Groundwork Engineering Limited

# Tomlinson Group of Companies – PROPOSED ASPHALT PLANT

# Stormwater Management Design Brief

## 8205 COUNTY ROAD 2, NAPANEE, ONTARIO

Prepared for:
**Tomlinson Group**

Prepared by:
**Groundwork Engineering Limited**

Project No. GW-20019

Original Report Date
June 2020
Revised: December 2020

# Contents

## 1.0 Introduction

Groundwork Engineering Limited (GWEL) has been retained by R.W. Tomlinson (Owner) to prepare a Stormwater Management design brief to support a zoning bylaw amendment to allow for an asphalt plant on the site.

The site is a vacant lot that has been partially stripped down to bedrock. Areas not stripped remain heavily treed. The site is located at 8205 County Road 2, Napanee, which can be legally described as Part 2 of Lot 21 Concession 7, Town of Greater Napanee, County of Lennox and Addington.

## 2.0 Existing Site Conditions

The site topography is gently sloping from the north to the southwest. The site has an existing gravel access road along the west side. The access road is on a shared unopened road allowance. A drainage ditch on the east side of the access road outfalls to the roadside ditch parallel to Highway 2. A portion of the site bordering the existing quarry has been stripped down to bedrock and is being used to store excess material. The remainder of the site is heavily treed.

The site currently has no stormwater management. The stormwater runs naturally via sheet flow to three (3) different receiving points, the existing quarry to the north, the neighboring property to the west, and to a roadside ditch parallel to Highway 2 via a ditch along the entrance road. The site is located at a high point with little to no off-site drainage entering the site.

The adjoining quarry lands to the north have a stormwater management plan that includes quantity and quality control. The stormwater outlets to the roadside ditch along Palace Road. The plan is approved by the Ministry of Environment, Conservation and Parks (MECP) under an Environmental Compliance Approval (ECA) for Industrial Sewage Works (No. 1967-BPKLCB).

## 3.0 Stormwater Management

The report deals with the stormwater management for the developed portion of the property identified as an asphalt plant site only.

Post-development stormwater management protects receiving watercourses. Post-development stormwater flows must meet pre-development flows. The Quinte Conservation Authority (QCA) requires quantity and quality control. It is expected that the “enhanced” level (80%) Total Suspended Solids (TSS) removal will be achieved for all runoff from the newly developed portion of the site.

Using the MECP guidelines, the development has been designed to provide adequate stormwater management control and improve runoff quality. It is our goal to utilize grassed swales and a wet pond to reduce TSS and improve the runoff quality. The pond will use an orifice and a rectangular weir as Inlet Control Devices (ICD) to discharge stormwater at less than the controlled pre-development flow rate.

### 3.1 Pre-Development Drainage Areas

Existing stormwater drainage areas are illustrated in the Pre-development drainage area drawing provided in Appendix A. The existing site is divided into three (3) stormwater drainage areas with the neighboring property, the existing quarry to the north of the subject property, and a municipally owned drainage ditch located parallel to Highway 2 being the ultimate receiving course. The drainage areas were determined using 3D analysis of a topographical survey completed by GWEL and CRCA LiDAR data. The drainage areas are valid as of the date of the survey.

Pre-development drainage areas are illustrated in Appendix A.

Drainage area P-1 is approximately 0.64ha. P-1 accounts for the heavily wooded area to the west of the access road and conveys stormwater by sheet flow to the west property line and onto the neighboring property, this area will remain undeveloped.

Drainage area P-2 is approximately 3.87ha. P-2 encompasses a portion of the land east of the access road and conveys stormwater by sheet flow to the northwest corner of the property and into the existing quarry. There is a small portion of the adjacent property to the east that may drain to this area.

Drainage area P-3 is approximately 2.08ha. P-3 encompasses a portion of the land east of the access road and conveys stormwater by sheet flow to the southwest corner of the site and into an existing ditch that runs parallel to the access road for the quarry and ultimately drains into the ditch along Highway 2.

| Pre-Development Runoff Values ($m^3/s$) | | | | | |
|---|---|---|---|---|---|
| **Area** | **2-Year** | **5-Year** | **10-Year** | **25-Year** | **100-Year** |
| P-1 | 0.23 | 0.36 | 0.45 | 0.58 | 0.78 |
| P-2 | 0.35 | 0.50 | 0.59 | 0.72 | 0.92 |
| P-3 | 0.19 | 0.27 | 0.32 | 0.39 | 0.49 |

### 3.2 Post-Development Drainage Areas

During the design process QCA has been consulted on issues regarding post-development stormwater drainage area boundaries, TSS removal, and quantity and quality control. The site will be graded to ensure sheet flow towards the proposed swale and pond. A sketch of the proposed post-development drainage areas can be found in Appendix D.

Post-development area A-1 is 0.64ha and will consist of Pre-development area P-1. The area is heavily treed and will remain undeveloped.

Post-development area A-2 is 5.95ha and will consist of Pre-development areas P-2 and P-3. The site will be regraded so water will flow from the northern corner of the site to the southern corner where the pond will be located. Stormwater will be conveyed by sheet flow across the site where it will enter a flat-bottomed grassed swale, which will convey the flow directly into the pond. Perimeter swales will capture any sheet flow graded to the lot boundaries and direct to the southwest corner of the site.

### 3.3 Hydrologic & Hydraulic Modelling

The site was modelled using PC-SWMM (Version 7.3.3095) which is a hydrologic and hydraulic modelling software that uses EPA SWMM (Version 5.1.015). The software simulates the precipitation and runoff of watersheds.

#### 3.3.1 Design Storms

The SCS Type II storm was chosen as the design storm for this model. The storm provides a peak intensity suitable for sizing conveyance methods and provides rainfall volumes that are suitable for sizing storage elements.

PCSWMM utilizes the Watershed lag method to determine the time of concentration for each sub-catchment area. The Watershed lag method uses the flow length, maximum potential retention and average watershed slope to calculate the time of concentration.

The Ontario Ministry of Transportation (MTO) Intensity-Duration-Frequency curve lookup tool was used to determine the rainfall hyetographs for storm events between the 2-year and 100-year return periods. The resulting hyetographs were used to calculate the total runoff for the pre-development and post-development area. The IDF tables can be found in Appendix B.

Runoff coefficients were taken from the MECP Stormwater Design Manual. Gravel was treated as asphalt to account for potential paving in the future.

| Post-Development Unrestricted Runoff Values ($m^3/s$) | | | | | | |
|---|---|---|---|---|---|---|
| **Area** | **25mm 4hr-Chicago** | **2-Year** | **5-Year** | **10-Year** | **25-Year** | **100-Year** |
| A-1 | 0.06 | 0.23 | 0.36 | 0.45 | 0.58 | 0.78 |
| A-2 | 0.59 | 0.85 | 1.18 | 1.41 | 1.71 | 2.16 |

### 3.4 Stormwater Quantity Control

To achieve pre-development release rates the proposed development will restrict the release rate of stormwater runoff using an ICD. The pre-development release rate is calculated for a 2, 5, 25, and 100-year rainfall event. The storage pond is designed for retention of a 100-year rainfall event in accordance with common Best Management Practices (BMPs). The ICD will restrict the post-development release rates to 17% less than the pre-development release rates.

Stormwater leaving the wet pond will be controlled by a 300mm quality control orifice and a rectangular weir, for the quantity control. The orifice invert will be placed at the permanent pool elevation (122.20m). The orifice will control the 25mm, 2-year-10-year storms. The rectangular

weir will be set at the 10-year storm elevation (123.40m), and will control all storms greater than the 10-year storm. Calculations and a staged release summary from the orifice and weir can be found in Appendix C. The pond will have a permanent pool elevation of 122.20m, a maximum extended detention water level of 123.60 m and 0.3m of freeboard (123.90m). The proposed pond will provide a storage volume of 3259m$^3$ and a peak 100-year controlled flow rate of 416L/s.

The discharge from the orifice and weir will flow down a riprap lined slope and into the grassed roadside ditch parallel to the existing access road. For more detailed information on the planned lot grading and overall project stormwater drainage plan please refer to drawing C101 in the design drawing set provided in Appendix F.

| A-2 Post-Development Restricted Runoff and Storage (m$^3$/s) | | |
|---|---|---|
| **Storm** | **Release Rate** | **Storage (m$^3$)** |
| 25mm 4hr-Chicago | 0.11 | 908.2 |
| 2-Year | 0.157 | 1707.5 |
| 5-Year | 0.183 | 2366.8 |
| 10-Year | 0.215 | 2615.8 |
| 100-Year | 0.416 | 3259.01 |

### 3.5 Stormwater Quality Control

The quality requirements of “enhanced” 80% TSS removal will be achieved by using a wet pond. The pond was designed based on guidelines presented in MECP Stormwater Management Planning and Design Manual. Based on the MECP Design Manual the required storage volume per hectare is 250m$^3$ per hectare. The area of the site contributing to the pond is 5.95 ha, giving a required volume of 1487m$^3$.

To meet the MECP sizing guidelines and to reduce the release rate to less than pre-development flow rates, the pond has been over sized. The pond will provide a permanent pool storage volume of 1523m$^3$ and an active storage volume for the 25mm storm event of 908m$^3$. The pond will have an active storage for the 100-year storm event of 3259m$^3$. The maximum active storage height will be 1.4m with 0.3m of freeboard.

The pond’s sediment forebay is designed to have a 2 to 1 length to width ratio and a 1.5-meter-deep permanent pool. This allows rate of the runoff to be reduced and allows time for sediment to settle. The forebay and permanent pool are separated by a rock flow check dam. The dam encourages pooling and reduces sediment from entering the permanent pool. The bottom of the pond has a permanent pool depth of 1.5m. Vegetation around the pond has been selected from the MECP guidelines and will aid in erosion control of the pond edge and deter waterfowl from entering the pond.

The entire development will employ Best Management Practices (BMPs) wherever possible. The intent of implementing stormwater BMPs throughout the development is to ensure that

water quality and quantity concerns are addressed at all stages of development. BMPs will be implemented at the lot, conveyance and end of pipe levels.

Lot level BMPs include the minimizing of ground slopes and maintaining as much of the lot as possible in a natural state. Recent recommendations by a number of Conservation Authorities and the MECP suggest that yard grading as flat as 0.5% be implemented to promote infiltration. The target range for finished ground slopes is recommended as 1.5% - 3% where possible for ease of grading. This range of slope will provide a significant opportunity for the absorption and filtration process in order to achieve a “normal” level of TSS removal. The side slope of all swales and drainage ditches shall not exceed 3:1. Side slopes steeper than 3:1 are prone to erosion and are difficult to maintain. In addition, swales are to be built with minimum depth and slope to allow for the opportunity for filtration and settlement of total suspended solids in grassed swales.

The conveyance methods to be utilized on the newly developed site are overland sheet flow and grassed swales directing flows to the new wet pond. All swales will be constructed at minimal gradient where possible, thus promoting absorption infiltration, as well as providing opportunity for particle filtration. Prior to construction heavy duty silt fence is to be installed around the proposed development and a straw bale check dam is also to be installed at the existing drainage channel outlet.

## 4.0 Maintenance

Occasional inspection and routine maintenance will be required to be carried out during construction and throughout the life of the stormwater system. The stormwater swales and storage pond are on private property. It will be the responsibility of the contractor to carry out routine visual inspections of the swale and storage pond during construction.

Once vegetation is established it will be the responsibility of the owner to carry out maintenance and inspections. Inspection of the stormwater swales and storage pond should be completed after each significant storm event for the first two years with quarterly inspection from then on. Inspections should include checking for sediment build up and vegetation health. Sediment removal is to be included with regular maintenance as well as replanting of any failed vegetation. Sediment removal should occur every 10 years. This will aid in the long-term performance of the stormwater swales and retention pond. It is recommended that all drainage swales be kept clear of debris.

Shoreline vegetation shall be maintained in a healthy state with weeds being removed on a regular basis. The outlet control device (rectangular weir) shall be inspected for deterioration yearly and maintained in good condition.

## 5.0 Summary

The proposed development of 8205 County Road 2, Napanee, will provide the required stormwater management control of post-development flows to pre-development level for the 2-year to 100-year storm events. The plan will require the construction of a wet storage pond to

provide runoff storage, detention, and discharge control using an orifice and a rectangular weir as an ICD. The stormwater management plan will utilize sheet flow and drainage swales to provide additional quality control measures that will achieve an “enhanced” level of TSS removal for all runoff from the site. Construction of erosion protection and sediment control will eliminate sediment laden runoff from leaving the site until vegetation is restored.

**Report prepared by:**

Daniel Fox, Engineering Technologist


**Report Reviewed by:**

Martin Burger, M.Eng., P.Eng.

**Statement of Qualifications and Limitations**

The attached Report has been prepared by Groundwork Engineering Limited (the Consultant) for the benefit of the Client in accordance with their Agreement.

The information, data, recommendations and conclusions contained in the Report:

1. is subject to the scope, schedule, and other constraints and limitations in the Agreement and the qualifications contained in the Report;
2. represents the Consultant's judgement in light of the limitations and industry standards for the preparation of similar reports;
3. may be based on information provided to Consultant which has not been independently verified;
4. has not been updated since the date of issuance of the Report and its accuracy is limited to the time and circumstances in which it was prepared; and
5. Must be read as a whole and sections should not be read out of context.

The Consultant shall be entitled to rely upon the accuracy and completeness of information that was provided to it and has no obligation to update such information. Consultant accepts no responsibility for any events or circumstances that may have occurred since the date on which the Report was prepared.

Any estimates or opinions regarding expected construction costs or construction schedule provided by Consultant represent Consultant's judgement in light of its experience and the knowledge and information available to it at the time of preparation. The Consultant does not make any representations, with respect to such estimates or opinions, and accepts no responsibility for any loss or damage arising from them. Persons relying on such estimates or opinions do so at their own risk.

Except as agreed to in writing by the Consultant and the Client; as required by-law; or to the extent used by governmental reviewing agencies for the purpose of obtaining permits or approvals, the Report and the Information may be used and relied upon only by the Client.

The Consultant accepts no responsibility, to parties other than the Client who may obtain access to the Report or the information for any injury, loss or damage suffered by such parties arising from their use of, reliance upon, or decisions or actions based on the Report, except to the extent those parties have obtained the prior written consent of the Consultant to use and rely upon the Report and the information. Any injury, loss or damages arising from improper use of the Report shall be borne by the party making such use.

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# Appendix A

## Pre-Development Drainage Areas

UNNAMED STREET

NE CORNER OF PARK LOT 1 RP No. 81

PARK LOT 1

PARK LOT 2

PARK LOT 3

PARK LOT 4

PART 9
29R-7004(P4)

MAIN STREET
NO REGISTERED CLOSING BY-LAW

IB

SSIB (1174)

WIRE FENCE ON LINE

RP

RIB WIT (1174)

WIRE FENCE ON LINE

SSIB (1174)

P-1 0.64 ha 0.25

P-2 3.87 ha 0.25

P-3 2.08 ha 0.25

RIB (1174)

PART 2
29R-905(P2)

PIN 45116-0106(LT)

RP

EXISTING GRAVEL ACCESS ROAD

EXISTING ROADSIDE DITCH

RIB (1174)

IB

EXISTING CULVERT:
W INV: 120.92m
E INV: 120.90m

PART 1
29R-905(P2)

PIN 45116-0105(LT)

PART 2
29R-905(P2)

PIN 45116-0106(LT)

APPROXIMATE POSITION OF LOT LINE

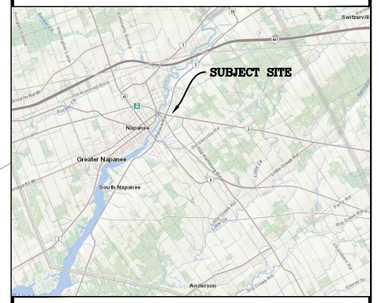
L O T 2 1

N W E S


Groundwork Engineering Limited

GEOTECHNICAL • CIVIL • STORMWATER • ONSITE WASTEWATER

UNIT 640 - 654 NORRIS COURT
KINGSTON, ONTARIO
OFFICE (613) 634-1789


LEGEND

| | |
|---|---|
| 2% | PROPOSED SLOPE |
| 84.19 | EXISTING GRADE |
| 83.65 | PROPOSED GRADE |
| | EXISTING CONTOUR |
| | DRAINAGE SWALE |

ALL EXISTING GRADES TAKEN FROM TOPO SURVEY

REVISIONS

| No. | Description | Date |
|---|---|---|
| #1 | ISSUED FOR SWM REPORT | 2020/06/24 |
| #2 | REVISED FOR SWM REPORT | 2020/12/16 |
| | | |
| | | |
| | | |

BENCHMARK:

| No. | DESCRIPTION | ELEVATION |
|---|---|---|
| ##. | XXX | XXX.XX |
| | | |
| | | |

LICENSED PROFESSIONAL ENGINEER
16 Dec 2020
M. H. BURGER
PROVINCE OF ONTARIO

Client / Land Owner:
TOMLINSON GROUP

Project:
NAPANEE ASPHALT PLANT
NAPANEE ONTARIO

Drawing Title:
PRE-DEVELOPMENT DRAINAGE AREAS

| | |
|---|---|
| Drawn by: DF | Project Number: GW-20019 |
| Checked By: MB | |
| Page Size: 24"x36" | Drawing Number: SK-PRE |
| Scale: 1:750 | |
| Date: JUNE 6, 2020 | SHEET 1 of 1 |

P:\Projects\20000\20019 – Tomlinson Asphalt Plant in Napanee\02 – Design\03 – Drawings\02 – Proposed Design (Nov. 2020)\GW – 20019 – Tomlinson Asphalt Plant.dwg
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# Appendix B

## MTO IDF Data

Ontario IDF CURVE LOOKUP

# Active coordinate

44° 15' 15" N, 76° 56' 15" W (44.254167,-76.937500)

Retrieved: Wed, 09 Jan 2019 18:19:21 GMT


## Location summary

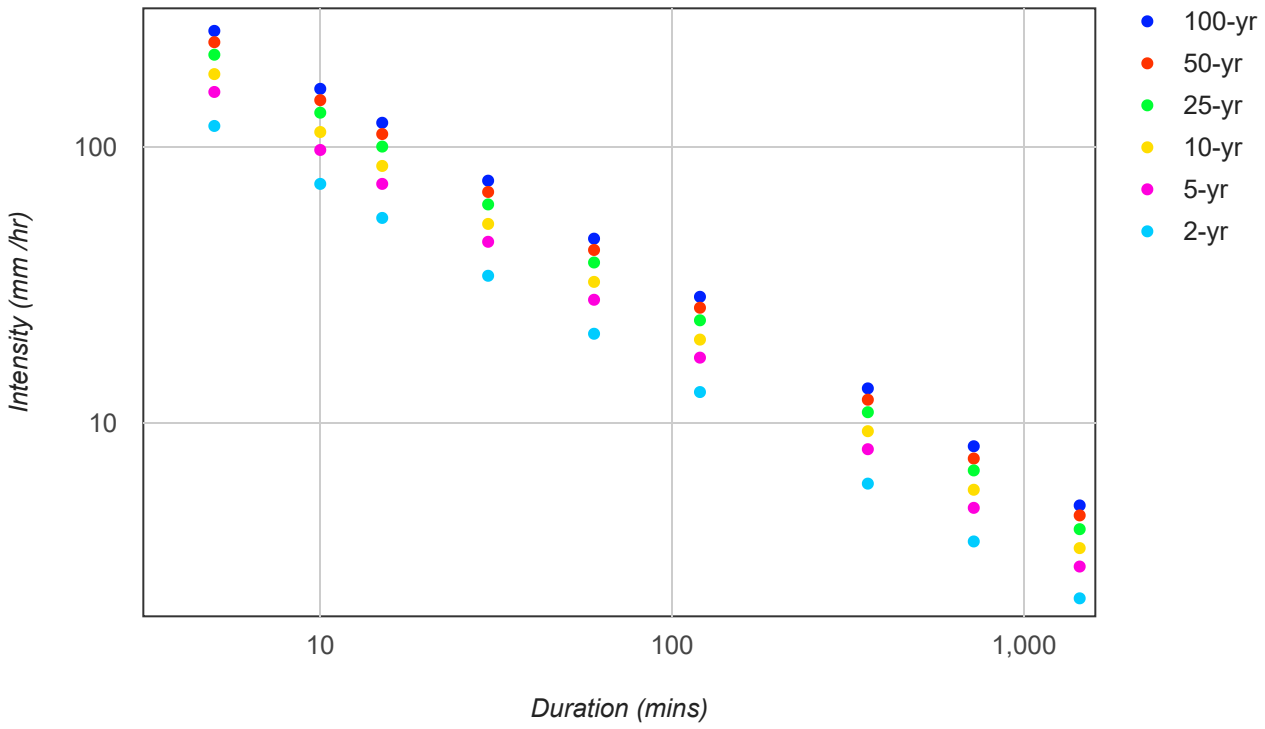
These are the locations in the selection.

**IDF Curve:** 44° 15' 15" N, 76° 56' 15" W (44.254167,-76.937500)

## Results

An IDF curve was found.

**Coordinate: 44.254167, -76.937500**
**IDF curve year: 2010**



## Coefficient summary

**IDF Curve:** 44° 15' 15" N, 76° 56' 15" W (44.254167,-76.937500)

Retrieved: Wed, 09 Jan 2019 18:19:21 GMT

**Data year:** 2010
**IDF curve year:** 2010

| Return period | 2-yr | 5-yr | 10-yr | 25-yr | 50-yr | 100-yr |
|---|---|---|---|---|---|---|
| **A** | 21.0 | 27.9 | 32.4 | 38.1 | 42.3 | 46.5 |
| **B** | -0.699 | -0.699 | -0.699 | -0.699 | -0.699 | -0.699 |

## Statistics

### Rainfall intensity (mm $hr^{-1}$)

| Duration | 5-min | 10-min | 15-min | 30-min | 1-hr | 2-hr | 6-hr | 12-hr | 24-hr |
|---|---|---|---|---|---|---|---|---|---|
| **2-yr** | 119.3 | 73.5 | 55.3 | 34.1 | 21.0 | 12.9 | 6.0 | 3.7 | 2.3 |
| **5-yr** | 158.5 | 97.6 | 73.5 | 45.3 | 27.9 | 17.2 | 8.0 | 4.9 | 3.0 |
| **10-yr** | 184.0 | 113.4 | 85.4 | 52.6 | 32.4 | 20.0 | 9.3 | 5.7 | 3.5 |
| **25-yr** | 216.4 | 133.3 | 100.4 | 61.9 | 38.1 | 23.5 | 10.9 | 6.7 | 4.1 |
| **50-yr** | 240.3 | 148.0 | 111.5 | 68.7 | 42.3 | 26.1 | 12.1 | 7.4 | 4.6 |
| **100-yr** | 264.1 | 162.7 | 122.5 | 75.5 | 46.5 | 28.6 | 13.3 | 8.2 | 5.0 |

### Rainfall depth (mm)

| Duration | 5-min | 10-min | 15-min | 30-min | 1-hr | 2-hr | 6-hr | 12-hr | 24-hr |
|---|---|---|---|---|---|---|---|---|---|
| **2-yr** | 9.9 | 12.2 | 13.8 | 17.0 | 21.0 | 25.9 | 36.0 | 44.4 | 54.7 |
| **5-yr** | 13.2 | 16.3 | 18.4 | 22.6 | 27.9 | 34.4 | 47.8 | 58.9 | 72.6 |
| **10-yr** | 15.3 | 18.9 | 21.3 | 26.3 | 32.4 | 39.9 | 55.6 | 68.5 | 84.3 |
| **25-yr** | 18.0 | 22.2 | 25.1 | 30.9 | 38.1 | 46.9 | 65.3 | 80.5 | 99.2 |
| **50-yr** | 20.0 | 24.7 | 27.9 | 34.3 | 42.3 | 52.1 | 72.5 | 89.4 | 110.1 |
| **100-yr** | 22.0 | 27.1 | 30.6 | 37.7 | 46.5 | 57.3 | 79.7 | 98.2 | 121.0 |

## Terms of Use

Groundwork Engineering Limited

# Appendix C

## Stormwater Management Calculation Sheets

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# Stormwater Wetpond Design Calculation

| | | | |
|---|---|---|---|
| Project Name : | Napanee Asphalt Plant | Project Number: | GW-20019 |
| Project Address : | 8205 Highway 2, Napanee | Clients Name : | Tomlinson Group |
| Prepared By: | Daniel Fox | Reviewed By: | Martin Burger |

## Sediment Forebay Design

### Calculation Variables

| | |
|---|---|
| 2 | r = Length to Width Ratio |
| 0.52 | $Q_p$ = Peak Flow Rate For Design Storm (10Yr Storm) |
| 0.0003 | $V_s$ = Settling Velocity (0.0003 m/s) |
| 0.55 | Q = Inlet Flow Rate($m^3$/s) (25mm Storm) |
| 1.5 | d = Depth of Permanent Pool (m) |
| 0.4 | $V_f$ = Desired Forebay Velocity (m/s) |

### Settling Calculation

$$Dist = \sqrt{\frac{r Q_p}{V_s}}$$

r= 2
$Q_p$ = 0.52
$V_s$ = 0.0003

| | | |
|---|---|---|
| Settling Length | 58.88 | m |

### Dispersion Length

$$Dist = \frac{8Q}{dV_f}$$

Q = 0.55
d = 1.5
$V_f$ = 0.4

| | | |
|---|---|---|
| Dispersion Length | 7.33 | m |

### Minimum Forebay Width

$$Width = \frac{Dist}{8}$$

Dist= 58.88

| | | |
|---|---|---|
| Forebay Deep Zone Width | 7.36 | m |

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# Stormwater Wetpond Design Calculation

| | | | |
|---|---|---|---|
| Project Name : | Napanee Asphalt Plant | Project Number: | GW-20019 |
| Project Address : | 8205 Highway 2, Napanee | Clients Name : | Tomlinson Group |
| Prepared By: | Daniel Fox | Reviewed By: | Martin Burger |

## Storage Requirements

| | |
|---|---|
| Enhanced 80% | Required TSS Removal |
| Wetpond | SWMP Type |
| 0.85 | Impervious Level |
| 5.95 ha | Site Area In Hectares |
| 250 $m^3$ | Required Storage Volume Per Hectare From Table |

| Water Quality Storage Requirements | | | | | |
|---|---|---|---|---|---|
| | | 35% | 55% | 70% | 85% |
| Enhanced 80% | Infiltration | 25 | 30 | 35 | 40 |
| | Wetlands | 80 | 105 | 120 | 140 |
| | Hybrid Wet Pond/Wetland | 110 | 150 | 175 | 195 |
| | Wetpond | 140 | 190 | 225 | 250 |
| Normal 70% | Infiltration | 20 | 20 | 25 | 30 |
| | Wetlands | 60 | 70 | 80 | 90 |
| | Hybrid Wet Pond/Wetland | 75 | 90 | 105 | 120 |
| | Wetpond | 90 | 110 | 130 | 150 |
| Basic 60% | Infiltration | 20 | 20 | 20 | 20 |
| | Wetlands | 60 | 60 | 60 | 60 |
| | Hybrid Wet Pond/Wetland | 60 | 70 | 75 | 80 |
| | Wetpond | 60 | 75 | 85 | 95 |
| | Dry Pond | 90 | 150 | 200 | 240 |

| | |
|---|---|
| Required Volume | 1487.5 $m^3$ |
| Permanent Pool Volume | 1249.5 $m^3$ |
| Active Storage Volume | 238 $m^3$ |

# Stage Storage Discharge

| Water Surface Elevation (m) | Area (m2) | Incremental Depth (m) | Intremental Volume (m3) | Total Volume (m3) | Quality Control Orifice diameter | Invert of Orifice Elevation | Centerline of Orifice Elevation (m) | Head Loss Across Orifice (m) | Release Rate | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| 122.20 | 0 | 0.05 | 0 | 0 | 0.30 | 122.20 | 122.350 | 0 | 0.000 | orifice |
| 122.25 | 1654.66 | 0.05 | 82.73 | 82.73 | 0.30 | 122.20 | 122.350 | -0.10 | #NUM! | orifice |
| 122.30 | 1617.55 | 0.05 | 80.88 | 163.61 | 0.30 | 122.20 | 122.350 | -0.05 | #NUM! | orifice |
| 122.35 | 1670.84 | 0.05 | 83.54 | 247.15 | 0.30 | 122.20 | 122.350 | 0.00 | 0.0000 | orifice |
| 122.40 | 1724.52 | 0.05 | 86.23 | 333.38 | 0.30 | 122.20 | 122.350 | 0.05 | 0.0420 | orifice |
| 122.45 | 1778.59 | 0.05 | 88.93 | 422.31 | 0.30 | 122.20 | 122.350 | 0.10 | 0.0594 | orifice |
| 122.50 | 1833.05 | 0.05 | 91.65 | 513.96 | 0.30 | 122.20 | 122.350 | 0.15 | 0.0728 | orifice |
| 122.55 | 1887.91 | 0.05 | 94.40 | 608.36 | 0.30 | 122.20 | 122.350 | 0.20 | 0.0840 | orifice |
| 122.60 | 1943.16 | 0.05 | 97.16 | 705.51 | 0.30 | 122.20 | 122.350 | 0.25 | 0.094 | orifice |
| 122.65 | 1998.79 | 0.05 | 99.94 | 805.45 | 0.30 | 122.20 | 122.350 | 0.30 | 0.103 | orifice |
| 122.70 | 2054.83 | 0.05 | 102.74 | 908.20 | 0.30 | 122.20 | 122.350 | 0.35 | 0.111 25mm | orifice |
| 122.75 | 2111.26 | 0.05 | 105.56 | 1013.76 | 0.30 | 122.20 | 122.350 | 0.40 | 0.119 | orifice |
| 122.80 | 2168.07 | 0.05 | 108.40 | 1122.16 | 0.30 | 122.20 | 122.350 | 0.45 | 0.126 | orifice |
| 122.85 | 2225.29 | 0.05 | 111.26 | 1233.43 | 0.30 | 122.20 | 122.350 | 0.50 | 0.133 | orifice |
| 122.90 | 2282.89 | 0.05 | 114.14 | 1347.57 | 0.30 | 122.20 | 122.350 | 0.55 | 0.139 | orifice |
| 122.95 | 2340.89 | 0.05 | 117.04 | 1464.62 | 0.30 | 122.20 | 122.350 | 0.60 | 0.146 | orifice |
| 123.00 | 2399.28 | 0.05 | 119.96 | 1584.58 | 0.30 | 122.20 | 122.350 | 0.65 | 0.151 | orifice |
| 123.05 | 2458.06 | 0.05 | 122.90 | 1707.48 | 0.30 | 122.20 | 122.350 | 0.70 | 0.157 2-YEAR | orifice |
| 123.10 | 2517.23 | 0.05 | 125.86 | 1833.34 | 0.30 | 122.20 | 122.350 | 0.75 | 0.163 | orifice |
| 123.15 | 2576.8 | 0.05 | 128.84 | 1962.18 | 0.30 | 122.20 | 122.350 | 0.80 | 0.168 | orifice |
| 123.20 | 2636.76 | 0.05 | 131.84 | 2094.02 | 0.30 | 122.20 | 122.350 | 0.85 | 0.173 | orifice |
| 123.25 | 2697.12 | 0.05 | 134.86 | 2228.88 | 0.30 | 122.20 | 122.350 | 0.90 | 0.178 | orifice |
| 123.30 | 2757.86 | 0.05 | 137.89 | 2366.77 | 0.30 | 122.20 | 122.350 | 0.95 | 0.183 5-Year | orifice |
| 123.35 | 2818.99 | 0.05 | 140.95 | 2507.72 | 0.30 | 122.20 | 122.350 | 1.00 | 0.188 | orifice |
| 123.40 | 2880.53 | 0.05 | 144.03 | 2651.75 | 0.30 | 122.20 | 122.350 | 1.05 | 0.215 10-YEAR | orifice |
| 123.45 | 2942.46 | 0.05 | 147.12 | 2798.87 | 0.30 | 122.20 | 122.350 | 1.10 | 0.220 | Orifice and weir |
| 123.50 | 3004.77 | 0.05 | 150.24 | 2949.11 | 0.30 | 122.20 | 122.350 | 1.15 | 0.265 | Orifice and weir |
| 123.55 | 3067.48 | 0.05 | 153.37 | 3102.48 | 0.30 | 122.20 | 122.350 | 1.20 | 0.323 | Orifice and weir |
| 123.60 | 3130.58 | 0.05 | 156.53 | 3259.01 | 0.30 | 122.20 | 122.350 | 1.25 | 0.416 100-YEAR | Orifice and weir |

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# Appendix D

## Post-Development Drainage Areas

UNNAMED STREET

NE CORNER OF PARK LOT 1 RP No. 81

IB

SSIB (1174)

WIRE FENCE ON LINE

RP

RIB WIT (1174)

WIRE FENCE ON LINE

SSIB (1174)

GRASSED SWALE

PARK LOT 1

PART 9
29R-7004(P4)

A-1 0.64 ha 0.25

RIB (1174)

RAP Stockpile

Site Office/ Lab

Feed Bins

Conceptual Asphalt Plant

Aggregate Stockpiles

PART 2
29R-905(P2)

PIN 45116-0106(LT)

A-2 5.95 ha 0.90

FLAT-BOTTOMED GRASS SWALE

PARK LOT 2

RP

MAIN STREET

NO REGISTERED CLOSING BY-LAW

PROPOSED POND

RIB (1174)

PARK LOT 3

EXISTING CULVERT:
W INV: 120.92m
E INV: 120.90m

IB

EXISTING ROADSIDE DITCH

EXISTING ACCESS ROAD

PART 2
29R-905(P2)

PIN 45116-0106(LT)

APPROXIMATE POSITION OF LOT LINE

PART 1
29R-905(P2)

PIN 45116-0105(LT)

PARK LOT 4

L O T 2 1

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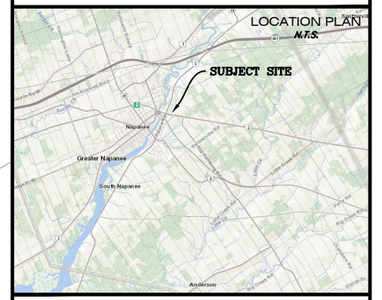
UNIT 640 - 654 NORRIS COURT
KINGSTON, ONTARIO
OFFICE (613) 634-1789

LOCATION PLAN
N.T.S.




LEGEND

| | |
|---|---|
| 2% | PROPOSED SLOPE |
| 84.19 | EXISTING GRADE |
| 83.65 | PROPOSED GRADE |
| | EXISTING CONTOUR |
| | DRAINAGE SWALE |

ALL EXISTING GRADES TAKEN FROM TOPO SURVEY

REVISIONS

| No. | Description | Date |
|---|---|---|
| #1 | ISSUED FOR SWM REPORT | 2020/06/24 |
| #2 | REVISED FOR SWM REPORT | 2020/12/16 |
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BENCHMARK:

| No. | DESCRIPTION | ELEVATION |
|---|---|---|
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| | | |

LICENSED PROFESSIONAL ENGINEER
16 Dec 2020
M. H. BURGER
PROVINCE OF ONTARIO

Client / Land Owner:
TOMLINSON GROUP

Project:
NAPANEE ASPHALT PLANT

NAPANEE ONTARIO

Drawing Title:
POST DEVELOPMENT DRAINAGE AREAS

Drawn by: DF
Checked By: MB
Page Size: 24"x36"
Scale: 1:750
Date: JUNE 6, 2020

Project Number: GW-20019
Drawing Number: SK-POST
SHEET 1 of 1

P:\Projects\20000\20019 - Tomlinson Asphalt Plant in Napanee\02 - Design\03 - Drawings\02 - Proposed Design (Nov. 2020)\GW - 20019 - Tomlinson Asphalt Plant.dwg
12/16/2020 4:15 PM

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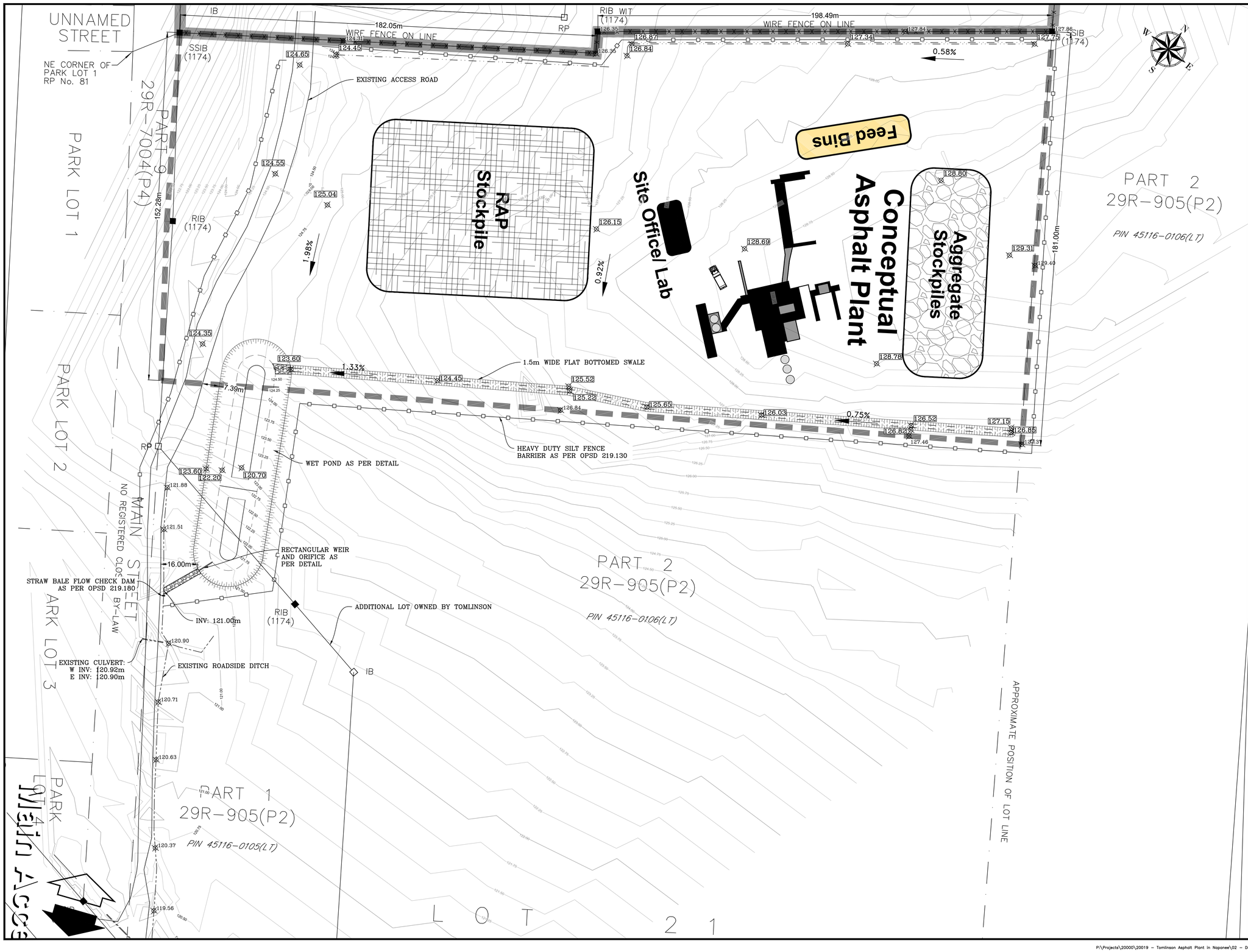
# Appendix E

## Design Drawing Set





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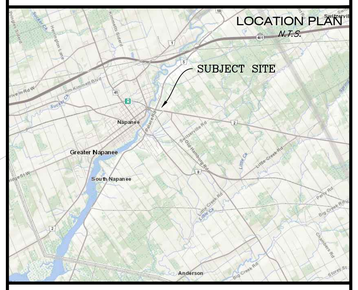


LEGEND

| | |
|---|---|
| 2% | PROPOSED SLOPE |
| 84.19 | EXISTING GRADE |
| 83.65 | PROPOSED GRADE |
| | EXISTING CONTOUR |
| | DRAINAGE SWALE |

ALL EXISTING GRADES TAKEN FROM TOPO SURVEY

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BENCHMARK:

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| | | |

LICENSED PROFESSIONAL ENGINEER
16 Dec 2020
M. H. BURGER
PROVINCE OF ONTARIO

Client / Land Owner:

TOMLINSON GROUP

Project:

NAPANEE ASPHALT PLANT

NAPANEE ONTARIO

Drawing Title:

SITE PLAN

Drawn by: DF
Checked By: MB
Page Size: 24"x36"
Scale: 1:750
Date: JUNE 6, 2020

Project Number: GW-20019

Drawing Number: C-101

SHEET 1 of 2

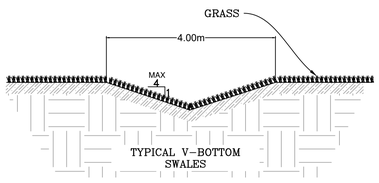
GENERAL NOTES:

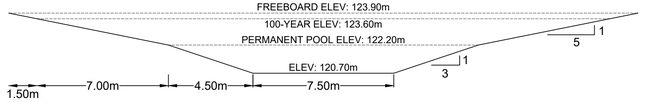
1. THE ORIGINAL TOPOGRAPHY AND GROUND ELEVATIONS, SERVICING AND SURVEY DATA SHOWN ON THIS PLAN ARE SUPPLIED FOR INFORMATION PURPOSES ONLY. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE ACCURACY OF ALL INFORMATION OBTAINED FROM THESE PLANS. ALL DIMENSIONS AND INVERTS MUST BE VERIFIED PRIOR TO CONSTRUCTION. IF THERE IS ANY DISCREPANCY THE CONTRACTOR IS TO NOTIFY THE ENGINEER PROMPTLY.
2. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE EXACT LOCATION, SIZE, MATERIAL AND ELEVATIONS OF ALL EXISTING UTILITIES PRIOR TO COMMENCING CONSTRUCTION. PROTECT AND ASSUME ALL RESPONSIBILITY FOR EXISTING UTILITIES WHETHER OR NOT SHOWN ON THE DRAWINGS. IF THERE ARE ANY DISCREPANCIES THE CONTRACTOR IS TO NOTIFY THE ENGINEER PROMPTLY. GAS, HYDRO, CABLE, TELEPHONE, OR ANY OTHER UTILITY THAT MAY EXIST ON SITE MUST BE LOCATED BY ITS OWN UTILITIES AND VERIFIED.
3. ALL UNDERGROUND SERVICES, MATERIALS AND INSTALLATIONS TO BE IN ACCORDANCE WITH ONTARIO PROVINCIAL STANDARDS AND SPECIFICATIONS UNLESS OTHERWISE STATED (OPSS).
4. ALL DISTURBED AREAS TO BE RESTORED TO ORIGINAL CONDITION OR BETTER UNLESS OTHERWISE SPECIFIED. ANY GRASSED AREAS DISTURBED ARE TO BE REINSTATED WITH MINIMUM 100MM TOPSOIL AND SEED.
5. THE CONTRACTOR IS RESPONSIBLE FOR ALL LAYOUT FOR CONSTRUCTION PURPOSES.
6. TREES DESIGNATED BY THE ENGINEER MUST BE PROTECTED AND MAINTAINED DURING CONSTRUCTION.
7. CONTRACTOR TO OBTAIN AND PAY FOR ALL NECESSARY PERMITS FROM THE COUNTY, MUNICIPALITY AND/OR CONSERVATION AUTHORITY PRIOR TO COMMENCING CONSTRUCTION.
8. CONTRACTOR TO PROVIDE SHOP DRAWINGS FOR REVIEW AND APPROVAL.
9. GRADES TO MATCH ADJACENT PROPERTIES AT PROPERTY LINE.
10. SLOPES IN LANDSCAPED AREAS SHALL NOT EXCEED 3:1 (3 HORIZONTAL TO 1 VERTICAL).
11. RIP RAP TO HAVE A MINIMUM DEPTH OF 0.30M AND TO BE MADE OF OF STONE 150MM–300MM, NO FINES. RIP RAP TO BE PLACED ON NON–WOVEN GEOTEXTILE (TEARAFIX 270R) OR EQUIVALENT
17. ALL SEWER TRENCHING AND BEDDING SHALL CONFORM TO OPSD 802.010 AND 802.013 UNLESS NOTED OTHERWISE.
18. BEDDING SHALL BE A MINIMUM 150MM OF GRANULAR "A", COMPACTED TO MINIMUM 98% STANDARD PROCTOR DRY DENSITY. CLEAR STONE BEDDING SHALL NOT BE PERMITTED.
19. SUB–BEDDING, IF REQUIRED SHALL BE AS PER THE DIRECTION OF GEOTECHNICAL ENGINEER
20. BACKFILL TO AT LEAST 300MM ABOVE TOP OF PIPE WITH GRANULAR "A".
21. TO MINIMIZE DIFFERENTIAL FROST HEAVING, TRENCH BACKFILL (FROM PAVEMENT SUBGRADE TO 2 METRES BELOW FINISHED GRADE) SHALL MATCH EXISTING SOIL CONDITIONS.
22. STORM SEWERS MANHOLES AND CATCH BASIN GRATES AND FRAMES TO CONFORM TO OPSS MUNI 1850.
23. DITCH INLET CATCH BASIN AS PER OPSD 705.040 TYPE A WITH 4H:1V GRATE.

ENVIRONMENTAL

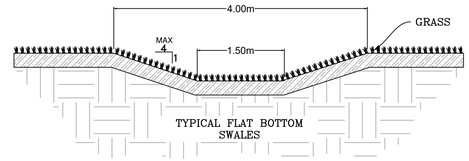
24. EROSION AND SEDIMENT CONTROLS SHALL BE INSTALLED PRIOR TO CONSTRUCTION AND MONITORED AND MAINTAINED BY THE CONTRACTOR UNTIL COMPLETION. THE TEMPORARY SEDIMENT AND EROSION CONTROL MEASURES MUST BE REMOVED ONCE THE SITE HAS BEEN STABILIZED AND SITE WORKS COMPLETED.
25. REGARDLESS OF SITE SPECIFIC ITEMS DETAILED ON THE PLANS, THE CONTRACTOR SHALL INSTALL EROSION CONTROL MEASURES TO SUIT THE PROPOSED WORK METHODS TO CONTROL SEDIMENT FROM RUNNING OFF THE SITE OR INTO WATER BEARING FEATURES PRIOR TO ANY DISTURBANCE. FOLLOWING CONSTRUCTION, DISTURBED AREAS, AS WELL AS PROPOSED GRASSED AND VEGETATED SURFACES SHALL BE REINSTATED.
26. IN THE EVENT THAT HUMAN REMAINS ARE ENCOUNTERED DURING CONSTRUCTION, THE MINISTRY OF CITIZENSHIP, CULTURE AND RECREATION SHALL BE NOTIFIED IMMEDIATELY AND THE REGISTRAR OR DEPUTY REGISTRAR OF THE CEMETARIES REGULATION UNIT OF THE MINISTRY OF CONSUMER AND COMMERCIAL RELATIONS (416) 362–8392, SHALL BE NOTIFIED IMMEDIATELY.
27. IN THE EVENT THAT BURIED ARCHEOLOGICAL REMAINS ARE FOUND DURING CONSTRUCTION ACTIVITIES, THE MINISTRY OF CITIZENSHIP, CULTURE AND RECREATION SHALL BE NOTIFIED IMMEDIATELY.
28. WHILE UNDERTAKING CLEARING, DEMOLITION, EXCAVATION OR CONSTRUCTION THE OWNER AND THEIR CONTRACTORS SHALL BE VIGILANT FOR THE POTENTIAL PRESENCE OF UNDERGROUND FUEL TANKS, CONTAMINATED SOIL OR GROUNDWATER, BURIED WASTE OR ABANDONED WATER WELLS. IF ANY OF THE ABOVE ARE ENCOUNTERED OR SUSPECTED, THE OWNER SHALL ENSURE THAT:

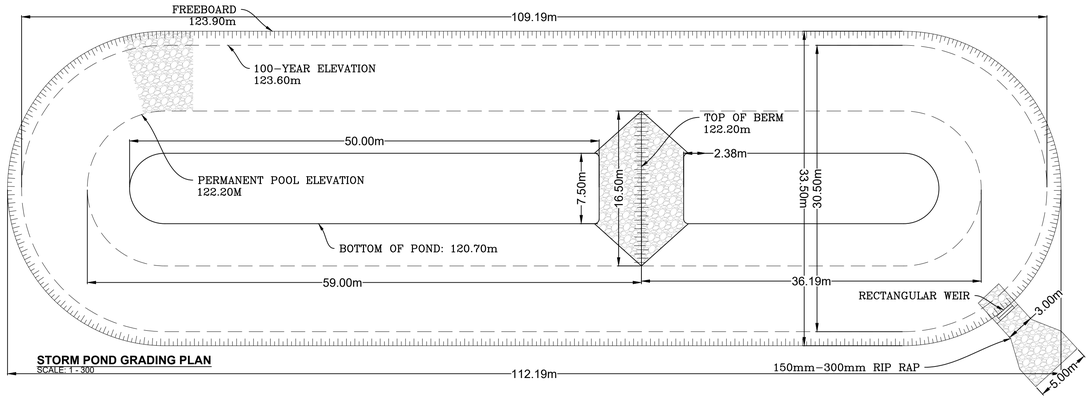
28.A. THE TOWN OF NAPANEE ENVIRONMENT DEPARTMENT IS ADVISED THAT CONTAMINANTS OR WASTES HAVE BEEN DISCOVERED OR ARE SUSPECTED.
28.B. ANY SOIL OR GROUNDWATER CONTAMINATION ENCOUNTERED IS REMEDIATED TO APPLICABLE STANDARDS AS DEFINED WITHIN O.REG OR AS REVISED;
28.C. ANY WASTES GENERATED BY SITE CLEAN–UPS ARE MANAGED IN ACCORDANCE WITH APPLICABLE LAWS AND STANDARDS;
28.D. ANY ABANDONED FUEL TANKS ENCOUNTERED ARE DECOMMISSIONED IN ACCORDANCE WITH APPLICABLE LAWS AND STANDARDS;
28.E. ANY UNUSED WATER WELLS (DRILLED OR DUG) ARE PROPERLY ABANDONED IN ACCORDANCE WITH ONTARIO REGULATIONS 903 – WELLS OR AS ADVISED;
28.F. IF IT APPEARS LIKELY THAT CONTAMINATION EXTENDS BEYOND THE BOUNDARIES OF THE SUBJECT PROPERTY, THE OWNER NOTIFIES THE LOCAL OFFICE OF THE MINISTRY OF ENVIRONMENT AND THE TOWN OF GANANOQUE ENVIRONMENT DEPARTMENT;
28.G. CONSTRUCTION WASTES ARE NOT TO BE BURIED WITHIN THE PROPERTY THAT IS THE SUBJECT OF THIS AGRREMENT, AND
28.H. THE OWNER AND THEIR CONTRACTORS REPORT ALL SPILLS TO THE MINISTRY OF THE ENVIRONMENT'S SPILLS ACTION CENTRE (1–800–268–6060) AND TO THE MUNICIPALITY FORTHWITH.



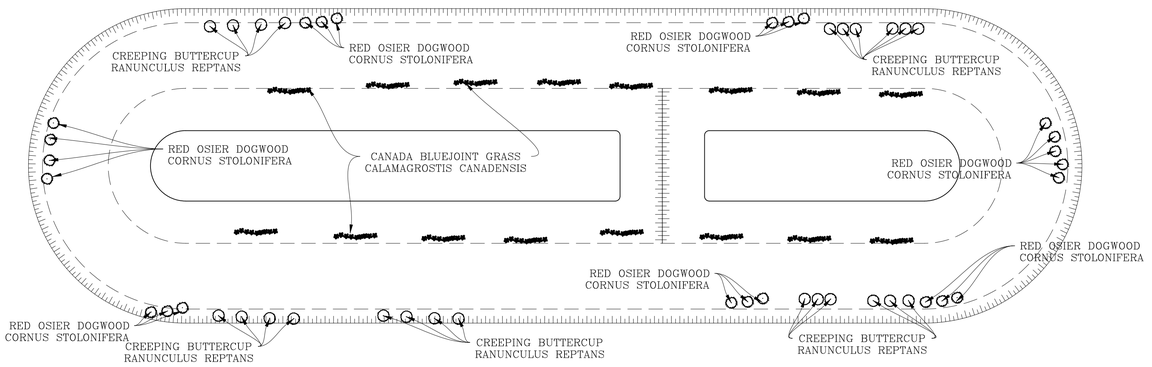




**WET POND SECTION**
SCALE: 1 - 150

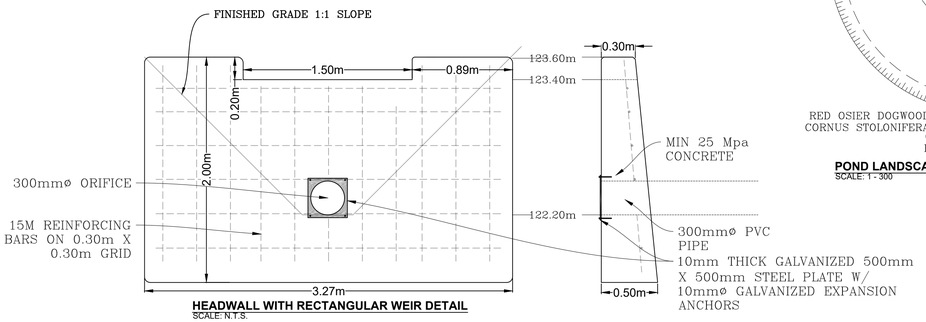


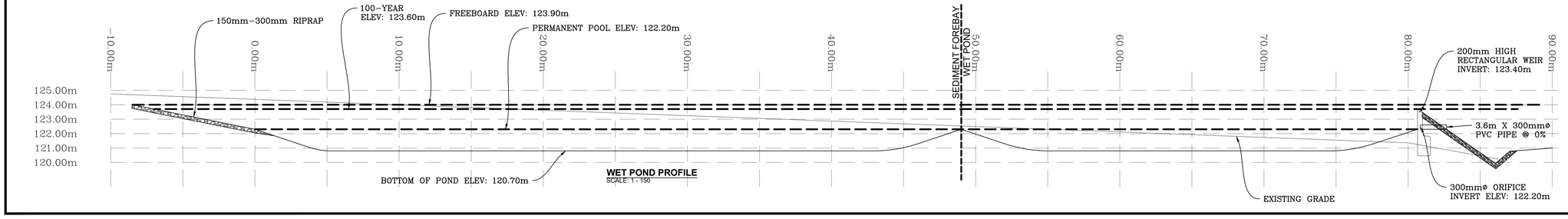

**STORM POND GRADING PLAN**
SCALE: 1 - 300




**POND LANDSCAPE PLAN**
SCALE: 1 - 300




**HEADWALL WITH RECTANGULAR WEIR DETAIL**
SCALE: N.T.S.




**WET POND PROFILE**
SCALE: 1 - 150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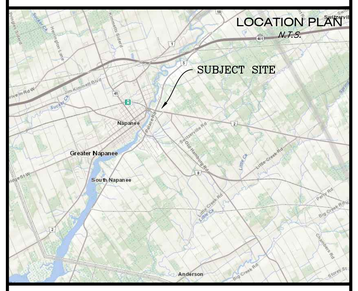


REVISIONS

| No. | Description | Date |
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Drawing Title:

DETAILS AND NOTES

Drawn by: DF
Checked By: MB
Page Size: 24"x36"
Scale: 1:750
Date: JUNE 6, 2020

Project Number: GW-20019

Drawing Number: C-102

SHEET 2 of 2