SERVICING AND STORM WATER MANAGEMENT BRIEF

225 MAPLE CREEK COURT

TO: Chris Clarke

FROM: Brandon LeBlanc, P.Eng.

CC: Spencer Manoryk, Ishaque Jafferjee, Bruce Rodger, Mark Grady

DATE: June 12th, 2024

1.0 SCOPE

WSP Canada Inc. was retained by ZanderPlan Inc. to complete a Servicing and Stormwater Management (SWM) brief for the proposed Recycling Facility located at 225 Maple Creek Court in the City of Ottawa. This report examines the potential Servicing and SWM impacts of the proposed development and summarizes how each will be addressed in accordance with applicable guidelines.

2.0 PROPOSED DEVELOPMENT

The proposed Recycling Facility includes the following:

- Cement pad (30m by 18m) with partitions for storage
- Small site trailer with no servicing requirements
- Weight scale
- Storage container
- Existing pumphouse shed to remain

3.0 SERVICING SUMMARY

Servicing design criteria were established during the Pre-Application Consultation Meeting with the City of Ottawa on June 28th, 2022 (meeting notes included in **Appendix A**). The existing site has a water supply well and pumphouse shed; however, the proposed Recycling Facility will not require water supply and as such the well will remain unused. Similarly, no sanitary servicing facilities will be required as part of this development. Storm sewer servicing will not be required as part of this development; however, stormwater conveyance shall be covered by other sections in this brief.

4.0 GROUNDWATER AND INFILTRATION

Per Geotechnical Investigation and Slope Stability Assessment completed by Gemtec, groundwater was encountered at a depth of 1.2-1.5m below the ground surface; however, these levels were recorded in August 2023 and may be higher during the spring. The report also indicated a glacial till deposit with a silty clay crust at depths ranging from 4.3 to 4.7 meters below the existing ground surface. Infiltration rates were not completed as part of the Geotechnical Investigation; however, due to the presence of high groundwater and silty clay the site is expected to have lower infiltration potential.

5.0 SWM DESIGN CRITERIA

SWM criteria for the proposed development were taken from the Pre-Application Consultation Meeting (**Appendix A**) and are as follows:

Stormwater Quantity – The allowable runoff rate from sites within the Reis Industrial Park is governed by a post-development runoff coefficient (C-value) of 0.775. C-values for the 100-year event are to be increased by 25% (to a maximum of C=1.0) as per City of Ottawa Sewer Design Guidelines (2012) Section 5.4.5.2.1 Table 5.7. If the resulting C-value from the proposed site will be less than the allowable rate, no on-site Stormwater Management will be required.

Stormwater Quality – Per Mississippi Valley Conservation Authority comments, an enhanced level of protection providing 80% Total Suspended Solids (TSS) removal is required.

6.0 SWM PRE-DEVELOPMENT CONDITIONS

6.1 Drainage Patterns

The existing drainage patterns were established based on the topographical survey provided by Annis, O'Sullivan, Vollebekk Ltd dated July 31 2023. The site is observed to generally sheet drain to the south-west to an open ditch running southwards along the western property boundary. This open ditch conveys water directly to Huntley Creek located at the south-west corner of the site.

6.2 Water Quantity

Under existing conditions, 225 Maple Creek Court is mostly undeveloped with a gravel lay down area and an existing pumphouse shed as shown on the Stormwater Drainage Area Plan (**Appendix B**). The pre-development runoff coefficient for the existing total site area **EX-1** was calculated to be **0.52** for the **2 & 5-year** events and **0.65** for the **100-year event**. Detailed pre-development runoff calculations are provided in Table 1 of **Appendix C** for reference.

7.0 SWM POST-DEVELOPMENT CONDITIONS

The general SWM strategy is the introduction of a natural berm level spreader which has been adequately designed to intercept, store, and generate sheet flow across a vegetated filter strip for treatment prior to entering Huntley Creek.

7.1 Drainage Patterns

The existing drainage patterns are generally unchanged in the post development condition, with overland flow being conveyed south-west across the site toward Huntley Creek.

Positive drainage is provided away from the storage container, site trailer, and weight scale, with sheet flow directed westward toward the existing swale along the property line. The existing swale conveys water southward along the property line toward Huntley Creek.

Runoff generated from the cement pad is anticipated to be intercepted and conveyed along the swale/berm system to the proposed level spreader. The level spreader has been designed to direct sheet flow south-west towards Huntley Creek.

7.2 Water Quantity

Under proposed conditions the Recycling Facility will retain the existing gravel lay down area and pumphouse. Proposed structures will locally increase the surface impermeability; however, the addition of the grass swale, berm, and filter strip reduces the sites gravel area and overall runoff coefficient.

The post-development runoff coefficient for the proposed total site area **PR-A1** was calculated to be **0.52** for the **2 & 5-year** events and **0.64** for the **100-year** event. As the post-development 100-year run-off coefficient for the total site is less than 0.775 no on-site stormwater quantity storage is required. Detailed post-development runoff calculations are provided in Table 2 and 3 of **Appendix C** for reference.

7.3 Water Quality

7.3.1 Level Spreader Berm

To achieve the TSS removal target a treatment train approach comprising of a grass swale and level spreader filter strip is proposed for the site. Stormwater runoff generated from the cement pad is intercepted by a grass swale and berm system and is directed toward the level spreader located in the south-west natural low point of the site. The level spreader as shown in **Figure 1** below is constructed perpendicular to the direction of the flow, damming the water upstream until the spill elevation of 112.90m is achieved. Water is intended to sheet flow over the berm, maximizing the contact area with the downstream vegetated area to filter out stormwater pollutants.

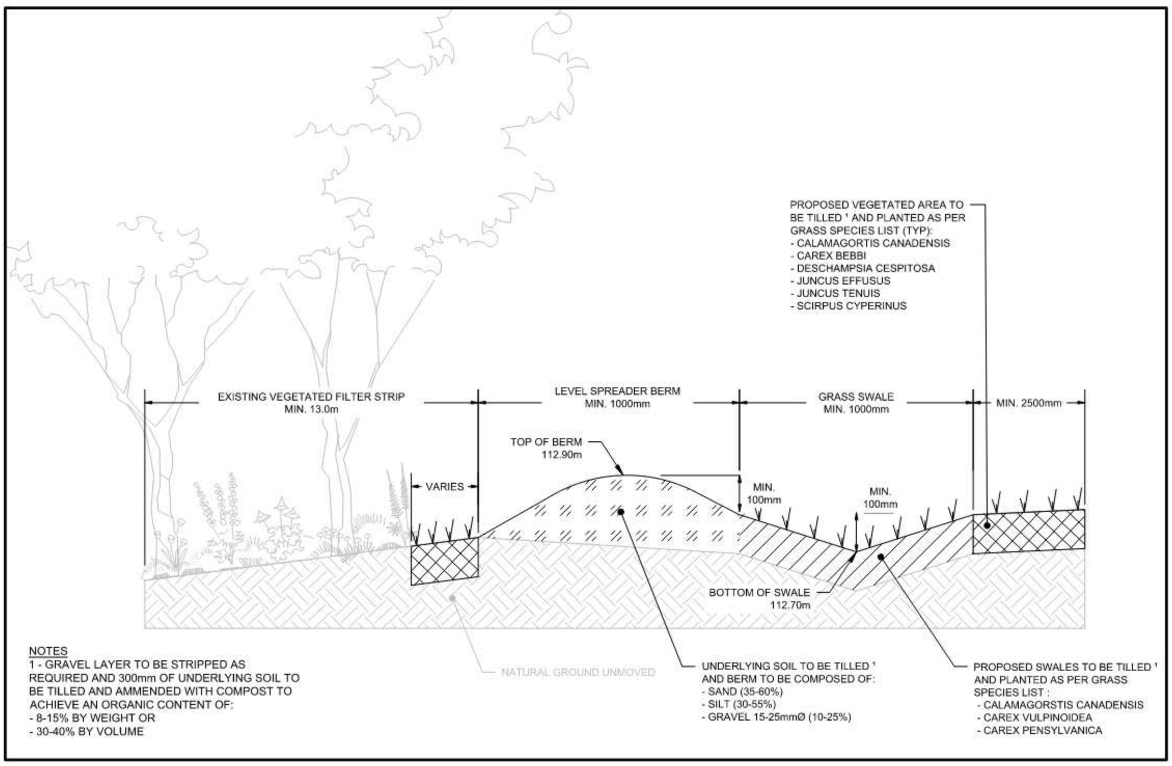


Figure 1 Vegetated Filter Strip and Level Spreader

Design recommendations for vegetated filter strips and level spreader berms are provided in the Ministry of the Environment's Stormwater Management Planning and Design Manual (MOE SWMP Manual) and are summarized as follows:

- Groundwater separation greater than 0.5m (MOE SWMP 4-6)
- Drainage Area less than 2ha (MOE SWMP 4-42)
- Filter Strip slope 1-5% (MOE SWMP 4-42)
- Filter Strip width of 10-15m in the direction of flow (MOE SWMP 4-42)
- Designed as a broad crested weir using a 4-hour Chicago distribution of 10mm storm (MOE SWMP 4-44)
- Less than 100mm of flow depth over the level spreader and through the filter strip (MOE SWMP 4-119)

The site-specific design parameters utilized for sizing the level spreader are as follows:

- Drainage Area = 0.755ha, % Imp=69.34
- Filter Strip Slope = 1.3%
- Filter Strip Width = 13.0m
- Level Spreader Dimensions = 0.10m height, 1.0m width, 32.5m length perpendicular to flow
- V-bottom Swale Dimensions = 0.10m depth, 1.0m width
- Level Spreader Spill Elevation = 112.90m
- Storage curve developed from finished grade topography

The above parameters were used to model the level spreader as a broad-crested weir in PCSWMM for the 4-hour Chicago distribution of a 10mm storm event. An additional model run of the 4-hour Chicago 25mm storm event was completed, as is typical for ensuring peak flow conveyance of grassed swales. The detailed PCSWMM model results are provided in **Appendix C** for reference and are summarized in **Table 1** below.

Table 1 PCSWMM Model Results

	10mm 4-hr Chicago	25mm 4-hr Chicago
Peak Runoff (L/s)	30	91
Max. Volume Stored (m^3)	10	12
Peak Flow over the berm (L/s)	30	91
Max. Depth over the berm (m)	0.01	0.02

The above modelling results indicate that the level spreader has been adequately designed to intercept, store, and generate sheet flow during both storm events. Following all storm events, the berm's pervious sand/gravel composition allows for ponded runoff to gradually flow through it and into the vegetated filter strip area.

7.3.2 Vegetated Filter Strip

Vegetated filter strips are gently sloping vegetated areas that can treat small drainage areas by slowing runoff velocity and filtering out pollutants. Sheet flow through the filter strip is essential for removing suspended sediments as contact area with the vegetation is maximized while also limiting the potential for erosion. Note that the Low Impact Development Stormwater Management Planning and Design Guide (LID Design Guide) prepared on behalf of the Toronto and Region Conservation Authority (TRCA) and Credit Valley Conservation Authority (CVC) was referenced throughout the design of the vegetated filter strip for this site.

A densely vegetated area acting as a natural stream corridor buffer strip already exists at the southern extent of the site between the fence line and Huntley Creek. It is proposed to place the 32.5m wide level spreader immediately upstream of the fence line and a portion of this existing vegetated area. The level spreader is proposed in some areas currently utilized as a gravel lay down area. As such, per the LID Design Guide, these areas with low infiltration or poor fertility are recommended to be tilled to a depth of 300mm and amended with compost to increase the organic content.

Filter strip vegetation can consist of a variety of grasses, wildflowers, shrubs, trees, and other native vegetation. Appendix B of the LID Design Guide was referenced for native grass species to be utilized in the filter strip area. Additionally, a 2.5-meter planting buffer is also provided between the edge of the berm/swale system and the retained gravel area.

7.3.3 Pollutant Removal Efficiency

The MOE SWM manual does not specifically comment on the TSS removal efficiency of the level spreader and filter strip method, but notes they are best utilized in sequence with other SWM practices to maximize water quality improvements. As such a grass swale, which can be anticipated to provide additional TSS removal, is utilized to intercept and convey flow to the level spreader berm.

The main pollutant removal mechanism in grass swale systems is infiltration. Per the LID Design Guide, infiltration of grassed swales can be maximized by introducing check dams and tilling the underlying soil. The level spreader berm creates a damming effect on the water, ponding the majority of the grass swale to an elevation of 112.90m as shown on the grading plan (**Appendix B**). Tilling and increasing the organic content of the underlying soil will increase the infiltration potential of the grassed swale and contribute to the pollutant removal efficiency of the treatment train system.

The removal efficiency of filter strips is highly varied and is dependent on several factors such as available space, site topography, length of level spreader berm, water table depth, percentage of vegetation coverage on the filter strip, soil infiltration rate, and flow path over pervious areas. The LID Design Guide provides the following table indicating the anticipated removal efficiencies of vegetated filter strips.

Table 2 Pollutant removal efficiencies of vegetated filter strips

Pollutant	Removal Efficiency[1]
Total Suspended Solids (TSS)	20 to 80%
Total Nitrogen	20 to 60%
Total Phosphorus	20 to 60%
Total Heavy Metals	20 to 80%

Source: ASCE, 2000

In this design the grass swale and berm level spreader act as a pre-treatment mechanism by settling course particles, and intercepting and ponding the rainfall to prevent channelization. The ponded water overtops the berm as sheet flow and travels through a minimum of 13 meters of well-established dense vegetation. Micro-grading is recommended as required within this established vegetated area to ensure consistent sheet flow. Shallow slopes of 1-2% through the vegetation will minimize sheet flow velocities and erosion through the filter strip and are within the MOE preferred 1-5% range. Following all rainfall events, water is ponded and allowed to infiltrate through the porous level spreader providing further opportunity for treatment. Existing gravel areas within the treatment train zone are to be stripped, tilled, and reinstated with organic soil and approved vegetation. This is anticipated to further increase the infiltration and treatment capacity of the system.

The high variabilities in physical parameters make it difficult to predict the pollutant removal efficiency of LID designs on a site-specific level. This LID design maximizes the treatment potential by taking advantage of key existing features such as shallow slopes and well-established dense vegetation, while also improving features such as soil infiltration potential and permeable area. As such, this treatment train approach is expected to function on the higher end of the 20-80% TSS removal potential.

7.0 CONCLUSIONS

A Servicing and Stormwater Management brief has been prepared to support the design of a proposed Recycling Facility and the following conclusions have been made:

Servicing

The proposed Recycling Facility will not require water, sanitary, and storm servicing. The existing well and pumphouse will remain unused in the post-development condition.

SWM Quantity Control

As the post-development 100-year runoff coefficient of 0.64 is less than the allowable runoff coefficient of 0.775, no on-site stormwater quantity control will be required.

SWM Quality Control

The proposed treatment train approach consisting of a grass swale, level spreader berm, and vegetated filter strip is anticipated to adequately intercept and treat the post-development runoff to a TSS removal rate of 80%.

This brief has demonstrated that the proposed Servicing and SWM strategy will address related impacts from this project and meet the applicable design requirements.

Feel free to contact the undersigned regarding any questions you may have.

Yours sincerely,

Brandon LeBlanc, P.Eng.

Senior Project Engineer

Land Development and Municipal Engineering

APPENDIX

A

PRE-CONSULTATION MEETING MINUTES

Pre-Application Consultation Meeting Notes

Property Address: 225 Maple Creek Court
PC2022-098
June 28th, 2022 - Teams

Attendees:
Stephan Kukkonen – File Lead
stephan.kukkonen@ottawa.ca

Brian Morgan – Project Manager
brian.morgan@ottawa.ca

Mark Elliot – Environmental Planner
mark.elliott@ottawa.ca

Erica Ogden – MVCA
eogden@mvc.on.ca

Chris Clarke - Applicant

Regrets:
Anissa McAlpine – Parks Planner
anissa.mcalpine@ottawa.ca

Tessa Di Iorio – Risk Management Officer
tessa.diiorio@ottawa.ca

Jasdeep Brar – Planning Student
jasdeep.brar@ottawa.ca

Subject: 225 Maple Creek Court – Site Plan

Meeting notes:

Opening & attendee introduction
- Introduction of meeting attendees
- Overview of proposal:
  - Glenview Iron and Metal proposing an iron recycling operation
  - The site will include a scale, scale house, and small warehouse facility, as well as storage
  - The main use of the property will be located towards the front of the property away from the natural features to the rear

Preliminary comments and questions from staff and agencies, including follow-up actions:

- **Planning**
  - The property is zoned as Rural General Industrial, subzone 5 (RG5) and the proposal of a metal recycling operation fits within the permitted uses.

- The Official Plan designation is Rural Industrial and Logistic. The proposed site plan should maintain the directives of Section 9.3 of the New Official Plan. This includes policies for appropriate screening from the roadway.
- The property falls within the specific area policy of the Carp Road Corridor which designates it as a light industrial area.
- The area has been identified to possibly have archaeological potential. As such, we will be requesting that the Ministry of Sport, Culture, and Tourism screening checklist is completed.
- Studies/supplementary information required:
  - Planning Rationale
  - Site Plan
  - Landscape Plan (Can be included with the site plan if it is not too crowded and clearly legible
  - Survey Plan
  - Criteria for Evaluating Archaelogical Potential checklist

- **Engineering**
  - Please provide a legal plan that indicates both the majority of the site (Part 3) and the smaller area in the north-east corner (Part 2). What is the purpose of Part 2? Utilities perhaps?

  - Proposed Site drawings should include reference to the: 100-yr flood-line, regulation limits, zoning setbacks, and meander belt limits. Note that the area hatched on your Glenview Site Plan as 'wetlands' is in fact 'Floodplain'.

  - Indicate the proposed location of the well and septic. Please note that the well should be sited in a location where it is protected from vehicular damage, and the grading plan should show how the final wellhead completion meets O.Reg. 903 (minimum 40cm casing above ground and the ground mounded such that water does not pool around the wellhead). Well and septic must be protected by bollards.

  - Please provide an approved septic permit from the OSSO office. Applications with a Septic Design rate BELOW 10,000 Litres require an OSSO permit approval before site plan approval can be awarded. In this situation, I'm led to believe that no MECP permit is required. However, applications with a Septic Design rate above 10,000 Litres will require an MECP ECA approval. ECA approvals typically have a wait time of 9 to 11 months.

  - As per the City Hydrogeologists comments provided separately, a Hydrogeological and Terrain Analysis Report is required. Please note that report must meet the City's current Hydrogeological and Terrain Analysis Report Guidelines (March 2021). It is recommended that the developer's hydrogeological consultant schedule a technical pre-consultation to scope the field work and study requirements. The consultant should contact Tessa Di Iorio (Tessa.diiorio@ottawa.ca).

Stormwater Management:

The allowable runoff rate from sites within the Reis Industrial Park is governed by the design assumptions used in the approved Engineering Report contained in Schedule “H” of the subdivision agreement. If the resulting runoff from the proposed site will be less than the allowable rate, no on-site Stormwater Management will be required. The design parameters used in the approved subdivision Engineering Report are as follows:

“The design of the internal drainage for the subdivision was based on site developments that would be: 50% building (C=1.0), 25% parking (C=0.9) and 25% undeveloped (C=0.2). By my interpretation of design assumptions in the subdivision Engineering Report, sites in this subdivision can be developed without a requirement for on-site Stormwater Management as long as the combined C-value does not exceed 0.775.“

It is important to note that the original subdivision design used constant C-values, while the newer City of Ottawa Sewer Design Guidelines (see Section 5.4.5.2.1 and Table 5.7) now stipulate that C-values be increased by 25% during the 100-year event (to a maximum of C=1.0). Accordingly, I would ask that you use the City’s increased 100-year runoff coefficients when determining the post-development combined C-value for the site.

If the post-development C-value is below 0.775, no on-site SWM will be required. If SWM is required, the allowable release will be based on the 5-year flow, with a C-value of 0.775.

- Please contact the MECP and enquire about the requirements for an ECA to establish a waste processing / recycling facility.
- The Geotechnical report must include a Slope Stability review and recommendations.
- Will this site require an oil/grit separator? Oil/grit separators must outlet to a ditch, not to the septic tank and will require MECP ECA application approval.
- All elevations in reports and drawings must be Geodetic.
- Please include a note on the Engineering drawings referencing the original survey plan, reference benchmark, site benchmark, and make use of only geodetic elevations. Please also provide the attributes of the survey monument used to establish datum and sufficient information to enable a layperson to locate the survey monument.

- Storm water quantity control
- Grading
- Water capacity
- Sewer (sanitary and storm) capacity
- Flow rates – Fire Services
- Geotechnical (including sensitive marine clay, where appropriate)
- Slope stability
- Hydrogeological and terrain analysis requirements (private servicing only)
- Construction constraints
- Background studies
- MECP approval

- **Hydrogeology and Terrain Analysis**
    - A Hydrogeological and Terrain Analysis Report is required to ensure servicing based on private wells is suitable (water quantity and water quality) and that the impact from the proposed onsite septic system is acceptable. For site plan applications, the supply well must be established and tested.

    - The Hydrogeological and Terrain Analysis Report must meet the City's current Hydrogeological and Terrain Analysis Report Guidelines (March 2021), which includes specifications for the supply well pump test and water quality parameters for analysis (which includes the 'subdivision suite' parameter, metals, VOCs, PH and any other parameter or potential contaminant of concern identified by the consultant based on existing nearby or former land uses). Guidelines also include clear calculations for the septic impact assessment (see requirements for industrial/commercial sites), as well as several other onsite testing requirements and standards.

    - The report needs to confirm the well water yield requirements for the development and the pump test rate should reflect the maximum daily rate.

    - The proposed use is a salvage yard with waste processing/recycling – identify the MECP approvals required with the application for the waste processing/recycling use.

    - The hydrogeological report must identity how groundwater will be protected from the onsite activities in the long term, this includes control of runoff water where waste transfer and recycling are occurring.

    - **The City should be aware of discussions with the MECP related to the ECA approval.**

    - The supply well should be sited in a location where it is protected from vehicular damage, and the grading plan should show how the final wellhead completion meets O.Reg. 903 (minimum 40cm casing above ground and the ground mounded such that water does not pool around the wellhead)

    - The site is within the Carp Road Corridor and policies of the Carp Road Corridor CDP are applicable. The site is located in an area identified as high recharge in the CDP and <u>clean</u> infiltration should be maintained onsite. Please discuss how water will be managed on site. This can be presented as a pre- and post- water budget.

  - A Septic (Nitrate) Impact Assessment is required with the hydrogeological report (as per City Guidelines). This should include an assessment of the septic flow required for the site. Note that a modified methodology for the septic impact assessment within the Carp Road Corridor has been developed for the City (see memo dated Sept. 27, 2016).

  - It is recommended that the developer's hydrogeological consultant schedule a technical pre-consultation to scope the field work and study requirements. The consultant can contact Tessa Di Iorio (Tessa.diiorio@ottawa.ca).

- **Environmental**
  - This site is already heavily impacted from previous industrial uses. However, the adjacent woodlands are classified as Significant Woodland and are part of the Natural Heritage System. An investigation into the possible effects of the proposed activity, especially sound pollution, on the woods and any wildlife are a critical component of the EIS.

  - There are also concerns about water quality, but these are better addressed through technical documents already being provided to city engineers and the conservation authority. A summary of the outcome of these documents would be required in order to determine that no negative impact would occur as a result of this development.

  - The EIS should also definitely clear up the misconception about whether or not the features on the southwestern corner of the site are floodplains or wetlands. Regardless of the outcome, the feature would need to be accounted for and the EIS would have to demonstrate how the proposed development would not incur a negative impact on the feature.

- **Mississippi Valley Conservation Authority**
  - The Mississippi Valley Conservation Authority (MVCA) confirms that a portion of the property is regulated under Ontario Regulation 153/06, *Development, Interference with Wetlands and Alterations to Shorelines and Watercourses*. Under Ontario Regulation 153/06, written permission is required from the MVCA prior to the initiation of development (which includes construction, site grading and the placement or removal of fill) within an area regulated by the Conservation Authority (regulation limit delineated in yellow on the enclosed regulation mapping) as well as straightening, changing, diverting or interfering in any way with the existing channel or the shoreline of a watercourse.

  - The subject property is located within the regulatory flood plain (orange line on the enclosed map) of Huntley Creek as defined by the 1:100 year flood level (a flood with a 1% chance of occurring in any given year). Development, filling and lot grading are not permitted within the flood plain.

- The property is also located within the meander belt erosion hazard (green line on the enclosed map). Development, filling and lot grading is generally restricted within the erosion hazard. The Conservation Authority regulates 15 metres beyond the greatest hazard, where any development, filling or grading works requires review and approval.

- Based on the plan submitted, the flood plain has been mislabeled as wetland.

- There does not appear to be any development proposed within the regulation limit, however no septic system has been identified, nor vehicle drive aisles.

- The fencing shown on the plan should be located along the meander belt erosion hazard.

- The subject property is also located within the Carp River Watershed Subwatershed Study Area, which establishes annual infiltration targets. The subject property is located within a high groundwater recharge area which has an annual infiltration target of 262mm/yr. The water quality requirements is an enhanced level of protection, 80% Total Suspended Solids removal.

- **Parks**
  1. The amount of parkland dedication that is required is to be calculated as per the City of Ottawa Parkland Dedication By-law No.2009-95 (or equivalent).

     The proposal is only for commercial development, therefore, parkland requirement for commercial uses is calculated as 2% of the gross land area of the site being developed. Section 13 (1) of the By-law states that "*The conveyance of land for park purposes or the payment of money in-lieu of accepting the conveyance is not required for development, redevelopment, subdivisions or consents, where it is known, or can be demonstrated that the required parkland conveyance or money in-lieu thereof has been previously satisfied in accordance with the Planning Act*"

     If parkland dedication for the parcel has been satisfied previously, please provide Parks and Facilities Planning with the supporting documentation.

     Otherwise, the owner will be responsible for providing parkland dedication. Parkland dedication will be a condition of site plan approval, the owner will be responsible in providing cash-in-lieu of parkland.

  2. The value of the land will be determined by the City's Realty Services Branch. The owner is responsible for any appraisal costs incurred by the City.

  3. Please provide the City with a surveyor's area certificate/memo which specifies the exact gross land area of the property parcel being developed.

4. Please note that the park comments are preliminary and will be finalized (and subject to change) upon receipt of the requested supporting documentation. Additionally, if the proposed land use changes, then the parkland dedication requirement will be re-evaluated accordingly.

- Feel free to contact Anissa McAlpine, Planner, Parks and Facilities Planning Services for follow-up questions.

- **City Surveyor**
  - The determination of property boundaries, minimum setbacks and other regulatory constraints are a critical component of development. An Ontario Land Surveyor (O.L.S.) needs to be consulted at the outset of a project to ensure properties are properly defined and can be used as the geospatial framework for the development.
  - Topographic details may also be required for a project and should be either carried out by the O.L.S. that has provided the Legal Survey or done in consultation with the O.L.S. to ensure that the project is integrated to the appropriate control network.

  Questions regarding the above requirements can be directed to the City's Surveyor, Bill Harper, at Bill.Harper@ottawa.ca

Submission requirements and fees

- Planning rationale
- Site Plan
- Landscape Plan
- Survey Plan
- Criteria for Evaluating Archaeological Potential Checklist
- Hydrogeological and Terrain Analysis
- Nitrate Impact Assessment
- Site Servicing Pan
- Grade Control and Drainage Plan
- Stormwater management brief
- Geotechnical and Slope Stability
- Environmental Impact Statement
- Additional information regarding fees related to planning applications can be found here.
- Plans are to be standard A1 size (594 mm x 841 mm) or Arch D size (609.6 mm x 914.4 mm) sheets, dimensioned in metric and utilizing an appropriate Metric scale (1:200, 1:250, 1:300, 1:400 or 1:500).
- All PDF submitted documents are to be unlocked and flattened.

Next steps

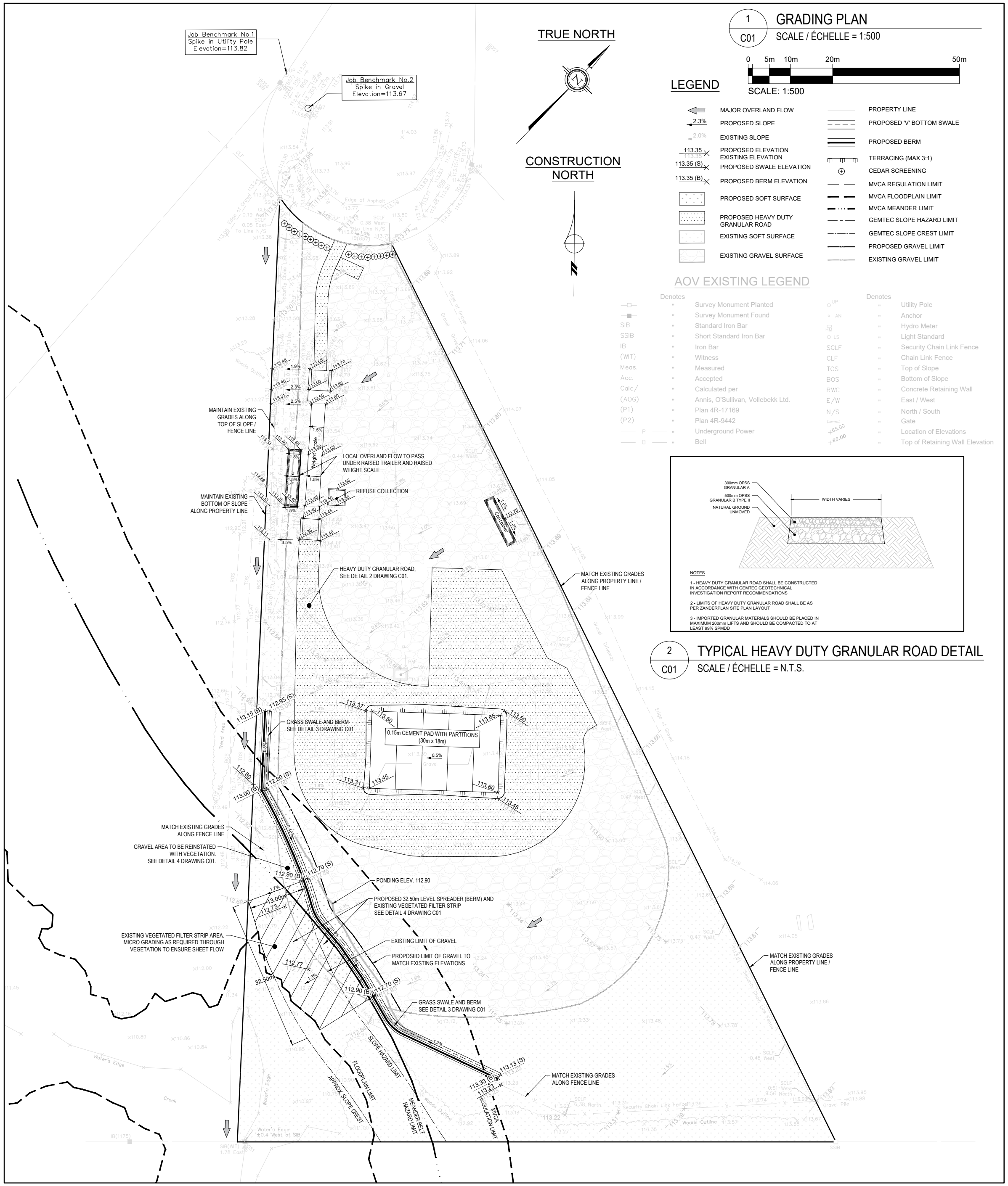
- Encourage applicant to discuss the proposal with Councillor, community groups and neighbours

APPENDIX

B

DESIGN DRAWINGS

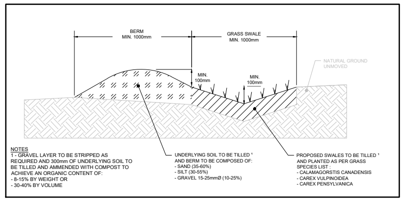
1 GRADING PLAN
C01 SCALE / ÉCHELLE = 1:500



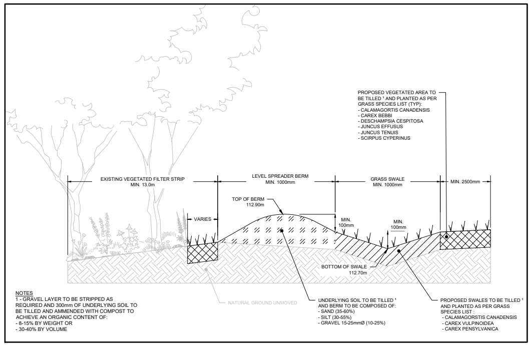
2 TYPICAL HEAVY DUTY GRANULAR ROAD DETAIL
C01 SCALE / ÉCHELLE = N.T.S.

NOTES: GENERAL

1. ALL SERVICES, MATERIALS, CONSTRUCTION METHODS AND INSTALLATIONS SHALL BE IN ACCORDANCE WITH THE LATEST STANDARDS AND REGULATIONS OF THE: CITY OF OTTAWA STANDARD SPECIFICATIONS AND DRAWINGS, ONTARIO PROVINCIAL SPECIFICATION STANDARD SPECIFICATION (OPSS) AND ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD).
2. THE POSITION OF EXISTING POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND ABOVEGROUND UTILITIES, STRUCTURES AND APPURTENANCES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWING, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL SATISFY HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES, AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM DURING THE COURSE OF CONSTRUCTION. ANY RELOCATION OF EXISTING UTILITIES REQUIRED BY THE DEVELOPMENT OF SUBJECT LANDS IS TO BE UNDERTAKEN AT CONTRACTOR'S EXPENSE.
3. THE CONTRACTOR MUST NOTIFY ALL EXISTING UTILITY COMPANY OFFICIALS FIVE (5) BUSINESS DAYS PRIOR TO START OF CONSTRUCTION AND HAVE ALL EXISTING UTILITIES AND SERVICES LOCATED IN THE FIELD OR EXPOSED PRIOR TO THE START OF CONSTRUCTION, INCLUDING BUT NOT LIMITED TO HYDRO, BELL, CABLE TV, AND CONSUMERS GAS LINES.
4. ALL TRENCHING AND EXCAVATIONS TO BE IN ACCORDANCE WITH THE LATEST REVISIONS OF THE OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
5. REFER TO ARCHITECTS PLANS FOR DIMENSIONS, ELEVATIONS, AND LAYOUT. ALL INFORMATION SHALL BE CONFIRMED PRIOR TO COMMENCEMENT OF CONSTRUCTION.
6. TOPOGRAPHIC SURVEY COMPLETED AND PROVIDED BY ANNIS, O'SULLIVAN, VOLLEBEKK LTD. DATED JULY 31 2023. CONTRACTOR TO VERIFY IN THE FIELD PRIOR TO CONSTRUCTION OF ANY WORK AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES.
7. ALL ELEVATIONS ARE GEODETIC AND UTILIZE METRIC UNITS.
8. ALL GROUND SURFACES SHALL BE EVENLY GRADED WITHOUT PONDING AREAS AND WITHOUT LOW POINTS EXCEPT WHERE APPROVED SWALE OR DRAIN OUTLETS ARE PROVIDED.
9. ALL DISTURBED AREAS OUTSIDE PROPOSED GRADING LIMITS TO BE RESTORED TO ORIGINAL ELEVATIONS AND CONDITIONS UNLESS OTHERWISE SPECIFIED. ALL RESTORATION SHALL BE COMPLETED FOLLOWING THE BACKFILL AND COMPACTION RECOMMENDATIONS PROVIDED BY GEMTEC GEOTECHNICAL INVESTIGATION AND SLOPE STABILITY ASSESSMENT.
10. ABUTTING PROPERTY GRADES TO BE MATCHED.
11. CONTRACTOR SHALL OBTAIN AND PAY FOR ALL NECESSARY PERMITS AND APPROVALS FROM THE MUNICIPAL AUTHORITIES PRIOR TO COMMENCING CONSTRUCTION.
12. MINIMIZE DISTURBANCE TO EXISTING VEGETATION DURING THE EXECUTION OF ALL WORKS.
13. REMOVE FROM SITE ALL EXCESS EXCAVATED MATERIAL UNLESS OTHERWISE DIRECTED FROM THE ENGINEER. EXCAVATE AND REMOVE ALL ORGANIC MATERIAL AND DEBRIS LOCATED WITHIN THE PROPOSED SITE.
14. PRIOR TO CONSTRUCTION, A GEOTECHNICAL ENGINEER REGISTERED IN THE PROVINCE OF ONTARIO IS TO INSPECT SUB-SURFACE OF SLAB ON GRADE.
15. CONTRACTOR TO OBTAIN POST-CONSTRUCTION TOPOGRAPHIC SURVEY PERFORMED BY CERTIFIED OLS OR P.ENG. CONFIRMING COMPLIANCE WITH DESIGN GRADING AND SERVICING. SURVEY IS TO INCLUDE LOCATION AND INVERTS FOR BURIED UTILITIES.
16. ELEVATIONS SHOWN ON THIS PLAN ARE RELATED TO CGVD28 GEODETIC DATUM. BENCHMARK NO.1 HAVING A PUBLISHED ELEVATION OF 113.82m AND BENCHMARK NO.2 HAVING A PUBLISHED ELEVATION OF 113.67m. TOPOGRAPHIC INFORMATION PROVIDED BY ANNIS, O'SULLIVAN, VOLLEBEKK LTD, DATED JULY 31, 2023.
17. SLAB ON GRADE TO BE DESIGNED BY OTHERS.



3 TYPICAL GRASS SWALE DETAIL
C01 SCALE / ÉCHELLE = N.T.S.



4 VEGETATED FILTER STRIP AND LEVEL SPREADER DETAIL
C01 SCALE / ÉCHELLE = N.T.S.

ZANDERPLAN
Your rural land planning experts

GIM GLENVIEW IRON & METAL LTD.

REVISION:

REV	DATE	DESCRIPTION	BY
3	2024-06-12	REVISED PER CITY & MVCA COMMENTS	BL
2	2024-02-07	REVISED PER CITY COMMENTS	BL
1	2023-10-10	ISSUED FOR SITE PLAN APPROVAL	BL

SEAL: REGISTERED PROFESSIONAL ENGINEER — B. LeBLANC 100504056 — JUNE 12 2024 — PROVINCE OF ONTARIO

ORIGINAL SCALE: VARIES
DATE: 2024-06-12
DESIGNED BY: SM/BL
DRAWN BY: SM
APPROVED BY: BL
IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE. 25mm
DISCIPLINE: CIVIL

wsp
WSP CANADA INC.
2611 QUEENSVIEW DRIVE, SUITE 300
OTTAWA ONTARIO K2B 8K2 CANADA
WSP.COM

PROJECT NUMBER: CA0005492.9288

CLIENT: GLENVIEW IRON AND METAL

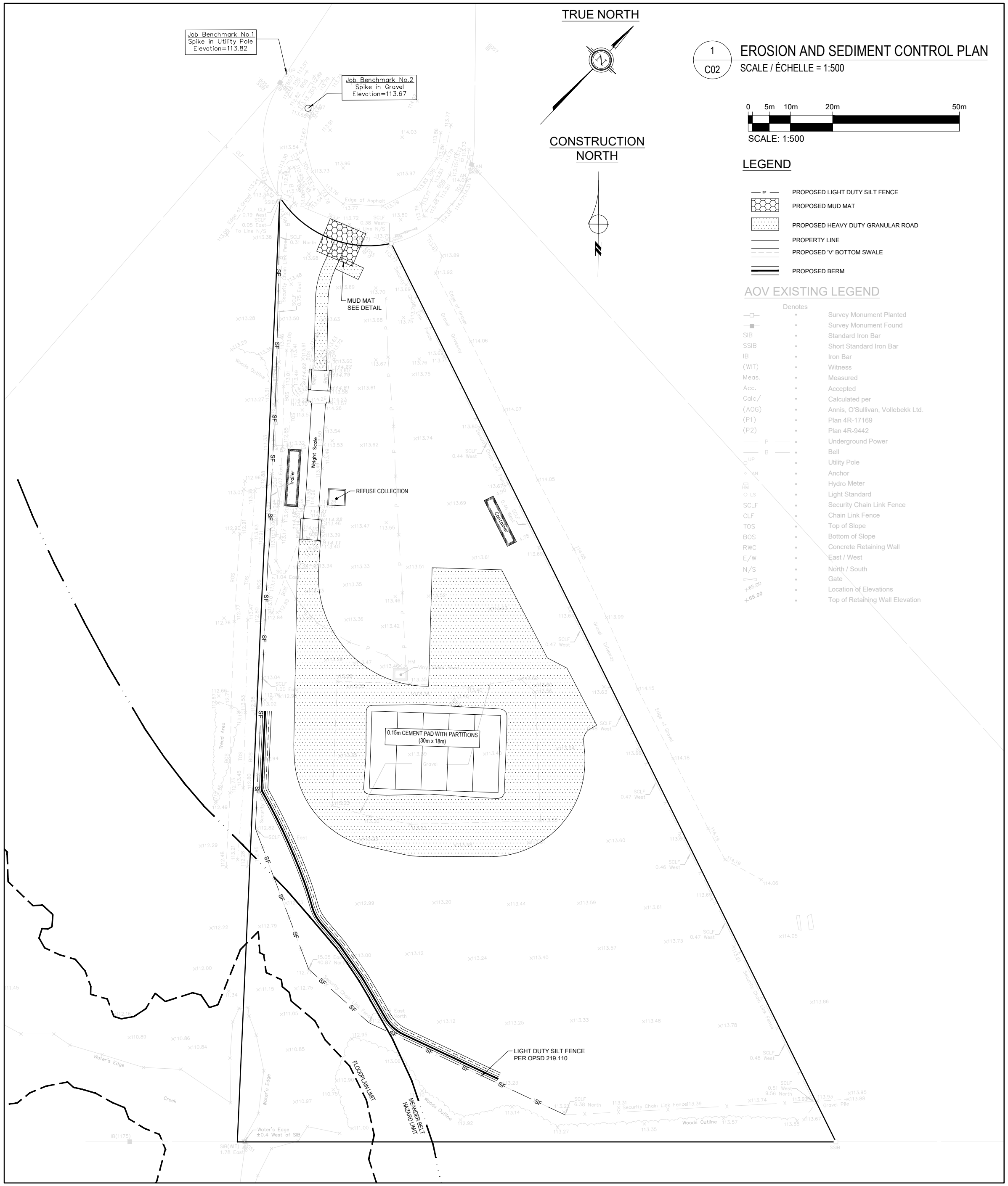
CLIENT REF. #:

PROJECT: 225 MAPLE CREEK COURT IRON RECYCLING FACILITY

TITLE: GRADING PLAN

DRAWING NUMBER: C01
REV. 3

CTB: wsp_ottawa.ctb
PLOTTED: 2024-06-12 - 3:56 PM
FILE: v:\10-13 me 2023 projects\ca0005492.9288 - 225 maple creek ct\14.0 tech_prof services\14.60_civil\3. drawings\working drawings\ca0005492.9288_c.dwg



NOTES: EROSION AND SEDIMENT CONTROL

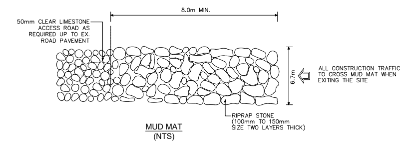
** CONTRACTOR IS RESPONSIBLE FOR ALL INSTALLATION, MONITORING, REPAIR AND REMOVAL OF ALL EROSION AND SEDIMENT CONTROL FEATURES. **

1. PRIOR TO START OF CONSTRUCTION:

1.1. INSTALL SILT FENCE IN LOCATION SHOWN.
1.2. INSTALL FILTER FABRIC OR SILT SACK FILTERS IN ALL THE CATCHBASINS AND MANHOLES TO REMAIN DURING CONSTRUCTION WITHIN THE SITE.
1.3. INSPECT MEASURES IMMEDIATELY AFTER INSTALLATION.
1.4. INSTALL MUD MAT AT CONSTRUCTION ENTRANCES.

2. DURING CONSTRUCTION:

2.1. MINIMIZE THE EXTENT OF DISTURBED AREAS AND THE DURATION OF EXPOSURE AND IMPACTS TO EXISTING GRADING.
2.2. PERIMETER VEGETATION TO REMAIN IN PLACE UNTIL PERMANENT STORM WATER MANAGEMENT IS IN PLACE. OTHERWISE, IMMEDIATELY INSTALL SILT FENCE WHEN THE EXISTING SITE IS DISTURBED AT THE PERIMETER.
2.3. PROTECT DISTURBED AREAS FROM OVERLAND FLOW BY PROVIDING TEMPORARY SWALES TO THE SATISFACTION OF THE FIELD ENGINEER.
2.4. PROVIDE TEMPORARY COVER SUCH AS SEEDING OR MULCHING IF DISTURBED AREA WILL NOT BE REHABILITATED WITHIN 30 DAYS.
2.5. INSPECT SILT FENCES, FILTER FABRIC FILTERS AND CATCH BASIN SUMPS WEEKLY AND WITHIN 24 HOURS AFTER A STORM EVENT. CLEAN AND REPAIR WHEN NECESSARY.
2.6. DOWNSTREAM STORM INFRASTRUCTURE SHALL BE PROTECTED FROM UNFILTERED RUNOFF DURING ON–SITE STORM INFRASTRUCTURE DEMOLITION.
2.7. DRAWING TO BE REVIEWED AND REVISED AS REQUIRED DURING CONSTRUCTION.
2.8. EROSION CONTROL FENCING TO BE ALSO INSTALLED AROUND THE BASE OF ALL STOCKPILES.
2.9. DO NOT LOCATE TOPSOIL PILES AND EXCAVATION MATERIAL CLOSER THAN 2.5m FROM ANY PAVED SURFACE, OR ONE WHICH IS TO BE PAVED BEFORE THE PILE IS REMOVED. ALL TOPSOIL PILES ARE TO BE SEEDED IF THEY ARE TO REMAIN ON SITE LONG ENOUGH FOR SEEDS TO GROW (LONGER THAN 30 DAYS).
2.10. CONTROL WIND–BLOWN DUST OFF SITE BY SEEDING TOPSOIL PILES AND OTHER AREAS TEMPORARILY (PROVIDE WATERING AS REQUIRED AND TO THE SATISFACTION OF THE ENGINEER).
2.11. NO ALTERNATE METHODS OF EROSION PROTECTION SHALL BE PERMITTED UNLESS APPROVED BY THE FIELD ENGINEER.
2.12. CITY ROADWAY AND SIDEWALK TO BE CLEANED OF ALL SEDIMENT FROM VEHICULAR TRACKING AS REQUIRED.
2.13. DURING WET CONDITIONS, TIRES OF ALL VEHICLES/EQUIPMENT LEAVING THE SITE ARE TO BE SCRAPED.
2.14. ANY MUD/MATERIAL TRACKED ONTO THE ROAD SHALL BE REMOVED IMMEDIATELY BY HAND OR RUBBER TIRE LOADER.
2.15. TAKE ALL NECESSARY STEPS TO PREVENT BUILDING MATERIAL, CONSTRUCTION DEBRIS OR WASTE BEING SPILLED OR TRACKED ONTO ABUTTING PROPERTIES OR PUBLIC STREETS DURING CONSTRUCTION AND PROCEED IMMEDIATELY TO CLEAN UP ANY AREAS SO AFFECTED.
2.16. ALL EROSION CONTROL STRUCTURE TO REMAIN IN PLACE UNTIL ALL DISTURBED GROUND SURFACES HAVE BEEN STABILIZED EITHER BY PAVING OR RESTORATION OF VEGETATIVE GROUND COVER.
2.17. THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES, TO PROVIDE FOR PROTECTION OF THE AREA DRAINAGE SYSTEM AND THE RECEIVING WATERCOURSE, DURING CONSTRUCTION ACTIVITIES. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.



2 / C02 MUD MAT DETAIL
SCALE / ÉCHELLE = NTS

Your rural land planning experts

GLENVIEW IRON & METAL LTD.

REVISION:

REV	DATE	DESCRIPTION	BY
3	2024-06-12	REVISED PER CITY & MVCA COMMENTS	BL
2	2024-02-07	REVISED PER CITY COMMENTS	BL
1	2023-10-10	ISSUED FOR SITE PLAN APPROVAL	BL

SEAL:
REGISTERED PROFESSIONAL ENGINEER
B. LeBLANC
100504056
JUNE 12 2024
PROVINCE OF ONTARIO

ORIGINAL SCALE: VARIES
DATE: 2024-06-12
DESIGNED BY: SM/BL
DRAWN BY: SM
APPROVED BY: BL
IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE.
25mm
DISCIPLINE: CIVIL

WSP CANADA INC.
2611 QUEENSVIEW DRIVE, SUITE 300
OTTAWA ONTARIO K2B 8K2 CANADA
WSP.COM

PROJECT NUMBER: CA0005492.9288

CLIENT:
GLENVIEW IRON AND METAL

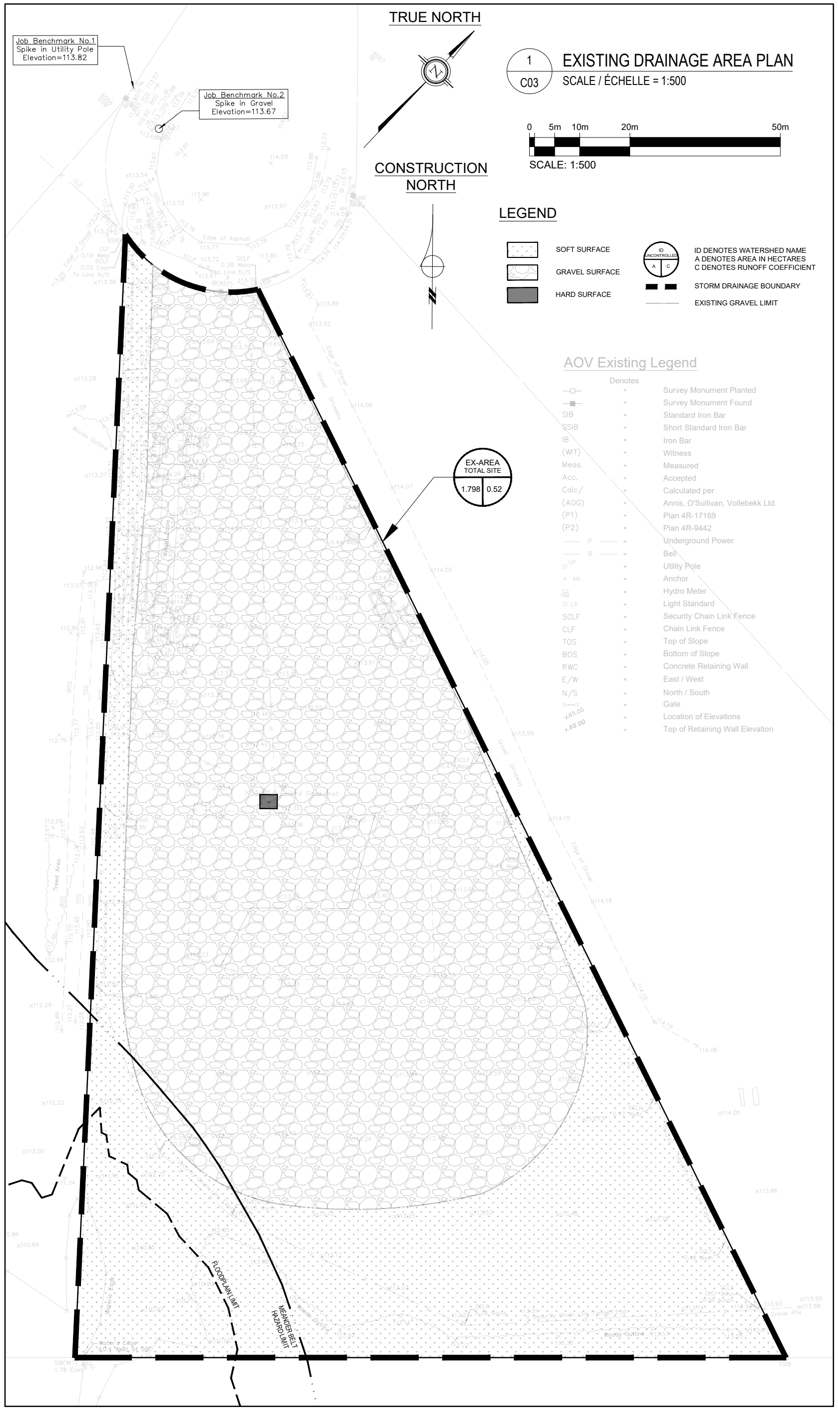
CLIENT REF. #:

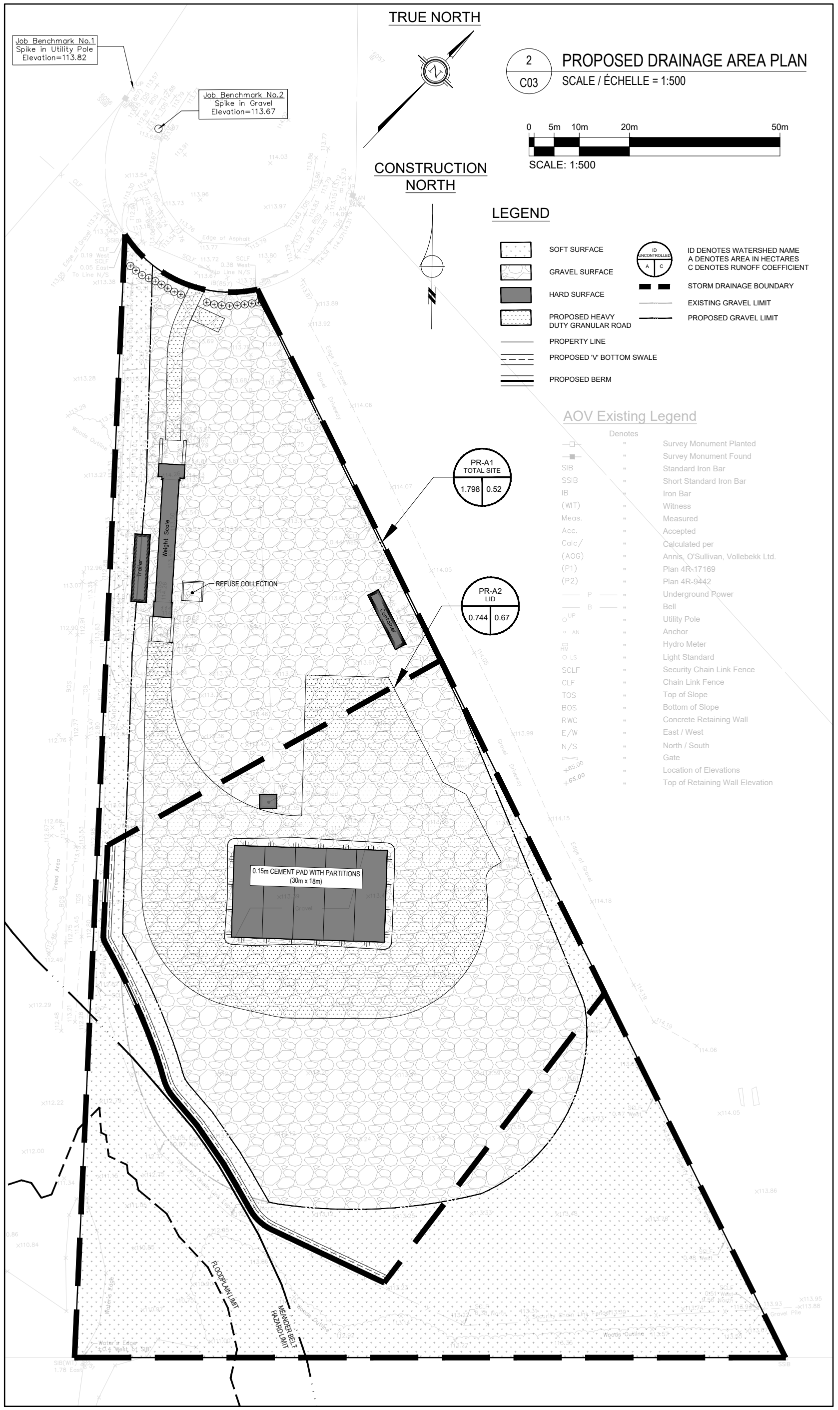
PROJECT:
225 MAPLE CREEK COURT
IRON RECYCLING FACILITY

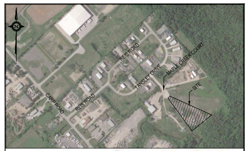
TITLE:
EROSION AND SEDIMENT CONTROL PLAN

DRAWING NUMBER: C02
REV. 3

CTB: wsp_ottawa.ctb
PLOTTED: 2024-06-12 - 4:03 PM
FILE: v:\10-13 me 2023 projects\ca0005492.9288 - 225 maple creek ct\14.0 tech_prof services\14.60_civil\3. drawings\working drawings\ca0005492.9288_c.dwg







ZANDERPLAN
Your rural land planning experts

GIM
GLENVIEW
IRON & METAL LTD.

REVISION:

REV	DATE	DESCRIPTION	BY
3	2024-06-12	REVISED PER CITY & MVCA COMMENTS	BL
2	2024-02-07	REVISED PER CITY COMMENTS	BL
1	2023-10-10	ISSUED FOR SITE PLAN APPROVAL	BL

SEAL:
REGISTERED PROFESSIONAL ENGINEER
B. LeBLANC
100504056
JUNE 12 2024
PROVINCE OF ONTARIO

ORIGINAL SCALE: 1:500
DATE: 2024-06-12
DESIGNED BY: SM/BL
DRAWN BY: SM
APPROVED BY: BL
IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE.
25mm
DISCIPLINE: CIVIL

wsp
WSP CANADA INC.
2611 QUEENSVIEW DRIVE, SUITE 300
OTTAWA ONTARIO K2B 8K2 CANADA
WSP.COM

PROJECT NUMBER: CA0005492.9288

CLIENT:
GLENVIEW IRON AND METAL

CLIENT REF. #:

PROJECT:
225 MAPLE CREEK COURT
IRON RECYCLING FACILITY

TITLE:
STORM DRAINAGE AREA PLAN

DRAWING NUMBER: C03
REV. 3

CTB: wsp_ottawa.ctb
PLOTTED: 2024-06-12 - 4:11 PM
FILE: v:\10-13 me 2023 projects\ca0005492.9288 - 225 maple creek ct\14.0 tech_prof services\14.60_civil\3. drawings\working drawings\ca0005492.9288_c.dwg

APPENDIX

C

SWM CALCULATIONS

Glenview Iron & Metal Ltd.
225 Maple Creek Court
Project: CA0005492.9288
Date: June 2024

TABLE 1 - Pre-Development EX-1 Total Site Uncontrolled Flow

Pre Dev run-off Coefficient "C"

			2 & 5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C"+25%	*C_{avg}
Total	Hard	0.001	1.00	**0.52**	1.00	**0.65**
1.798	Gravel	1.142	0.70		0.88	
	Soft	0.654	0.20		0.25	

Runoff Coefficient Equation
$C = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{tot}$
$*C = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{tot}$

*Runoff coefficients increased by 25% up to a maximum value of 0.99 for the 100-Year event

Pre Dev Free Flow
5 Year Event

Pre Dev.	C	Intensity	Area
5 Year	0.52	104.19	1.798
2.78CIA=	270.74		
270.70	L/S		

**Use a 10 minute time of concentration for 5 year

Pre Dev Free Flow
100 Year Event

Pre Dev.	C	Intensity	Area
100 Year	0.65	178.56	1.798
2.78CIA=	579.97		
580.00	L/S		

**Use a 10 minute time of concentration for 100 year

Equations:
Flow Equation
$Q = 2.78 \times C \times I \times A$
Where:
C is the runoff coefficient
I is the intensity of rainfall, City of Ottawa IDF
A is the total drainage area

Glenview Iron & Metal Ltd.
225 Maple Creek Court
Project: CA0005492.9288
Date: June 2024

TABLE 2 - Post-Development PR-A1 Total Site Uncontrolled Flow

Post Dev run-off Coefficient "C"

			2 & 5 Year Event		100 Year Event	
Area	**Surface**	**Ha**	**"C"**	**C_{avg}**	**"C"+25%**	**$^*C_{avg}$**
Total	Hard	0.074	1.00	**0.52**	1.00	**0.64**
1.798	Gravel	1.027	0.70		0.88	
	Soft	0.697	0.20		0.25	

Runoff Coefficient Equation

$C = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{tot}$

$^*C = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{tot}$

*Runoff coefficients increased by 25% up to a maximum value of 0.99 for the 100-Year event

Post Dev Free Flow
5 Year Event

Post Dev.	**C**	**Intensity**	**Area**
5 Year	0.52	104.19	1.798
2.78CIA=	270.88		
270.90	L/S		

**Use a 10 minute time of concentration for 5 year

Post Dev Free Flow
100 Year Event

Post Dev.	**C**	**Intensity**	**Area**
100 Year	0.64	178.56	1.798
2.78CIA=	571.34		
571.30	L/S		

**Use a 10 minute time of concentration for 100 year

Equations:

Flow Equation

Q = 2.78 x C x I x A

Where:

C is the runoff coefficient

I is the intensity of rainfall, City of Ottawa IDF

A is the total drainage area

Glenview Iron & Metal Ltd.
225 Maple Creek Court
Project: CA0005492.9288
Date: June 2024

TABLE 3 - Post-Development PR-A2 Controlled Flow

Runoff Coefficient Equation
$C = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{tot}$
$*C = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{tot}$

*Runoff coefficients increased by 25% up to a maximum value of 0.99 for the 100-Year event

Post Dev run-off Coefficient "C"

			2 & 5 Year Event		100 Year Event	
Area	**Surface**	**Ha**	**"C"**	**C_{avg}**	**"C"+25%**	**$*C_{avg}$**
Total	Hard	0.057	1.00	**0.67**	1.00	**0.82**
0.744	Gravel	0.607	0.70		0.88	
	Soft	0.081	0.20		0.25	

Post Dev Free Flow
5 Year Event

Post Dev.	C	Intensity	Area
5 Year	0.67	104.19	0.744
2.78CIA=	144.39		
144.40 L/S			

**Use a 10 minute time of concentration for 5 year

Post Dev Free Flow
100 Year Event

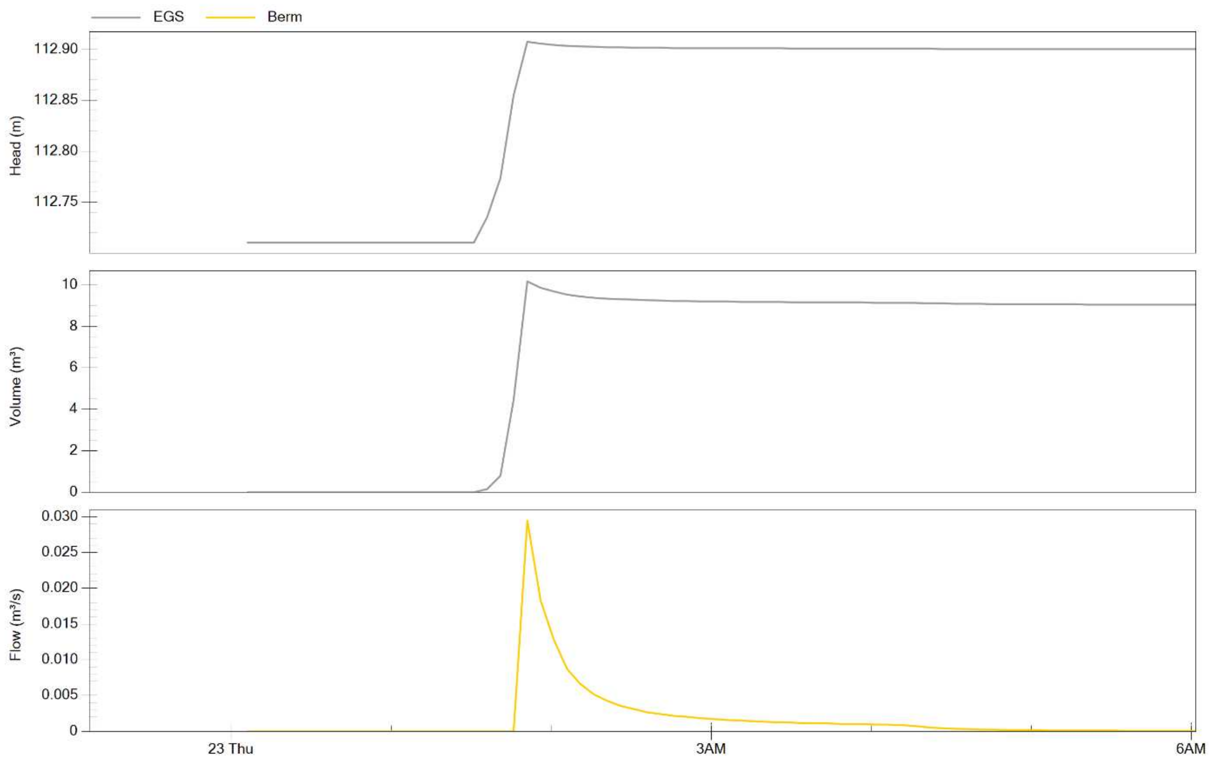
Post Dev.	C	Intensity	Area
100 Year	0.82	178.56	0.744
2.78CIA=	302.84		
302.80 L/S			

**Use a 10 minute time of concentration for 100 year

Equations:
Flow Equation
Q = 2.78 x C x I x A
Where:
C is the runoff coefficient
I is the intensity of rainfall, City of Ottawa IDF
A is the total drainage area

PCSWMM Modelling Results

10mm 4-hour Chicago Design Storm




```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.2 (Build 5.2.3)
------------------------------------------------------------


*************
Element Count
*************
Number of rain gages ...... 17
Number of subcatchments ... 1
Number of nodes ........... 2
Number of links ........... 1
Number of pollutants ...... 0
Number of land uses ....... 0


****************
Raingage Summary
****************
                                                    Data       Recording
Name                 Data Source                    Type       Interval
------------------------------------------------------------------------
100yr_3hr_Chicago    100yr_3hr_Chicago              INTENSITY   10 min.
100yr_3hr_Chicago_Climate_Change 100yr_3hr_Chicago_Increase_20percent INTENSITY   10 min.
100yr_6hr_Chicago    100yr_6hr_Chicago              INTENSITY   10 min.
100yr_6hr_Chicago_Climate_Change 100yr_6hr_Chicago_Increase_20percent INTENSITY   10 min.
10mm_4hr_Chicago     10mm_4hr_Chicago               INTENSITY   10 min.
10yr_3hr_Chicago     10yr_3hr_Chicago               INTENSITY   10 min.
10yr_6hr_Chicago     10yr_6hr_Chicago               INTENSITY   10 min.
25mm_3hr_Chicago     25mm_3hr_Chicago               INTENSITY   10 min.
25mm_4hr_Chicago     25mm_4hr_Chicago               INTENSITY   10 min.
25yr_3hr_Chicago     25yr_3hr_Chicago               INTENSITY   10 min.
25yr_6hr_Chicago     25yr_6hr_Chicago               INTENSITY   10 min.
2yr_3hr_Chicago      2yr_3hr_Chicago                INTENSITY   10 min.
2yr_6hr_Chicago      2yr_6hr_Chicago                INTENSITY   10 min.
50yr_3hr_Chicago     50yr_3hr_Chicago               INTENSITY   10 min.
50yr_6hr_Chicago     50yr_6hr_Chicago               INTENSITY   10 min.
5yr_3hr_Chicago      5yr_3hr_Chicago                INTENSITY   10 min.
5yr_6hr_Chicago      5yr_6hr_Chicago                INTENSITY   10 min.


********************
Subcatchment Summary
********************
Name                       Area     Width   %Imperv    %Slope Rain Gage            Outlet
```

```
--------------------------------------------------------------------------------------------------------------
S1                         0.75     85.76     69.34    1.1000 10mm_4hr_Chicago     EGS


************
Node Summary
************
                                          Invert      Max.    Ponded    External
Name                 Type                  Elev.     Depth      Area    Inflow  
--------------------------------------------------------------------------------
Outfall              OUTFALL              112.00      0.00       0.0
EGS                  STORAGE              112.71      0.89       0.0


************
Link Summary
************
Name             From Node        To Node          Type            Length    %Slope Roughness
---------------------------------------------------------------------------------------------
Berm             EGS              Outfall          WEIR


*********************
Cross Section Summary
*********************
                                       Full     Full     Hyd.     Max.   No. of     Full
Conduit          Shape                Depth     Area     Rad.    Width  Barrels     Flow
---------------------------------------------------------------------------------------


****************
Analysis Options
****************
Flow Units ............... CMS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ YES
  Water Quality .......... NO
Infiltration Method ...... HORTON
Flow Routing Method ...... DYNWAVE
Surcharge Method ......... EXTRAN
Starting Date ............ 07/23/2009 00:01:00
Ending Date .............. 07/24/2009 00:01:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:05:00
Wet Time Step ............ 00:05:00
Dry Time Step ............ 00:05:00
Routing Time Step ........ 1.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 20
Number of Threads ........ 1
Head Tolerance ........... 0.001500 m


**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Total Precipitation ......         0.008        10.004
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         0.002         3.067
Surface Runoff ...........         0.004         5.921
Final Storage ............         0.001         1.090
Continuity Error (%) .....        -0.733


**************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         0.004         0.045
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.000
External Outflow .........         0.004         0.036
Flooding Loss ............         0.000         0.000
Evaporation Loss .........         0.000         0.000
Exfiltration Loss ........         0.000         0.000
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.001         0.009
Continuity Error (%) .....         0.000


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


********************************
Highest Flow Instability Indexes
********************************
```

All links are stable.

****
Most Frequent Nonconverging Nodes
****
Convergence obtained at all time steps.

****
Routing Time Step Summary
****

Minimum Time Step	:	0.50 sec
Average Time Step	:	1.00 sec
Maximum Time Step	:	1.00 sec
% of Time in Steady State	:	0.00
Average Iterations per Step	:	2.00
% of Steps Not Converging	:	0.00
Time Step Frequencies	:	
1.000 - 0.871 sec	:	100.00 %
0.871 - 0.758 sec	:	0.00 %
0.758 - 0.660 sec	:	0.00 %
0.660 - 0.574 sec	:	0.00 %
0.574 - 0.500 sec	:	0.00 %

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
S1	10.00	0.00	0.00	3.07	5.92	0.00	5.92	0.04	0.03	0.592

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
Outfall	OUTFALL	0.00	0.00	112.00	0 00:00	0.00
EGS	STORAGE	0.18	0.20	112.91	0 01:50	0.20

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
Outfall	OUTFALL	0.000	0.030	0 01:50	0	0.0356	0.000
EGS	STORAGE	0.031	0.031	0 01:50	0.0447	0.0447	-0.015

****
Node Surcharge Summary
****

No nodes were surcharged.

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m³	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m³	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
EGS	0.008	1.3	0.0	0.0	0.010	1.6	0 01:50	0.030

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
Outfall	18.96	0.002	0.030	0.036
System	18.96	0.002	0.030	0.036

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
Berm	WEIR	0.030	0 01:50			0.01

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl

(Column group "Dry" through "Inlet Ctrl": ---------- Fraction of Time in Flow Class ----------)

****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Thu Jan 11 12:31:18 2024
Analysis ended on: Thu Jan 11 12:31:19 2024
Total elapsed time: 00:00:01

25mm 4 hour Chicago

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.2 (Build 5.2.3)
------------------------------------------------------------


*************
Element Count
*************
Number of rain gages ...... 17
Number of subcatchments ... 1
Number of nodes ........... 2
Number of links ........... 1
Number of pollutants ...... 0
Number of land uses ....... 0


****************
Raingage Summary
****************
                                                      Data       Recording
Name                 Data Source                      Type       Interval
------------------------------------------------------------------------
100yr_3hr_Chicago    100yr_3hr_Chicago                INTENSITY   10 min.
100yr_3hr_Chicago_Climate_Change 100yr_3hr_Chicago_Increase_20percent INTENSITY   10 min.
100yr_6hr_Chicago    100yr_6hr_Chicago                INTENSITY   10 min.
100yr_6hr_Chicago_Climate_Change 100yr_6hr_Chicago_Increase_20percent INTENSITY   10 min.
10mm_4hr_Chicago     10mm_4hr_Chicago                 INTENSITY   10 min.
10yr_3hr_Chicago     10yr_3hr_Chicago                 INTENSITY   10 min.
10yr_6hr_Chicago     10yr_6hr_Chicago                 INTENSITY   10 min.
25mm_3hr_Chicago     25mm_3hr_Chicago                 INTENSITY   10 min.
25mm_4hr_Chicago     25mm_4hr_Chicago                 INTENSITY   10 min.
25yr_3hr_Chicago     25yr_3hr_Chicago                 INTENSITY   10 min.
25yr_6hr_Chicago     25yr_6hr_Chicago                 INTENSITY   10 min.
2yr_3hr_Chicago      2yr_3hr_Chicago                  INTENSITY   10 min.
2yr_6hr_Chicago      2yr_6hr_Chicago                  INTENSITY   10 min.
50yr_3hr_Chicago     50yr_3hr_Chicago                 INTENSITY   10 min.
50yr_6hr_Chicago     50yr_6hr_Chicago                 INTENSITY   10 min.
5yr_3hr_Chicago      5yr_3hr_Chicago                  INTENSITY   10 min.
5yr_6hr_Chicago      5yr_6hr_Chicago                  INTENSITY   10 min.


********************
Subcatchment Summary
********************
Name                       Area     Width   %Imperv    %Slope Rain Gage            Outlet
-----------------------------------------------------------------------------------------------------------
S1                         0.75     85.76     69.34    1.1000 25mm_4hr_Chicago     EGS


************
Node Summary
************
                                           Invert      Max.    Ponded    External
Name                 Type                   Elev.     Depth      Area    Inflow
-------------------------------------------------------------------------------
Outfall              OUTFALL               112.00      0.00       0.0
EGS                  STORAGE               112.71      0.89       0.0


************
Link Summary
************
Name             From Node        To Node          Type            Length    %Slope Roughness
---------------------------------------------------------------------------------------------
Berm             EGS              Outfall          WEIR


*********************
Cross Section Summary
*********************
                                        Full     Full     Hyd.     Max.   No. of     Full
Conduit          Shape                 Depth     Area     Rad.    Width  Barrels     Flow
---------------------------------------------------------------------------------------


****************
Analysis Options
```

```
****************
Flow Units ............... CMS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ YES
  Water Quality .......... NO
Infiltration Method ...... HORTON
Flow Routing Method ...... DYNWAVE
Surcharge Method ......... EXTRAN
Starting Date ............ 07/23/2009 00:01:00
Ending Date .............. 07/24/2009 00:01:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:05:00
Wet Time Step ............ 00:05:00
Dry Time Step ............ 00:05:00
Routing Time Step ........ 1.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 20
Number of Threads ........ 1
Head Tolerance ........... 0.001500 m


**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Total Precipitation ......         0.019        25.000
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         0.006         7.664
Surface Runoff ...........         0.012        16.434
Final Storage ............         0.001         1.090
Continuity Error (%) .....        -0.754


**************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         0.012         0.124
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.000
External Outflow .........         0.011         0.115
Flooding Loss ............         0.000         0.000
Evaporation Loss .........         0.000         0.000
Exfiltration Loss ........         0.000         0.000
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.001         0.009
Continuity Error (%) .....         0.000


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


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


*********************************
Most Frequent Nonconverging Nodes
*********************************
Convergence obtained at all time steps.


*************************
Routing Time Step Summary
*************************
Minimum Time Step           :     0.50 sec
Average Time Step           :     1.00 sec
Maximum Time Step           :     1.00 sec
% of Time in Steady State   :     0.00
```

```
Average Iterations per Step :     2.00
% of Steps Not Converging   :     0.00
Time Step Frequencies       :
    1.000 -  0.871 sec      :   100.00 %
    0.871 -  0.758 sec      :     0.00 %
    0.758 -  0.660 sec      :     0.00 %
    0.660 -  0.574 sec      :     0.00 %
    0.574 -  0.500 sec      :     0.00 %
```

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
S1	25.00	0.00	0.00	7.66	16.43	0.00	16.43	0.12	0.09	0.657

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
Outfall	OUTFALL	0.00	0.00	112.00	0 00:00	0.00
EGS	STORAGE	0.18	0.21	112.92	0 01:30	0.21

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
Outfall	OUTFALL	0.000	0.091	0 01:30	0	0.115	0.000
EGS	STORAGE	0.092	0.092	0 01:30	0.124	0.124	-0.005

****
Node Surcharge Summary
****

No nodes were surcharged.

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m³	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m³	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
EGS	0.009	1.3	0.0	0.0	0.012	1.8	0 01:30	0.091

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
Outfall	21.61	0.006	0.091	0.115
System	21.61	0.006	0.091	0.115

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
Berm	WEIR	0.091	0 01:30			0.02

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl

(---------- Fraction of Time in Flow Class ----------)

****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Wed Jan 17 10:40:28 2024
Analysis ended on: Wed Jan 17 10:40:28 2024
Total elapsed time: < 1 sec