000
    [I%=40.0:S%= 2.00]
*
    ADD [  0140+  0203]  0063  3  5.0   38.21    1.81  2.00  37.10  n/a   0.000
*
    ADD [  0063+  0204]  0063  1  5.0   49.45    3.82  1.33  39.06  n/a   0.000
*
    ADD [  0063+  0208]  0063  3  5.0   51.25    3.83  1.33  38.29  n/a   0.000
*
```

```
    ADD [  0063+  0226]  0063  1  5.0   59.78    5.58  1.33  39.56  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0405  1  5.0   59.78    2.29  2.25  39.53  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 70.40 mm ]
*
 *  CALIB NASHYD         0216  1  5.0   11.42    0.11  2.83  10.92 0.16   0.000
    [CN=50.0         ]
    [ N = 3.0:Tp 1.03]
*
    CHIC STORM                 10.0
    [ Ptot= 70.40 mm ]
*
 *  CALIB NASHYD         0215  1  5.0    2.06    0.14  1.67  31.28 0.44   0.000
    [CN=77.8         ]
    [ N = 3.0:Tp 0.33]
*
    CHIC STORM                 10.0
    [ Ptot= 70.40 mm ]
*
 *  CALIB NASHYD         0207  1  5.0    1.37    0.09  1.58  27.64 0.39   0.000
    [CN=74.0         ]
    [ N = 3.0:Tp 0.27]
*
    ADD [  0207+  0215]  0145  3  5.0    3.43    0.23  1.58  29.83  n/a   0.000
*
    ADD [  0145+  0216]  0145  1  5.0   14.85    0.26  1.67  15.29  n/a   0.000
*
    ADD [  0145+  0405]  0145  3  5.0   74.64    2.49  2.25  34.70  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0062  1  5.0   74.64    1.53  3.17  34.70  n/a   0.000
*
    CHANNEL[ 2:  0062]   0048  1  5.0   74.64    1.49  3.42  34.70  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 70.40 mm ]
*
 *  CALIB STANDHYD       0108  1  5.0    3.97    1.29  1.33  55.37 0.79   0.000
    [I%=67.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 70.40 mm ]
*
 *  CALIB STANDHYD       0107  1  5.0    4.81    1.88  1.33  63.56 0.90   0.000
    [I%=86.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 70.40 mm ]
*
 *  CALIB STANDHYD       0106  1  5.0   26.74    3.93  1.50  46.23 0.66   0.000
    [I%=15.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 70.40 mm ]
*
 *  CALIB STANDHYD       0209  1  5.0   10.31    2.14  1.33  49.24 0.70   0.000
    [I%=39.0:S%= 2.00]
*
    ADD [  0106+  0209]  0146  3  5.0   37.05    5.66  1.33  47.07  n/a   0.000
*
    CHANNEL[ 2:  0146]   0049  1  5.0   37.05    2.00  1.83  46.89  n/a   0.000
```

```
*
    ADD [  0107+  0108]  0036  3  5.0    8.78    3.17  1.33  59.86  n/a   0.000
*
    ADD [  0036+  0049]  0036  1  5.0   45.83    3.93  1.33  49.37  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0065  1  5.0   45.83    1.78  2.33  49.37  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 70.40 mm ]
*
 ** CALIB STANDHYD       0206  1  5.0   28.45    6.54  1.33  49.89 0.71   0.000
    [I%=53.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 70.40 mm ]
*
 *  CALIB STANDHYD       0205  1  5.0   10.19    2.82  1.33  50.62 0.72   0.000
    [I%=53.0:S%= 2.00]
*
    ADD [  0205+  0206]  0155  3  5.0   38.64    9.36  1.33  50.08  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0404  1  5.0   38.64    0.89  2.50  46.69  n/a   0.000
*
    ADD [  0404+  0048]  0031  3  5.0  113.28    2.28  3.25  38.79  n/a   0.000
*
    ADD [  0031+  0065]  0031  1  5.0  159.11    3.70  3.00  41.84  n/a   0.000
*
    PIPE   [ 2:  0031]   0066  1  5.0  159.11    3.70  3.00  41.84  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 70.40 mm ]
*
 *  CALIB NASHYD         0217  1  5.0    8.74    0.09  2.75  10.92 0.16   0.000
    [CN=50.0         ]
    [ N = 3.0:Tp 0.95]
*
    ADD [  0217+  0066]  0149  3  5.0  167.85    3.79  3.00  40.23  n/a   0.000
*
    CHANNEL[ 2:  0149]   0051  1  5.0  167.85    3.66  3.33  40.22  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 70.40 mm ]
*
 *  CALIB NASHYD         0220  1  5.0    5.14    0.15  2.17  23.60 0.34   0.000
    [CN=71.4         ]
    [ N = 3.0:Tp 0.68]
*
    CHIC STORM                 10.0
    [ Ptot= 70.40 mm ]
*
 *  CALIB NASHYD         0218  1  5.0   10.21    0.08  3.67  10.92 0.16   0.000
    [CN=50.0         ]
    [ N = 3.0:Tp 1.54]
*
    CHIC STORM                 10.0
    [ Ptot= 70.40 mm ]
*
 *  CALIB STANDHYD       0224  1  5.0    2.58    0.45  1.33  42.61 0.61   0.000
    [I%=31.0:S%= 2.00]
*
    ADD [  0218+  0220]  0170  3  5.0   15.35    0.20  2.42  15.16  n/a   0.000
*
```

```
    ADD [  0170+  0224]  0170  1  5.0   17.93    0.47  1.33  19.11  n/a    0.000
 *
    CHANNEL[ 2:  0170]   0061  1  5.0   17.93    0.23  2.83  19.03  n/a    0.000
 *
    CHIC STORM                 10.0
    [ Ptot= 70.40 mm ]
 *
  * CALIB STANDHYD       0210  1  5.0    7.09    2.66  1.33  62.30 0.88    0.000
    [I%=83.0:S%= 2.00]
 *
    CHIC STORM                 10.0
    [ Ptot= 70.40 mm ]
 *
  * CALIB STANDHYD       0211  1  5.0    8.86    1.89  1.33  47.51 0.67    0.000
    [I%=43.0:S%= 2.00]
 *
    ADD [  0210+  0211]  0148  3  5.0   15.95    4.55  1.33  54.09  n/a    0.000
 *
 ** Reservoir
    OUTFLOW:             0403  1  5.0   15.95    0.40  2.42  53.95  n/a    0.000
 *
    CHIC STORM                 10.0
    [ Ptot= 70.40 mm ]
 *
  * CALIB NASHYD         0213  1  5.0    0.39    0.05  1.33  18.18 0.26    0.000
    [CN=69.0          ]
    [ N = 3.0:Tp 0.05]
 *
    ADD [  0213+  0403]  0044  3  5.0   16.34    0.40  2.42  53.09  n/a    0.000
 *
    ADD [  0044+  0061]  0044  1  5.0   34.27    0.62  2.50  35.27  n/a    0.000
 *
    CHANNEL[ 2:  0044]   0060  1  5.0   34.27    0.51  3.33  35.27  n/a    0.000
 *
    ADD [  0051+  0060]  0038  3  5.0  202.11    4.17  3.33  39.38  n/a    0.000
 *
    CHANNEL[ 2:  0038]   0052  1  5.0  202.11    4.16  3.50  39.38  n/a    0.000
 *
    CHIC STORM                 10.0
    [ Ptot= 70.40 mm ]
 *
  * CALIB NASHYD         0219  1  5.0    2.06    0.02  2.67  10.92 0.16    0.000
    [CN=50.0          ]
    [ N = 3.0:Tp 0.90]
 *
    CHIC STORM                 10.0
    [ Ptot= 70.40 mm ]
 *
  * CALIB STANDHYD       0214  1  5.0    6.35    1.99  1.33  56.25 0.80    0.000
    [I%=60.0:S%= 2.00]
 *
 ** Reservoir
    OUTFLOW:             0401  1  5.0    6.35    0.22  2.00  56.10  n/a    0.000
    OVERFLOW:            0401  3  5.0    0.00    0.00  0.00   0.00  n/a    0.000
 *
    CHIC STORM                 10.0
    [ Ptot= 70.40 mm ]
 *
  * CALIB STANDHYD       0212  1  5.0    8.34    1.10  1.33  40.41 0.57    0.000
    [I%=20.0:S%= 2.00]
 *
 ** Reservoir
    OUTFLOW:             0402  1  5.0    8.34    0.20  2.33  40.16  n/a    0.000
    OVERFLOW:            0402  3  5.0    0.00    0.00  0.00   0.00  n/a    0.000
```

```
 *
    ADD [  0219+  0401]  0039  3  5.0    8.41    0.24  2.08  45.03  n/a    0.000
 *
    ADD [  0039+  0402]  0039  1  5.0   16.75    0.43  2.17  42.61  n/a    0.000
 *
    ADD [  0039+  0052]  0039  3  5.0  218.87    4.46  3.42  39.63  n/a    0.000
 *
    CHIC STORM                 10.0
    [ Ptot= 70.40 mm ]
 *
  * CALIB NASHYD         0227  1  5.0    1.44    0.13  1.50  33.36 0.47    0.000
    [CN=80.7          ]
    [ N = 3.0:Tp 0.23]
 *
    CHIC STORM                 10.0
    [ Ptot= 70.40 mm ]
 *
  * CALIB STANDHYD       0223  1  5.0    1.91    0.38  1.33  43.27 0.61    0.000
    [I%=30.0:S%= 2.00]
 *
    CHIC STORM                 10.0
    [ Ptot= 70.40 mm ]
 *
  * CALIB STANDHYD       0222  1  5.0   14.26    4.08  1.33  53.78 0.76    0.000
    [I%=59.0:S%= 2.00]
 *
    ADD [  0222+  0223]  0185  3  5.0   16.17    4.46  1.33  52.54  n/a    0.000
 *
 ** Reservoir
    OUTFLOW:             0406  1  5.0   16.17    0.26  3.25  52.41  n/a    0.000
 *
    ADD [  0227+  0406]  0186  3  5.0   17.61    0.28  3.17  50.85  n/a    0.000
 *
    CHIC STORM                 10.0
    [ Ptot= 70.40 mm ]
 *
  * CALIB STANDHYD       0201  1  5.0    2.75    0.65  1.33  51.76 0.74    0.000
    [I%=28.0:S%= 2.00]
 *
    CHIC STORM                 10.0
    [ Ptot= 70.40 mm ]
 *
  * CALIB STANDHYD       0202  1  5.0   11.74    3.20  1.33  56.98 0.81    0.000
    [I%=42.0:S%= 2.00]
 *
    CHIC STORM                 10.0
    [ Ptot= 70.40 mm ]
 *
  * CALIB STANDHYD       0100  1  5.0    2.66    0.53  1.33  47.82 0.68    0.000
    [I%=20.0:S%= 2.00]
 *
    CHIC STORM                 10.0
    [ Ptot= 70.40 mm ]
 *
  * CALIB STANDHYD       0221  1  5.0    2.42    0.89  1.33  55.98 0.80    0.000
    [I%=77.0:S%= 2.00]
 *
    ADD [  0100+  0201]  0173  3  5.0    5.41    1.18  1.33  49.82  n/a    0.000
 *
    ADD [  0173+  0202]  0173  1  5.0   17.15    4.38  1.33  54.72  n/a    0.000
 *
    ADD [  0173+  0221]  0173  3  5.0   19.57    5.27  1.33  54.88  n/a    0.000
 *
 ** Reservoir
```

```
    OUTFLOW:             0400  1  5.0   19.57    0.45  2.67  54.58  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 70.40 mm ]
*
 *  CALIB STANDHYD       0225  1  5.0   14.21    1.54  1.33  36.17 0.51   0.000
    [I%=17.0:S%= 2.00]
*
    ADD [  0186+  0225]  0178  3  5.0   31.82    1.66  1.33  44.30  n/a   0.000
*
    ADD [  0178+  0400]  0178  1  5.0   51.39    1.91  1.50  48.21  n/a   0.000
*
=================================================================================
==========================


       V    V   I    SSSSS  U   U    A    L              (v 6.2.2008)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                   *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output       filename:   C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\d0f96fcf-8a4c-4993-8d60-d1f15d3f215c\s
  Summary     filename:    C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\d0f96fcf-8a4c-4993-8d60-d1f15d3f215c\s


DATE: 08-28-2023                           TIME: 10:52:27

USER:


COMMENTS: ____________________________________________________________


  ************************************************
  ** SIMULATION : 5yr 12hr 15min SCS            **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                 15.0
    [ Ptot= 65.07 mm ]
    fname                 :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\de2a957f-c553-4ce9-aba9-
    remark: 5yr 12hr 15min SCS
*
```

```
 ** CALIB NASHYD         0101  1  5.0   29.62    1.31  6.75  30.54 0.47   0.000
    [CN=81.9        ]
    [ N = 3.0:Tp 0.57]
*
    PIPE   [ 2:  0101]   0140  1  5.0   29.62    1.29  6.83  30.54  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 65.07 mm ]
    fname                 :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\de2a957f-c553-4ce9-aba9-
    remark: 5yr 12hr 15min SCS
*
 ** CALIB NASHYD         0208  1  5.0    1.80    0.04  6.75  14.61 0.22   0.000
    [CN=62.3        ]
    [ N = 3.0:Tp 0.53]
*
    READ STORM                 15.0
    [ Ptot= 65.07 mm ]
    fname                 :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\de2a957f-c553-4ce9-aba9-
    remark: 5yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0203  1  5.0    8.59    1.09  6.25  41.13 0.63   0.000
    [I%=36.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 65.07 mm ]
    fname                 :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\de2a957f-c553-4ce9-aba9-
    remark: 5yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0204  1  5.0   11.24    1.42  6.25  41.31 0.63   0.000
    [I%=37.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 65.07 mm ]
    fname                 :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\de2a957f-c553-4ce9-aba9-
    remark: 5yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0226  1  5.0    8.53    1.14  6.25  42.75 0.66   0.000
    [I%=40.0:S%= 2.00]
*
    ADD [  0140+  0203]  0063  3  5.0   38.21    1.55  6.75  32.92  n/a   0.000
*
    ADD [  0063+  0204]  0063  1  5.0   49.45    2.87  6.25  34.83  n/a   0.000
*
    ADD [  0063+  0208]  0063  3  5.0   51.25    2.89  6.25  34.12  n/a   0.000
*
    ADD [  0063+  0226]  0063  1  5.0   59.78    4.03  6.25  35.35  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0405  1  5.0   59.78    1.69  7.08  35.31  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 65.07 mm ]
    fname                 :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\de2a957f-c553-4ce9-aba9-
    remark: 5yr 12hr 15min SCS
*
 *  CALIB NASHYD         0216  1  5.0   11.42    0.09  7.42   9.17 0.14   0.000
    [CN=50.0        ]
    [ N = 3.0:Tp 1.03]
*
```

```
    READ STORM                  15.0
    [ Ptot= 65.07 mm ]
    fname              :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\de2a957f-c553-4ce9-aba9-
    remark: 5yr 12hr 15min SCS
*
 *  CALIB NASHYD          0215  1  5.0    2.06    0.12  6.42  27.48 0.42   0.000
    [CN=77.8          ]
    [ N = 3.0:Tp 0.33]
*
    READ STORM                  15.0
    [ Ptot= 65.07 mm ]
    fname              :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\de2a957f-c553-4ce9-aba9-
    remark: 5yr 12hr 15min SCS
*
 *  CALIB NASHYD          0207  1  5.0    1.37    0.08  6.42  24.15 0.37   0.000
    [CN=74.0          ]
    [ N = 3.0:Tp 0.27]
*
    ADD [  0207+  0215]   0145  3  5.0    3.43    0.20  6.42  26.15  n/a   0.000
*
    ADD [  0145+  0216]   0145  1  5.0   14.85    0.23  6.50  13.09  n/a   0.000
*
    ADD [  0145+  0405]   0145  3  5.0   74.64    1.84  7.08  30.89  n/a   0.000
*
 ** Reservoir
    OUTFLOW:              0062  1  5.0   74.64    1.05  7.83  30.89  n/a   0.000
*
    CHANNEL[ 2:  0062]    0048  1  5.0   74.64    1.00  8.17  30.89  n/a   0.000
*
    READ STORM                  15.0
    [ Ptot= 65.07 mm ]
    fname              :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\de2a957f-c553-4ce9-aba9-
    remark: 5yr 12hr 15min SCS
*
 *  CALIB STANDHYD        0108  1  5.0    3.97    0.70  6.25  50.66 0.78   0.000
    [I%=67.0:S%= 2.00]
*
    READ STORM                  15.0
    [ Ptot= 65.07 mm ]
    fname              :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\de2a957f-c553-4ce9-aba9-
    remark: 5yr 12hr 15min SCS
*
 *  CALIB STANDHYD        0107  1  5.0    4.81    1.03  6.25  58.48 0.90   0.000
    [I%=86.0:S%= 2.00]
*
    READ STORM                  15.0
    [ Ptot= 65.07 mm ]
    fname              :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\de2a957f-c553-4ce9-aba9-
    remark: 5yr 12hr 15min SCS
*
 *  CALIB STANDHYD        0106  1  5.0   26.74    3.02  6.25  41.59 0.64   0.000
    [I%=15.0:S%= 2.00]
*
    READ STORM                  15.0
    [ Ptot= 65.07 mm ]
    fname              :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\de2a957f-c553-4ce9-aba9-
    remark: 5yr 12hr 15min SCS
*
```

```
 *  CALIB STANDHYD        0209  1  5.0   10.31    1.43  6.25  44.62 0.69   0.000
    [I%=39.0:S%= 2.00]
*
    ADD [  0106+  0209]   0146  3  5.0   37.05    4.45  6.25  42.44  n/a   0.000
*
    CHANNEL[ 2:  0146]    0049  1  5.0   37.05    1.44  6.75  42.26  n/a   0.000
*
    ADD [  0107+  0108]   0036  3  5.0    8.78    1.73  6.25  54.95  n/a   0.000
*
    ADD [  0036+  0049]   0036  1  5.0   45.83    2.58  6.25  44.69  n/a   0.000
*
 ** Reservoir
    OUTFLOW:              0065  1  5.0   45.83    1.39  7.00  44.68  n/a   0.000
*
    READ STORM                  15.0
    [ Ptot= 65.07 mm ]
    fname              :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\de2a957f-c553-4ce9-aba9-
    remark: 5yr 12hr 15min SCS
*
 ** CALIB STANDHYD        0206  1  5.0   28.45    3.89  6.25  45.42 0.70   0.000
    [I%=53.0:S%= 2.00]
*
    READ STORM                  15.0
    [ Ptot= 65.07 mm ]
    fname              :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\de2a957f-c553-4ce9-aba9-
    remark: 5yr 12hr 15min SCS
*
 *  CALIB STANDHYD        0205  1  5.0   10.19    1.60  6.25  45.92 0.71   0.000
    [I%=53.0:S%= 2.00]
*
    ADD [  0205+  0206]   0155  3  5.0   38.64    5.49  6.25  45.55  n/a   0.000
*
 ** Reservoir
    OUTFLOW:              0404  1  5.0   38.64    0.61  7.08  42.11  n/a   0.000
*
    ADD [  0404+  0048]   0031  3  5.0  113.28    1.51  8.00  34.72  n/a   0.000
*
    ADD [  0031+  0065]   0031  1  5.0  159.11    2.74  7.75  37.59  n/a   0.000
*
    PIPE   [ 2:  0031]    0066  1  5.0  159.11    2.74  7.75  37.59  n/a   0.000
*
    READ STORM                  15.0
    [ Ptot= 65.07 mm ]
    fname              :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\de2a957f-c553-4ce9-aba9-
    remark: 5yr 12hr 15min SCS
*
 *  CALIB NASHYD          0217  1  5.0    8.74    0.07  7.25   9.17 0.14   0.000
    [CN=50.0          ]
    [ N = 3.0:Tp 0.95]
*
    ADD [  0217+  0066]   0149  3  5.0  167.85    2.81  7.75  36.11  n/a   0.000
*
    CHANNEL[ 2:  0149]    0051  1  5.0  167.85    2.68  8.08  36.11  n/a   0.000
*
    READ STORM                  15.0
    [ Ptot= 65.07 mm ]
    fname              :                 C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\de2a957f-c553-4ce9-aba9-
    remark: 5yr 12hr 15min SCS
*
 *  CALIB NASHYD          0220  1  5.0    5.14    0.13  6.92  20.39 0.31   0.000
```

```
    [CN=71.4          ]
    [ N = 3.0:Tp 0.68]
*
    READ STORM                 15.0
    [ Ptot= 65.07 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\de2a957f-c553-4ce9-aba9-
    remark: 5yr 12hr 15min SCS
*
 *  CALIB NASHYD          0218  1  5.0   10.21    0.06  8.08   9.17 0.14   0.000
    [CN=50.0          ]
    [ N = 3.0:Tp 1.54]
*
    READ STORM                 15.0
    [ Ptot= 65.07 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\de2a957f-c553-4ce9-aba9-
    remark: 5yr 12hr 15min SCS
*
 *  CALIB STANDHYD        0224  1  5.0    2.58    0.31  6.25  38.38 0.59   0.000
    [I%=31.0:S%= 2.00]
*
    ADD [  0218+  0220]   0170  3  5.0   15.35    0.17  7.00  12.93  n/a   0.000
*
    ADD [  0170+  0224]   0170  1  5.0   17.93    0.35  6.25  16.59  n/a   0.000
*
    CHANNEL[ 2:  0170]    0061  1  5.0   17.93    0.18  7.33  16.51  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 65.07 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\de2a957f-c553-4ce9-aba9-
    remark: 5yr 12hr 15min SCS
*
 *  CALIB STANDHYD        0210  1  5.0    7.09    1.48  6.25  57.29 0.88   0.000
    [I%=83.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 65.07 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\de2a957f-c553-4ce9-aba9-
    remark: 5yr 12hr 15min SCS
*
 *  CALIB STANDHYD        0211  1  5.0    8.86    1.20  6.25  43.07 0.66   0.000
    [I%=43.0:S%= 2.00]
*
    ADD [  0210+  0211]   0148  3  5.0   15.95    2.68  6.25  49.39  n/a   0.000
*
 ** Reservoir
    OUTFLOW:              0403  1  5.0   15.95    0.24  7.08  49.25  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 65.07 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\de2a957f-c553-4ce9-aba9-
    remark: 5yr 12hr 15min SCS
*
 *  CALIB NASHYD          0213  1  5.0    0.39    0.03  6.25  15.81 0.24   0.000
    [CN=69.0          ]
    [ N = 3.0:Tp 0.05]
*
    ADD [  0213+  0403]   0044  3  5.0   16.34    0.25  7.08  48.45  n/a   0.000
*
    ADD [  0044+  0061]   0044  1  5.0   34.27    0.42  7.17  31.74  n/a   0.000
```

```
*
    CHANNEL[ 2:  0044]    0060  1  5.0   34.27    0.34  8.17  31.74  n/a   0.000
*
    ADD [  0051+  0060]   0038  3  5.0  202.11    3.01  8.08  35.36  n/a   0.000
*
    CHANNEL[ 2:  0038]    0052  1  5.0  202.11    2.98  8.17  35.36  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 65.07 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\de2a957f-c553-4ce9-aba9-
    remark: 5yr 12hr 15min SCS
*
 *  CALIB NASHYD          0219  1  5.0    2.06    0.02  7.25   9.17 0.14   0.000
    [CN=50.0          ]
    [ N = 3.0:Tp 0.90]
*
    READ STORM                 15.0
    [ Ptot= 65.07 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\de2a957f-c553-4ce9-aba9-
    remark: 5yr 12hr 15min SCS
*
 *  CALIB STANDHYD        0214  1  5.0    6.35    1.10  6.25  51.39 0.79   0.000
    [I%=60.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:              0401  1  5.0    6.35    0.13  6.92  51.24  n/a   0.000
    OVERFLOW:             0401  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 65.07 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\de2a957f-c553-4ce9-aba9-
    remark: 5yr 12hr 15min SCS
*
 *  CALIB STANDHYD        0212  1  5.0    8.34    0.86  6.25  36.20 0.56   0.000
    [I%=20.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:              0402  1  5.0    8.34    0.14  7.08  35.95  n/a   0.000
    OVERFLOW:             0402  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    ADD [  0219+  0401]   0039  3  5.0    8.41    0.15  6.92  40.93  n/a   0.000
*
    ADD [  0039+  0402]   0039  1  5.0   16.75    0.29  6.92  38.45  n/a   0.000
*
    ADD [  0039+  0052]   0039  3  5.0  218.87    3.19  8.17  35.60  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 65.07 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\de2a957f-c553-4ce9-aba9-
    remark: 5yr 12hr 15min SCS
*
 *  CALIB NASHYD          0227  1  5.0    1.44    0.12  6.33  29.33 0.45   0.000
    [CN=80.7          ]
    [ N = 3.0:Tp 0.23]
*
    READ STORM                 15.0
    [ Ptot= 65.07 mm ]
    fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\de2a957f-c553-4ce9-aba9-
    remark: 5yr 12hr 15min SCS
```

```
*
 *  CALIB STANDHYD       0223  1  5.0    1.91    0.23  6.25  38.98 0.60   0.000
    [I%=30.0:S%= 2.00]
*
    READ STORM                15.0
    [ Ptot= 65.07 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\de2a957f-c553-4ce9-aba9-
    remark: 5yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0222  1  5.0   14.26    2.29  6.25  49.08 0.75   0.000
    [I%=59.0:S%= 2.00]
*
    ADD [  0222+  0223]  0185  3  5.0   16.17    2.52  6.25  47.89  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0406  1  5.0   16.17    0.11  8.42  47.76  n/a   0.000
*
    ADD [  0227+  0406]  0186  3  5.0   17.61    0.17  6.33  46.25  n/a   0.000
*
    READ STORM                15.0
    [ Ptot= 65.07 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\de2a957f-c553-4ce9-aba9-
    remark: 5yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0201  1  5.0    2.75    0.39  6.25  46.92 0.72   0.000
    [I%=28.0:S%= 2.00]
*
    READ STORM                15.0
    [ Ptot= 65.07 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\de2a957f-c553-4ce9-aba9-
    remark: 5yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0202  1  5.0   11.74    1.89  6.25  51.96 0.80   0.000
    [I%=42.0:S%= 2.00]
*
    READ STORM                15.0
    [ Ptot= 65.07 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\de2a957f-c553-4ce9-aba9-
    remark: 5yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0100  1  5.0    2.66    0.34  6.25  43.08 0.66   0.000
    [I%=20.0:S%= 2.00]
*
    READ STORM                15.0
    [ Ptot= 65.07 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\de2a957f-c553-4ce9-aba9-
    remark: 5yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0221  1  5.0    2.42    0.49  6.25  51.02 0.78   0.000
    [I%=77.0:S%= 2.00]
*
    ADD [  0100+  0201]  0173  3  5.0    5.41    0.73  6.25  45.03  n/a   0.000
*
    ADD [  0173+  0202]  0173  1  5.0   17.15    2.62  6.25  49.77  n/a   0.000
*
    ADD [  0173+  0221]  0173  3  5.0   19.57    3.12  6.25  49.93  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0400  1  5.0   19.57    0.39  7.00  49.58  n/a   0.000
```

```
*
    READ STORM                15.0
    [ Ptot= 65.07 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\de2a957f-c553-4ce9-aba9-
    remark: 5yr 12hr 15min SCS
*
 *  CALIB STANDHYD       0225  1  5.0   14.21    1.22  6.25  32.25 0.50   0.000
    [I%=17.0:S%= 2.00]
*
    ADD [  0186+  0225]  0178  3  5.0   31.82    1.37  6.25  40.00  n/a   0.000
*
    ADD [  0178+  0400]  0178  1  5.0   51.39    1.58  6.33  43.65  n/a   0.000
*
================================================================================
==========================


       V    V   I    SSSSS  U   U    A    L              (v 6.2.2008)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO    TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O     T      T    H   H   Y Y   MM MM  O   O
       O   O     T      T    H   H    Y    M   M  O   O
        OOO      T      T    H   H    Y    M   M   OOO
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                   *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output      filename:   C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\812e3d57-3418-48df-9d34-ad83f2ad2513\s
  Summary    filename:    C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\812e3d57-3418-48df-9d34-ad83f2ad2513\s


DATE: 08-28-2023                           TIME: 10:52:26

USER:


COMMENTS: ____________________________________________________________


  **************************************************
  ** SIMULATION : 5yr 24hr 15min SCS              **
  **************************************************

  W/E COMMAND              HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                    min    ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                15.0
    [ Ptot= 80.17 mm ]
    fname                :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\eb84ab1a-aaca-4381-89f0-
```

```
    remark: 5yr 24hr 15min SCS
*
 ** CALIB NASHYD         0101  1  5.0   29.62    1.57 12.75  42.49 0.53   0.000
    [CN=81.9         ]
    [ N = 3.0:Tp 0.57]
*
    PIPE   [ 2:  0101]   0140  1  5.0   29.62    1.53 12.83  42.48  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 80.17 mm ]
    fname               :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\eb84ab1a-aaca-4381-89f0-
    remark: 5yr 24hr 15min SCS
*
 ** CALIB NASHYD         0208  1  5.0    1.80    0.05 12.67  22.09 0.28   0.000
    [CN=62.3         ]
    [ N = 3.0:Tp 0.53]
*
    READ STORM                 15.0
    [ Ptot= 80.17 mm ]
    fname               :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\eb84ab1a-aaca-4381-89f0-
    remark: 5yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0203  1  5.0    8.59    1.29 12.25  53.72 0.67   0.000
    [I%=36.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 80.17 mm ]
    fname               :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\eb84ab1a-aaca-4381-89f0-
    remark: 5yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0204  1  5.0   11.24    1.68 12.25  53.90 0.67   0.000
    [I%=37.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 80.17 mm ]
    fname               :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\eb84ab1a-aaca-4381-89f0-
    remark: 5yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0226  1  5.0    8.53    1.34 12.25  55.54 0.69   0.000
    [I%=40.0:S%= 2.00]
*
    ADD [  0140+  0203]  0063  3  5.0   38.21    1.82 12.75  45.01  n/a   0.000
*
    ADD [  0063+  0204]  0063  1  5.0   49.45    3.43 12.25  47.03  n/a   0.000
*
    ADD [  0063+  0208]  0063  3  5.0   51.25    3.45 12.25  46.15  n/a   0.000
*
    ADD [  0063+  0226]  0063  1  5.0   59.78    4.79 12.25  47.49  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0405  1  5.0   59.78    2.36 12.83  47.46  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 80.17 mm ]
    fname               :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\eb84ab1a-aaca-4381-89f0-
    remark: 5yr 24hr 15min SCS
*
 *  CALIB NASHYD         0216  1  5.0   11.42    0.12 13.33  14.42 0.18   0.000
    [CN=50.0         ]
```

```
    [ N = 3.0:Tp 1.03]
*
    READ STORM                 15.0
    [ Ptot= 80.17 mm ]
    fname               :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\eb84ab1a-aaca-4381-89f0-
    remark: 5yr 24hr 15min SCS
*
 *  CALIB NASHYD         0215  1  5.0    2.06    0.14 12.42  38.54 0.48   0.000
    [CN=77.8         ]
    [ N = 3.0:Tp 0.33]
*
    READ STORM                 15.0
    [ Ptot= 80.17 mm ]
    fname               :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\eb84ab1a-aaca-4381-89f0-
    remark: 5yr 24hr 15min SCS
*
 *  CALIB NASHYD         0207  1  5.0    1.37    0.10 12.42  34.35 0.43   0.000
    [CN=74.0         ]
    [ N = 3.0:Tp 0.27]
*
    ADD [  0207+  0215]  0145  3  5.0    3.43    0.24 12.42  36.87  n/a   0.000
*
    ADD [  0145+  0216]  0145  1  5.0   14.85    0.29 12.50  19.61  n/a   0.000
*
    ADD [  0145+  0405]  0145  3  5.0   74.64    2.59 12.83  41.92  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0062  1  5.0   74.64    1.47 13.67  41.92  n/a   0.000
*
    CHANNEL[ 2:  0062]   0048  1  5.0   74.64    1.41 13.92  41.92  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 80.17 mm ]
    fname               :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\eb84ab1a-aaca-4381-89f0-
    remark: 5yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0108  1  5.0    3.97    0.81 12.25  64.10 0.80   0.000
    [I%=67.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 80.17 mm ]
    fname               :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\eb84ab1a-aaca-4381-89f0-
    remark: 5yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0107  1  5.0    4.81    1.19 12.25  72.90 0.91   0.000
    [I%=86.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 80.17 mm ]
    fname               :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\eb84ab1a-aaca-4381-89f0-
    remark: 5yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0106  1  5.0   26.74    3.58 12.25  54.90 0.68   0.000
    [I%=15.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 80.17 mm ]
    fname               :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\eb84ab1a-aaca-4381-89f0-
```

```
    remark: 5yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0209  1  5.0   10.31    1.69 12.25  57.84 0.72   0.000
    [I%=39.0:S%= 2.00]
*
    ADD [  0106+  0209]  0146  3  5.0   37.05    5.27 12.25  55.72  n/a   0.000
*
    CHANNEL[ 2:  0146]   0049  1  5.0   37.05    1.82 12.67  55.54  n/a   0.000
*
    ADD [  0107+  0108]  0036  3  5.0    8.78    2.00 12.25  68.92  n/a   0.000
*
    ADD [  0036+  0049]  0036  1  5.0   45.83    3.09 12.25  58.10  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0065  1  5.0   45.83    1.66 12.92  58.10  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 80.17 mm ]
    fname               :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\eb84ab1a-aaca-4381-89f0-
    remark: 5yr 24hr 15min SCS
*
 ** CALIB STANDHYD       0206  1  5.0   28.45    4.71 12.25  58.24 0.73   0.000
    [I%=53.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 80.17 mm ]
    fname               :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\eb84ab1a-aaca-4381-89f0-
    remark: 5yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0205  1  5.0   10.19    1.86 12.25  59.36 0.74   0.000
    [I%=53.0:S%= 2.00]
*
    ADD [  0205+  0206]  0155  3  5.0   38.64    6.58 12.25  58.54  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0404  1  5.0   38.64    0.96 12.83  55.01  n/a   0.000
*
    ADD [  0404+  0048]  0031  3  5.0  113.28    2.11 13.75  46.38  n/a   0.000
*
    ADD [  0031+  0065]  0031  1  5.0  159.11    3.52 13.50  49.76  n/a   0.000
*
    PIPE   [ 2:  0031]   0066  1  5.0  159.11    3.52 13.50  49.76  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 80.17 mm ]
    fname               :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\eb84ab1a-aaca-4381-89f0-
    remark: 5yr 24hr 15min SCS
*
 *  CALIB NASHYD         0217  1  5.0    8.74    0.10 13.25  14.42 0.18   0.000
    [CN=50.0          ]
    [ N = 3.0:Tp 0.95]
*
    ADD [  0217+  0066]  0149  3  5.0  167.85    3.61 13.50  47.92  n/a   0.000
*
    CHANNEL[ 2:  0149]   0051  1  5.0  167.85    3.45 13.83  47.91  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 80.17 mm ]
    fname               :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\eb84ab1a-aaca-4381-89f0-
    remark: 5yr 24hr 15min SCS
```

```
*
 *  CALIB NASHYD         0220  1  5.0    5.14    0.16 12.83  29.82 0.37   0.000
    [CN=71.4          ]
    [ N = 3.0:Tp 0.68]
*
    READ STORM                 15.0
    [ Ptot= 80.17 mm ]
    fname               :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\eb84ab1a-aaca-4381-89f0-
    remark: 5yr 24hr 15min SCS
*
 *  CALIB NASHYD         0218  1  5.0   10.21    0.08 14.00  14.42 0.18   0.000
    [CN=50.0          ]
    [ N = 3.0:Tp 1.54]
*
    READ STORM                 15.0
    [ Ptot= 80.17 mm ]
    fname               :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\eb84ab1a-aaca-4381-89f0-
    remark: 5yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0224  1  5.0    2.58    0.37 12.25  50.57 0.63   0.000
    [I%=31.0:S%= 2.00]
*
    ADD [  0218+  0220]  0170  3  5.0   15.35    0.21 13.00  19.58  n/a   0.000
*
    ADD [  0170+  0224]  0170  1  5.0   17.93    0.43 12.25  24.04  n/a   0.000
*
    CHANNEL[ 2:  0170]   0061  1  5.0   17.93    0.22 13.33  23.96  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 80.17 mm ]
    fname               :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\eb84ab1a-aaca-4381-89f0-
    remark: 5yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0210  1  5.0    7.09    1.70 12.25  71.55 0.89   0.000
    [I%=83.0:S%= 2.00]
*
    READ STORM                 15.0
    [ Ptot= 80.17 mm ]
    fname               :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\eb84ab1a-aaca-4381-89f0-
    remark: 5yr 24hr 15min SCS
*
 *  CALIB STANDHYD       0211  1  5.0    8.86    1.42 12.25  55.81 0.70   0.000
    [I%=43.0:S%= 2.00]
*
    ADD [  0210+  0211]  0148  3  5.0   15.95    3.12 12.25  62.81  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0403  1  5.0   15.95    0.39 12.83  62.67  n/a   0.000
*
    READ STORM                 15.0
    [ Ptot= 80.17 mm ]
    fname               :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\eb84ab1a-aaca-4381-89f0-
    remark: 5yr 24hr 15min SCS
*
 *  CALIB NASHYD         0213  1  5.0    0.39    0.04 12.25  22.78 0.28   0.000
    [CN=69.0          ]
    [ N = 3.0:Tp 0.05]
*
    ADD [  0213+  0403]  0044  3  5.0   16.34    0.40 12.83  61.72  n/a   0.000
```

```
*
   ADD [  0044+  0061]  0044  1  5.0   34.27    0.60 12.92  41.96  n/a   0.000
*
   CHANNEL[ 2:  0044]   0060  1  5.0   34.27    0.46 13.67  41.96  n/a   0.000
*
   ADD [  0051+  0060]  0038  3  5.0  202.11    3.90 13.83  46.90  n/a   0.000
*
   CHANNEL[ 2:  0038]   0052  1  5.0  202.11    3.88 14.00  46.90  n/a   0.000
*
   READ STORM                 15.0
   [ Ptot= 80.17 mm ]
   fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\eb84ab1a-aaca-4381-89f0-
   remark: 5yr 24hr 15min SCS
*
 *  CALIB NASHYD        0219  1  5.0    2.06    0.02 13.17  14.42 0.18   0.000
   [CN=50.0         ]
   [ N = 3.0:Tp 0.90]
*
   READ STORM                 15.0
   [ Ptot= 80.17 mm ]
   fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\eb84ab1a-aaca-4381-89f0-
   remark: 5yr 24hr 15min SCS
*
 *  CALIB STANDHYD      0214  1  5.0    6.35    1.36 12.25  65.26 0.81   0.000
   [I%=60.0:S%= 2.00]
*
 ** Reservoir
   OUTFLOW:             0401  1  5.0    6.35    0.22 12.67  65.11  n/a   0.000
   OVERFLOW:            0401  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
   READ STORM                 15.0
   [ Ptot= 80.17 mm ]
   fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\eb84ab1a-aaca-4381-89f0-
   remark: 5yr 24hr 15min SCS
*
 *  CALIB STANDHYD      0212  1  5.0    8.34    1.03 12.25  48.35 0.60   0.000
   [I%=20.0:S%= 2.00]
*
 ** Reservoir
   OUTFLOW:             0402  1  5.0    8.34    0.22 12.83  48.09  n/a   0.000
   OVERFLOW:            0402  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
   ADD [  0219+  0401]  0039  3  5.0    8.41    0.24 12.67  52.70  n/a   0.000
*
   ADD [  0039+  0402]  0039  1  5.0   16.75    0.45 12.75  50.40  n/a   0.000
*
   ADD [  0039+  0052]  0039  3  5.0  218.87    4.14 13.92  47.17  n/a   0.000
*
   READ STORM                 15.0
   [ Ptot= 80.17 mm ]
   fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\eb84ab1a-aaca-4381-89f0-
   remark: 5yr 24hr 15min SCS
*
 *  CALIB NASHYD        0227  1  5.0    1.44    0.14 12.33  40.99 0.51   0.000
   [CN=80.7         ]
   [ N = 3.0:Tp 0.23]
*
   READ STORM                 15.0
   [ Ptot= 80.17 mm ]
   fname              :                C:\Users\jmacdonald\AppData\Local\Temp
```

```
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\eb84ab1a-aaca-4381-89f0-
   remark: 5yr 24hr 15min SCS
*
 *  CALIB STANDHYD      0223  1  5.0    1.91    0.27 12.25  51.34 0.64   0.000
   [I%=30.0:S%= 2.00]
*
   READ STORM                 15.0
   [ Ptot= 80.17 mm ]
   fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\eb84ab1a-aaca-4381-89f0-
   remark: 5yr 24hr 15min SCS
*
 *  CALIB STANDHYD      0222  1  5.0   14.26    2.67 12.25  62.50 0.78   0.000
   [I%=59.0:S%= 2.00]
*
   ADD [  0222+  0223]  0185  3  5.0   16.17    2.94 12.25  61.19  n/a   0.000
*
 ** Reservoir
   OUTFLOW:             0406  1  5.0   16.17    0.18 13.58  61.06  n/a   0.000
*
   ADD [  0227+  0406]  0186  3  5.0   17.61    0.20 12.33  59.42  n/a   0.000
*
   READ STORM                 15.0
   [ Ptot= 80.17 mm ]
   fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\eb84ab1a-aaca-4381-89f0-
   remark: 5yr 24hr 15min SCS
*
 *  CALIB STANDHYD      0201  1  5.0    2.75    0.46 12.25  60.73 0.76   0.000
   [I%=28.0:S%= 2.00]
*
   READ STORM                 15.0
   [ Ptot= 80.17 mm ]
   fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\eb84ab1a-aaca-4381-89f0-
   remark: 5yr 24hr 15min SCS
*
 *  CALIB STANDHYD      0202  1  5.0   11.74    2.19 12.25  66.26 0.83   0.000
   [I%=42.0:S%= 2.00]
*
   READ STORM                 15.0
   [ Ptot= 80.17 mm ]
   fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\eb84ab1a-aaca-4381-89f0-
   remark: 5yr 24hr 15min SCS
*
 *  CALIB STANDHYD      0100  1  5.0    2.66    0.40 12.25  56.65 0.71   0.000
   [I%=20.0:S%= 2.00]
*
   READ STORM                 15.0
   [ Ptot= 80.17 mm ]
   fname              :                C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\eb84ab1a-aaca-4381-89f0-
   remark: 5yr 24hr 15min SCS
*
 *  CALIB STANDHYD      0221  1  5.0    2.42    0.57 12.25  65.12 0.81   0.000
   [I%=77.0:S%= 2.00]
*
   ADD [  0100+  0201]  0173  3  5.0    5.41    0.86 12.25  58.72  n/a   0.000
*
   ADD [  0173+  0202]  0173  1  5.0   17.15    3.05 12.25  63.88  n/a   0.000
*
   ADD [  0173+  0221]  0173  3  5.0   19.57    3.62 12.25  64.03  n/a   0.000
*
```

```
 ** Reservoir
    OUTFLOW:            0400  1  5.0   19.57    0.48 12.92  63.55  n/a   0.000
*
    READ STORM                   15.0
    [ Ptot= 80.17 mm ]
    fname              :                   C:\Users\jmacdonald\AppData\Local\Temp
\d262faa6-7527-4f3b-9e3f-9e99a831fc42\eb84ab1a-aaca-4381-89f0-
    remark: 5yr 24hr 15min SCS
*
 *  CALIB STANDHYD      0225  1  5.0   14.21    1.49 12.25  43.61 0.54   0.000
    [I%=17.0:S%= 2.00]
*
    ADD [  0186+  0225]  0178  3  5.0   31.82    1.66 12.25  52.36  n/a   0.000
*
    ADD [  0178+  0400]  0178  1  5.0   51.39    2.03 12.25  56.62  n/a   0.000
*
==================================================================================
==========================


       V    V   I    SSSSS  U   U    A    L              (v 6.2.2008)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M  OOO     TM
       O   O    T      T    H   H   Y Y   MM MM O   O
       O   O    T      T    H   H    Y    M   M O   O
        OOO     T      T    H   H    Y    M   M  OOO
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                   *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output       filename:    C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\02d64c11-2c15-40d1-8158-fdfbaed76bb6\s
  Summary     filename:     C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\02d64c11-2c15-40d1-8158-fdfbaed76bb6\s


DATE: 08-28-2023                           TIME: 10:52:22

USER:


COMMENTS: ____________________________________________________________


  ************************************************
  ** SIMULATION : 5yr 4hr 10min Chicago        **
  ************************************************

  W/E COMMAND             HYD ID   DT     AREA  ' Qpeak Tpeak    R.V.  R.C.    Qbase
                                   min     ha   '  cms   hrs      mm             cms

      START @  0.00 hrs
      --------------------
    CHIC STORM                   10.0
    [ Ptot= 46.73 mm ]
```

```
*
 ** CALIB NASHYD        0101  1  5.0   29.62    0.73  2.00  17.35 0.37   0.000
    [CN=81.9          ]
    [ N = 3.0:Tp 0.57]
*
    PIPE   [ 2:  0101]  0140  1  5.0   29.62    0.71  2.17  17.34  n/a   0.000
*
    CHIC STORM                   10.0
    [ Ptot= 46.73 mm ]
*
 ** CALIB NASHYD        0208  1  5.0    1.80    0.02  2.08   7.15 0.15   0.000
    [CN=62.3          ]
    [ N = 3.0:Tp 0.53]
*
    CHIC STORM                   10.0
    [ Ptot= 46.73 mm ]
*
 *  CALIB STANDHYD      0203  1  5.0    8.59    0.93  1.33  26.73 0.57   0.000
    [I%=36.0:S%= 2.00]
*
    CHIC STORM                   10.0
    [ Ptot= 46.73 mm ]
*
 *  CALIB STANDHYD      0204  1  5.0   11.24    1.22  1.33  26.91 0.58   0.000
    [I%=37.0:S%= 2.00]
*
    CHIC STORM                   10.0
    [ Ptot= 46.73 mm ]
*
 *  CALIB STANDHYD      0226  1  5.0    8.53    1.02  1.33  28.05 0.60   0.000
    [I%=40.0:S%= 2.00]
*
    ADD [  0140+  0203]  0063  3  5.0   38.21    0.95  1.33  19.46  n/a   0.000
*
    ADD [  0063+  0204]  0063  1  5.0   49.45    2.17  1.33  21.15  n/a   0.000
*
    ADD [  0063+  0208]  0063  3  5.0   51.25    2.17  1.33  20.66  n/a   0.000
*
    ADD [  0063+  0226]  0063  1  5.0   59.78    3.19  1.33  21.71  n/a   0.000
*
 ** Reservoir
    OUTFLOW:            0405  1  5.0   59.78    0.58  3.50  21.68  n/a   0.000
    OVERFLOW:           0405  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    CHIC STORM                   10.0
    [ Ptot= 46.73 mm ]
*
 *  CALIB NASHYD        0216  1  5.0   11.42    0.04  3.00   4.18 0.09   0.000
    [CN=50.0          ]
    [ N = 3.0:Tp 1.03]
*
    CHIC STORM                   10.0
    [ Ptot= 46.73 mm ]
*
 *  CALIB NASHYD        0215  1  5.0    2.06    0.06  1.67  15.47 0.33   0.000
    [CN=77.8          ]
    [ N = 3.0:Tp 0.33]
*
    CHIC STORM                   10.0
    [ Ptot= 46.73 mm ]
*
 *  CALIB NASHYD        0207  1  5.0    1.37    0.04  1.58  13.29 0.28   0.000
    [CN=74.0          ]
    [ N = 3.0:Tp 0.27]
```

```
*
   ADD [  0207+  0215]  0145  3  5.0    3.43    0.10  1.67  14.60  n/a   0.000
*
   ADD [  0145+  0216]  0145  1  5.0   14.85    0.12  1.67   6.58  n/a   0.000
*
   ADD [  0145+  0405]  0145  3  5.0   74.64    0.65  3.50  18.68  n/a   0.000
*
 ** Reservoir
   OUTFLOW:             0062  1  5.0   74.64    0.50  4.42  18.67  n/a   0.000
*
   CHANNEL[ 2:  0062]   0048  1  5.0   74.64    0.48  4.75  18.67  n/a   0.000
*
   CHIC STORM                 10.0
   [ Ptot= 46.73 mm ]
*
 * CALIB STANDHYD       0108  1  5.0    3.97    0.78  1.33  34.86 0.75   0.000
   [I%=67.0:S%= 2.00]
*
   CHIC STORM                 10.0
   [ Ptot= 46.73 mm ]
*
 * CALIB STANDHYD       0107  1  5.0    4.81    1.21  1.33  41.19 0.88   0.000
   [I%=86.0:S%= 2.00]
*
   CHIC STORM                 10.0
   [ Ptot= 46.73 mm ]
*
 * CALIB STANDHYD       0106  1  5.0   26.74    2.00  1.50  26.28 0.56   0.000
   [I%=15.0:S%= 2.00]
*
   CHIC STORM                 10.0
   [ Ptot= 46.73 mm ]
*
 * CALIB STANDHYD       0209  1  5.0   10.31    1.27  1.33  29.33 0.63   0.000
   [I%=39.0:S%= 2.00]
*
   ADD [  0106+  0209]  0146  3  5.0   37.05    3.13  1.33  27.13  n/a   0.000
*
   CHANNEL[ 2:  0146]   0049  1  5.0   37.05    0.97  1.92  26.95  n/a   0.000
*
   ADD [  0107+  0108]  0036  3  5.0    8.78    1.98  1.33  38.33  n/a   0.000
*
   ADD [  0036+  0049]  0036  1  5.0   45.83    2.33  1.33  29.13  n/a   0.000
*
 ** Reservoir
   OUTFLOW:             0065  1  5.0   45.83    0.93  2.17  29.12  n/a   0.000
*
   CHIC STORM                 10.0
   [ Ptot= 46.73 mm ]
*
 ** CALIB STANDHYD      0206  1  5.0   28.45    3.92  1.33  30.55 0.65   0.000
   [I%=53.0:S%= 2.00]
*
   CHIC STORM                 10.0
   [ Ptot= 46.73 mm ]
*
 * CALIB STANDHYD       0205  1  5.0   10.19    1.59  1.33  30.23 0.65   0.000
   [I%=53.0:S%= 2.00]
*
   ADD [  0205+  0206]  0155  3  5.0   38.64    5.51  1.33  30.47  n/a   0.000
*
 ** Reservoir
   OUTFLOW:             0404  1  5.0   38.64    0.27  4.00  27.08  n/a   0.000
*
```

```
   ADD [  0404+  0048]  0031  3  5.0  113.28    0.70  4.42  21.54  n/a   0.000
*
   ADD [  0031+  0065]  0031  1  5.0  159.11    1.16  4.08  23.72  n/a   0.000
*
   PIPE   [ 2:  0031]   0066  1  5.0  159.11    1.16  4.08  23.72  n/a   0.000
*
   CHIC STORM                 10.0
   [ Ptot= 46.73 mm ]
*
 * CALIB NASHYD         0217  1  5.0    8.74    0.03  2.83   4.18 0.09   0.000
   [CN=50.0          ]
   [ N = 3.0:Tp 0.95]
*
   ADD [  0217+  0066]  0149  3  5.0  167.85    1.19  4.08  22.71  n/a   0.000
*
   CHANNEL[ 2:  0149]   0051  1  5.0  167.85    1.14  4.33  22.70  n/a   0.000
*
   CHIC STORM                 10.0
   [ Ptot= 46.73 mm ]
*
 * CALIB NASHYD         0220  1  5.0    5.14    0.06  2.25  10.58 0.23   0.000
   [CN=71.4          ]
   [ N = 3.0:Tp 0.68]
*
   CHIC STORM                 10.0
   [ Ptot= 46.73 mm ]
*
 * CALIB NASHYD         0218  1  5.0   10.21    0.03  3.92   4.18 0.09   0.000
   [CN=50.0          ]
   [ N = 3.0:Tp 1.54]
*
   CHIC STORM                 10.0
   [ Ptot= 46.73 mm ]
*
 * CALIB STANDHYD       0224  1  5.0    2.58    0.27  1.33  24.56 0.53   0.000
   [I%=31.0:S%= 2.00]
*
   ADD [  0218+  0220]  0170  3  5.0   15.35    0.08  2.50   6.32  n/a   0.000
*
   ADD [  0170+  0224]  0170  1  5.0   17.93    0.27  1.33   8.95  n/a   0.000
*
   CHANNEL[ 2:  0170]   0061  1  5.0   17.93    0.10  2.92   8.87  n/a   0.000
*
   CHIC STORM                 10.0
   [ Ptot= 46.73 mm ]
*
 * CALIB STANDHYD       0210  1  5.0    7.09    1.69  1.33  40.22 0.86   0.000
   [I%=83.0:S%= 2.00]
*
   CHIC STORM                 10.0
   [ Ptot= 46.73 mm ]
*
 * CALIB STANDHYD       0211  1  5.0    8.86    1.12  1.33  28.42 0.61   0.000
   [I%=43.0:S%= 2.00]
*
   ADD [  0210+  0211]  0148  3  5.0   15.95    2.81  1.33  33.67  n/a   0.000
*
 ** Reservoir
   OUTFLOW:             0403  1  5.0   15.95    0.10  4.00  33.53  n/a   0.000
*
   CHIC STORM                 10.0
   [ Ptot= 46.73 mm ]
*
 * CALIB NASHYD         0213  1  5.0    0.39    0.02  1.33   8.53 0.18   0.000
```

```
    [CN=69.0          ]
    [ N = 3.0:Tp 0.05]
*
    ADD [  0213+  0403]  0044  3  5.0   16.34    0.10  4.00  32.93  n/a   0.000
*
    ADD [  0044+  0061]  0044  1  5.0   34.27    0.20  4.00  20.34  n/a   0.000
*
    CHANNEL[ 2:  0044]   0060  1  5.0   34.27    0.17  4.08  20.34  n/a   0.000
*
    ADD [  0051+  0060]  0038  3  5.0  202.11    1.30  4.33  22.30  n/a   0.000
*
    CHANNEL[ 2:  0038]   0052  1  5.0  202.11    1.29  4.50  22.30  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 46.73 mm ]
*
 *  CALIB NASHYD         0219  1  5.0    2.06    0.01  2.75   4.18 0.09   0.000
    [CN=50.0          ]
    [ N = 3.0:Tp 0.90]
*
    CHIC STORM                 10.0
    [ Ptot= 46.73 mm ]
*
 *  CALIB STANDHYD       0214  1  5.0    6.35    1.22  1.33  35.04 0.75   0.000
    [I%=60.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:             0401  1  5.0    6.35    0.05  4.00  34.89  n/a   0.000
    OVERFLOW:            0401  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 46.73 mm ]
*
 *  CALIB STANDHYD       0212  1  5.0    8.34    0.61  1.33  22.55 0.48   0.000
    [I%=20.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:             0402  1  5.0    8.34    0.06  3.92  22.29  n/a   0.000
    OVERFLOW:            0402  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    ADD [  0219+  0401]  0039  3  5.0    8.41    0.06  4.00  27.36  n/a   0.000
*
    ADD [  0039+  0402]  0039  1  5.0   16.75    0.12  3.92  24.84  n/a   0.000
*
    ADD [  0039+  0052]  0039  3  5.0  218.87    1.39  4.33  22.50  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 46.73 mm ]
*
 *  CALIB NASHYD         0227  1  5.0    1.44    0.06  1.50  16.54 0.35   0.000
    [CN=80.7          ]
    [ N = 3.0:Tp 0.23]
*
    CHIC STORM                 10.0
    [ Ptot= 46.73 mm ]
*
 *  CALIB STANDHYD       0223  1  5.0    1.91    0.20  1.33  24.94 0.53   0.000
    [I%=30.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 46.73 mm ]
*
 *  CALIB STANDHYD       0222  1  5.0   14.26    2.32  1.33  33.36 0.71   0.000
    [I%=59.0:S%= 2.00]
```

```
*
    ADD [  0222+  0223]  0185  3  5.0   16.17    2.52  1.33  32.36  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0406  1  5.0   16.17    0.06  4.17  32.24  n/a   0.000
*
    ADD [  0227+  0406]  0186  3  5.0   17.61    0.10  1.58  30.96  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 46.73 mm ]
*
 *  CALIB STANDHYD       0201  1  5.0    2.75    0.31  1.33  30.78 0.66   0.000
    [I%=28.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 46.73 mm ]
*
 *  CALIB STANDHYD       0202  1  5.0   11.74    1.68  1.33  35.02 0.75   0.000
    [I%=42.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 46.73 mm ]
*
 *  CALIB STANDHYD       0100  1  5.0    2.66    0.23  1.33  27.38 0.59   0.000
    [I%=20.0:S%= 2.00]
*
    CHIC STORM                 10.0
    [ Ptot= 46.73 mm ]
*
 *  CALIB STANDHYD       0221  1  5.0    2.42    0.57  1.33  34.24 0.73   0.000
    [I%=77.0:S%= 2.00]
*
    ADD [  0100+  0201]  0173  3  5.0    5.41    0.55  1.33  29.11  n/a   0.000
*
    ADD [  0173+  0202]  0173  1  5.0   17.15    2.22  1.33  33.15  n/a   0.000
*
    ADD [  0173+  0221]  0173  3  5.0   19.57    2.79  1.33  33.29  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0400  1  5.0   19.57    0.29  2.67  33.00  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 46.73 mm ]
*
 *  CALIB STANDHYD       0225  1  5.0   14.21    0.77  1.33  19.68 0.42   0.000
    [I%=17.0:S%= 2.00]
*
    ADD [  0186+  0225]  0178  3  5.0   31.82    0.84  1.33  25.92  n/a   0.000
*
    ADD [  0178+  0400]  0178  1  5.0   51.39    0.85  1.33  28.62  n/a   0.000
*
```

```
================================================================================
=========================


       V    V   I    SSSSS  U   U    A    L             (v 6.2.2008)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                   *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output       filename:    C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\cb37cb41-7326-49f8-8124-0e9c9116b4e6\s
  Summary     filename:     C:\Users\jmacdonald\AppData\Local\Civica\VH5\c1a411b8-
f6bf-49d9-879b-0deef97c7539\cb37cb41-7326-49f8-8124-0e9c9116b4e6\s


DATE: 08-28-2023                           TIME: 11:01:46

USER:


COMMENTS: ____________________________________________________________


  ************************************************
  ** SIMULATION : Hazel                         **
  ************************************************

  W/E COMMAND             HYD ID   DT     AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min      ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                60.0
    [ Ptot=212.00 mm ]
    fname       :       C:\Users\jmacdonald\AppData\Local\Temp\ddd1f0f1-23ed-4fba-
aa2b-1e4b72f3bf9f\d32d31d1-fd91-45cf-a20c-
    remark: Hazel
*
 ** CALIB NASHYD        0101  1  5.0   29.62    3.69 10.33 193.69 0.91   0.000
    [CN=95.0          ]
    [ N = 3.0:Tp 0.57]
*
    PIPE   [ 2:  0101]   0140  1  5.0   29.62    3.67 10.50 193.69  n/a   0.000
*
    READ STORM                60.0
    [ Ptot=212.00 mm ]
    fname       :       C:\Users\jmacdonald\AppData\Local\Temp\ddd1f0f1-23ed-4fba-
aa2b-1e4b72f3bf9f\d32d31d1-fd91-45cf-a20c-
    remark: Hazel
*
```

```
 *  CALIB NASHYD        0208  1  5.0    1.80    0.20 10.33 152.09 0.72   0.000
    [CN=79.2          ]
    [ N = 3.0:Tp 0.53]
*
    READ STORM                60.0
    [ Ptot=212.00 mm ]
    fname       :       C:\Users\jmacdonald\AppData\Local\Temp\ddd1f0f1-23ed-4fba-
aa2b-1e4b72f3bf9f\d32d31d1-fd91-45cf-a20c-
    remark: Hazel
*
 *  CALIB STANDHYD      0203  1  5.0    8.59    1.23 10.00 192.80 0.91   0.000
    [I%=36.0:S%= 2.00]
*
    READ STORM                60.0
    [ Ptot=212.00 mm ]
    fname       :       C:\Users\jmacdonald\AppData\Local\Temp\ddd1f0f1-23ed-4fba-
aa2b-1e4b72f3bf9f\d32d31d1-fd91-45cf-a20c-
    remark: Hazel
*
 *  CALIB STANDHYD      0204  1  5.0   11.24    1.60 10.00 192.83 0.91   0.000
    [I%=37.0:S%= 2.00]
*
    READ STORM                60.0
    [ Ptot=212.00 mm ]
    fname       :       C:\Users\jmacdonald\AppData\Local\Temp\ddd1f0f1-23ed-4fba-
aa2b-1e4b72f3bf9f\d32d31d1-fd91-45cf-a20c-
    remark: Hazel
*
 *  CALIB STANDHYD      0226  1  5.0    8.53    1.22 10.00 194.21 0.92   0.000
    [I%=40.0:S%= 2.00]
*
    ADD [  0140+  0203]  0063  3  5.0   38.21    4.62 10.42 193.49  n/a   0.000
*
    ADD [  0063+  0204]  0063  1  5.0   49.45    6.02 10.00 193.34  n/a   0.000
*
    ADD [  0063+  0208]  0063  3  5.0   51.25    6.21 10.00 191.89  n/a   0.000
*
    ADD [  0063+  0226]  0063  1  5.0   59.78    7.43 10.00 192.22  n/a   0.000
*
 ** Reservoir
    OUTFLOW:            0405  1  5.0   59.78    7.32 10.08 192.19  n/a   0.000
*
    READ STORM                60.0
    [ Ptot=212.00 mm ]
    fname       :       C:\Users\jmacdonald\AppData\Local\Temp\ddd1f0f1-23ed-4fba-
aa2b-1e4b72f3bf9f\d32d31d1-fd91-45cf-a20c-
    remark: Hazel
*
 *  CALIB NASHYD        0216  1  5.0   11.42    0.97 11.25 128.14 0.60   0.000
    [CN=69.4          ]
    [ N = 3.0:Tp 1.03]
*
    READ STORM                60.0
    [ Ptot=212.00 mm ]
    fname       :       C:\Users\jmacdonald\AppData\Local\Temp\ddd1f0f1-23ed-4fba-
aa2b-1e4b72f3bf9f\d32d31d1-fd91-45cf-a20c-
    remark: Hazel
*
 *  CALIB NASHYD        0215  1  5.0    2.06    0.28 10.08 182.16 0.86   0.000
    [CN=89.9          ]
    [ N = 3.0:Tp 0.33]
*
    READ STORM                60.0
    [ Ptot=212.00 mm ]
```

```
    fname       :       C:\Users\jmacdonald\AppData\Local\Temp\ddd1f0f1-23ed-4fba-
aa2b-1e4b72f3bf9f\d32d31d1-fd91-45cf-a20c-
    remark: Hazel
*
 *  CALIB NASHYD        0207  1  5.0    1.37    0.19 10.00 175.95 0.83   0.000
    [CN=87.5        ]
    [ N = 3.0:Tp 0.27]
*
    ADD [  0207+  0215]  0145  3  5.0    3.43    0.47 10.00 179.68  n/a   0.000
*
    ADD [  0145+  0216]  0145  1  5.0   14.85    1.32 11.00 140.05  n/a   0.000
*
    ADD [  0145+  0405]  0145  3  5.0   74.64    8.45 10.17 181.82  n/a   0.000
*
 ** Reservoir
    OUTFLOW:            0062  1  5.0   74.64    7.85 11.08 181.81  n/a   0.000
*
    CHANNEL[ 2:  0062]   0048  1  5.0   74.64    7.81 11.17 181.81  n/a   0.000
*
    READ STORM                60.0
    [ Ptot=212.00 mm ]
    fname       :       C:\Users\jmacdonald\AppData\Local\Temp\ddd1f0f1-23ed-4fba-
aa2b-1e4b72f3bf9f\d32d31d1-fd91-45cf-a20c-
    remark: Hazel
*
 *  CALIB STANDHYD      0108  1  5.0    3.97    0.57 10.00 199.01 0.94   0.000
    [I%=67.0:S%= 2.00]
*
    READ STORM                60.0
    [ Ptot=212.00 mm ]
    fname       :       C:\Users\jmacdonald\AppData\Local\Temp\ddd1f0f1-23ed-4fba-
aa2b-1e4b72f3bf9f\d32d31d1-fd91-45cf-a20c-
    remark: Hazel
*
 *  CALIB STANDHYD      0107  1  5.0    4.81    0.70 10.00 206.11 0.97   0.000
    [I%=86.0:S%= 2.00]
*
    READ STORM                60.0
    [ Ptot=212.00 mm ]
    fname       :       C:\Users\jmacdonald\AppData\Local\Temp\ddd1f0f1-23ed-4fba-
aa2b-1e4b72f3bf9f\d32d31d1-fd91-45cf-a20c-
    remark: Hazel
*
 *  CALIB STANDHYD      0106  1  5.0   26.74    3.83 10.00 196.45 0.93   0.000
    [I%=15.0:S%= 2.00]
*
    READ STORM                60.0
    [ Ptot=212.00 mm ]
    fname       :       C:\Users\jmacdonald\AppData\Local\Temp\ddd1f0f1-23ed-4fba-
aa2b-1e4b72f3bf9f\d32d31d1-fd91-45cf-a20c-
    remark: Hazel
*
 *  CALIB STANDHYD      0209  1  5.0   10.31    1.49 10.00 196.89 0.93   0.000
    [I%=39.0:S%= 2.00]
*
    ADD [  0106+  0209]  0146  3  5.0   37.05    5.32 10.00 196.57  n/a   0.000
*
    CHANNEL[ 2:  0146]   0049  1  5.0   37.05    3.86 11.00 196.39  n/a   0.000
*
    ADD [  0107+  0108]  0036  3  5.0    8.78    1.28 10.00 202.90  n/a   0.000
*
    ADD [  0036+  0049]  0036  1  5.0   45.83    4.79 11.00 197.64  n/a   0.000
*
 ** Reservoir
```

```
    OUTFLOW:            0065  1  5.0   45.83    4.70 11.00 197.63  n/a   0.000
*
    READ STORM                60.0
    [ Ptot=212.00 mm ]
    fname       :       C:\Users\jmacdonald\AppData\Local\Temp\ddd1f0f1-23ed-4fba-
aa2b-1e4b72f3bf9f\d32d31d1-fd91-45cf-a20c-
    remark: Hazel
*
 ** CALIB STANDHYD      0206  1  5.0   28.45    4.03 10.00 194.42 0.92   0.000
    [I%=53.0:S%= 2.00]
*
    READ STORM                60.0
    [ Ptot=212.00 mm ]
    fname       :       C:\Users\jmacdonald\AppData\Local\Temp\ddd1f0f1-23ed-4fba-
aa2b-1e4b72f3bf9f\d32d31d1-fd91-45cf-a20c-
    remark: Hazel
*
 ** CALIB STANDHYD      0205  1  5.0   10.19    1.47 10.00 196.67 0.93   0.000
    [I%=53.0:S%= 2.00]
*
    ADD [  0205+  0206]  0155  3  5.0   38.64    5.50 10.00 195.01  n/a   0.000
*
 ** Reservoir
    OUTFLOW:            0404  1  5.0   38.64    4.50 10.33 191.53  n/a   0.000
*
    ADD [  0404+  0048]  0031  3  5.0  113.28   11.88 11.00 185.13  n/a   0.000
*
    ADD [  0031+  0065]  0031  1  5.0  159.11   16.58 11.00 188.73  n/a   0.000
*
    PIPE   [ 2:  0031]   0066  1  5.0  159.11   16.58 11.00 188.73  n/a   0.000
*
    READ STORM                60.0
    [ Ptot=212.00 mm ]
    fname       :       C:\Users\jmacdonald\AppData\Local\Temp\ddd1f0f1-23ed-4fba-
aa2b-1e4b72f3bf9f\d32d31d1-fd91-45cf-a20c-
    remark: Hazel
*
 ** CALIB NASHYD        0217  1  5.0    8.74    0.76 11.17 128.14 0.60   0.000
    [CN=69.4        ]
    [ N = 3.0:Tp 0.95]
*
    ADD [  0217+  0066]  0149  3  5.0  167.85   17.34 11.00 185.58  n/a   0.000
*
    CHANNEL[ 2:  0149]   0051  1  5.0  167.85   17.14 11.08 185.57  n/a   0.000
*
    READ STORM                60.0
    [ Ptot=212.00 mm ]
    fname       :       C:\Users\jmacdonald\AppData\Local\Temp\ddd1f0f1-23ed-4fba-
aa2b-1e4b72f3bf9f\d32d31d1-fd91-45cf-a20c-
    remark: Hazel
*
 ** CALIB NASHYD        0220  1  5.0    5.14    0.58 10.58 168.81 0.80   0.000
    [CN=85.7        ]
    [ N = 3.0:Tp 0.68]
*
    READ STORM                60.0
    [ Ptot=212.00 mm ]
    fname       :       C:\Users\jmacdonald\AppData\Local\Temp\ddd1f0f1-23ed-4fba-
aa2b-1e4b72f3bf9f\d32d31d1-fd91-45cf-a20c-
    remark: Hazel
*
 ** CALIB NASHYD        0218  1  5.0   10.21    0.74 11.67 128.14 0.60   0.000
    [CN=69.4        ]
    [ N = 3.0:Tp 1.54]
```

```
*
    READ STORM                60.0
    [ Ptot=212.00 mm ]
    fname       :       C:\Users\jmacdonald\AppData\Local\Temp\ddd1f0f1-23ed-4fba-
aa2b-1e4b72f3bf9f\d32d31d1-fd91-45cf-a20c-
    remark: Hazel
*
 *  CALIB STANDHYD       0224  1  5.0    2.58    0.37 10.00 189.84 0.90   0.000
    [I%=31.0:S%= 2.00]
*
    ADD [  0218+  0220]  0170  3  5.0   15.35    1.24 11.17 141.76  n/a   0.000
*
    ADD [  0170+  0224]  0170  1  5.0   17.93    1.50 11.00 148.68  n/a   0.000
*
    CHANNEL[ 2:  0170]   0061  1  5.0   17.93    1.38 11.25 148.60  n/a   0.000
*
    READ STORM                60.0
    [ Ptot=212.00 mm ]
    fname       :       C:\Users\jmacdonald\AppData\Local\Temp\ddd1f0f1-23ed-4fba-
aa2b-1e4b72f3bf9f\d32d31d1-fd91-45cf-a20c-
    remark: Hazel
*
 ** CALIB STANDHYD       0210  1  5.0    7.09    1.04 10.00 205.06 0.97   0.000
    [I%=83.0:S%= 2.00]
*
    READ STORM                60.0
    [ Ptot=212.00 mm ]
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aa2b-1e4b72f3bf9f\d32d31d1-fd91-45cf-a20c-
    remark: Hazel
*
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*
    ADD [  0210+  0211]  0148  3  5.0   15.95    2.30 10.00 198.89  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0403  1  5.0   15.95    1.85 10.25 198.75  n/a   0.000
*
    READ STORM                60.0
    [ Ptot=212.00 mm ]
    fname       :       C:\Users\jmacdonald\AppData\Local\Temp\ddd1f0f1-23ed-4fba-
aa2b-1e4b72f3bf9f\d32d31d1-fd91-45cf-a20c-
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*
 ** CALIB NASHYD         0213  1  5.0    0.39    0.04 10.00 101.81 0.48   0.000
    [CN=69.0         ]
    [ N = 3.0:Tp 0.05]
*
    ADD [  0213+  0403]  0044  3  5.0   16.34    1.88 10.25 196.44  n/a   0.000
*
    ADD [  0044+  0061]  0044  1  5.0   34.27    3.16 11.00 171.41  n/a   0.000
*
    CHANNEL[ 2:  0044]   0060  1  5.0   34.27    3.02 11.00 171.40  n/a   0.000
*
    ADD [  0051+  0060]  0038  3  5.0  202.11   20.16 11.08 183.17  n/a   0.000
*
    CHANNEL[ 2:  0038]   0052  1  5.0  202.11   20.11 11.17 183.17  n/a   0.000
*
    READ STORM                60.0
    [ Ptot=212.00 mm ]
    fname       :       C:\Users\jmacdonald\AppData\Local\Temp\ddd1f0f1-23ed-4fba-
aa2b-1e4b72f3bf9f\d32d31d1-fd91-45cf-a20c-
    remark: Hazel
```

```
*
 ** CALIB NASHYD         0219  1  5.0    2.06    0.18 11.08 128.14 0.60   0.000
    [CN=69.4         ]
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*
    READ STORM                60.0
    [ Ptot=212.00 mm ]
    fname       :       C:\Users\jmacdonald\AppData\Local\Temp\ddd1f0f1-23ed-4fba-
aa2b-1e4b72f3bf9f\d32d31d1-fd91-45cf-a20c-
    remark: Hazel
*
 ** CALIB STANDHYD       0214  1  5.0    6.35    0.92 10.00 201.78 0.95   0.000
    [I%=60.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:             0401  1  5.0    6.35    0.92 10.00 201.62  n/a   0.000
    OVERFLOW:            0401  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    READ STORM                60.0
    [ Ptot=212.00 mm ]
    fname       :       C:\Users\jmacdonald\AppData\Local\Temp\ddd1f0f1-23ed-4fba-
aa2b-1e4b72f3bf9f\d32d31d1-fd91-45cf-a20c-
    remark: Hazel
*
 *  CALIB STANDHYD       0212  1  5.0    8.34    1.19 10.00 189.39 0.89   0.000
    [I%=20.0:S%= 2.00]
*
 ** Reservoir
    OUTFLOW:             0402  1  5.0    8.34    1.14 10.08 189.13  n/a   0.000
    OVERFLOW:            0402  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    ADD [  0219+  0401]  0039  3  5.0    8.41    1.04 10.00 183.62  n/a   0.000
*
    ADD [  0039+  0402]  0039  1  5.0   16.75    2.17 10.00 186.37  n/a   0.000
*
    ADD [  0039+  0052]  0039  3  5.0  218.87   21.74 11.08 183.41  n/a   0.000
*
    READ STORM                60.0
    [ Ptot=212.00 mm ]
    fname       :       C:\Users\jmacdonald\AppData\Local\Temp\ddd1f0f1-23ed-4fba-
aa2b-1e4b72f3bf9f\d32d31d1-fd91-45cf-a20c-
    remark: Hazel
*
 *  CALIB NASHYD         0227  1  5.0    1.44    0.21 10.00 185.20 0.87   0.000
    [CN=91.6         ]
    [ N = 3.0:Tp 0.23]
*
    READ STORM                60.0
    [ Ptot=212.00 mm ]
    fname       :       C:\Users\jmacdonald\AppData\Local\Temp\ddd1f0f1-23ed-4fba-
aa2b-1e4b72f3bf9f\d32d31d1-fd91-45cf-a20c-
    remark: Hazel
*
 *  CALIB STANDHYD       0223  1  5.0    1.91    0.27 10.00 191.27 0.90   0.000
    [I%=30.0:S%= 2.00]
*
    READ STORM                60.0
    [ Ptot=212.00 mm ]
    fname       :       C:\Users\jmacdonald\AppData\Local\Temp\ddd1f0f1-23ed-4fba-
aa2b-1e4b72f3bf9f\d32d31d1-fd91-45cf-a20c-
    remark: Hazel
*
 *  CALIB STANDHYD       0222  1  5.0   14.26    2.05 10.00 198.91 0.94   0.000
    [I%=59.0:S%= 2.00]
```

```
*
    ADD [  0222+  0223]  0185  3  5.0   16.17    2.32 10.00 198.01  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0406  1  5.0   16.17    1.92 10.25 197.88  n/a   0.000
*
    ADD [  0227+  0406]  0186  3  5.0   17.61    2.10 10.25 196.84  n/a   0.000
*
    READ STORM                 60.0
    [ Ptot=212.00 mm ]
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aa2b-1e4b72f3bf9f\d32d31d1-fd91-45cf-a20c-
    remark: Hazel
*
 *  CALIB STANDHYD       0201  1  5.0    2.75    0.40 10.00 201.61 0.95   0.000
    [I%=28.0:S%= 2.00]
*
    READ STORM                 60.0
    [ Ptot=212.00 mm ]
    fname       :       C:\Users\jmacdonald\AppData\Local\Temp\ddd1f0f1-23ed-4fba-
aa2b-1e4b72f3bf9f\d32d31d1-fd91-45cf-a20c-
    remark: Hazel
*
 *  CALIB STANDHYD       0202  1  5.0   11.74    1.71 10.00 204.78 0.97   0.000
    [I%=42.0:S%= 2.00]
*
    READ STORM                 60.0
    [ Ptot=212.00 mm ]
    fname       :       C:\Users\jmacdonald\AppData\Local\Temp\ddd1f0f1-23ed-4fba-
aa2b-1e4b72f3bf9f\d32d31d1-fd91-45cf-a20c-
    remark: Hazel
*
 *  CALIB STANDHYD       0100  1  5.0    2.66    0.39 10.00 198.65 0.94   0.000
    [I%=20.0:S%= 2.00]
*
    READ STORM                 60.0
    [ Ptot=212.00 mm ]
    fname       :       C:\Users\jmacdonald\AppData\Local\Temp\ddd1f0f1-23ed-4fba-
aa2b-1e4b72f3bf9f\d32d31d1-fd91-45cf-a20c-
    remark: Hazel
*
 *  CALIB STANDHYD       0221  1  5.0    2.42    0.35 10.00 199.53 0.94   0.000
    [I%=77.0:S%= 2.00]
*
    ADD [  0100+  0201]  0173  3  5.0    5.41    0.79 10.00 200.16  n/a   0.000
*
    ADD [  0173+  0202]  0173  1  5.0   17.15    2.49 10.00 203.32  n/a   0.000
*
    ADD [  0173+  0221]  0173  3  5.0   19.57    2.84 10.00 202.85  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0400  1  5.0   19.57    2.15 10.50 202.45  n/a   0.000
*
    READ STORM                 60.0
    [ Ptot=212.00 mm ]
    fname       :       C:\Users\jmacdonald\AppData\Local\Temp\ddd1f0f1-23ed-4fba-
aa2b-1e4b72f3bf9f\d32d31d1-fd91-45cf-a20c-
    remark: Hazel
*
 *  CALIB STANDHYD       0225  1  5.0   14.21    1.98 10.00 184.20 0.87   0.000
    [I%=17.0:S%= 2.00]
*
    ADD [  0186+  0225]  0178  3  5.0   31.82    3.95 10.17 191.20  n/a   0.000
*
```

```
    ADD [  0178+  0400]  0178  1  5.0   51.39    6.03 10.17 195.49  n/a   0.000
*
 FINISH

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Appendix H:
April 8, 2022 Meeting Minutes

TATHAM ENGINEERING

115 Sanford Fleming Drive, Suite 200
Collingwood, Ontario L9Y 5A6

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Minutes

File	Attendees	Company
120157	**Colin Baker**	**Township of Centre Wellington (Township)**
	Adam Gilmore	**Township**
	Dustin Lyttle	**Triton Engineering (Triton)**
	Ray Kirtz	**Triton**
	Suzanne Troxler	**Tatham Engineering Limited (Tatham)**
	Robin Deduro	**Tatham**
	Keith Hajling	**Tatham**
	Daniel Twigger	**Tatham**

Meeting Date	Purpose	Time & Place
April 8, 2022	**South Fergus MESP and Secondary Plan Internal/External Servicing Discussion**	**9:30 – 10:45 am Teams**

Item	Agenda Item	Action

1. Introductions

Brief introductions were provided by all in attendance.

2. Sanitary Servicing

Tatham provided an overview of the internal sanitary servicing strategy. Specifically, sanitary servicing area 1 (northeast corner of the Secondary Planning Area) is proposed to drain to the existing sanitary servicing stub on McQueen Boulevard at Millburn Boulevard. The sanitary sewage from sanitary servicing area 1 will drain to the temporary sewage pumping station on Tower Street. The Tower Street sewage pumping station will be decommissioned and sewage will be redirected via gravity west through the South Fergus Secondary Plan Area to a future trunk sanitary sewer on Guelph Street. Sanitary servicing area 2 will drain via gravity to the future trunk sanitary sewer of Guelph Street. The remainder of the South Fergus Secondary Plan Area will drain via gravity to the southwest corner of the South Fergus Secondary Plan Area and a future sewage pumping station which will transfer sewage via sanitary force main to the future trunk sanitary sewer on Guelph Street.

Triton noted there is limited downstream capacity in the Tower Street and MacTavish Street sanitary sewers.

The Town noted that the Union Street sewage pumping station upgrades, Union Street force main upgrades, and Guelph Street trunk sanitary sewer construction are required to be completed ahead of development in the

Item	Agenda Item	Action
	South Fergus Secondary Plan Area. Tatham noted that the Union Street sewage pumping station upgrades are included in the Townships capital plan for completion in 2030. The Township will entertain entering into a cost sharing agreement with the landowners in the South Fergus secondary plan area to accelerate the completion of the external servicing requirements.	
	Triton requested that Tatham consider lowering the invert of the future trunk sanitary sewer on Guelph Street to drain a larger portion of the South Fergus Secondary Plan Area via gravity to Guelph Street.	Tatham
	Tatham noted the South Fergus Servicing Area extends south of the South Fergus Secondary Plan Area and questioned if these lands should be considered in the internal and external servicing designs for the South Fergus Secondary Plan Area. The Township noted that the lands south of the South Fergus Secondary Plan Area are not included in the settlement area and there are no development concepts available for these lands. It was agreed that the lands to the south in the South Fergus Servicing Area should be considered when identifying external servicing requirements and the Township agreed to work with Triton to establish preliminary sewage flows and water demands.	Township/ Triton
	Tatham asked the Township to update the Townships sanitary sewage model with the sewage flows provided to identify if the existing external sanitary sewer from the stub on McQueen Boulevard at Millburn Boulevard to the temporary Tower Street sewage pumping station has sufficient capacity to convey the anticipated sewage flows from sanitary servicing area 1 in the South Fergus Secondary Plan Area. Triton noted they could update the sanitary model and provide results within two weeks of receiving the preliminary internal road network for the South Fergus Secondary Plan Area.	Township/ Triton
	Post Meeting Note: Tatham respectively suggests the internal road network is not required to confirm the if the existing external sanitary sewer from the stub on McQueen Boulevard at Millburn Boulevard to the temporary Tower Street sewage pumping station has sufficient capacity to convey anticipated flows from sanitary servicing area 1 and requests that this analysis be completed at this time.	
3.	**Water Servicing**	
	Tatham identified the available and future water main connection locations bordering the Secondary Plan Area as follows: ▪ Connection No. 1 (existing) – 300 mm diameter water main on McQueen Boulevard west of Tower Street; ▪ Connection No. 2 (existing) – 300 mm diameter water main on Tower Street immediately south of the existing traffic signals; ▪ Connection No. 3 (existing) – 300 mm diameter water main on McQueen Boulevard at MacTavish Street;	

Item Agenda Item Action

- Connection No. 4 (existing) – 300 mm diameter water main on Scotland Street immediately south of the existing school property; and
- Connection No. 5 (future) – water main to be constructed on Guelph Street as part of future road improvements.

Tatham asked the Township to update their existing water supply model to identify the available flow rates and water pressures surrounding the Secondary Plan Area and to identify and external water supply improvements required to service the Secondary Plan Area. Triton requested the following the update the water supply model and noted the results of the model would be provided to Tatham two weeks following receipt of all the required information:

Township/
Triton

- preliminary internal road network for the South Fergus Secondary Plan Area;
- preliminary grading plan for the South Fergus Secondary Plan Area;
- required fire flow calculations; and
- proposed development details (building types, building uses, number of floors, densities, etc.).

4. Stormwater Management

Tatham provided a brief overview of the proposed stormwater management plan for the South Fergus Secondary Plan Area. Specifically, the SWM plan for the lands east of Highway 6 is consistent with the recommendations of the Nicol Drain No. 2 Subwatershed Study. West of Highway 6, a SWMF (406) will be constructed adjacent to McQueen Boulevard and drain into the existing Westminster SWMF to provide the requisite SWM controls for drainage area 222. A SWMF (403) will be constructed north of the tributary of Nicol Drain No. 2 to provide the required controls for drainage areas 211 and 210. For the business park blocks, SWMFs (401 and 402) are required to provide water quality control only as the other SWMFs proposed within the Secondary Plan Area provide the requisite water quantity controls to attenuate post development peak flows to pre-development levels within Nicol Drain No. 2 at 2nd Line. Within the business park blocks, alternative methods (LIDs, oil grit separators, etc.) should be considered to minimize the footprint of the required SWM controls and maximize the developable area.

The Township noted that the outlet from the existing Westminster SWMF is constrained and requested that Tatham consider relocating SWMF 406 to avoid sending additional runoff to the Westminster SWMF. Tatham agreed to review relocating SWMF 406 to the southeast corner of the future McQueen Boulevard and Guelph Street intersection and assessing the drainage improvements required along Guelph Street to safely convey the SWMF discharge north within the road allowance to Nicol Drain No. 13.

Item	Agenda Item	Action
5.	**Transportation**	

Tatham provided a brief overview of the proposed external road improvements required to service the Secondary Plan Area. Specifically, improvements to Guelph Street, 2nd Line and Scotland Street are required, the timing of which will be identified as part of the Traffic Impact Study.

The Township noted the MTO has initiated and Environmental Assessment for Highway 6 from 2nd Line to County Road 22. The Township also noted that we need to have a consistent approach to traffic throughout the Secondary Plan Area and noted their preference for a round-about at the intersection of Highway 6 and 2nd Line in lieu of traffic signals which is a option being considered by the MTO.

Errors & Omissions

Please report any errors or omissions to the author within 7 days of receipt of these minutes otherwise they will be deemed correct.

Prepared by

Daniel Twigger, P.Eng.

Distributed to

All Present

I:\2020 Projects\120157 - South Fergus MESP and Secondary Plan\Documents\Meetings\Minutes - April 8, 2022.docx

Appendix I:
Water Quality Calculations

Water Quality Requirements

Project Details

South Fergus MESP and Secondary Plan	120157

Prepared By

Jonathan Paul	March 3, 2023

SWM Pond 401

Water Quality Sizing Criteria

Methodology & Data Source	Volumetric water quality criteria as presented in Table 3.2 in Ministry of Environment, Conservation and Parks (MECP) Stormwater Management Planning & Design Manual (SWMPDM) March 2003.

Contributing Catchments

Catchment ID	Area (ha)	Impervious (%)
214	6.35	76.00%
Total	**6.35**	**76.0%**

Treatment Method Details

SWM Facility Type	Wet Pond
Target Treatment Leve	Enhanced Level
Treatment Percentage	80%

Treatment

Water Quality Storage Requirement	1,492	m^3
Extended Detention Volume (40 m^3)	254	m^3
Permanent Pool Volume Required	1,238	m^3
25 mm Storm Runoff Depth	17	mm
25 mm Storm Runoff Volume	1,055	m^3
Required Extended Detention Volume	1,055	m^3
Erosion Control Storage Required	1,715	m^3

Permanent Pool Volume Provided	2,392	**Provided**	**>**	**Required**
Extended Detention Storage Provided	1,778	**Provided**	**>**	**Required**
Active Storage Provided	2,469	**Provided**	**>**	**Required**

Water Quality Requirements

Project Details

South Fergus MESP and Secondary Plan	120157

Prepared By

Jonathan Paul	March 3, 2023

SWM Pond 402

Water Quality Sizing Criteria

Methodology & Data Source	Volumetric water quality criteria as presented in Table 3.2 in Ministry of Environment, Conservation and Parks (MECP) Stormwater Management Planning & Design Manual (SWMPDM) March 2003.

Contributing Catchments

Catchment ID	Area (ha)	Impervious (%)
212	8.34	40.00%
Total	**8.34**	**40.0%**

Treatment Method Details

SWM Facility Type	Wet Pond
Target Treatment Leve	Enhanced Level
Treatment Percentage	80%

Treatment

Water Quality Storage Requirement	1,272	m^3
Extended Detention Volume (40 m^3)	334	m^3
Permanent Pool Volume Required	938	m^3
25 mm Storm Runoff Depth	9	mm
25 mm Storm Runoff Volume	723	m^3
Required Extended Detention Volume	723	m^3
Erosion Control Storage Required	1,001	m^3

Permanent Pool Volume Provided	3,132	**Provided**	**>**	**Required**
Extended Detention Storage Provided	1,104	**Provided**	**>**	**Required**
Active Storage Provided	2,871	**Provided**	**>**	**Required**

TATHAM ENGINEERING

Water Quality Requirements

Project Details

South Fergus MESP and Secondary Plan	120157

Prepared By

Jonathan Paul June 9, 2022

SWM Pond 403

Water Quality Sizing Criteria

Methodology & Data Source	Volumetric water quality criteria as presented in Table 3.2 in Ministry of Environment, Conservation and Parks (MECP) Stormwater Management Planning & Design Manual (SWMPDM) March 2003.

Contributing Catchments

Catchment ID	Area (ha)	Impervious (%)
210	7.09	83.00%
211	8.86	52.00%
Total	**15.95**	**65.8%**

Treatment Method Details

SWM Facility Type	Wet Pond
Target Treatment Leve	Enhanced Level
Treatment Percentage	80%

Treatment

Water Quality Storage Requirement	3,402	m^3
Extended Detention Volume (40 m^3)	638	m^3
Permanent Pool Volume Required	2,764	m^3
25 mm Storm Runoff Depth	16	mm
25 mm Storm Runoff Volume	2,572	m^3
Required Extended Detention Volume	2,572	m^3
Erosion Control Storage Required	3,987	m^3

Permanent Pool Volume Provided	7,089	**Provided**	**>**	**Required**
Extended Detention Storage Provided	4,121	**Provided**	**>**	**Required**
Active Storage Provided	9,877	**Provided**	**>**	**Required**

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Water Quality Requirements

Project Details

South Fergus MESP and Secondary Plan	120157

Prepared By

Jonathan Paul	March 3, 2023

SWM Pond 404

Water Quality Sizing Criteria

Methodology & Data Source	Volumetric water quality criteria as presented in Table 3.2 in Ministry of Environment, Conservation and Parks (MECP) Stormwater Management Planning & Design Manual (SWMPDM) March 2003.

Contributing Catchments

Catchment ID	Area (ha)	Impervious (%)
205	10.19	66.00%
206	28.45	62.00%
Total	**38.64**	**63.1%**

Treatment Method Details

SWM Facility Type	Wet Pond
Target Treatment Level	Enhanced Level
Treatment Percentage	80%

Treatment

Water Quality Storage Requirement	8,063	m^3
Extended Detention Volume (40 m^3)	1,546	m^3
Permanent Pool Volume Required	6,517	m^3
25 mm Storm Runoff Depth	11	mm
25 mm Storm Runoff Volume	4,172	m^3
Required Extended Detention Volume	4,172	m^3
Erosion Control Storage Required	9,274	m^3

Permanent Pool Volume Provided	10,672	**Provided**	**>**	**Required**
Extended Detention Storage Provided	6,443	**Provided**	**>**	**Required**
Active Storage Provided	25,291	**Provided**	**>**	**Required**

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Water Quality Requirements

Project Details

South Fergus MESP and Secondary Plan	120157

Prepared By

Jonathan Paul	March 3, 2023

SWM Pond 405

Water Quality Sizing Criteria

Methodology & Data Source	Volumetric water quality criteria as presented in Table 3.2 in Ministry of Environment, Conservation and Parks (MECP) Stormwater Management Planning & Design Manual (SWMPDM) March 2003.

Contributing Catchments

Catchment ID	Area (ha)	Impervious (%)
201	29.62	0.00%
202	8.53	53.00%
203	8.59	49.00%
204	11.25	48.00%
208	1.80	56.00%
Total	**59.79**	**25.3%**

Treatment Method Details

SWM Facility Type	Wet Pond
Target Treatment Leve	Enhanced Level
Treatment Percentage	80%

Treatment

Water Quality Storage Requirement	6,875	m^3
Extended Detention Volume (40 m^3)	2,391	m^3
Permanent Pool Volume Required	4,484	m^3
25 mm Storm Runoff Depth	8	mm
25 mm Storm Runoff Volume	4,868	m^3
Required Extended Detention Volume	4,868	m^3
Erosion Control Storage Required	6,277	m^3

Permanent Pool Volume Provided	6,465	**Provided**	**>**	**Required**
Extended Detention Storage Provided	6,840	**Provided**	**>**	**Required**
Active Storage Provided	13,098	**Provided**	**>**	**Required**

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Water Quality Requirements

Project Details

South Fergus MESP and Secondary Plan	120157

Prepared By

Jonathan Paul	June 9, 2022

SWM Pond 406

Water Quality Sizing Criteria

Methodology & Data Source	Volumetric water quality criteria as presented in Table 3.2 in Ministry of Environment, Conservation and Parks (MECP) Stormwater Management Planning & Design Manual (SWMPDM) March 2003.

Contributing Catchments

Catchment ID	Area (ha)	Impervious (%)
222	14.26	66.00%
223	4.52	40.00%
Total	**18.78**	**59.7%**

Treatment Method Details

SWM Facility Type	Wet Pond
Target Treatment Level	Enhanced Level
Treatment Percentage	80%

Treatment

Water Quality Storage Requirement	3,744	m^3
Extended Detention Volume (40 m^3)	751	m^3
Permanent Pool Volume Required	2,993	m^3
25 mm Storm Runoff Depth	15	mm
25 mm Storm Runoff Volume	2,740	m^3
Required Extended Detention Volume	2,740	m^3
Erosion Control Storage Required	4,320	m^3

Permanent Pool Volume Provided	5,281	**Provided**	**>**	**Required**
Extended Detention Storage Provided	5,612	**Provided**	**>**	**Required**
Active Storage Provided	11,592	**Provided**	**>**	**Required**

TATHAM
ENGINEERING

Water Quality Requirements

Project Details

South Fergus MESP and Secondary Plan	120157

Prepared By

Jonathan Paul	June 9, 2022

Westminster Wet Pond

Water Quality Sizing Criteria

Methodology & Data Source	Volumetric water quality criteria as presented in Table 3.2 in Ministry of Environment, Conservation and Parks (MECP) Stormwater Management Planning & Design Manual (SWMPDM) March 2003.

Contributing Catchments

Catchment ID	Area (ha)	Impervious (%)
300	2.66	20.00%
301	2.75	40.00%
302	11.74	60.00%
221	2.42	77.00%
Total	**19.57**	**53.9%**

Treatment Method Details

SWM Facility Type	Wet Pond
Target Treatment Leve	Enhanced Level
Treatment Percentage	80%

Treatment

Water Quality Storage Requirement	3,620	m^3
Extended Detention Volume (40 m^3)	783	m^3
Permanent Pool Volume Required	2,838	m^3
25 mm Storm Runoff Depth	15	mm
25 mm Storm Runoff Volume	2,879	m^3
Required Extended Detention Volume	2,879	m^3
Erosion Control Storage Required	3,718	m^3

Permanent Pool Volume Provided	2,916	**Provided**	**>**	**Required**
Extended Detention Storage Provided	3,793	**Provided**	**>**	**Required**
Active Storage Provided	10,175	**Provided**	**>**	**Required**

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ENGINEERING

Water Quality Requirements

Project Details

South Fergus MESP and Secondary Plan	120157

Prepared By

Jonathan Paul	December 18, 2023

Nichol Drain No. 2 Pond

Water Quality Sizing Criteria

Methodology & Data Source	Volumetric water quality criteria as presented in Table 3.2 in Ministry of Environment, Conservation and Parks (MECP) Stormwater Management Planning & Design Manual (SWMPDM) March 2003.

Contributing Catchments

Catchment ID	Area (ha)	Impervious (%)
106	26.74	60.00%
107	4.81	86.00%
108	3.97	67.00%
209	10.31	61.00%
Total	**45.83**	**63.6%**

Treatment Method Details

SWM Facility Type	Hybrid Wet Pond/Wetlands
Target Treatment Leve	Enhanced Level
Treatment Percentage	80%

Treatment

Water Quality Storage Requirement	7,486	m^3
Extended Detention Volume (40 m^3)	1,833	m^3
Permanent Pool Volume Required	5,652	m^3
25 mm Storm Runoff Depth	13	mm
25 mm Storm Runoff Volume	5,737	m^3
Required Extended Detention Volume	5,737	m^3
Erosion Control Storage Required	7,333	m^3

Permanent Pool Volume Provided	5,726	**Provided**	**>**	**Required**
Extended Detention Storage Provided	6,175	**Provided**	**>**	**Required**
Active Storage Provided	21,030	**Provided**	**>**	**Required**

TATHAM ENGINEERING

PROJECT South Fergus MESP and Secondary Plan
FILE 120157
DATE 3/3/2023
SUBJECT SWMF 401 Forebay Calculations
NAME Jonathan Paul
PAGE 1 OF 1

Forebay design based on MECP Stormwater Management Planning and Design Manual (March 2003)

1) Settling

Dist = √(r*Qp/Vs)

Dist = Forebay length (m)
r = Length to width ratio = 2
Qp = 25mm SWM outflow - water quality (m^3/s = 0.018
Vs = settling velocity for 0.15 mm particles (m/ = 0.0003

Dist = 11.0 m

Actual forebay length = 40.0 m

2) Dispersion Length

Dist = 8*Q/(d*Vf)

Dist =Length of dispersion (m)
Q = 1:5-yr max inlet flow (m^3/s) = 1.360
d = depth of permanent pool in forebay (m) = 0.65
Vf= desired velocity in forebay (m/s) = 0.50

Dist = 33.5 m

Actual forebay length = 40.0 m

3) Cleanout Frequency

Cleanout = Vol/(load*Asew*eff.)

A_{sew} = contributing sewer area (ha) = 6.35
Actual Forebay Length (m) = 40.00
Imp = avg. percent Impervious (%) = 76%
load = sediment loading (m^3/ha) = 3.20
eff. = removal effciency (%) = 80%
Cleanout Freqency Target (Years) = 10
Vol = bottom 0.75 m volume (m^3) = 196

Cleanout = 12.1 years - therefore cleanout target is satisfied

TATHAM
ENGINEERING

PROJECT	South Fergus MESP and Secondary Plan	FILE	120157
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SUBJECT	SWMF 402 South Forebay Calculations	NAME	Jonathan Paul
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Forebay design based on MECP Stormwater Management Planning and Design Manual (March 2003)

1) Settling

Dist = √(r*Qp/Vs)

Dist = Forebay length (m)
r = Length to width ratio = 2
Qp = 25mm SWM outflow - water quality (m^3/s = 0.007
Vs = settling velocity for 0.15 mm particles (m/ = 0.0003

Dist = 6.8 m

Actual forebay length = 37.0 m

2) Dispersion Length

Dist = 8*Q/(d*Vf)

Dist =Length of dispersion (m)
Q = 1:5-yr max inlet flow (m^3/s) = 0.344 *
d = depth of permanent pool in forebay (m) = 0.70
Vf= desired velocity in forebay (m/s) = 0.50

Dist = 7.9 m

Actual forebay length = 37.0 m

3) Cleanout Frequency

Cleanou = Vol/(load*Asew*eff.)

A_{sew} = contributing sewer area (ha) = 2.78
Actual Forebay Length (m) = 37.00
Imp = avg. percent Impervious (%) = 40%
load = sediment loading (m^3/ha) = 0.93
eff. = removal effciency (%) = 80%
Cleanout Freqency Target (Years) = 10
Vol = bottom 0.7 m volume (m^3) = 160

Cleanou = 77.4 years - therefore cleanout target is satisfied

TATHAM ENGINEERING

PROJECT	South Fergus MESP and Secondary Plan	FILE	120157
		DATE	3/3/2023
SUBJECT	SWMF 402 North Forebay Calculations	NAME	Jonathan Paul
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Forebay design based on MECP Stormwater Management Planning and Design Manual (March 2003)

1) Settling

Dist = √(r*Qp/Vs)

Dist = Forebay length (m)
r = Length to width ratio = 2
Qp = 25mm SWM outflow - water quality (m^3/s = 0.007
Vs = settling velocity for 0.15 mm particles (m/ = 0.0003

Dist = 6.8 m

Actual forebay length = 38.0 m

2) Dispersion Length

Dist = 8*Q/(d*Vf)

Dist =Length of dispersion (m)
Q = 1:5-yr max inlet flow (m^3/s) = 0.689 *
d = depth of permanent pool in forebay (m) = 0.70
Vf= desired velocity in forebay (m/s) = 0.50

Dist = 15.7 m

Actual forebay length = 38.0 m

3) Cleanout Frequency

Cleanou = Vol/(load*Asew*eff.)

A_{sew} = contributing sewer area (ha) = 5.56
Actual Forebay Length (m) = 38.00
Imp = avg. percent Impervious (%) = 40%
load = sediment loading (m^3/ha) = 0.93
eff. = removal effciency (%) = 80%
Cleanout Freqency Target (Years) = 10
Vol = bottom 0.7 m volume (m^3) = 195

Cleanou = 47.1 years - therefore cleanout target is satisfied

TATHAM
ENGINEERING

PROJECT	South Fergus MESP and Secondary Plan	FILE	120157
		DATE	3/3/2023
SUBJECT	SWMF 403 Forebay Calculations	NAME	Jonathan Paul
		PAGE	1 OF 1

Forebay design based on MECP Stormwater Management Planning and Design Manual (March 2003)

1) Settling

Dist = √(r*Qp/Vs)

Dist = Forebay length (m)
r = Length to width ratio = 2.5
Qp = 25mm SWM outflow - water quality (m^3/s = 0.032
Vs = settling velocity for 0.15 mm particles (m/ = 0.0003

Dist = 16.3 m

Actual forebay length = 60.0 m

2) Dispersion Length

Dist = 8*Q/(d*Vf)

Dist =Length of dispersion (m)
Q = 1:5yr max inlet flow (m^3/s) = 3.119
d = depth of permanent pool in forebay (m) = 0.90
Vf= desired velocity in forebay (m/s) = 0.50

Dist = 55.4 m

Actual forebay length = 60.0 m

3) Cleanout Frequency

Cleanou = Vol/(load*Asew*eff.)

A_{sew} = contributing sewer area (ha) = 15.95
Actual Forebay Length (m) = 60.00
Imp = avg. percent Impervious (%) = 66%
load = sediment loading (m^3/ha) = 2.50
eff. = removal effciency (%) = 80%
Cleanout Freqency Target (Years) = 10
Vol = bottom 0.5 m volume (m^3) = 337

Cleanou = 10.6 years - therefore cleanout target is satisfied

TATHAM ENGINEERING

PROJECT	South Fergus MESP and Secondary Plan	FILE	120157
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SUBJECT	SWMF 404 North Forebay Calculations	NAME	Jonathan Paul
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Forebay design based on MECP Stormwater Management Planning and Design Manual (March 2003)

1) Settling

Dist = √(r*Qp/Vs)

Dist = Forebay length (m)

r = Length to width ratio = 4

Qp = 25mm SWM outflow - water quality (m^3/s = 0.04

Vs = settling velocity for 0.15 mm particles (m/ = 0.0003

Dist = 23.1 m

Actual forebay length = 72.0 m

2) Dispersion Length

Dist = 8*Q/(d*Vf)

Dist =Length of dispersion (m)

Q = 1:5yr max inlet flow (m^3/s) = 1.862

d = depth of permanent pool in forebay (m) = 0.50

Vf= desired velocity in forebay (m/s) = 0.50

Dist = 59.6 m

Actual forebay length = 72.0 m

3) Cleanout Frequency

Cleanou = Vol/(load*Asew*eff.)

A_{sew} = contributing sewer area (ha) = 10.19

Actual Forebay Length (m) = 72.00

Imp = avg. percent Impervious (%) = 66%

load = sediment loading (m^3/ha) = 2.56

eff. = removal effciency (%) = 80%

Cleanout Freqency Target (Years) = 10

Vol = bottom 0.5 m volume (m^3) = 252

Cleanou = 12.1 years - therefore cleanout target is satisfied

TATHAM ENGINEERING

PROJECT	South Fergus MESP and Secondary Plan	FILE	120157
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SUBJECT	SWMF 404 South Forebay Calculations	NAME	Jonathan Paul
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Forebay design based on MECP Stormwater Management Planning and Design Manual (March 2003)

1) Settling

Dist = √(r*Qp/Vs)

Dist = Forebay length (m)
r = Length to width ratio = 5.3
Qp = 25mm SWM outflow - water quality (m^3/s = 0.04
Vs = settling velocity for 0.15 mm particles (m/ = 0.0003

Dist = 26.6 m

Actual forebay length = 108 m

2) Dispersion Length

Dist = 8*Q/(d*Vf)

Dist =Length of dispersion (m)
Q = 1:5yr max inlet flow (m^3/s) = 4.717
d = depth of permanent pool in forebay (m) = 0.73
Vf= desired velocity in forebay (m/s) = 0.50

Dist = #### m

Actual forebay length = 108 m

3) Cleanout Frequency

Cleanou = Vol/(load*Asew*eff.)

A_{sew} = contributing sewer area (ha) = 28.45
Actual Forebay Length (m) = 108.00
Imp = avg. percent Impervious (%) = 53%
load = sediment loading (m^3/ha) = 1.77
eff. = removal effciency (%) = 80%
Cleanout Freqency Target (Years) = 10
Vol = bottom 0.57 m volume (m^3) = 530

Cleanou = 13.2 years - therefore cleanout target is satisfied

TATHAM
ENGINEERING

PROJECT	South Fergus MESP and Secondary Plan	FILE	120157
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SUBJECT	SWMF 405 Forebay Calculations	NAME	Jonathan Paul
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Forebay design based on MECP Stormwater Management Planning and Design Manual (March 2003)

1) Settling

Dist = √(r*Qp/Vs)

Dist = Forebay length (m)

r = Length to width ratio = 3.2

Qp = 25mm SWM outflow - water quality (m^3/s = 0.064

Vs = settling velocity for 0.15 mm particles (m/ = 0.0003

Dist = 26.1 m

Actual forebay length = 78.0 m

2) Dispersion Length

Dist = 8*Q/(d*Vf)

Dist =Length of dispersion (m)

Q = 1:5yr max inlet flow (m^3/s) = 4.791

d = depth of permanent pool in forebay (m) = 1.06

Vf= desired velocity in forebay (m/s) = 0.50

Dist = 72.3 m

Actual forebay length = 78.0 m

3) Cleanout Frequency

Cleanou = Vol/(load*Asew*eff.)

A_{sew} = contributing sewer area (ha) = 58.85

Actual Forebay Length (m) = 78.00

Imp = avg. percent Impervious (%) = 25%

load = sediment loading (m^3/ha) = 0.60

eff. = removal effciency (%) = 80%

Cleanout Freqency Target (Years) = 10

Vol = bottom 0.34 m volume (m^3) = 285

Cleanou = 10.1 years - therefore cleanout target is satisfied

TATHAM
ENGINEERING

PROJECT	South Fergus MESP and Secondary Plan	FILE	120157
		DATE	3/3/2023
SUBJECT	SWMF 406 Forebay Calculations	NAME	Jonathan Paul
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Forebay design based on MECP Stormwater Management Planning and Design Manual (March 2003)

1) Settling

Dist = √(r*Qp/Vs)

Dist = Forebay length (m)
r = Length to width ratio = 2
Qp = 25mm SWM outflow - water quality (m^3/s = 0.04
Vs = settling velocity for 0.15 mm particles (m/ = 0.0003

Dist = 16.3 m

Actual forebay length = 57.0 m

2) Dispersion Length

Dist = 8*Q/(d*Vf)

Dist =Length of dispersion (m)
Q = 1:5yr max inlet flow (m^3/s) = 3.303
d = depth of permanent pool in forebay (m) = 0.98
Vf= desired velocity in forebay (m/s) = 0.50

Dist = 53.9 m

Actual forebay length = 57.0 m

3) Cleanout Frequency

Cleanout = Vol/(load*Asew*eff.)

A_{sew} = contributing sewer area (ha) = 18.78
Actual Forebay Length (m) = 57.00
Imp = avg. percent Impervious (%) = 60%
load = sediment loading (m^3/ha) = 2.20
eff. = removal effciency (%) = 80%
Cleanout Freqency Target (Years) = 10
Vol = bottom 0.42 m volume (m^3) = 331

Cleanout = 10.0 years - therefore cleanout target is satisfied

TATHAM
ENGINEERING

PROJECT South Fergus MESP and Secondary Plan
SUBJECT SWM Pond 401 Drawdown
FILE 120157
DATE 3/3/2023
NAME J. Paul
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DRAWDOWN TIME FOR EXTENDED DETENTION AND 25MM STORM VOLUMES

Using the falling head orifice equation

$$t= \frac{2\ A_p}{C\ A_o\ (2g)^{0.5}} \quad (h_1^{0.5} - h_2^{0.5})$$

where t = drawdown time in seconds
A_p = surface area of pond (m^2)
C = discharge coefficient (orifice)
A_o = cross-sectional area of orifice (m^2)
g = gravitational acceleration constant (9.81 m/s^2)
h_1 = starting water elevation above the orifice (m)
h_2 = ending water elevation above the orifice (m)

25mm Storm Volume

A_p = 2796 m^2 (average of h_1 and h_2 areas)
C = 0.63
A_o = 0.01227 m^2
g = 9.81 m/s^2
h_1 = 0.27
h_2 = 0

Orifice Diameter = 125 mm
25mm Water Level = 407.63 m
Orifice Centroid = 407.36 m

t= 84849.46 seconds

t= **23.57** hours

Extended Detention Volume

A_p = 2968 m^2 (average of h_1 and h_2 areas)
C = 0.63
A_o = 0.01227 m^2
g = 9.81 m/s^2
h_1 = 0.54
h_2 = 0

Orifice Diameter = 125 mm
Extended Detention Water Level = 407.90 m
Orifice Centroid = 407.36 m

t= 127376.94 seconds

t= **35.38** hours

TATHAM
ENGINEERING

PROJECT South Fergus MESP and Secondary Plan
FILE 120157
DATE 3/3/2023
SUBJECT SWM Pond 402 Drawdown
NAME J. Paul
PAGE 1 OF 1

DRAWDOWN TIME FOR EXTENDED DETENTION AND 25MM STORM VOLUMES

Using the falling head orifice equation

$$t = \frac{2\ A_p}{C\ A_o\ (2g)^{0.5}} \quad (h_1^{0.5} - h_2^{0.5})$$

where t = drawdown time in seconds
A_p = surface area of pond (m^2)
C = discharge coefficient (orifice)
A_o = cross-sectional area of orifice (m^2)
g = gravitational acceleration constant (9.81 m/s^2)
h_1 = starting water elevation above the orifice (m)
h_2 = ending water elevation above the orifice (m)

25mm Storm Volume

A_p = 4300 m^2 (average of h_1 and h_2 areas)
C = 0.63
A_o = 0.00785 m^2 Orifice Diameter = 100 mm
g = 9.81 m/s^2
h_1 = 0.11 25mm Water Level = 407.46 m
h_2 = 0 Orifice Centroid = 407.35 m

t= 130141.22 seconds

t= **36.15** hours

Extended Detention Volume

A_p = 4402 m^2 (average of h_1 and h_2 areas)
C = 0.63
A_o = 0.00785 m^2 Orifice Diameter = 100 mm
g = 9.81 m/s^2
h_1 = 0.20 Extended Detention Water Level = 407.55 m
h_2 = 0 Orifice Centroid = 407.35 m

t= 179644.99 seconds

t= **49.90** hours

TATHAM ENGINEERING

PROJECT	South Fergus MESP and Secondary Plan	FILE	120157
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SUBJECT	SWM Pond 403 Drawdown	NAME	J. Paul
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DRAWDOWN TIME FOR EXTENDED DETENTION AND 25MM STORM VOLUMES

Using the falling head orifice equation

$$t= \frac{2\,A_p}{C\,A_o\,(2g)^{0.5}}\quad(h_1^{0.5} - h_2^{0.5})$$

where t = drawdown time in seconds
A_p = surface area of pond (m^2)
C = discharge coefficient (orifice)
A_o = cross-sectional area of orifice (m^2)
g = gravitational acceleration constant (9.81 m/s^2)
h_1 = starting water elevation above the orifice (m)
h_2 = ending water elevation above the orifice (m)

25mm Storm Volume

A_p = 7200 m^2 (average of h_1 and h_2 areas)
C = 0.63
A_o = 0.02405 m^2
g = 9.81 m/s^2
h_1 = 0.24
h_2 = 0

Orifice Diameter = 175 mm
25mm Water Level = 408.63 m
Orifice Centroid = 408.39 m

t= 105648.26 seconds

t= **29.35** hours

Extended Detention Volume

A_p = 7484 m^2 (average of h_1 and h_2 areas)
C = 0.63
A_o = 0.02405 m^2
g = 9.81 m/s^2
h_1 = 0.46
h_2 = 0

Orifice Diameter = 175 mm
Extended Detention Water Level = 408.85 m
Orifice Centroid = 408.39 m

t= 151657.40 seconds

t= **42.13** hours

TATHAM
ENGINEERING

PROJECT	South Fergus MESP and Secondary Plan	FILE	120157
		DATE	3/3/2023
SUBJECT	SWM Pond 404 Drawdown	NAME	J. Paul
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DRAWDOWN TIME FOR EXTENDED DETENTION AND 25MM STORM VOLUMES

Using the falling head orifice equation

$$t= \frac{2 A_p}{C A_o (2g)^{0.5}} (h_1^{0.5} - h_2^{0.5})$$

where t = drawdown time in seconds
A_p = surface area of pond (m^2)
C = discharge coefficient (orifice)
A_o = cross-sectional area of orifice (m^2)
g = gravitational acceleration constant (9.81 m/s^2)
h_1 = starting water elevation above the orifice (m)
h_2 = ending water elevation above the orifice (m)

25mm Storm Volume

A_p = 12688 m^2 (average of h_1 and h_2 areas)
C = 0.63
A_o = 0.03243 m^2
g = 9.81 m/s^2
h_1 = 0.30
h_2 = 0

8 Inches
Orifice Diameter = 203.2 mm

25mm Water Level = 411.30 m
Orifice Centroid = 411.00 m

t= 153587.71 seconds

t= **42.66** hours

Extended Detention Volume

A_p = 12888 m^2 (average of h_1 and h_2 areas)
C = 0.63
A_o = 0.03243 m^2
g = 9.81 m/s^2
h_1 = 0.40
h_2 = 0

8 Inches
Orifice Diameter = 203.2 mm

Extended Detention Water Level = 411.40 m
Orifice Centroid = 411.00 m

t= 180143.33 seconds

t= **50.04** hours

TATHAM ENGINEERING

PROJECT	South Fergus MESP and Secondary Plan	FILE	120157
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SUBJECT	SWM Pond 405 Drawdown	NAME	J. Paul
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DRAWDOWN TIME FOR EXTENDED DETENTION AND 25MM STORM VOLUMES

Using the falling head orifice equation

$$t= \frac{2\ A_p}{C\ A_o\ (2g)^{0.5}}\ (h_1^{0.5} - h_2^{0.5})$$

where t = drawdown time in seconds
A_p = surface area of pond (m^2)
C = discharge coefficient (orifice)
A_o = cross-sectional area of orifice (m^2)
g = gravitational acceleration constant (9.81 m/s^2)
h_1 = starting water elevation above the orifice (m)
h_2 = ending water elevation above the orifice (m)

25mm Storm Volume

A_p = 6903 m^2 (average of h_1 and h_2 areas)
C = 0.63
A_o = 0.03243 m^2
g = 9.81 m/s^2
h_1 = 0.50
h_2 = 0

8inches
Orifice Diameter = 203.2 mm

25mm Water Level = 418.10 m
Orifice Centroid = 417.60 m

t= 107876.17 seconds

t= **29.97** hours

Extended Detention Volume

A_p = 7187 m^2 (average of h_1 and h_2 areas)
C = 0.63
A_o = 0.03243 m^2
g = 9.81 m/s^2
h_1 = 0.80
h_2 = 0

8inches
Orifice Diameter = 203.2 mm

Extended Detention Water Level = 418.40 m
Orifice Centroid = 417.60 m

t= 142067.68 seconds

t= **39.46** hours

TATHAM ENGINEERING

PROJECT	South Fergus MESP and Secondary Plan	FILE	120157
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SUBJECT	SWM Pond 406 Drawdown	NAME	J. Paul
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DRAWDOWN TIME FOR EXTENDED DETENTION AND 25MM STORM VOLUMES

Using the falling head orifice equation

$$t= \frac{2\ A_p}{C\ A_o\ (2g)^{0.5}} \left(h_1^{0.5} - h_2^{0.5}\right)$$

where t = drawdown time in seconds
A_p = surface area of pond (m^2)
C = discharge coefficient (orifice)
A_o = cross-sectional area of orifice (m^2)
g = gravitational acceleration constant (9.81 m/s^2)
h_1 = starting water elevation above the orifice (m)
h_2 = ending water elevation above the orifice (m)

25mm Storm Volume

A_p = 5825 m^2 (average of h_1 and h_2 areas)
C = 0.63
A_o = 0.02483 m^2
g = 9.81 m/s^2
h_1 = 0.33
h_2 = 0

7 inches
Orifice Diameter = 177.8 mm

25mm Water Level = 410.97 m
Orifice Centroid = 410.64 m

t= 96591.62 seconds

t= **26.83** hours

Extended Detention Volume

A_p = 6214 m^2 (average of h_1 and h_2 areas)
C = 0.63
A_o = 0.02483 m^2
g = 9.81 m/s^2
h_1 = 0.81
h_2 = 0

7 inches
Orifice Diameter = 177.8 mm

Extended Detention Water Level = 411.45 m
Orifice Centroid = 410.64 m

t= 161435.97 seconds

t= **44.84** hours

TATHAM ENGINEERING

PROJECT	South Fergus MESP and Secondary Plan	FILE	120157
		DATE	12/18/2023
SUBJECT	Nichol Drain No. 2 SWM Pond Drawdown	NAME	J. Paul
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DRAWDOWN TIME FOR EXTENDED DETENTION AND 25MM STORM VOLUMES

Using the falling head orifice equation

$$t = \frac{2\,A_p}{C\,A_o\,(2g)^{0.5}}\left(h_1^{0.5} - h_2^{0.5}\right)$$

where t = drawdown time in seconds

A_p = surface area of pond (m^2)

C = discharge coefficient (orifice)

A_o = cross-sectional area of orifice (m^2)

g = gravitational acceleration constant (9.81 m/s^2)

h_1 = starting water elevation above the orifice (m)

h_2 = ending water elevation above the orifice (m)

25mm Storm Volume

A_p = 6088 m^2 (average of h_1 and h_2 areas)

C = 0.63

A_o = 0.03142 m^2

g = 9.81 m/s^2

h_1 = 0.61

h_2 = 0

Orifice Diameter = 200 mm

25mm Water Level = 409.71 m

Orifice Centroid = 409.10 m

t= 108474.99 seconds

t= **30.13** hours

Extended Detention Volume

A_p = 6527 m^2 (average of h_1 and h_2 areas)

C = 0.63

A_o = 0.03142 m^2

g = 9.81 m/s^2

h_1 = 0.90

h_2 = 0

Orifice Diameter = 200 mm

Extended Detention Water Level = 410.00 m

Orifice Centroid = 409.10 m

t= 141261.87 seconds

t= **39.24** hours

TATHAM ENGINEERING

PROJECT	South Fergus MESP and Secondary Plan	FILE	120157
		DATE	12/18/2023
SUBJECT	Westminster SWM Pond Drawdown	NAME	J. Paul
		PAGE	1 OF 1

DRAWDOWN TIME FOR EXTENDED DETENTION AND 25MM STORM VOLUMES

Using the falling head orifice equation

$$t = \frac{2\,A_p}{C\,A_o\,(2g)^{0.5}}\left(h_1^{0.5} - h_2^{0.5}\right)$$

where t = drawdown time in seconds

A_p = surface area of pond (m^2)

C = discharge coefficient (orifice)

A_o = cross-sectional area of orifice (m^2)

g = gravitational acceleration constant ($9.81\ m/s^2$)

h_1 = starting water elevation above the orifice (m)

h_2 = ending water elevation above the orifice (m)

25mm Storm Volume

A_p = 9377.9 m^2 (average of h_1 and h_2 areas)

C = 0.63

A_o = 0.01767 m^2

g = 9.81 m/s^2

h_1 = 0.21

h_2 = 0

Orifice Diameter = 150 mm

25mm Water Level = 410.84 m

Orifice Centroid = 410.63 m

t= 176356.87 seconds

t= **48.99** hours

Extended Detention Volume

A_p = 9496.5 m^2 (average of h_1 and h_2 areas)

C = 0.63

A_o = 0.01767 m^2

g = 9.81 m/s^2

h_1 = 0.32

h_2 = 0

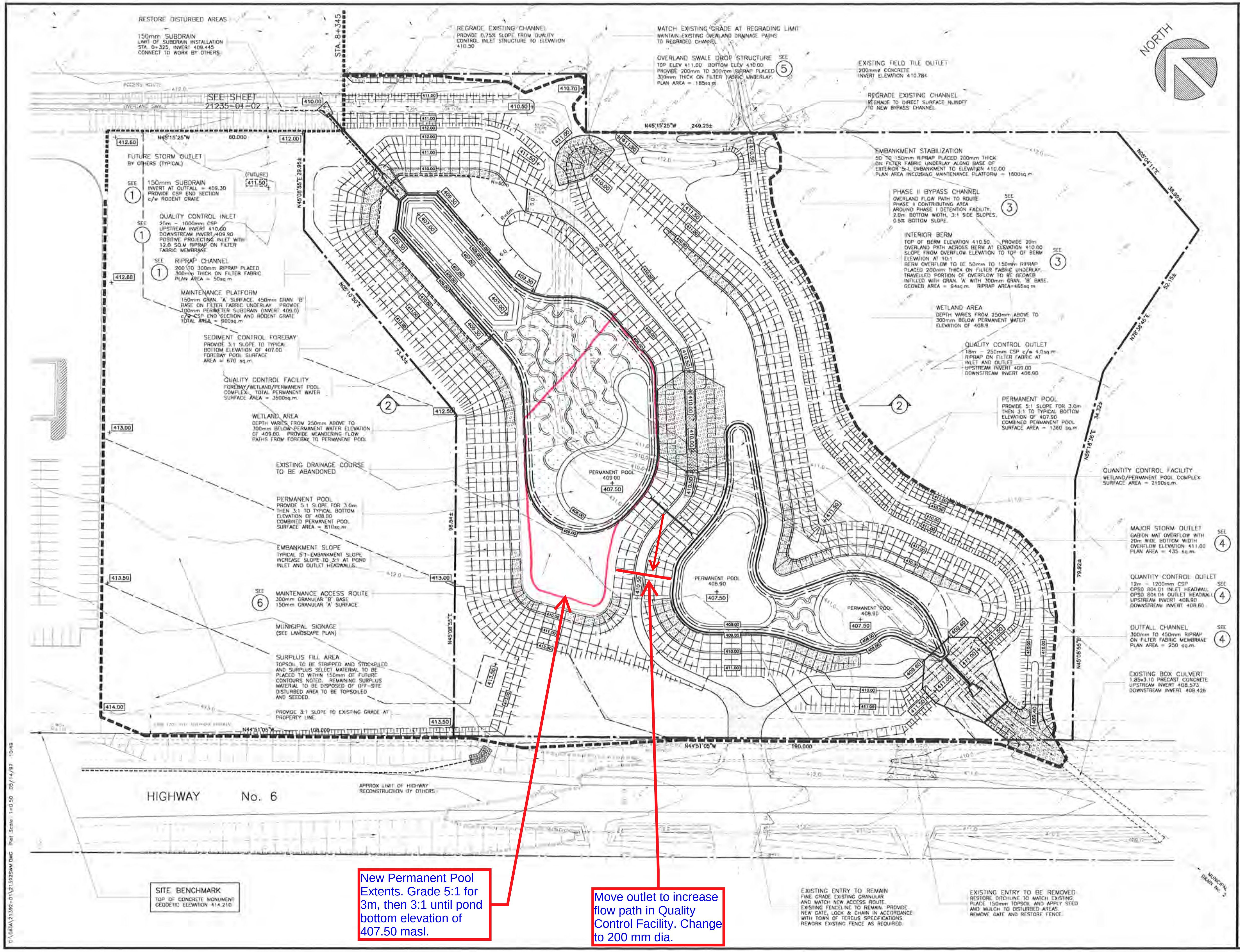
Orifice Diameter = 150 mm

Extended Detention Water Level = 410.95 m

Orifice Centroid = 410.63 m

t= 219569.90 seconds

t= **60.99** hours



RESTORE DISTURBED AREAS

150mm SUBDRAIN
LIMIT OF SUBDRAIN INSTALLATION
STA. 0+325, INVERT 409.445
CONNECT TO WORK BY OTHERS

FUTURE STORM OUTLET
BY OTHERS (TYPICAL)

SEE ① 150mm SUBDRAIN
INVERT AT OUTFALL = 409.30
PROVIDE CSP END SECTION
c/w RODENT GRATE

SEE ① QUALITY CONTROL INLET
25m – 1000mm CSP
UPSTREAM INVERT 410.60
DOWNSTREAM INVERT 409.90
POSITIVE PROJECTING INLET WITH
12.0 SQ.M RIPRAP ON FILTER
FABRIC MEMBRANE

SEE ① RIPRAP CHANNEL
200 TO 300mm RIPRAP PLACED
300mm THICK ON FILTER FABRIC.
PLAN AREA = 50sq.m

MAINTENANCE PLATFORM
150mm GRAN. 'A' SURFACE. 450mm GRAN. 'B'
BASE ON FILTER FABRIC UNDERLAY. PROVIDE
100mm PERIMETER SUBDRAIN (INVERT 409.0)
c/w CSP END SECTION AND RODENT GRATE
TOTAL AREA = 900sq.m

SEDIMENT CONTROL FOREBAY
PROVIDE 3:1 SLOPE TO TYPICAL
BOTTOM ELEVATION OF 407.00
FOREBAY POOL SURFACE
AREA = 670 sq.m

QUALITY CONTROL FACILITY
FOREBAY/WETLAND/PERMANENT POOL
COMPLEX. TOTAL PERMANENT WATER
SURFACE AREA = 3500sq.m.

WETLAND AREA
DEPTH VARIES FROM 250mm ABOVE TO
300mm BELOW PERMANENT WATER ELEVATION
OF 409.00. PROVIDE MEANDERING FLOW
PATHS FROM FOREBAY TO PERMANENT POOL

EXISTING DRAINAGE COURSE
TO BE ABANDONED

PERMANENT POOL
PROVIDE 5:1 SLOPE FOR 3.0m
THEN 3:1 TO TYPICAL BOTTOM
ELEVATION OF 408.00
COMBINED PERMANENT POOL
SURFACE AREA = 810sq.m

EMBANKMENT SLOPE
TYPICAL 5:1 EMBANKMENT SLOPE.
INCREASE SLOPE TO 3:1 AT POND
INLET AND OUTLET HEADWALLS.

SEE ⑥ MAINTENANCE ACCESS ROUTE
300mm GRANULAR 'B' BASE
150mm GRANULAR 'A' SURFACE

MUNICIPAL SIGNAGE
(SEE LANDSCAPE PLAN)

SURPLUS FILL AREA
TOPSOIL TO BE STRIPPED AND STOCKPILED
AND SURPLUS SELECT MATERIAL TO BE
PLACED TO WITHIN 150mm OF FUTURE
CONTOURS NOTED. REMAINING SURPLUS
MATERIAL TO BE DISPOSED OF OFF-SITE.
DISTURBED AREA TO BE TOPSOILED
AND SEEDED.

PROVIDE 3:1 SLOPE TO EXISTING GRADE AT
PROPERTY LINE.

REGRADE EXISTING CHANNEL
PROVIDE 0.75% SLOPE FROM QUALITY
CONTROL INLET STRUCTURE TO ELEVATION
410.50

MATCH EXISTING GRADE AT REGRADING LIMIT
MAINTAIN EXISTING OVERLAND DRAINAGE PATHS
TO REGRADED CHANNEL

OVERLAND SWALE DROP STRUCTURE SEE ⑤
TOP ELEV 411.00 BOTTOM ELEV 410.00
PROVIDE 200mm TO 300mm RIPRAP PLACED
300mm THICK ON FILTER FABRIC UNDERLAY.
PLAN AREA = 185sq.m

EXISTING FIELD TILE OUTLET
200mmø CONCRETE
INVERT ELEVATION 410.784

REGRADE EXISTING CHANNEL
REGRADE TO DIRECT SURFACE RUNOFF
TO NEW BYPASS CHANNEL

EMBANKMENT STABILIZATION
50 TO 150mm RIPRAP PLACED 200mm THICK
ON FILTER FABRIC UNDERLAY ALONG BASE OF
EXTERIOR 5:1 EMBANKMENT TO ELEVATION 410.00
PLAN AREA INCLUDING MAINTENANCE PLATFORM = 1600sq.m

PHASE II BYPASS CHANNEL SEE ③
OVERLAND FLOW PATH TO ROUTE
PHASE II CONTRIBUTING AREA
AROUND PHASE I DETENTION FACILITY.
2.0m BOTTOM WIDTH, 3:1 SIDE SLOPES,
0.5% BOTTOM SLOPE.

INTERIOR BERM SEE ③
TOP OF BERM ELEVATION 410.50. PROVIDE 20m
OVERLAND PATH ACROSS BERM AT ELEVATION 410.00
SLOPE FROM OVERFLOW ELEVATION TO TOP OF BERM
ELEVATION AT 10:1
BERM OVERFLOW TO BE 50mm TO 150mm RIPRAP
PLACED 200mm THICK ON FILTER FABRIC UNDERLAY.
TRAVELLED PORTION OF OVERFLOW TO BE GEOWEB
INFILLED WITH GRAN. 'A' WITH 300mm GRAN. 'B' BASE.
GEOWEB AREA = 94sq.m. RIPRAP AREA=466sq.m

WETLAND AREA
DEPTH VARIES FROM 250mm ABOVE TO
300mm BELOW PERMANENT WATER
ELEVATION OF 408.9.

QUALITY CONTROL OUTLET
18m – 250mm CSP c/w 4.0sq.m
RIPRAP ON FILTER FABRIC AT
INLET AND OUTLET
UPSTREAM INVERT 409.00
DOWNSTREAM INVERT 408.90

PERMANENT POOL
PROVIDE 5:1 SLOPE FOR 3.0m
THEN 3:1 TO TYPICAL BOTTOM
ELEVATION OF 407.90
COMBINED PERMANENT POOL
SURFACE AREA = 1360 sq.m.

QUANTITY CONTROL FACILITY
WETLAND/PERMANENT POOL COMPLEX
SURFACE AREA = 2190sq.m.

MAJOR STORM OUTLET SEE ④
GABION MAT OVERFLOW WITH
20m WIDE BOTTOM WIDTH
OVERFLOW ELEVATION 411.00
PLAN AREA = 435 sq.m.

QUANTITY CONTROL OUTLET SEE ④
12m – 1200mm CSP
OPSD 804.01 INLET HEADWALL
OPSD 804.04 OUTLET HEADWALL
UPSTREAM INVERT 408.90
DOWNSTREAM INVERT 408.60

OUTFALL CHANNEL SEE ④
300mm TO 450mm RIPRAP
ON FILTER FABRIC MEMBRANE
PLAN AREA = 250 sq.m.

EXISTING BOX CULVERT
1.85x3.10 PRECAST CONCRETE
UPSTREAM INVERT 408.573
DOWNSTREAM INVERT 408.428

APPROX. LIMIT OF HIGHWAY
RECONSTRUCTION BY OTHERS

EXISTING ENTRY TO REMAIN
FINE GRADE EXISTING GRANULAR
AND MATCH NEW ACCESS ROUTE.
EXISTING FENCELINE TO REMAIN. PROVIDE
NEW GATE, LOCK & CHAIN IN ACCORDANCE
WITH TOWN OF FERGUS SPECIFICATIONS.
REWORK EXISTING FENCE AS REQUIRED.

EXISTING ENTRY TO BE REMOVED
RESTORE DITCHLINE TO MATCH EXISTING.
PLACE 150mm TOPSOIL AND APPLY SEED
AND MULCH TO DISTURBED AREAS.
REMOVE GATE AND RESTORE FENCE.

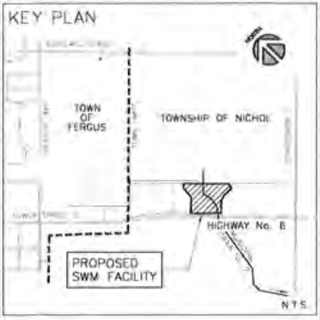
SITE BENCHMARK
TOP OF CONCRETE MONUMENT
GEODETIC ELEVATION 414.210

New Permanent Pool Extents. Grade 5:1 for 3m, then 3:1 until pond bottom elevation of 407.50 masl.

Move outlet to increase flow path in Quality Control Facility. Change to 200 mm dia.

C:\DATA\21392-01\21392SWM.DWG Plot Scale 1=0.50 05/14/97 10:49

KEY PLAN



LEGEND

FINISHED GRADE ELEVATION	+ 412.00
EXISTING GRADE ELEVATION	
FINISHED CONTOURS	— 412.00 —
EXISTING CONTOURS	— 412.0 —
EMBANKMENT SLOPE	⊤⊤⊤⊤⊤⊤
SURFACE FLOW ARROW	←
WETLAND AREA	☐
PERMANENT POOL	☐
RIPRAP	▨
GABION MAT	☐
GRANULAR SURFACE	☐
LIMIT OF REGRADING (APPROX)	■ ■ ■ ■ ■

NOTES

- REGRADED AREAS TO BE CLEARED OF ORGANIC AND DELETERIOUS MATTER AND TOPSOIL STRIPPED AND STOCKPILED.
- SELECT ON-SITE MATERIAL TO BE USED IN FILL AREAS, PLACED IN ACCORDANCE WITH OPSS 206.
- SURPLUS AND UNACCEPTABLE MATERIAL TO BE DISPOSED OF AT AN OFF-SITE LOCATION.
- REDISTRIBUTE SELECT ON-SITE TOPSOIL TO A MINIMUM DEPTH OF 150mm IN CUT AREAS AND 300mm IN FILL AREAS.
- SEE LANDSCAPE PLAN FOR PLANTING REQUIREMENTS.
- ALL WORK TO BE PERFORMED IN STRICT ACCORDANCE WITH THE REQUIREMENTS OF THE EROSION AND SEDIMENTATION CONTROL PLAN.

3	MAY/97	GENERAL REVISIONS
2	MAR/97	GENERAL REVISIONS
1	JAN/97	GENERAL REVISIONS
No.	DATE	REVISIONS

30 Dupont Street East, Waterloo, Ontario N2J 2G9

PHASE I FINAL DESIGN
NICHOL DRAIN No. 2
SWM FACILITY
TOWNSHIP OF NICHOL

AREA GRADING PLAN

DM		DM		OCT/96	
RFC		RT		21392-01	
1 : 500		21392-01-01			

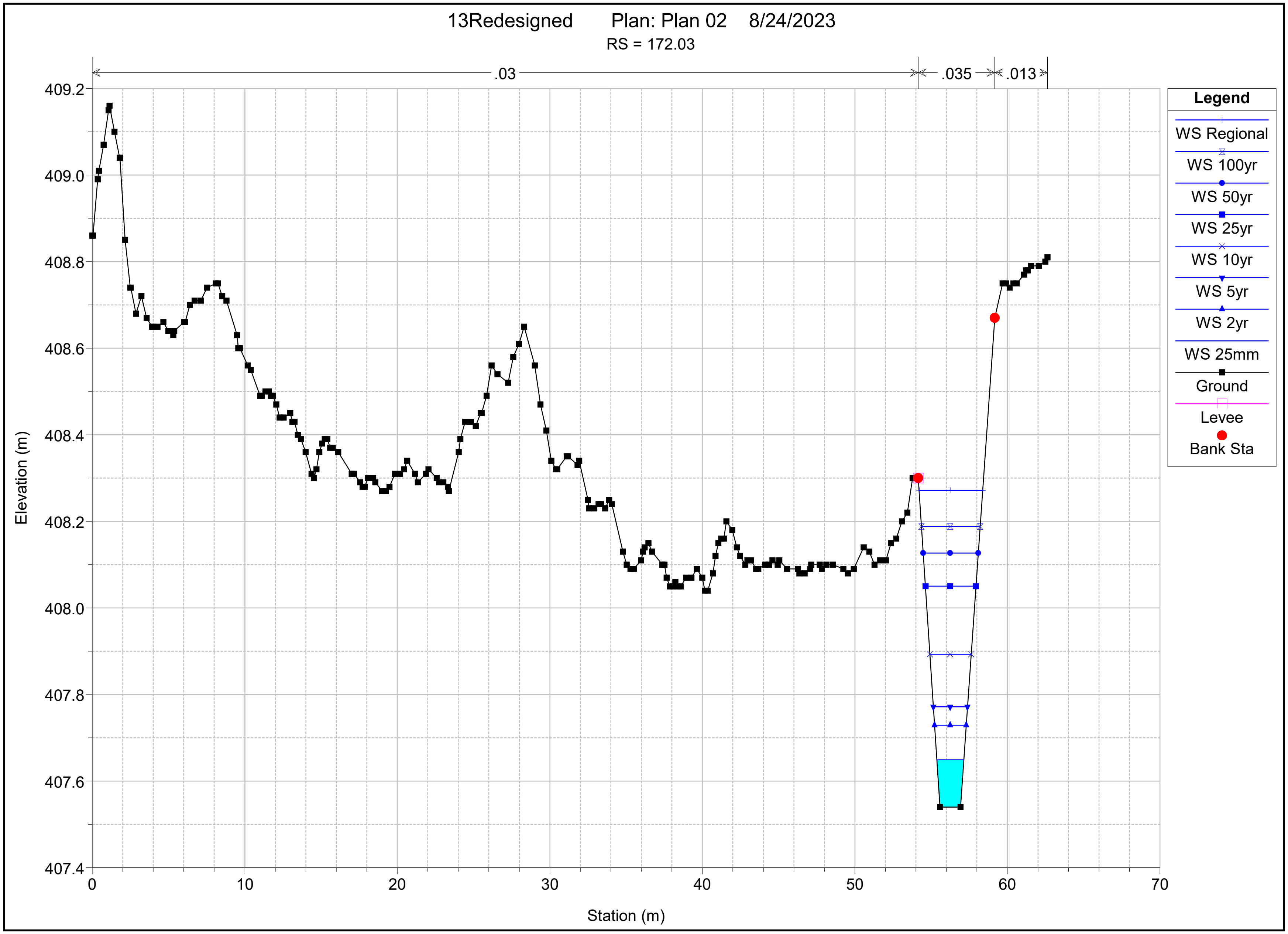
Appendix J:
Nichol Drain No. 13 Hydraulic Analysis

HEC-RAS Plan: Plan 02 River: Guelph Street Di Reach: Guelph Street Di

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Guelph Street Di	172.03	25mm	0.05	407.54	407.65	407.59	407.65	0.002498	0.29	0.17	1.78	0.30
Guelph Street Di	172.03	2yr	0.14	407.54	407.73	407.64	407.74	0.002757	0.42	0.33	2.10	0.34
Guelph Street Di	172.03	5yr	0.20	407.54	407.77	407.66	407.78	0.002825	0.48	0.42	2.27	0.35
Guelph Street Di	172.03	10yr	0.43	407.54	407.89	407.74	407.91	0.002738	0.59	0.72	2.75	0.37
Guelph Street Di	172.03	25yr	0.84	407.54	408.05	407.83	408.07	0.002581	0.70	1.20	3.38	0.37
Guelph Street Di	172.03	50yr	1.09	407.54	408.13	407.88	408.15	0.002518	0.74	1.47	3.69	0.37
Guelph Street Di	172.03	100yr	1.33	407.54	408.19	407.92	408.22	0.002480	0.78	1.71	3.93	0.38
Guelph Street Di	172.03	Regional	1.93	407.54	408.27	408.01	408.28	0.000904	0.50	5.27	26.37	0.23
Guelph Street Di	152.11	25mm	0.05	407.47	407.56	407.53	407.57	0.008256	0.46	0.11	1.40	0.53
Guelph Street Di	152.11	2yr	0.14	407.47	407.64	407.58	407.65	0.006940	0.60	0.23	1.70	0.53
Guelph Street Di	152.11	5yr	0.20	407.47	407.68	407.61	407.70	0.005937	0.64	0.31	1.89	0.50
Guelph Street Di	152.11	10yr	0.43	407.47	407.82	407.69	407.84	0.004353	0.71	0.60	2.42	0.46
Guelph Street Di	152.11	25yr	0.84	407.47	407.98	407.80	408.01	0.003565	0.79	1.06	3.09	0.43
Guelph Street Di	152.11	50yr	1.09	407.47	408.06	407.85	408.10	0.003364	0.83	1.31	3.40	0.43
Guelph Street Di	152.11	100yr	1.33	407.47	408.12	407.89	408.16	0.003247	0.86	1.53	3.65	0.43
Guelph Street Di	152.11	Regional	1.93	407.47	408.27	407.98	408.27	0.000142	0.20	12.88	55.44	0.09
Guelph Street Di	132.07	25mm	0.05	407.41	407.51	407.45	407.51	0.001449	0.22	0.23	2.59	0.23
Guelph Street Di	132.07	2yr	0.14	407.41	407.60	407.48	407.61	0.001048	0.28	0.50	2.97	0.21
Guelph Street Di	132.07	5yr	0.20	407.41	407.65	407.50	407.66	0.000957	0.30	0.66	3.18	0.21
Guelph Street Di	132.07	10yr	0.43	407.41	407.80	407.56	407.80	0.000873	0.37	1.15	3.74	0.21
Guelph Street Di	132.07	25yr	0.84	407.41	407.97	407.64	407.98	0.000886	0.46	1.84	4.42	0.23
Guelph Street Di	132.07	50yr	1.09	407.41	408.05	407.68	408.06	0.000907	0.50	2.21	4.74	0.23
Guelph Street Di	132.07	100yr	1.33	407.41	408.11	407.71	408.12	0.000928	0.53	2.51	4.99	0.24
Guelph Street Di	132.07	Regional	1.93	407.41	408.25	407.79	408.26	0.000980	0.60	3.24	5.55	0.25
Guelph Street Di	112.11	25mm	0.05	407.35	407.46	407.41	407.47	0.003050	0.33	0.15	1.57	0.33
Guelph Street Di	112.11	2yr	0.14	407.35	407.57	407.46	407.58	0.002272	0.40	0.34	1.99	0.31
Guelph Street Di	112.11	5yr	0.20	407.35	407.62	407.49	407.63	0.002118	0.44	0.45	2.21	0.31
Guelph Street Di	112.11	10yr	0.43	407.35	407.76	407.56	407.78	0.001971	0.53	0.80	2.77	0.31
Guelph Street Di	112.11	25yr	0.84	407.35	407.93	407.67	407.95	0.001964	0.64	1.32	3.44	0.33
Guelph Street Di	112.11	50yr	1.09	407.35	408.01	407.72	408.03	0.001980	0.68	1.60	3.75	0.33
Guelph Street Di	112.11	100yr	1.33	407.35	408.07	407.76	408.10	0.001998	0.72	1.84	4.00	0.34
Guelph Street Di	112.11	Regional	1.93	407.35	408.20	407.85	408.24	0.002045	0.80	2.41	4.56	0.35
Guelph Street Di	92.08	25mm	0.05	407.29	407.43	407.34	407.43	0.001185	0.23	0.22	1.83	0.21
Guelph Street Di	92.08	2yr	0.14	407.29	407.54	407.39	407.54	0.001126	0.31	0.44	2.27	0.23
Guelph Street Di	92.08	5yr	0.20	407.29	407.59	407.42	407.60	0.001141	0.35	0.57	2.49	0.23
Guelph Street Di	92.08	10yr	0.43	407.29	407.73	407.49	407.74	0.001226	0.44	0.96	3.05	0.25
Guelph Street Di	92.08	25yr	0.84	407.29	407.90	407.59	407.92	0.001354	0.55	1.52	3.71	0.28
Guelph Street Di	92.08	50yr	1.09	407.29	407.98	407.64	408.00	0.001413	0.60	1.82	4.02	0.29
Guelph Street Di	92.08	100yr	1.33	407.29	408.04	407.68	408.06	0.001459	0.64	2.07	4.27	0.29
Guelph Street Di	92.08	Regional	1.93	407.29	408.17	407.77	408.20	0.001558	0.72	2.68	4.80	0.31
Guelph Street Di	72.10	25mm	0.05	407.22	407.39	407.31	407.39	0.003308	0.38	0.13	1.13	0.35
Guelph Street Di	72.10	2yr	0.14	407.22	407.49	407.38	407.51	0.003323	0.49	0.28	1.56	0.37
Guelph Street Di	72.10	5yr	0.20	407.22	407.55	407.42	407.56	0.003327	0.54	0.37	1.77	0.38
Guelph Street Di	72.10	10yr	0.43	407.22	407.68	407.52	407.71	0.003364	0.66	0.64	2.31	0.40
Guelph Street Di	72.10	25yr	0.84	407.22	407.84	407.64	407.87	0.003417	0.79	1.06	2.95	0.42
Guelph Street Di	72.10	50yr	1.09	407.22	407.92	407.69	407.95	0.003443	0.85	1.29	3.24	0.43
Guelph Street Di	72.10	100yr	1.33	407.22	407.97	407.74	408.02	0.003463	0.89	1.48	3.48	0.44
Guelph Street Di	72.10	Regional	1.93	407.22	408.10	407.83	408.15	0.003509	0.99	1.96	3.99	0.45
Guelph Street Di	52.10	25mm	0.05	407.16	407.33	407.25	407.33	0.003053	0.36	0.14	1.16	0.34
Guelph Street Di	52.10	2yr	0.14	407.16	407.43	407.32	407.44	0.003198	0.49	0.28	1.58	0.37
Guelph Street Di	52.10	5yr	0.20	407.16	407.48	407.36	407.50	0.003214	0.54	0.37	1.79	0.38
Guelph Street Di	52.10	10yr	0.43	407.16	407.62	407.45	407.64	0.003313	0.66	0.65	2.33	0.40
Guelph Street Di	52.10	25yr	0.84	407.16	407.77	407.57	407.81	0.003415	0.79	1.06	2.95	0.42
Guelph Street Di	52.10	50yr	1.09	407.16	407.85	407.62	407.88	0.003456	0.85	1.29	3.25	0.43
Guelph Street Di	52.10	100yr	1.33	407.16	407.90	407.67	407.95	0.003490	0.90	1.48	3.48	0.44
Guelph Street Di	52.10	Regional	1.93	407.16	408.03	407.77	408.08	0.003555	0.99	1.95	3.98	0.45
Guelph Street Di	32.07	25mm	0.05	407.10	407.26	407.19	407.27	0.003358	0.38	0.13	1.16	0.35
Guelph Street Di	32.07	2yr	0.14	407.10	407.36	407.26	407.38	0.003436	0.50	0.28	1.58	0.38
Guelph Street Di	32.07	5yr	0.20	407.10	407.42	407.29	407.43	0.003460	0.55	0.36	1.79	0.39
Guelph Street Di	32.07	10yr	0.43	407.10	407.55	407.39	407.57	0.003520	0.67	0.63	2.33	0.41
Guelph Street Di	32.07	25yr	0.84	407.10	407.70	407.51	407.74	0.003594	0.80	1.04	2.96	0.43
Guelph Street Di	32.07	50yr	1.09	407.10	407.77	407.56	407.81	0.003625	0.86	1.27	3.26	0.44
Guelph Street Di	32.07	100yr	1.33	407.10	407.83	407.61	407.87	0.003652	0.91	1.46	3.49	0.45
Guelph Street Di	32.07	Regional	1.93	407.10	407.96	407.70	408.01	0.003699	1.00	1.93	4.00	0.46
Guelph Street Di	12.06	25mm	0.05	407.03	407.19	407.12	407.20	0.003088	0.37	0.14	1.16	0.34
Guelph Street Di	12.06	2yr	0.14	407.03	407.30	407.19	407.31	0.003405	0.50	0.28	1.57	0.38
Guelph Street Di	12.06	5yr	0.20	407.03	407.35	407.22	407.36	0.003522	0.55	0.36	1.77	0.39
Guelph Street Di	12.06	10yr	0.43	407.03	407.47	407.32	407.50	0.003750	0.69	0.62	2.28	0.42
Guelph Street Di	12.06	25yr	0.84	407.03	407.62	407.43	407.66	0.003938	0.84	1.00	2.88	0.45
Guelph Street Di	12.06	50yr	1.09	407.03	407.70	407.50	407.74	0.004002	0.90	1.22	3.16	0.46
Guelph Street Di	12.06	100yr	1.33	407.03	407.75	407.54	407.80	0.004051	0.95	1.40	3.38	0.47
Guelph Street Di	12.06	Regional	1.93	407.03	407.87	407.63	407.93	0.004135	1.05	1.84	3.87	0.49
Guelph Street Di	0.00	25mm	0.05	407.00	407.15	407.09	407.15	0.005004	0.43	0.11	1.08	0.43

HEC-RAS Plan: Plan 02   River: Guelph Street Di   Reach: Guelph Street Di (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Guelph Street Di	0.00	2yr	0.14	407.00	407.24	407.16	407.26	0.005002	0.57	0.24	1.47	0.45
Guelph Street Di	0.00	5yr	0.20	407.00	407.29	407.19	407.31	0.005003	0.63	0.32	1.67	0.46
Guelph Street Di	0.00	10yr	0.43	407.00	407.42	407.29	407.45	0.005008	0.77	0.55	2.17	0.49
Guelph Street Di	0.00	25yr	0.84	407.00	407.56	407.40	407.61	0.005006	0.91	0.92	2.76	0.51
Guelph Street Di	0.00	50yr	1.09	407.00	407.63	407.46	407.68	0.005001	0.98	1.12	3.04	0.51
Guelph Street Di	0.00	100yr	1.33	407.00	407.69	407.50	407.74	0.005009	1.03	1.29	3.26	0.52
Guelph Street Di	0.00	Regional	1.93	407.00	407.81	407.60	407.87	0.005005	1.13	1.72	3.75	0.53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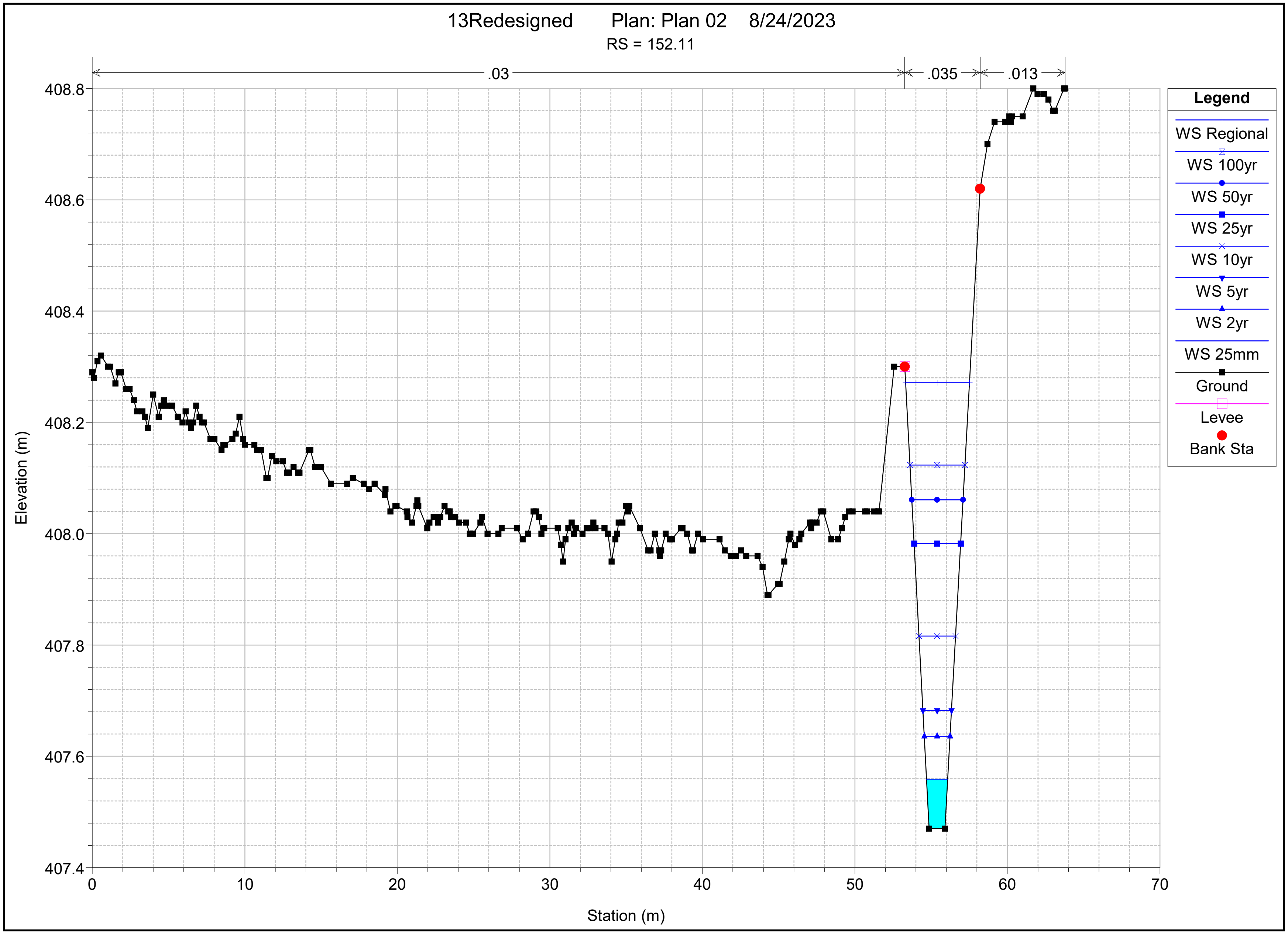
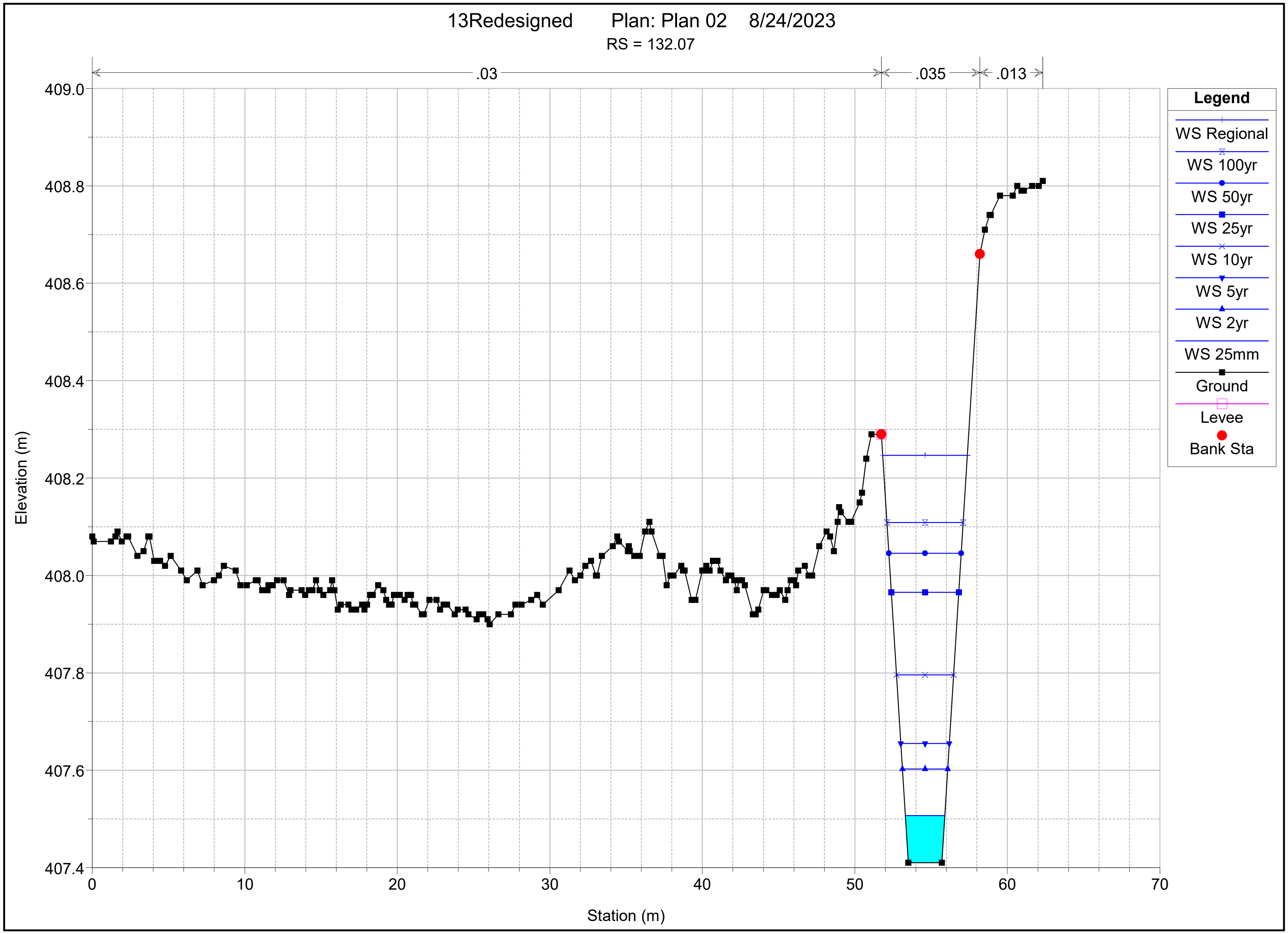
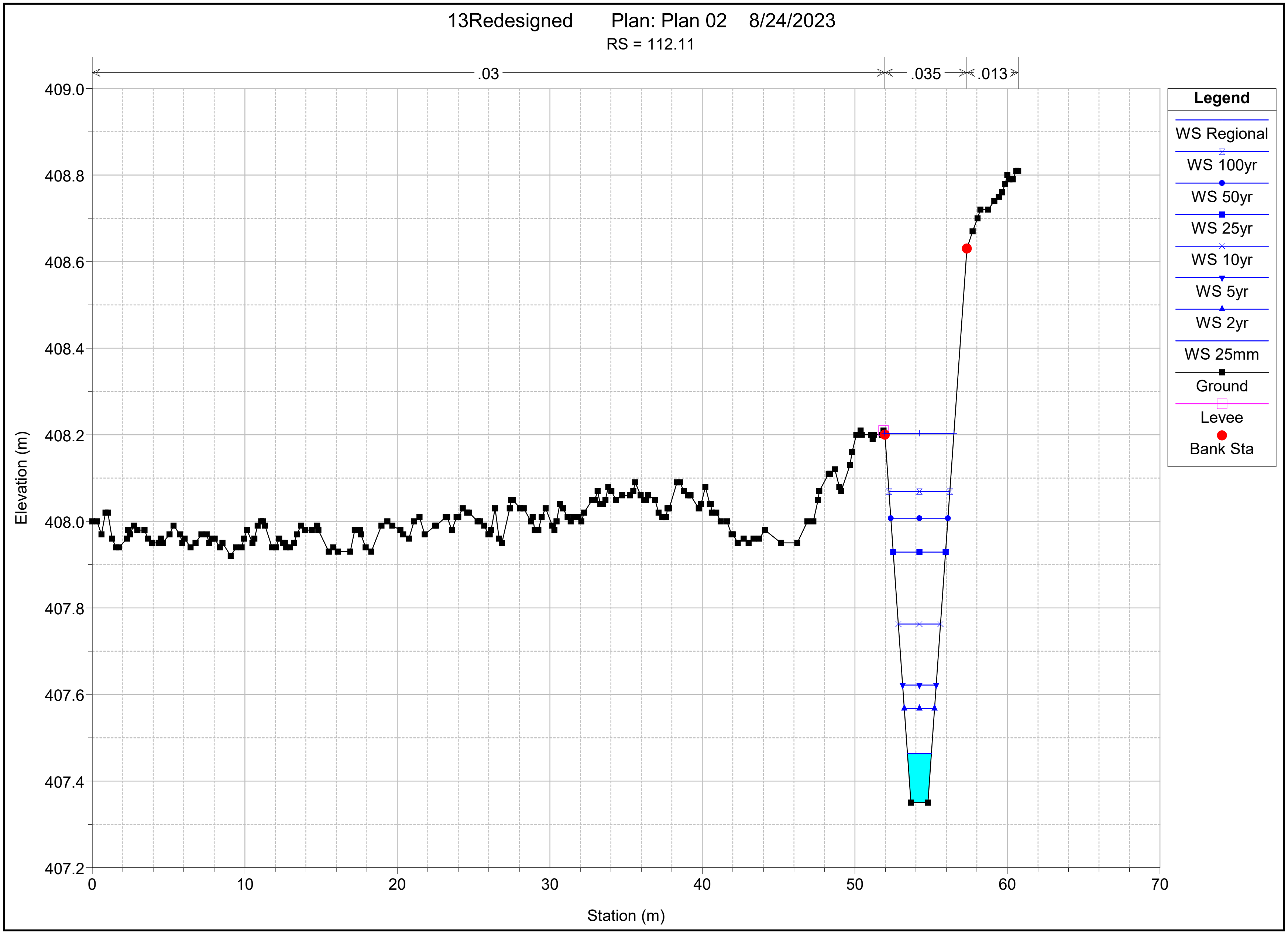
.03
.035
.013
Legend
WS Regional
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
WS 25mm
Ground
Levee
Bank Sta
Elevation (m)
409.2
409.0
408.8
408.6
408.4
408.2
408.0
407.8
407.6
407.4
Station (m)
0
10
20
30
40
50
60
70



13Redesigned Plan: Plan 02 8/24/2023
RS = 152.11
.03
.035
.013
Legend
WS Regional
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
WS 25mm
Ground
Levee
Bank Sta
Elevation (m)
408.8
408.6
408.4
408.2
408.0
407.8
407.6
407.4
Station (m)
0
10
20
30
40
50
60
70


13Redesigned Plan: Plan 02 8/24/2023
RS = 132.07
.03
.035
.013
Elevation (m)
409.0
408.8
408.6
408.4
408.2
408.0
407.8
407.6
407.4
Station (m)
0
10
20
30
40
50
60
70
Legend
WS Regional
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
WS 25mm
Ground
Levee
Bank Sta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408.2
408.0
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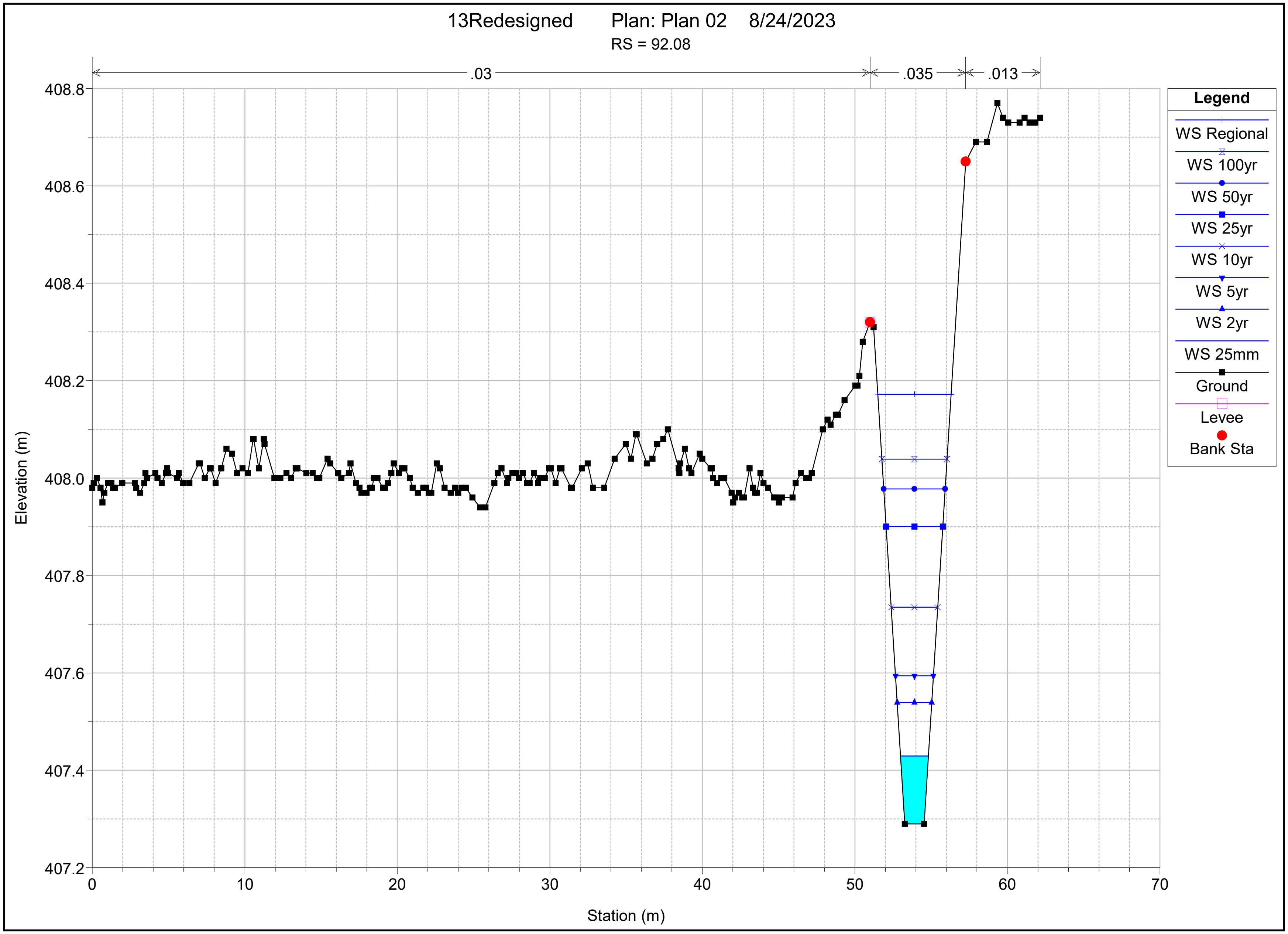
407.6
407.4
407.2
Station (m)
0
10
20
30
40
50
60
70
Legend
WS Regional
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
WS 25mm
Ground
Levee
Bank Sta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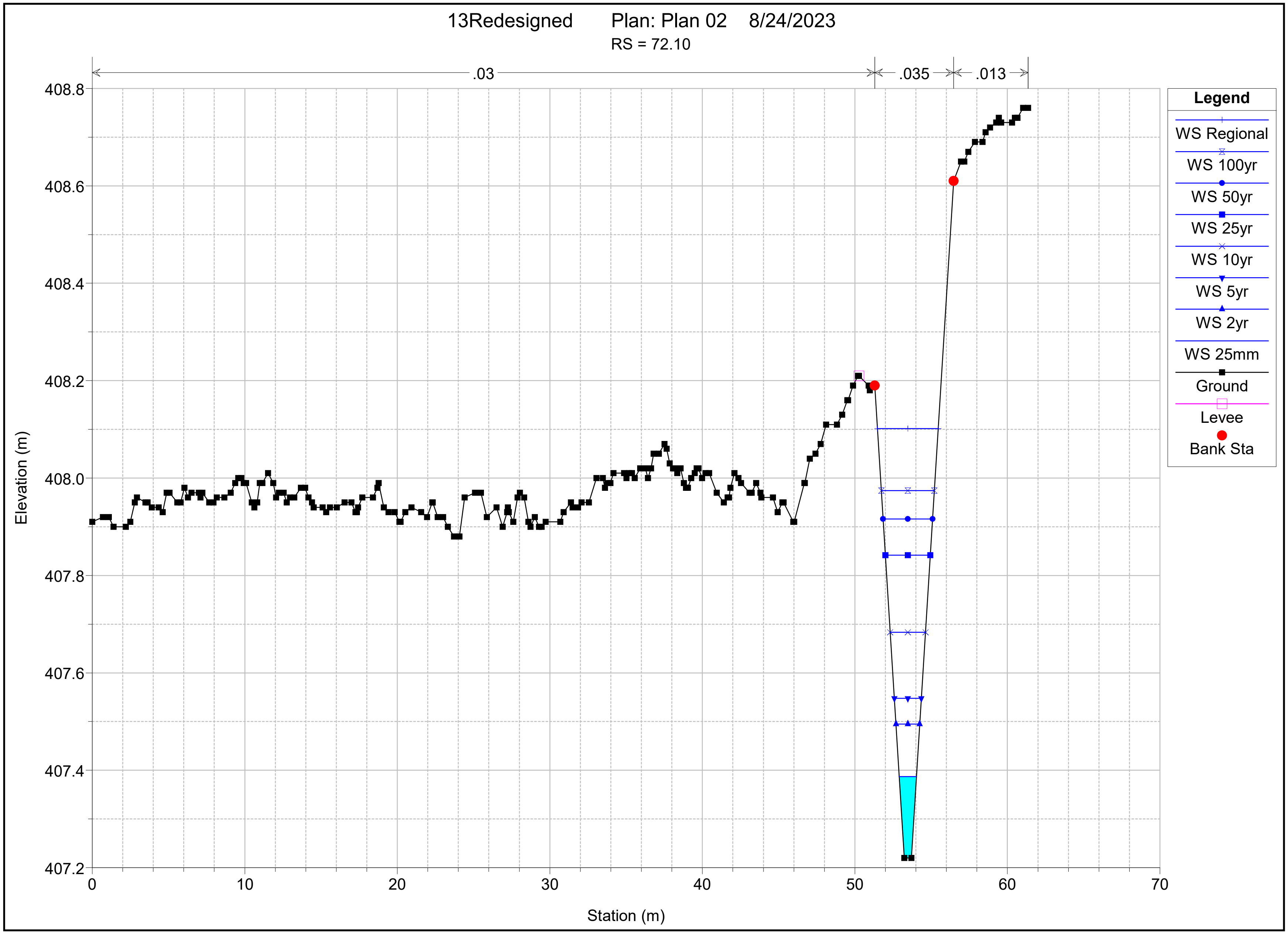
WS 10yr
WS 5yr
WS 2yr
WS 25mm
Ground
Levee
Bank Sta
Elevation (m)
408.8
408.6
408.4
408.2
408.0
407.8
407.6
407.4
407.2
Station (m)
0
10
20
30
40
50
60
70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Legend
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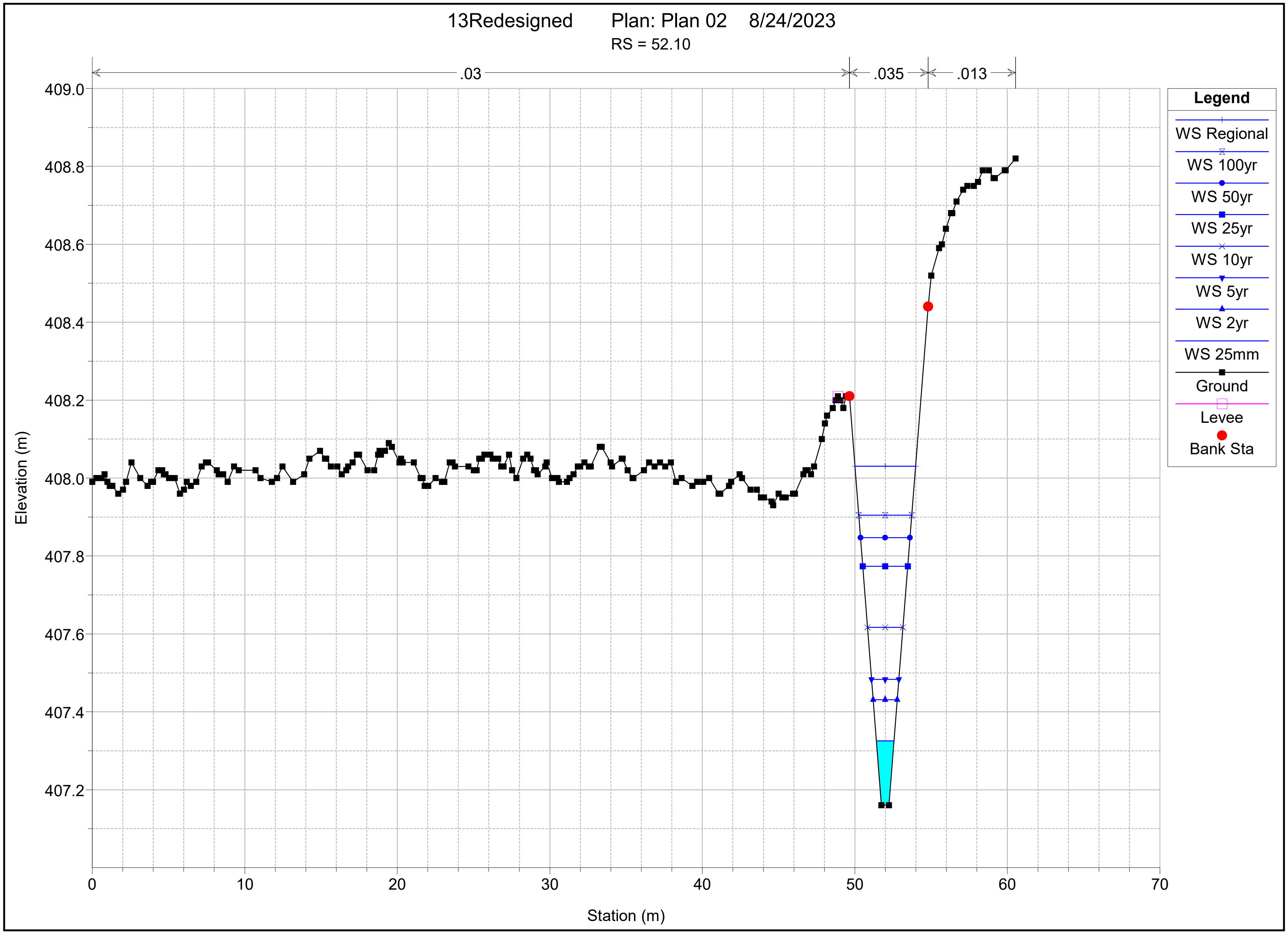
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
WS 25mm
Ground
Levee
Bank Sta
Elevation (m)
408.8
408.6
408.4
408.2
408.0
407.8
407.6
407.4
407.2
Station (m)
0
10
20
30
40
50
60
70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408.2
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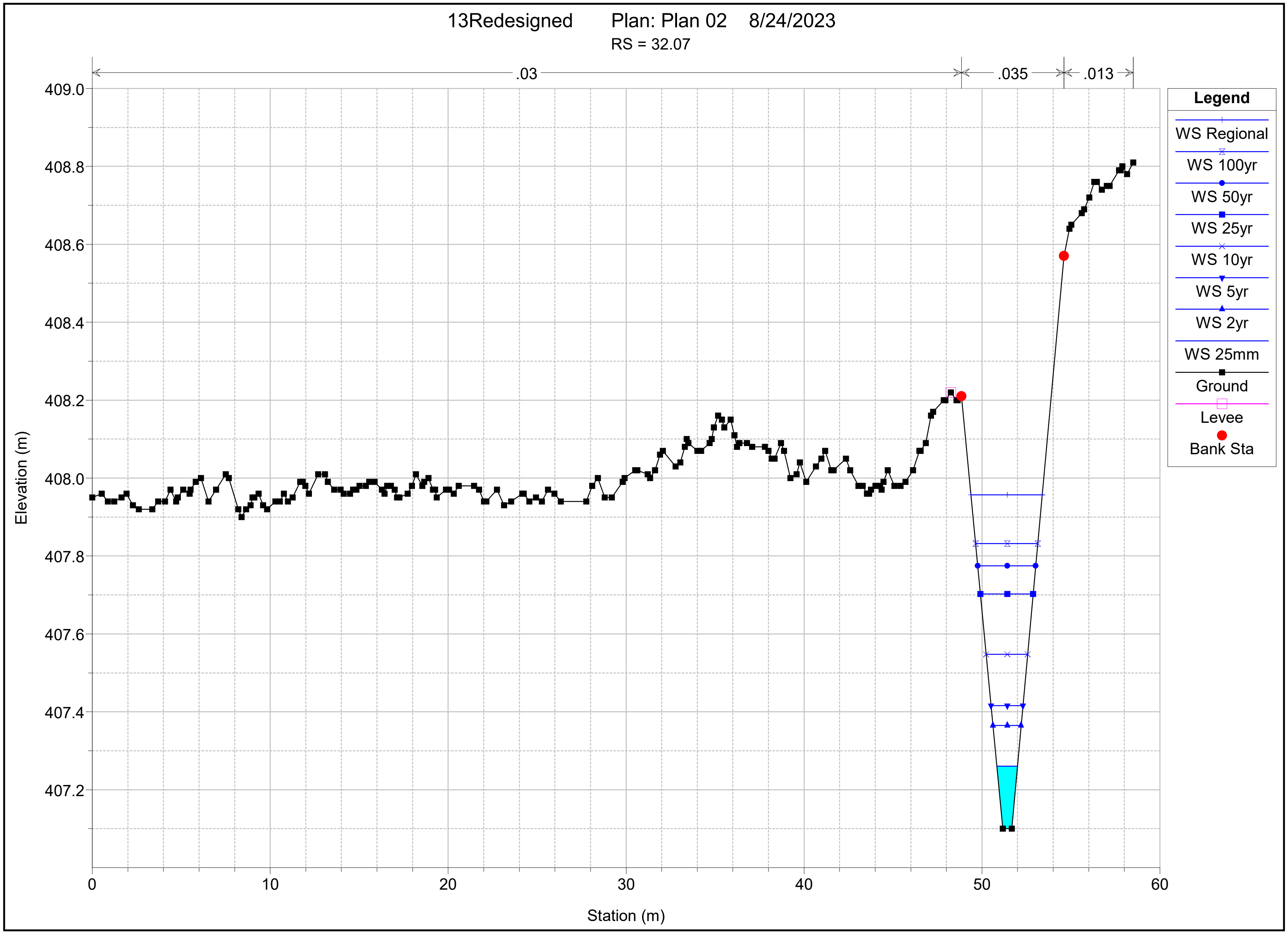
407.6
407.4
407.2
Station (m)
0
10
20
30
40
50
60
70
Legend
WS Regional
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
WS 25mm
Ground
Levee
Bank Sta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Elevation (m)
0
10
20
30
40
50
60
Station (m)
Legend
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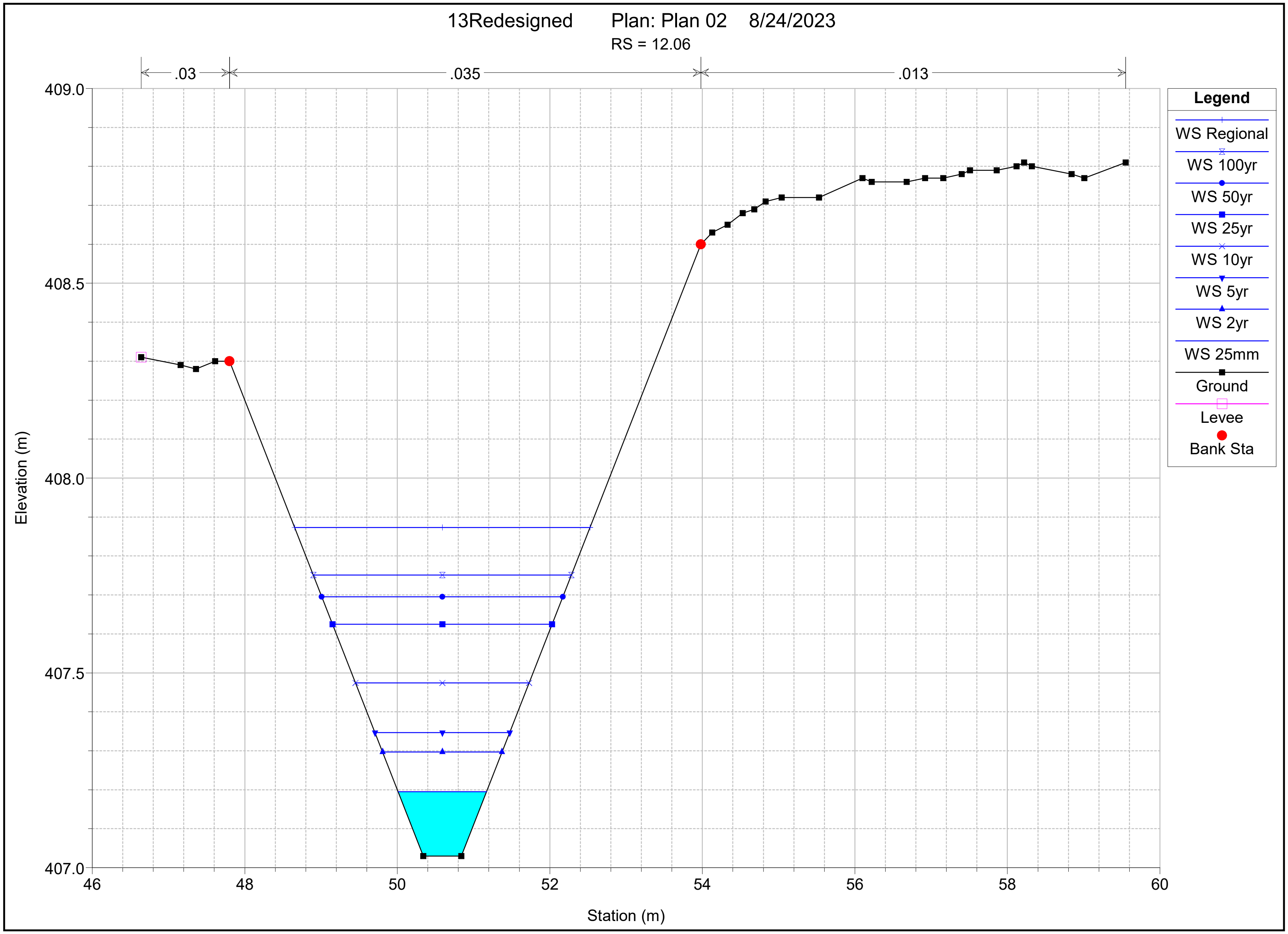
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
WS 25mm
Ground
Levee
Bank Sta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WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
WS 25mm
Ground
Levee
Bank Sta
Elevation (m)
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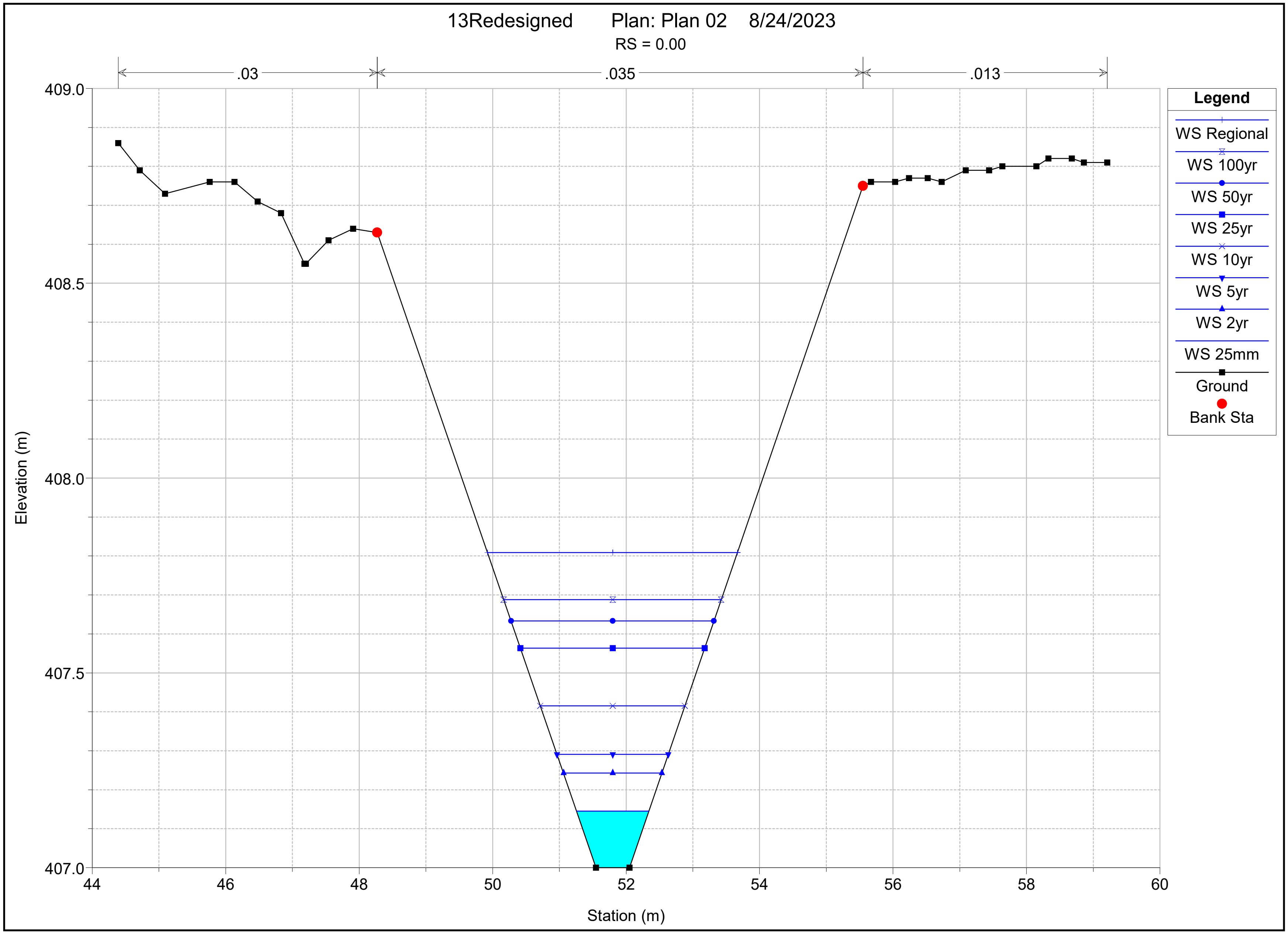
408.5
408.0
407.5
407.0
Station (m)
46
48
50
52
54
56
58
60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Legend
WS Regional
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
WS 25mm
Ground
Bank Sta
Elevation (m)
409.0
408.5
408.0
407.5
407.0
Station (m)
44
46
48
50
52
54
56
58
60

ROW Capacity - Composite Manning's Calculations

Project Details

South Fergus MESP	120157

Prepared By:

JP	12/21/2023

ROW capacity calculations using Manning's Equation with composite channel sections

ROW Description: Urbanized Guelph Street

ROW Information:

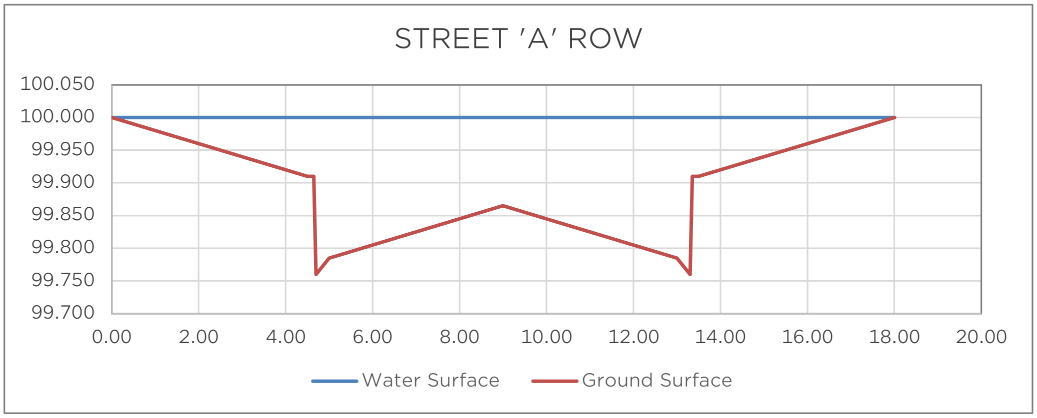
Manning's n Boulevard	0.035	
Manning's n Roadway	0.016	
Row Width	18	m
Road Width	8	m
Boulevard Slope	0.02	m/m
Curb Top Width	0.15	m
Curb Height	0.15	m
Gutter Width	0.3	m
Gutter Depth	0.025	m
Slope	0.005	m/m

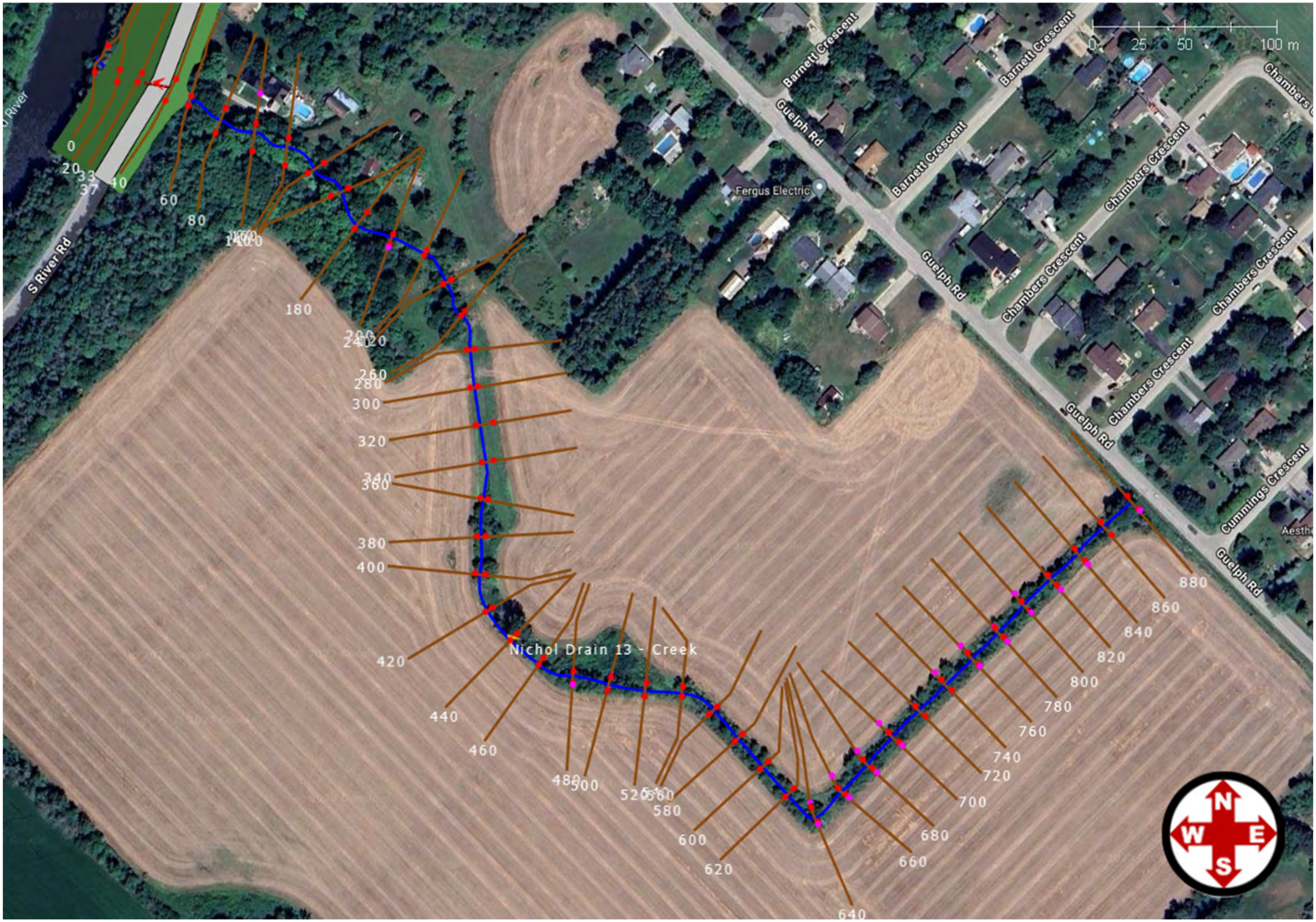
Manning's Equation

$$Q = \frac{1}{n} A R^{2/3} s^{1/2}$$

STA.	ELEV.	AREA (m^2)		WET. PERIMETER (m)		HYD. RAD (m)	Q (m^3/s)	
0.00	100.000							
4.50	99.910	0.203		4.5009		0.045	0.052	Left Boulevard
4.65	99.910	0.014	1.58	0.150	9.220	0.171	2.154	Roadway
4.70	99.760	0.008		0.158				
5.00	99.785	0.068		0.301				
9.00	99.865	0.700		4.001				
13.00	99.785	0.700		4.001				
13.30	99.760	0.068		0.301				
13.35	99.910	0.008		0.158				
13.50	99.910	0.014		0.150				
18.00	100.000	0.203		4.5009		0.045	0.052	Right Boulevard

Total Flow Capacity	**2.258**	m^3/s
Design Flow	1.326	m^3/s





South Fergus MESP and Secondary Plan - 120157

Nichol Drain No. 13 Hydraulic Analysis

HEC-RAS Plan: Existing Conditions River: Nichol Drain 13 Reach: Creek

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Creek	880	2yr	1.22	406.67	407.46	407.06	407.47	0.001513	0.51	2.36	4.83	0.23
Creek	880	5yr	2.29	406.67	407.75	407.20	407.76	0.001347	0.57	3.98	6.29	0.23
Creek	880	10yr	2.84	406.67	407.86	407.26	407.88	0.001295	0.60	4.72	6.74	0.23
Creek	880	25yr	3.65	406.67	407.99	407.33	408.01	0.001229	0.63	6.35	24.38	0.23
Creek	880	50yr	4.29	406.67	408.07	407.39	408.09	0.001065	0.62	8.79	38.80	0.21
Creek	880	100yr	4.84	406.67	408.12	407.43	408.13	0.000947	0.60	10.71	40.36	0.20
Creek	880	Hazel	5.88	406.67	408.20	407.51	408.21	0.000803	0.58	14.06	46.58	0.19
Creek	860	2yr	1.22	406.52	407.43		407.44	0.001449	0.53	2.29	4.16	0.23
Creek	860	5yr	2.29	406.52	407.71		407.73	0.001496	0.63	3.61	5.12	0.24
Creek	860	10yr	2.84	406.52	407.83		407.85	0.001565	0.67	4.22	5.66	0.25
Creek	860	25yr	3.65	406.52	407.96		407.98	0.001547	0.70	5.88	31.32	0.25
Creek	860	50yr	4.29	406.52	408.05		408.06	0.001136	0.62	9.58	47.24	0.22
Creek	860	100yr	4.84	406.52	408.10		408.11	0.000906	0.56	12.23	54.45	0.19
Creek	860	Hazel	5.88	406.52	408.18		408.19	0.000623	0.48	17.53	72.61	0.16
Creek	840	2yr	1.22	406.46	407.41	406.89	407.42	0.000937	0.45	2.69	4.49	0.19
Creek	840	5yr	2.29	406.46	407.69	407.03	407.71	0.001046	0.56	4.07	5.24	0.20
Creek	840	10yr	2.84	406.46	407.80	407.09	407.82	0.001115	0.61	4.67	5.58	0.21
Creek	840	25yr	3.65	406.46	407.93	407.18	407.96	0.001215	0.67	5.73	14.77	0.22
Creek	840	50yr	4.29	406.46	408.02	407.24	408.04	0.001215	0.67	7.48	30.27	0.22
Creek	840	100yr	4.84	406.46	408.07	407.29	408.09	0.001197	0.67	9.53	43.01	0.22
Creek	840	Hazel	5.88	406.46	408.16	407.36	408.18	0.000905	0.58	13.85	51.59	0.20
Creek	820	2yr	1.22	406.31	407.40	406.77	407.40	0.000517	0.36	3.38	5.05	0.14
Creek	820	5yr	2.29	406.31	407.68	406.90	407.69	0.000646	0.46	4.93	5.89	0.16
Creek	820	10yr	2.84	406.31	407.79	406.96	407.80	0.000700	0.51	5.59	6.17	0.17
Creek	820	25yr	3.65	406.31	407.92	407.04	407.94	0.000784	0.57	6.64	13.18	0.18
Creek	820	50yr	4.29	406.31	408.00	407.10	408.02	0.000817	0.59	8.08	24.39	0.19
Creek	820	100yr	4.84	406.31	408.05	407.14	408.07	0.000836	0.61	9.76	40.66	0.19
Creek	820	Hazel	5.88	406.31	408.15	407.22	408.16	0.000694	0.58	14.16	52.06	0.17
Creek	800	2yr	1.22	406.39	407.38	406.82	407.39	0.000705	0.41	2.99	4.70	0.16
Creek	800	5yr	2.29	406.39	407.66	406.96	407.68	0.000854	0.52	4.43	5.55	0.18
Creek	800	10yr	2.84	406.39	407.77	407.02	407.79	0.000920	0.56	5.05	5.85	0.19
Creek	800	25yr	3.65	406.39	407.90	407.09	407.92	0.001050	0.63	5.81	6.31	0.21
Creek	800	50yr	4.29	406.39	407.98	407.15	408.00	0.001135	0.68	6.32	6.59	0.22
Creek	800	100yr	4.84	406.39	408.02	407.20	408.05	0.001243	0.73	6.63	6.76	0.23
Creek	800	Hazel	5.88	406.39	408.11	407.28	408.14	0.001408	0.82	7.21	7.39	0.25
Creek	780	2yr	1.22	406.48	407.35	406.92	407.37	0.001791	0.56	2.16	4.24	0.25
Creek	780	5yr	2.29	406.48	407.63	407.09	407.65	0.001703	0.66	3.47	5.11	0.26
Creek	780	10yr	2.84	406.48	407.74	407.15	407.76	0.001735	0.70	4.03	5.41	0.26
Creek	780	25yr	3.65	406.48	407.86	407.24	407.89	0.001864	0.77	4.72	5.78	0.27
Creek	780	50yr	4.29	406.48	407.93	407.30	407.97	0.002021	0.83	5.15	5.99	0.29
Creek	780	100yr	4.84	406.48	407.97	407.35	408.02	0.002263	0.90	5.41	6.11	0.30
Creek	780	Hazel	5.88	406.48	408.05	407.43	408.10	0.002663	1.00	5.87	6.33	0.33
Creek	760	2yr	1.22	406.34	407.33	406.77	407.34	0.000782	0.42	2.91	4.82	0.17
Creek	760	5yr	2.29	406.34	407.61	406.91	407.63	0.000910	0.52	4.37	5.73	0.19
Creek	760	10yr	2.84	406.34	407.72	406.98	407.73	0.000973	0.57	4.99	6.06	0.20
Creek	760	25yr	3.65	406.34	407.84	407.07	407.86	0.001091	0.63	5.75	6.41	0.21
Creek	760	50yr	4.29	406.34	407.91	407.12	407.93	0.001214	0.69	6.22	6.60	0.23
Creek	760	100yr	4.84	406.34	407.95	407.17	407.98	0.001384	0.75	6.47	6.69	0.24
Creek	760	Hazel	5.88	406.34	408.02	407.25	408.06	0.001671	0.85	6.95	6.83	0.27
Creek	740	2yr	1.22	406.27	407.32	406.71	407.33	0.000742	0.42	2.92	4.60	0.17
Creek	740	5yr	2.29	406.27	407.59	406.87	407.61	0.000922	0.53	4.28	5.38	0.19
Creek	740	10yr	2.84	406.27	407.70	406.95	407.71	0.001010	0.58	4.86	5.69	0.20
Creek	740	25yr	3.65	406.27	407.81	407.03	407.84	0.001162	0.66	5.55	6.01	0.22
Creek	740	50yr	4.29	406.27	407.88	407.09	407.91	0.001312	0.72	5.97	6.17	0.23
Creek	740	100yr	4.84	406.27	407.92	407.14	407.95	0.001521	0.78	6.18	6.25	0.25
Creek	740	Hazel	5.88	406.27	407.98	407.22	408.02	0.001896	0.90	6.57	6.40	0.28
Creek	720	2yr	1.22	406.34	407.30	406.76	407.31	0.000935	0.45	2.70	4.55	0.19
Creek	720	5yr	2.29	406.34	407.57	406.92	407.59	0.001096	0.57	4.03	5.31	0.21
Creek	720	10yr	2.84	406.34	407.67	406.98	407.69	0.001190	0.62	4.59	5.62	0.22
Creek	720	25yr	3.65	406.34	407.79	407.06	407.81	0.001365	0.69	5.24	5.96	0.24
Creek	720	50yr	4.29	406.34	407.85	407.13	407.88	0.001547	0.76	5.64	6.12	0.25
Creek	720	100yr	4.84	406.34	407.88	407.17	407.91	0.001817	0.83	5.81	6.20	0.27
Creek	720	Hazel	5.88	406.34	407.93	407.26	407.98	0.002316	0.96	6.13	6.34	0.31
Creek	700	2yr	1.22	406.10	407.29	406.58	407.30	0.000489	0.35	3.50	5.33	0.14
Creek	700	5yr	2.29	406.10	407.56	406.74	407.57	0.000638	0.45	5.04	6.22	0.16

HEC-RAS Plan: Existing Conditions River: Nichol Drain 13 Reach: Creek (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Creek	700	10yr	2.84	406.10	407.66	406.82	407.67	0.000710	0.50	5.68	6.56	0.17
Creek	700	25yr	3.65	406.10	407.77	406.90	407.79	0.000829	0.57	6.45	7.96	0.19
Creek	700	50yr	4.29	406.10	407.83	406.96	407.85	0.000933	0.62	7.06	10.67	0.20
Creek	700	100yr	4.84	406.10	407.86	407.02	407.88	0.001101	0.68	7.36	12.46	0.22
Creek	700	Hazel	5.88	406.10	407.91	407.10	407.94	0.001402	0.78	7.98	14.57	0.25
Creek	680	2yr	1.22	406.03	407.28	406.54	407.29	0.000352	0.31	3.87	5.27	0.12
Creek	680	5yr	2.29	406.03	407.55	406.68	407.56	0.000513	0.43	5.36	6.09	0.15
Creek	680	10yr	2.84	406.03	407.65	406.74	407.66	0.000579	0.47	5.99	6.61	0.16
Creek	680	25yr	3.65	406.03	407.76	406.82	407.77	0.000701	0.54	7.08	12.35	0.17
Creek	680	50yr	4.29	406.03	407.82	406.88	407.84	0.000662	0.54	9.74	36.45	0.17
Creek	680	100yr	4.84	406.03	407.86	406.92	407.87	0.000488	0.48	15.34	69.88	0.15
Creek	680	Hazel	5.88	406.03	407.91	407.00	407.92	0.000474	0.48	19.00	74.31	0.15
Creek	660	2yr	1.22	406.34	407.26	406.79	407.28	0.001303	0.51	2.38	4.25	0.22
Creek	660	5yr	2.29	406.34	407.52	406.95	407.54	0.001564	0.63	3.62	5.83	0.25
Creek	660	10yr	2.84	406.34	407.62	407.01	407.64	0.001514	0.68	4.25	6.88	0.25
Creek	660	25yr	3.65	406.34	407.72	407.10	407.75	0.001566	0.75	5.19	13.30	0.26
Creek	660	50yr	4.29	406.34	407.79	407.15	407.82	0.001582	0.79	6.07	14.54	0.26
Creek	660	100yr	4.84	406.34	407.84	407.20	407.85	0.000918	0.63	12.43	64.26	0.20
Creek	660	Hazel	5.88	406.34	407.90	407.29	407.91	0.000437	0.45	23.41	107.77	0.14
Creek	640	2yr	1.22	406.31	407.24	406.70	407.25	0.001105	0.48	2.52	4.16	0.20
Creek	640	5yr	2.29	406.31	407.49	406.86	407.51	0.001419	0.63	3.64	4.83	0.23
Creek	640	10yr	2.84	406.31	407.58	406.94	407.61	0.001570	0.69	4.11	5.08	0.25
Creek	640	25yr	3.65	406.31	407.68	407.02	407.72	0.001911	0.79	4.63	5.45	0.27
Creek	640	50yr	4.29	406.31	407.74	407.09	407.78	0.002225	0.87	4.94	5.60	0.30
Creek	640	100yr	4.84	406.31	407.77	407.13	407.82	0.002567	0.94	5.14	5.72	0.32
Creek	640	Hazel	5.88	406.31	407.82	407.22	407.88	0.003321	1.09	5.41	5.88	0.36
Creek	620	2yr	1.22	406.35	407.21		407.23	0.001552	0.54	2.26	4.28	0.24
Creek	620	5yr	2.29	406.35	407.45		407.48	0.001804	0.67	3.39	5.12	0.26
Creek	620	10yr	2.84	406.35	407.55		407.57	0.001858	0.73	4.08	17.88	0.27
Creek	620	25yr	3.65	406.35	407.66		407.68	0.001531	0.70	6.87	33.15	0.25
Creek	620	50yr	4.29	406.35	407.72		407.74	0.001287	0.65	9.27	42.32	0.23
Creek	620	100yr	4.84	406.35	407.76		407.78	0.001143	0.62	11.11	45.88	0.22
Creek	620	Hazel	5.88	406.35	407.82		407.83	0.001023	0.61	13.96	55.80	0.21
Creek	600	2yr	1.22	406.33	407.17		407.19	0.001850	0.58	2.10	4.06	0.26
Creek	600	5yr	2.29	406.33	407.41		407.44	0.002167	0.71	3.20	5.16	0.29
Creek	600	10yr	2.84	406.33	407.51		407.53	0.002178	0.76	4.02	15.08	0.29
Creek	600	25yr	3.65	406.33	407.63		407.65	0.001634	0.70	6.59	26.43	0.26
Creek	600	50yr	4.29	406.33	407.69		407.71	0.001306	0.66	8.72	34.26	0.23
Creek	600	100yr	4.84	406.33	407.74		407.75	0.001189	0.66	10.33	41.03	0.23
Creek	600	Hazel	5.88	406.33	407.80		407.81	0.001052	0.65	13.21	55.05	0.21
Creek	580	2yr	1.22	406.36	407.15		407.16	0.001064	0.47	2.58	4.73	0.20
Creek	580	5yr	2.29	406.36	407.38		407.40	0.001291	0.61	3.78	5.65	0.23
Creek	580	10yr	2.84	406.36	407.48		407.50	0.001378	0.67	4.32	6.94	0.24
Creek	580	25yr	3.65	406.36	407.59		407.62	0.001382	0.71	5.81	18.51	0.25
Creek	580	50yr	4.29	406.36	407.66		407.69	0.001347	0.73	7.37	28.42	0.24
Creek	580	100yr	4.84	406.36	407.71		407.73	0.001302	0.74	8.77	37.21	0.24
Creek	580	Hazel	5.88	406.36	407.77		407.79	0.001241	0.75	11.49	49.86	0.24
Creek	560	2yr	1.22	406.28	407.12		407.14	0.001459	0.53	2.31	4.28	0.23
Creek	560	5yr	2.29	406.28	407.35		407.37	0.001782	0.68	3.37	5.20	0.26
Creek	560	10yr	2.84	406.28	407.44		407.47	0.001895	0.74	3.86	5.68	0.28
Creek	560	25yr	3.65	406.28	407.55		407.58	0.002001	0.81	4.75	12.87	0.29
Creek	560	50yr	4.29	406.28	407.62		407.65	0.001993	0.82	6.34	31.96	0.29
Creek	560	100yr	4.84	406.28	407.67		407.70	0.001793	0.81	8.27	47.40	0.28
Creek	560	Hazel	5.88	406.28	407.74		407.76	0.001375	0.75	12.12	58.56	0.25
Creek	540	2yr	1.22	406.32	407.08		407.10	0.002814	0.66	1.83	3.99	0.31
Creek	540	5yr	2.29	406.32	407.29		407.33	0.003186	0.82	2.77	4.73	0.34
Creek	540	10yr	2.84	406.32	407.38		407.42	0.003352	0.89	3.19	5.06	0.36
Creek	540	25yr	3.65	406.32	407.48		407.53	0.003494	0.97	3.84	9.25	0.37
Creek	540	50yr	4.29	406.32	407.55		407.60	0.003140	0.98	5.15	25.50	0.36
Creek	540	100yr	4.84	406.32	407.62		407.66	0.002395	0.90	7.36	41.10	0.32
Creek	540	Hazel	5.88	406.32	407.71		407.73	0.001531	0.77	11.48	52.19	0.26
Creek	520	2yr	1.22	406.18	407.03	406.66	407.05	0.002323	0.61	1.98	4.19	0.28
Creek	520	5yr	2.29	406.18	407.23	406.82	407.26	0.002883	0.77	2.95	5.19	0.33
Creek	520	10yr	2.84	406.18	407.31	406.89	407.35	0.003108	0.84	3.39	5.62	0.34
Creek	520	25yr	3.65	406.18	407.42	406.97	407.46	0.003321	0.91	4.00	6.11	0.36

HEC-RAS Plan: Existing Conditions River: Nichol Drain 13 Reach: Creek (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Creek	520	50yr	4.29	406.18	407.49	407.03	407.54	0.003501	0.97	4.44	6.45	0.37
Creek	520	100yr	4.84	406.18	407.54	407.08	407.60	0.003590	1.01	4.81	7.23	0.38
Creek	520	Hazel	5.88	406.18	407.63	407.16	407.69	0.003518	1.06	6.22	23.68	0.38
Creek	500	2yr	1.22	406.16	406.94	406.68	406.98	0.005000	0.85	1.43	3.21	0.41
Creek	500	5yr	2.29	406.16	407.11	406.85	407.17	0.007033	1.13	2.02	3.79	0.49
Creek	500	10yr	2.84	406.16	407.17	406.92	407.25	0.008053	1.26	2.26	4.01	0.53
Creek	500	25yr	3.65	406.16	407.25	407.01	407.35	0.009706	1.41	2.58	4.44	0.59
Creek	500	50yr	4.29	406.16	407.29	407.07	407.41	0.011251	1.54	2.78	4.70	0.64
Creek	500	100yr	4.84	406.16	407.33	407.13	407.47	0.012279	1.63	2.97	4.95	0.67
Creek	500	Hazel	5.88	406.16	407.37	407.22	407.55	0.015204	1.85	3.18	5.21	0.75
Creek	480	2yr	1.22	406.08	406.87	406.57	406.90	0.003025	0.70	1.78	4.71	0.33
Creek	480	5yr	2.29	406.08	407.02	406.73	407.06	0.004330	0.96	2.57	6.77	0.40
Creek	480	10yr	2.84	406.08	407.07	406.80	407.12	0.004977	1.06	2.94	7.98	0.43
Creek	480	25yr	3.65	406.08	407.13	406.89	407.19	0.005679	1.18	3.52	11.59	0.47
Creek	480	50yr	4.29	406.08	407.16	406.95	407.23	0.006180	1.26	4.00	15.28	0.49
Creek	480	100yr	4.84	406.08	407.19	407.02	407.27	0.006740	1.34	4.48	16.69	0.52
Creek	480	Hazel	5.88	406.08	407.24	407.09	407.32	0.007029	1.40	5.24	17.33	0.53
Creek	460	2yr	1.22	406.04	406.81		406.84	0.003180	0.69	1.84	6.39	0.33
Creek	460	5yr	2.29	406.04	406.95		406.98	0.003522	0.85	3.17	12.10	0.36
Creek	460	10yr	2.84	406.04	407.00		407.03	0.003448	0.89	3.82	13.17	0.37
Creek	460	25yr	3.65	406.04	407.06		407.10	0.003557	0.96	4.73	18.57	0.38
Creek	460	50yr	4.29	406.04	407.09		407.13	0.003598	1.00	5.43	21.85	0.38
Creek	460	100yr	4.84	406.04	407.12		407.16	0.003805	1.06	6.02	24.17	0.40
Creek	460	Hazel	5.88	406.04	407.16		407.21	0.003781	1.10	7.13	25.80	0.40
Creek	440	2yr	1.22	406.10	406.76		406.78	0.002956	0.64	1.96	7.11	0.32
Creek	440	5yr	2.29	406.10	406.87		406.91	0.003819	0.85	2.90	8.72	0.38
Creek	440	10yr	2.84	406.10	406.91		406.96	0.004191	0.94	3.34	13.29	0.40
Creek	440	25yr	3.65	406.10	406.96		407.01	0.004858	1.07	4.16	19.92	0.44
Creek	440	50yr	4.29	406.10	406.99		407.05	0.004957	1.12	4.84	21.37	0.45
Creek	440	100yr	4.84	406.10	407.02		407.07	0.005016	1.16	5.38	22.46	0.46
Creek	440	Hazel	5.88	406.10	407.06		407.12	0.005165	1.23	6.38	25.72	0.47
Creek	420	2yr	1.22	406.07	406.68		406.71	0.003884	0.72	1.90	9.80	0.37
Creek	420	5yr	2.29	406.07	406.80		406.83	0.003812	0.85	3.30	15.58	0.38
Creek	420	10yr	2.84	406.07	406.84		406.87	0.004008	0.91	4.01	19.41	0.40
Creek	420	25yr	3.65	406.07	406.89		406.92	0.003818	0.94	5.10	23.43	0.39
Creek	420	50yr	4.29	406.07	406.92		406.96	0.003661	0.96	5.95	24.72	0.39
Creek	420	100yr	4.84	406.07	406.95		406.98	0.003652	0.99	6.56	25.94	0.39
Creek	420	Hazel	5.88	406.07	406.99		407.03	0.003491	1.01	7.76	27.81	0.38
Creek	400	2yr	1.22	405.97	406.61		406.63	0.004003	0.66	1.92	8.56	0.36
Creek	400	5yr	2.29	405.97	406.72		406.75	0.004384	0.83	3.19	15.83	0.40
Creek	400	10yr	2.84	405.97	406.76		406.79	0.004331	0.87	3.85	16.81	0.40
Creek	400	25yr	3.65	405.97	406.81		406.84	0.004289	0.93	4.78	20.77	0.41
Creek	400	50yr	4.29	405.97	406.84		406.88	0.004375	0.98	5.52	22.41	0.42
Creek	400	100yr	4.84	405.97	406.87		406.91	0.004293	1.00	6.14	24.57	0.42
Creek	400	Hazel	5.88	405.97	406.91		406.95	0.004279	1.04	7.24	26.20	0.42
Creek	380	2yr	1.22	405.87	406.57		406.58	0.001514	0.50	2.80	12.77	0.24
Creek	380	5yr	2.29	405.87	406.67		406.69	0.002046	0.66	4.24	17.00	0.28
Creek	380	10yr	2.84	405.87	406.70		406.73	0.002265	0.73	4.88	18.45	0.30
Creek	380	25yr	3.65	405.87	406.75		406.78	0.002457	0.80	5.81	20.94	0.32
Creek	380	50yr	4.29	405.87	406.78		406.81	0.002649	0.85	6.47	22.82	0.33
Creek	380	100yr	4.84	405.87	406.81		406.84	0.002700	0.88	7.06	23.40	0.34
Creek	380	Hazel	5.88	405.87	406.85		406.88	0.002752	0.93	8.08	24.10	0.34
Creek	360	2yr	1.22	406.00	406.51		406.53	0.004656	0.71	2.04	12.81	0.39
Creek	360	5yr	2.29	406.00	406.60		406.63	0.004549	0.83	3.42	16.85	0.41
Creek	360	10yr	2.84	406.00	406.63		406.66	0.004844	0.89	3.95	17.98	0.42
Creek	360	25yr	3.65	406.00	406.67		406.71	0.005010	0.96	4.75	20.07	0.44
Creek	360	50yr	4.29	406.00	406.70		406.74	0.005163	1.01	5.27	20.69	0.45
Creek	360	100yr	4.84	406.00	406.72		406.76	0.005075	1.03	5.79	21.33	0.45
Creek	360	Hazel	5.88	406.00	406.76		406.81	0.005267	1.10	6.64	23.25	0.46
Creek	340	2yr	1.22	405.90	406.38		406.41	0.007345	0.76	1.73	12.05	0.48
Creek	340	5yr	2.29	405.90	406.46		406.50	0.008937	0.95	2.78	16.42	0.55
Creek	340	10yr	2.84	405.90	406.49		406.53	0.008850	1.00	3.27	17.11	0.55
Creek	340	25yr	3.65	405.90	406.52		406.57	0.009376	1.09	3.84	17.75	0.58
Creek	340	50yr	4.29	405.90	406.55		406.60	0.008795	1.12	4.39	18.37	0.57
Creek	340	100yr	4.84	405.90	406.57		406.63	0.009141	1.18	4.83	20.96	0.58

HEC-RAS Plan: Existing Conditions River: Nichol Drain 13 Reach: Creek (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Creek	340	Hazel	5.88	405.90	406.60		406.67	0.009460	1.26	5.50	22.66	0.60
Creek	320	2yr	1.22	405.96	406.20		406.22	0.012341	0.72	1.78	14.45	0.58
Creek	320	5yr	2.29	405.96	406.26		406.30	0.011476	0.87	2.77	16.86	0.59
Creek	320	10yr	2.84	405.96	406.29		406.33	0.011225	0.94	3.29	18.13	0.60
Creek	320	25yr	3.65	405.96	406.33		406.37	0.010297	0.98	3.98	18.72	0.58
Creek	320	50yr	4.29	405.96	406.35		406.40	0.010486	1.05	4.47	20.33	0.60
Creek	320	100yr	4.84	405.96	406.37		406.42	0.010824	1.10	4.80	20.59	0.61
Creek	320	Hazel	5.88	405.96	406.41		406.47	0.010155	1.15	5.61	21.72	0.60
Creek	300	2yr	1.22	405.79	406.01		406.03	0.007714	0.53	2.00	16.47	0.45
Creek	300	5yr	2.29	405.79	406.07		406.10	0.008634	0.70	3.04	19.17	0.50
Creek	300	10yr	2.84	405.79	406.09		406.13	0.009598	0.79	3.39	20.23	0.54
Creek	300	25yr	3.65	405.79	406.11		406.16	0.011296	0.91	3.84	22.13	0.59
Creek	300	50yr	4.29	405.79	406.13	406.09	406.18	0.012331	1.00	4.28	23.02	0.62
Creek	300	100yr	4.84	405.79	406.15	406.11	406.20	0.011660	1.02	4.78	24.17	0.62
Creek	300	Hazel	5.88	405.79	406.17	406.15	406.23	0.013577	1.14	5.17	24.70	0.67
Creek	280	2yr	1.22	405.22	405.75	405.66	405.81	0.016591	1.15	1.09	9.03	0.71
Creek	280	5yr	2.29	405.22	405.82	405.82	405.88	0.013287	1.22	2.53	22.60	0.67
Creek	280	10yr	2.84	405.22	405.85	405.84	405.91	0.012668	1.25	3.10	24.73	0.66
Creek	280	25yr	3.65	405.22	405.89	405.87	405.94	0.010725	1.23	4.05	26.51	0.61
Creek	280	50yr	4.29	405.22	405.91	405.89	405.96	0.010158	1.24	4.66	27.27	0.60
Creek	280	100yr	4.84	405.22	405.92	405.90	405.98	0.010808	1.30	5.07	29.27	0.63
Creek	280	Hazel	5.88	405.22	405.96	405.92	406.01	0.008764	1.24	6.26	30.49	0.57
Creek	260	2yr	1.22	404.97	405.37	405.37	405.45	0.019717	1.35	1.19	8.91	0.80
Creek	260	5yr	2.29	404.97	405.47	405.47	405.56	0.015854	1.48	2.43	14.51	0.75
Creek	260	10yr	2.84	404.97	405.49	405.49	405.59	0.019479	1.69	2.68	14.75	0.84
Creek	260	25yr	3.65	404.97	405.53	405.53	405.64	0.019695	1.81	3.32	16.21	0.86
Creek	260	50yr	4.29	404.97	405.56	405.56	405.68	0.019545	1.88	3.80	17.25	0.86
Creek	260	100yr	4.84	404.97	405.59	405.59	405.70	0.018123	1.88	4.36	18.10	0.84
Creek	260	Hazel	5.88	404.97	405.62	405.62	405.75	0.020621	2.07	4.82	18.55	0.90
Creek	240	2yr	1.22	404.38	404.70	404.67	404.75	0.017085	1.07	1.59	13.27	0.72
Creek	240	5yr	2.29	404.38	404.77	404.77	404.83	0.018986	1.30	2.72	19.27	0.78
Creek	240	10yr	2.84	404.38	404.81	404.79	404.86	0.015765	1.27	3.52	23.10	0.72
Creek	240	25yr	3.65	404.38	404.82	404.81	404.90	0.021918	1.53	3.81	23.78	0.86
Creek	240	50yr	4.29	404.38	404.85	404.85	404.93	0.020299	1.54	4.51	24.37	0.83
Creek	240	100yr	4.84	404.38	404.87	404.86	404.94	0.020377	1.58	4.92	24.51	0.84
Creek	240	Hazel	5.88	404.38	404.90	404.88	404.98	0.019679	1.62	5.73	25.16	0.83
Creek	220	2yr	1.22	404.00	404.27	404.27	404.32	0.027701	1.22	1.59	15.28	0.89
Creek	220	5yr	2.29	404.00	404.33	404.33	404.39	0.026348	1.43	2.69	20.10	0.91
Creek	220	10yr	2.84	404.00	404.34	404.34	404.42	0.034270	1.66	2.86	20.88	1.04
Creek	220	25yr	3.65	404.00	404.40	404.40	404.46	0.022528	1.54	4.41	33.53	0.87
Creek	220	50yr	4.29	404.00	404.42	404.42	404.48	0.022745	1.62	5.19	34.89	0.89
Creek	220	100yr	4.84	404.00	404.43	404.43	404.50	0.025659	1.75	5.43	35.36	0.95
Creek	220	Hazel	5.88	404.00	404.45	404.45	404.52	0.026560	1.84	6.17	36.20	0.97
Creek	200	2yr	1.22	402.54	402.87	402.87	402.95	0.032230	1.30	0.98	5.84	0.96
Creek	200	5yr	2.29	402.54	402.96	402.96	403.08	0.028977	1.56	1.58	6.79	0.96
Creek	200	10yr	2.84	402.54	403.00	403.00	403.14	0.028130	1.66	1.86	7.25	0.96
Creek	200	25yr	3.65	402.54	403.07	403.07	403.21	0.024730	1.72	2.38	8.82	0.93
Creek	200	50yr	4.29	402.54	403.11	403.11	403.26	0.023496	1.78	2.74	9.24	0.92
Creek	200	100yr	4.84	402.54	403.14	403.14	403.29	0.023445	1.85	3.01	9.56	0.92
Creek	200	Hazel	5.88	402.54	403.18	403.18	403.36	0.023735	1.96	3.50	10.46	0.94
Creek	180	2yr	1.22	401.43	401.70	401.70	401.78	0.039530	1.20	1.01	7.11	1.01
Creek	180	5yr	2.29	401.43	401.78	401.78	401.88	0.034063	1.40	1.64	8.76	1.00
Creek	180	10yr	2.84	401.43	401.82	401.82	401.93	0.031123	1.48	1.96	9.13	0.98
Creek	180	25yr	3.65	401.43	401.86	401.86	401.99	0.028845	1.58	2.38	9.92	0.96
Creek	180	50yr	4.29	401.43	401.89	401.89	402.03	0.027742	1.65	2.71	10.47	0.96
Creek	180	100yr	4.84	401.43	401.92	401.92	402.06	0.026679	1.70	3.00	10.75	0.95
Creek	180	Hazel	5.88	401.43	401.96	401.96	402.12	0.027316	1.83	3.41	11.16	0.98
Creek	160	2yr	1.22	399.45	399.78	399.78	399.88	0.035841	1.40	0.87	4.46	1.01
Creek	160	5yr	2.29	399.45	399.89	399.89	400.02	0.032572	1.54	1.48	6.07	1.00
Creek	160	10yr	2.84	399.45	399.94	399.94	400.07	0.031404	1.64	1.73	6.33	1.00
Creek	160	25yr	3.65	399.45	399.99	399.99	400.15	0.029986	1.75	2.08	6.61	1.00
Creek	160	50yr	4.29	399.45	400.03	400.03	400.20	0.029112	1.83	2.34	6.78	1.00
Creek	160	100yr	4.84	399.45	400.06	400.06	400.24	0.029492	1.92	2.53	6.92	1.01
Creek	160	Hazel	5.88	399.45	400.11	400.11	400.32	0.028587	2.02	2.92	7.21	1.01

HEC-RAS Plan: Existing Conditions River: Nichol Drain 13 Reach: Creek (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Creek	140	2yr	1.22	397.86	398.18	398.18	398.29	0.034597	1.49	0.82	3.62	1.00
Creek	140	5yr	2.29	397.86	398.31	398.31	398.45	0.033924	1.64	1.39	5.26	1.02
Creek	140	10yr	2.84	397.86	398.36	398.36	398.51	0.032341	1.74	1.63	5.38	1.01
Creek	140	25yr	3.65	397.86	398.42	398.42	398.59	0.030844	1.87	1.94	5.53	1.01
Creek	140	50yr	4.29	397.86	398.46	398.46	398.66	0.030189	1.97	2.18	5.63	1.01
Creek	140	100yr	4.84	397.86	398.49	398.49	398.70	0.029320	2.04	2.38	5.71	1.01
Creek	140	Hazel	5.88	397.86	398.55	398.55	398.79	0.028672	2.16	2.73	5.85	1.01
Creek	120	2yr	1.22	396.22	396.58	396.58	396.70	0.034400	1.51	0.81	3.51	1.01
Creek	120	5yr	2.29	396.22	396.71	396.71	396.87	0.031202	1.78	1.28	4.01	1.01
Creek	120	10yr	2.84	396.22	396.76	396.76	396.94	0.030359	1.88	1.51	4.25	1.01
Creek	120	25yr	3.65	396.22	396.83	396.83	397.04	0.029518	2.01	1.81	4.47	1.01
Creek	120	50yr	4.29	396.22	396.88	396.88	397.11	0.028793	2.09	2.05	4.69	1.01
Creek	120	100yr	4.84	396.22	396.93	396.93	397.16	0.028473	2.16	2.25	4.84	1.01
Creek	120	Hazel	5.88	396.22	397.00	397.00	397.26	0.027717	2.25	2.61	5.14	1.01
Creek	100	2yr	1.22	395.01	395.41	395.41	395.54	0.033208	1.59	0.77	2.99	1.00
Creek	100	5yr	2.29	395.01	395.55	395.55	395.73	0.030018	1.84	1.24	3.53	0.99
Creek	100	10yr	2.84	395.01	395.61	395.61	395.81	0.029857	1.95	1.45	3.75	1.00
Creek	100	25yr	3.65	395.01	395.70	395.70	395.91	0.028260	2.05	1.78	4.08	0.99
Creek	100	50yr	4.29	395.01	395.75	395.75	395.98	0.028489	2.15	1.99	4.25	1.01
Creek	100	100yr	4.84	395.01	395.79	395.79	396.04	0.028615	2.24	2.17	4.38	1.01
Creek	100	Hazel	5.88	395.01	395.87	395.87	396.14	0.026891	2.31	2.55	4.64	1.00
Creek	80	2yr	1.22	393.01	393.41	393.41	393.54	0.034016	1.59	0.77	2.96	1.00
Creek	80	5yr	2.29	393.01	393.55	393.55	393.73	0.031445	1.90	1.21	3.27	1.00
Creek	80	10yr	2.84	393.01	393.61	393.61	393.82	0.031261	2.02	1.40	3.40	1.01
Creek	80	25yr	3.65	393.01	393.69	393.69	393.93	0.030173	2.15	1.69	3.61	1.00
Creek	80	50yr	4.29	393.01	393.75	393.75	394.01	0.029551	2.24	1.91	3.77	1.00
Creek	80	100yr	4.84	393.01	393.80	393.80	394.07	0.029163	2.30	2.10	3.91	1.00
Creek	80	Hazel	5.88	393.01	393.88	393.88	394.18	0.029147	2.43	2.42	4.14	1.01
Creek	60	2yr	1.22	391.84	392.22	392.22	392.36	0.034054	1.61	0.75	2.88	1.01
Creek	60	5yr	2.29	391.84	392.37	392.37	392.56	0.031465	1.92	1.19	3.22	1.01
Creek	60	10yr	2.84	391.84	392.43	392.43	392.64	0.029951	2.02	1.41	3.39	1.00
Creek	60	25yr	3.65	391.84	392.51	392.51	392.75	0.029665	2.16	1.69	3.59	1.01
Creek	60	50yr	4.29	391.84	392.57	392.57	392.83	0.029340	2.26	1.89	3.69	1.01
Creek	60	100yr	4.84	391.84	392.62	392.62	392.90	0.028889	2.34	2.07	3.80	1.01
Creek	60	Hazel	5.88	391.84	392.71	392.71	393.01	0.027989	2.44	2.41	4.01	1.00
Creek	40	2yr	1.22	391.39	392.18	391.62	392.18	0.000022	0.07	25.33	70.67	0.03
Creek	40	5yr	2.29	391.39	392.24	391.68	392.24	0.000055	0.12	29.78	86.84	0.05
Creek	40	10yr	2.84	391.39	392.26	391.72	392.26	0.000082	0.15	31.51	87.27	0.06
Creek	40	25yr	3.65	391.39	392.27	391.78	392.27	0.000128	0.18	32.16	87.38	0.07
Creek	40	50yr	4.29	391.39	392.29	391.82	392.29	0.000149	0.20	34.09	87.73	0.08
Creek	40	100yr	4.84	391.39	392.30	391.83	392.30	0.000171	0.22	35.33	88.20	0.09
Creek	40	Hazel	5.88	391.39	392.32	391.87	392.33	0.000214	0.25	37.29	88.58	0.10
Creek	37		Culvert									
Creek	33	2yr	1.22	389.17	389.56	389.56	389.68	0.035006	1.51	0.81	3.60	1.01
Creek	33	5yr	2.29	389.17	389.69	389.69	389.85	0.031366	1.73	1.32	4.36	1.01
Creek	33	10yr	2.84	389.17	389.74	389.74	389.92	0.031344	1.84	1.54	4.62	1.02
Creek	33	25yr	3.65	389.17	389.81	389.81	390.00	0.029750	1.94	1.88	5.02	1.01
Creek	33	50yr	4.29	389.17	389.87	389.87	390.07	0.026876	1.98	2.19	6.15	0.98
Creek	33	100yr	4.84	389.17	389.91	389.91	390.12	0.025747	2.05	2.43	6.51	0.97
Creek	33	Hazel	5.88	389.17	389.96	389.96	390.20	0.025183	2.19	2.81	6.92	0.98
Creek	20	2yr	1.22	386.67	387.04	387.04	387.18	0.034518	1.64	0.74	2.71	1.00
Creek	20	5yr	2.29	386.67	387.19	387.19	387.38	0.032147	1.95	1.17	3.10	1.01
Creek	20	10yr	2.84	386.67	387.25	387.25	387.47	0.031196	2.06	1.38	3.23	1.01
Creek	20	25yr	3.65	386.67	387.34	387.34	387.58	0.029995	2.19	1.67	3.43	1.00
Creek	20	50yr	4.29	386.67	387.40	387.40	387.67	0.029877	2.29	1.87	3.56	1.01
Creek	20	100yr	4.84	386.67	387.45	387.45	387.73	0.029597	2.36	2.05	3.68	1.01
Creek	20	Hazel	5.88	386.67	387.54	387.54	387.85	0.028871	2.46	2.40	3.97	1.01
Creek	0	2yr	1.22	382.25	382.58	382.58	382.64	0.037326	1.09	1.12	8.56	0.96
Creek	0	5yr	2.29	382.25	382.66	382.66	382.72	0.027916	1.16	2.18	17.57	0.88
Creek	0	10yr	2.84	382.25	382.68	382.68	382.75	0.030451	1.25	2.55	18.49	0.92
Creek	0	25yr	3.65	382.25	382.71	382.71	382.79	0.030024	1.29	3.22	20.56	0.93
Creek	0	50yr	4.29	382.25	382.73	382.73	382.82	0.030138	1.33	3.66	21.58	0.93
Creek	0	100yr	4.84	382.25	382.75	382.75	382.84	0.030602	1.36	4.04	23.06	0.94
Creek	0	Hazel	5.88	382.25	382.78	382.78	382.87	0.030745	1.46	4.63	23.86	0.96

HEC-RAS Plan: Proposed Conditions River: Nichol Drain 13 Reach: Creek

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Creek	880	2yr	1.08	406.67	407.41	407.04	407.42	0.001558	0.50	2.15	4.63	0.24
Creek	880	5yr	2.03	406.67	407.69	407.17	407.70	0.001385	0.56	3.61	6.04	0.23
Creek	880	10yr	2.48	406.67	407.79	407.22	407.81	0.001324	0.58	4.24	6.46	0.23
Creek	880	25yr	3.30	406.67	407.94	407.30	407.96	0.001290	0.62	5.40	13.16	0.23
Creek	880	50yr	4.13	406.67	408.05	407.38	408.07	0.001111	0.62	8.15	36.97	0.22
Creek	880	100yr	4.86	406.67	408.12	407.43	408.13	0.000943	0.60	10.76	40.41	0.20
Creek	880	Hazel	6.03	406.67	408.21	407.52	408.22	0.000773	0.57	14.59	46.82	0.19
Creek	860	2yr	1.08	406.52	407.38		407.39	0.001453	0.52	2.10	4.02	0.23
Creek	860	5yr	2.03	406.52	407.65		407.67	0.001458	0.61	3.32	4.85	0.24
Creek	860	10yr	2.48	406.52	407.76		407.78	0.001526	0.65	3.83	5.32	0.24
Creek	860	25yr	3.30	406.52	407.91		407.93	0.001606	0.70	4.80	12.85	0.25
Creek	860	50yr	4.13	406.52	408.03		408.05	0.001252	0.65	8.66	46.47	0.23
Creek	860	100yr	4.86	406.52	408.10		408.11	0.000900	0.56	12.30	54.88	0.19
Creek	860	Hazel	6.03	406.52	408.20		408.20	0.000588	0.47	18.42	76.58	0.16
Creek	840	2yr	1.08	406.46	407.36	406.87	407.37	0.000929	0.44	2.49	4.39	0.18
Creek	840	5yr	2.03	406.46	407.63	407.00	407.65	0.001012	0.54	3.77	5.06	0.20
Creek	840	10yr	2.48	406.46	407.73	407.06	407.75	0.001070	0.58	4.29	5.36	0.21
Creek	840	25yr	3.30	406.46	407.88	407.15	407.90	0.001180	0.64	5.14	8.08	0.22
Creek	840	50yr	4.13	406.46	408.00	407.22	408.02	0.001231	0.68	6.95	24.76	0.23
Creek	840	100yr	4.86	406.46	408.07	407.28	408.09	0.001192	0.67	9.60	43.08	0.22
Creek	840	Hazel	6.03	406.46	408.18	407.38	408.19	0.000880	0.57	14.52	53.38	0.19
Creek	820	2yr	1.08	406.31	407.35	406.74	407.36	0.000498	0.34	3.15	4.92	0.14
Creek	820	5yr	2.03	406.31	407.62	406.88	407.63	0.000617	0.44	4.59	5.72	0.16
Creek	820	10yr	2.48	406.31	407.72	406.93	407.73	0.000665	0.48	5.17	5.99	0.16
Creek	820	25yr	3.30	406.31	407.87	407.01	407.88	0.000752	0.54	6.09	7.71	0.18
Creek	820	50yr	4.13	406.31	407.98	407.08	408.00	0.000815	0.59	7.67	20.01	0.19
Creek	820	100yr	4.86	406.31	408.05	407.14	408.07	0.000840	0.61	9.81	41.03	0.19
Creek	820	Hazel	6.03	406.31	408.16	407.23	408.17	0.000666	0.57	14.86	54.45	0.17
Creek	800	2yr	1.08	406.39	407.34	406.80	407.35	0.000684	0.39	2.78	4.57	0.16
Creek	800	5yr	2.03	406.39	407.60	406.93	407.62	0.000822	0.49	4.11	5.39	0.18
Creek	800	10yr	2.48	406.39	407.70	406.98	407.72	0.000878	0.53	4.65	5.66	0.19
Creek	800	25yr	3.30	406.39	407.85	407.06	407.87	0.000991	0.60	5.50	6.12	0.20
Creek	800	50yr	4.13	406.39	407.96	407.14	407.98	0.001114	0.67	6.20	6.52	0.22
Creek	800	100yr	4.86	406.39	408.02	407.19	408.05	0.001245	0.73	6.64	6.77	0.23
Creek	800	Hazel	6.03	406.39	408.12	407.28	408.15	0.001428	0.83	7.31	8.54	0.25
Creek	780	2yr	1.08	406.48	407.31	406.89	407.32	0.001802	0.55	1.98	4.06	0.25
Creek	780	5yr	2.03	406.48	407.57	407.06	407.59	0.001704	0.64	3.19	4.96	0.25
Creek	780	10yr	2.48	406.48	407.67	407.11	407.69	0.001710	0.67	3.67	5.21	0.26
Creek	780	25yr	3.30	406.48	407.81	407.21	407.84	0.001800	0.74	4.44	5.64	0.27
Creek	780	50yr	4.13	406.48	407.92	407.29	407.95	0.001982	0.82	5.05	5.94	0.28
Creek	780	100yr	4.86	406.48	407.98	407.36	408.02	0.002268	0.90	5.41	6.11	0.30
Creek	780	Hazel	6.03	406.48	408.06	407.44	408.11	0.002713	1.02	5.94	6.36	0.34
Creek	760	2yr	1.08	406.34	407.29	406.75	407.30	0.000762	0.40	2.70	4.67	0.17
Creek	760	5yr	2.03	406.34	407.55	406.89	407.57	0.000881	0.50	4.05	5.56	0.19
Creek	760	10yr	2.48	406.34	407.65	406.94	407.66	0.000932	0.54	4.59	5.85	0.19
Creek	760	25yr	3.30	406.34	407.79	407.03	407.81	0.001038	0.61	5.44	6.28	0.21
Creek	760	50yr	4.13	406.34	407.89	407.11	407.92	0.001183	0.68	6.11	6.55	0.22
Creek	760	100yr	4.86	406.34	407.95	407.17	407.98	0.001387	0.75	6.48	6.69	0.24
Creek	760	Hazel	6.03	406.34	408.03	407.26	408.07	0.001709	0.86	7.02	6.85	0.27
Creek	740	2yr	1.08	406.27	407.28	406.69	407.28	0.000716	0.40	2.73	4.48	0.16
Creek	740	5yr	2.03	406.27	407.54	406.84	407.55	0.000879	0.51	3.99	5.22	0.19
Creek	740	10yr	2.48	406.27	407.63	406.90	407.65	0.000953	0.55	4.49	5.50	0.19
Creek	740	25yr	3.30	406.27	407.77	406.99	407.79	0.001093	0.63	5.27	5.90	0.21
Creek	740	50yr	4.13	406.27	407.87	407.07	407.89	0.001275	0.70	5.87	6.14	0.23
Creek	740	100yr	4.86	406.27	407.92	407.14	407.95	0.001526	0.79	6.18	6.25	0.25
Creek	740	Hazel	6.03	406.27	407.99	407.23	408.03	0.001946	0.91	6.63	6.42	0.29
Creek	720	2yr	1.08	406.34	407.26	406.73	407.27	0.000909	0.43	2.51	4.41	0.18
Creek	720	5yr	2.03	406.34	407.52	406.88	407.53	0.001056	0.54	3.74	5.16	0.20
Creek	720	10yr	2.48	406.34	407.61	406.94	407.63	0.001129	0.59	4.23	5.42	0.21
Creek	720	25yr	3.30	406.34	407.74	407.03	407.76	0.001285	0.66	4.98	5.83	0.23
Creek	720	50yr	4.13	406.34	407.84	407.11	407.86	0.001501	0.74	5.55	6.09	0.25
Creek	720	100yr	4.86	406.34	407.88	407.18	407.92	0.001822	0.83	5.82	6.20	0.28
Creek	720	Hazel	6.03	406.34	407.94	407.26	407.99	0.002384	0.98	6.18	6.36	0.32
Creek	700	2yr	1.08	406.10	407.25	406.56	407.25	0.000467	0.33	3.28	5.19	0.13
Creek	700	5yr	2.03	406.10	407.50	406.70	407.51	0.000603	0.43	4.71	6.03	0.16

HEC-RAS Plan: Proposed Conditions   River: Nichol Drain 13   Reach: Creek (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Creek	700	10yr	2.48	406.10	407.60	406.77	407.61	0.000664	0.47	5.27	6.35	0.16
Creek	700	25yr	3.30	406.10	407.73	406.86	407.74	0.000782	0.54	6.14	6.86	0.18
Creek	700	50yr	4.13	406.10	407.82	406.95	407.84	0.000908	0.61	6.91	10.29	0.20
Creek	700	100yr	4.86	406.10	407.86	407.02	407.88	0.001104	0.68	7.37	12.48	0.22
Creek	700	Hazel	6.03	406.10	407.91	407.12	407.94	0.001437	0.79	8.08	14.59	0.25
Creek	680	2yr	1.08	406.03	407.24	406.51	407.25	0.000329	0.30	3.65	5.16	0.11
Creek	680	5yr	2.03	406.03	407.49	406.65	407.50	0.000474	0.40	5.04	5.91	0.14
Creek	680	10yr	2.48	406.03	407.58	406.71	407.59	0.000538	0.44	5.59	6.27	0.15
Creek	680	25yr	3.30	406.03	407.71	406.79	407.73	0.000666	0.51	6.58	10.85	0.17
Creek	680	50yr	4.13	406.03	407.81	406.87	407.82	0.000665	0.54	9.23	34.45	0.17
Creek	680	100yr	4.86	406.03	407.86	406.93	407.87	0.000487	0.48	15.40	69.96	0.15
Creek	680	Hazel	6.03	406.03	407.91	407.02	407.92	0.000466	0.48	19.59	75.72	0.15
Creek	660	2yr	1.08	406.34	407.22	406.77	407.23	0.001270	0.49	2.21	4.12	0.21
Creek	660	5yr	2.03	406.34	407.47	406.91	407.49	0.001586	0.61	3.33	5.38	0.24
Creek	660	10yr	2.48	406.34	407.55	406.97	407.58	0.001543	0.65	3.84	6.35	0.25
Creek	660	25yr	3.30	406.34	407.68	407.05	407.71	0.001538	0.72	4.73	8.71	0.25
Creek	660	50yr	4.13	406.34	407.77	407.14	407.80	0.001574	0.78	5.87	14.38	0.26
Creek	660	100yr	4.86	406.34	407.84	407.20	407.85	0.000913	0.63	12.49	64.29	0.20
Creek	660	Hazel	6.03	406.34	407.91	407.30	407.91	0.000421	0.44	24.30	108.52	0.14
Creek	640	2yr	1.08	406.31	407.20	406.68	407.21	0.001056	0.46	2.35	4.04	0.19
Creek	640	5yr	2.03	406.31	407.44	406.83	407.46	0.001346	0.60	3.40	4.69	0.22
Creek	640	10yr	2.48	406.31	407.52	406.89	407.55	0.001472	0.65	3.81	4.92	0.24
Creek	640	25yr	3.30	406.31	407.65	406.99	407.67	0.001762	0.75	4.42	5.32	0.26
Creek	640	50yr	4.13	406.31	407.73	407.07	407.76	0.002145	0.85	4.87	5.57	0.29
Creek	640	100yr	4.86	406.31	407.78	407.14	407.82	0.002575	0.94	5.14	5.73	0.32
Creek	640	Hazel	6.03	406.31	407.83	407.24	407.89	0.003436	1.11	5.44	5.90	0.37
Creek	620	2yr	1.08	406.35	407.17		407.19	0.001528	0.52	2.09	4.17	0.23
Creek	620	5yr	2.03	406.35	407.40		407.43	0.001735	0.64	3.14	4.89	0.26
Creek	620	10yr	2.48	406.35	407.49		407.51	0.001821	0.69	3.57	5.41	0.27
Creek	620	25yr	3.30	406.35	407.61		407.64	0.001684	0.72	5.58	26.83	0.26
Creek	620	50yr	4.13	406.35	407.71		407.73	0.001305	0.65	8.73	39.97	0.23
Creek	620	100yr	4.86	406.35	407.76		407.78	0.001137	0.62	11.15	46.00	0.22
Creek	620	Hazel	6.03	406.35	407.83		407.84	0.001004	0.61	14.38	56.65	0.21
Creek	600	2yr	1.08	406.33	407.14		407.15	0.001807	0.56	1.95	3.93	0.25
Creek	600	5yr	2.03	406.33	407.36		407.39	0.002150	0.69	2.96	4.96	0.28
Creek	600	10yr	2.48	406.33	407.45		407.47	0.002186	0.73	3.38	5.42	0.29
Creek	600	25yr	3.30	406.33	407.58		407.60	0.001903	0.73	5.38	23.37	0.28
Creek	600	50yr	4.13	406.33	407.68		407.70	0.001368	0.67	8.25	32.74	0.24
Creek	600	100yr	4.86	406.33	407.74		407.76	0.001184	0.66	10.38	41.24	0.23
Creek	600	Hazel	6.03	406.33	407.80		407.82	0.001041	0.65	13.64	56.13	0.21
Creek	580	2yr	1.08	406.36	407.11		407.12	0.001039	0.45	2.40	4.60	0.20
Creek	580	5yr	2.03	406.36	407.34		407.35	0.001244	0.58	3.51	5.46	0.22
Creek	580	10yr	2.48	406.36	407.42		407.44	0.001324	0.63	3.97	5.77	0.23
Creek	580	25yr	3.30	406.36	407.55		407.57	0.001394	0.70	5.09	13.31	0.25
Creek	580	50yr	4.13	406.36	407.65		407.67	0.001356	0.73	6.99	25.12	0.24
Creek	580	100yr	4.86	406.36	407.71		407.73	0.001299	0.74	8.82	37.71	0.24
Creek	580	Hazel	6.03	406.36	407.77		407.80	0.001227	0.75	11.90	50.95	0.24
Creek	560	2yr	1.08	406.28	407.09		407.10	0.001397	0.50	2.15	4.15	0.22
Creek	560	5yr	2.03	406.28	407.30		407.32	0.001714	0.65	3.14	5.00	0.26
Creek	560	10yr	2.48	406.28	407.38		407.41	0.001828	0.70	3.54	5.38	0.27
Creek	560	25yr	3.30	406.28	407.51		407.54	0.001972	0.79	4.29	8.31	0.28
Creek	560	50yr	4.13	406.28	407.60		407.64	0.002018	0.83	5.90	27.03	0.29
Creek	560	100yr	4.86	406.28	407.67		407.70	0.001777	0.81	8.34	47.62	0.28
Creek	560	Hazel	6.03	406.28	407.75		407.77	0.001315	0.74	12.67	60.02	0.24
Creek	540	2yr	1.08	406.32	407.04		407.06	0.002774	0.64	1.70	3.86	0.31
Creek	540	5yr	2.03	406.32	407.25		407.28	0.003086	0.79	2.57	4.58	0.34
Creek	540	10yr	2.48	406.32	407.32		407.36	0.003252	0.85	2.92	4.83	0.35
Creek	540	25yr	3.30	406.32	407.44		407.48	0.003482	0.94	3.53	6.26	0.37
Creek	540	50yr	4.13	406.32	407.54		407.59	0.003302	0.99	4.72	23.23	0.37
Creek	540	100yr	4.86	406.32	407.62		407.66	0.002398	0.91	7.42	41.38	0.32
Creek	540	Hazel	6.03	406.32	407.72		407.74	0.001465	0.76	12.04	52.86	0.25
Creek	520	2yr	1.08	406.18	406.99	406.63	407.01	0.002247	0.59	1.84	4.04	0.28
Creek	520	5yr	2.03	406.18	407.19	406.78	407.22	0.002771	0.74	2.74	5.00	0.32
Creek	520	10yr	2.48	406.18	407.26	406.84	407.29	0.002967	0.80	3.11	5.33	0.33
Creek	520	25yr	3.30	406.18	407.38	406.93	407.42	0.003222	0.88	3.75	5.90	0.35

HEC-RAS Plan: Proposed Conditions River: Nichol Drain 13 Reach: Creek (Continued)

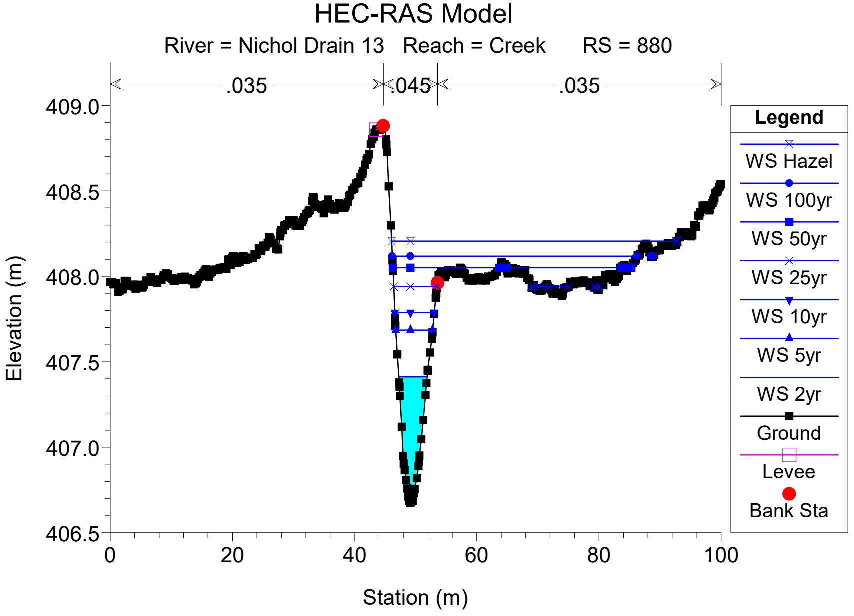
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Creek	520	50yr	4.13	406.18	407.47	407.02	407.52	0.003462	0.95	4.33	6.37	0.37
Creek	520	100yr	4.86	406.18	407.55	407.08	407.60	0.003592	1.01	4.82	7.30	0.38
Creek	520	Hazel	6.03	406.18	407.64	407.17	407.70	0.003447	1.05	6.51	23.93	0.38
Creek	500	2yr	1.08	406.16	406.91	406.65	406.94	0.004755	0.81	1.34	3.11	0.39
Creek	500	5yr	2.03	406.16	407.08	406.81	407.13	0.006517	1.07	1.90	3.68	0.47
Creek	500	10yr	2.48	406.16	407.13	406.88	407.20	0.007411	1.18	2.10	3.86	0.51
Creek	500	25yr	3.30	406.16	407.22	406.98	407.31	0.008922	1.34	2.46	4.27	0.57
Creek	500	50yr	4.13	406.16	407.28	407.06	407.40	0.010855	1.51	2.74	4.63	0.63
Creek	500	100yr	4.86	406.16	407.33	407.13	407.47	0.012316	1.63	2.98	4.95	0.67
Creek	500	Hazel	6.03	406.16	407.38	407.23	407.56	0.015641	1.89	3.20	5.23	0.76
Creek	480	2yr	1.08	406.08	406.85	406.54	406.87	0.002880	0.67	1.66	4.41	0.32
Creek	480	5yr	2.03	406.08	406.99	406.69	407.03	0.004048	0.91	2.39	6.56	0.39
Creek	480	10yr	2.48	406.08	407.03	406.75	407.08	0.004562	1.00	2.69	7.10	0.41
Creek	480	25yr	3.30	406.08	407.10	406.85	407.16	0.005586	1.15	3.23	9.56	0.46
Creek	480	50yr	4.13	406.08	407.16	406.94	407.23	0.006062	1.24	3.88	14.48	0.49
Creek	480	100yr	4.86	406.08	407.19	407.01	407.27	0.006744	1.34	4.49	16.70	0.52
Creek	480	Hazel	6.03	406.08	407.24	407.09	407.33	0.007070	1.41	5.33	17.38	0.53
Creek	460	2yr	1.08	406.04	406.79		406.81	0.002998	0.65	1.70	5.50	0.32
Creek	460	5yr	2.03	406.04	406.92		406.95	0.003602	0.83	2.83	11.85	0.37
Creek	460	10yr	2.48	406.04	406.96		407.00	0.003496	0.86	3.39	12.61	0.37
Creek	460	25yr	3.30	406.04	407.03		407.07	0.003501	0.93	4.29	14.55	0.37
Creek	460	50yr	4.13	406.04	407.09		407.13	0.003580	0.99	5.27	20.60	0.38
Creek	460	100yr	4.86	406.04	407.12		407.16	0.003802	1.06	6.04	24.22	0.40
Creek	460	Hazel	6.03	406.04	407.17		407.21	0.003787	1.10	7.27	25.89	0.40
Creek	440	2yr	1.08	406.10	406.73		406.75	0.002788	0.60	1.82	6.06	0.31
Creek	440	5yr	2.03	406.10	406.85		406.88	0.003652	0.81	2.70	8.37	0.37
Creek	440	10yr	2.48	406.10	406.89		406.92	0.003999	0.89	3.03	9.18	0.39
Creek	440	25yr	3.30	406.10	406.94		406.99	0.004468	1.01	3.80	17.29	0.42
Creek	440	50yr	4.13	406.10	406.99		407.04	0.004979	1.12	4.67	21.10	0.45
Creek	440	100yr	4.86	406.10	407.02		407.08	0.004973	1.16	5.42	22.57	0.45
Creek	440	Hazel	6.03	406.10	407.07		407.12	0.005162	1.23	6.52	26.03	0.47
Creek	420	2yr	1.08	406.07	406.66		406.69	0.004013	0.70	1.69	9.44	0.37
Creek	420	5yr	2.03	406.07	406.78		406.81	0.003859	0.82	2.95	14.39	0.38
Creek	420	10yr	2.48	406.07	406.81		406.84	0.003810	0.86	3.55	17.41	0.38
Creek	420	25yr	3.30	406.07	406.87		406.90	0.003959	0.94	4.62	22.38	0.40
Creek	420	50yr	4.13	406.07	406.92		406.95	0.003587	0.94	5.77	23.93	0.38
Creek	420	100yr	4.86	406.07	406.95		406.99	0.003597	0.98	6.62	26.62	0.39
Creek	420	Hazel	6.03	406.07	407.00		407.03	0.003463	1.01	7.93	27.91	0.38
Creek	400	2yr	1.08	405.97	406.59		406.61	0.003695	0.63	1.77	7.58	0.35
Creek	400	5yr	2.03	405.97	406.69		406.72	0.004322	0.79	2.87	13.86	0.39
Creek	400	10yr	2.48	405.97	406.73		406.76	0.004389	0.85	3.43	16.45	0.40
Creek	400	25yr	3.30	405.97	406.78		406.82	0.004358	0.91	4.35	19.01	0.41
Creek	400	50yr	4.13	405.97	406.83		406.87	0.004390	0.97	5.36	22.14	0.42
Creek	400	100yr	4.86	405.97	406.87		406.91	0.004390	1.01	6.15	24.58	0.42
Creek	400	Hazel	6.03	405.97	406.92		406.96	0.004234	1.05	7.42	26.59	0.42
Creek	380	2yr	1.08	405.87	406.55		406.56	0.001419	0.47	2.60	11.57	0.23
Creek	380	5yr	2.03	405.87	406.65		406.67	0.001964	0.63	3.90	16.07	0.28
Creek	380	10yr	2.48	405.87	406.68		406.70	0.002153	0.69	4.45	17.48	0.29
Creek	380	25yr	3.30	405.87	406.73		406.75	0.002386	0.77	5.38	20.36	0.31
Creek	380	50yr	4.13	405.87	406.77		406.80	0.002624	0.84	6.32	22.69	0.33
Creek	380	100yr	4.86	405.87	406.81		406.84	0.002702	0.88	7.07	23.41	0.34
Creek	380	Hazel	6.03	405.87	406.86		406.89	0.002712	0.93	8.27	24.19	0.34
Creek	360	2yr	1.08	406.00	406.49		406.52	0.004747	0.69	1.85	12.26	0.40
Creek	360	5yr	2.03	406.00	406.58		406.61	0.004843	0.82	3.06	16.35	0.42
Creek	360	10yr	2.48	406.00	406.61		406.64	0.004741	0.85	3.58	17.20	0.42
Creek	360	25yr	3.30	406.00	406.65		406.69	0.004951	0.93	4.37	19.28	0.43
Creek	360	50yr	4.13	406.00	406.69		406.73	0.005155	1.00	5.14	20.52	0.45
Creek	360	100yr	4.86	406.00	406.72		406.76	0.005079	1.03	5.80	21.34	0.45
Creek	360	Hazel	6.03	406.00	406.77		406.82	0.005201	1.11	6.86	24.14	0.46
Creek	340	2yr	1.08	405.90	406.37		406.39	0.007131	0.73	1.57	10.03	0.47
Creek	340	5yr	2.03	405.90	406.44		406.48	0.008765	0.90	2.52	15.21	0.54
Creek	340	10yr	2.48	405.90	406.47		406.51	0.008671	0.96	2.98	16.66	0.54
Creek	340	25yr	3.30	405.90	406.51		406.55	0.009080	1.05	3.61	17.36	0.56
Creek	340	50yr	4.13	405.90	406.54		406.60	0.008848	1.11	4.27	18.20	0.57
Creek	340	100yr	4.86	405.90	406.57		406.63	0.009145	1.18	4.84	20.97	0.58

HEC-RAS Plan: Proposed Conditions   River: Nichol Drain 13   Reach: Creek (Continued)

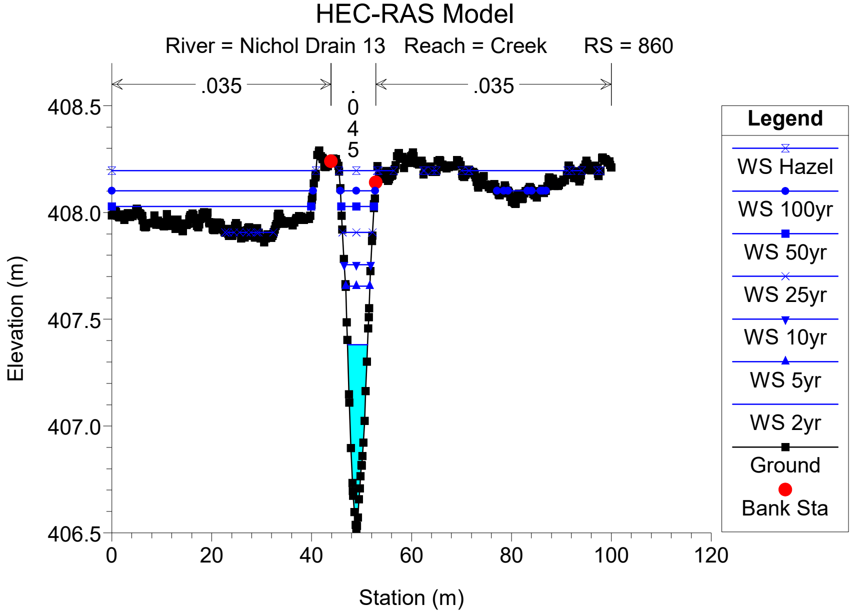
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Creek	340	Hazel	6.03	405.90	406.61		406.67	0.009841	1.29	5.60	22.95	0.61
Creek	320	2yr	1.08	405.96	406.19		406.21	0.012270	0.70	1.65	14.02	0.57
Creek	320	5yr	2.03	405.96	406.25		406.28	0.011660	0.84	2.54	15.99	0.59
Creek	320	10yr	2.48	405.96	406.27		406.31	0.011685	0.90	2.91	17.19	0.60
Creek	320	25yr	3.30	405.96	406.31		406.35	0.010981	0.97	3.65	18.34	0.60
Creek	320	50yr	4.13	405.96	406.35		406.40	0.010033	1.02	4.43	20.30	0.58
Creek	320	100yr	4.86	405.96	406.37		406.43	0.010787	1.10	4.81	20.60	0.61
Creek	320	Hazel	6.03	405.96	406.41		406.47	0.010117	1.15	5.71	21.79	0.60
Creek	300	2yr	1.08	405.79	406.00		406.02	0.008243	0.52	1.80	15.86	0.46
Creek	300	5yr	2.03	405.79	406.06		406.09	0.008453	0.66	2.78	18.88	0.49
Creek	300	10yr	2.48	405.79	406.08		406.11	0.008571	0.72	3.22	19.70	0.50
Creek	300	25yr	3.30	405.79	406.10		406.15	0.010215	0.85	3.69	21.46	0.56
Creek	300	50yr	4.13	405.79	406.12		406.18	0.012332	0.99	4.18	22.94	0.62
Creek	300	100yr	4.86	405.79	406.15	406.11	406.20	0.011689	1.02	4.78	24.17	0.62
Creek	300	Hazel	6.03	405.79	406.17	406.15	406.24	0.013832	1.16	5.23	24.78	0.68
Creek	280	2yr	1.08	405.22	405.72		405.78	0.016888	1.14	0.95	3.69	0.71
Creek	280	5yr	2.03	405.22	405.81	405.81	405.87	0.013253	1.20	2.28	22.24	0.66
Creek	280	10yr	2.48	405.22	405.83	405.83	405.89	0.014623	1.29	2.61	22.75	0.70
Creek	280	25yr	3.30	405.22	405.86	405.86	405.93	0.012968	1.30	3.50	25.78	0.67
Creek	280	50yr	4.13	405.22	405.91	405.89	405.96	0.009825	1.21	4.59	27.15	0.59
Creek	280	100yr	4.86	405.22	405.92	405.90	405.98	0.010793	1.30	5.08	29.28	0.63
Creek	280	Hazel	6.03	405.22	405.97		406.02	0.008488	1.23	6.45	30.58	0.56
Creek	260	2yr	1.08	404.97	405.36	405.36	405.43	0.018550	1.27	1.09	8.75	0.77
Creek	260	5yr	2.03	404.97	405.46	405.46	405.54	0.015580	1.43	2.20	14.30	0.74
Creek	260	10yr	2.48	404.97	405.48	405.48	405.57	0.016608	1.54	2.55	14.63	0.77
Creek	260	25yr	3.30	404.97	405.53	405.53	405.62	0.017348	1.68	3.22	16.06	0.80
Creek	260	50yr	4.13	404.97	405.55	405.55	405.67	0.020655	1.90	3.61	16.67	0.88
Creek	260	100yr	4.86	404.97	405.59	405.59	405.70	0.018109	1.88	4.37	18.10	0.84
Creek	260	Hazel	6.03	404.97	405.62	405.62	405.76	0.021052	2.10	4.87	18.63	0.91
Creek	240	2yr	1.08	404.38	404.69	404.67	404.74	0.016823	1.03	1.45	12.38	0.70
Creek	240	5yr	2.03	404.38	404.77	404.75	404.82	0.016360	1.20	2.62	19.12	0.72
Creek	240	10yr	2.48	404.38	404.78	404.77	404.84	0.018365	1.31	2.94	19.63	0.77
Creek	240	25yr	3.30	404.38	404.82	404.81	404.88	0.018912	1.41	3.73	23.63	0.80
Creek	240	50yr	4.13	404.38	404.84	404.83	404.92	0.021387	1.56	4.31	24.31	0.85
Creek	240	100yr	4.86	404.38	404.87	404.86	404.94	0.020369	1.58	4.93	24.51	0.84
Creek	240	Hazel	6.03	404.38	404.90	404.88	404.98	0.020628	1.66	5.74	25.17	0.85
Creek	220	2yr	1.08	404.00	404.26	404.26	404.31	0.027755	1.18	1.46	14.70	0.88
Creek	220	5yr	2.03	404.00	404.31	404.31	404.37	0.030668	1.46	2.33	18.99	0.97
Creek	220	10yr	2.48	404.00	404.33	404.33	404.40	0.029080	1.51	2.75	20.56	0.96
Creek	220	25yr	3.30	404.00	404.38	404.38	404.44	0.025930	1.58	3.78	29.07	0.93
Creek	220	50yr	4.13	404.00	404.42	404.42	404.48	0.023067	1.62	5.03	34.72	0.89
Creek	220	100yr	4.86	404.00	404.43	404.43	404.50	0.025645	1.75	5.44	35.40	0.95
Creek	220	Hazel	6.03	404.00	404.45	404.45	404.53	0.026074	1.84	6.32	36.28	0.96
Creek	200	2yr	1.08	402.54	402.85	402.85	402.93	0.033745	1.26	0.89	5.72	0.97
Creek	200	5yr	2.03	402.54	402.94	402.94	403.05	0.031030	1.53	1.41	6.44	0.98
Creek	200	10yr	2.48	402.54	402.98	402.98	403.10	0.028802	1.60	1.67	6.92	0.96
Creek	200	25yr	3.30	402.54	403.04	403.04	403.18	0.025680	1.69	2.18	8.56	0.94
Creek	200	50yr	4.13	402.54	403.09	403.09	403.24	0.025323	1.81	2.60	9.08	0.95
Creek	200	100yr	4.86	402.54	403.14	403.14	403.29	0.023571	1.85	3.01	9.56	0.93
Creek	200	Hazel	6.03	402.54	403.19	403.19	403.37	0.023543	1.98	3.58	10.55	0.94
Creek	180	2yr	1.08	401.43	401.69	401.69	401.76	0.039507	1.17	0.92	6.70	1.01
Creek	180	5yr	2.03	401.43	401.77	401.77	401.86	0.033984	1.34	1.52	8.57	0.98
Creek	180	10yr	2.48	401.43	401.79	401.79	401.90	0.032864	1.43	1.76	8.89	0.99
Creek	180	25yr	3.30	401.43	401.84	401.84	401.96	0.030782	1.56	2.18	9.66	0.98
Creek	180	50yr	4.13	401.43	401.88	401.88	402.02	0.028134	1.64	2.63	10.38	0.96
Creek	180	100yr	4.86	401.43	401.92	401.92	402.06	0.026660	1.70	3.00	10.76	0.95
Creek	180	Hazel	6.03	401.43	401.96	401.96	402.13	0.027068	1.84	3.49	11.26	0.98
Creek	160	2yr	1.08	399.45	399.76	399.76	399.86	0.035495	1.34	0.81	4.34	0.99
Creek	160	5yr	2.03	399.45	399.87	399.87	399.99	0.033444	1.50	1.35	5.92	1.00
Creek	160	10yr	2.48	399.45	399.91	399.91	400.04	0.032177	1.58	1.57	6.17	1.00
Creek	160	25yr	3.30	399.45	399.97	399.97	400.11	0.030566	1.70	1.94	6.50	1.00
Creek	160	50yr	4.13	399.45	400.01	400.01	400.19	0.030420	1.84	2.25	6.72	1.01
Creek	160	100yr	4.86	399.45	400.06	400.06	400.24	0.028562	1.90	2.56	6.95	1.00
Creek	160	Hazel	6.03	399.45	400.12	400.12	400.33	0.028422	2.03	2.97	7.25	1.01

HEC-RAS Plan: Proposed Conditions   River: Nichol Drain 13   Reach: Creek (Continued)

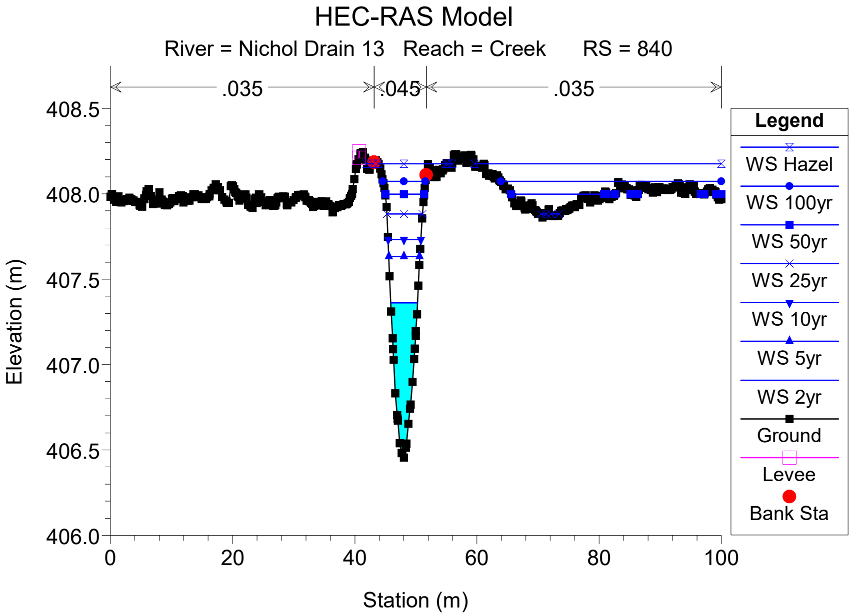
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Creek	140	2yr	1.08	397.86	398.16	398.16	398.27	0.035021	1.44	0.75	3.51	1.00
Creek	140	5yr	2.03	397.86	398.29	398.29	398.42	0.034250	1.57	1.29	5.21	1.01
Creek	140	10yr	2.48	397.86	398.33	398.33	398.47	0.033236	1.68	1.48	5.31	1.01
Creek	140	25yr	3.30	397.86	398.39	398.39	398.56	0.031519	1.82	1.81	5.46	1.01
Creek	140	50yr	4.13	397.86	398.45	398.45	398.64	0.029459	1.93	2.14	5.62	1.00
Creek	140	100yr	4.86	397.86	398.49	398.49	398.71	0.029389	2.04	2.38	5.71	1.01
Creek	140	Hazel	6.03	397.86	398.56	398.56	398.80	0.028594	2.18	2.77	5.87	1.01
Creek	120	2yr	1.08	396.22	396.56	396.56	396.67	0.034252	1.45	0.75	3.45	1.00
Creek	120	5yr	2.03	396.22	396.68	396.68	396.83	0.032021	1.73	1.17	3.88	1.01
Creek	120	10yr	2.48	396.22	396.73	396.73	396.90	0.030962	1.82	1.36	4.11	1.01
Creek	120	25yr	3.30	396.22	396.80	396.80	397.00	0.029886	1.96	1.68	4.38	1.01
Creek	120	50yr	4.13	396.22	396.87	396.87	397.09	0.028848	2.07	2.00	4.64	1.01
Creek	120	100yr	4.86	396.22	396.93	396.93	397.16	0.028412	2.16	2.25	4.85	1.01
Creek	120	Hazel	6.03	396.22	397.01	397.01	397.27	0.027628	2.27	2.66	5.18	1.01
Creek	100	2yr	1.08	395.01	395.39	395.39	395.51	0.034349	1.55	0.70	2.92	1.01
Creek	100	5yr	2.03	395.01	395.52	395.52	395.69	0.030809	1.80	1.13	3.39	1.00
Creek	100	10yr	2.48	395.01	395.58	395.58	395.76	0.029442	1.87	1.32	3.62	0.99
Creek	100	25yr	3.30	395.01	395.66	395.66	395.87	0.029055	2.02	1.63	3.92	1.00
Creek	100	50yr	4.13	395.01	395.74	395.74	395.97	0.028342	2.13	1.94	4.21	1.00
Creek	100	100yr	4.86	395.01	395.79	395.79	396.04	0.027829	2.22	2.19	4.39	1.00
Creek	100	Hazel	6.03	395.01	395.88	395.88	396.16	0.027162	2.34	2.58	4.67	1.00
Creek	80	2yr	1.08	393.01	393.39	393.39	393.51	0.035429	1.55	0.70	2.89	1.01
Creek	80	5yr	2.03	393.01	393.52	393.52	393.69	0.032527	1.85	1.10	3.21	1.01
Creek	80	10yr	2.48	393.01	393.57	393.57	393.76	0.031954	1.96	1.27	3.31	1.01
Creek	80	25yr	3.30	393.01	393.66	393.66	393.88	0.030583	2.10	1.57	3.52	1.01
Creek	80	50yr	4.13	393.01	393.74	393.74	393.99	0.029696	2.22	1.86	3.73	1.00
Creek	80	100yr	4.86	393.01	393.80	393.80	394.07	0.029181	2.31	2.11	3.92	1.00
Creek	80	Hazel	6.03	393.01	393.89	393.89	394.20	0.029051	2.44	2.47	4.16	1.01
Creek	60	2yr	1.08	391.84	392.21	392.21	392.33	0.033805	1.55	0.70	2.83	1.00
Creek	60	5yr	2.03	391.84	392.34	392.34	392.51	0.031934	1.86	1.09	3.15	1.01
Creek	60	10yr	2.48	391.84	392.39	392.39	392.59	0.030976	1.96	1.27	3.28	1.01
Creek	60	25yr	3.30	391.84	392.48	392.48	392.71	0.029972	2.11	1.56	3.50	1.01
Creek	60	50yr	4.13	391.84	392.56	392.56	392.81	0.029471	2.24	1.84	3.67	1.01
Creek	60	100yr	4.86	391.84	392.62	392.62	392.90	0.028797	2.33	2.08	3.80	1.01
Creek	60	Hazel	6.03	391.84	392.72	392.72	393.02	0.027970	2.45	2.46	4.04	1.00
Creek	40	2yr	1.08	391.39	392.17	391.61	392.17	0.000020	0.07	24.22	67.52	0.03
Creek	40	5yr	2.03	391.39	392.23	391.67	392.23	0.000043	0.10	29.07	85.46	0.04
Creek	40	10yr	2.48	391.39	392.25	391.70	392.25	0.000070	0.13	30.40	87.08	0.05
Creek	40	25yr	3.30	391.39	392.26	391.76	392.26	0.000114	0.17	31.22	87.22	0.07
Creek	40	50yr	4.13	391.39	392.28	391.81	392.29	0.000142	0.20	33.79	87.67	0.08
Creek	40	100yr	4.86	391.39	392.30	391.83	392.30	0.000174	0.22	35.14	88.04	0.09
Creek	40	Hazel	6.03	391.39	392.33	391.89	392.33	0.000214	0.25	37.92	88.68	0.10
Creek	37		Culvert									
Creek	33	2yr	1.08	389.17	389.55	389.55	389.65	0.035502	1.46	0.74	3.51	1.01
Creek	33	5yr	2.03	389.17	389.67	389.67	389.81	0.031543	1.68	1.21	4.22	1.00
Creek	33	10yr	2.48	389.17	389.71	389.71	389.87	0.031323	1.78	1.40	4.44	1.01
Creek	33	25yr	3.30	389.17	389.79	389.79	389.97	0.029520	1.88	1.75	4.87	1.00
Creek	33	50yr	4.13	389.17	389.86	389.86	390.05	0.027546	1.96	2.12	6.05	0.99
Creek	33	100yr	4.86	389.17	389.91	389.91	390.12	0.025732	2.05	2.43	6.52	0.97
Creek	33	Hazel	6.03	389.17	389.97	389.97	390.21	0.024424	2.19	2.89	7.05	0.97
Creek	20	2yr	1.08	386.67	387.02	387.02	387.15	0.035243	1.59	0.68	2.66	1.01
Creek	20	5yr	2.03	386.67	387.16	387.16	387.34	0.032585	1.88	1.08	3.03	1.01
Creek	20	10yr	2.48	386.67	387.21	387.21	387.41	0.031825	1.99	1.25	3.14	1.01
Creek	20	25yr	3.30	386.67	387.30	387.30	387.54	0.030393	2.13	1.55	3.35	1.00
Creek	20	50yr	4.13	386.67	387.38	387.38	387.65	0.030007	2.27	1.82	3.53	1.01
Creek	20	100yr	4.86	386.67	387.45	387.45	387.73	0.029535	2.36	2.06	3.68	1.01
Creek	20	Hazel	6.03	386.67	387.55	387.55	387.86	0.028756	2.47	2.45	4.01	1.01
Creek	0	2yr	1.08	382.25	382.57	382.57	382.62	0.036339	1.04	1.04	8.39	0.94
Creek	0	5yr	2.03	382.25	382.64	382.64	382.71	0.031094	1.17	1.86	16.64	0.91
Creek	0	10yr	2.48	382.25	382.67	382.67	382.73	0.026296	1.15	2.40	18.10	0.86
Creek	0	25yr	3.30	382.25	382.69	382.69	382.78	0.032220	1.32	2.83	19.29	0.96
Creek	0	50yr	4.13	382.25	382.72	382.72	382.81	0.032112	1.36	3.46	21.07	0.96
Creek	0	100yr	4.86	382.25	382.75	382.75	382.84	0.031739	1.38	4.00	22.98	0.96
Creek	0	Hazel	6.03	382.25	382.78	382.78	382.88	0.030453	1.47	4.72	23.93	0.96


HEC-RAS Model

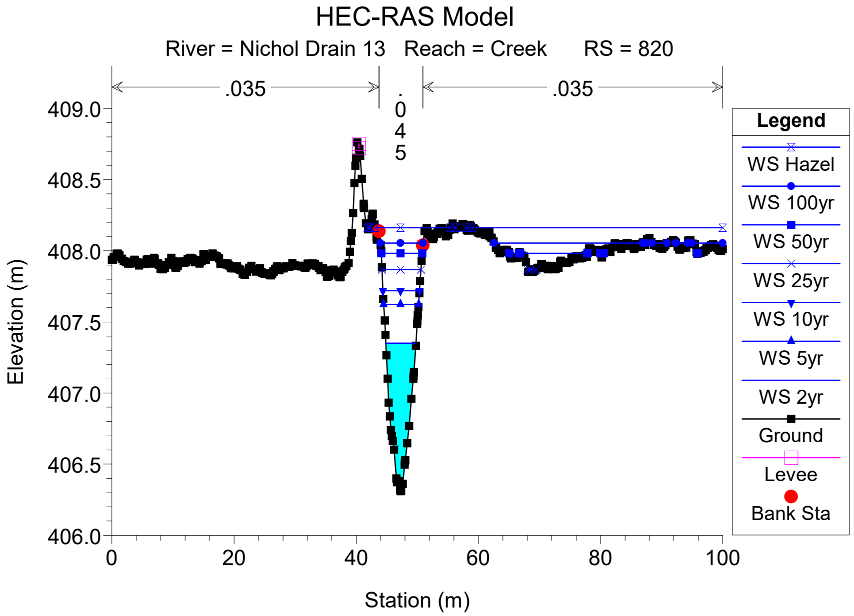
River = Nichol Drain 13 Reach = Creek RS = 880


HEC-RAS Model

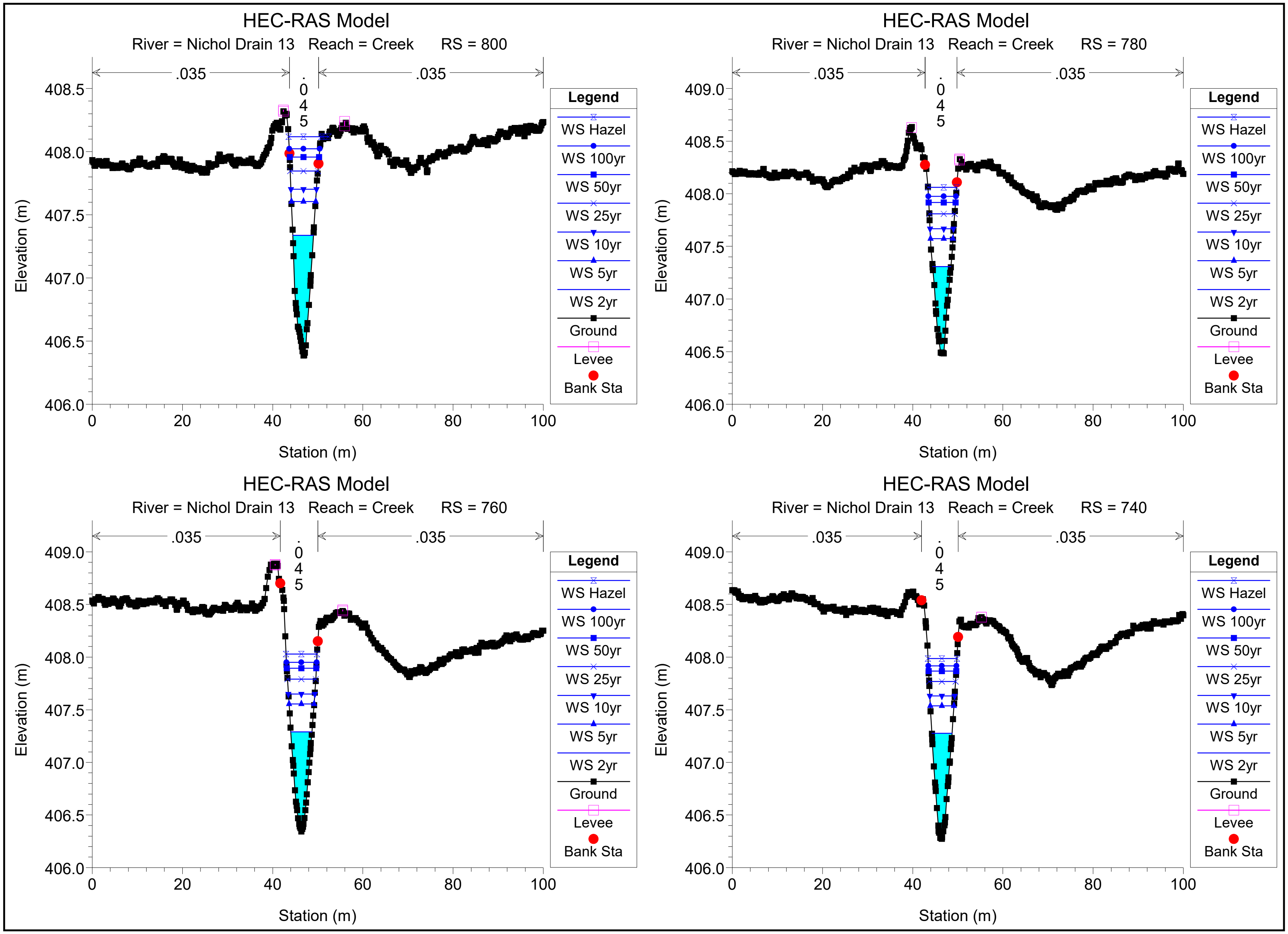
River = Nichol Drain 13 Reach = Creek RS = 860

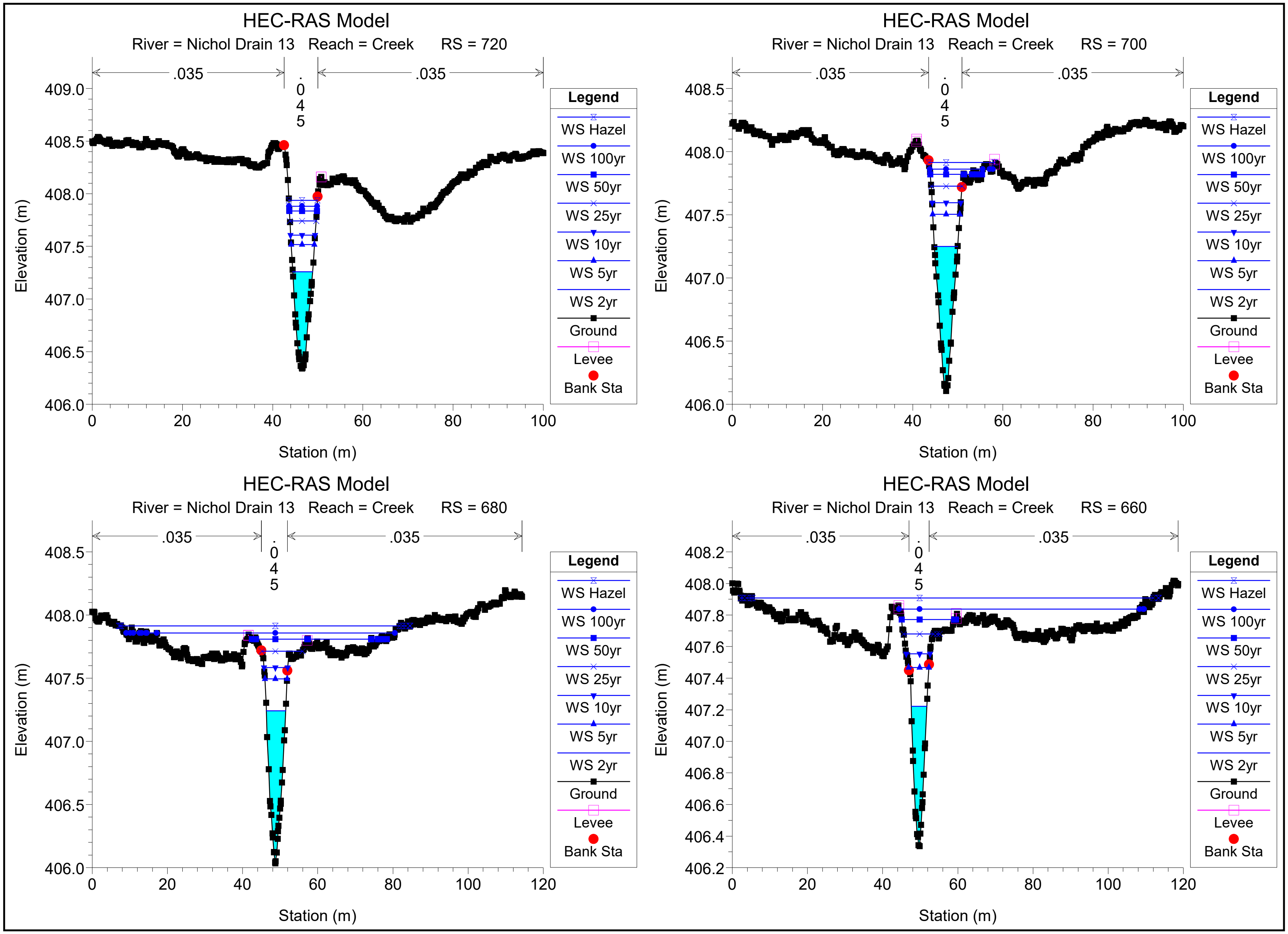

HEC-RAS Model

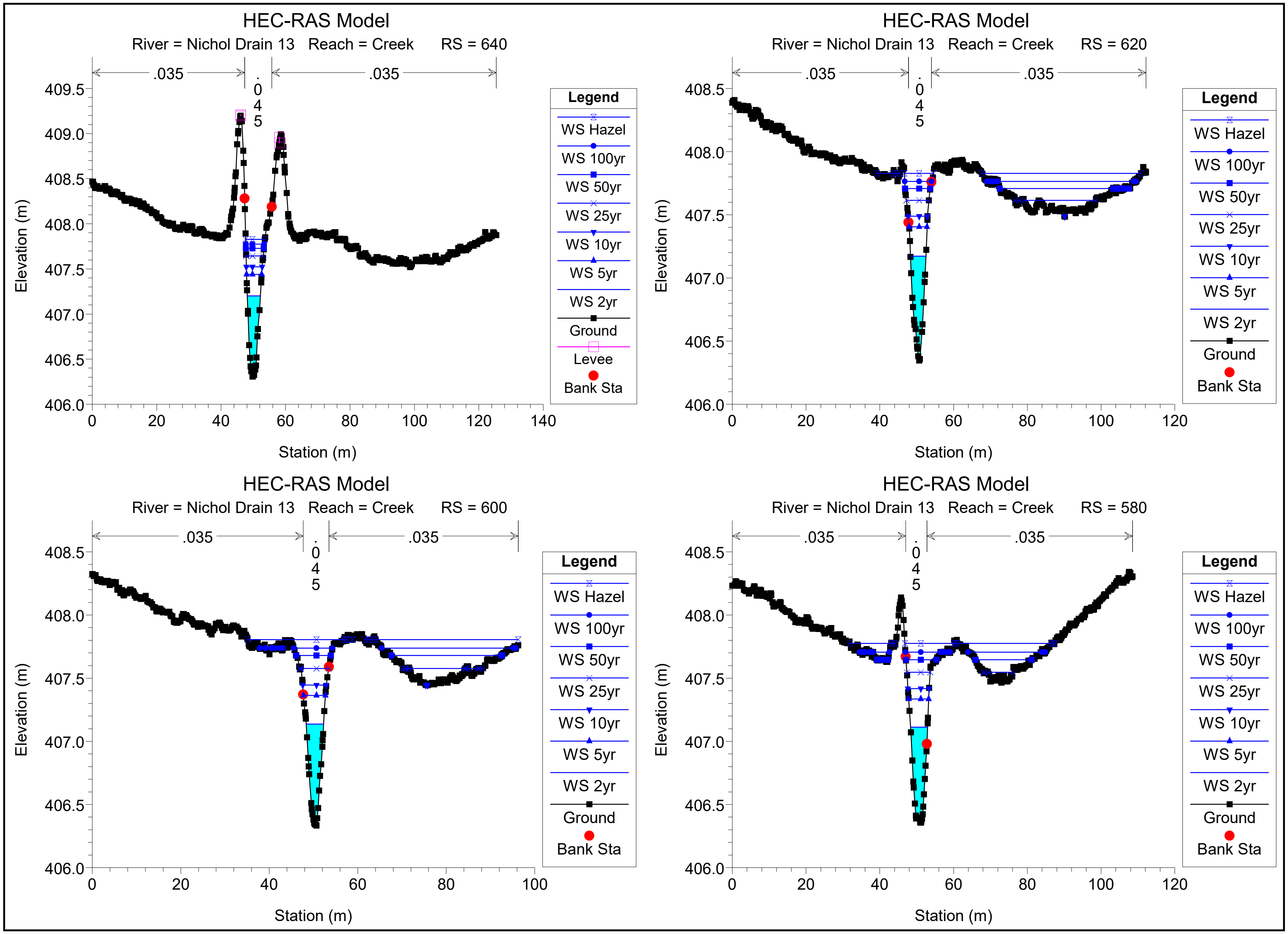
River = Nichol Drain 13 Reach = Creek RS = 840

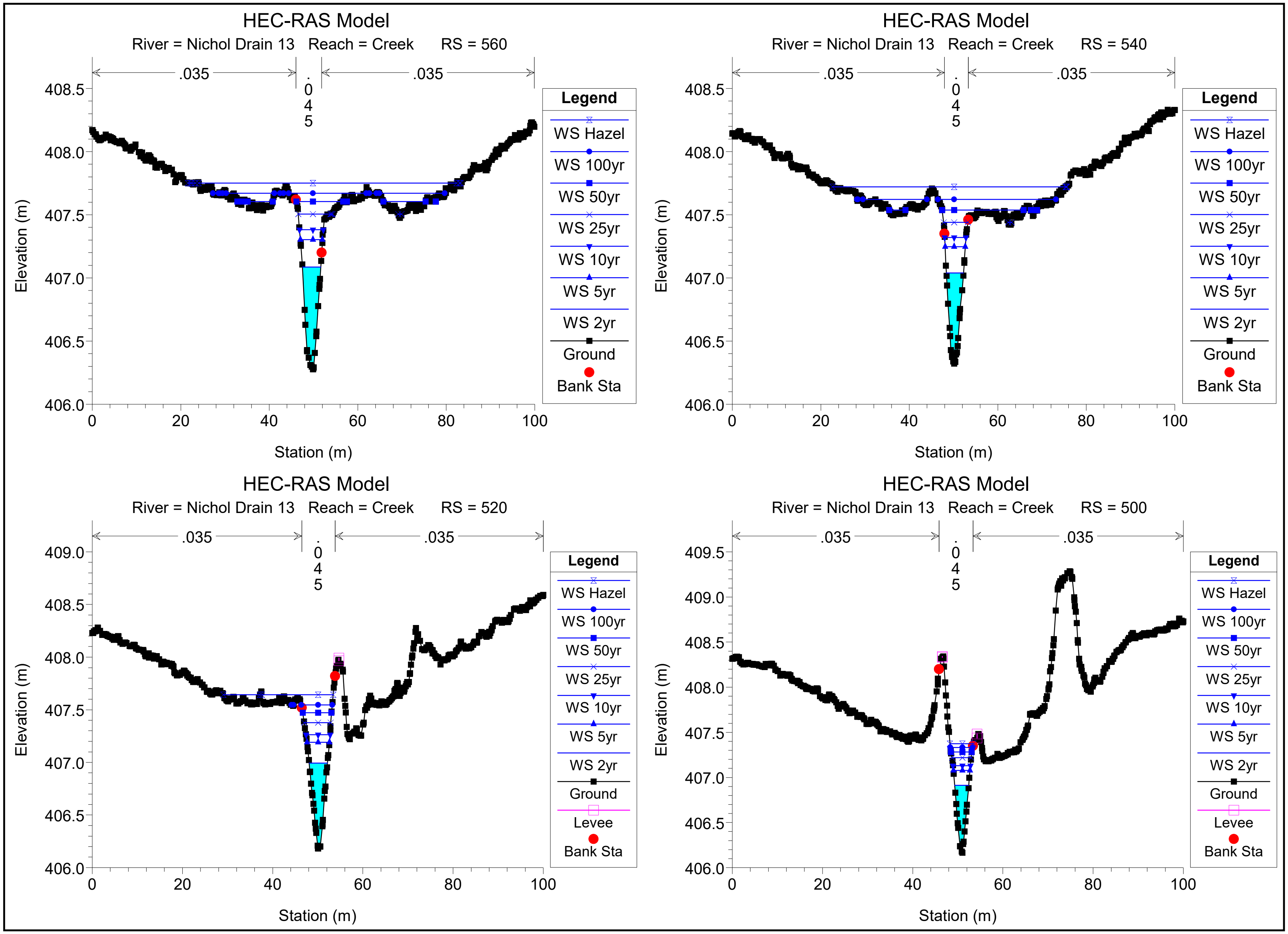

HEC-RAS Model

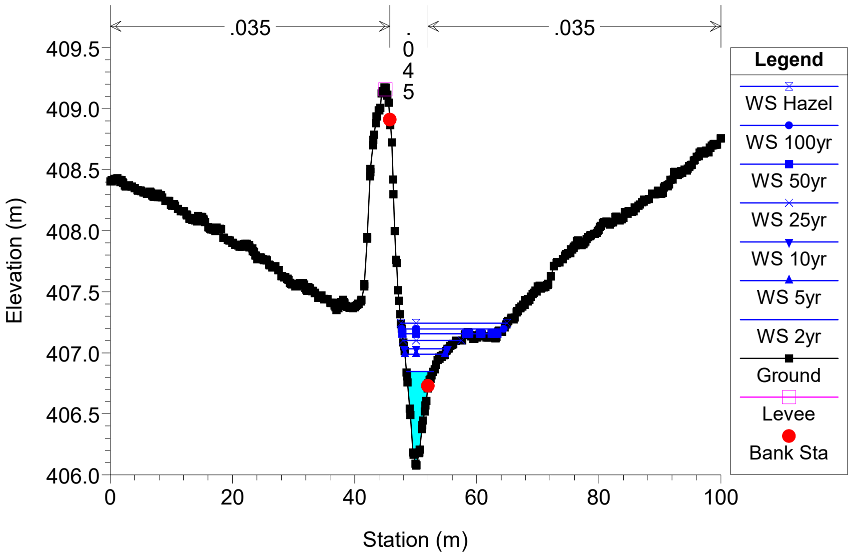
River = Nichol Drain 13 Reach = Creek RS = 820


HEC-RAS Model
River = Nichol Drain 13 Reach = Creek RS = 800
.035
.045
.035
408.5
408.0
407.5
407.0
406.5
406.0
Elevation (m)
0
20
40
60
80
100
Station (m)
Legend
WS Hazel
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
Ground
Levee
Bank Sta
HEC-RAS Model
River = Nichol Drain 13 Reach = Creek RS = 780
.035
.045
.035
409.0
408.5
408.0
407.5
407.0
406.5
406.0
Elevation (m)
0
20
40
60
80
100
Station (m)
Legend
WS Hazel
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
Ground
Levee
Bank Sta
HEC-RAS Model
River = Nichol Drain 13 Reach = Creek RS = 760
.035
.045
.035
409.0
408.5
408.0
407.5
407.0
406.5
406.0
Elevation (m)
0
20
40
60
80
100
Station (m)
Legend
WS Hazel
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
Ground
Levee
Bank Sta
HEC-RAS Model
River = Nichol Drain 13 Reach = Creek RS = 740
.035
.045
.035
409.0
408.5
408.0
407.5
407.0
406.5
406.0
Elevation (m)
0
20
40
60
80
100
Station (m)
Legend
WS Hazel
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
Ground
Levee
Bank Sta

HEC-RAS Model
River = Nichol Drain 13 Reach = Creek RS = 720
.035
.045
.035
Elevation (m)
409.0
408.5
408.0
407.5
407.0
406.5
406.0
0
20
40
60
80
100
Station (m)
Legend
WS Hazel
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
Ground
Levee
Bank Sta
HEC-RAS Model
River = Nichol Drain 13 Reach = Creek RS = 700
.035
.045
.035
Elevation (m)
408.5
408.0
407.5
407.0
406.5
406.0
0
20
40
60
80
100
Station (m)
Legend
WS Hazel
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
Ground
Levee
Bank Sta
HEC-RAS Model
River = Nichol Drain 13 Reach = Creek RS = 680
.035
.045
.035
Elevation (m)
408.5
408.0
407.5
407.0
406.5
406.0
0
20
40
60
80
100
120
Station (m)
Legend
WS Hazel
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
Ground
Levee
Bank Sta
HEC-RAS Model
River = Nichol Drain 13 Reach = Creek RS = 660
.035
.045
.035
Elevation (m)
408.2
408.0
407.8
407.6
407.4
407.2
407.0
406.8
406.6
406.4
406.2
0
20
40
60
80
100
120
Station (m)
Legend
WS Hazel
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
Ground
Levee
Bank Sta

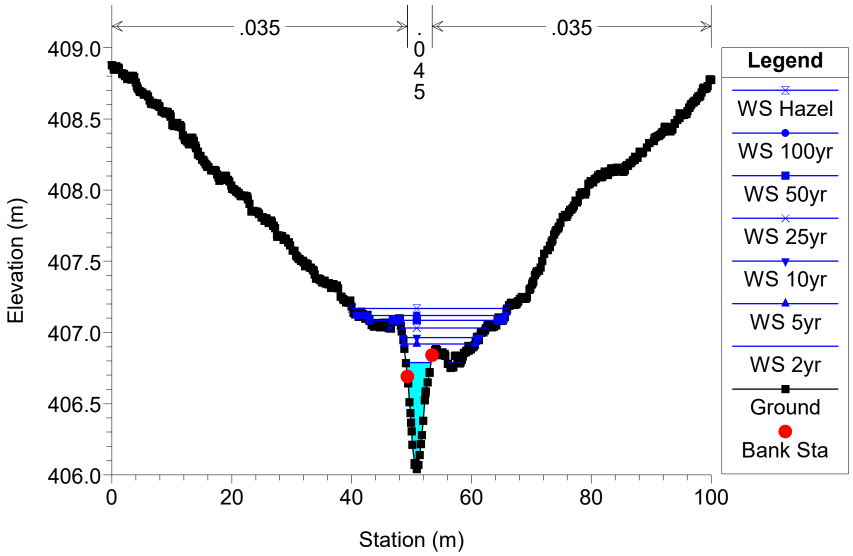

HEC-RAS Model
River = Nichol Drain 13 Reach = Creek RS = 640
.035
.045
.035
Elevation (m)
409.5
409.0
408.5
408.0
407.5
407.0
406.5
406.0
Station (m)
0
20
40
60
80
100
120
140
Legend
WS Hazel
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
Ground
Levee
Bank Sta
HEC-RAS Model
River = Nichol Drain 13 Reach = Creek RS = 620
.035
.045
.035
Elevation (m)
408.5
408.0
407.5
407.0
406.5
406.0
Station (m)
0
20
40
60
80
100
120
Legend
WS Hazel
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
Ground
Bank Sta
HEC-RAS Model
River = Nichol Drain 13 Reach = Creek RS = 600
.035
.045
.035
Elevation (m)
408.5
408.0
407.5
407.0
406.5
406.0
Station (m)
0
20
40
60
80
100
Legend
WS Hazel
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
Ground
Bank Sta
HEC-RAS Model
River = Nichol Drain 13 Reach = Creek RS = 580
.035
.045
.035
Elevation (m)
408.5
408.0
407.5
407.0
406.5
406.0
Station (m)
0
20
40
60
80
100
120
Legend
WS Hazel
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
Ground
Bank Sta


HEC-RAS Model
River = Nichol Drain 13 Reach = Creek RS = 560
.035
.045
.035
408.5
408.0
407.5
407.0
406.5
406.0
Elevation (m)
0
20
40
60
80
100
Station (m)
Legend
WS Hazel
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
Ground
Bank Sta
HEC-RAS Model
River = Nichol Drain 13 Reach = Creek RS = 540
.035
.045
.035
408.5
408.0
407.5
407.0
406.5
406.0
Elevation (m)
0
20
40
60
80
100
Station (m)
Legend
WS Hazel
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
Ground
Bank Sta
HEC-RAS Model
River = Nichol Drain 13 Reach = Creek RS = 520
.035
.045
.035
409.0
408.5
408.0
407.5
407.0
406.5
406.0
Elevation (m)
0
20
40
60
80
100
Station (m)
Legend
WS Hazel
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
Ground
Levee
Bank Sta
HEC-RAS Model
River = Nichol Drain 13 Reach = Creek RS = 500
.035
.045
.035
409.5
409.0
408.5
408.0
407.5
407.0
406.5
406.0
Elevation (m)
0
20
40
60
80
100
Station (m)
Legend
WS Hazel
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
Ground
Levee
Bank Sta



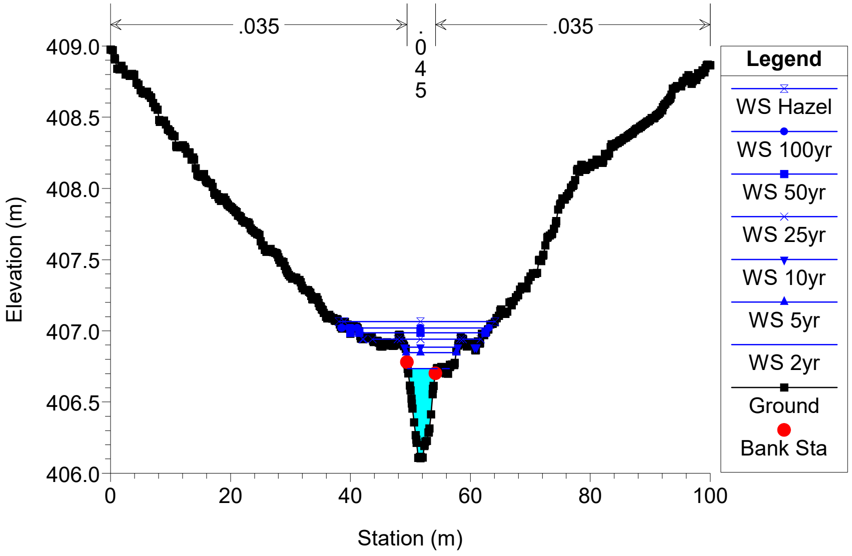
HEC-RAS Model

River = Nichol Drain 13 Reach = Creek RS = 480



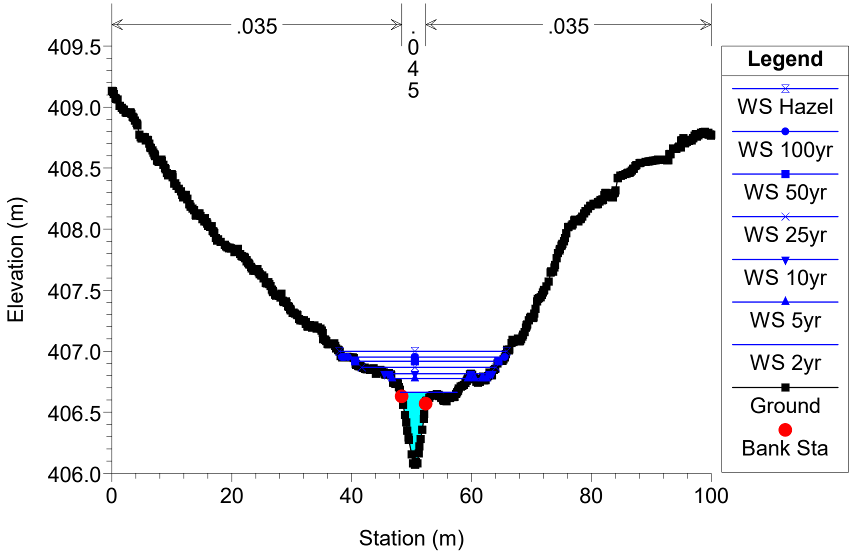
HEC-RAS Model

River = Nichol Drain 13 Reach = Creek RS = 460



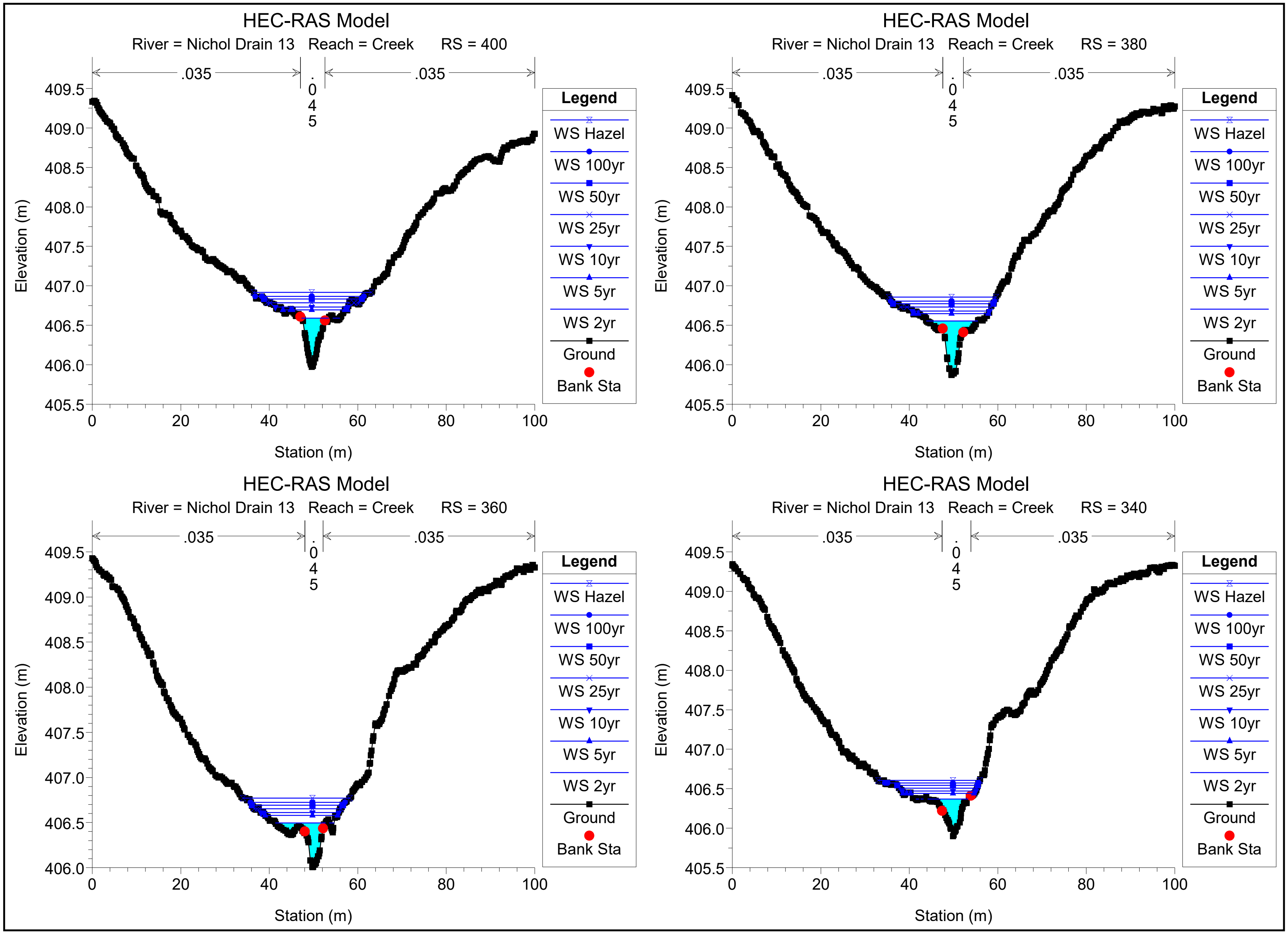
HEC-RAS Model

River = Nichol Drain 13 Reach = Creek RS = 440



HEC-RAS Model

River = Nichol Drain 13 Reach = Creek RS = 420

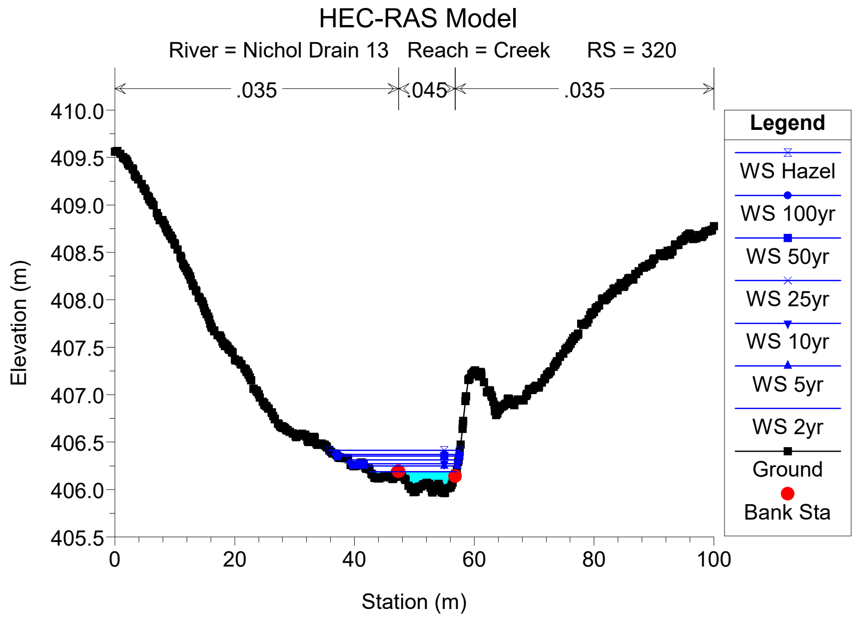


HEC-RAS Model
River = Nichol Drain 13 Reach = Creek RS = 400

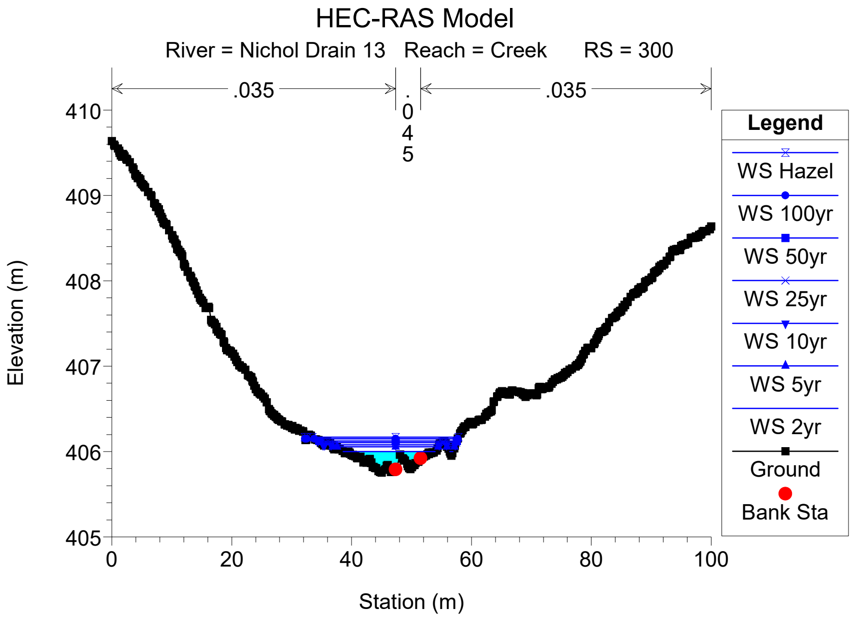
HEC-RAS Model
River = Nichol Drain 13 Reach = Creek RS = 380

HEC-RAS Model
River = Nichol Drain 13 Reach = Creek RS = 360

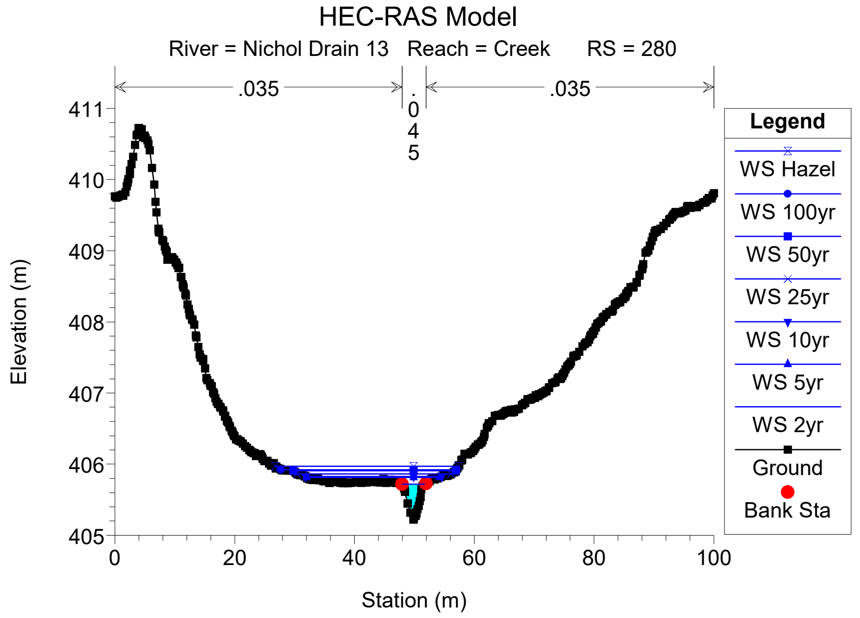
HEC-RAS Model
River = Nichol Drain 13 Reach = Creek RS = 340


HEC-RAS Model

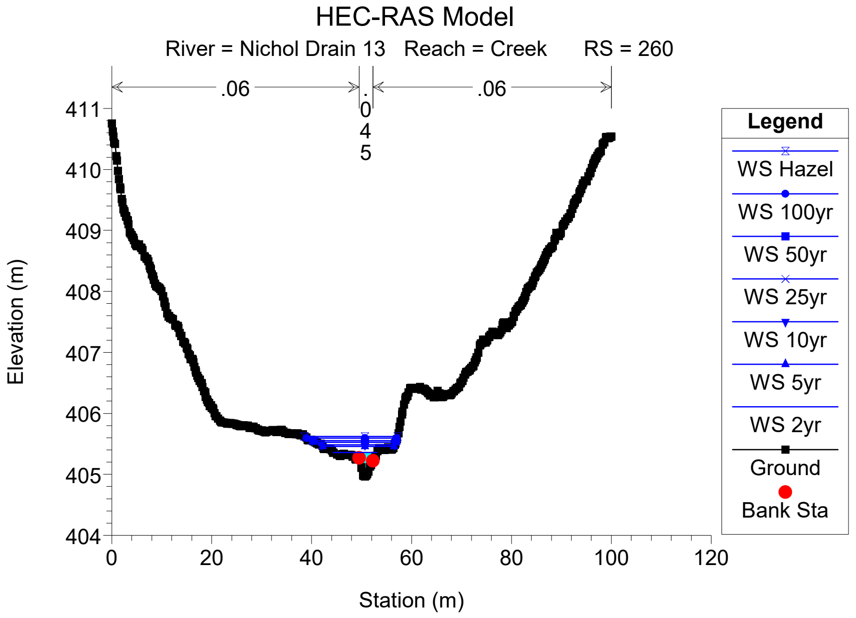
River = Nichol Drain 13 Reach = Creek RS = 320


HEC-RAS Model

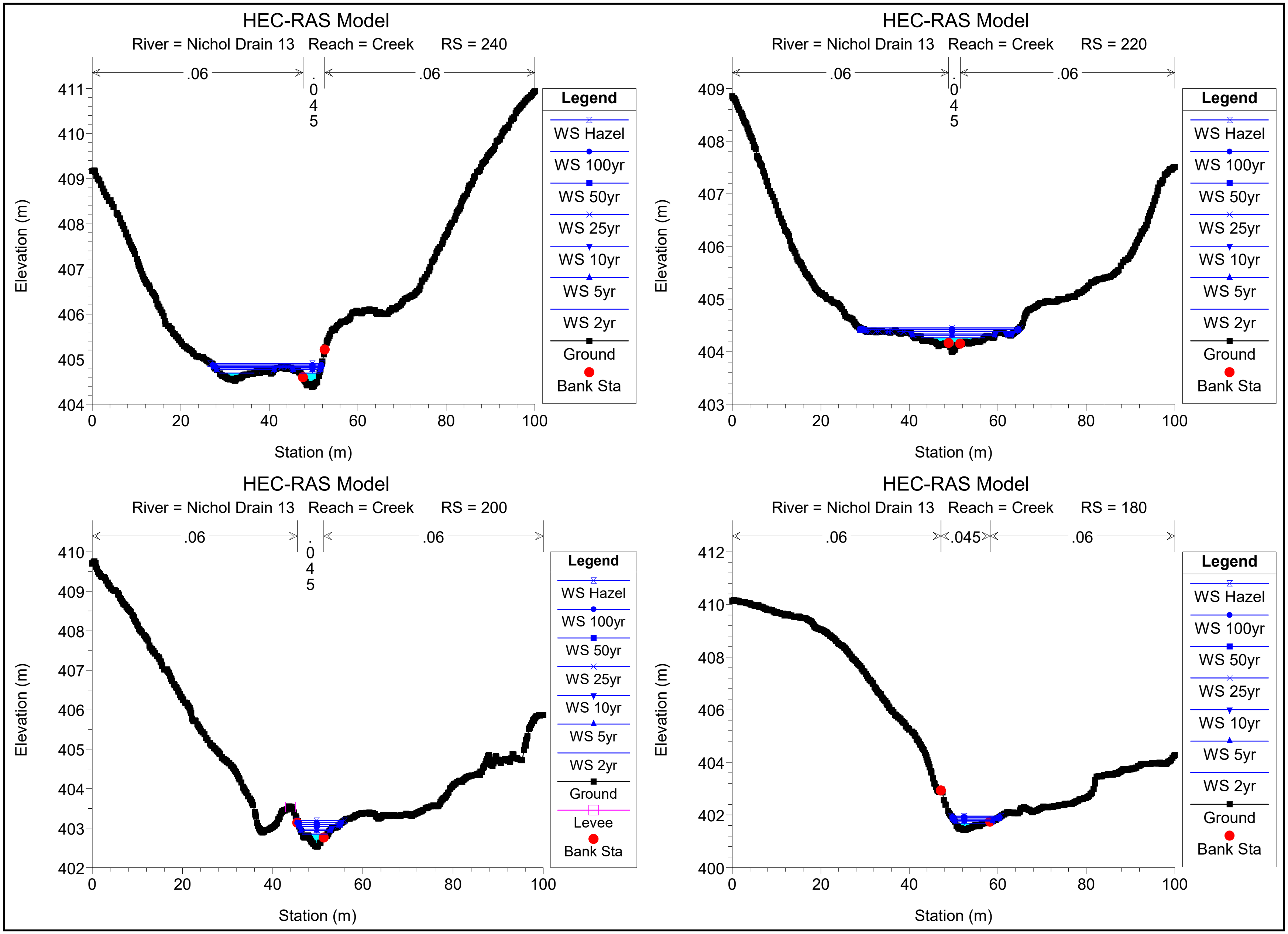
River = Nichol Drain 13 Reach = Creek RS = 300

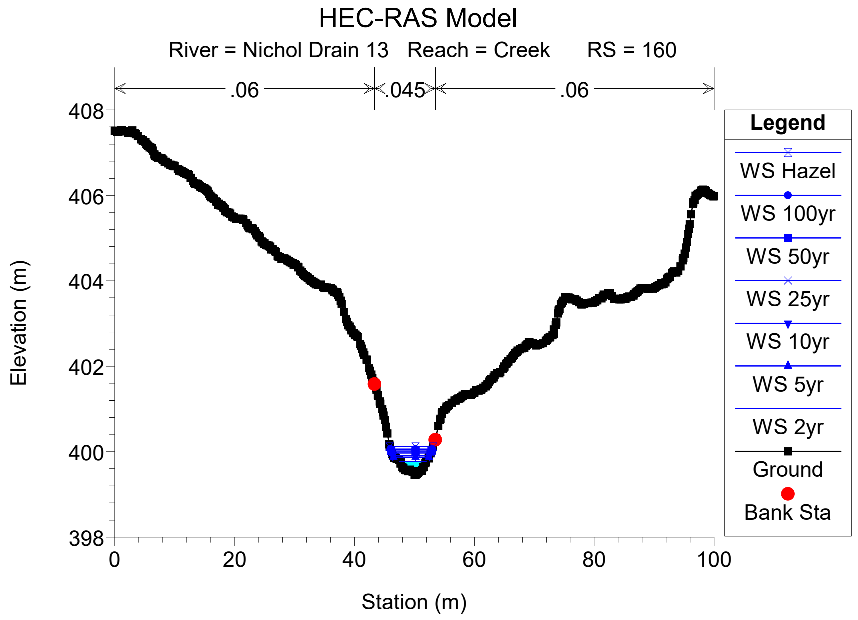

HEC-RAS Model

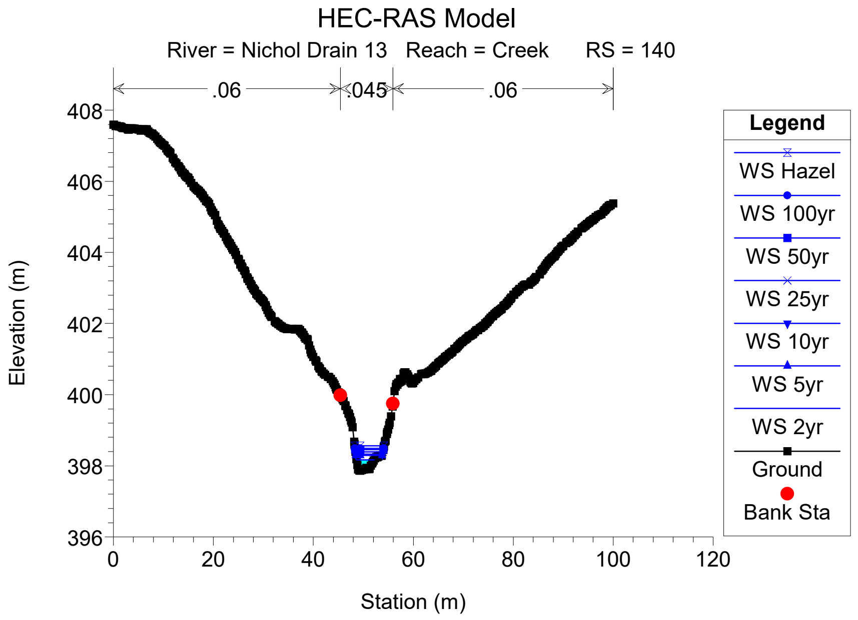
River = Nichol Drain 13 Reach = Creek RS = 280

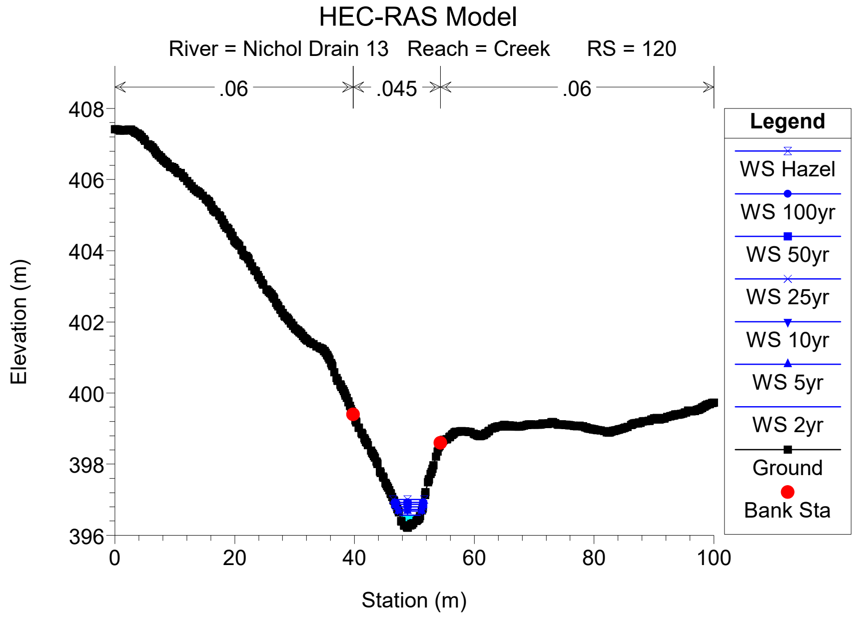

HEC-RAS Model

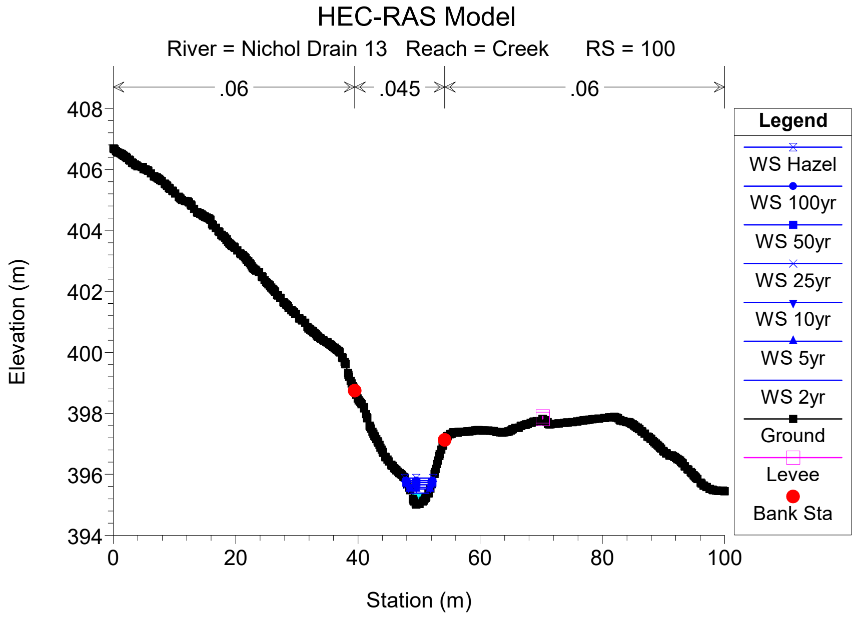
River = Nichol Drain 13 Reach = Creek RS = 260

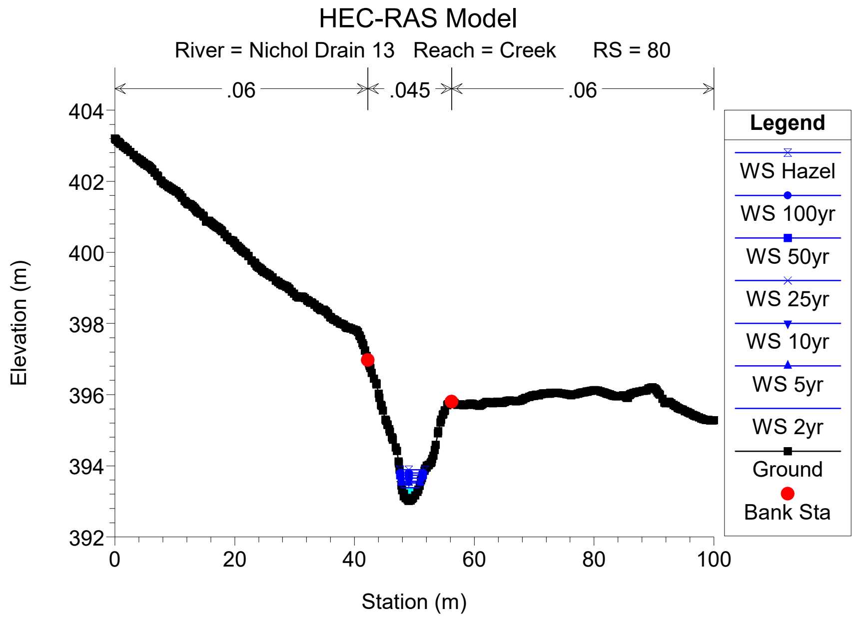

HEC-RAS Model
River = Nichol Drain 13 Reach = Creek RS = 240
.06
.045
.06
Elevation (m)
Station (m)
Legend
WS Hazel
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
Ground
Bank Sta
HEC-RAS Model
River = Nichol Drain 13 Reach = Creek RS = 220
.06
.045
.06
Elevation (m)
Station (m)
Legend
WS Hazel
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
Ground
Bank Sta
HEC-RAS Model
River = Nichol Drain 13 Reach = Creek RS = 200
.06
.045
.06
Elevation (m)
Station (m)
Legend
WS Hazel
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
Ground
Levee
Bank Sta
HEC-RAS Model
River = Nichol Drain 13 Reach = Creek RS = 180
.06
.045
.06
Elevation (m)
Station (m)
Legend
WS Hazel
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
Ground
Bank Sta


HEC-RAS Model
River = Nichol Drain 13 Reach = Creek RS = 160
.06
.045
.06
Elevation (m)
408
406
404
402
400
398
Station (m)
0
20
40
60
80
100
Legend
WS Hazel
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
Ground
Bank Sta


HEC-RAS Model
River = Nichol Drain 13 Reach = Creek RS = 140
.06
.045
.06
Elevation (m)
408
406
404
402
400
398
396
Station (m)
0
20
40
60
80
100
120
Legend
WS Hazel
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
Ground
Bank Sta

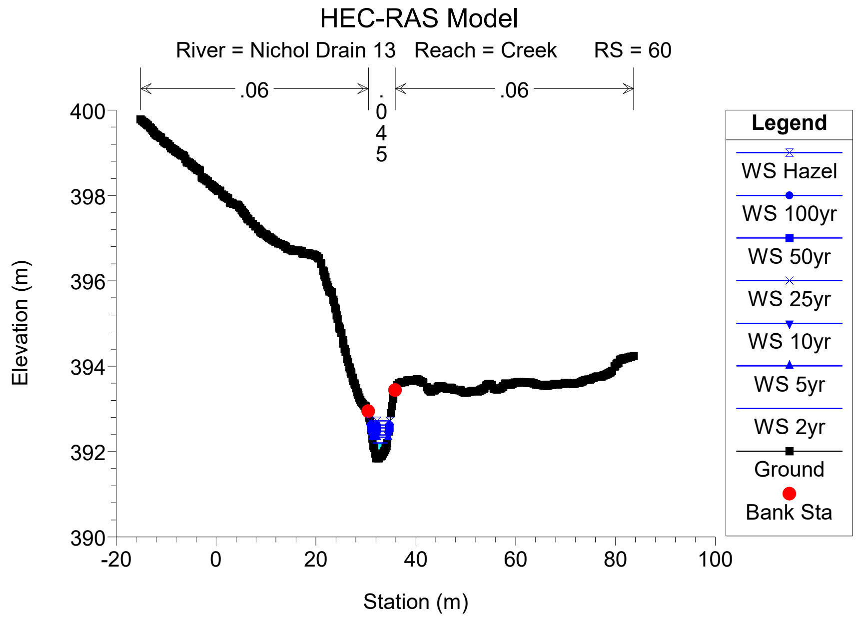

HEC-RAS Model
River = Nichol Drain 13 Reach = Creek RS = 120
.06
.045
.06
Elevation (m)
408
406
404
402
400
398
396
Station (m)
0
20
40
60
80
100
Legend
WS Hazel
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
Ground
Bank Sta


HEC-RAS Model
River = Nichol Drain 13 Reach = Creek RS = 100
.06
.045
.06
Elevation (m)
408
406
404
402
400
398
396
394
Station (m)
0
20
40
60
80
100
Legend
WS Hazel
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
Ground
Levee
Bank Sta



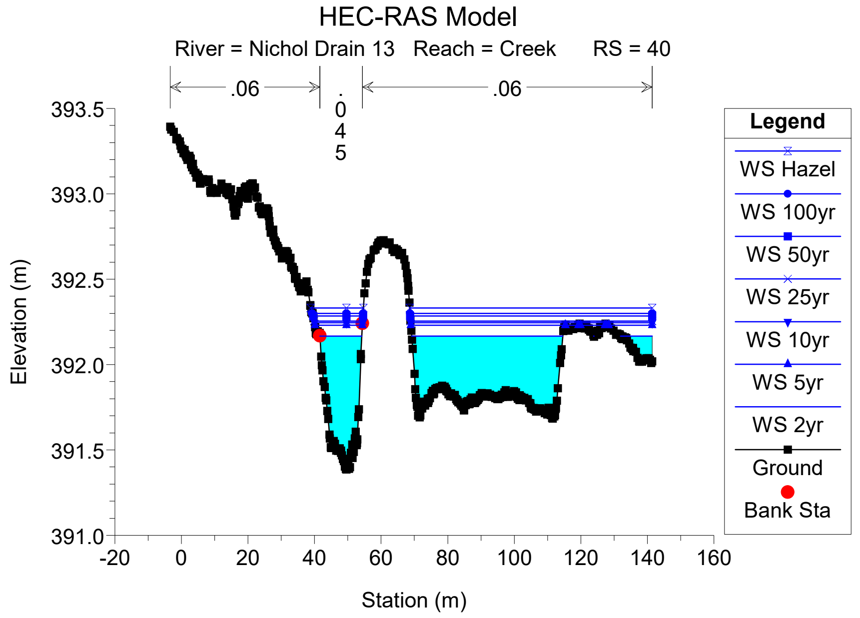
HEC-RAS Model

River = Nichol Drain 13 Reach = Creek RS = 80



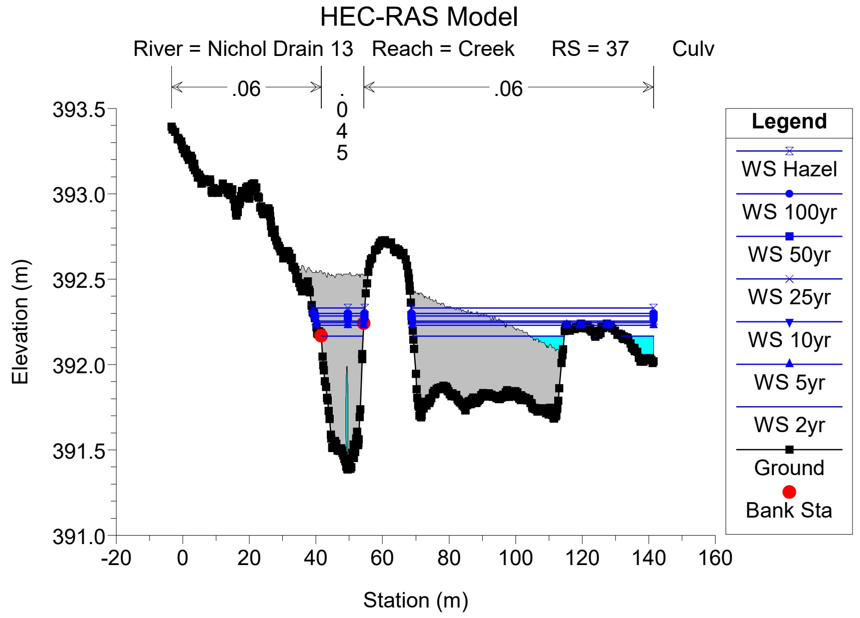
HEC-RAS Model

River = Nichol Drain 13 Reach = Creek RS = 60



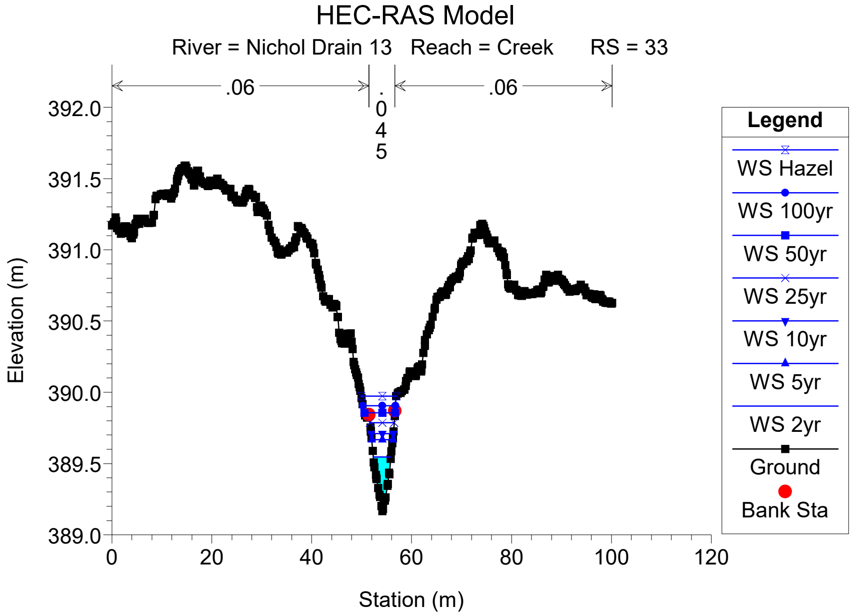
HEC-RAS Model

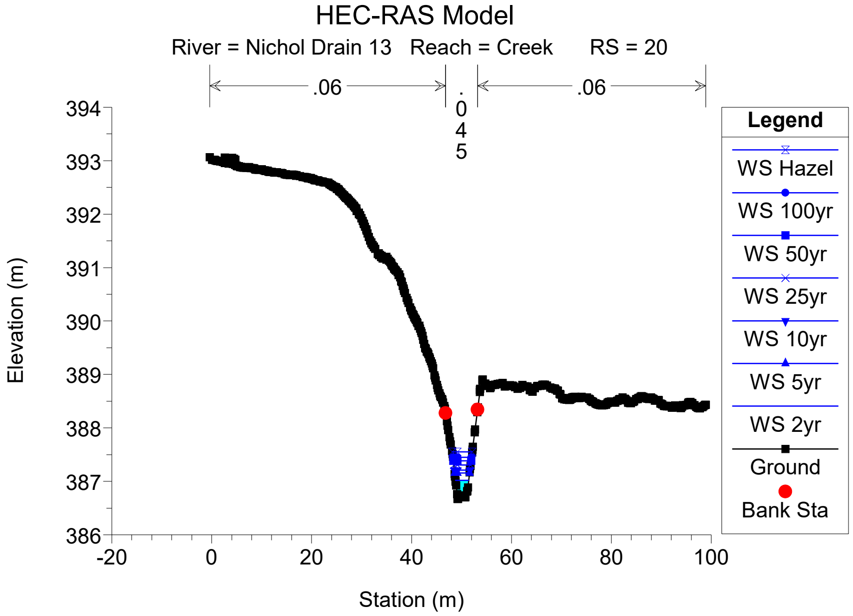
River = Nichol Drain 13 Reach = Creek RS = 40

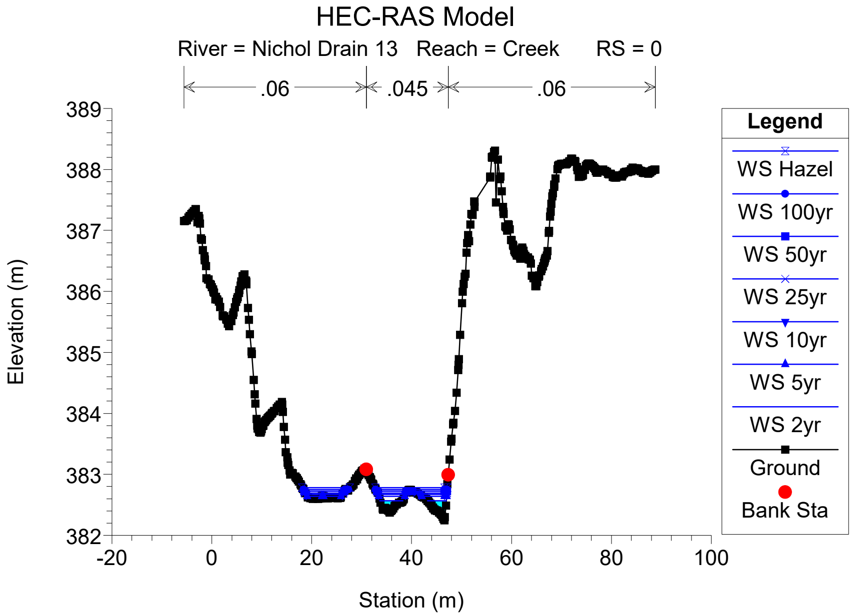


HEC-RAS Model

River = Nichol Drain 13 Reach = Creek RS = 37 Culv


HEC-RAS Model
River = Nichol Drain 13 Reach = Creek RS = 33
.06
.045
.06
392.0
391.5
391.0
390.5
390.0
389.5
389.0
Elevation (m)
0
20
40
60
80
100
120
Station (m)
Legend
WS Hazel
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
Ground
Bank Sta


HEC-RAS Model
River = Nichol Drain 13 Reach = Creek RS = 20
.06
.045
.06
394
393
392
391
390
389
388
387
386
Elevation (m)
-20
0
20
40
60
80
100
Station (m)
Legend
WS Hazel
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
Ground
Bank Sta


HEC-RAS Model
River = Nichol Drain 13 Reach = Creek RS = 0
.06
.045
.06
389
388
387
386
385
384
383
382
Elevation (m)
-20
0
20
40
60
80
100
Station (m)
Legend
WS Hazel
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
Ground
Bank Sta

Nichol Drain No. 13 Erosion Potential Summary from Proposed HEC-RAS model

Reach	River Station	Profile	Total Flow (m^3/s)			Channel Velocity (m/s)			Shear Stress in Channel (N/m2)		
			Existing	Proposed	Difference	Existing	Proposed	Difference	Existing	Proposed	Difference
Creek	880	2yr	1.22	1.08	-0.14	0.51	0.50	-0.01	6.82	6.67	-0.15
Creek	860	2yr	1.22	1.08	-0.14	0.53	0.52	-0.01	7.08	6.76	-0.32
Creek	840	2yr	1.22	1.08	-0.14	0.45	0.44	-0.01	4.98	4.70	-0.28
Creek	820	2yr	1.22	1.08	-0.14	0.36	0.34	-0.02	3.06	2.82	-0.24
Creek	800	2yr	1.22	1.08	-0.14	0.41	0.39	-0.02	3.96	3.68	-0.28
Creek	780	2yr	1.22	1.08	-0.14	0.56	0.55	-0.01	8.13	7.83	-0.30
Creek	760	2yr	1.22	1.08	-0.14	0.42	0.40	-0.02	4.23	3.96	-0.27
Creek	740	2yr	1.22	1.08	-0.14	0.42	0.40	-0.02	4.15	3.84	-0.31
Creek	720	2yr	1.22	1.08	-0.14	0.45	0.43	-0.02	4.94	4.61	-0.33
Creek	700	2yr	1.22	1.08	-0.14	0.35	0.33	-0.02	2.85	2.62	-0.23
Creek	680	2yr	1.22	1.08	-0.14	0.31	0.30	-0.01	2.26	2.04	-0.22
Creek	660	2yr	1.22	1.08	-0.14	0.51	0.49	-0.02	6.48	6.06	-0.42
Creek	640	2yr	1.22	1.08	-0.14	0.48	0.46	-0.02	5.74	5.29	-0.45
Creek	620	2yr	1.22	1.08	-0.14	0.54	0.52	-0.02	7.34	6.90	-0.44
Creek	600	2yr	1.22	1.08	-0.14	0.58	0.56	-0.02	8.54	8.01	-0.53
Creek	580	2yr	1.22	1.08	-0.14	0.47	0.45	-0.02	5.53	5.14	-0.39
Creek	560	2yr	1.22	1.08	-0.14	0.53	0.50	-0.03	7.02	6.49	-0.53
Creek	540	2yr	1.22	1.08	-0.14	0.66	0.64	-0.02	11.65	10.99	-0.66
Creek	520	2yr	1.22	1.08	-0.14	0.61	0.59	-0.02	9.89	9.21	-0.68
Creek	500	2yr	1.22	1.08	-0.14	0.85	0.81	-0.04	19.51	17.92	-1.59
Creek	480	2yr	1.22	1.08	-0.14	0.70	0.67	-0.03	12.95	11.82	-1.13
Creek	460	2yr	1.22	1.08	-0.14	0.69	0.65	-0.04	12.63	11.50	-1.13
Creek	440	2yr	1.22	1.08	-0.14	0.64	0.60	-0.04	11.16	10.11	-1.05
Creek	420	2yr	1.22	1.08	-0.14	0.72	0.70	-0.02	14.27	13.91	-0.36
Creek	400	2yr	1.22	1.08	-0.14	0.66	0.63	-0.03	12.53	11.43	-1.10
Creek	380	2yr	1.22	1.08	-0.14	0.50	0.47	-0.03	6.56	5.92	-0.64
Creek	360	2yr	1.22	1.08	-0.14	0.71	0.69	-0.02	14.65	14.24	-0.41
Creek	340	2yr	1.22	1.08	-0.14	0.76	0.73	-0.03	18.14	16.91	-1.23
Creek	320	2yr	1.22	1.08	-0.14	0.72	0.70	-0.02	19.12	18.09	-1.03
Creek	300	2yr	1.22	1.08	-0.14	0.53	0.52	-0.01	10.70	10.44	-0.26
Creek	280	2yr	1.22	1.08	-0.14	1.15	1.14	-0.01	41.29	40.91	-0.38

Nichol Drain No. 13 Erosion Potential Summary from Proposed HEC-RAS model

Reach	River Station	Profile	Total Flow (m^3/s)			Channel Velocity (m/s)			Shear Stress in Channel (N/m2)		
			Existing	Proposed	Difference	Existing	Proposed	Difference	Existing	Proposed	Difference
Creek	260	2yr	1.22	1.08	-0.14	1.35	1.27	-0.08	54.73	49.62	-5.11
Creek	240	2yr	1.22	1.08	-0.14	1.07	1.03	-0.04	37.36	35.26	-2.10
Creek	220	2yr	1.22	1.08	-0.14	1.22	1.18	-0.04	51.18	48.97	-2.21
Creek	200	2yr	1.22	1.08	-0.14	1.30	1.26	-0.04	58.75	57.04	-1.71
Creek	180	2yr	1.22	1.08	-0.14	1.20	1.17	-0.03	54.83	52.98	-1.85
Creek	160	2yr	1.22	1.08	-0.14	1.40	1.34	-0.06	67.15	63.23	-3.92
Creek	140	2yr	1.22	1.08	-0.14	1.49	1.44	-0.05	73.32	70.30	-3.02
Creek	120	2yr	1.22	1.08	-0.14	1.51	1.45	-0.06	74.74	70.35	-4.39
Creek	100	2yr	1.22	1.08	-0.14	1.59	1.55	-0.04	79.78	77.48	-2.30
Creek	80	2yr	1.22	1.08	-0.14	1.59	1.55	-0.04	80.41	78.42	-1.99
Creek	60	2yr	1.22	1.08	-0.14	1.61	1.55	-0.06	82.44	77.42	-5.02
Creek	40	2yr	1.22	1.08	-0.14	0.07	0.07	0.00	0.12	0.10	-0.02
Creek	37		Culvert	Culvert							0.00
Creek	33	2yr	1.22	1.08	-0.14	1.51	1.46	-0.05	74.80	71.62	-3.18
Creek	20	2yr	1.22	1.08	-0.14	1.64	1.59	-0.05	85.00	81.63	-3.37
Creek	0	2yr	1.22	1.08	-0.14	1.09	1.04	-0.05	46.79	43.37	-3.42