



## **Design, Operations and Closure Plan (DO&C)**

Sioux Narrows Waste Disposal Site

April 21, 2023

Prepared for:

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## DESIGN, OPERATIONS AND CLOSURE PLAN (DO&C)

April 21, 2023

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## DESIGN, OPERATIONS AND CLOSURE PLAN (DO&C)

### Abbreviations

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## Abbreviations

DO&C	Design Operations and Closure Plan
DOC	Dissolved Organic Carbon
ECA	Environmental Compliance Approval
ha	Hectare
km	Kilometres
m	Metres
m/s	Metres per second
m <sup>3</sup>	Cubic metres
masl	Metres Above Sea Level
mbgs	Metres Below Ground Surface
MECP	Ministry of the Environment, Conservation and Parks
mm	Millimetres
MNRF	Ministry of Natural Resources and Forestry
O. Reg.	Ontario Regulation
ODWS	Ontario Drinking Water Standards
OGS	Ontario Geologic Survey
PWQO	Provincial Water Quality Objectives
RUG	Reasonable Use Guideline
Stantec	Stantec Consulting Ltd.
TDS	Total Dissolved Solids
TGE	True Grit Engineering Ltd.



## **DESIGN, OPERATIONS AND CLOSURE PLAN (DO&C)**

### Abbreviations

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Township	Sioux Narrows – Nestor Falls
WDS, the Site	Waste Disposal Site
WTS	Waste Transfer Site



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## Introduction

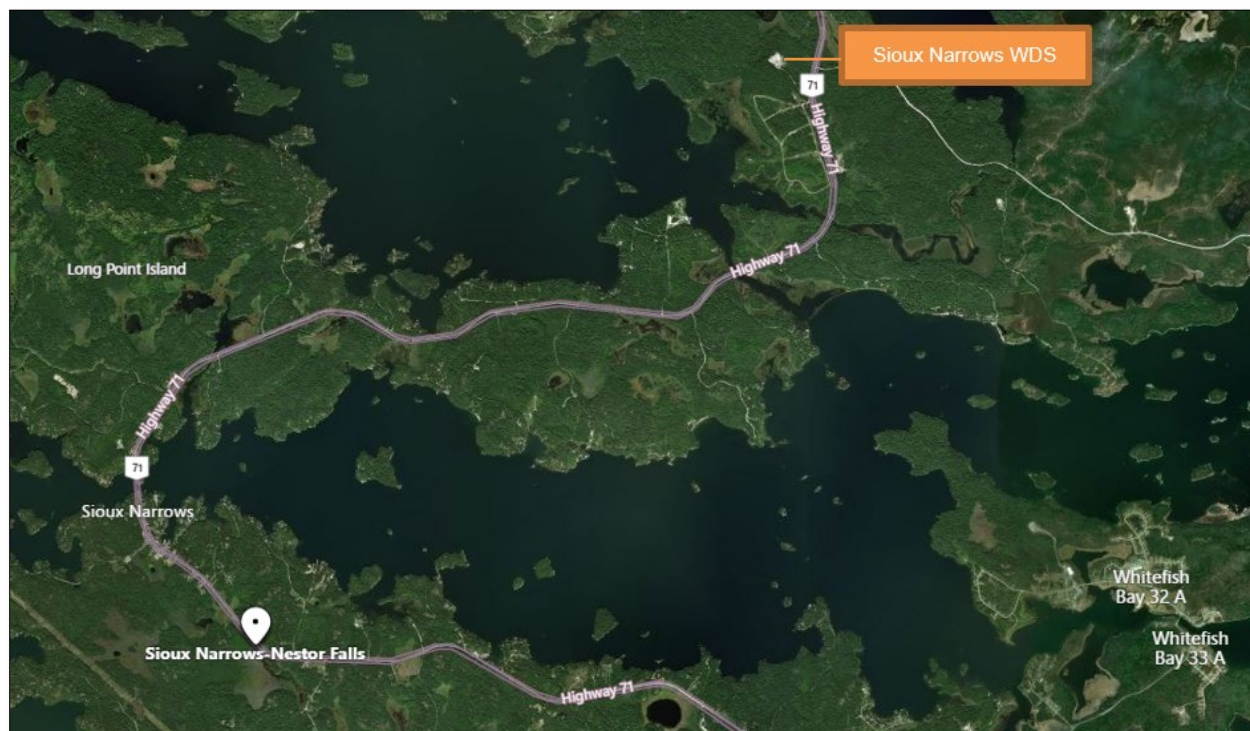
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## 1.0 INTRODUCTION

Stantec Consulting Ltd. (Stantec) was retained by the Township of Sioux Narrows – Nestor Falls (Township) to prepare a Design, Operations and Closure (DO&C) Plan and to assess the waste capacity of their existing Sioux Narrows waste disposal site (WDS, hereinafter referred to as the “Site”) in Sioux Narrows, Ontario.

The WDS is located approximately 10 kms (kilometres) northeast of Sioux Narrows, Ontario, west of Highway 71 in the district of Rainy River. The regional setting of the Site is shown on Figure 1-1, below. The WDS is governed by Ontario Ministry of the Environment, Conservation and Parks (MECP) Environmental Compliance Approval (ECA) Number A601102 issued December 30, 1991 (**Appendix B**).

**Figure 1-1: Sioux Narrows Regional Site Setting**



The purpose of this DO&C Plan is to provide the Township and the MECP with the necessary information and plans to: support interim and future stewardship of the WDS; to verify the remaining capacity at the landfill; to develop an interim design, operations and closure plan; advance closure readiness; and, to identify potential future waste management solutions for the Township's consideration. The Plan was prepared using guidance from Ontario Regulation (O. Reg.) 232/98 and the MECP supporting guideline entitled *Landfill Standards: A Guideline on the Regulatory and Approval Requirements for New or*



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*Expanding Landfill Sites* issued in May 1998, last revised in January 2012 (MECP Landfill Standards), to support imminent closure considerations and objectives. Although O. Reg. 232/98 does not apply to this Site because it is not a new or expanding landfill, the guidance provided in the Landfill Standards was considered in the preparation of this report.

## 1.1 BACKGROUND

The WDS operates under ECA A601102 issued on December 30, 1991. The landfill was established in 1977 in an old gravel pit in the former Township of Willingdon and has been in operation ever since. The landfill is used predominantly by local residents.

The ECA conditions issued in 1991 do not reflect typical compliance requirements found in more recent or modern approvals. For example, there are no requirements for annual water quality monitoring or reporting. As a result, in 2011, the Township elected to conduct voluntary groundwater monitoring as part of its own due diligence. Furthermore, the Site and the associated contaminant attenuation zone (CAZ) are located on Crown Land. While a historical land use permit (LUP) from the Kenora Office of the Ministry of Natural Resources and Forestry (MNRF) exists for the WDS (**Appendix B**), the LUP limits are not sufficient to encompass the WDS as well as the recommended CAZ. Stantec understands that the Township is currently working with MNRF to renew the LUP and expand the boundary to include the CAZ.

In 2018, True Grit Engineering Ltd. (TGE) conducted a study and proposed a theoretical waste volume capacity of 93,300 m<sup>3</sup> for the WDS. The results of the study were documented in the report entitled *Determination of Contaminant Attenuation Zone Limits, Sioux Narrows Waste Disposal Site, Sioux Narrows, Ontario*, Reference No. 17-347-09, dated January 25, 2018 (TGE, 2018).

In the 2021 water quality monitoring report prepared by Stantec (Stantec, 2022), the *in-situ* volume of waste was estimated to be 77,079 cubic metres (m<sup>3</sup>) and was calculated to be 82.6% of the total theoretical capacity of 93,300 m<sup>3</sup>. The average waste deposition rate is approximately 2,445 m<sup>3</sup> per year (including interim and daily cover), providing a remaining site life of approximately seven years (2023-2029) (Stantec, 2022).

The following list summarizes key information from the ECA:

- permits the use, location, and operation of a 10-hectare dump site;
- waste will be covered and compacted once a week, or more frequently, depending on use; and
- refuse may be burned at the Site with written approval and in accordance with MECP guidelines.

## 1.2 PURPOSE

The WDS is near capacity with approximately seven years of operational time remaining (ending in 2029). Recent MECP inspection reports have expressed the need for closure planning to commence. The DO&C Plan serves as a clear and concise document which details the design, operations, monitoring and



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proposed closure of the WDS for the protection of the environment and the health and safety of the public through implementation of landfilling techniques in accordance with approved standards and best management practices.

When the Township proceeds with submission of a formal closure plan to the MECP (typically two years before reaching capacity), it will trigger an amendment to the current 1991 ECA. At this time, the DO&C Plan will be used initially for internal planning purposes to support the future information requirements of a closure amendment application. The Plan is also intended to support interim discussion with MECP regarding environmental stewardship of the Site including, but not limited to: support procedures for waste management; water migration; contamination zone; and closure geometry. Lastly, the Plan will also help to further inform landfill operational procedures, direction for closure preparation and future use of the Site.

### 1.3 PROJECT UNCERTAINTY & LIMITATIONS

Stantec has prepared this DO&C Plan using the best available information sources known to date to develop conceptual closure plans for the WDS. The development of the DO&C Plan was established based on topographic information gathered in 2022 during a LiDAR aerial survey and through site investigations (test pit study), in addition to incorporating past monitoring studies for the WDS. Although the Plan was developed using reliable survey data, overall project uncertainty may have the potential to influence closure planning. As a result, these factors should be taken into consideration before initiating closure activities.

The Township holds an LUP (LUP #2452) that shows a 5-acre parcel on the Site. Stantec understands that the LUP does not include the CAZ, but that the Township is currently in the process of updating the LUP to include both the WDS limits and the CAZ. As the DO&C Plan is intended to support operational planning for closure, there is planning uncertainty and limitations for which this document may be used. As a result, recommendations related to risk mitigation have been included at the end of this document for the Township's consideration in navigating uncertainty related to closure planning. The following list is provided to identify limitations of the Plan based on current knowledge:

- Without a verified property boundary (or, in this case, LUP boundary), the closure design and footprint herein remain uncertain until verification of a valid LUP boundary is obtained for the necessary area, including the CAZ. In the absence of the LUP, there is risk that contamination or landfill waste is not on land that is in the care and control of the Township. Future changes to waste deposition or closure footprint should be discussed with MECP knowing that the Township is in the process of revising its LUP which would be incorporated into a future ECA amendment.
- Without a verified LUP boundary, placement of waste material is a potential risk for the Township, because it is possible that the boundary information could change the closure design. The formal closure plan activities should not be initiated until a valid LUP is in place.
- The current ECA does not include directives for closure parameters (i.e., waste capacity). Closure planning assumptions for the DO&C Plan were based on the 2018 CAZ analysis report (TGE, 2018),



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which was prepared (by request) and submitted to MECP. It is understood that the 2018 study is acceptable to the MECP although Stantec understands that MECP has not formally approved the CAZ recommendation. As a result, the 2018 CAZ and waste capacity references were applied to the DO&C Plan and were again verified based on the most recent topographic and water quality information to date.

- Changes in water quality concentrations, environmental factors (i.e., temperature, precipitation, groundwater recharge) and/or the approach in the operational management of the landfill between the date of this report and the planned closure date, could present additional considerations that influence closure assumptions. The closure plan should be reevaluated against current data prior to closure.
- While this Plan was established using the best information sources to date, Stantec is not responsible for future outcomes regarding amendment implications for the ECA or closure planning approvals.

## 1.4 SITE DESCRIPTION

Stantec oversaw completion of an aerial drone LiDAR topographic survey for the Site in October 2022 performed by Sumac Geomatics Ltd. Stantec also performed a Real Time Kinematic (RTK) Global Positioning System (GPS) survey of eight test pit locations within the footprint of the waste disposal area. The survey results and the existing Site features are illustrated on Drawings 1 and 2, including:

- Site topography as of October 2022;
- active waste deposition area;
- monitoring well locations; and
- location of miscellaneous site features (e.g., ancillary buildings, equipment storage).

## 1.5 ASSOCIATED REPORTS

The following reports related to the WDS were used as reference documents for the preparation of this DO&C Plan:

- MECP (2012) *Landfill Standards - A Guideline on the Regulatory and Approval Requirements for New or Expanding Landfill Sites*
- True Grit Consulting Ltd. and Stantec Consulting Ltd., Annual Water Quality Assessment Reports (2011-2021) for the Sioux Narrows Landfill
- True Grit Engineering Ltd. (2018) *Determination of Contaminant Attenuation Zone Limit, Sioux Narrows Waste Disposal Site*, Ref. No. 17-347-09.
- MECP Inspection Report dated December 2, 2021.





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- MECP (1994) *Guideline B-7 - Incorporation of the Reasonable Use Concept into MOEE Groundwater Management Activities of the Ontario Water Resources Act.*
- Ontario Regulation (O. Reg) 169/03: *Ontario Drinking Water Quality Standards* (2002).
- MECP (1994, updated online 2021) *Water management: policies, guidelines, provincial water quality objectives – Provincial Water Quality Objectives.*
- Sioux Narrows-Nestor Falls (2012) Official Plan and Zoning By-Laws.



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## 2.0 SITE SETTING

### 2.1 LOCATION AND DESCRIPTION

The WDS is located approximately 10 kms northeast of Sioux Narrows, Ontario, west of Highway 71 in the district of Rainy River and is accessed via a 0.5 km gravel road from Highway 71. The Site is approved for waste disposal within a total site area of 10 hectares (ha). A 24.4-ha CAZ for the WDS was established for the Site. The immediate land surrounding the WDS consists predominantly of undeveloped forested lands. The general site and waste features are shown on Drawings 1 and 2.

The WDS location area includes important water features, as shown on Drawing 3. A review of MECP well records indicates that there are registered groundwater wells in the vicinity of the landfill area. Within the immediate landfill area, well records identify groundwater monitoring wells associated with the landfill that are owned by the Township. The MECP well records do not indicate the presence of drinking water wells downgradient of the landfill. A residential water well is also located 600 m upgradient of the landfill on Highway 71. Surface water bodies located proximal to the WDS include an unnamed lake, located approximately 0.4 km north of the WDS, and Berry River, located approximately 0.6 km southwest of the WDS, which drains into Berry Lake. The WDS is currently located approximately 300 m northeast of a wetland that is connected to Lake of the Woods, which is a well-established recreational and property ownership area.

Under the approved 2011 Official Plan for Sioux Narrows-Nestor Falls, the WDS is situated on land designated as rural and, as shown on Schedule B of the Official Plan, is zoned as 'Waste Disposal'. The rural land use designation permits waste disposal sites. Due to the designation of landfill zoning, the Site is also considered as a 'Development Control Area' as lands designated on Schedule D in the Official Plan, where development requires special restriction. As a waste disposal site under the Development Control Area, permitted uses includes areas which have in the past been or are presently used as waste or sewage disposal landfill site and/or lagoons or other sewage treatment or disposal facilities. The control area ensures that new development and groundwater use does not occur within the vicinity of the landfill.

The surrounding land use at the WDS is primarily undeveloped forested lands; however, several land use features are found within the area and are shown on Drawing 3 based on information found within the Township's Official Plan. The boundary of Whitefish Bay Indian Reserve 32A land (Naothamegwaning First Nation) is adjacent to the WDS. There are also commercial tourist and rural residential land designation zones. These land users are located within 600 m and 1.5 kms of the WDS on Berry Lake and Lake of the Woods. No sensitive land use areas in the Official Plan are within close proximity of the WDS.



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## **2.2 TOPOGRAPHY AND DRAINAGE**

The Site is characterized by a topographical divide located at the approximate middle section of the Site causing the ground to slope moderately toward the northwest. The drainage slope leads northwest towards a small creek west of the landfilling area. The local topographic high point is a bedrock outcrop found north of the active fill area.

Generally, storm water drainage runs west but locally flows east towards the fire pond along the eastern portion of the Site. Storm water flow that drains to the west reports toward the westerly creek drainage. The approximate location of the fire pond and the creek are shown on Drawing 2.

## **2.3 GEOLOGY**

Ontario Geological Survey (OGS) Map No. 2554 (Quaternary Geology of Ontario, West-Central Sheet, Scale 1:1,000,000, 1991) indicates that surficial geology consists of undifferentiated igneous and metamorphic rock, exposed at the surface or covered by a discontinuous, thin layer of glacial drift deposits. OGS Map 2542 (Bedrock Geology of Ontario, West-Central Sheet, Scale 1:1,000,000, 1991) indicates bedrock geology consisting of mafic to intermediate metavolcanic rocks, minor metasedimentary and intrusive rocks.

Previous field work conducted at the WDS during monitoring well installation and test pitting events have provided indication of the overburden layer composition. The overburden beneath the landfill area is characterized by sandy clay deposits underlying the waste material to at least 8.3 metres below ground surface (mbgs). In the area northwest of the landfilling area, the overburden is characterized by a shallow silty sand layer underlain by silty clay and silty sand with cobbles. The depth to bedrock varies across the Site. Bedrock outcrops are located both north and south of the fill area.

## **2.4 HYDROGEOLOGY**

The primary pathway for groundwater flow at the WDS is through shallow overburden. The water table follows the general site topography, with underlying bedrock and surface flow generally moving northwest across the Site.

## **2.5 SITE LAYOUT AND EXISTING WASTE**

On September 13, 2022, Stantec completed a test pitting program at the WDS to establish the existing depth of waste and determine the total volume of waste in the WDS. A total of eight test pits were advanced through the WDS to delineate the horizontal and vertical limits of buried waste. A CAT 225 excavator was used to excavate within the WDS limits to assess the current site conditions and to verify the current waste depth and extent. Table 2-1 summarizes the depths to native soil in each test pit. Test pit locations are shown on Drawing 2.



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**Table 2-1: WDS Test Pit Depth Measurement to Native Soil September 2022**

Test Pit ID	UTM Coordinates		Waste Depth (mbgs)	Geologic Observation
	Northing	Easting		
TP1	5478221.772	426859.806	7.6	silt, clay, trace gravel and sand
TP2	5478252.826	426898.216	6.7	sand, gravel, silt
TP3	5478212.865	426896.893	5.2	sand, gravel
TP4	5478209.374	426930.007	4.9	bedrock
TP5	5478251.715	426946.799	4.0	sand, some gravel
TP6	5478215.370	426972.103	3.1	sand, stone, gravel, bedrock
TP7	5478165.943	426943.828	2.4	sand, some gravel
TP8	5478195.681	426991.865	4.6	sand, some gravel

Test pit data was also collected in 2017 to verify waste capacity and thickness (as measured from top of waste mound). The test pit depths are relative to the elevations of the WDS at the time of the test pit study and are shown in Table 2-2, below.

**Table 2-2: WDS Test Pit Depth measurement to Native Soil May 2017**

Test Pit ID	UTM Coordinates		Waste Depth (mbgs)**	Geologic Observations
	Northing	Easting		
TP100	426987.064	5478175.050	3.5	sandy silt
TP101	426986.528	5478196.039	5.0	sand
TP102	426976.058	5478208.149	4.0	sand
TP103	426950.764	5478202.696	4.2	bedrock
TP104	426939.898	5478198.763	2.8	bedrock
TP105	426950.185	5478228.050	5.2	bedrock
TP106	426968.637	5478244.123	4.4	bedrock
TP107	426942.101	5478264.492	4.9	Bedrock
TP108	426928.448	5478237.047	7.8	Sand
TP109	426912.622	5478490.763	1.5	Clay
TP110	426850.604	5478215.313	9.0	unknown*
TP111	426933.434	5478283.809	4.2	Bedrock
TP112	426908.179	5478262.709	5.6	Sand
1. * Note: Waste was encountered to the maximum depth achievable by the excavator. 2. ** Note: Waste depths relative to the elevation of the WDS in May 2017 3. Source: TGE 2018				

Coinciding with the 2022 test pitting program, a detailed topographical survey was conducted on October 18, 2022. The survey was processed in NAD83 CSRS2013 UTM zone15/CGVD 2013, with



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contours generated at a 25 cm interval. The LiDAR survey data was used to generate a digital terrain model (DTM) of the Site, which represents bare earth (vegetation removed) and was generated with 10 cm resolution.

The Site layout is presented on Drawing 2 and consists of the following features:

- Aboveground landfill area measuring approximately 1.8 ha in size;
- The existing in-situ waste volume of 70,000 m<sup>3</sup> as of fall 2022;
- Access roads leading to the landfilling areas;
- Perimeter fencing which extends from the northeast corner to the south side of the WDS;
- One bin for recyclable materials;
- One wood burning area;
- A scrap metal pile;
- A fire pond;
- A dozer storage shed;
- An operator shack; and
- An e-waste storage area (sea-can).



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### 3.0 WATER QUALITY CONDITIONS

Under the existing ECA for the landfill, there are no mandatory groundwater or surface water monitoring requirements stipulated within the ECA conditions. The Township performs an existing voluntary monitoring program that will be expanded and formalized at closure as part of an ECA amendment for closure. Currently, Site monitoring includes groundwater and surface water monitoring, via monitoring wells or surface grab sample stations, as summarized in Table 3-1. The sampling occurs at the Site twice per year, with one spring groundwater and surface water sampling event completed between May 15 and June 15, and a second surface water sampling event completed at least 60 days later.

**Table 3-1: Operational Water Quality Monitoring Program**

Sample Event	Matrix	Sample Location ID	Parameters
Spring (May 15 – June 15)	Groundwater	TH5, TH6, TH7, SP1	Calcium, magnesium, sodium, chloride, sulphate, nitrate, nitrite, hardness, alkalinity, pH, conductivity, total dissolved solids (TDS), metals, ammonia, dissolved organic carbon (DOC) and ion balances.
Summer or Fall (60 days following spring event)	Surface Water	Fire Pond, Creek 1, Creek 2	Calcium, magnesium, sodium, chloride, sulphate, nitrate, nitrite, hardness, alkalinity, pH, conductivity, TDS, metals, ammonia, un-ionized ammonia and DOC

### 3.1 GROUNDWATER MONITORING

#### 3.1.1 Monitoring Stations

In 1993, five groundwater monitoring wells (TH1, TH2, TH3, TH4, TH5) were installed at the Site. In 2011 and 2012, additional monitoring wells (SP1) and (TH6, TH7) were installed. Monitoring wells TH1, TH2, TH3 and TH4 are not monitored as the wells were either damaged or destroyed. To date, TH5, TH6, TH7 and SP1 are the active monitoring wells that remain on the Site. The current and historical wells are depicted on Drawing 2, and are described as follows:

- TH5: Located upgradient of the landfill area and serves as a suitable location to determine the reasonable use guideline (RUG) water quality criteria relative to contamination limits and attenuation zone planning, per the MECP Guideline B-7. The well is representative of background (natural) conditions.



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- TH6: Located within the waste fill area and is representative of leachate impacted groundwater conditions at the Site.
- TH7: Located downgradient of the WDS based on Site topography.
- SP1: Farthest downgradient monitoring well based on Site topography.

### 3.1.2 Groundwater Quality Criteria

Groundwater quality data is compared to criteria that is calculated based on the methods outlined in the MECP document Guideline B-7, *Incorporation of the Reasonable Use Concept into MOEE Groundwater Management Activities of the Ontario Water Resources Act* (MECP, 1994). The reasonable use guideline (RUG) criteria are calculated based on a rate that is 25% or 50% of the difference between background conditions and the drinking water quality standards based on O. Reg 169/03: Ontario Drinking Water Standard (ODWS) (2002). A RUG criterion is calculated for each analytical parameter based on the local background water quality sampling data from 2010 to present that is upgradient of the WDS. RUG criteria for each analytical parameter are calculated using the following formula:

$$C_m = C_b + x(C_r - C_b)$$

Where:

$C_m$  = RUG criterion

$C_b$  = Background concentration

$C_r$  = Maximum concentration based on Guideline B-7

$x$  = 0.5 for non-health or 0.25 for health-related parameters

Groundwater monitoring occurs at four locations (TH5, TH6, TH7 and SP1) and represents various conditions at the Site based on their location relative to the landfill deposition area. Historical groundwater quality data exists from 2011 to the present date.

## 3.2 SURFACE WATER MONITORING

### 3.2.1 Monitoring Stations

Surface water sampling is currently performed at three locations: Fire Pond, Creek 1 and Creek 2, as shown on Drawing 2.

- Fire Pond is located at the eastern edge of the landfill area and is affected by overland flow from the landfill and stagnant conditions.
- Creek 1 and Creek 2 are established to represent surface water conditions of water flowing northwest via a creek near the landfilling area. The Creek 1 station is known to be dry, which resulted in the addition of the Creek 2 sampling location.



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### 3.2.2 Surface Water Quality Criteria

Surface water quality data is compared to criteria that is established based on the Provincial Water Quality Objectives (PWQO) of the MECP (MECP, 2021).

## 3.3 SOIL CONDITIONS

Based on the historical site investigation work completed at the Site and as confirmed based on the September 13, 2022 test pit investigations, the landfill area's natural soil conditions consist mainly of sandy clay and sand deposits underlying the waste material. The northwest portion of the landfilling area is characterized by a shallow silty sand layer, underlain by silty clay sand with cobbles (KGS, 1993). The depth to bedrock varies across the Site, ranging from 0.31 mbgs at TH2 to 8.53 mbgs at TH3 (KGS, 1993). In the surrounding area, bedrock outcrops are found on the north side of the Site.

## 3.4 GROUNDWATER CONDITIONS

### 3.4.1 Groundwater Quantity

Based on the 2021 annual water quality report for the landfill, static groundwater levels at the Site for TH5, TH6, TH7 and SP1 ranged from 1.44 to 3.26 metres below top of pipe (mbtp), with groundwater geodetic elevations ranging from 335.53 to 351.27 metres above sea level (masl). Groundwater contours have not been interpreted at the Site between monitoring wells TH6, TH7 and SP1 because the horizontal separation between the monitoring well locations was not sufficient to define a water table surface. Based on the local bedrock formation and surficial topography, groundwater at the Site is understood to flow northwest towards the local wetland. The topographical divide that transects the Site is likely to influence local groundwater flow.

Hydraulic conductivity for the Site was modelled in the 2021 annual water quality report at stations SP1 and TH7. The screened interval was in soils identified as silty sand and cobbles. The hydraulic conductivity was calculated using Aqtesolv Pro software using the Bouwer-Rice solution method. The Site is characterized as having a hydraulic conductivity of  $1.3 \times 10^{-6}$  metres per second (m/s) and  $1.6 \times 10^{-5}$  m/s for SP1 and TH7, respectively. These findings are consistent with literature values.

### 3.4.2 Groundwater Quality

Downgradient of the landfill area, elevated concentrations of parameters that are typical of the source well (TH6) conditions were measured at monitoring well TH7. Historically, exceedances based on RUG criteria are generally associated with TDS, DOC, nitrate, sodium, boron, manganese, and uranium. ODWS upper limit concentration exceedances also exist for hardness and alkalinity. Concentrations of leachate indicator parameters at TH7 are lower than at TH6 (source well), indicating that attenuation processes are occurring.





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The downgradient conditions at TH7 follow an improvement trend to SP1, which is the farthest downgradient well at the Site. At SP1, the overall groundwater monitoring data demonstrated improved water quality with decreased concentrations of leachate indicator parameters. The parameters that exceeded RUG criteria at SP1 were TDS, DOC, iron, manganese, and uranium. The source of elevated iron at SP1 is unknown and is not following historical trends relative to TH6 and TH7. Concentrations of TDS, chloride, sodium and manganese are not characteristic of the background water quality at monitoring well TH5 and, as a result, the exceedances at downgradient monitors are likely a result of the landfilling activity.

While RUG exceedances are noted within the historical data trends for the WDS, the decreased elevations between TH7 and SP1 demonstrate that the attenuation process is working as expected. The proposed CAZ boundary is located 180 m farther downgradient of SP1. Given the trending decrease in concentrations between TH7 and SP1, it is expected that water leaving the CAZ will meet RUG criteria. Confirmation of the improved attenuation with increasing distance from the WDS can be done by expanding the existing groundwater monitoring well network; however, previous attempts to expand the monitoring network have been difficult due to shallow bedrock outcropping and access issues (i.e., thick brush, topographical relief).

### 3.5 SURFACE WATER CONDITIONS

Groundwater associated with the WDS is likely hydraulically connected to the surface water condition of Creek 2, as evidenced by PWQO exceedances. Overall, the data trends suggest that water quality between Creek 1 and Creek 2 improves, with concentrations higher in Creek 1, located closer to the WDS area. Consistent PWQO exceedances at these locations are measured for boron, cobalt, copper, iron, vanadium, and zinc. These trends are likely to be improved with regular covering of exposed waste to limit water infiltration. Furthermore, data from the Fire Pond shows fewer exceedances relative to the PWQO criteria than Creek 2 samples. Overall, no historical trends for leachate indicator parameters in surface water for Creek 2 or the Fire Pond could be made.

### 3.6 ATTENUATION ZONE

In 2018, TGE completed a study of the landfill to determine the CAZ using a mass balance approach. The approach assumed that a given volume of leachate is generated from the water surplus in the landfill footprint, which is then diluted by the water surplus within the CAZ. Based on the report, the CAZ was calculated to be 24.4 ha, based on a proposed length of 403 m downgradient of the waste footprint (within an overall length of 692 m E-W) and a width of approximately 350 m, which provides for a 100 m wide buffer surrounding the WDS footprint. The CAZ is shown to scale on Drawing 10 and is described with expanded detail in Section 4.6. Figure 3-1 shows a non-scaled image of the CAZ relative to the landfill and surrounding land features.



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**Figure 3-1: Proposed Contaminant Attenuation Zone**



Source: TGE 2018



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## 4.0 PROPOSED SITE DESIGN

### 4.1 OVERVIEW

Based on the current volumetric capacity assessments completed by Stantec (Stantec, 2022) using LiDAR and test pit data, the total estimated *in-situ* waste and interim cover material volume is 70,000 m<sup>3</sup>. The 2022 LiDAR survey has verified the site footprint area at 1.8 ha.

The proposed closure design provides for a total capacity of 93,300 m<sup>3</sup> within the maximum overall footprint established of 1.8 ha. Based on these figures, the current waste capacity assessment shows that there is 23,300 m<sup>3</sup> of *in-situ* waste deposition capacity remaining within the current waste footprint.

Table 4-1 provides a summary of site conditions and proposed site design assumptions that will be applied to closure planning for the Sioux Narrow WDS.

**Table 4-1: Site Conditions and Proposed Design Assumptions for Closure**

Item	Proposed Design Assumption
Waste Characteristics	Domestic, non-hazardous, solid
Service Area	Township of Sioux Narrows
Waste Footprint Area	1.8 ha
Total Site Capacity	93,300 m <sup>3</sup>
Waste Disposal Method	Aboveground disposal
Buffer Zone (fire break)	Min 30 m from the limit of the landfill area, max 100 m
Leachate Management	Natural attenuation
Attenuation Zone	24.4 ha (approximately 692 m E-W and 350 m N-S)
Side Slopes	Max 4H:1V
Waste Top Slope	Min 20H:1V (5%)
Final Cover	600 millimetres (mm) low permeability soil (i.e., silt, silty fine sand, clay)
Organic Layer	150 mm thick & hydroseeded
Groundwater/Surface Water Monitoring	Monitoring wells, surface water monitoring locations
E-waste	Can be accommodated by future transfer station.
Tire Collection	Can be accommodated by future transfer station.
Scrap Metal/White Goods	Can be accommodated by future transfer station.



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## **4.2 WASTE CHARACTERISTICS**

The waste deposition recorded at the landfill in recent years includes categories related to non-hazardous solid waste. The WDS is not permitted for, and does not currently accept or manage, hazardous waste disposal items (i.e., used oil, batteries, paint). In previous years, the Township has temporarily accepted hazardous waste and stored it within a trailer on Site. These hazardous waste items require removal by an MECP-licensed carrier approved for the appropriate waste classes requiring removal. As the landfill was established in 1977, and officially permitted in 1991, there is a lack of verified data regarding the complete history of waste acceptance/deposition over time.

Under Ontario's Producer Responsibility programs, existing and future (if a transfer station is proposed for the landfill's end use) waste could be managed through individual programs established to manage Municipal Hazardous waste (e.g., paint, used oil, antifreeze, batteries, fertilizers), used tires, waste electrical & electronic equipment, and scrap metals/white goods. The Township may elect to establish/manage these programs at the Nestor Falls landfill if a transfer station/depot at the Sioux Narrows WDS is not practicable.

As an alternative to a depot, the Township could establish one or two designated days per year when residents may bring their hazardous waste items to the landfill for scheduled pick up by a licensed handler. The following types of waste are proposed for this initiative: e-waste (as defined by Reg. 347); used oil (Ontario Waste Class 252); lead-acid batteries (Ontario Waste Class 112); and paint (Ontario Waste Class 145).

## **4.3 LANDFILL AREA AND TOTAL SITE AREA**

As the WDS is nearing its capacity, the Township has indicated that it plans to close the Site once capacity is reached. The landfill footprint area was calculated in 2018 by TGE and was anticipated to be 1.8 ha based on the Site conditions at that time, topography, and anticipated closure slope geometry. The forecasted closure footprint is well within the existing 10 ha area limit specified by the ECA. Based on the current LiDAR data and Site conditions, the projected closure model estimates that 1.8 ha will be needed for closure of the waste footprint. If the Township wants to recognize the CAZ within an ECA amendment, the total Site area would need to be increased to 24.2 ha (assuming control of the CAZ is granted to the Township through an updated MNR LUP). If the post-closure end use is to continue operations as a transfer facility, it would be prudent that the LUP also include the buffer land to the east of the WDS up to the Highway 71 corridor so that the Township has permission for the continued use of the entrance road (this buffer does not need to be incorporated into a revised ECA).

## **4.4 LANDFILL CAPACITY AND WASTE CAPACITY**

The WDS ECA does not provide an approved closure capacity for the landfill. The landfill capacity was calculated in 2018 by TGE and was anticipated to be 93,300 m<sup>3</sup> based on the Site conditions at that time, topography, and anticipated conceptual closure slope geometry. Within the current context of waste deposited since 2018, and taking into consideration closure design objectives, the final waste capacity



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(excluding final cover design) was confirmed at 93,300 m<sup>3</sup>. Based on this information, the landfill currently has 23,300 m<sup>3</sup> of remaining capacity for waste deposition at this time.

Based on the most recent data in the 2021 annual water quality assessment report, the volume of compacted waste deposited at the WDS between 2019 and 2022 was 3,212 m<sup>3</sup> (maximum), 2,452 m<sup>3</sup>, 2,483 m<sup>3</sup>, and 1,632 m<sup>3</sup>, respectively. Using these compacted waste volumes, an average yearly deposition rate of 2,445 m<sup>3</sup> per year can be calculated. Ignoring the outlier (1,632 m<sup>3</sup>), the average annual rate increases to be 2,715 m<sup>3</sup> per year.

By applying a landfiling rate between 2,445 m<sup>3</sup> (average) and 3,212 m<sup>3</sup> (maximum) per year, the proposed design is anticipated to provide between seven and nine years of remaining capacity for the landfill. To be conservative, this DO&C Plan has assumed a remaining service life of seven years (ending in 2029). The details of the Site development and final closure design is provided in Section 5 and Section 12, respectively.

## 4.5 BUFFER ZONE

A buffer zone of at least 30 m from the limits of the landfill area should be maintained on the Site to be compliant with MECP landfill standards. The buffer zones are shown on Drawing 8 and consist of the following widths; 50 m north, 50 m south, 100 m west and 116 m east. When the waste footprint is added to these buffers, it delineates an area of 250 m N-S and 400 m E-W and encompasses an area of 10 ha.

## 4.6 CONTAMINATION ATTENUATION ZONE

The CAZ is required to ensure that lands under which groundwater has been impacted by landfill leachate are properly managed to limit groundwater development. The size of the CAZ must be estimated with as much accuracy as possible and then monitored to ensure that it is sufficient. In 2018, TGE calculated the CAZ for the WDS using a mass balance approach (Drawing 10). The CAZ calculations take into consideration the following equation values shown in Table 4-2. The subsequent summary of information demonstrates TGE's calculation approach for the CAZ. All values have been reviewed and are consistent with current Site data and information.

**Table 4-2: Contamination Attenuation Zone Equation Variables**

Description	Symbol	Value	Source
Maximum capacity of municipal waste	V	93,300 m <sup>3</sup>	Proposed maximum waste volume (TGE, 2018)
Area of waste footprint	A	17,934 m <sup>2</sup> rounded to 1.8 ha for discussion purposes in report	Proposed waste limits for landfill (TGE, 2018)
Length perpendicular to groundwater flow	L	144 m	Measured from 2018 conceptual closure model (TGE, 2018)
Width	W	1 m	Assumed width of the plane



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**Table 4-2: Contamination Attenuation Zone Equation Variables**

Description	Symbol	Value	Source
Runoff Coefficient		0.18	MTO Drainage Management Manual – Design Chart 1.07 (October 1997)
Water surplus		0.15 m/year	Brown, D.M. et al. Temporal and Spatial Variability of Water Surplus in Ontario, Canada. 2013.
Maximum permissible chloride concentration (downgradient)	$C_m$	131 mg/L	2016 Water Quality Assessment, prepared by TGE, dated March 27, 2017.

Source: TGE 2018

**Infiltration:** Based on a runoff coefficient of 0.18 for an area with sand with 10-30% slopes of woodland (MTO, 1997) and an annual water surplus of approximately 150 mm for Sioux Narrows area (D.M. Brown, 2013), the infiltration rate at the Site was estimated to be  $0.15 \text{ m/year} \times (1 - 0.18) = 0.123 \text{ m/year}$ . Based on conservation of mass, the leachate volume ( $V_L$ ) was assumed to be equivalent to the infiltration volume of the landfill area ( $V_{inf}$ ).  $V_L$  is calculated as shown below:

$$V_L = V_{inf} = A * D$$

$$V_L = 17,934 \text{ m}^2 * 0.123 \text{ m/year} = 2,206 \text{ m}^3/\text{year}$$

**Source Chloride Concentration:** In order to calculate the size of the required CAZ, it is necessary to know the source concentration of the contaminant of concern. Gehrels and Puumala (2000) determined that the critical contaminant in leachate at a naturally attenuating landfill site is chloride. Chloride is used for this analysis because it is present at elevated levels in domestic waste. Unlike other contaminants present, chloride can only be attenuated by dilution and is therefore a good tracer. Based on this study, the predicted source chloride can be derived from the following equation:

$$C_L = 0.00098V + 463$$

$C_L$  is the source chloride concentration (in mg/L)

$V$  is the maximum site capacity (in  $\text{m}^3$ )

This form of the equation represents the 95% confidence interval for the data observed in the Gehrels and Puumala study making it appropriate for conservative estimates.

$$C_{cl} = 554.4 \text{ mg/L}$$

This result is consistent with historical results at TH6 (source well) which have ranged between 139 and 629 mg/L chloride for the years 2011, 2012, 2016 and 2018.

**Attenuation Zone Calculation:** The size of the attenuation was calculated based on the following assumptions:

- Chloride concentration in the leachate ( $C_L$ ) is equal to 554.4 mg/L



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- Maximum acceptable chloride concentration at the downgradient CAZ boundary ( $C_m$ ) is equal to 131 mg/L
- The leachate volume ( $V_L$ ) generated is 2,206 m<sup>3</sup>/year as calculated above

Using a mass balance, the following formula is derived:

$$C_L V_L + C_A V_A = C_m V_m$$

Where:

- $C_A$  is the concentration of chloride from infiltration of dilution water in the CAZ (assumed to be negligible)
- $V_A$  is the attenuation volume
- $C_m$  is the maximum concentration of chloride at the attenuation boundary (131 mg/L as calculated above)
- $V_m$  is the sum of the attenuation and landfill volumes ( $V_A + V_L$ )

$$C_L V_L + 0 = C_m * (V_A + V_L)$$

$$V_A = \frac{C_L V_L - C_m V_L}{C_m}$$

$$\begin{aligned} V_A &= \frac{554.4 \text{ mg/L} * 2,206 \text{ m}^3/\text{year} - 131 \text{ mg/L} * 2,206 \text{ m}^3/\text{year}}{131 \text{ mg/L}} \\ &= 7,129.93 \text{ m}^3/\text{year} \end{aligned}$$

The attenuation area is calculated below.

$$7,129.93 \text{ m}^3/\text{year} = A_A * 0.123 \text{ m/year}$$

$$A_A = 57,967 \text{ m}^2$$

Using the length of the landfill that is perpendicular to the groundwater flow direction (~144 m), the proposed length of the CAZ downgradient of the footprint is 403 m and represents an area of 5.8 ha. The proposed CAZ must also consider potential flux along the WDS side slopes on the north, south and east sides (within the 100 m buffers) that increases the CAZ to 24.2 ha (692 m E-W by 350 m N-S), as shown on Drawings 8 and 10.



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## **4.7 CURRENT SITE FACILITIES**

The WDS does not contain a wide array of buildings or facility features. All Site facilities are shown on Drawing 2. The following list described the existing Site facilities and storage areas:

- **Sheds:** There are three sheds located on the property for storage of equipment and materials.
- **Wood Waste Storage/Burn Area:** There is a small wood storage pile and burn area. Burning is conducted once a year during the winter.
- **E-waste:** The Site utilizes a sea-can as an e-waste depot for electronic devices.
- **Tire Storage:** The Township segregates tires.
- **Metal Storage:** The Township segregates metals into a specific storage area. Appliances are collected and stored within the metal storage pile if they are tagged and proven to be drained of hazardous chemicals.
- **Hazardous Waste Trailer:** The Township has hazardous waste on Site that requires removal by a certified disposal agency. Collection of hazardous waste is prohibited unless conducted under a Producer Responsibility program.

## **4.8 INTERIM COVER MATERIAL**

Landfill sites accepting domestic solid waste are required to use an interim cover material during operations. Interim cover is used for purposes such as: minimizing erosion of landfill waste; minimizing blowing litter; reducing landfill odours; discouraging vermin and vector activity; and improving vehicular access to the active disposal area. Interim cover is applied when waste is not scheduled to be deposited in a specified area for 12 months or more.

Interim cover material will typically consist of a 0.15 m to 0.3 m thick layer of soil and will be stockpiled in convenient locations so that it is readily available for cover as required. The application of the interim cover material will follow the operational procedures described in Section 10.6.

## **4.9 FINAL COVER**

The final cover layer has been designed to allow a controlled infiltration rate that will reduce the long-term maintenance and monitoring requirements over the contaminating lifespan of the Site. The design elements for the cover materials are detailed in the Site Closure Plan (Section 12.0).





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## **4.10 SITE CLOSURE AND END USE**

A detailed site closure plan is described in Section 12.0. At this time, the Township is anticipating that the end use plan for the WDS will be as a waste transfer station. The Site closure plan and end use plan will be submitted to the MECP for approval prior to implementation.



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## 5.0 SITE DEVELOPMENT

### 5.1 GENERAL

Development of the WDS has occurred over several decades since the landfill's inception in 1977. Given the advanced operational stage of the landfill, waste deposition will be performed in alignment with the prescribed closure geometry defined in Section 12.0, Site Closure Plan and Drawing 9. The WDS will advance progressive closure by placing final cover in the northward section of the landfill that has reached vertical capacity relative to the closure design.

The remaining active landfill deposition area will occur within the middle and eastern portions of the landfill footprint, as shown in Drawing 9. Fill sequencing for the active landfill area should be arranged to meet the final waste elevations. The active disposal area will be minimized to the extent possible to control litter, odour, and exposure of waste. The waste will be compacted using a landfill bulldozer (two to three passes) and covered by daily cover materials weekly.

### 5.2 SEQUENCING

Final development of the landfill leading up to closure will be carried out in a sequenced manner to optimize waste deposition in support of the final closure elevation and geometric design. To establish the waste deposition sequence for the final seven years of operational landfill life, the Site was divided into five zones (Drawing 9). The overall waste disposal sequence focuses waste placement in a progressive manner that will close the Site from back to front as landfill elevations are progressively met.

The zone-related volume objectives are undefined and the number of years that it takes to reach the ideal volume deposition within each zone will vary because the assumed average waste deposition rate may not be consistent year to year. Township staff will operate the landfill by directing waste deposition to the appropriate active zoning area, while also tracking volume deposition by zone, to meet the final closure elevation objectives. The existing waste sideslopes along the western WDS limit (Zone 1) are currently steeper than the design final slope of 4H:1V and will require the relocation of approximately 7,000 cubic metres of waste to the zone areas with available capacity (i.e., Zones 2 and 3, Drawing 9). As the existing ground along the west limit already has a pronounced slope, the option to flatten this slope to the desired profile is not practical.

The final closure design is presented on Drawings 4 to 8. Based on the closure design, an operational waste deposition sequence is shown on Drawing 9.

Once the west slope has been regraded to the proposed limits of waste as shown on Drawings 5 to 7 at a slope of 4H:1V, the area should be progressively capped using low permeability soils (600 mm thick) and an organic layer (150 mm thick and hydroseeded). The specification of the capping (borrow) materials and organic layer are provided in Section 12.2.3.



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## **6.0 LEACHATE MANAGEMENT**

### **6.1 GENERAL**

Leachate is generated as water, usually originating as precipitation falling on the landfill and percolating through the waste, as well as excess liquid within the waste that filters through the waste mass. Although the chemical makeup and generation rate of leachate will vary with moisture content, composition, and age of the waste, landfill leachate from domestic waste landfills is generally high in DOC, biochemical oxygen demand (BOD), chemical oxygen demand (COD), dissolved and colloidal solids (TDS and TSS), and soluble ions, including heavy metals.

The WDS does not have a leachate management system or mandatory groundwater monitoring program required by their current ECA. As a result, the landfill relies on a natural attenuation design, where leachate is managed through naturally occurring degradation processes in the subsurface prior to groundwater discharge to receptors such as surface water bodies. The existing voluntary monitoring program will be expanded and formalized at closure as part of an ECA amendment. The expanded monitoring program will allow for further assessment of water quality and proactive leachate management by way of measuring the efficacy of the attenuation process.

### **6.2 LEACHATE CHARACTERIZATION AND SITE PERFORMANCE EVALUATION**

Groundwater and surface water sampling at the WDS is conducted to assess groundwater and surface water for physical and chemical evidence of leachate impact. When samples are collected, qualitative evidence of leachate is noted where colour and odour is present. Quantitative evidence is evaluated through a review of laboratory analytical results for leachate indicator parameters. Benzene, cadmium, chloride, lead, 1,4-dichlorobenzene, dichloromethane, toluene, and vinyl chloride are listed as potential leachate contaminant parameters from waste disposal sites in O. Reg. 232/98. Based on experience at other sites in northern Ontario, chloride is expected to be the primary parameter of concern (usually the most prevalent and also highly mobile) and, therefore, modelled chloride concentrations are used to assess the CAZ.

## **7.0 SURFACE WATER MANAGEMENT**

### **7.1 GENERAL**

The WDS does not have a mandatory surface water management plan based on the current ECA conditions. The Township voluntarily performs surface water monitoring as an aspect of due diligence and environmental stewardship. Township staff ensure that potential environmental impacts including flood risk, water quality and quantity, and erosion and sediment control are managed through operations, and



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that mitigative measures are applied as/when necessary. The Site runoff during operation and after closure will be directed by the topography and the proposed perimeter ditches to the nearby ditch along the west limit, to the pond to the east and forested areas. It is anticipated that a surface water management plan will be formalized at closure as part of the future ECA amendment.

## **7.2 OPERATING CONDITIONS**

As explained in Section 3.0, during the operation of the WDS, site surface runoff water drains to the Fire Pond and a northwesterly located creek. In closure, a proposed perimeter ditch will be constructed to capture runoff water from the landfill slopes along the east, west, and north slopes. Site drainage will generally be directed to the southeastern areas of the WDS and will drain via the perimeter ditch for dispersion within the forested area, as shown on Drawing 8.

The proposed drainage ditches will be trapezoid shaped with a 0.5 to 1.0 m wide bottom and daylighting using 3H:1V slopes. The bottom of the ditch should not exceed 1 m depth except where a deeper bottom is required to slacken slope to prevent erosion. Natural processes and hydroseeding of slopes will be required to establish a vegetative cover to prevent erosion. Details on ditch construction will be provided with the closure application to confirm that it can manage a 1:100-year storm.

## **7.3 FINAL CLOSURE CONDITIONS**

The proposed final WDS contours prior to placement of capping materials are presented on Drawings 5 to 8. All perimeter ditches and drainages, both existing or newly constructed, will be maintained during and after the final closure of the Site.

Due to the low permeability soils used in the final cover, minimal infiltration will take place within the closure area. Most of the runoff in the closure area will run towards the south and east areas to the forested areas.



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## **8.0 LANDFILL GAS MANAGEMENT**

Landfill gas is generated during the decomposition of the organic component of the landfill waste. The gas is produced until the available organic material has been exhausted. The objective of a landfill gas control system, therefore, is not to prevent the generation of landfill gas, but rather to provide the necessary means of controlling its migration. Gas control is typically provided by diverting the gas flow through natural or induced systems, by providing sufficient buffer space for venting of gas to surface or by the presence of physical barriers such as water features or clay seals.

This Site is not anticipated to generate significant quantities of landfill gas. The Site is located within an isolated forested setting with shallow overburden underlain by bedrock or clay, with the nearest residential property located more than 600 m away; therefore, we do not anticipate that landfill gas poses a concern that requires mitigation.

During the operation and closure of the WDS, it is not anticipated that new buildings will be developed in the landfill area. If this is not the case, mitigative measures (such as a vapour barrier and a coarse granular layer for venting beneath the building slab) should be considered. With placement of a final cover, the lateral extent of landfill gas migration is anticipated to increase and any existing on-site buildings that are not removed during the closure activities should be assessed for potential locations for gas accumulation (typically maintenance sheds have sufficient ventilation to prevent gas accumulation).

Based on our assessment of physical features that minimize the potential for migration of landfill gas generated at the Site and the lack of proximal receptors, a landfill gas monitoring program is not proposed.



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## **9.0 SITE FACILITIES**

### **9.1 SITE ACCESS**

Site access is controlled by a lockable swing gate at the only access road – SN Landfill Road (Drawing 1). The landfill is located approximately 0.5 km west from Highway 71 and is isolated by forested rural land. The gate is open to the public during the designated operating hours as set out in Section 10.2.

### **9.2 SIGNS**

A sign is posted at the main entrance of the Site, displaying the following information:

- Name of the Site;
- Operating authority;
- Site ECA number;
- Types of waste accepted;
- Hours and days of operation;
- Contact information for the facility;
- Emergency contact information;
- Warning against unauthorized access; and
- Warning against dumping outside the Site.

Directional signs are posted in the appropriate locations throughout the Site.

### **9.3 SITE EQUIPMENT**

The Site is operated and maintained by the Township of Sioux Narrows – Nestor Falls or a qualified contractor working under contract with the Township. Heavy equipment utilized at the landfill includes tracked equipment for compaction; stationary waste compactor; waste handling equipment; and equipment to maintain clearings or for snow removal.



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## **9.4 SITE BUILDINGS**

The buildings on Site include three storage sheds and a sea-can that are located toward the southern side of the landfill area (Drawing 2). It is expected that these structures are sufficient for the continued operation of the landfill Site. No new buildings are proposed or understood to be required.

## **9.5 WASTE STORAGE FEATURES**

Several waste storage segregation areas and/or storages are established at the WDS and are shown on Drawing 2. The following waste storage features are found at the WDS:

- Household recycling (paper, cardboard, plastic, glass) is accepted and stored within bins located at the east side of the landfill.
- E-Waste is accepted and stored within a centrally located sea-can.
- Segregated stockpile areas for acceptance of tires, scrap metal, and white goods – some of these are subject to the Producer Responsibility programs.
- Construction waste zone (southern front portion of landfill).



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## **10.0 SITE OPERATIONS**

### **10.1 WASTE DELIVERY**

The service area of the Site is intended for those located within the Township of Sioux Narrows – Nestor Falls which has a population of approximately 727 based on the 2021 census information. The WDS is primarily used by permanent residents in the Sioux Narrows area, which is roughly half of the overall Township population. Individual households are responsible for transporting their own waste to the Site during the operating hours. No formal waste pickup service exists in Sioux Narrows.

### **10.2 SITE SUPERVISION**

The WDS is operated by the Township using qualified personnel. One site supervisor is on site during operating hours.

The supervisor is responsible for accepting or rejecting waste loads, placing waste and cover material, record keeping, site inspection, and housekeeping. In addition, the supervisor is responsible for maintaining environmental controls including dust, litter, odour, and noise, as required.

The supervisor of the Site maintains site security and ensures that all persons entering the Site are authorized to do so. The main access gate is locked outside of normal operating hours to prohibit vehicle entrance and uncontrolled disposal when the Site is closed. All vehicles entering the Site are checked by the site attendant prior to any disposal activities.

### **10.3 STAFF TRAINING**

The Township will ensure that all landfill employees are adequately trained with respect to the technical requirements of operation the Site. This will include, but is not limited to: health and safety training; Township waste management by-laws, operation of heavy equipment (for qualified operators); waste management legislation (WHMIS and other regulation and guidelines); control of nuisance conditions; and record keeping and reporting. It is also beneficial for staff to be trained on biological hazards, be current on their inoculation and have First Aid training.

### **10.4 HOURS OF OPERATION**

The operating hours for the Site will remain the same and are listed as follows:

- May 1 to September 30 (summer hours):
  - 8:00 am – 11:30 am Wednesdays through Sundays (closed Mondays and Tuesdays)





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- October 1 to April 30 (winter hours):
  - 9:00 am – 11:30 am on Tuesdays, Thursdays, and Saturdays

## **10.5 SITE SAFETY**

The safety of personnel undertaking any activity on Site is of paramount importance. The following is a list of specific considerations about the operation of the WDS:

- For bulldozing operations that shape and compact waste – these activities should be primarily conducted when the Site is closed to the public. If operations are done during open hours, where mobile equipment is operating, site staff should close the work area from the general public by posting signs or other physical measures.
- For staff safety, personnel other than equipment operators should stay away from the operations area and not approach mobile equipment while in operation. If contact with the equipment operator becomes necessary, they should not approach equipment until they have received visual contact or radio contact from the operator before proceeding into the machine work area.
- Disposal of unauthorized materials must be reported immediately.
- All relevant requirements of the Occupational Health and Safety Act will be followed.

## **10.6 NORMAL OPERATIONS**

Section 5.0, Site Development, provided details on the sequence and operations of the WDS. In general, waste will be deposited in a manner that minimizes the exposure of the working face of the landfill area. The primary objective of advanced stage landfill operations will be to deposit waste in a progressive sequence, from the back to the front of the landfill, as an orderly means to meet the final closure elevations and design.

Deposited waste will be compacted as required using a bulldozer. Cover materials (150 mm thick) will be applied to all the exposed waste weekly from May 15 to October 15 and biweekly for the rest of the year. Once the final closure geometry is reached, waste materials will be capped with appropriate low permeability materials.

## **10.7 WINTER OPERATIONS**

Winter operations at the landfill follow the same methods described for normal operations with the exception of snow clearing of landfill area access roads. Cleared snow is temporarily stockpiled within the Site and eventually melts and is drained by the current established surface water drainage pathway. The temporary stockpiles are placed such that melt water will not contact the waste. Snow is plowed toward the Fire Pond where it will melt and drain away from the Site.



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Daily cover material stockpiles will be placed near the active working face for placement as practical during winter conditions. Often, it is not possible to apply cover material during the winter due to frozen soil conditions. This is a limitation of small northern landfill management. Cover material should be applied immediately in the spring once soil has thawed.

## 10.8 BURNING

Under the existing ECA, Condition 1 states that burning of waste is not permitted. Notwithstanding, refuse may be burned at the landfill site if: a) written approval by a District Officer is provided and b) burning is done in accordance with the MECP's Guideline C-7 *Burning at Landfill Site*.

Currently, the landfill operates a small wood waste pile at the WDS. The burning of clean wood waste is scheduled during the winter months. Burning shall be undertaken when wind conditions are appropriate, burn piles are small in size so a fire can be extinguished if needed, staff supervises the burning and has the equipment/resources (sand stockpile) available to extinguish the burn if weather conditions change, burn pile locations maintain an adequate fire break to nearby trees, and staff obtains any necessary burn permits (if needed by MNRF or Township by-laws).

## 10.9 SCRAP METALS

Scrap metals are segregated in a designated metal storage area. Air conditioners, freezers, and refrigerators must display a tag or notice signed by a certified technician indicating that the fluorocarbons known as CFCs, HCFCs or HFCs have been removed. The Township will refuse acceptance of these products at the landfill unless the Township's waste management by-law develops a procedure to accept and stockpile (in a separate area from the scrap metal pile) these types of products. In this case, the Township would need to retain a certified technician to remove the refrigerant before this material can be removed from the Site.

## 10.10 E-WASTE COLLECTION

The e-waste received at the WDS is collected and stored in a pre-engineered heavy gauge steel sea-can. The Township will not treat, process or dispose of the e-waste on Site. The only management of waste done at the Site will be collection, handling, and storage of waste electrical and electronic equipment. The e-waste is transferred from the Site to an MECP-licensed carrier (Producer Responsibility program) for final processing of these materials.

## 10.11 ENVIRONMENTAL CONTROLS

### 10.11.1 Fire Control

Any sign of smoke or fire should be reported immediately to the emergency number posted at the entrance sign (usually 911). Usually, the local Fire Department would be the first point of contact along with the Townships Public Works Dept (to open gates and advise equipment operators). The fire



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department has been made aware of the risk of fire associated with the WDS and is prepared to respond to landfill emergencies. Note that the Sioux Narrows Fire Department is composed of volunteers and is not a full-time professional firefighting service. Heavy equipment located on Site will also be used to manipulate the waste and cover materials to aid in smothering the fire in a safe manner.

#### 10.11.2 Dust Control

Dust generation is a common environmental occurrence associated with landfill operations. Roadways and landfill cover materials create source emissions of dust particles that can be problematic during dry weather spells (loss of daily cover exposes waste to vectors). Maintenance of road or traffic areas is ongoing and is part of the Township's Road Maintenance Program. The road maintenance related to dust control includes water application to limit dust emissions. Dust emanating from the landfill waste area is controlled through compaction and cover, applied during low wind periods where possible. The Site is surrounded by forest and there are no sensitive receptors nearby; although during windy conditions when dust is generated, conditions are appropriate for plastic and other debris subject to wind-blown influence to be dislodged and captured by the trees. At minimum, a spring and fall cleanup is typically warranted to maintain an adequate visual appearance.

#### 10.11.3 Litter Control

Wind-blown litter is another environmental occurrence both on and off the WDS. On Site, waste is blown away during the dumping and compaction operations. Use of interim cover materials will mitigate against wind transport of waste. Additionally, the treed buffer zone around the perimeter of the WDS will act as a control to catch windblown litter from escaping the working area. The occurrence of off-site litter happens when waste has been blown or falls from the waste transport vehicles. Off-site litter control includes enforcing the use of tarps or other cover alternatives during transportation of the waste. A biannual clean-up should be completed to collect blown litter from the Site.

#### 10.11.4 Noise Control

Landfill noise is generated from waste vehicles travelling to and from the Site, localized traffic on Site, and from heavy equipment used in landfill operations. As cover placement and other construction activities will only occur on an infrequent basis, noise levels at nearby receptors from heavy equipment should be minor when compared to the traffic generated along Highway 71. As the nearest private property owners are located more than 500 m from the waste footprint, the existing forest will provide a natural visual and noise control buffer.

#### 10.11.5 Odour Control

Odours originating from a landfill site are generated from incoming waste, special wastes, aerobic decomposition of exposed waste, and anaerobic decomposition of buried waste. Odour is controlled with regular compaction of the waste after disposal, regular placement of daily and interim cover soils, and by minimizing the exposed working area.



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**10.11.6 Vector and Vermin Control**

Vectors and vermin are generally attracted to waste due to the availability of food and potential breeding areas within the waste. As with landfill odours, this issue can be controlled with proper compaction of the waste after disposal, regular placement of cover soils and by minimizing the working area. In situations where vermin cannot be controlled solely by covering of the waste, an extermination program carried out by a licensed exterminator may be required to re-establish control of this nuisance. Implementation of a bait program and monthly inspection of the Site by the exterminator may be required over a period of several months until control over the situation is achieved.

**10.12 UNAUTHORIZED ENTRY AND SCAVENGING**

No scavenging of waste materials will be permitted at the Site. The entrance gate will be kept closed and locked at all times with access only by authorized personnel.

**10.13 INSPECTION, COMPLAINTS AND RECORD KEEPING**

Township inspection of the landfill is completed on a weekly basis to evaluate items such as general site development, day-to-day landfill operations, schedule of construction activities, staff compliance and environmental control measures including drainage features (ditches), interim site cover, and ensuring that litter is not being windblown or dumped off-site. Any noted problems or infractions are attended to immediately.

Complaints received by landfill personnel will be documented. The landfill personnel will undertake corrective action(s) as soon as possible after identification of need.

The landfill personnel will ensure that all material entering the Site has been tracked, and is estimated for volume, source and type of waste. The landfill does not have a weigh scale. As a result, waste deposition is assumed by vehicle type. The applied volumes assumptions related to record keeping are shown in Table 10-1.

**Table 10-1: Waste Volume by Vehicle Type**

<b>Vehicle Type</b>	<b>Uncompacted Waste Volume (m<sup>3</sup>) Estimation</b>
Car	0.5
½ Ton Truck	1.8
Trailer	1.8
Tandem Truck	12
Commercial Truck	30



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## **10.14 TOPOGRAPHICAL SURVEY AND LANDFILL VOLUME UPDATE**

A topographic survey for the Site will be conducted by qualified persons on a two to three year basis to determine the *in-situ* volume of the waste and cover materials placed since the last survey. The last survey at the time of the DO&C issuance was completed in 2022. The next scheduled topographical survey should be completed in 2024 or 2025.



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## 11.0 SITE MONITORING

### 11.1 PROPOSED CONCEPTUAL CLOSURE MONITORING PLAN

The current ECA for the landfill does not include a mandatory condition related to water quality monitoring. The voluntary groundwater and surface water quality monitoring that is performed by the Township shall continue as is summarized in Section 3.0. In addition to the current water quality monitoring, it is recommended that additional groundwater and surface water monitoring locations are included in support of closure to monitor the landfill attenuation process and surface water interaction following landfill closure.

The current groundwater and surface water monitoring and sampling program shall be continued for a period of five years following closure to measure water quality at and downgradient of the Site and assess the site's compliance with RUG. Sampling is proposed to occur twice per year, with one spring groundwater and surface water sampling event completed during May or June, and a second surface water sampling event completed at least 60 days later. Additional closure monitoring stations are also recommended at the Site to further assess water quality and compliance with RUG in relation to the outer extent of the CAZ. The proposed analytical program will consist of parameters listed in Schedule 5 of O. Reg. 232/98 (Landfill Standards Guideline). The monitoring locations proposed for closure, including new stations denoted with an asterisk, are described below in Table 11-1 and are shown on Drawing 8.

**Table 11-1: Proposed Analytical Surface and Groundwater Quality Program**

Sample Event	Matrix	Sample Location ID	Parameters
Spring	Groundwater	TH5, TH6, TH7, SP1, SP2*	Calcium, magnesium, sodium, chloride, sulphate, nitrate, nitrite, hardness, alkalinity, pH, conductivity, total dissolved solids (TDS), metals, ammonia, dissolved organic carbon (DOC) and ion balances.
Spring and Fall	Surface Water	Fire Pond, Creek 1, Creek 2, Creek 3*	Calcium, magnesium, sodium, chloride, sulphate, nitrate, nitrite, hardness, alkalinity, pH, conductivity, TDS, metals, ammonia, un-ionized ammonia and DOC
Note: * indicates new proposed monitoring stations			

Additional groundwater and surface water sampling stations are preliminarily identified for closure monitoring of the landfill to confirm attenuation processes and migration of contaminants. The new stations are proposed to align with likely regulator expectations. The additional stations identified in Table 11-1 include one groundwater station and one surface water station, referred to as SP2 and Creek 3, respectively. These stations are included in the closure monitoring program for the following reasons, as summarized:



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SP2	situated at boundary of the CAZ to verify that groundwater contaminants are not migrating past the CAZ boundary
Creek 3	situated at the boundary of the CAZ to verify that surface water contaminants are not migrating past the CAZ boundary

The new monitoring stations suggested in Table 11-1 are conceptual at this time. Future field investigation is needed to determine the ground and topographic suitability to access the monitoring locations. Previous attempts to install new groundwater monitoring wells with a drill rig closer to the downgradient CAZ boundary have not been successful due to the presence of rugged terrain and thick brush. Manual installation (i.e., via hand auger) of SP2 may be possible; alternatively, clearing of an access route to the drill location would most certainly be required.

If manual installation or access is not possible or feasible for SP2 and/or Creek 3, these stations would be removed from the closure monitoring program prior to the ECA amendment. In this scenario, the monitoring program would rely on the existing sampling locations. It is recommended that a memo is drafted to capture the results of the field investigation related to SP2 well installation and access for SP2 and Creek 3. Prior to the ECA amendment, Section 11.0 should be revised to reflect and support the final approach for monitoring, with justifying rationale for why the farthest extent of the CAZ will not be monitored (if that is the outcome).

The remainder of Section 11.0 discusses the sampling protocols and assessment approach, with the assumption that SP2 will be implemented, as the preferred option.

## 11.2 MONITORING AND SAMPLING PROTOCOLS

The approach for monitoring and sampling will be conducted in alignment with the below descriptions:

- The condition of each monitoring well will be assessed and recorded during each monitoring event. Where damage to the monitoring wells are observed, recommendations for repair and/or replacement will be provided.
- Static groundwater levels in each monitoring well will be measured relative to the top of the riser pipes using a water level meter.
- Prior to sample collection, an aliquot of groundwater from each well will be field tested for pH, temperature, and conductivity.
- Following water level measurements and field parameter testing, standing water should be purged from each well to obtain fresh formation water for collection and analysis. Dedicated sampling equipment should be used to purge three to ten well casing volumes of groundwater from each well. Where wells are purged dry, the well should be allowed to recover to within 80% of the initial static water level, then purged dry a second time prior to sample collection.



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- Groundwater samples will be collected directly from the sampling equipment into clean laboratory-supplied bottles. When appropriate based on the sample type and lab procedures, the sample bottle and cap will be rinsed three times with sample water before filling the bottle. Samples for cations should be field-filtered using 0.45-micron inline filters into laboratory-supplied sample bottles pre-charged with a nitric acid preservative.
- Prior to collecting surface water samples, levels of pH, temperature, dissolved oxygen, and conductivity will field tested. Surface water samples will be collected by dipping the sample bottles into the water while taking care to minimize disturbances of bottom sediment.
- All samples will be stored in chilled insulated containers and shipped under Chain of Custody to an accredited laboratory for chemical analysis of the proposed parameters.
- Standard field QA/QC will be implemented following procedures outlined in the MECP document *Guidance and Analytical Methods for Use at Contaminated Sites in Ontario* (1996). Blind duplicate samples will be submitted to the laboratory to check analytical consistency using relative percent difference (RPD) to indicate result precision. A conservative RPD value of 20% is used to trigger a reassessment of the original and duplicate sample results.

## 11.3 WATER QUALITY ASSESSMENT CRITERIA

### 11.3.1 Groundwater Criteria

The groundwater quality criteria will follow the same approach as is described in Section 3.1.2, Groundwater Quality Data, by incorporating the methods outlined in Guideline B-7 for RUG criteria, and ODWS based on O. Reg 169/03.

For compliance purposes, the RUG criteria apply only in groundwater within the designated boundary. The assumption of drinking water as the reasonable use for groundwater for the purposes of RUG is considered conservative since there are no established downgradient groundwater users within 1 km of the Site.

Currently, RUG criteria have been calculated based on background levels considered to be represented by the geometric mean of results from monitoring well TH5, located upgradient of the disposal area, using data from 2010 to the present date.

### 11.3.2 Surface Water Criteria

Surface water quality data is compared to criteria that is established based on the Provincial Water Quality Objectives (PWQO) of the MECP (MECP, 2021).





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## 11.4 TRIGGER PROGRAM AND CONTINGENCY PLANS

### 11.4.1 Trigger Criteria

Trigger wells are used to indicate action response to contamination beyond approved limited. As a result, SP2 is proposed as the trigger well as it will be situated closest to the downgradient CAZ boundary; the proposed location of SP2 is shown on Drawing 8. If SP2 cannot be installed, the trigger well would become SP1.

Based on the 2010 to 2021 groundwater chemistry and typical landfill leachate parameters, the trigger parameters are proposed to be chloride and sodium. These parameters are conservative indicators because each would be expected to migrate at a faster rate downgradient of the site than many other RUG parameters. Increasing chloride and sodium concentrations in the trigger wells will be an early indication of the advancing leachate plume. The trigger criteria were developed using 75% of the RUG criteria calculated using the ODWS criteria. The proposed trigger criteria are provided in Table 11-2 and provide response time to develop contingency measures prior to potential off site exceedances of groundwater that does not meet RUG criteria.

**Table 11-2: Trigger Well RUG Criteria**

Parameter	RUG Criteria (mg/L)	Trigger Criteria (mg/L)
Chloride	131	98
Sodium	110	83

### 11.4.2 Trigger Responses

If a trigger exceedance occurs as a result of a laboratory sampling bias or error, the sample will be reanalyzed (if possible) and checked again during the next sampling event.

If groundwater quality trends suggest the trigger exceedance is the result of groundwater impacts, the result will be confirmed by additional sampling within one month of the receipt of analytical results. If the trigger exceedance is not confirmed, the additional sampling results are included and discussed in the annual report and documented, but no further action is required. If the confirmatory sample shows a valid groundwater trigger exceedance, the contingency plans will be executed.

### 11.4.3 Contingency Plan

In the event that a trigger exceedance is confirmed, further actions will be required. Specific options would be developed by a qualified engineer or geoscientist based on the groundwater sampling and monitoring data available at that time. These steps could include increasing the CAZ and/or making adjustments to site monitoring. Action will be taken to determine if impacts are relevant to local land and



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water values or water users. MECP will be consulted to review the data and approve the corrective response.

## **11.5 REPORTING**

Annual reporting of Site monitoring results will be performed in accordance with the amended ECA requirements.



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## 12.0 SITE CLOSURE PLAN

### 12.1 END OF LIFE AND CAPACITY

The WDS is an existing landfill Site with a present *in-situ* volume of 70,000 m<sup>3</sup> relative to a final proposed capacity of 93,300 m<sup>3</sup>. Based on a 2022 LiDAR topographic survey, the landfill has approximately 23,000 m<sup>3</sup> of remaining landfill capacity. Based on an annual deposition rate of 3,212 m<sup>3</sup> (average waste deposition between 2019 and 2022), it is anticipated that the landfill has approximately seven years of operational life remaining. Therefore, a conservative estimate for closure is calculated to be 2029. The proposed final closure design is intended to meet the final closure requirements in O. Reg. 232/98. Final closure design plans and cross-sections are provided as Drawings 5 to 7.

### 12.2 CLOSURE DESIGN OVERVIEW

The proposed final closure design is intended to meet the final closure requirements outlined in O. Reg. 232/98. The final waste area will be 1.8 ha, which falls within the 10 ha WDS footprint allowance specified in the ECA. The final closure design and cross-sections are provided on Drawings 5 to 7.

Final cover slopes were designed to promote stability while maximizing surface water runoff and minimizing infiltration. The final contours were also designed to fit the end use plan for the Site, with the goal of minimizing the amount of reshaping required for the landfill at closure. Additionally, the final contours were selected such that erosion and sediment transport would be minimized. As shown on Drawings 6 and 7, the final cover will have a minimum top slope of 20H:1V and side slopes with a maximum 4H:1V.

Surface water control for the WDS includes several features to support the long-term physical and chemical stability of the Site and surrounding land area. Ditch features are included in the design to direct water away from the CAZ and toward the southeastern forested area of the WDS. Water infiltration within the landfill will be mitigated by impermeable cover material, to reduce groundwater/waste interaction.

Finally, the closure design concept includes provisional planning for a waste transfer station. The landfill entrance area will be prepared and levelled to support future development of a Waste Transfer Site (WTS). A travel road/lane at the landfill near the current entrance area will be left for future maintenance or site access purposes.

### 12.3 CLOSURE PROCEDURES

#### 12.3.1 Public Notification

Residents and businesses of Sioux Narrows as well as Naotkamegwanning First Nation (Whitefish Bay Indian Reserve) will be notified in advance of Site closure. Signage will be posted at the entrance of the



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landfill indicating the closure of the Site, contact information, and alternative waste disposal arrangements.

Two years prior to the WDS reaching its total disposal volume capacity, the Township will prepare and submit a formal closure report to the MECP. The report will detail site closure activities and post-closure care requirements in further detail for items such as: notification procedures; completion and ongoing final cover and contouring; end use; final construction of environmental controls; post-closure operation, maintenance and monitoring activities.

### 12.3.2 Site Preparation

Before the Site can be closed with final cover materials and graded, several activities will occur in support of site preparation:

- Waste that is found outside of the active deposition area will be cleaned up and disposed of. This may include advancing suitable materials for recycling destinations and retrieving windblown litter or other items for placement within the landfill, as appropriate. All waste should be within the waste footprint.
- Based on the site development approach outlined in Section 5.2, waste will be deposited in a manner that progressively meets the closure design elevation and contours. Waste filling will progress from the west limit towards the east.
- Landfill side slopes that are steeper than 4H:1V (i.e., north, and southeast slopes) will be contoured using an excavator to move excess material inwards until a 4H:1V slope is achieved. The waste should be placed within the active area, following the development outlined in Section 5.2. The side slopes will have final cover applied.
- Materials for closure will be sourced prior to commencing closure activities (i.e., cover materials, coarse rock, seed).

### 12.3.3 Decommissioning of Site Structures

The remaining e-waste storage (sea-can) and sheds will be removed from the Site and delivered to a recycling facility. Alternatively, the sea-can and sheds may be retained for future use at the waste transfer station. Retained site buildings will be evaluated for safety and protection against landfill gas migration.

### 12.3.4 Site Grading and Surface Water Management

As the waste reaches its final contours as the active face advances from west to east, final cover should be applied to the finished grade. Placement of final cover progressively following the sequencing shown on Drawing 9 will allow vegetation to take hold and reduce the loss of cover material from wind action, as well as promote surface water runoff and reduce water infiltration and leachate generation. The perimeter of the Site will also be graded to match the surrounding topography. The top of the WDS will be graded



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20H:1V (5% decline) to encourage positive drainage directing the majority of surface water runoff towards the southeast area of the Site via perimeter ditches. Landfill side slopes will be graded to a maximum of 4H:1V. The perimeter ditch system will capture slope run off, which will be diverted towards the south and east forested areas of the Site. The perimeter ditches will be graded to prevent erosion, with vegetation growth along the side slopes (minimum 3H:1V) to aid stability and minimize bank sloughing.

### 12.3.5 Final Cover & Vegetation

The final cover layer will be applied once the final closure elevation and geometry have been met. The final cover material is designed to control the water infiltration rate through the closed landfill. By reducing water infiltration, the long-term maintenance and monitoring requirements over the contaminating lifespan of the Site will also be reduced. The cross-section view and the details of the final cover are shown on Drawings 6 and 7. The design elements for the cover materials include the following:

- 600 mm thickness of low permeability soil, such as silt, silty fine sand, or clay. The preferred final cover material is silty fine sand because it retains moisture for vegetative growth and does not crack like clay in hot, dry weather.
- 150 mm thickness of an organic layer will be applied over the silty sand layer. The organic layer will be hydroseeded which includes mulch and fertilizer. The hydroseeding specification will follow the Ministry of Transportation standards for road use.
- Vegetative cover will be encouraged via hydroseeding and will rely on natural regeneration processes to establish a permanent cover of grasses and shrubs.

### 12.3.6 Buffer Area and Litter

The land adjacent to the toe of the disposal area will be a buffer area. The closure design identifies a 30 m wide clearing of vegetation around the disposal area for fire safety. With the ECA specifying a 10 ha site, buffers of 50 m can be provided along the north and south sides of the waste footprint and 100 m or more along the east and west sides. The Site will also be cleared of any windblown litter prior to closure that is found within the buffer area and/or beyond. The buffer area will be periodically cleared of trees to prevent encroachment of the tree line for fire protection. Groundwater monitors are to be flagged with fluorescent tape so they can be found once vegetation is established.

### 12.3.7 Site Security

Following closure, the Site will be closed off to the public with a locked gate and fencing that separates the WDS from the future waste transfer station. Access to the closed landfill area will only be granted to the authorized personnel for site inspections and monitoring activities.



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### **12.3.8 Future Land Use – Waste Transfer Station**

The proposed end use concept for the WDS is a combination of a WTS and natural green space with vegetative regrowth. The closed portion of the Site (former waste footprint) will become a natural green space that will require minimal care during its post-closure period. The area located near the front entrance (east side) will be levelled during final contouring for the designated development of the waste transfer station, as shown on Drawing 8.

The design and operation of the WTS has many variables to consider. An analysis of feasible options should be undertaken to determine the most economical means of waste transfer, including bin style and waste disposal methods. Early conceptual planning for the WTS is further described in the following sections.

#### ***Waste Transfer Infrastructure - Receiving, Storage and Handling***

The WTS will include some form, or a combination of, waste storage systems intended for simple transfer and handling of products. The storage options would include holding bin options such as: metal bins with hinged lids; roll-on/roll-off tilt frame bins; or trailer style bins. The bins may be emptied by front, rear or side loading compaction trucks, lifted onto flatbed transports, or carried using hydraulic tipping trucks. The WTS is envisioned to receive approved waste types and volumes that are currently accepted under the landfill ECA including: household waste and recyclables; organics; untreated wood; scrap metal; e-waste; and tires. Residents will bring waste for drop off disposal during designated hours, where the refuse will be received, inspected, sorted, and recorded by attendants. Waste will be removed from the WTS in the storage bin via truck on a regular schedule and transported to the Nestor Falls landfill, or other destinations approved to receive recyclables.

The WTS bins may not be suitable to accommodate large disposal items such as furniture or construction and demolition waste. Alternative means for this type of waste disposal will require residents to deliver bulky waste to the Nestor Falls landfill. The Township may also consider a bi-annual schedule for collection of bulky items.

#### ***Environmental & Safety Controls***

The WTS will be managed to control environmental and security factors of concern. The holding bins will be sealed to prevent environmental and wildlife interactions. Storm water runoff will be prevented from contacting waste. The bins will be secured/shut when the WTS is closed, and will remain within a gated and locked area to prevent human and wildlife interferences. The WTS will be monitored for litter and leakage associated with drop off, storage, and transfer activities. Suitable fire buffers of 30 m or more will be maintained around the active area. Buildings associated with the WTS may require monitoring for landfill gas.



April 21, 2023

## **12.4 POST CLOSURE CARE**

### **12.4.1 Water Quality and Monitoring Program**

Monitoring will continue for the duration of the contaminating life span of the landfill. This period is defined as the timeframe during which the Site will produce contaminants at concentrations that could have unacceptable impact if discharged from the Site. Over time, water quality is expected to continue to improve and eventually meet site-based RUG criteria.

The environmental monitoring program and associated reporting (as set out in Section 11.0) should be continued annually for a period of 5 years following closure of the WDS and the frequency reassessed after that time. After the first 5-year monitoring period, a Post-Closure Report will be prepared that proposes a potential revised environmental monitoring program based on the results of the annual monitoring program.

### **12.4.2 Site Maintenance**

The Site should be inspected, and deficiencies noted and corrected as needed, after closure activities are completed. The Site will be inspected during intervals that coincide with the water quality monitoring program for deficiencies associated with the final cover, vegetation, surface water management and monitoring well conditions. Where necessary, repairs will be made to ensure that the Site complies with the closure plan. Inspections and corrective actions will be noted in post-closure reporting.

### **12.4.3 Post-Closure Reporting**

A Post-Closure Report and water quality data summary will be prepared for the Site after 5 years of post-closure monitoring. The Post-Closure Report will be prepared by a qualified Professional Geoscientist or Engineer licensed to practice in Ontario and will contain, at a minimum, the following information:

- an assessment of the condition of the cover material with respect to erosion, stability, seepage, etc.;
- results of the water quality sampling and monitoring program;
- an evaluation of compliance with MECP Guideline B-7 (RUG);
- recommendations for a revised environmental monitoring program and associated reports; and
- a revised Leachate Contingency Plan and Trigger Level Monitoring Program, if necessary.

## **12.5 TRIGGER PROGRAM AND CONTINGENCY PLANS**

The Trigger Program and Contingency Plans (Section 11.4) will remain in place through the closure process. If required, a new/revised Trigger Program and Contingency Plan will be proposed in the Post-Closure Report for MECP review and approval prior to implementation.



April 21, 2023

## 13.0 CLOSURE AND POST-CLOSURE MONITORING SUMMARY

Water quality monitoring during closure and post-closure will rely on an annual sampling program for groundwater and surface water: a spring event that will take place in May or June, and a fall surface water sampling event that will occur approximately 60 days later. Given the current positive indication of natural attenuation, it is anticipated that the leachate plume will stabilize within five years of landfill closure. If analytical data does not demonstrate stabilization, then the existing program will remain in place. The potential for the Trigger Program and Contingency Plans will remain.

Based on the anticipated stabilization of the analytical water quality data within five years of closure, consideration could be given to reducing the sampling frequency to once per year with reporting completed once every three years, at which point the post-closure period will be initiated. Based on sample results following the first three years of once-annual sampling, a recommendation will be provided to MECP for potential monitoring reductions, if supported by water quality data. A conceptual closure and post-closure monitoring summary is provided in Table 13-1.

**Table 13-1: Conceptual Closure and Post-Closure Monitoring Summary**

Phase	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Operations*	○	○	○	○	○	○	○										
Closure							○	○	○	○	○						
Post-Closure														○			○

○ = water quality sample event (spring + spring fall) and inspection

\* operational monitoring program and inspection details are found in Sections 3.0 and 10.3, respectively.





April 21, 2023

## 14.0 FINAL RECOMMENDATIONS

To strengthen operation of the landfill in alignment with closure planning and to mitigate risk identified in Section 1.3, the following list of recommendations is provided to the Township.

- Develop a workplan for key waste management actions or initiatives for the next 7 years including: land use plan process; hazardous waste removal; survey dates; monitoring activities; field investigation for SP2; recontouring; site preparation work leading up to closure (i.e., buffers); engagement, design and budget support for the future waste transfer station; and final capping.
- Obtain an updated LUP prior to initiating closure activities. The LUP will provide the Township with permission to implement measures and control over lands where waste is deposited on as well as allow use of land as the CAZ. No advancement of closure activities should occur until a revised LUP is in place. The LUP should include authority for the Township to access lands covered by the waste, buffer areas, the CAZ and the open space that the entrance road is located on.
- Initiate progressive infill deposition sequencing during the final years of operations to achieve landfill elevations. Reduce the landfill slopes to meet closure contouring in areas that do not meet 4H:1V design criteria.
- Initiate a feasibility study and detailed design for the WTS in support of budgetary planning for future waste management in Sioux Narrows.
- Evaluate the feasibility of installing new groundwater and surface water monitoring stations (SP2, Creek 3) near the downgradient CAZ boundary. Begin data collection, if feasible.
- The DO&C Plan should be updated with refined closure planning details based on volume estimations, water quality monitoring results and future site plans.
- Initiate a topographical survey to verify closure elevation and volumetric capacity prior to entering closure planning phase (i.e., in 2024 or 2025).
- Hold interim discussion with the MECP to review closure planning and the operational approach in support of site closure.
- Verify the final closure monitoring program following further discussion with MECP, field investigations and installation of groundwater well SP2. Revise Section 11.0 to reflect the final closure monitoring program in support of a future ECA amendment for closure.
- Prepare to submit an ECA amendment within 2 years of closure.



April 21, 2023

## 15.0 LIMITATIONS

This report documents work that was performed in accordance with generally accepted professional standards at the time and location in which the services were provided. No other representations, warranties or guarantees are made concerning the accuracy or completeness of the data or conclusions contained within this report, including no assurance that this work has uncovered all potential liabilities associated with the identified property.

All information received from the client or third parties in the preparation of this report has been assumed by Stantec to be correct. Stantec assumes no responsibility for any deficiency or inaccuracy in information received from others.

The opinions in this report can only be relied upon as they relate to the condition of the portion of the identified property that was assessed at the time the work was conducted. Activities at the property subsequent to Stantec's assessment may have significantly altered the property's condition. Stantec cannot comment on other areas of the property that were not assessed.

Conclusions made within this report consist of Stantec's professional opinion as of the time of the writing of this report and are based solely on the scope of work described in the report, the limited data available and the results of the work. They are not a certification of the property's environmental condition. This report should not be construed as legal advice.

This report has been prepared for the exclusive use of the client identified herein and any use by any third party is prohibited. Stantec assumes no responsibility for losses, damages, liabilities or claims, howsoever arising, from third party use of this report.

The locations of any utilities, buildings and structures, and property boundaries illustrated in or described within this report, if any, including pole lines, conduits, water mains, sewers and other surface or sub surface utilities and structures are not guaranteed. Before starting work, the exact location of all such utilities and structures should be confirmed and Stantec assumes no liability for damage to them.

Should additional information become available which differs significantly from our understanding of conditions presented in this report, Stantec specifically disclaims any responsibility to update the conclusions in this report.



April 21, 2023

## 16.0 REFERENCES

MECP. 2012. *Landfill Standards: A Guideline on the Regulatory and Approval Requirements for New or Expanding Landfill Sites*. January 2012.

True Grit Consulting and Stantec Consulting Ltd. Sioux Narrows Waste Disposal Site – Annual Water Quality Assessments (2011-2021)

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Sioux Narrows-Nestor Falls. 2012. *Comprehensive Zoning By-Law & Official Plan – Schedule B Sioux Narrows, Sioux Narrows-Nestor Falls, Ontario*. December 18, 2012.

Barnett, P.J, et al. 1991. *Quaternary Geology of Ontario, West-Central Sheet*, Map 2554, scale 1:1,000,000.

Ontario Geological Survey (OGS). *Bedrock Geology of Ontario, West-Central Sheet*; Ontario Geological Survey, Map 2542, scale 1:1,000,000.

KGS Group Consulting Engineers. 2002. Ministry of Natural Resources, *Nestor Falls Landfill Certificate of Approval and Supporting Documentation*, March 2002.



# **APPENDICES**

# **APPENDIX A**

## **Site Plan Drawings**



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1263 Innovation Drive  
Thunder Bay, ON K2E 7E4  
Tel: (807) 626-5640  
www.stantec.com

#### Notes

1. LANDFILL OPERATES UNDER ENVIRONMENTAL COMPLIANCE APPROVAL A601102.

Township of Sioux Narrows-Nestor Falls  
Sioux Narrows Waste Disposal Site, Ontario

#### Client/Project

TOWNSHIP OF SIOUX  
NARROWS-NESTOR FALLS  
  
DESIGN, OPERATIONS  
AND CLOSURE PLAN  
SIOUX NARROWS WASTE  
DISPOSAL SITE, ONTARIO

#### Project No.

111475291

#### Title

EXISTING SITE FEATURES

#### Revision

A

#### Date

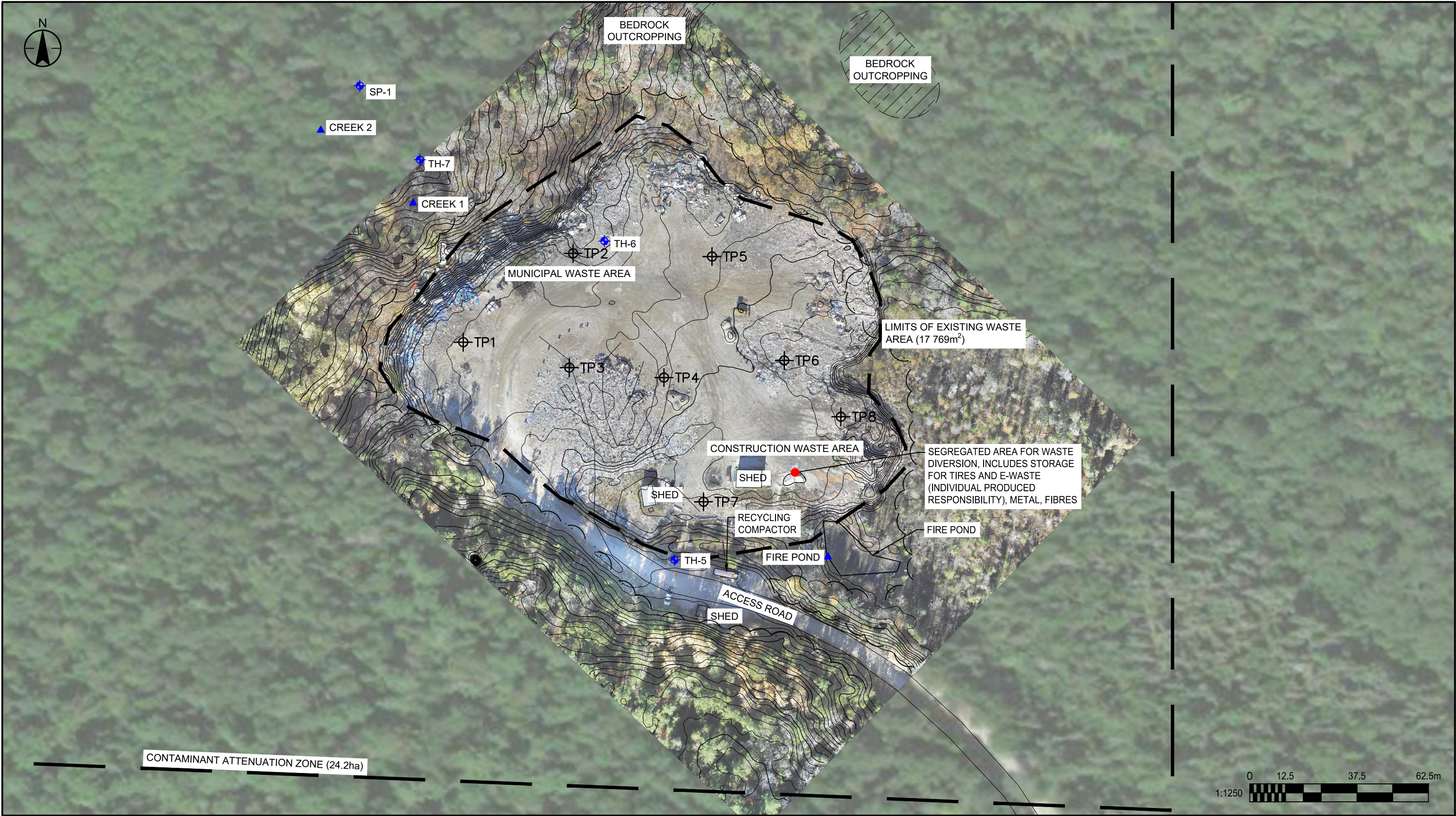
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#### Reference Sheet

DRAWING 1



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#### Legend

- ▲ TH-7 SURFACE WATER SAMPLING LOCATION
- ◆ CREEK 1 MONITORING WELL
- ⊕ TP4 TEST PIT (2022)

#### Client/Project

TOWNSHIP OF SIOUX  
NARROWS-NESTOR FALLS  
DESIGN, OPERATIONS  
AND CLOSURE PLAN  
SIOUX NARROWS WASTE  
DISPOSAL SITE, ONTARIO  
Project No.  
111475291

#### Title

EXISTING WASTE  
FEATURES

#### Revision

A

#### Reference Sheet

DRAWING 2

#### Date

2023.03.11



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#### Legend

- RURAL RESIDENTIAL - RR
- TOURIST COMMERCIAL - TC
- INDIAN RESERVES

#### Notes

- AREAS NOT SHADED ARE ZONED RURAL-R.
- LANDFILL OPERATES UNDER ENVIRONMENTAL COMPLIANCE APPROVAL A601102.
- ZONING CLASSIFICATION FROM ZONING BY-LAW SCHEDULE B DATED DECEMBER 18, 2012.
- LAND USE AND RESERVATION BOUNDARIES ARE APPROXIMATE AND HAVE NOT BEEN SURVEYED.

#### Client/Project

TOWNSHIP OF SIOUX  
NARROWS-NESTOR FALLS  
DESIGN, OPERATIONS  
AND CLOSURE PLAN  
SIOUX NARROWS WASTE  
DISPOSAL SITE, ONTARIO

#### Project No.

111475291

#### Title

LAND USE SURROUNDING  
THE WDS

#### Revision

A

#### Date

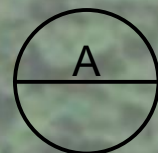
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#### Reference Sheet

DRAWING 3

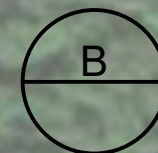
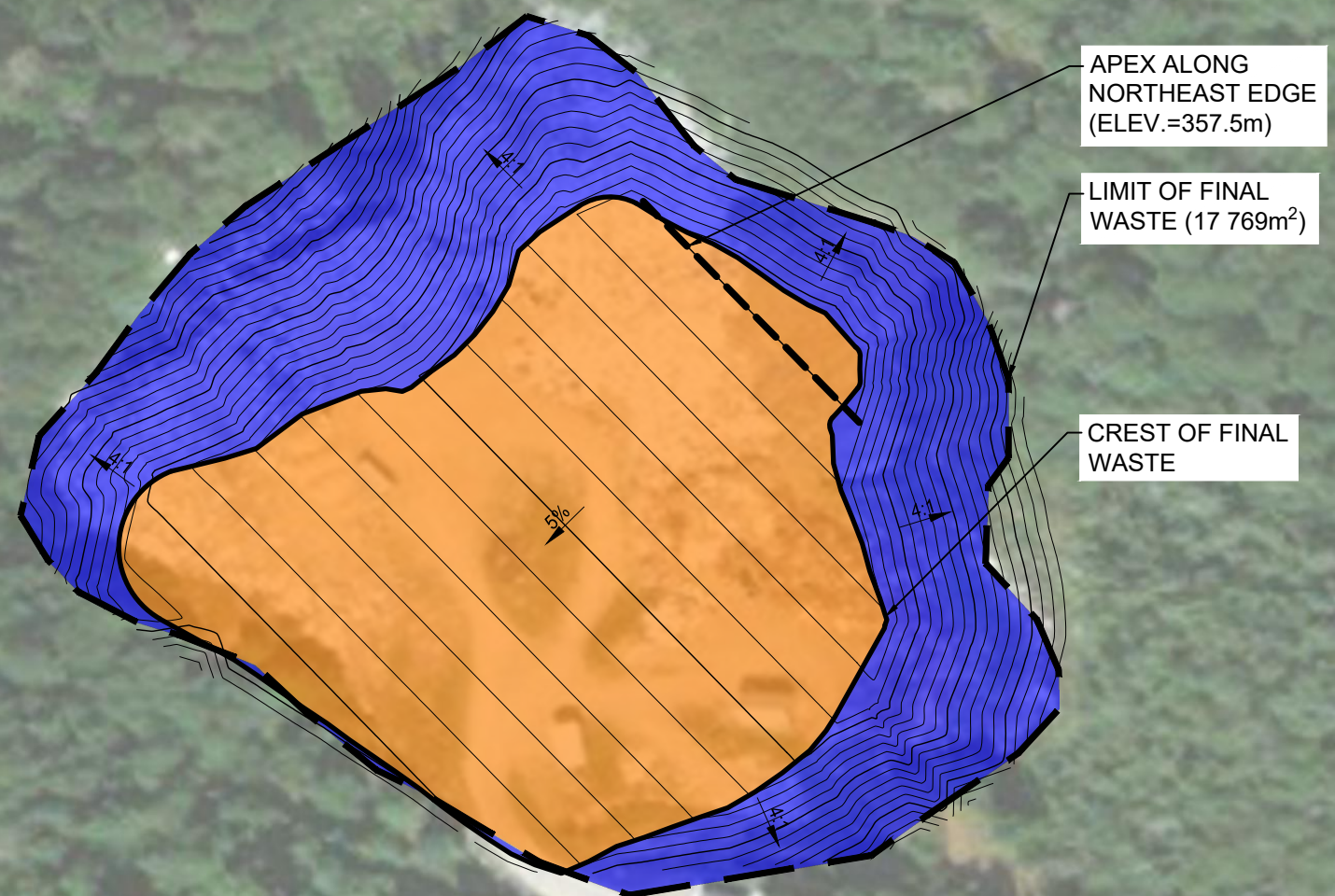
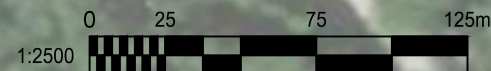


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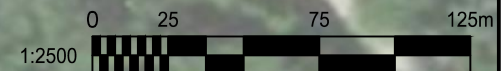
CLOSURE DESIGN OPTION A

1:2500



CLOSURE DESIGN OPTION B

1:2500



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Legend

- AREA OF 4H:1V SLOPE
- AREA OF 5% SLOPE

Notes

- ALL WASTE SIDE SLOPES ARE 4H:1V.
- CONTOURS DO NOT INCLUDE FINAL COVER THICKNESS OF 750mm.

Client/Project

TOWNSHIP OF SIOUX  
NARROWS-NESTOR FALLS  
DESIGN, OPERATIONS  
AND CLOSURE PLAN  
SIOUX NARROWS WASTE  
DISPOSAL SITE, ONTARIO  
Project No.  
111475291

Title

DESIGN OPTIONS  
FOR CLOSURE

Revision

A

Date

2023.03.11

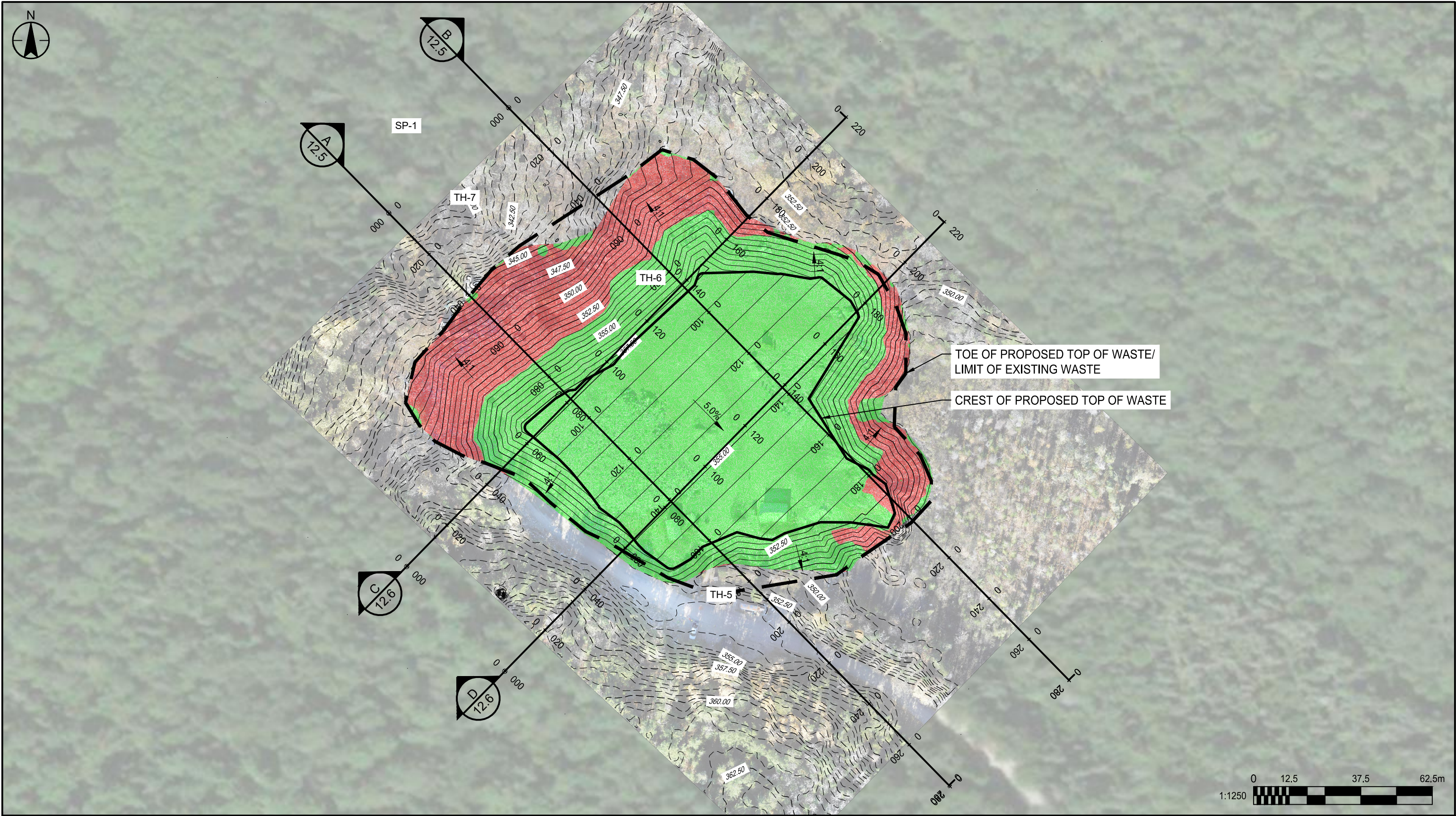
Reference Sheet

DRAWING 4



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- Legend
- AREA REQUIRING MATERIAL BE REMOVED
  - AREA REQUIRING MATERIAL BE PLACED
  - PROPOSED MAJOR CONTOUR
  - PROPOSED MINOR CONTOUR
  - EXISTING MAJOR CONTOUR
  - EXISTING MINOR CONTOUR

- Notes
- EXISTING SURFACE AND TOPOGRAPHIC IMAGE COLLECTED ON OCTOBER 18, 2022 BY SUMAC GEOMATICS INC.
  - ALL WASTE SIDESLOPES ARE 4H:1V.
  - CONTOURS DO NOT INCLUDE COVER THICKNESS OF 750mm.

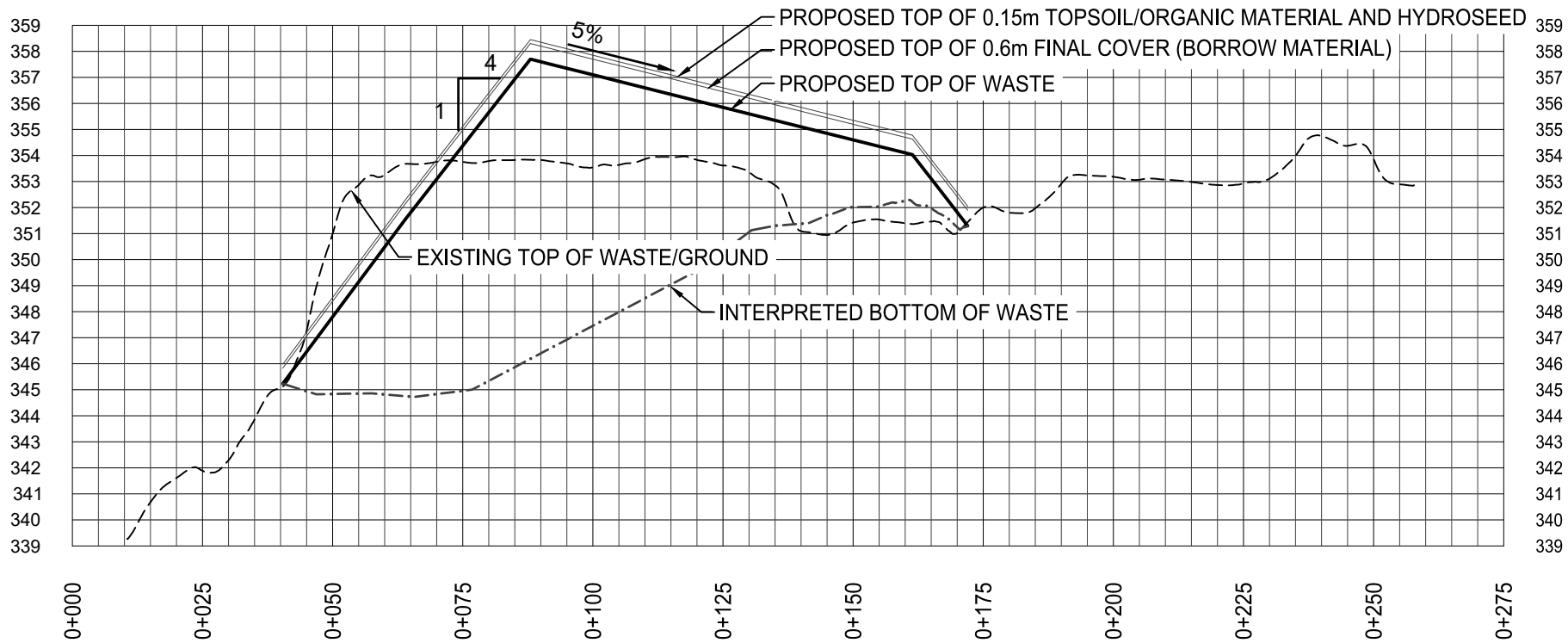
Client/Project  
TOWNSHIP OF SIOUX  
NARROWS-NESTOR FALLS  
DESIGN, OPERATIONS  
AND CLOSURE PLAN  
SIOUX NARROWS WASTE  
DISPOSAL SITE, ONTARIO  
Project No.  
111475291

Title  
PROPOSED FINAL  
WASTE CONTOURS  
Revision  
A  
Date  
2023.03.11  
Reference Sheet  
DRAWING 5

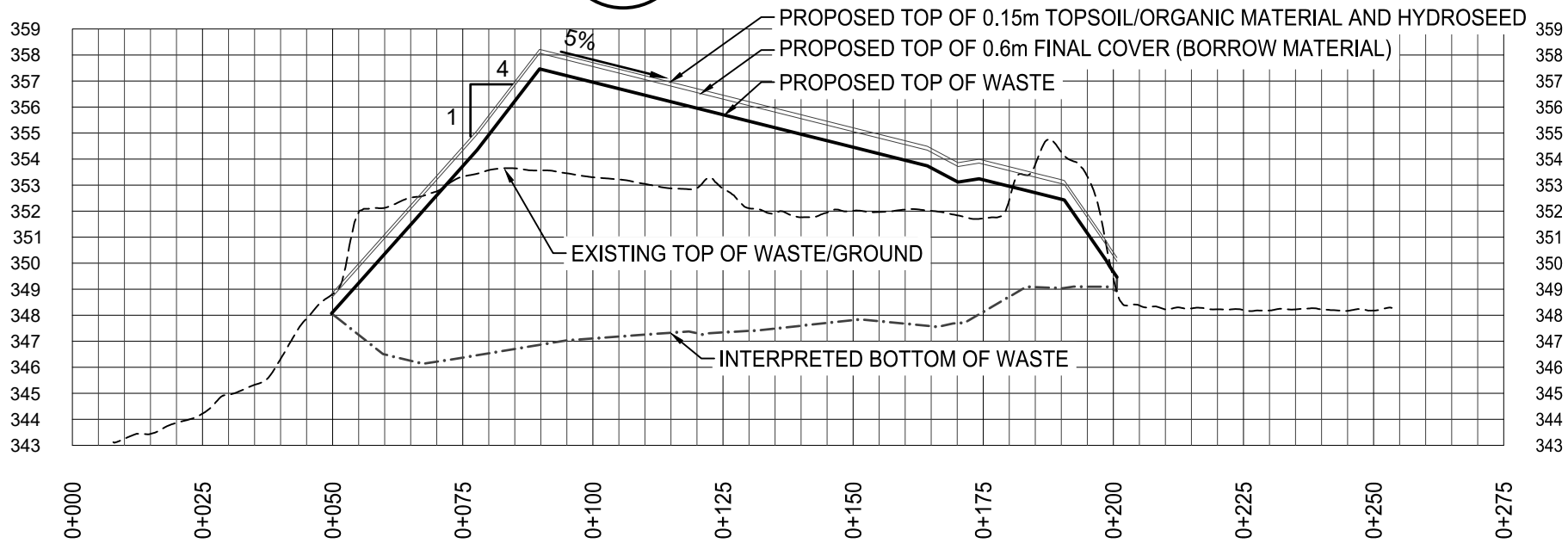


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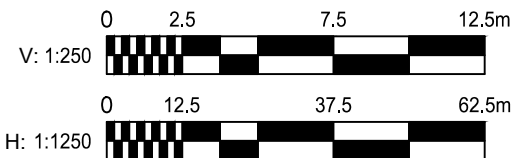
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**A**  
12.3  
**WASTE SECTION A**  
H: 1:1250 V:1:250



**B**  
12.3  
**WASTE SECTION B**  
H: 1:1250 V:1:250



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**Notes**

1. ALL WASTE CONTOURS ARE 4H:1V.
2. CONTOURS DO NOT INCLUDE FINAL COVER THICKNESS OF 750mm.
3. FINAL COVER TO CONSIST OF A 600mm THICK LOW PERMEABILITY SOIL COVERED WITH AN ORGANIC LAYER (150mm) WHICH IS HYDROSEEDDED.

**Client/Project**

TOWNSHIP OF SIOUX  
NARROWS-NESTOR FALLS  
DESIGN, OPERATIONS  
AND CLOSURE PLAN  
SIOUX NARROWS WASTE  
DISPOSAL SITE, ONTARIO  
Project No.  
111475291

**Title**

**PROPOSED FINAL WASTE  
CROSS SECTIONS**

**Revision**

A

**Date**

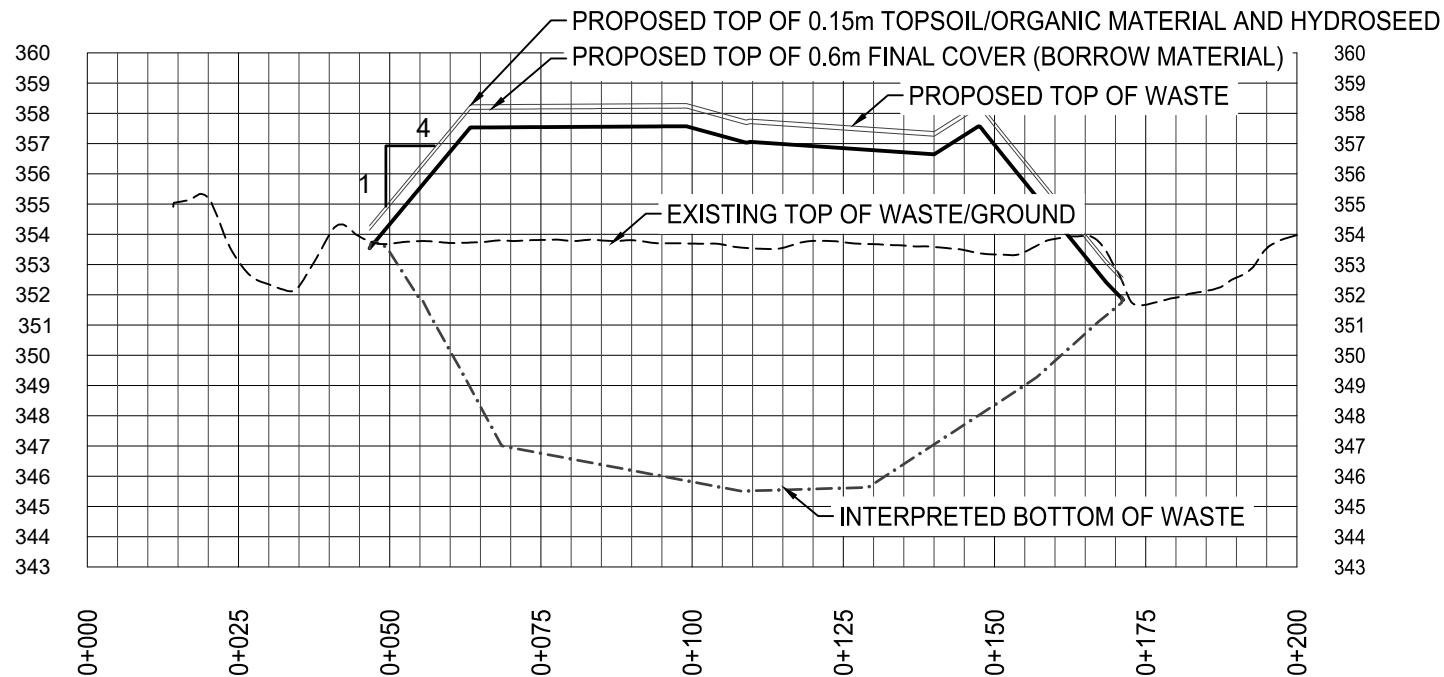
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**Reference Sheet**

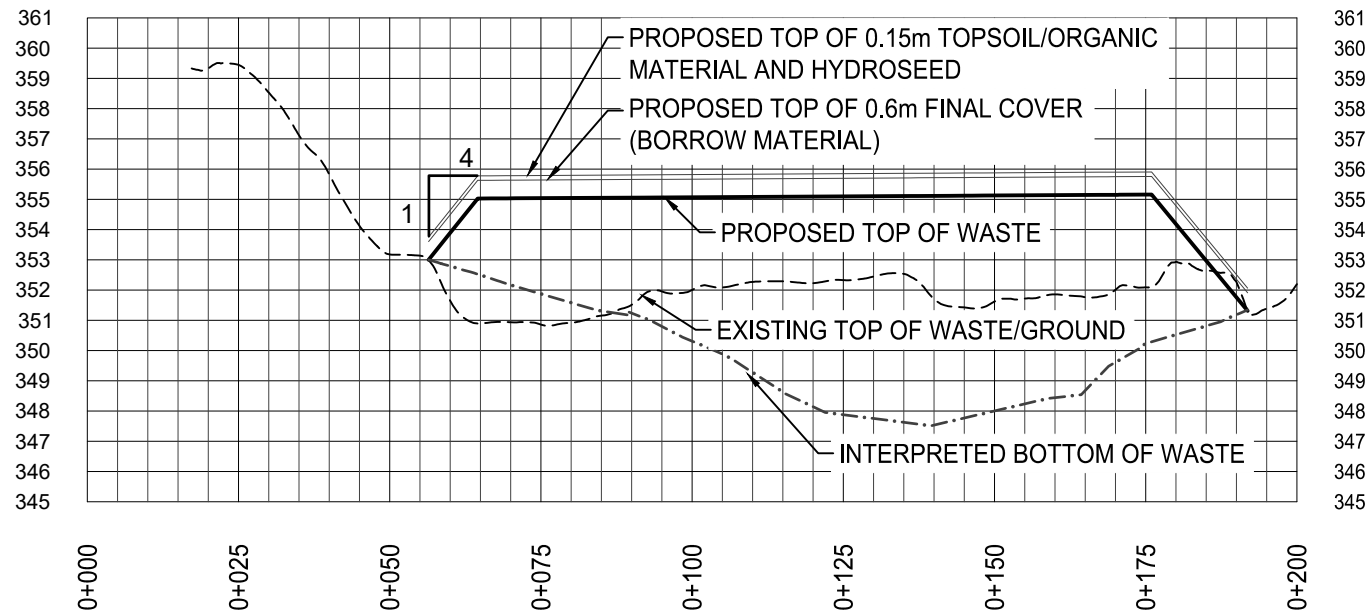
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**C**  
12.3  
**WASTE SECTION C**  
H: 1:1250 V:1:250



**D**  
12.3  
**WASTE SECTION D**  
H: 1:1250 V:1:250



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**Notes**

1. ALL WASTE CONTOURS ARE 4H:1V.
2. CONTOURS DO NOT INCLUDE FINAL COVER THICKNESS OF 750mm.
3. FINAL COVER TO CONSIST OF A 600mm THICK LOW PERMEABILITY SOIL COVERED WITH AN ORGANIC LAYER (150mm) WHICH IS HYDROSEEDDED.

**Client/Project**

TOWNSHIP OF SIOUX  
NARROWS-NESTOR FALLS  
DESIGN, OPERATIONS  
AND CLOSURE PLAN  
SIOUX NARROWS WASTE  
DISPOSAL SITE, ONTARIO  
Project No.  
111475291

**Title**

**PROPOSED FINAL  
WASTE CROSS  
SECTIONS**

**Revision**

A

**Date**

2023.03.11

**Reference Sheet**

DRAWING 7



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- Legend
- PROPOSED MAJOR CONTOUR
  - PROPOSED MINOR CONTOUR
  - - EXISTING MAJOR CONTOUR
  - - EXISTING MINOR CONTOUR
  - - - - - CONTAMINANT ATTENUATION ZONE

Notes

TOE OF WASTE TO PROPOSED ATTENUATION ZONE PROVIDES APPROX. BUFFERS OF 110m (N), 80m (S), and 90m (E).

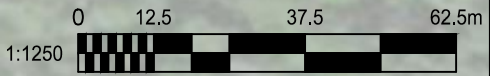
Client/Project  
TOWNSHIP OF SIOUX  
NARROWS-NESTOR FALLS  
DESIGN, OPERATIONS  
AND CLOSURE PLAN  
SIOUX NARROWS WASTE  
DISPOSAL SITE, ONTARIO  
Project No.  
111475291

Title  
PROPOSED CLOSURE  
ACTIVITIES

Revision A	Date 2023.03.11
Reference Sheet DRAWING 8	



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- Notes
1. ZONE 1 TO BE EXCAVATED AND WASTE MOVED INSIDE FINAL LANDFILL AREA. ZONES 2-6 TO BE FILLED SEQUENTIALLY.
  2. WASTE TO BE EXCAVATED IN SEQUENCE 1 AREA IS TO BE PRIORITIZED TO MINIMIZE FUTURE REHANDLING.
  3. GRADING TO BE FLATTENED BY INCREASING THICKNESS OF FINAL COVER ALONG EAST SIDE OF SEQUENCE AREA 6 IF AREA IS TO BE USED AS A TRANSFER STATION,
- Legend
- PROPOSED MAJOR CONTOUR
  - PROPOSED MINOR CONTOUR
  - - EXISTING MAJOR CONTOUR
  - - EXISTING MINOR CONTOUR

Client/Project  
TOWNSHIP OF SIOUX  
NARROWS-NESTOR FALLS  
DESIGN, OPERATIONS  
AND CLOSURE PLAN  
SIOUX NARROWS WASTE  
DISPOSAL SITE, ONTARIO  
Project No.  
111475291

Title	
SEQUENCING OF ACTIVITIES	
Revision	Date
A	2023.03.11
Reference Sheet	
DRAWING 9	



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Legend	
◆ SP1 (349.58)	MONITORING WELL LOCATION MAY 2017 GROUNDWATER ELEVATION (MASL)
✕ WATER LEVEL 322.50	JANUARY 2018 SURFACE WATER ELEVATION (MASL)

Client/Project	TOWNSHIP OF SIOUX NARROWS-NESTOR FALLS
	DESIGN, OPERATIONS AND CLOSURE PLAN
	SIOUX NARROWS WASTE DISPOSAL SITE, ONTARIO
	Project No. 111475291

Title	
CONTAMINANT ATTENUATION ZONE (TGE 2018)	
Revision A	Date 2023.03.11
Reference Sheet DRAWING 10	



# **APPENDIX B**

## **ECA & Supporting Documentation**





Ministry of the Environment  
Ministère de l'Environnement

Provisional Certificate of Approval for a  
Waste Disposal Site  
Certificat d'autorisation provisoire  
de décharge

Provisional Certificate of Approval No.  
Certificat d'autorisation provisoire n°

A601102

Page 1 of 2  
page 1 de 2

Under the Environmental Protection Act and the regulations and subject to the limitations thereof, this Provisional Certificate of Approval is issued to:

Aux termes de la Loi sur la protection de l'environnement et des règlements y afférents et sous réserve des restrictions qui s'y appliquent, ce Certificat provisoire d'autorisation est délivré à:

The Corporation of the Improvement  
District of Sioux Narrows  
Box 417  
Sioux Narrows, Ontario  
POX 1N0

for the use and operation of a 10 hectare dump site subject to the following conditions:

Located: Abandoned gravel pit between Indian Reservation and present Northern Boundary .402 km west of Highway 71, 9.654 km north of Sioux Narrows.

Improvement District of Sioux Narrows (former unorganized Township of Willingdon), NTS Map 52E8, Easting 427190, Northing 5477950.

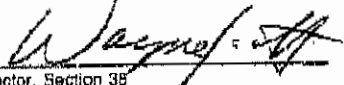
1. Except as otherwise provided by these conditions, the waste disposal site shall be operated in accordance with the application dated May 31, 1977, letter dated October 31, 1977 from Janice Ross, Secretary Treasurer, revisions dated December 6, 1990, and with supporting information, plans and specifications submitted herewith.
2. The waste shall be covered and compacted at least once a week or more frequently depending on the use.
3.
  1. No burning of waste shall take place at the landfill site.
  2. Notwithstanding subcondition 1 refuse may be burned at the landfill site if: a) the District Officer gives written approval (which may be either for a specific burn or for a specific period of time), b) any burning is done in accordance with, Ontario Ministry of the Environment "Guidelines for Burning at Landfill Sites in Ontario", dated November 1981.

Dated this  
Fait le

30th

day of  
jour de

December 19 91

  
Director, Section 38  
Environmental Protection Act  
Directeur, Section 38  
Loi sur la protection de l'environnement



Ontario

Ministry  
of the  
EnvironmentMinistère  
de  
l'EnvironnementProvisional Certificate of Approval for a  
Waste Disposal SiteCertificat d'autorisation provisoire  
de décharge

The following conditions are additional to the conditions shown on Provisional Certificate  
Les conditions ci-dessous s'ajoutent à celles indiquées dans le Certificat d'autorisation  
of Approval Number  
provisoire n°

A601102

dated  
fait le

Dec 30/91

4. This Provisional Certificate of Approval revokes all previously issued Provisional Certificates of Approval issued under Part V of the Environmental Protection Act for this waste management site. The approval given herein, including the terms and conditions set out, replaces all previously issued approvals and related terms and conditions under Part V of the Act for this waste management site.



## NOTICE

TO: The Corporation of the Improvement  
District of Sioux Narrows  
Box 417  
Sioux Narrows, Ontario  
POX 1N0

You are hereby notified that Provisional Certificate of Approval No. A601102 has been amended subject to the conditions outlined therein.

The reasons for the imposition of these conditions are as follows:

1. The reason for Condition 1 is to ensure that this waste disposal site is operated in accordance with the application submitted for the Provisional Certificate of Approval and not on a basis which the Director has not been asked to consider.
2. The reason for Condition 2 is to prevent the accumulation of waste from creating a nuisance and for the conservation of the natural environment.
3. The reason for Condition 3, subsection 1 is that burning of refuse may create a nuisance and may cause environmental problems. The reason for Condition 3, Subcondition 2 is that if the municipality conducts burning of certain wastes at appropriate times under carefully controlled conditions, then the risks involved in burning these wastes are reduced.
4. The reason for Condition 4 is to clearly set out and consolidate the current provisions of the approval covering the Company's operations of the waste management site including the terms and conditions for this approval. By amending and re-issuing this Provisional Certificate of Approval in this manner all interested parties are aware of the rights and obligations of the Company imposed by this approval.

Should you wish to appeal any or all of these conditions, you may by written notice served upon me and the Environmental Appeal Board within 15 days after receipt of this Notice, require a hearing by the Board.

This Notice should be served upon:

The Secretary  
Environmental Appeal Board  
112 St. Clair Avenue West  
5th Floor  
Toronto, Ontario  
M4V 1N3

AND

The Director  
Section 38, E.P.A.  
Ministry of Environment  
435 James Street East  
Thunder Bay, Ontario  
P7C 5G6

DATED at THUNDER BAY this 30th day of December, 1991.



Director  
Section 38, E.P.A.  
Ministry of Environment

**Ministry of the Environment and  
Climate Change**

Northern Region  
Thunder Bay District Office  
Kenora Area Office  
808 Robertson St  
Kenora ON P9N 1X9  
Fax: (807) 468-2735  
Tel: (807) 468-2729

**Ministère de l'Environnement et de  
l'Action en matière de changement  
climatique**

Direction régionale du Nord  
Bureau du district de Thunder Bay  
Bureau du secteur de Kenora  
808 rue Robertson  
Kenora ON P9N 1X9  
Télécopieur: (807) 468-2735  
Tél: (807) 468-2729



December 8, 2016

The Corporation of the Township of Sioux Narrows-Nestor Falls  
Attn: Wanda Kabel, CAO  
Post Office Box 417  
Sioux Narrows Nestor Falls, Ontario  
POX 1N0  
Canada

Dear Ms. Kabel:

**RE:** Solid Non-Hazardous Waste Disposal Site Inspection Reports -  
Nestor Falls Waste Disposal Site and Sioux Narrows Landfill  
Reference Number 6022-ABSK3L

Thank you for your and Mr. Salvador's' cooperation during my October 25, 2016 inspections of the above noted sites. Copies of the inspection reports are enclosed for your review.

As a result of these inspections, the following actions require your attention:

**Nestor Falls Waste Disposal Site**

1. By **October 31, 2017**, ensure the landfill area (footprint) is clearly marked on the ground.

**Sioux Narrows Landfill**

1. By **October 1, 2017**, submit to the undersigned Provincial Officer, a proposed contaminant attenuation zone (CAZ) for the landfill. This shall be conducted in accordance with ministry guideline B-7 and B-7-1.

By **January 6, 2017**, submit to the undersigned Provincial Officer, a written response regarding the above noted action items.

If you have any questions regarding these reports or Ontario's environmental legislation, please contact me at (807) 468-2729 or [cathy.debney@ontario.ca](mailto:cathy.debney@ontario.ca).

Yours truly,

A handwritten signature in black ink, appearing to read "C. Debney". The signature is fluid and cursive, with a large loop at the end of the last name.

---

Cathy Debney  
Senior Environmental Officer  
Kenora Area Office

File Storage Number: DK SN H71 & RR NF H71

Encl.

cc

Kenora District Office - Ministry of Natural Resources and Forestry (Sioux Narrows Site only)



## Solid Non-Hazardous Waste Disposal Site Inspection Report

<b>Client:</b>	The Corporation of the Township of Sioux Narrows-Nestor Falls Mailing Address: Post Office Box, 417, Sioux Narrows Nestor Falls, Ontario, Canada, P0X 1N0 Physical Address: 5521 Hwy 71, Sioux Narrows Nestor Falls, Township, District of Kenora, Ontario, Canada, P0X 1N0 Telephone: (807)226-5241, FAX: (807)226-5712, email: wkabel@siouxnarrows-nestorfalls.ca Client #: 4936-59YKJE, Client Type: Municipal Government		
<b>Inspection Site Address:</b>	Sioux Narrows Landfill Address: Hwy 71, Sioux Narrows Nestor Falls, Township, District of Kenora, P0X 1N0 District Office: Kenora GeoReference: Method: GPS, , LIO GeoReference: Zone: 15, UTM Easting: 425566.75, UTM Northing: 5459964.0, Latitude: 49.28789, Longitude: -94.02357 Site #: 4421-5KKKEB		
<b>Contact Name:</b>	Wanda Kabel	<b>Title:</b>	Chief Administrative Officer
<b>Contact Telephone:</b>	(807)226-5241 ext	<b>Contact Fax:</b>	(807)226-5712
<b>Last Inspection Date:</b>	2012/05/10		
<b>Inspection Start Date:</b>	2016/10/25	<b>Inspection Finish Date:</b>	2016/10/25
<b>Region:</b>	Northern		

### 1.0 INTRODUCTION

This inspection was conducted under section 156(1) of the *Environmental Protection Act* (EPA). The purpose of this inspection was to assess compliance with the applicable Environmental Compliance Approval (ECA), Regulation 347, the EPA and other applicable legislation and guidelines.

The landfill was established in 1977 in an old gravel pit in the former township of Willingdon and has been in operation since. The landfill is located on Hwy 71, approx. 10 km north-east of Sioux Narrows and is used predominately by the local residents. The landfill site is under the tenure of a Land Use Permit (LUP issued by the Kenora Office of the Ministry of Natural Resources.

An estimated volume of 8,831 m<sup>3</sup> of waste was reportedly deposited at the site in 2013.

This inspection included a site tour and discussion with Wanda Kabel and Mike Salvadore and a file review.

A copy of this inspection will also be provided to the Kenora Office of the Ministry of Natural Resources and Forestry.

### 2.0 INSPECTION OBSERVATIONS

#### Certificate of Approval Number(s):

Provisional Certificate of Approval A601102 was issued to the Corporation of the Improvement District of Sioux Narrows on December 30, 1991.

### 2.1 FINANCIAL ASSURANCE:

**Specifics:**

Since the ECA is issued to a municipality, no financial assurance is required at this time.

**2.2 APPROVED AREA OF THE SITE:**

**Specifics:**

The ECA states that the site is a 10 ha dump site. There is no identified buffer or Contaminant Attenuation Zone (CAZ) for this site. The landfill boundaries have also not been delineated.

**2.3 APPROVED CAPACITY:**

**Specifics:**

There is no approved capacity in the ECA. The current in-situ waste volume is unknown. The estimated volume of waste deposition at the site is approx. 1,150 m<sup>3</sup>/year.

**2.4 ACCESS CONTROL:**

**Specifics:**

Subsection 11(2) of Reg. 347 requires that access to the site shall be limited to such times as an attendant is on duty and the site shall be restricted to use by persons authorized to deposit waste in the fill area.

Site access is controlled via a locked gate and fence at the access road entrance.

**2.5 COVER MATERIAL:**

**Specifics:**

Condition 2 of the ECA requires that waste shall be covered and compacted at least once a week or more frequently depending on use.

The compaction and cover typically occurs weekly or three times a month pending use.

**2.6 WASTE BURNING:**

**Specifics:**

ECA condition 3.1-3.2 state that no burning of waste shall take place at the landfill site. Notwithstanding sub-condition 1 refuse may be burned at the landfill site if: a) the District Officer gives written approval (which may either for a specific burn or for a specific period of time), b) any burning is done in accordance with Guideline C-7.

There was a small woodwaste pile on site. The burning of clean-wood waste typically occurs once during the winter months.

There is however, no fire break between the limit of waste and forested area. This area is proposed for maintenance this fall to include the re-aligning of an internal road in the site.

**2.7 GROUNDWATER/SURFACEWATER IMPACT:**

**Specifics:**

The Township does conduct ground and surface water monitoring on a voluntary basis as their ECA does not require a monitoring program. The last sampling event occurred in 2013, and the program re-commenced in 2016.

**2.8 LEACHATE CONTROL SYSTEM:**

**Specifics:**

There is currently no identified CAZ for this location. The landfilling area is approx. 300 m from a wetland in Lake of the Woods, and 200 m from Whitefish Bay First Nation land (vacant land), and as such any potential off-site impacts are not known at this time. The fire pond also appears to be collecting leachate from the site.

According to a report entitled "Township of Sioux Narrows-Nestor Falls, Sioux Narrows Waste Disposal Site, 2013 Water Quality Report", prepared by True Grit Consulting Ltd, dated February 27, 2014, it states that



based on leachate modelling, the CAZ would have to extend 1 km west-northwest to allow for dilution of leachate impacts below the Reasonable Use Guideline (RUG). It is estimated that leachate impacted groundwater flowing forth-northwest from the site would likely discharge to the creek that flows from the small lake norther of the site to Lake of the Woods.

## 2.9 METHANE GAS CONTROL SYSTEM:

### Specifics:

A methane gas control system is not required at this time.

## 2.10 OTHER WASTES:

### Specifics:

The Township of Sioux Narrows-Nestor Falls operates a voluntary recycling program with a recycling materials drop off depot at the landfill. Users can drop off commingled recyclable materials and they are deposited into roll-off bin with built in compactor and is solar powered.

There is also an e-waste depot (sea-can) drop off for electronic devices.

The Township also segregates tires, and metals. There is also an established area for un-tagged refrigerants. Once the appliances have had the ozone depleting substances removed, they will be relocated to the metals pile.

There was no evidence of liquid wastes being deposited at the site during the inspection.

## 3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

The following actions are required as a result of the May 10, 2012 inspection:

1. Cease all scavenging by members of the public at the Sioux Narrows waste disposal site as required by Reg. 347.
  - The Township has addressed the scavenging issue at the landfill.

## 4.0 SUMMARY OF INSPECTION FINDINGS (HEALTH/ENVIRONMENTAL IMPACT)

**Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?**

No

### Specifics:

**Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material ?**

No

### Specifics:

**Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment ?**

No

### Specifics:

**Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material ?**

Yes

### Specifics:

1. There is currently no identified CAZ and the extent of leachate impacts are unknown.

**Was there any indication of minor administrative non-compliance?**

No

### Specifics:

## 5.0 ACTION(S) REQUIRED


The following actions are required as a result of this inspection:

1. By October 1, 2017, submit to the undersigned Provincial Officer, a proposed contaminant attenuation zone (CAZ) for the landfill. This shall be conducted in accordance with ministry guidelines B-7 and B-7-1.

## 6.0 OTHER INSPECTION FINDINGS

1. The LUP for the site reportedly authorizes the land use of a 0.1 ha site. The ECA authorizes the establishment of a 10 ha site. The Township must be able to demonstrate that they have care and control of the entire permitted 10 ha site, i.e. the LUP and ECA should reflect the same size.
2. Pending the outcome of the CAZ study, defined boundaries for the landfill should be identified and clearly marked on the ground as well as the development of landfill.
3. During the inspection, it was discussed that the proposed development of the landfill is to the south east. This proposal should be re-evaluated after the CAZ has been determined as the presence of a black spruce stand indicates a higher water table. In accordance with Regulation 347, subsection 11.5 - waste shall be placed sufficiently above or isolated from the maximum water table at the site in such a manner that impairment of groundwater.
4. Procedures shall be established for the control of rodents or other animals (bears) and insects at the site i.e. deter bear watching.

## 7.0 INCIDENT REPORT

Applicable  
3753-AFGMM5 

## 8.0 ATTACHMENTS

Sioux Narrows Landfill.pdf

### PREPARED BY:

Environmental Officer:

Name:

District Office:

Date:

Signature

Cathy Debney  
Kenora Area Office  
2016/11/07



### REVIEWED BY:

District Supervisor:

Name:

District Office:

Date:

Signature:

Glen Niznowski  
Kenora Area Office  
2016/11/22



**File Storage Number:** DK SN H71

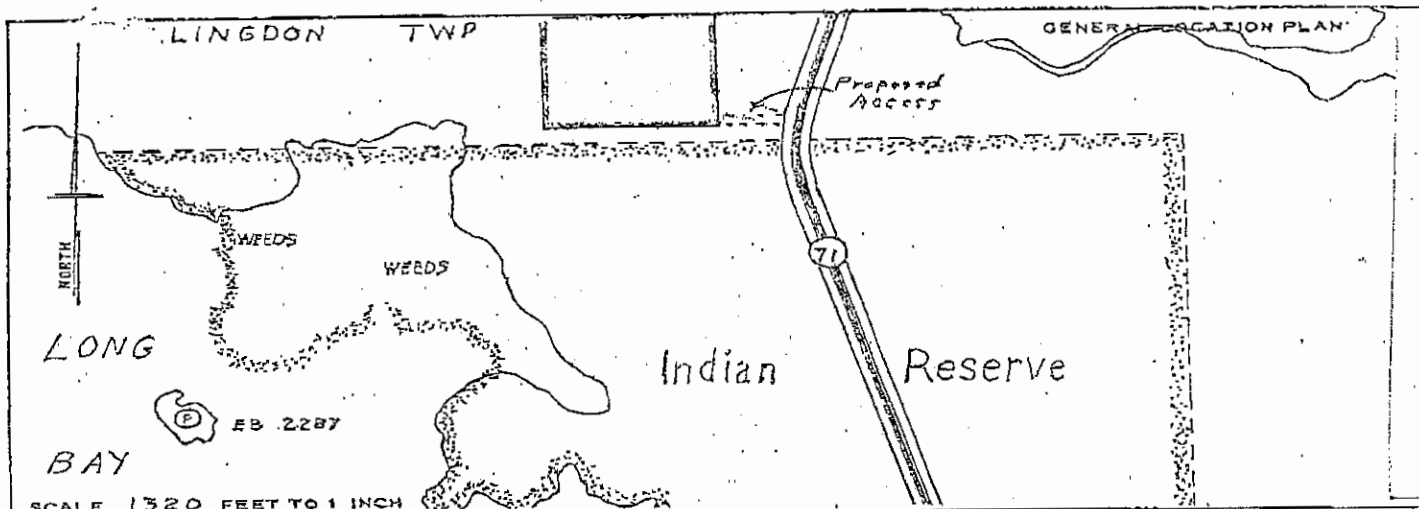
**Note:**

"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

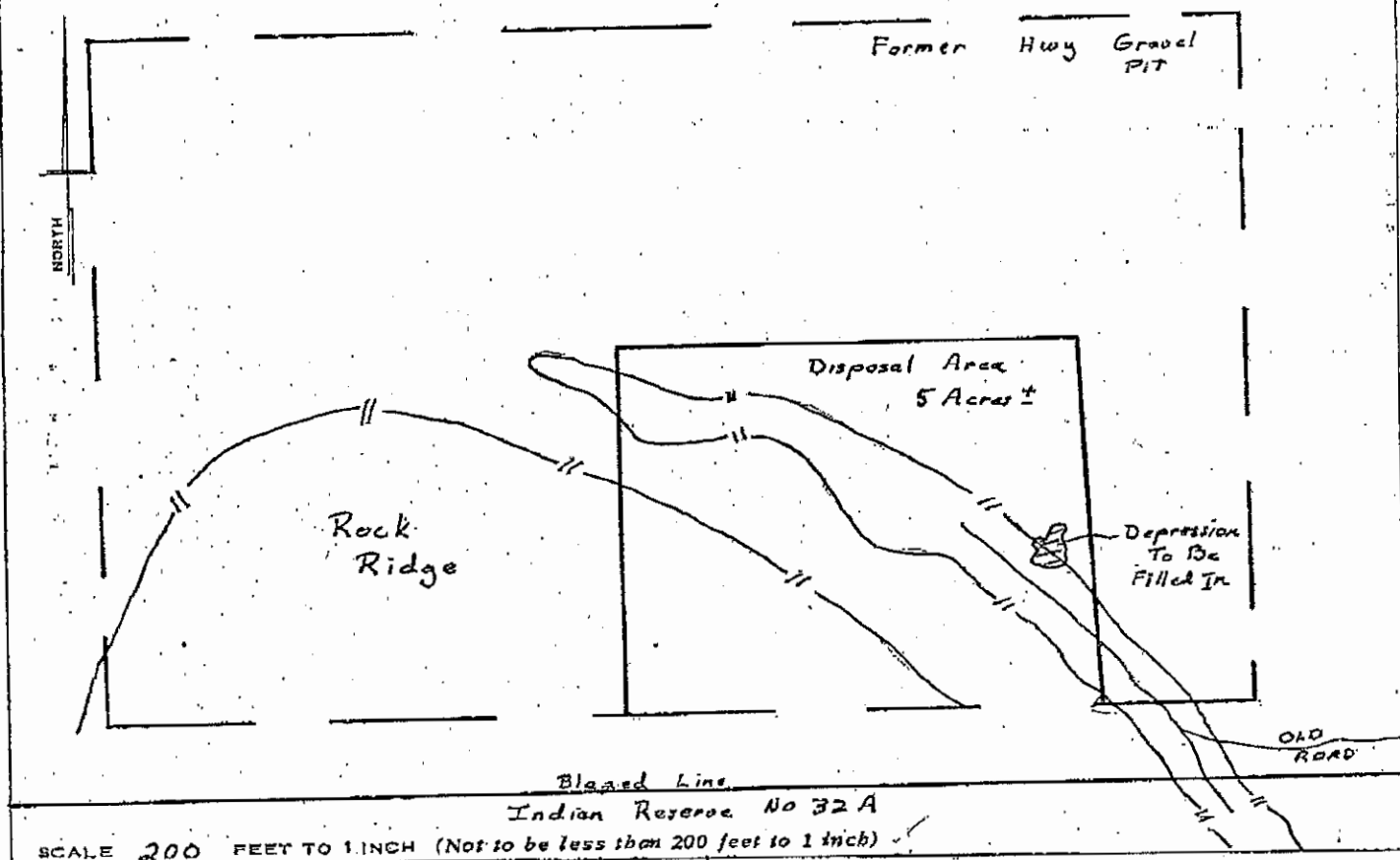
# **APPENDIX C**

## **Land Use Permit**

SURVEYS SECTION



DETAIL PLAN - (Position of shore line taken from most recent information available)



PRIVATE USE ☐ COMMERCIAL USE ☐ SPECIAL USE ☐

LOT NO. OF PRELIMINARY SUBDIVISION ☐

INDIVIDUAL LOCATION ☐

LEVEL OF LAKE CONTROLLED BY A DAM YES ☐ NO ☐

BOUNDARIES COMPLETELY CUT OUT

PRELIMINARY SURVEY BY

DATE OF PRELIMINARY SURVEY

NAME OF APPLICANT Twp. Sidhu Narayan

ADDRESS

REMARKS

To be used by District Offices in submitting applications for summer resort locations and locations for special use.

DEPARTMENT OF LANDS AND FORESTS

DISTRICT OFFICE

ONTARIO PROVINCIAL GOVERNMENT

DATED

TOWNSHIP OF

LOT CONCESSION

LUP 2452

APPROVED

District Forester