Terrapure is proud to have received the 2016 Industry Excellence Award for Health & Safety from Natural Resources Magazine.

Stoney Creek Regional Facility Environmental Assessment

Draft Conceptual Design Report

1195 Stellar Drive, Unit #1 Newmarket Ontario L3Y 7B8 Canada
11102771 | Report No 24 | December 7, 2017

Table of Contents

1. Introduction 1
   - 1.1 Background 1
   - 1.2 Objectives of the Document 3
2. Conceptual Design Basis 4
   - 2.1 Overview 4
   - 2.2 Site Capacity and Fill Rate 6
   - 2.3 Footprint Size 6
   - 2.4 Final Contours and Slopes 6
   - 2.5 Peak Elevation and Height 6
   - 2.6 Buffer Areas 6
   - 2.7 Setbacks to Surrounding Developments 7
   - 2.8 Infrastructure Requirements 7
   - 2.9 Groundwater Management 8
   - 2.10 Leachate Management 8
   - 2.11 Stormwater Management 8
   - 2.12 Gas Management 9
   - 2.13 Traffic 9
   - 2.14 Operations 10
3. Alternative Methods 10
   - 3.1 Option 1 – Reconfiguration 10
   - 3.2 Option 2 – Footprint Expansion 11
   - 3.3 Option 3 – Height Increase 11
   - 3.4 Option 4 – Reconfiguration and Footprint Expansion 11
   - 3.5 Option 5 – Reconfiguration and Height Increase 12
   - 3.6 Option 6 – Footprint Expansion and Height Increase 12
4. Summary 19

Figure Index

Figure 1.1 Stoney Creek Regional Facility Site Location 2

Figure 2.1 Current Approved Footprint 5

Figure 3.1 Option 1 – Reconfiguration 13

Figure 3.2 Option 2 – Footprint Expansion 14

Figure 3.3 Option 3 – Height Increase 15

Figure 3.4 Option 4 – Reconfiguration and Footprint Expansion 16

Figure 3.5 Option 5 – Reconfiguration and Height Increase 17

Figure 3.6 Option 6 – Footprint Expansion and Height Increase 18

Table Index

Table 4.1 Comparison of Alternatives 20

Appendices

Appendix A Leachate Generation

Appendix B Traffic Levels

1. Introduction

1.1 Background

The Stoney Creek Regional Facility (SCRF) is owned and operated by Revolution Landfill LP, operating as Terrapure Environmental, herein referred to as Terrapure (Owner, Proponent). The SCRF is located at the northwest corner of Mud Street and Upper Centennial Parkway in the City of Hamilton (formerly the City of Stoney Creek, **Figure 1.1**), and has been in operation since it was approved by the Ministry of the Environment and Climate Change (MOECC) in 1996. The SCRF, which operates under Environmental Compliance Approval (ECA) No. A181008, as amended, has a total approved site capacity of 8,320,000 cubic metres (m^3) (6,320,000 m^3 for solid, non-hazardous residual material and approximately 2,000,000 m^3 for industrial fill), with an approved maximum annual volume of 750,000 tonnes of residual material.

Terrapure is proposing to increase the total approved capacity for post-diversion solid, non-hazardous industrial residual material at the SCRF by 3,680,000 m^3, so that Terrapure can continue to operate its business and receive this material to support local industry. The proposal would not change the type or annual volume of residual material currently accepted at the Facility, nor the maximum number of vehicles to the Site per day. The Minister of the Environment and Climate Change (Minister) approved the Terms of Reference (ToR) for the Environmental Assessment (EA) on November 9, 2017, which included a brief overview of the alternative methods (i.e., footprint options) to be examined during the EA. The ToR made a commitment that further details on the alternative methods would be provided during the EA. This report provides a greater level of detail on each of the alternative footprint options for further evaluation.

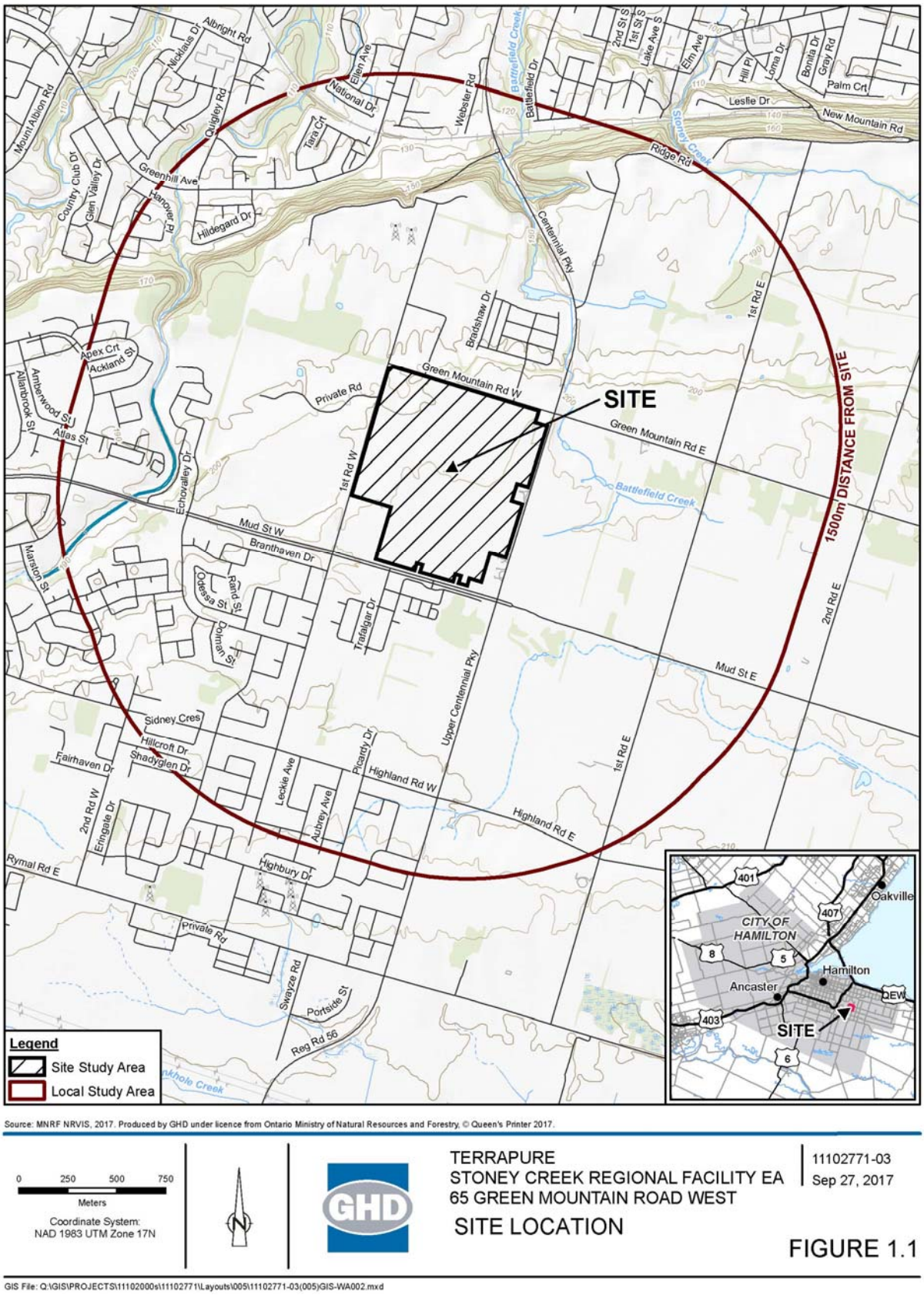

Figure 1.1 Stoney Creek Regional Facility Site Location

1.2 Objectives of the Document

This document is a Conceptual Design Report (CDR) which presents conceptual designs for the Alternative Methods of Carrying Out the Undertaking (Alternative Methods) within the existing Site boundaries. The report is intended to form the basis of a comparative analysis of the Alternative Methods by the project team technical disciplines. The comparative analysis will lead to the identification of a preferred Alternative Method, which will be subject to further design development and a detailed impact assessment.

The Alternative Methods presented in this report were developed to a conceptual level of detail based on the following characteristics:

- Site capacity and fill rate
- Footprint size
- Final contours and slopes
- Peak elevation and height relative to surrounding landscape
- Buffer areas between the SCRF footprint and the property boundary
- Setbacks to surrounding developments
- Infrastructure requirements
- Leachate management
- Stormwater management
- Gas management
- Traffic
- Operations

Furthermore, the expansion alternatives were prepared in consideration of the requirements outlined in the following documents:

- Approved Amended Terms of Reference, SCRF EA, GHD, November 2017
- O. Reg. 101/07 – Waste Management Projects, under the *EA Act*
- O. Reg. 232/98 – Landfilling Sites, under the Environmental Protection Act (Last amendment: O. Reg. 268/11, October 31, 2011)
- Landfill Standards: A Guideline on the Regulatory and Approval Requirements for New or Expanding Landfilling Sites, Ontario Ministry of the Environment (Last revision: January, 2012)
- ECA No. A110302 for Waste, and ECA Nos. 6869-9EAT28 and 1907-99NSF2 for Industrial Sewage Works

It should be noted that different approaches may be possible to achieve the same or better design objectives. The conceptual designs for the Alternative Methods presented herein will be further developed during the technical design stage for the preferred alternative.

2. Conceptual Design Basis

2.1 Overview

A series of criteria and assumptions were established to guide the development of the Alternative Methods for the Site. These include Terrapure's projected waste disposal capacity requirements and regulatory requirements relating to Site design geometry. In addition, O. Reg. 232/98 and the accompanying Landfilling Standards Guideline specify requirements and/or provide recommendations for key Site design parameters. Assumptions were also made relating to operational traffic levels, leachate generation rates, and aspects of Site design and operations. The criteria and assumptions used in the development of the Alternative Methods are discussed in the sections that follow.

For reference, the currently approved design for the SCRF is presented in **Figure 2.1**.

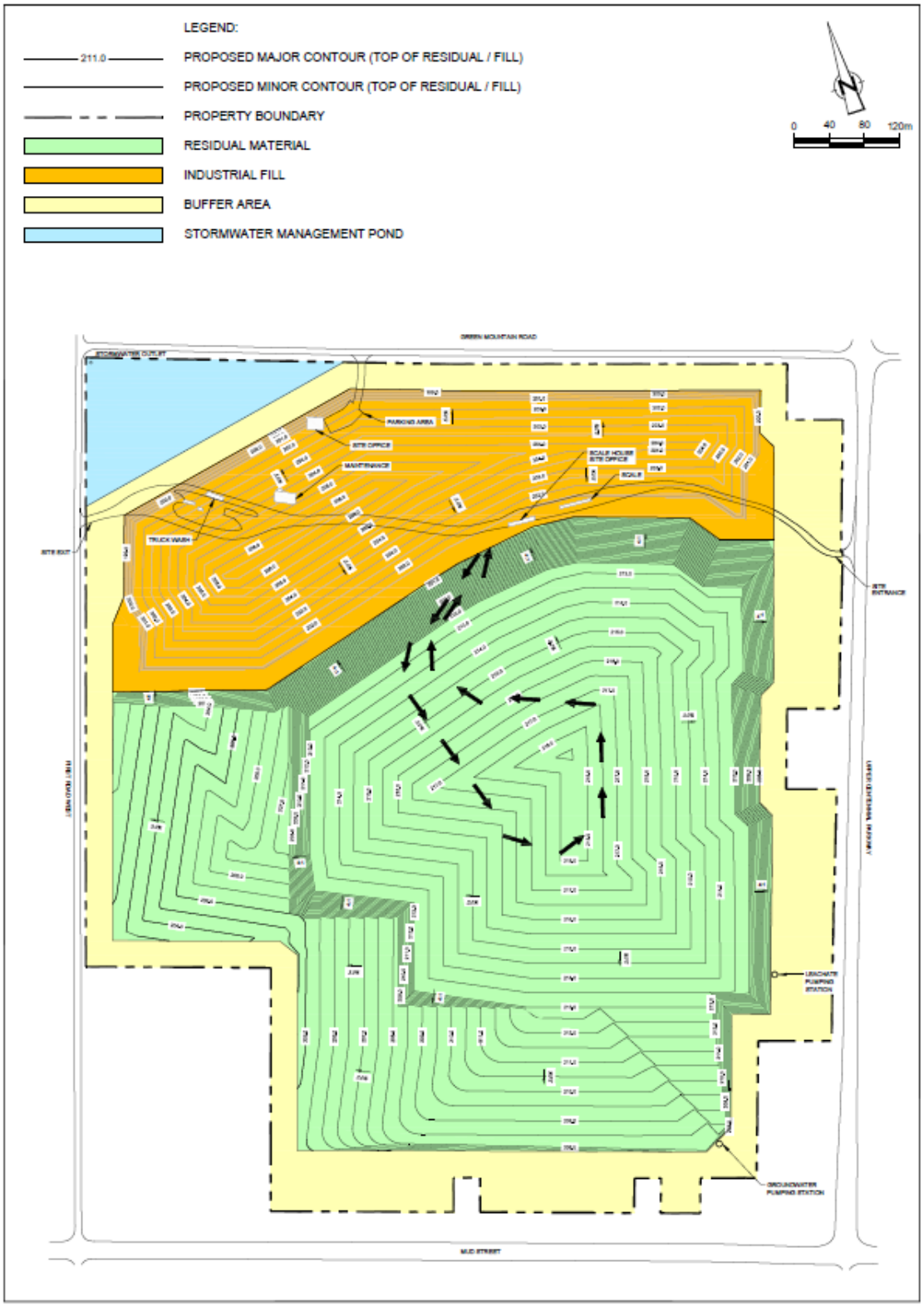

Figure 2.1 Current Approved Footprint

2.2 Site Capacity and Fill Rate

As noted above, the SCRF has a total approved site capacity of 8,320,000 m^3 (6,320,000 m^3 for solid, non-hazardous residual material and approximately 2,000,000 m^3 for industrial fill), with an approved maximum annual volume of 750,000 tonnes of residual material. The expansion proposed under this EA is to increase the total approved capacity for post-diversion solid, non-hazardous industrial residual material at the SCRF by 3,680,000 m^3. No changes are being proposed to the maximum approved fill rate of up to 750,000 tonnes per year.

2.3 Footprint Size

As shown in **Figure 2.1**, the current approved footprint for the residual material is 41.5 ha, while the industrial fill material covers a footprint of approximately 12.9 ha. The maximum allowable footprint for the Site is limited by the size of the property currently owned by Terrapure. The property currently covers a total area of 75.1 ha, and is bounded by Green Mountain Road West in the north, Upper Centennial Parkway in the east, Mud Street in the south, and First Road West in the west. There are a few properties around the periphery of the Site that are privately owned and are not being considered for expansion of the SCRF footprint. Additional requirements surrounding buffers and setbacks from these properties are discussed further below.

2.4 Final Contours and Slopes

The regulatory requirements specify a maximum slope of four units horizontal to one unit vertical (4H to 1V, or 25%) and a minimum slope of 20H to 1V (5%), but allow variance where it can be shown to be appropriate with respect to slope stability, erosion potential, end uses, and infiltration requirements for groundwater protection. Slopes of a minimum 33.3H to 1V (3%) are currently approved at the SCRF. Final contours for the Alternative Methods were developed based on these slope requirements and in consideration of other aspects such as footprint configuration and stormwater management.

2.5 Peak Elevation and Height

The peak elevation of the SCRF refers to the highest point of the Site measured in metres above mean sea level (mAMSL), while the height of the SCRF is measured relative to the surrounding landscape. There are no regulatory requirements specifically constraining peak elevations or landfill height. However, the peak elevation is limited by the geometry of the Site and the maximum height is indirectly governed by regulatory requirements to ensure that adequate foundation conditions exist and that slopes are stable. The suitability of the proposed height increase relative to the subsurface conditions will be evaluated in more detail, once a preferred alternative is chosen. Screening measures are currently in place at the Site to mitigate potential impacts from a visual and noise standpoint, including earth berms and fences. Additional screening measures will be implemented as required based on the development of the Site and surrounding area.

2.6 Buffer Areas

Regulatory requirements specify a minimum buffer width of 100 metres (m) between the limit of the residual footprint and the Site boundary, but allow this to be reduced to 30 m if it is shown to be appropriate based on a site specific assessment (e.g., if the buffer provides adequate space for

vehicle movements, ancillary facilities, and ensures that potential effects from the Site operations do not have unacceptable impacts outside of the Site).

As shown in **Figure 2.1**, minimum buffer areas of 30 m are currently approved around the perimeter of the residual material area. These buffers extend to approximately 65 m in various areas along the east and south side of the Site, and up to approximately 130 m in the vicinity of the existing stormwater management facility in the northwest corner of the Site.

2.7 Setbacks to Surrounding Developments

In addition to the on-site buffers noted above that will be maintained in relation to the SCRF, additional buffer separation is achieved through road allowances and setbacks for other developments required in accordance with local planning by-laws.

The closest residential dwellings to the south of the Site is situated approximately 60 m from the property line, while the closest residential dwelling (currently under construction) to the property line in the north is situated approximately 35 m away. The closest existing residential dwelling to the east is situated approximately 150 m from the property line, while the closest residential dwellings in the west are situated approximately 795 m from the property line.

2.8 Infrastructure Requirements

The SCRF requires various infrastructure components in order to operate the Site, including:

- Site entrance and exit
- Scale facility
- Administrative facility
- Maintenance facility
- Groundwater management system
- Leachate management system
- Stormwater management system

The existing Site entrance from Upper Centennial Parkway and the existing Site exit to First Road West are anticipated to be maintained in their current locations. However, if they need to be relocated to accommodate other infrastructure or Site operations, Upper Centennial Parkway and First Road West will remain as the preferred connection points.

The scale facility, administrative facility, and maintenance facility will be relocated as required in order to accommodate development of the Site. This may include relocation to the buffer area, the industrial fill area, residual material area, or to an off-site location.

The groundwater management system, leachate management system, and stormwater management system will be reconfigured as required to accommodate the Alternative Methods. Further details are provided in the sections that follow.

2.9 Groundwater Management

Groundwater is currently collected through a network of trenches and piping excavated within the bedrock below the base liner system. Groundwater drains by gravity to a pumping station in the southeast corner of the Site, where it is subsequently recovered for use in Site operations (i.e., dust control) or discharged to the sanitary sewer. The groundwater collection system trenches and piping will be extended as required underneath any new residual material areas. No changes are anticipated to the groundwater pumping station or the discharge to the sanitary sewer.

2.10 Leachate Management

Leachate is currently collected through a network of perforated pipes on top of the base liner system, under the residual material area, where it drains by gravity to a leachate pumping station in the southeast of the Site. Leachate is then pumped to the surface where it is discharged to a gravity main that flows to the equalization pond within the adjacent closed west Site before being discharged to the sanitary sewer under Mistywood Drive. However, Terrapure has started discussions with relevant stakeholders in order to establish a new connection to the sanitary trunk sewer currently under construction under Upper Centennial Parkway. Should a new discharge connection be established, it may allow the existing gravity main and equalization pond to be decommissioned.

The leachate collection system piping will be extended as required in any residual material areas where a new liner system is proposed. Alternate and/or additional locations for the leachate pumping station(s) and discharge location(s) may be required based on the Alternative Methods.

The leachate generation rate is an important parameter used in assessing the operational and environmental performance of a landfill site. Estimated leachate generation rates for each Option are summarized in Section 4.0 and are supported by the calculations presented in **Appendix A**. However, it should be noted that the leachate generation rate will vary over the operational and post-closure period of the Facility, and is influenced by factors including precipitation, degree of landfill development (e.g., area of landfill that is actively undergoing development versus areas where interim/final cover has been placed), final cover design, and other factors.

2.11 Stormwater Management

O. Reg. 232/98 requires that landfill sites be designed to protect surface water to specified performance standards based on the following principles:

- Divert or control clean surface water flowing onto the site.
- Control quality and quantity of runoff discharging from the site to control erosion, sediment transport, and flooding.

Under the current design, clean runoff is shed from the final cover into perimeter drainage ditches, where it drains by gravity to a series of ponds (i.e., sediment forebay and detention pond) in the northwest corner of the Site before being discharged to the storm sewer under First Road West.

While the overall function of the stormwater management system is not expected to change, the location and alignment of the existing ponds and ditches may need to be relocated to accommodate the Alternative Methods. The outlet to the existing storm sewer under First Road West will remain under all Alternative Methods. The capacity of the existing stormwater management system will be

confirmed against each Alternative Method, although significant changes to the capacity are not expected to be required since the overall catchment area of the Site will remain largely unchanged.

The design of the final cover system will not change under any of the Alternative Methods, with each consisting of 0.60 m of compacted clay and 0.15 m of vegetated topsoil.

2.12 Gas Management

Because the Site does not accept waste capable of decomposing and generating gases, it has received a MOECC exemption[1] from the requirement to have a gas collection system, (as stated in O. Reg. 232/98), based on supporting documentation, including a gas emission study and annual confirmatory monitoring.

Under the current ECA for the SCRF, Terrapure is required to monitor for landfill gas and provide the results in the Annual Monitoring Report submitted to the MOECC by June 30th every calendar year. A Landfill Gas Assessment was conducted in 2011, demonstrating that very little gas is generated at the SCRF. Notwithstanding this, a commitment was made in the Approved Amended ToR that an update of the 2011 Assessment will be carried out as part of the SCRF EA to determine the necessity or lack thereof of landfill gas collection system being required. This assessment will be carried out once a Preferred Alternative Method (i.e., footprint) has been identified.

2.13 Traffic

Vehicle traffic associated with the development of the Site is important in assessing the potential impacts of the Site on various receptors. Traffic levels were estimated based on the following:

- Each Alternative Method is projected to increase the total approved capacity for post-diversion solid, non-hazardous industrial residual material at the SCRF by up to 3,680,000 m^3
- Some Alternative Methods will also include the placement of up to 2,000,000 m^3 of industrial fill
- Although some material stockpiles currently exist on-site (i.e., liner clay, topsoil, aggregate), to be conservative all construction materials are assumed to be imported from off-site
- Total vehicle traffic volumes were calculated based on assumed vehicle types and average capacities
- Traffic associated with staff vehicles or other Site operations is assumed to be negligible
- Traffic levels are kept within the approved limit of 250 vehicles/day

Estimated traffic levels for each Option are summarized in Section 4.0 and are supported by the calculations presented in **Appendix B**. However, it should be noted that traffic levels will vary depending on Site operations and construction scheduling. Traffic volumes will be further refined during the detailed impact assessment of the preferred alternative.

[1] Confirmed by MOECC in 2011 when the then owners of the site (Newalta) successfully applied for an exemption from a landfill gas collection requirement. Annual reports submitted by Terrapure identify the site as exempt from landfill gas collection requirements under O. Reg. 232/98.

2.14 Operations

O. Reg. 232/98 requires that landfills be designed and operated to ensure that nuisance impacts are minimized, and the regulation requires that the proponent prepare a report describing all aspects of the operation as well as maintenance procedures that will be followed.

A key objective in planning Site operations is to minimize nuisance impacts including noise, litter, vectors, dust, and odour. Typical operating practices relating to these issues include:

- Vehicles transporting waste to and around the Site are covered to prevent odour and dust
- All materials received at the Site are verified and recorded to ensure compliance with regulatory conditions
- On-site equipment is operated in such a manner as to minimize noise and visual impacts wherever possible
- All equipment required for the development, operation, or closure of the Site should comply with the noise levels outlined in applicable MOECC guidelines and technical standards
- All vehicles leaving the Site must drive through a wheel-wash to minimize track-out of mud/dirt
- The Site design includes screening features, such as fences, berms and tree plantings, which mitigate visual impact and noise

These operating practices will be common to all Alternative Methods. While these would not significantly influence the comparative analysis, they should nevertheless be considered in reviewing the Alternative Methods. Any modifications to the design and operations will be outlined during the detailed impact assessment of the preferred alternative.

3. Alternative Methods

Six Alternative Methods have been developed for comparative analysis, and have been identified herein as Options 1 to 6. The Alternative Methods were identified in consideration of the criteria and assumptions outlined in Section 2.0, and based on agency and public input received during the ToR. These Options are illustrated on **Figures 3.1 to 3.6**.

The sections that follow outline the attributes that are unique to each of the six proposed Alternative Methods.

3.1 Option 1 – Reconfiguration

Option 1 is shown in **Figure 3.1** and has the following general attributes:

- The area at the SCRF currently approved for receiving industrial fill would be replaced with post-diversion solid, non-hazardous industrial residual material. As a result, the SCRF would no longer be approved to receive industrial fill with Option 1.
- The area at the SCRF currently approved for receiving residual material would remain unchanged.
- Option 1 would not include either a horizontal or vertical expansion.

3.2 Option 2 – Footprint Expansion

Option 2 is shown in **Figure 3.2** and has the following general attributes:

- The area at the SCRF currently approved for receiving industrial fill would remain unchanged. Therefore, the SCRF would still be approved to receive industrial fill with Option 2.
- The areas at the SCRF not currently approved for receiving either industrial fill or residual material would be expanded into so that they would be able to receive post-diversion solid, non-hazardous industrial residual material.
- A minimum 30 m buffer would be established around the entire area for receiving industrial fill or post-diversion solid, non-hazardous industrial residual material.
- Option 2 would include a horizontal expansion, but not a vertical expansion. The peak height currently approved would remain unchanged.

3.3 Option 3 – Height Increase

Option 3 is shown in **Figure 3.3** and has the following general attributes:

- The area at the SCRF currently approved for receiving industrial fill would remain unchanged. Therefore, the SCRF would still be approved to receive industrial fill with Option 3.
- The area at the SCRF currently approved for receiving residual material would be expanded vertically so that additional post-diversion solid, non-hazardous industrial residual material could be received.
- Option 3 would not include a horizontal expansion, but would include a vertical expansion, increasing the overall height of the area currently approved to receive post-diversion solid, non-hazardous industrial residual material.

3.4 Option 4 – Reconfiguration and Footprint Expansion

Option 4 is shown in **Figure 3.4** and has the following general attributes:

- Option 4 reflects a combination of Options 1 and 2. The currently approved area at the SCRF for receiving industrial fill would be replaced with post-diversion solid, non-hazardous industrial residual material. In addition, the areas at the SCRF not currently approved for receiving either industrial fill or residual material would be expanded into so that they would be able to receive post-diversion solid, non-hazardous industrial residual material.
- The SCRF would no longer be approved to receive industrial fill, but only post-diversion solid, non-hazardous industrial residual material.
- A minimum 30 m buffer would be established around the entire area for receiving post-diversion solid, non-hazardous industrial residual material.
- Option 4 would include a horizontal expansion, but would not include a vertical expansion. The peak height currently approved would remain unchanged.

3.5 Option 5 – Reconfiguration and Height Increase

Option 5 is shown in **Figure 3.5** and has the following general attributes:

- Option 5 reflects a combination of Options 1 and 3. The currently approved area at the SCRF for receiving industrial fill would be replaced with post-diversion solid, non-hazardous industrial residual material. The entire area at the SCRF currently approved for receiving either industrial fill or post-diversion solid, non-hazardous industrial residual material would be expanded vertically so that additional residual material could be received.
- The SCRF would no longer be approved to receive industrial fill, but only post-diversion solid, non-hazardous industrial residual material.
- A minimum 30 m buffer would be established around the entire area for receiving post-diversion solid, non-hazardous industrial residual material.
- Option 5 would not include a horizontal expansion, but would include a vertical expansion. The peak height currently approved would be increased.

3.6 Option 6 – Footprint Expansion and Height Increase

Option 6 is shown in **Figure 3.6** and has the following general attributes:

- Option 6 reflects a combination of Options 2 and 3. The existing approved area at the SCRF for receiving industrial fill would remain unchanged. Therefore, the SCRF would still be approved to receive industrial fill with Option 6.
- The area at the SCRF currently approved for receiving post-diversion solid, non-hazardous industrial residual material would be expanded vertically, and the areas at the SCRF not currently approved for receiving either industrial fill or post-diversion solid, non-hazardous industrial residual material would be expanded into so that they would be able to receive post-diversion solid, non-hazardous industrial residual material.
- A minimum 30 m buffer would be established around the entire area for receiving industrial fill or post-diversion solid, non-hazardous industrial residual material.
- Option 6 would include both horizontal and vertical expansions, thus increasing the currently approved peak height

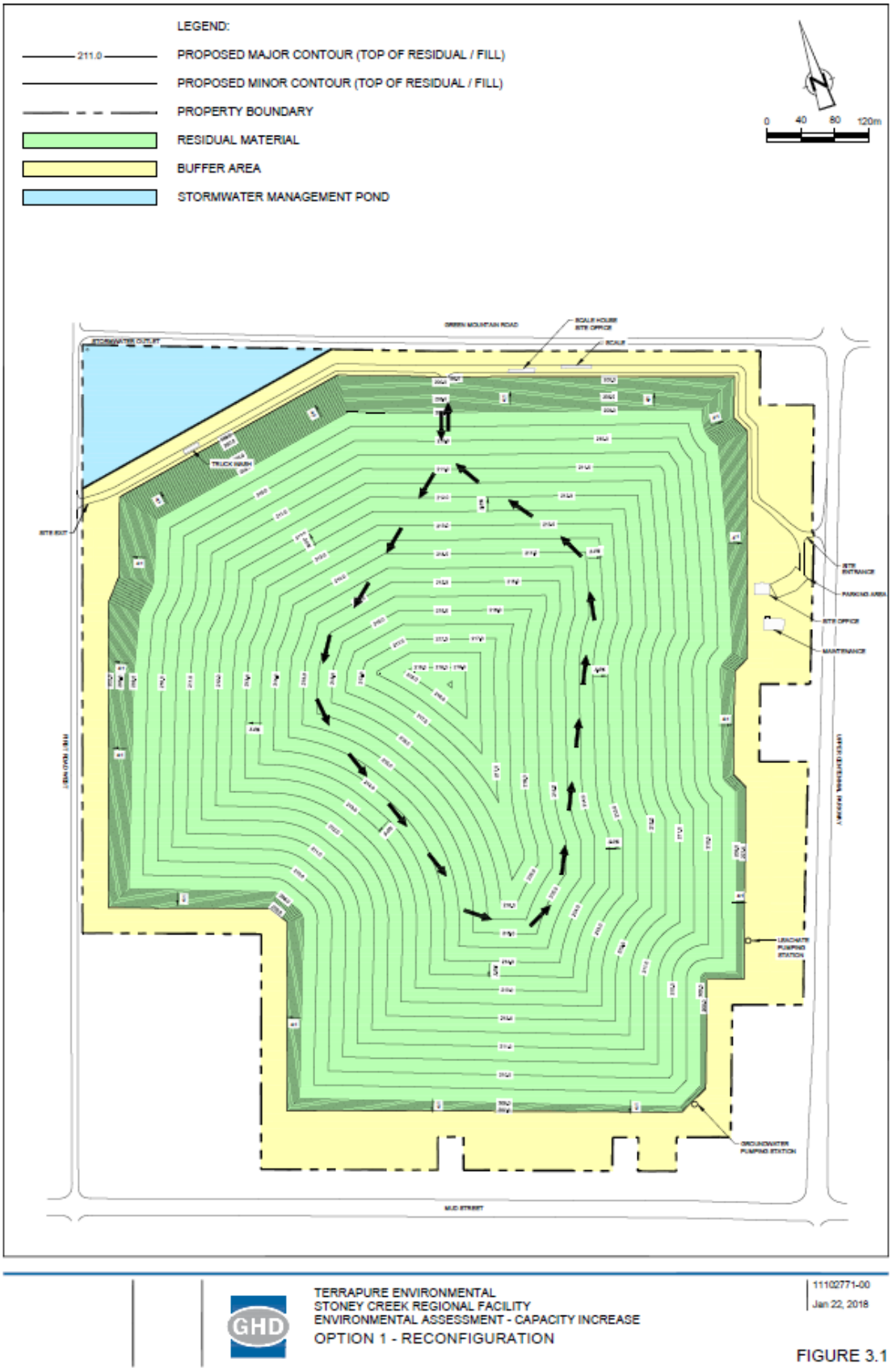

Figure 3.1 Option 1 – Reconfiguration

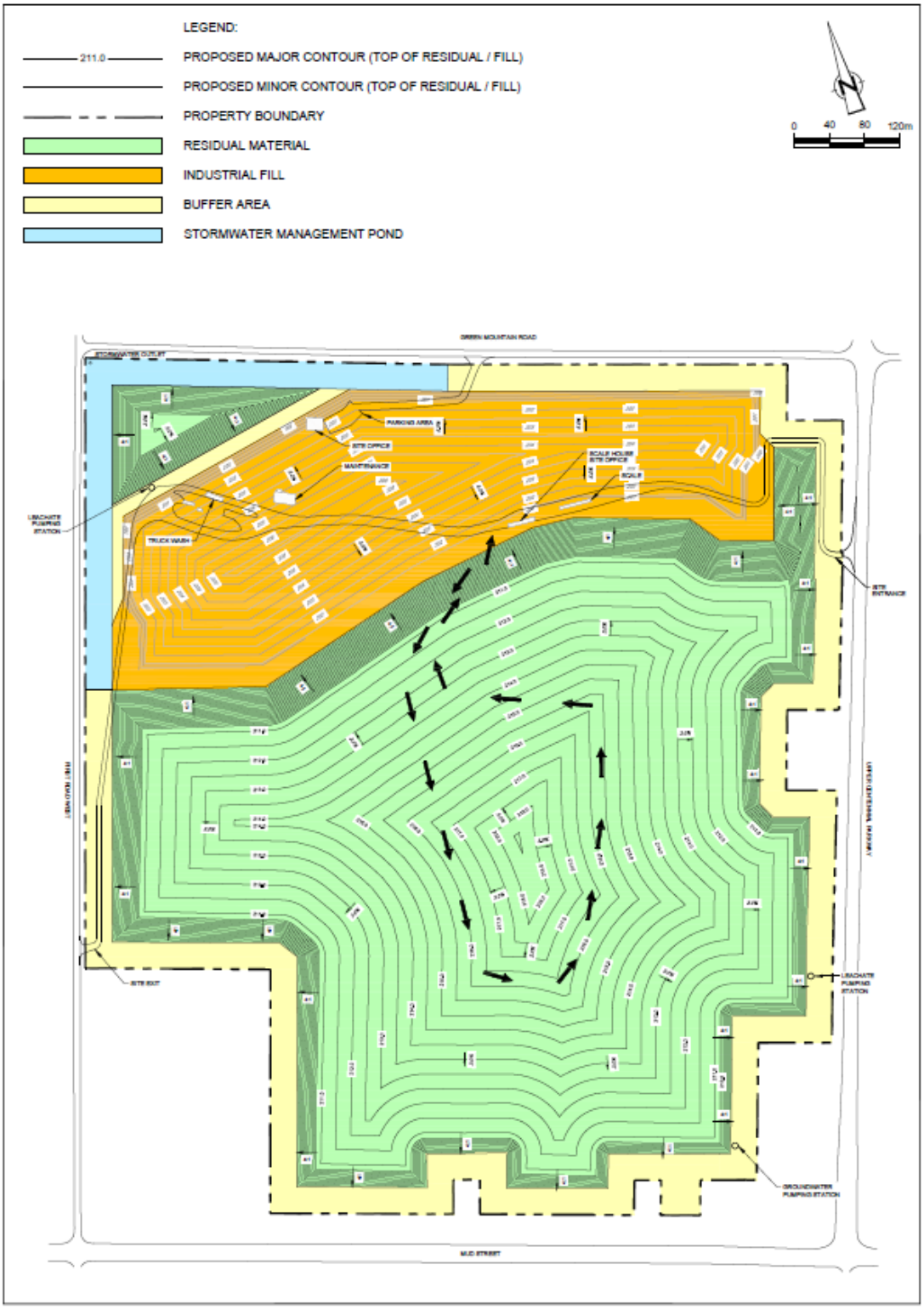

Figure 3.2 Option 2 – Footprint Expansion

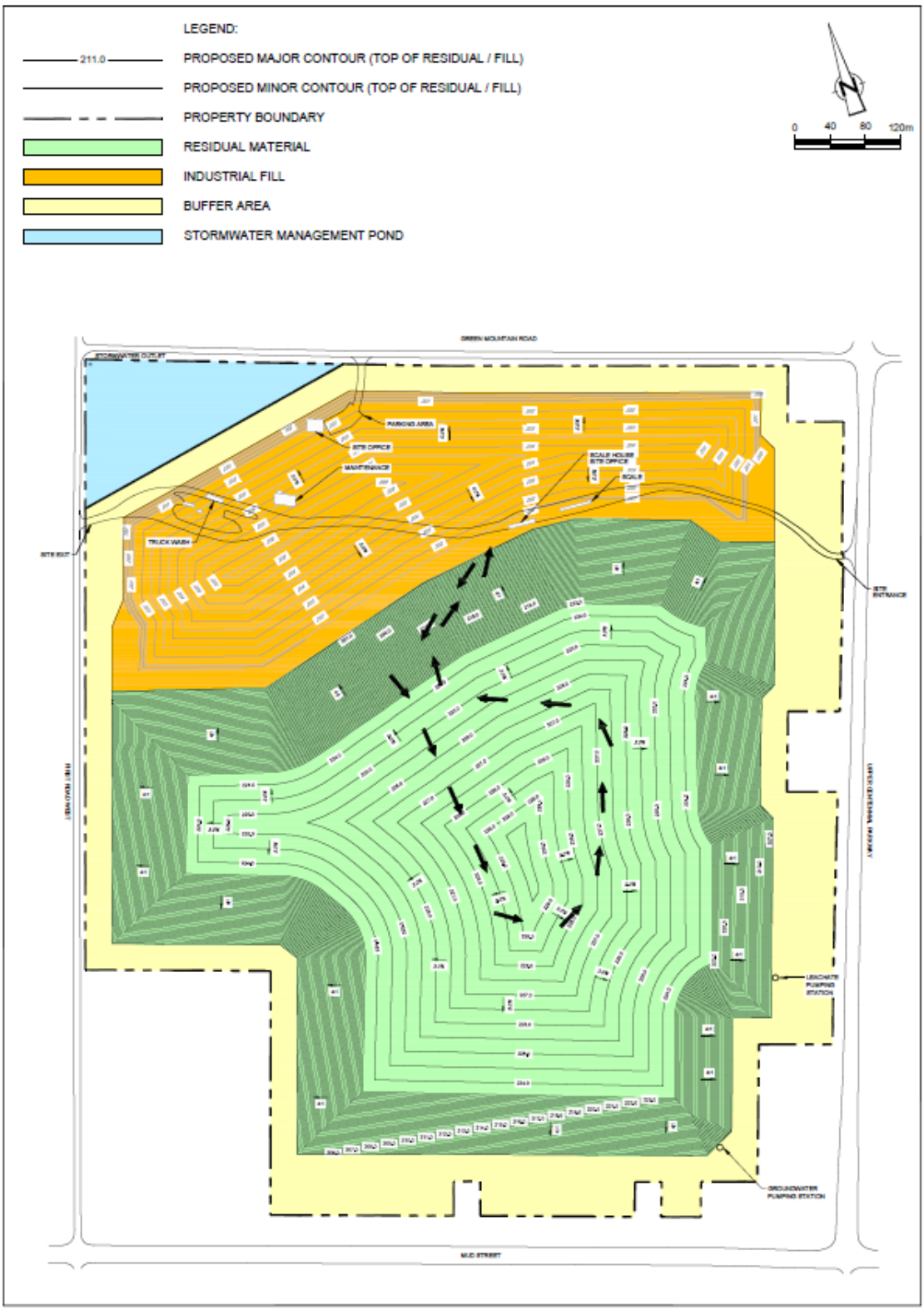

Figure 3.3 Option 3 – Height Increase

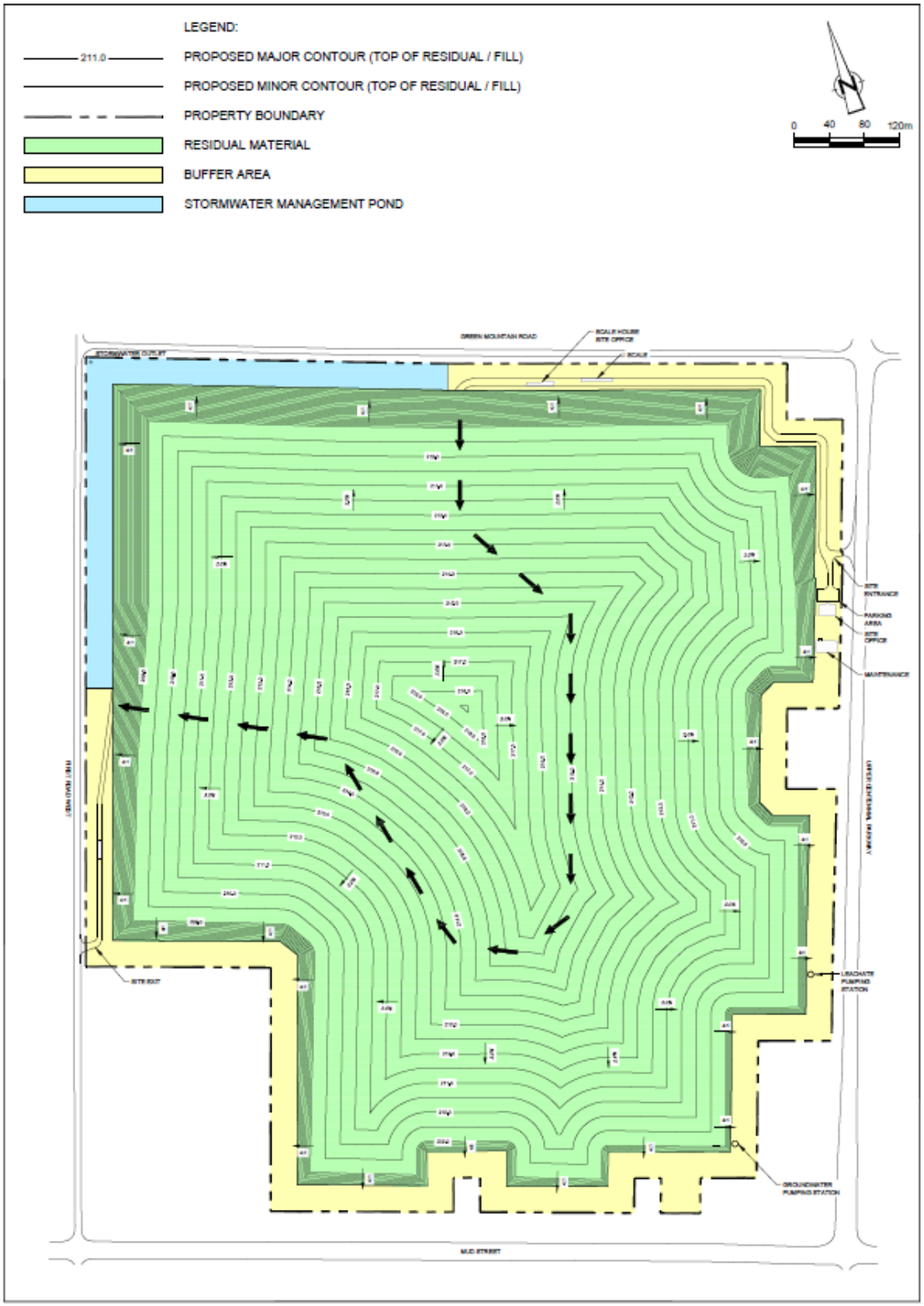

Figure 3.4 Option 4 – Reconfiguration and Footprint Expansion

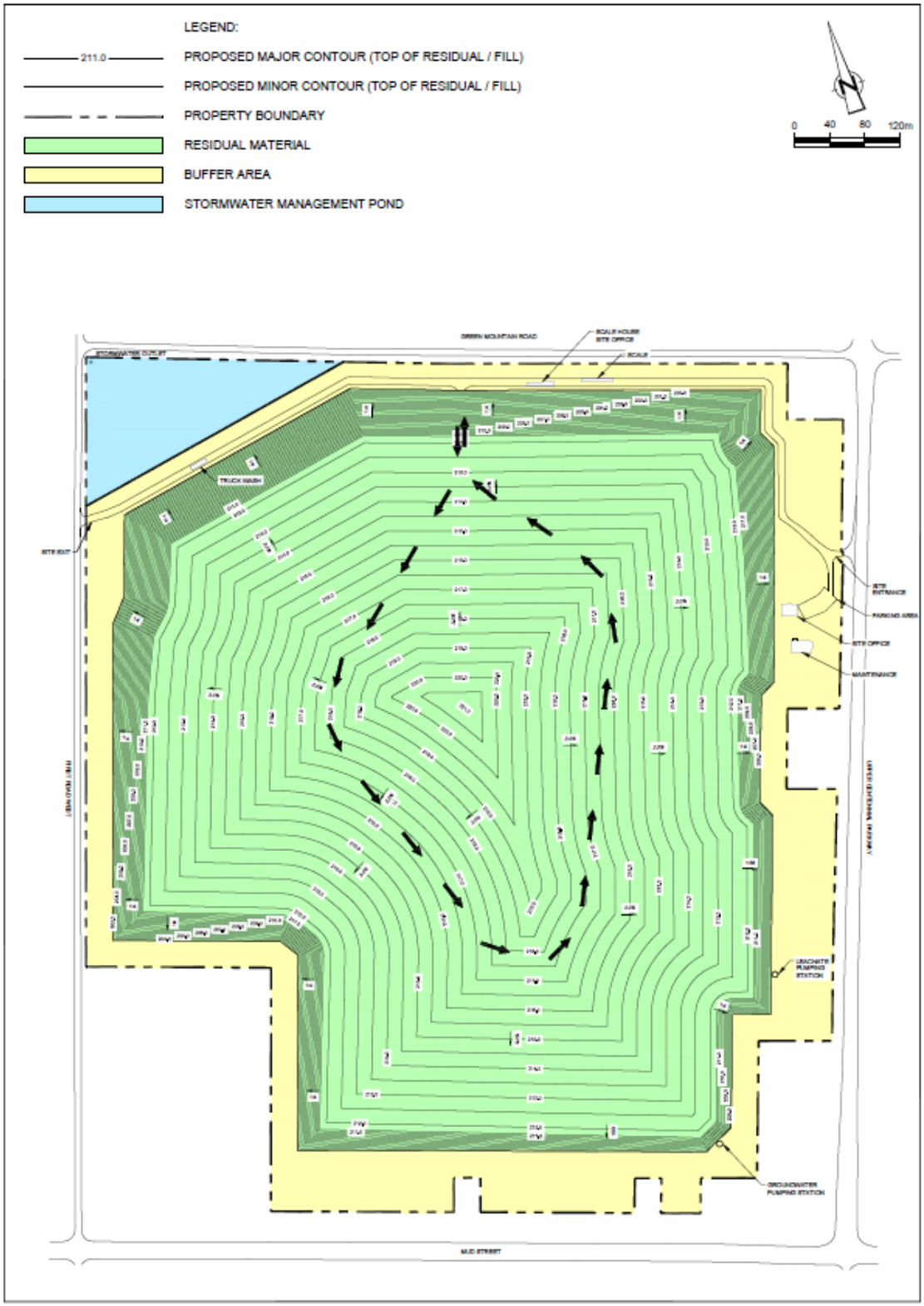

Figure 3.5 Option 5 – Reconfiguration and Height Increase

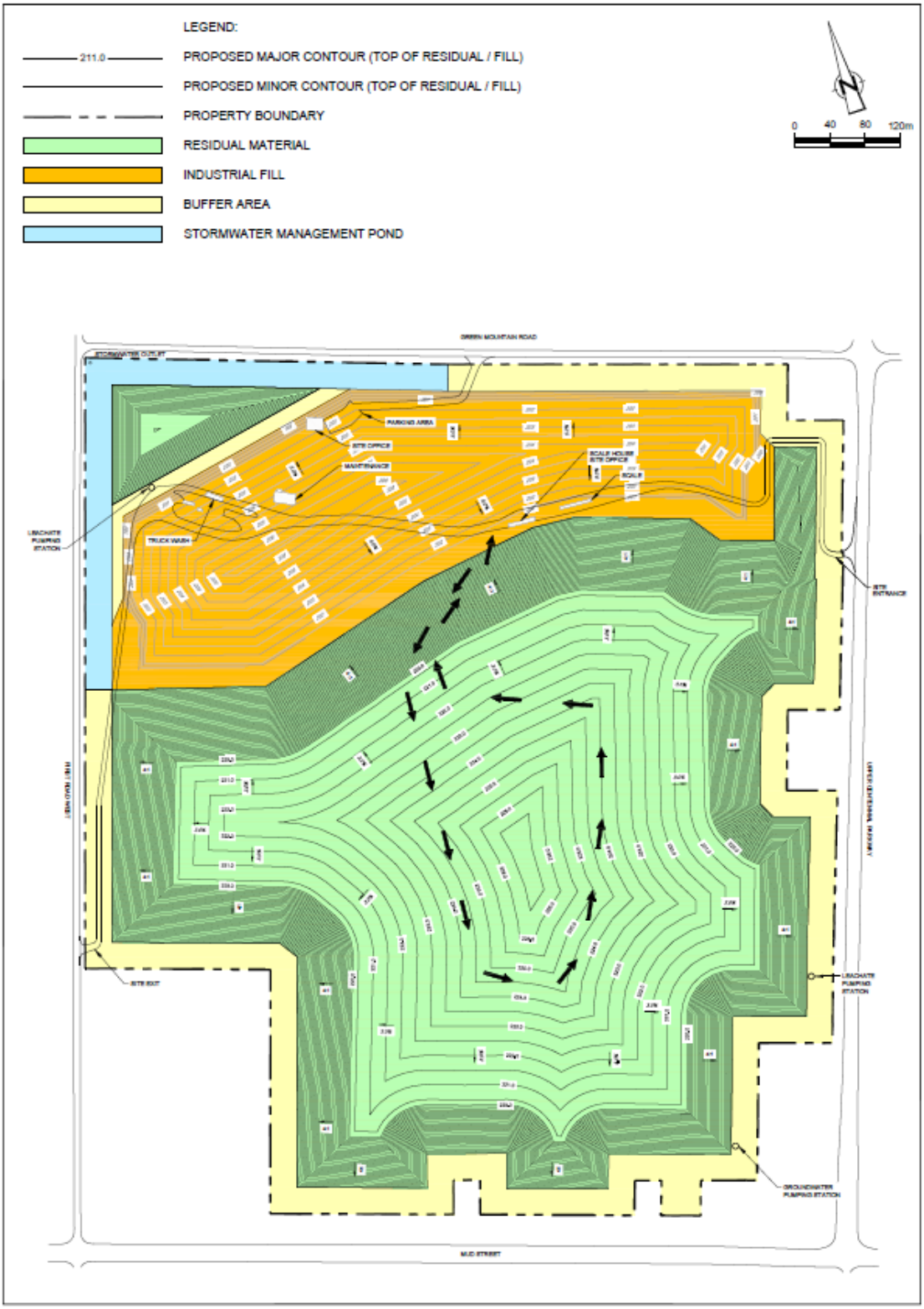

Figure 3.6 Option 6 – Footprint Expansion and Height Increase

4. Summary

A summary table comparing the details of each of the Options is presented in **Table 4.1**

Table 4.1 Comparison of Alternatives

Option No.	Description	Volume (m^3)		Footprint Area (ha)		Peak Elevation (mAMSL)	Height Relative to Surrounding Area (m)		Stormwater Management	Leachate Management	Construction Considerations	Traffic
		Residual Material	Industrial Fill	Residual Material	Industrial Fill		Green Mountain & First Road (192 mAMSL)	Upper Centennial & Mud (205 mAMSL)				
-	Existing Approved	6,320,000	2,000,000	41.5	12.9	218.5	26.5	13.5				
1	> Replace industrial fill area with residual material > No horizontal or vertical expansion	8,830,000	N/A	54.4	N/A	218.5	26.5	13.5	> Drainage ditches around perimeter of residual material area. > Reconfiguration of existing stormwater management ponds in northwest corner of site. > Discharge to First Rd. W. storm sewer.	> Extension of existing leachate collection system at base of residual material area. > Approximate leachate generation rate of 7.4 L/s during active operation. > Approximate leachate generation rate of 5.0 L/s post-closure. > Leachate collection via existing leachate pumping station in southeast of residual material area. > Leachate discharge to existing/new sanitary sewer.	> Requires staged relocation/closure of existing site infrastructure (i.e., scale facility, maintenance area, wheelwash facility, site office, site access). > May require liner perforation for pumping well M4. > Residual material area extends over existing clay plug.	> Approximately 183,423 trucks associated with residual material. > Approximately 64,314 trucks associated with construction.
2	> Maintain industrial fill area > Expand limits of residual material area horizontally, maintaining minimum 30 m buffer > Maintain currently approved peak elevation	7,420,000	2,000,000	46.4	12.9	218.5	26.5	13.5	> Drainage ditches around perimeter of residual material areas. > Drainage ditches around perimeter of industrial fill area. > Construction of new stormwater management ponds in west buffer and north buffer. > Discharge to First Rd. W. storm sewer.	> Extension of existing leachate collection system at base of main residual material area. > Construction of new leachate collection system at base of secondary residual material area. > Approximate leachate generation rate of 6.4 L/s during active operation. > Approximate leachate generation rate of 4.4 L/s post-closure. > Leachate collection via existing leachate pumping station in southeast of main residual material area. > Construction of new leachate pumping station in secondary residual material area. > Leachate discharge to existing/new sanitary sewer.	> Requires staged relocation/closure of existing site infrastructure (i.e., scale facility, maintenance area, wheelwash facility, site office, site access). > Requires excavation (i.e., residual material, soil, bedrock) to extend base liner system in east buffer and south buffer. > Requires reconfiguration of screening bermalfences in east buffer and south buffer.	> Approximately 95,731 trucks associated with residual material. > Approximately 226,154 trucks associated with industrial fill material. > Approximately 48,074 trucks associated with construction.
3	> Maintain industrial fill area > Maintain current limit of residual material area > Increase peak elevation of residual material area	10,000,000	2,000,000	41.5	12.9	223.5	37.5	24.5	> Drainage ditches around perimeter of residual material area. > Drainage ditches around perimeter of industrial fill area. > Reconfiguration of existing stormwater management ponds in northwest corner of site. > Discharge to First Rd. W. storm sewer.	> Maintain existing leachate collection system at base of residual material area. > Approximate leachate generation rate of 5.6 L/s during active operation. > Approximate leachate generation rate of 3.8 L/s post-closure. > Leachate collection via existing leachate pumping station in southeast of residual material area. > Leachate discharge to existing/new sanitary sewer.	> Requires staged relocation/closure of existing site infrastructure (i.e., scale facility, maintenance area, wheelwash facility, site office, site access).	> Approximately 268,323 trucks associated with residual material. > Approximately 226,154 trucks associated with industrial fill material. > Approximately 27,678 trucks associated with construction.
4	> Replace industrial fill area with residual material > Expand limits of residual material area horizontally, maintaining minimum 30 m buffer > Maintain currently approved peak elevation	3,580,000	N/A	62.3	N/A	218.5	26.5	13.5	> Drainage ditches around perimeter of residual material area. > Construction of new stormwater management ponds in west buffer and north buffer. > Discharge to First Rd. W. storm sewer.	> Extension of existing leachate collection system at base of residual material area. > Approximate leachate generation rate of 8.6 L/s during active operation. > Approximate leachate generation rate of 5.9 L/s post-closure. > Leachate collection via existing leachate pumping station in southeast of residual material area. > Leachate discharge to existing/new sanitary sewer.	> Requires staged relocation/closure of existing site infrastructure (i.e., scale facility, maintenance area, wheelwash facility, site office, site access). > Requires excavation (i.e., residual material, soil, bedrock) to extend base liner system in east buffer and south buffer. > Requires reconfiguration of screening bermalfences in east buffer and south buffer. > May require liner perforation for pumping well M4.	> Approximately 252,846 trucks associated with residual material. > Approximately 33,370 trucks associated with construction.
5	> Replace industrial fill area with residual material > Increase peak elevation of residual material area	10,000,000	N/A	54.4	N/A	221.0	29.0	16.0	> Drainage ditches around perimeter of residual material area. > Reconfiguration of existing stormwater management ponds in northwest corner of site. > Discharge to First Rd. W. storm sewer.	> Extension of existing leachate collection system at base of residual material area. > Approximate leachate generation rate of 7.4 L/s during active operation. > Approximate leachate generation rate of 5.0 L/s post-closure. > Leachate collection via existing leachate pumping station in southeast of residual material area. > Leachate discharge to existing/new sanitary sewer.	> Requires staged relocation/closure of existing site infrastructure (i.e., scale facility, maintenance area, wheelwash facility, site office, site access). > May require liner perforation for pumping well M4. > Residual material area extends over existing clay plug.	> Approximately 268,323 trucks associated with residual material. > Approximately 64,314 trucks associated with construction.
6	> Maintain industrial fill area > Expand limits of residual material area horizontally, maintaining minimum 30 m buffer > Increase peak elevation of residual material area	10,000,000	2,000,000	46.4	12.9	226.8	34.8	21.8	> Drainage ditches around perimeter of residual material areas. > Drainage ditches around perimeter of industrial fill area. > Construction of new stormwater management ponds in west buffer and north buffer. > Discharge to First Rd. W. storm sewer.	> Extension of existing leachate collection system at base of main residual material area. > Construction of new leachate collection system at base of secondary residual material area. > Approximate leachate generation rate of 6.4 L/s during active operation. > Approximate leachate generation rate of 4.4 L/s post-closure. > Leachate collection via existing leachate pumping station in southeast of main residual material area. > Construction of new leachate pumping station in secondary residual material area. > Leachate discharge to existing/new sanitary sewer.	> Requires staged relocation/closure of existing site infrastructure (i.e., scale facility, maintenance area, wheelwash facility, site office, site access). > Requires excavation (i.e., residual material, soil, bedrock) to extend base liner system in east buffer and south buffer. > Requires reconfiguration of screening bermalfences in east buffer and south buffer.	> Approximately 268,323 trucks associated with residual material. > Approximately 226,154 trucks associated with industrial fill material. > Approximately 48,074 trucks associated with construction.

Appendix A
Leachate Generation

Table A.1
Leachate Generation

Option No.	Figure No.	Footprint Area (ha)	Leachate Generation Rate (m^3/year)		Leachate Generation Rate (litres per second)	
		Residual Material	Active Operation	Post-Closure	Active Operation	Post-Closure
1	Figure 3.1	54.4	233,376	158,848	7.4	5.0
2	Figure 3.2	47.3	202,917	138,116	6.4	4.4
3	Figure 3.3	41.5	178,035	121,180	5.6	3.8
4	Figure 3.4	63.2	271,128	184,544	8.6	5.9
5	Figure 3.5	54.4	233,376	158,848	7.4	5.0
6	Figure 3.6	47.3	202,917	138,116	6.4	4.4

Assumptions:

1) Only Residual Material contribute to leachate generation.
2) Modeled based on the following conditions:

Scenario	Precipitation (mm/year)	Runoff (mm/year)	Evapotranspiration (mm/year)	Infiltration (mm/year)	Leachate Generation (mm/year)
Active Operation	918	208	489	221	429
Post-Closure	918	205	421	292	292

Appendix B
Traffic Levels

Table B.1
Traffic Levels

Option No.	Figure No.	Volume (m^3)		Footprint Area (ha)		Construction Quantities (m^3)					No. of Vehicles			
		Residual Material	Industrial Fill	Residual Material	Industrial Fill	Liner Clay	Aggregate	Engineered Fill	Cover Clay	Topsoil	Residual Material	Industrial Fill Material	Construction	Total
1	Figure 3.1	8,830,000	0	54.4	0	258,000	154,800	150,000	260,400	65,100	183,423	0	64,914	248,337
2	Figure 3.2	7,630,000	2,000,000	47.3	12.9	116,000	69,600	200,000	217,800	54,450	95,731	226,154	48,074	369,958
3	Figure 3.3	10,000,000	2,000,000	41.5	12.9	0	0	150,000	183,000	45,750	268,923	226,154	27,678	522,755
4	Figure 3.4	9,780,000	0	63.2	0	434,000	260,400	200,000	313,200	78,300	252,846	0	93,970	346,816
5	Figure 3.5	10,000,000	0	54.4	0	258,000	154,800	150,000	260,400	65,100	268,923	0	64,914	333,837
6	Figure 3.6	10,000,000	2,000,000	47.3	12.9	116,000	69,600	200,000	217,800	54,450	268,923	226,154	48,074	543,151

Assumptions:

1) Any excess materials generated by the excavation of existing materials are assumed to be managed on-site.
2) Construction of the currently approved base liner system footprint is assumed to be completed.
3) Construction of 11 hectares of completed final cover assumed to be completed.
4) Truck types, usage, and capacities as follows:

Truck Type	Truck Usage (%)	Truck Capacity (m^3)
Tri-Axle	60%	12
Roll-Off	20%	10
Tractor Traile	20%	65

5) Minimum site life based on maximum 250 trucks/day, 250 operating days/year.