PATERSON GROUP

Environmental Noise Control Study – Stationary Noise Component Proposed Residential Development

3317 Navan Road
Ottawa, Ontario

Prepared for Renfoe Land Management

Report PG6556-3 Revision 1 dated November 15, 2023

Table of Contents

PAGE

Appendices

1.0 Introduction

Paterson Group (Paterson) was commissioned by Renfoe Land Management to conduct a Stationary Noise Review for the proposed residential development to be located at 3317 Navan Road, in the City of Ottawa. It should be noted that Paterson's report was solely prepared to review the stationary noise source, which is identified as the adjacent properties (Navan Waste Recycling and Disposal Facility).

The following report has been prepared specifically and solely for the aforementioned project which is described herein. It contains our findings and includes acoustical recommendations pertaining to the design and construction of the subject development as they are understood at the time of writing this report.

This study has been conducted according to City of Ottawa document - Engineering Noise Control Guidelines (ENCG), dated January 2016, and the Ontario Ministry of the Environment Guideline NPC-300.

2.0 Background

It is understood that the proposed development will consist of three (3) four storey residential buildings (Building A, Building B, Building C), each with one level of basement. The buildings will extend 13 m above grade. Each building will consist of 164 units. Associated walkways, driveways, and landscaped areas are further anticipated. Outdoor living areas - rooftop terraces at all three residential buildings, and a private at-grade amenity space at Building B were identified on the proposed site plan.

3.0 Methodology and Noise Assessment Criteria

Stationary Noise

Stationary noise sources include sources or facilities that are fixed or mobile and can cause a combination of sound and vibration levels emitted beyond the property line. These sources may include commercial air conditioner units, generators, and fans. Facilities that may contribute to stationary noise may include car washes, snow disposal sites, transit stations and manufacturing facilities. In this situation, the stationary noise source consists of an existing waste recycling and disposal facility.

The impact of stationary noise sources is directly related to the location of the subject site within the urban environment. The proposed development can be classified as Class 2 by provincial guidelines and outlined in the ENGC, meaning "a suburban areas of the City outside of the busy core where the urban hum is evident but within the urban boundary".

Table 1 - Guidelines for Stationary Noise - Class 2

Time of Day	Outdoor Point of Reception	Pane of Window
7:00-19:00	50	50
19:00-23:00	45	50
23:00-7:00	-	45
Standards taken from Table 3.2a; Guidelines for Stationary Noise - Steady and Varying Sound		

If the sound level limits are exceeded the following Warning Clause may be referenced:

Table 2 – Warning Clauses for Sound Level Exceedances

Warning Clause	Description
Warning Clause Type E	"Purchasers/tenants are advised that due to the proximity of the adjacent industry (facility) (utility), noise from the industry (facility) (utility) may at times be audible."
Clauses taken from section C8 Warning Clauses; Environmental Noise Guidelines - NPC-300	

4.0 Analysis

The stationary noise source consisting of the Navan Waste Recycling and Disposal Facility was identified within the 500 m radius from the proposed development. Waste Connections of Canada (WCC) document – 2021 Operations and Monitoring Report – Drawing 2.4 Site Features Plan indicates that the Navan landfill site is subdivided into 8 areas (Phase 1 to Phase 8). Drawing 3.2 Proposed Closure Sequence indicates that excavation and filling operations within landfill site started at the southeastern, western, and northern portions of landfill area (Phase 1 to Phase 3) and occur in a clockwise order. By the end of year 2023, excavation and filling operations at the western, northern, and eastern portions of the landfill site would be completed. Future excavation and filling operations are anticipated to mainly occur at Phase 5 and Phase 8.

It is understood that the northern limit of waste placement at the Navan Waste Recycling and Disposal Facility is separated from the southern edge of the proposed residential development by approximately 185 m. Drawing 3.2 Proposed Closure Sequence located in Appendix 2 indicates that the excavating, filling and landscaping operations at Phase 2, Phase 3, and Phase 4 have been completed. Therefore, it is understood that there is another buffer zone of 85 m between the northern limit of waste placement and the northern limit of active operation area. Such that, the northern limit of active operation area within Navan landfill site is separated from the southern edge of the proposed residential development by approximately 270 m. Drawing 3.1 Approved Top of Waste Elevations, located in Appendix 2, indicates that the waste is placed as terraces in the shape of tetrahedron. The approved top of waste elevation at the limits of waste placement is 84 m, and the approved top of waste elevation at the northern limit of active operation area is 96 m. The approved top of waste elevation goes up to 105 m within the landfill site. Cover soil is placed on waste for landscaping when waste placement is completed in each phase area. WCC document – 2021 Operations and Monitoring Report states that the remaining life of landfill site is estimated to be 5.1 to 5.2 years as of December 31, 2021, based on future projected maximum annual waste receipts for landfilling and a 5-year average waste density. Based on an agreement made during the Environmental Assessment process, the waste recycling and disposal facility will close upon reaching the currently approved capacity. Therefore, this stationary noise source is considered temporary and all analysis and recommendations made with respect to this stationary noise source can be removed from all deeds of sale once the waste recycling and disposal facility is closed.

The noise sources were modelled as the worst-case indicator as specified in the WCC document – 2021 Operations and Monitoring Report – Section 3.2 Daily Site Operations. The approved daily operation hours for receipt of waste are 10 hours, from 7:00am to 5:00pm from Mondays to Fridays; and 6 hours, from 7:00am to 1:00pm on Saturdays. The equipment utilized in the analysis is representative of the equipment that is used for Landfill excavation, transportation, filling, and compaction at the active operation area (Phase 5 and Phase 8). The equipment consists of two excavators, two bulldozers, a vibratory compactor, and six trucks into and out of the existing waste recycling and disposal facility. A break down of the elevations, operation hours, frequency's and sound levels of equipment is included in Appendix 1. Operation hours are set to be 10 hours (daytime) in the model for all equipment. The reference elevation is set to be 72 m, and the terrain elevations in the model are set to be the elevations above this reference elevation. All equipment elevations in the model are set to be 1.5 m above terrain elevations. Details of terrain elevations and equipment elevations are presented in Table 3.

Table 3 – Terrain Elevations and Equipment Elevations

Equipment	Terrain Elevation (m)	Elevations Above Reference Elevation (m)	Equipment Elevation (m)
Truck 1	98	26	99.5
Truck 2	86	14	87.5
Truck 3	99	27	100.5
Truck 4	100	28	101.5
Truck 5	100	28	101.5
Truck 6	99	27	100.5
Compactor	99	27	100.5
Bulldozer 1	101	29	102.5
Bulldozer 2	102	30	103.5
Excavator 1	97	25	98.5
Excavator 2	98	26	99.5

The existing waste recycling and disposal facility is the only stationary noise source located within the proximity of the proposed development. The analysis was completed with specialized noise software: Predictor-Lima Version 2021.1. The terrain elevation is 86 m, which 14 m above the reference elevation of 72 m. Twenty-seven (27) reception points were selected for our analysis. Twenty-four (24) reception points (REC 1 to REC 6) were selected at 1.5 m, 4.5 m, 7.5 m, and 10.5 m above the terrain elevation, so that both pane of glass at each level of the proposed buildings could be interpolated. Three (3) reception points (REC 7 to REC 9) and one reception point (REC 10) were selected at 14.5 m and 1.5 m above the terrain elevation, respectively, so that the rooftop terraces of proposed buildings and the private amenity space at Building B could be interpolated. The results of these reception points are included in Appendix 1.

5.0 Discussion

Surface Transportation Noise

Results of the analysis can be found in Appendix 1. Reception points were analyzed at 1.5 m, 4.5 m, 7.5 m, 10.5 m, and 14.5 m above the terrain elevation.

Proposed Residential Development

An analysis was completed for the proposed residential development, taking into consideration the lot layouts and approximate dwelling alignments. An initial analysis was performed with no sound mitigation measures. This analysis at the proposed buildings resulted in a maximum value of 50 dBA, which is equal to the 50 dBA limit. The anticipated noise levels are considered acceptable. Therefore, additional noise mitigation measures will not be required.

As per the Environmental Noise Guidelines prepared by the City of Ottawa, the following chart outlines the procedures to follow for exceedances to the stationary noise levels.

Table 4 - Noise Control Measures for New Residential Development in Proximity to The Stationary Noise Sources at the Navan Waste Recycling and Disposal Facility

Primary Mitigation Measure in order of Preference	**Proposed Mitigation Measure**
Insertion of noise insensitive land uses between the source and sensitive receptor	A 270-metre noise insensitive land is inserted between the proposed residential development and the active operation area within Navan Waste Recycling and Disposal Facility
Orientation of buildings to provide quiet zones in rear yards, interior spaces and amenity areas	Orientation of building is not required to change for noise mitigation
construction techniques, enhanced construction quality	Standard construction techniques are considered acceptable for the proposed building
earth berms	Earth berms are not required for noise mitigation
acoustic barriers	Acoustic barriers are not required for noise mitigation

6.0 Conclusion

The anticipated noise level at proposed residential development is considered acceptable while the Navan Waste Recycling and Disposal Facility is in operation. Therefore, no additional noise mitigation measures are required.

7.0 Statement of Limitations

The recommendations made in this report are in accordance with our present understanding of the project. Our recommendations should be reviewed when the project drawings and specifications are complete.

The present report applies only to the project described in this document. Use of this report for purposes other than those described herein or by person(s) other than Renfroe Land Management or their agent(s) is not authorized without review by this firm for the applicability of our recommendations to the altered use of the report.

Paterson Group Inc.

Yolanda Tang, M.A.Sc.

Stephanie A. Boisvenue, P.Eng.

Report Distribution:

- ❑ Renfroe Land Management (email copy)
- ❑ Paterson Group (1 copy)

APPENDIX 1

Figure 1 - Model of Proposed Residential Development

Figure 2 - Initial Analysis (Table of Result)

Figure 3 - Initial Analysis (Contour Result)

Item Properties (Equipment)

Item Properties (Receptor Points)

Figure 1- Model of Proposed Residential Development

Industrial noise - LimA - ISO 9613.1/2, [version of Area - Model - 3317 Navan Road] , Predictor V2021.1 Licensed to Paterson Group Inc. , Canada

Paterson Group Inc. , Canada

Report: Table of Results
Model: Model - 3317 Navan Road
LAeq: total results for receivers
Group: (main group)
Group Reduction: No

Name Receiver	Description	Height	Day	Evening	Night
REC 1_A	REC 1	1.50	47.9	--	--
REC 1_B	REC 1	4.50	49.2	--	--
REC 1_C	REC 1	7.50	49.7	--	--
REC 1_D	REC 1	10.50	50.3	--	--
REC 10_A	REC 10	1.50	32.1	--	--
REC 2_A	REC 2	1.50	46.2	--	--
REC 2_B	REC 2	4.50	47.5	--	--
REC 2_C	REC 2	7.50	48.0	--	--
REC 2_D	REC 2	10.50	48.6	--	--
REC 3_A	REC 3	1.50	46.9	--	--
REC 3_B	REC 3	4.50	47.3	--	--
REC 3_C	REC 3	7.50	47.8	--	--
REC 3_D	REC 3	10.50	48.2	--	--
REC 4_A	REC 4	1.50	45.3	--	--
REC 4_B	REC 4	4.50	46.1	--	--
REC 4_C	REC 4	7.50	46.6	--	--
REC 4_D	REC 4	10.50	47.1	--	--
REC 5_A	REC 5	1.50	45.8	--	--
REC 5_B	REC 5	4.50	46.5	--	--
REC 5_C	REC 5	7.50	47.0	--	--
REC 5_D	REC 5	10.50	47.4	--	--
REC 6_A	REC 6	1.50	34.7	--	--
REC 6_B	REC 6	4.50	37.4	--	--
REC 6_C	REC 6	7.50	40.2	--	--
REC 6_D	REC 6	10.50	43.1	--	--
REC 7_A	REC 7	14.50	47.5	--	--
REC 8_A	REC 8	14.50	46.7	--	--
REC 9_A	REC 9	14.50	45.1	--	--

All shown dB values are A-weighted

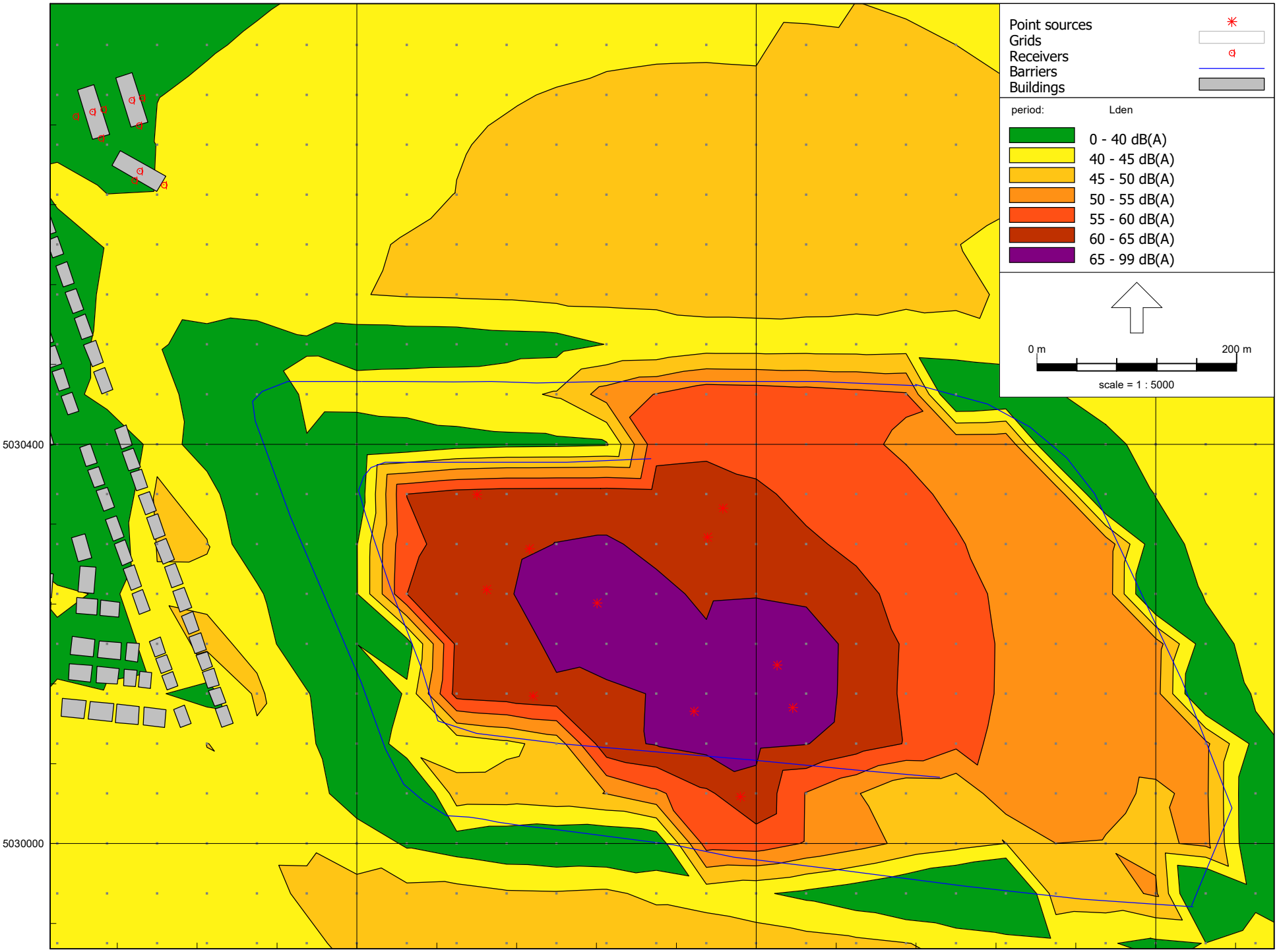


Figure 3 - Initial Analysis (Contour Results)

Paterson Group Inc. , Canada

Item Properties (Equipment)
Initial Analysis

Model: Model - 3317 Navan Road
version of Area - Area
Group: (main group)
Listing of: Point sources, for method Industrial noise - LimA - ISO 9613.1/2

Desc.	Terrain L	Rel.H	Pa(h)(D)	Pa(h)(E)	Pa(h)(N)	Lw 63	Lw 125	Lw 250	Lw 500	Lw 1k	Lw 2k	Lw 4k	Lw 8k	Lw Tot
Compactor	27.00	1.50	10.0042	--	--	71.80	89.90	98.40	96.80	105.00	97.20	95.00	88.90	107.28
Truck 1	26.00	1.50	10.0042	--	--	81.80	87.90	92.40	94.80	97.00	95.20	92.00	84.90	101.97
Truck 2	14.00	1.50	10.0042	--	--	81.80	87.90	92.40	94.80	97.00	95.20	92.00	84.90	101.97
Excavator 1	25.00	1.50	10.0042	--	--	74.80	84.90	88.40	94.80	95.00	93.20	87.00	77.90	99.94
Excavator 2	26.00	1.50	10.0042	--	--	74.80	84.90	88.40	94.80	95.00	93.20	87.00	77.90	99.94
Truck 3	27.00	1.50	10.0042	--	--	81.80	87.90	92.40	94.80	97.00	95.20	92.00	84.90	101.97
Truck 4	28.00	1.50	10.0042	--	--	81.80	87.90	92.40	94.80	97.00	95.20	92.00	84.90	101.97
Truck 5	28.00	1.50	10.0042	--	--	81.80	87.90	92.40	94.80	97.00	95.20	92.00	84.90	101.97
Truck 6	27.00	1.50	10.0042	--	--	81.80	87.90	92.40	94.80	97.00	95.20	92.00	84.90	101.97
Bulldozer 1	29.00	1.50	10.0042	--	--	78.80	97.90	94.40	99.80	110.00	109.20	102.00	93.90	113.42
Bulldozer 2	30.00	1.50	10.0042	--	--	78.80	97.90	94.40	99.80	110.00	109.20	102.00	93.90	113.42

Item Properties (Receptor Points)
Initial Analysis

Model: Model - 3317 Navan Road
version of Area - Area
Group: (main group)
Listing of: Receivers, for method Industrial noise - LimA - ISO 9613.1/2

Desc.	Terrain L	Height A	Height B	Height C	Height D
REC 1	14.00	1.50	4.50	7.50	10.50
REC 2	14.00	1.50	4.50	7.50	10.50
REC 3	14.00	1.50	4.50	7.50	10.50
REC 4	14.00	1.50	4.50	7.50	10.50
REC 5	14.00	1.50	4.50	7.50	10.50
REC 6	14.00	1.50	4.50	7.50	10.50
REC 7	14.00	14.50	--	--	--
REC 8	14.00	14.50	--	--	--
REC 9	14.00	14.50	--	--	--
REC 10	14.00	1.50	--	--	--

APPENDIX 2

**Figures from the 2021 Operations and Monitoring Report –
Navan Waste Recycling and Disposal Facility
– 3354 Navan Road, Ottawa, Ontario
– Prepared by Waste Connections of Canada – dated March 2022**

Section 3.2 - Daily Site Operations

Drawing 2.4 Site Features Plan

Drawing 3.1 Approved Top of Waste Elevations

Drawing 3.2 Proposed Closure Sequence

3.1.12 Aerial Photography

Base Mapping Co. Ltd. of Ottawa was again retained to undertake aerial photography of the Navan Waste Recycling and Disposal Facility. Digitized topographic maps of the site with 0.5 metre contour intervals were obtained for May 1st, 2021. The 2021 topography with 2 metre contour intervals is shown on most drawings. To date, a total of 221,100 m^2 of the waste footprint has received clay cover as shown of Figure 3.2.

3.2 *Daily Site Operations*

The site continues to be operated in accordance with the approved Design and Operations report (Golder, 2008) and the amended Certificate of Approval. Daily site operations are described in the following sub-sections.

3.2.1 Access

The site is well serviced by Regional Roads, being located on Regional Road 28, locally known as Navan Road (refer to Figure 1.1). Most of the traffic at the site is generated by commercial vehicles which access the site via Innes Road (Regional Road 30) and Navan Road. The Tenth Line Road (Regional Road 47) and Milton Road (Regional Road 31) also provide access from East Ottawa (Cumberland Township).

Access to the site is provided by one entrance located off Navan Road. The gate is kept locked after hours to restrict access. The access road is paved between Navan Road and a distance past the scale house and wheel wash station (Grid Lines C-15). A well-maintained all-weather road provides access to the designated unloading areas. Other access roads are provided throughout the site allowing access to water management systems, material stockpiles, site facilities and equipment storage areas (refer to the Site Features Plan - Figure 2.4).

3.2.2 Hours of Operation

Approved hours of operation for the receipt of waste are from 7:00 am to 6:00 pm Monday through Saturday, inclusive, however the site generally closes at 5:00 pm on week days and 1:00 pm on Saturdays and statutory holidays. The site does not receive waste prior to 7:00 am or after 6:00 pm on these days. Waste acceptance outside of these hours requires the approval of the MECP District Manager. Operating hours may vary within the approved hours. On occasion and as required, Landfill excavation and equipment/site maintenance may occur outside these hours.

The site is secured after operating hours and includes sporadic security patrols by a security services contractor. No scavenging is permitted at the site.

3.2.3 Site Staffing

WCC routinely reviews and monitors its staffing needs for the site and adjusts the staffing level accordingly. Currently 23 fulltime equivalent employees (FTE) are employed locally at the site including management, sales, administrative, clerical, and operations personnel. University and/or college students are also retained to assist with general landfill task and fulfil the work requirements of their co-op program.

The number of employees at the landfill site is variable from time to time and is based on the workload which can be seasonal and personnel turnover. Throughout the year, part time personnel or contractors are hired to perform general tasks such as grass cutting, general site clean-up, minor site maintenance work, surveying, traffic control, etc. Personnel from other WCC districts are also called upon from time to time to assist with landfill operations. When required, contractors are also hired for task specific work such as maintenance, security and landscaping.

3.2.4 Equipment

The following equipment was in use at the landfill site in 2021:

1) 1- 826G & 1- 826H CATERPILLAR WASTE COMPACTOR
   - levelling; compaction; grading of waste

2) D7R CATERPILLAR BULLDOZER (c/w LANDFILL PKG)
   - levelling; placing; grading of waste

3) D6N LGP CATERPILLAR BULLDOZER
   - Levelling; compaction; grading; earth works

4) D6T XW & D6T LGP CATERPILLAR BULLDOZER
   - Levelling; compaction; grading; earth works

5) Volvo EC340DL EXCAVATOR
   - excavating; levelling; ditching; grading; soil movement; berm construction

6) CAT 330 WH EXCAVATOR c/w GRAPPLER
   - recycling; excavating; levelling; ditching; grading; soil movement; berm construction; processing; box scrape outs

7) Volvo EC220 EL EXCAVATOR c/w GRAPPLER AND MAGNET
   - recycling; excavating; levelling; ditching; grading; soil movement; berm construction; processing; box scrape outs

8) JOHN DEERE 310J BACKHOE (c/w ATTACHMENTS)
   - excavating; recycling; levelling; ditching; grading; snow removal; box scrape outs

9) CAT 420F BACKHOE (c/w ATTACHMENTS)
   - excavating; levelling; ditching; grading; snow removal; box scrape outs; tree planting

10) 1 – 730 CAT ARTICULATED TRUCK
- 6-wheel drive truck / earthworks; daily cover

11) 2 - A25E VOLVO ARTICULATED TRUCK
- 6-wheel drive truck / earthworks; daily cover

12) 1 - CAT 950H LOADER
- material loading; snow removal; processing; road maintenance

13) 1 - CAT 950M LOADER
- material loading; snow removal; processing; road maintenance

14) DURATECH EJ100 WOOD GRINDER
- wood and drywall grinding

15) 2- MACK ROLL-OFF TRUCK
- on-site container management; dust control

16) PICK-UP TRUCKS AND ALL-TERRAIN VEHICLES
- site access; road sweeping; snow removal; magnetic sweeps; salting

17) 1 TON DUMP TRUCK (c/w SNOW PLOUGH)
- For general use and snow removal both on-site and off-site

18) 3-35 HP LEACHATE PUMPS
- available throughout the year for leachate management

19) 2- 100 MM GORMAN RUPP PUMPS AND ADDITIONAL GENERAL PURPOSE PUMPS
- available for the handling of leachate and surface water

20) TANKER 22.7 m^3 (5,000 GAL.)
- On-site water needs (dust control; clean roadways; flush leachate MHs etc.)

21) 100 KW GENERATOR, 40 KW GENERATOR AND 20KW GENERATOR
- Power supply for the candlestick flare
- Power supply for the odour misting system
- Pump Station backup power supply.

22) KUBOTA UTILITY VEHICLE
- Equipped with snow blowing and lawn mowing equipment.

23) ARGO UTILITY VEHICLE C/W TRACKS
- All terrain vehicle.

24) LIGHT TOWERS
- Landfill and recycling area lighting and power supply for equipment.

25) METSO SCREENING PLANT
- Screening of oversize materials from soil and rubble.

Vehicles are equipped with 2-way radio equipment along with hand held portable 2-way radios utilized for on-site communication between equipment operators, supervisors, spotter, weigh scale attendants, maintenance personnel and site office.

The size and type of equipment available on site handles the every day and long-term operation of this engineered facility. Additional equipment is brought on site as required to supplement or replace the WCC heavy equipment during repair programs or for special projects.

3.2.5 Equipment Maintenance

A maintenance building completed in 2009 is used for equipment repairs and storage of parts, tools and supplies. A comprehensive preventative maintenance program is in place and equipment maintenance is fully documented. A maintenance schedule is followed in a strict manner. WCC's own staff mechanics perform all lubrication and oil changes as well as most vehicle repairs. Qualified equipment dealers perform major repairs and warranty work when required. A daily pre-trip and post-trip inspection of all equipment in use is performed by equipment operators.

All machinery is equipped with fire suppressant and first aid equipment. First-aid stations are located at various locations on site.

On-site personnel are able to perform routine maintenance on all machinery and employees are trained to operate and maintain different pieces of equipment. A daily, weekly and monthly equipment inspection is carried out and documented for each piece of equipment. Daily records of fuel, lubrication consumption, and hours of operation are maintained.

3.2.6 Scale House and Small Vehicle Pad

Two full-time employees operate the scale house. Two 100 tonne Rice Lake scales installed in early 2009 are in operation to reduce traffic congestion on Navan Road. All vehicles are weighed upon entering and leaving the landfill. Drivers must exit their vehicle and sign the weigh bill at the scale house. The scale clerk records the name of the client, the origin of the waste (customer), the type of waste, driver identification, truck identification and notes using a grid system where the waste was placed within the landfill. All records from these transactions are maintained at the site office and recorded in WCC's computer records.

The scale clerk has contact with the site office, spotter and equipment operators at all times. The site cannot be opened unless the scale clerk and an operator/spotter are present. Rejected loads of waste are recorded and reported to the MECP and a record is kept on site.

A small vehicle unloading area was built southeast of the weigh scales to service small vehicles and promote recycling. The paved area is maintained and kept clean at all times. Concrete bunkers were added in 2012 west of the small vehicle pad to add capacity for small loads of aggregate, shingles, asphalt, metals, wood

and recyclable windshield glass. These bunkers are also used to accommodate small waste vehicles preventing them from entering the landfill where commercial and heavy equipment activity is occurring.

3.2.7 Site Office

Management and administrative staff work in an office/maintenance building constructed in 2009 located north of the landfill near the Navan Road site entrance. The site office is open Monday to Friday during working hours of the landfill. All records are maintained at the site office. The site office is equipped with several computers to maintain landfill records, employee information and site operation manuals. Areas of active landfilling are recorded daily and referenced to a grid system. The daily operation of the landfill is carried out from this office.

3.2.8 House Keeping and Controls

(a) Site safety

All employees have been instructed in safety procedures and a Joint Occupational Health and Safety Committee meets monthly to discuss health and safety issues at the site. Managers have been tasked as Site Safety Leaders dedicating time to safety related programs, training and safety awareness. On-site employees have completed waste handling safety courses, GHS training (Global Harmonized System of Classification and Labelling of Chemicals), confined space entry, and CPR & basic first aid training courses. On-site first-aid stations are available on the equipment, maintenance facility, scale house, pump station and site office. On-site communication allows for quick response. Emergency spill kits are available at the maintenance garage and site office. All workers have been provided with personal protective equipment (PPE) and must wear hard hats, safety boots, reflective clothing and safety glasses. All vehicles have back-up alarms. A spotter directs all traffic and machinery at the working face of the landfill.

Employees have been instructed in the handling of special materials, in particular impacted soils and asbestos, a designated waste. All employees and haulers follow a documented protocol for the handling of these materials. In brief, the procedure is as follows:

No hauler is allowed to enter the site with these materials without prior approval. All haulers of these materials must give advance warning of their coming to the site. A time slot is then assigned for receipt of the material. A designated spot for the placement of the materials is prepared. Asbestos waste is landfilled and covered without any equipment coming into contact with the waste. Disposable safety coveralls, head covers and respirators are also available on site for the handling of special wastes.

Employees have been instructed as to the types of waste allowed and materials not allowed to be received at the site. All containers must be open and void of any liquid material before they can enter the site. Closed containers are refused. Waste that is inadvertently dumped at the site is either placed back in the hauler vehicle or stored in one of WCC's boxes for later removal. Hauled materials are inspected for any banned waste and the above procedure followed. Materials rejected from the landfill are reported to the MECP district office. Records of rejected waste and materials removed from the site are kept at the landfill site office.

(b) Scavenging control

No scavenging is permitted at the site. The spotter and equipment operators working at the active face strictly enforce this. On-site personnel carry out recycling of wood, metals and white goods in a controlled and manageable manner at the active face using heavy equipment specially equipped with a grappler and magnet. A small vehicle receiving pad is provided where waste from small vehicles can be received safely and materials can be sorted for recycling by the vehicle operator. Concrete bunkers were added to this area to further assist with the recycling of materials such as asphalt, aggregates, shingles, wood, metals and windshield glass. A program for the recovery of refrigerants is available and this service continued throughout 2021.

(c) Litter control

Litter has not been a problem at the Navan Waste Recycling and Disposal Facility because of the use of daily cover. Periodic checks are made of the finished and active areas of the site for litter. Litter fencing is maintained at the active working face and temporary fencing is maintained in areas of the landfill perimeter as a supplementary litter control measure. Fencing is cleaned of litter as required. At least twice each year WCC personnel collect litter accumulated in the ditches along Navan Road for a distance of 1 km to the east and west of the site entrance. No complaints related to litter were received in 2021.

(d) Vector and vermin control

The presence of vermin and vectors is not a problem at the site primarily due to the dry, non-putrescible nature of the waste stream. Periodic checks have proven that no problems with vermin exist at the site due to proper landfilling procedures. If vermin are detected at the site, a registered pest control company is retained to control the problem. Although some seagulls and crows do frequent the site in summer months, this is not considered a health or environmental problem because of the small numbers present. A bird scare permit has been obtained from the Ministry of Natural Resources. When required, pellet whistlers are shot into the air to control birds during business hours. Abell Pest Control was hired in 2018 to set up bait control stations at various locations throughout the landfill to monitor activity on site and continued their work throughout 2021. No complaints were received in 2021.

(e) Dust management plan

The landfill has the potential to generate fugitive dust emissions. Fugitive dust sources have been assessed in accordance with MECP guidelines. In order to minimize the potential for off-property impacts due to fugitive dust, the following practices are implemented at the site:

- Aggregate (e.g., gravel, crushed limestone) is spread over unpaved roads to reduce silt loading. Repeat applications of aggregate are done on an as-needed basis, dependent on the condition of the roads.
- Watering of unpaved roads is carried out to increase the moisture content of the surface material and reduce the potential for fugitive dust generation. Dust suppressants (e.g., calcium chloride,

wood chips) are also used, depending on the ability of watering to appropriately control dust. The frequency of application of water or dust suppressants to roadways is adjusted based on road conditions, weather conditions and traffic loadings. In 2021, watering of access roads for dust suppressant with the use of an on-site water truck was carried out on 142 separate occasions throughout the dry weather months. The company also owns a backhoe equipped with a road brush for sweeping asphalted surfaces. In addition to the use of on-site equipment, mud and dirt was removed from Navan Road and on-site paved roads by a subcontractor retained to vacuum sweep/flush paved surfaces on 9 separate occasions.

- A speed limit of 15 km/h is enforced while vehicles are traveling on unpaved roads. This limit is posted on site and communicated to users of the unpaved roads.
- Where possible, travel distances to material transfers and drop points are kept as short as practical to reduce dust generation.
- A wheel wash station was constructed in 2009 east of the weigh scales and scale house to wash vehicles exiting the landfill and to reduce mud drag-out onto Navan Road. The wheel wash station is operational during the non-freezing months of the year.

The site maintains a log to record the date and time of any fugitive dust complaints and a summary is provided in Appendix '4' – Schedule 'A'. This log also describes activities related to the investigation of the complaint and also records the mitigative measures implemented to address concerns raised. In 2021, WCC received no complaints related to dust or dirty roads.

(f) Noise control

The active face of the landfill operation is sufficiently set back from Navan Road to minimize disturbance resulting from noise. Berms and soil stockpiles are located between active fill areas and nearby homes and offices to act as a sound barrier. Landscaped berms have been constructed along Navan Road east and west of the site access as well as east of the wheel wash station. No complaints related to noise were received in 2021. Noise monitoring was carried out by Golder Associates Ltd. and results are presented in Appendix 3. The results and site observations indicate that elevated background noise levels exist at surrounding receptors due to road traffic noise along Navan Road including landfill activities. Based on these results, the operations of the Navan Landfill are considered to be in compliance with the MECP's Landfill Guideline and NPC-205.

(g) Aesthetic controls

Landscaped berms have been constructed along Navan Road and a tree planting program is in place to improve site aesthetics. Each year efforts are made to further improve site aesthetics. A fish habitat ditch was completed along the east limit of the site complete with vegetation, landscaping and other ditch features. In addition to drainage, the ditch also provides an aesthetic barrier to the landfill.

(h) Fire control

Fire control is maintained by the supervision of all staff including the scale staff, the spotter and equipment operators. A number of non-smoking signs have been erected throughout the site that warns users of the

danger of fire in the landfill. Personnel have been instructed on the procedures of handling a landfill fire. The use of the landfill compactor and soil as cover material does not allow a fire to persist. The excavator, compactor, loader and the dozers are available to isolate a fire. Spare cover material, available at the working face, will be used in conjunction with the landfill compactor to smother a fire. The proximity of the Ottawa Fire Department at Blackburn Hamlet (less than 5 kilometres) will allow any superficial fire to be put out in a timely manner. On-site security and the presence of employees who live adjacent to the site will allow for quick action in the event of fire after hours. All machinery is equipped with proper fire extinguishers.

(i) Odour Control (Odour Management Plan)

To ensure the WCC Navan Facility is operated in a manner that minimizes the impact from odour on the public and the natural environment, the following program is in place at the WCC Navan Facility to deal with odour issues.

(1) Odour Monitoring

WCC has a comprehensive program for monitoring odours and for taking remedial action in the event that odours become at all problematic in the operation of the WCC Navan Facility. Any unusual odour events and any measures taken to deal with odour at the site are recorded and filed on-site.

There are no Ontario Government standards for odour. There are no agreed-upon, empirical measurement protocols or odour thresholds that may be used in the operation of a landfill or processing facility. Consequently, the ultimate test of an effective odour-control strategy for any facility can only be that it produces no odour complaints from the surrounding community over an extended period of operation. The operators of the facility need to take preventative and other control measures to ensure that odours never reach a threshold where they can generate complaints. The best odour monitoring program available is to give responsibility to all staff working at the site to use their own senses to constantly monitor for excessive levels of odour on-site. While some level of on site odour is normal and acceptable, it can become a problem when these same odours register off the property. As well, the character of the odour is significant. Many 'aerobic' odours may be very inoffensive, even at a significant concentration, while even very low levels of the types of odour associated with anaerobic activity may be deeply offensive.

It is normal practice at the site to monitor odours in the following way. Every morning, when staff first arrives on the site, a general inspection is undertaken of the facility. While the site manager is looking for anything untoward, the presence of any odours likely to extend beyond the perimeter of the site will be of special concern. In addition, whenever any material at the site is being disturbed by the equipment used at the facility, staff on site periodically stand downwind of the work that is being done, and assure themselves that any odours being created are mild, indicative of fully aerobic activity, and are not likely to be carried off the property.

In the event staff on-site believes any odours may have some potential for off-site impact, they will drive to a location off-site and downwind from the work at the facility to determine at that moment if any off-site impact can be detected. If there is a detectable off-site impact, work on the site will be stopped immediately and remedial measures will be taken (see below). If no off-site impacts are detectable, work

at the site will proceed with caution, with further periodic inspections off-site. Remedial measures will again be taken as appropriate.

The key to this approach is that all staff is constantly vigilant for even mild odours produced on-site and will take actions to deal with those odours well before they become evident off-site.

A windsock and flag is installed on the site. This provides a strong visual reminder to site staff of existing wind conditions, such that they can make judgments as to the potential for off-site odours, given that day's planned activities.

No odour monitoring program is of much value unless there is a companion program to control those same odours, once they are detected. What follows is a stepped program, capable of dealing effectively with everything from the mildest odours to the most offensive. It should be noted that all of the measures described below can and are just as likely to be applied to only sections of a site, rather than to the entire site. The source of odour problems can commonly be quite localized.

(2) Prevention

The best odour control strategy is odour prevention. If experienced staff early in the process makes the correct, preventative decisions, odour will not be an issue. Although mild odours are experienced on-site from time to time, they are mild in nature and should not be noticeable off-site.

A perimeter drainage system put in place by WCC has been excavated through the sand deposit into the underlying clay and extends below the water table. This drainage system has significantly reduced, if not eliminated, the potential for off-site migration of LFG.

Monitoring of methane gas at the landfill site is performed on three occasions per year generally during the spring, summer and late fall or winter. Results of the monitoring programs and interpretation of the data are presented in Section 8 of this report.

A leachate pumping station has been constructed in the southeast corner of the landfill site and a forcemain connection to the municipal sewage treatment plant commenced in 2007. Presently, the disposal method of choice for leachate generated by the WCC Navan Facility is treatment at the Robert O. Pickard Environmental Centre, a waste water treatment plant. The use of leachate retention ponds has been discontinued. This eliminates the possibility of odours emanating from on-site treatment and leachate retention ponds.

As discussed an interim LFG odour control system was installed in 2011 and commissioned in April 2012. The purpose of the interim LFG odour control system is to control potential odorous emissions from the site until the full-scale LFG collection system is installed at the site. The interim LFG odour control system includes connections to the existing leachate collection system cleanouts and to existing vertical LFG extraction wells as well as a series of horizontal extraction wells.

(3) Masking the Odour

Principally, these additional measures will consist of using physical, biological and/or chemical methods to mask the odours on the surface of the odour source, so that none of the odours contained within are

released to the environment. A number of proven masking techniques are available and can be used at the discretion of the site manager:

- Physically covering the surface of the odour source with a 15 centimetre layer of bulking material is often enough to block the release of most odours for a period of a day or more while remedial work is done;

- A number of biological inoculants are available commercially. These substances, when applied to the surface in a water solution, are felt to effectively reinforce aggressive aerobic activity on the surface by out competing any anaerobic colonies that may be present in the near surface area. In effect, this creates a bio-filter, and biologically processes anaerobic gases as they are released; and/or

- A number of chemical/nutrient mixtures are also available commercially. These substances, when applied to the odour source in much the same manner used with the biological inoculants, can have a very similar or even stronger effect. Manufacturers of these products claim that their compounds rapidly stimulate the growth of one desirable family of microorganisms or another, again to create a bio-filter effect.

Whatever the actual mechanism, these products have been proven effective in the field. In all cases, odour control strategies used at this level can be applied within minutes of the decision to use them, and the effects will be largely felt within 10-15 minutes of that application, if not sooner.

(4) Isolating an Odour Source

The last strategy will consist of using additional measures to isolate and neutralize the offending odour source material. The offensive material may be removed from the problem area, landfilled and covered immediately. This isolation strategy will be used at the discretion of the site manager.

(j) Contingency for winter operations

The following contingency factors have been implemented in the event that very cold conditions cause operating problems:

- Snow removal equipment

A variety of equipment is available for snow removal. Two CAT 950 loaders are mainly used for this purpose. A John Deere and a CAT backhoe along with a one ton truck equipped with snow ploughing equipment are also used. A Kubota utility vehicle equipped with snow blowing equipment is available to assist with snow removal along walkways and vehicle restricted areas.

- Cover material stockpiles

Impacted soil reserved for re-use as daily cover material has been stockpiled in certain areas of the landfill. In case of frost, an excavator equipped with ripping tooth is available for ripping through the frost line. The excavator and 6-wheel drive articulated dump trucks are used to move and stockpile cover as a contingency.

(k) Complaints Procedure

In the event that an odour complaint is received, either by the City of Ottawa or the MECP, it is expected that those parties will immediately contact WCC site staff and notify them of the problem. WCC staff will take immediate steps to determine the extent of the problem and whether or not it is caused by the facility. If the source of the complaint is deemed to be originating from the WCC Navan Facility, appropriate measures as described above will be taken to mitigate the problem. Again, all such measures taken will be documented and a record kept on-site. If the identity of the complainant is made known to WCC staff, staff will contact the complainant that day, listen to their description of the problem, advise them in detail of the measures taken to rectify the problem, and invite them to visit the facility at some point to see for themselves how the site is operated. WCC will also call them back to determine whether or not they have been aware of any other site related issues.

WCC staff has found in the past that this kind of immediate and personal attention goes a long way to building community support for a facility and builds community confidence in the management of the site.

The site maintains a log to record the date and time of any complaints. This log describes activities related to the investigation of the complaint, and the mitigative measures implemented, if required, to address concerns. A summary of complaints received in 2021 is provided as Schedule 'A' in Appendix '4'. In 2021, WCC personnel received 1 odour related complaint. No other complaints were received by site personnel in 2021.

(l) Record Keeping

Record keeping is in accordance with the requirements of the ECA and as described in the D&O (Golder, 2008) as follows:

Site inspection records and daily waste records are retained at the site for a minimum period of two years. The records include the following information:

a. Type and estimated amount of waste received at the site for landfilling and processing;
b. Area of the site in which landfilling operations are taking place;
c. Type, source and amount of daily and intermediate cover used;
d. Waste types and quantities of recyclable wastes received at the site;
e. Source of their generation (e.g. customer);
f. Waste types and quantities of recyclable wastes transferred off the site;
g. Destination of recyclable wastes transferred off the site;
h. White goods tag numbers tagged at the site;
i. Types of wastes and quantity transferred from the processing area into the landfill area;
j. The calculated total quantity (including volume or weight) of waste remaining on-site at the end of each day;
k. Records of any dust suppression activities undertaken at the site;
l. Maintenance and repairs performed on the equipment used at the site;

m. Records of complaints received and actions taken to resolve them;
n. Summary of emergency situations and actions taken to address them; and
o. Any environmental and operational problems and any mitigative actions taken.

3.2.9 Waste Acceptance and Placement

The mechanics of waste placement at the active disposal face are described as follows:

1. Procedures are in place at the site to pre-screen all special waste materials prior to arrival at the site. Generators/haulers are required to provide information related to the type of waste to be delivered at the site and complete and submit a computer generated or hard copy Special Waste Approval Form which is screened prior to approval by WCC staff. Once approved, an Vehicle Code (VC) number is provided and must be presented at the scale prior to entry to the site.

2. The gate clerk registers all vehicles entering the site at the weigh scale. Vehicles are weighed and directed to the active disposal face. Light vehicles are diverted to an unloading area near the entrance to the site and do not enter the working area of the landfill. Appropriate signs are posted to indicate clearly where vehicles are to unload.

3. Vehicles reach the active face via a well-maintained gravel surfaced access road. On arrival, they wait until a ground worker screens the load and directs them to back into the active working face. The working face length is confined to as small an area as possible, but generally is wide enough so that 6 to 8 trucks can operate safely in the working face area at any one time. After dumping, the trucks move a distance of several metres from the active working face where they can be cleaned by the truck operator.

4. Waste is placed and compacted on the active working face using a "push down method" and/or a "push up method" to an average depth of approximately 60 cm.

5. A landfill D7 dozer is used to spread and level the waste as it is received. An 826 CAT compactor works on top of the refuse and compacts and shapes the waste into place. Between 3 and 5 passes with this equipment are made before the required density is obtained. Additional waste is spread evenly by repeated passes of the dozer and compactor to a total average lift depth of 2.5 to 3 metres.

6. Cover material is placed daily and as required. Generally, impacted soil hauled to the active face is used as cover material and spread into a minimum 15 cm thick layer. Areas not visited for an extended period of time are covered with a minimum of 25 cm of interim cover material.

7. All weigh tickets are kept on site along with daily and monthly summaries which are available for review. All rejected waste loads are reported to the Ministry of the Environment, Conservation and Parks (MECP) district office in Ottawa and a record of the report is kept on site.

8. Asbestos waste is landfilled in accordance with Section 17 of Ont. Reg. 347. These procedures consist of the following:

    a. Personnel involved in the disposal of asbestos are trained to recognize the related hazards.

b. Asbestos is accepted only in containers/bags and not in a loose form. Care is taken to ensure that staff and equipment do not come into contact with the asbestos.
c. Asbestos is accepted only with 24 hour pre-notification.
d. Personal protective equipment including disposable coveralls, head covers and respirators are available for the handling of special wastes.
e. Prior to the arrival of asbestos on-site, a trench is excavated to receive the material.
f. Other operations in the immediate vicinity of the trench are temporarily suspended while the containers are emptied in the trench.
g. The trench is immediately covered over with at least 1.25 metres of waste or cover soil.

9. Refrigerant containing appliances are received and handled in accordance with the following procedures:

a. When refrigerant containing appliances are identified in the waste load, the client will be notified and given the opportunity to reclaim the unit(s) and remove it from the site and a rejected waste form shall be completed by scale personnel if the unit is reclaimed for removal;

b. Should the client/driver not reclaim the refrigerant containing unit(s), scale personnel shall be notified immediately and the unit(s) shall be recorded on the weigh ticket and the unit(s) shall be removed by landfill or recycling personnel and taken to a designated area on the recycling pad taking all necessary precautions not to damage the refrigerant containing unit;

c. Every effort shall be taken by personnel to store the refrigerant containing unit in the designated area on the recycling pad in an orderly manner that is accessible to the refrigerant removal technician and in an up-right position or, if not possible due to damage, in a manner to prevent damage to the refrigerant containing unit.

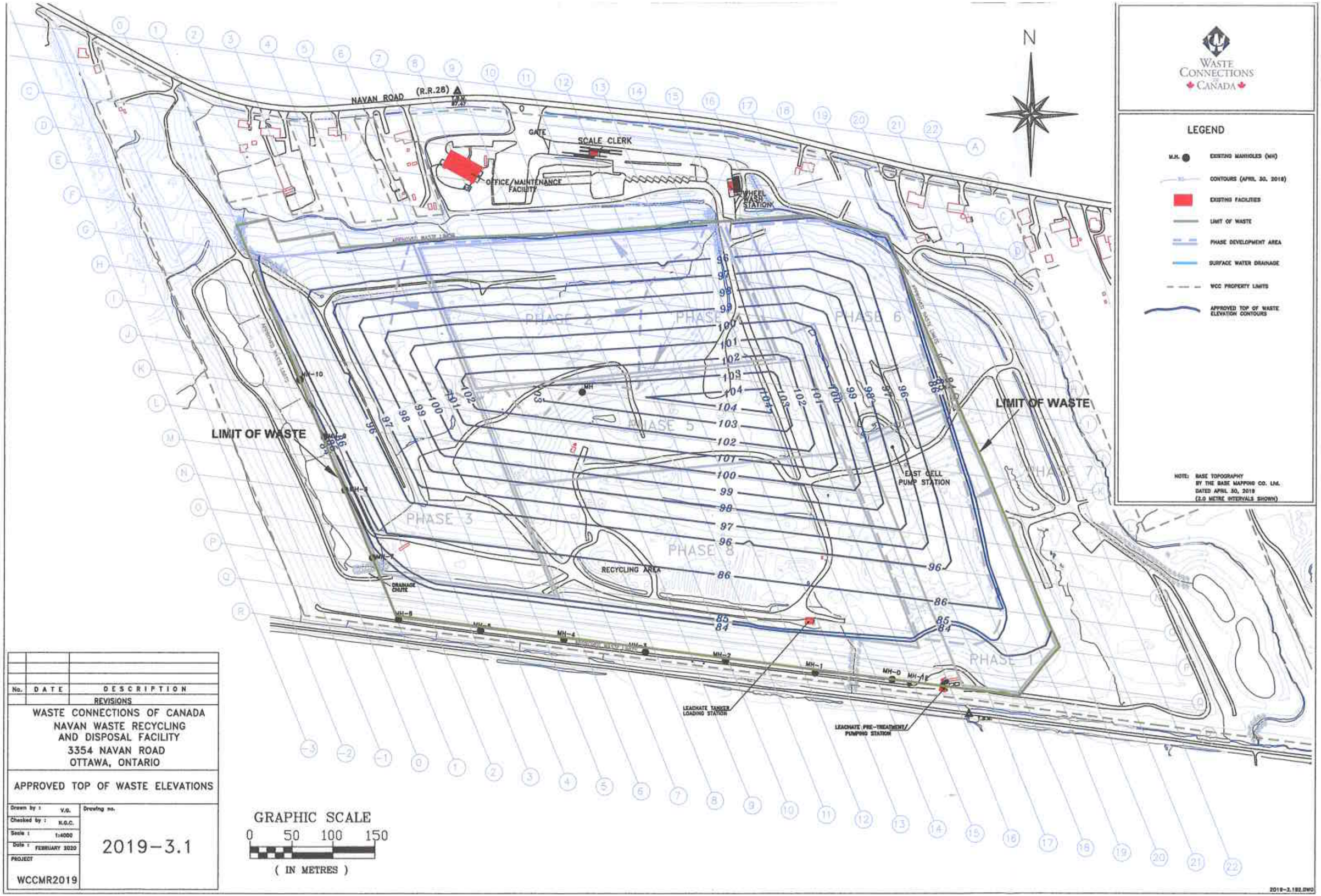
d. Once a sufficient number of units have been stored for removal of refrigerants, or once quarterly, a certified technician shall be retained to safely remove all refrigerants and certify them as completed and a record of the certification shall be kept on file;

e. Once the unit has been certified it shall be available for removal as scrap metal;

f. The procedures noted above shall apply for all units received at the site that do not contain a refrigerant removal certificate, including those claimed to no longer contain refrigerant materials.

No waste is accepted, deposited or removed from the site unless the site supervisory personnel is present.


GATE
SCALE CLERK
OFFICE/MAINTENANCE FACILITY
WHEEL WASH STATION
PHASE 2 (COMPLETED)
PHASE 4
PHASE 6
PHASE 5
PHASE 3
PHASE 8
PHASE 7
PHASE 1
LIMIT OF WASTE
LIMIT OF WASTE
INTERIM LANDFILL GAS FLARE
MATERIAL PROCESSING AREA & SCREENINGS
MATERIAL PROCESSING AREA
RECYCLING AREA
CONTAMINATED SOIL TREATMENT AREA
EAST CELL PUMP STATION
DRAINAGE CHUTE
LEACHATE TANKER LOADING STATION
LEACHATE PRE-TREATMENT PUMPING STATION
MH-10
MH-9
MH-8
MH-7
MH-6
MH-5
MH-4
MH-3
MH-2
MH-1
MH-0
C.O.MH
002411



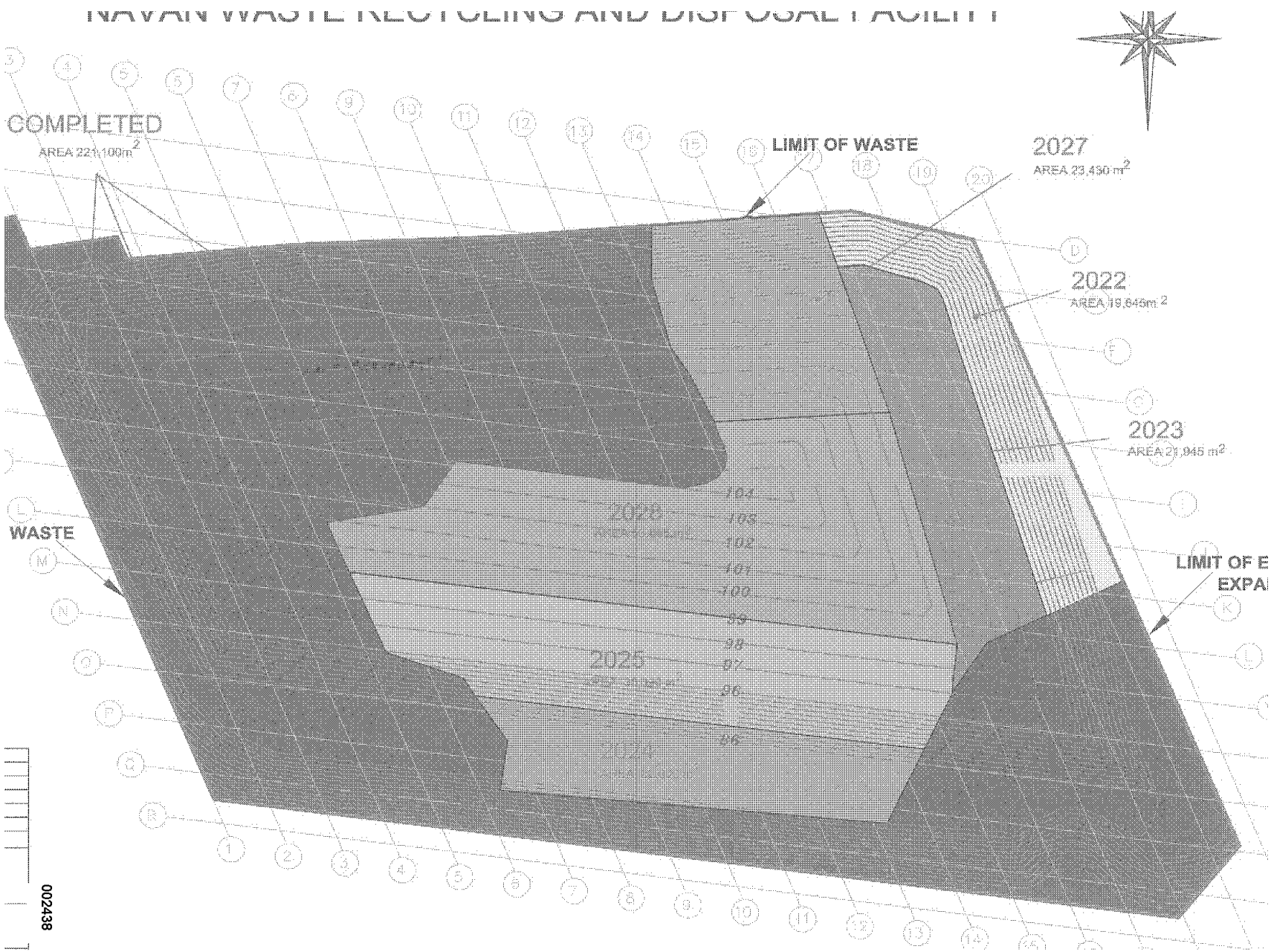
No.	DATE	DESCRIPTION
		REVISIONS

WASTE CONNECTIONS OF CANADA
NAVAN WASTE RECYCLING AND DISPOSAL FACILITY
3354 NAVAN ROAD
OTTAWA, ONTARIO

APPROVED TOP OF WASTE ELEVATIONS

Drawn by : V.G.	Drawing no.
Checked by : N.G.C.	2019-3.1
Scale : 1:4000	
Date : FEBRUARY 2020	
PROJECT WCCMR2019	

2019-3.1R2.DWG


NAVAN WASTE RECYCLING AND DISPOSAL FACILITY
COMPLETED
AREA 221,100m²
LIMIT OF WASTE
2027
AREA 23,430 m²
2022
AREA 19,646m²
2023
AREA 21,945 m²
2024
2025
104
103
102
101
100
99
98
97
96
95
WASTE
LIMIT OF E
EXPA
002438