Supporting Document 3-9

Visual Landscape Effects Assessment Report

Twin Creeks Environmental Centre Landfill Optimization Project Environmental Assessment

WM Canada

Watford, Ontario

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Prepared by:

Schollen & Company Inc.
30 Wertheim Court, Unit 15
Richmond Hill, ONT L4B 1B9

SCHOLLEN & COMPANY INC.
30 Wertheim Court, Unit 15
Richmond Hill, Ontario L4B 1B9
Tel: 289.695.0009
Fax: 289.695.0010
Email: design@schollenandcompany.com
Website: www.schollenandcompany.com
Landscape Architecture • Urban Design • Environmental Management

Executive Summary

Schollen & Company Inc. (SCI) was contracted by HDR Corporation on behalf of WM Canada (WM) to prepare this Visual Landscape Effects Assessment Report as part of the Twin Creeks Environmental Centre (TCEC) Landfill Optimization Project Environmental Assessment (EA). The EA is being carried out in accordance with the requirements of the *Ontario Environmental Assessment Act* (*OEAA*) and the EA Terms of Reference (ToR), which was approved by the Ministry of Environment, Conservation and Parks (MECP) on December 13, 2022. The Visual Landscape considers the visual impact of the facility based on the rationale that the contours of the waste disposal facility may affect the visual appeal of the landscape. The indicator that determines the visual impact of the facility is the degree of predicted change in perceptions of landscapes and views.

The purpose of this Effects Assessment Report is to present the:

- potential environmental effects of the Alternative Methods on the Visual Landscape;
- comparison of the net effects of each Alternative Method;
- selection of a Preferred Alternative;
- assessment of the environmental effects of the Preferred Alternative; and
- commitments and monitoring.

There are approximately 6 years of approved landfill airspace capacity remaining at the TCEC (i.e., capacity will be reached in approximately 2031). The proposed optimization would provide additional airspace of approximately 14.3 million cubic metres (m^3), which could extend the site life by approximately 12 years (from 2031 to 2043) and may be achieved through alternative landfill configurations (Alternative Methods) within the existing 301-hectare (ha) TCEC site area. No changes are proposed to the size of the TCEC site area, approved service area, or annual fill rate.

Three Alternative Methods for carrying out the optimization were developed to a preliminary conceptual design level in the Conceptual Design Report (CDR).

Alternative Method 1 includes the increase of the final landfill side slopes from 4H:1V to 3H:1V between the original grade and elevation 320 metres above sea level (masl), about 70 m in grade change, transitioning to a 20H:1V upper slope and peaking at elevation 324.5 masl within the Expansion Landfill footprint. The topographic form of Alternative Method 1 is described as a peak with a plateau.

Under Alternative Method 1 the existing approved waste disposal footprint area of the TCEC would not change, but rather, the maximum permitted height of waste would be increased by 44.5 m, from 280 masl (the current approved elevation for top of waste) to 324.5 masl, which is the maximum elevation of the top of the final cover for Alternative Method 1.

Alternative Method 1 would not change the existing approved landfill limit of waste, the existing property boundaries and buffer width will remain the same after the vertical expansion.

The existing vegetated screening berms are not proposed to be altered; however, the existing trees will continue to grow and will increase in height from the present day to the completion of Phase 5.

Alternative Method 2 includes the increase of final landfill side slopes from 4H:1V to 2.5H:1V between elevation 250 masl and elevation 310 masl, about 60 m in grade change, transitioning to a 20H:1V upper slope and peaking at elevation 319 masl within the Expansion Landfill footprint. The topographic form of Alternative Method 2 is described as a plateau.

Under Alternative Method 2 the existing approved waste disposal footprint area of the TCEC would not change, but rather, the maximum permitted height of waste would be increased by 40 m, from 280 masl (the current approved elevation for top of waste) to 319 masl, which is the maximum elevation of the top of the final cover for Alternative Method 2.

Alternative Method 2 would not change the existing approved landfill limit of waste, the existing property boundaries and buffer width will remain the same after the vertical expansion.

The existing vegetated screening berms are not proposed to be altered; however, the existing trees will continue to grow and will increase in height from the present day to the completion of Phase 5.

Alternative Method 3 includes the increase of final landfill side slopes from 4H:1V to 2.5H:1V between elevation 260 masl and elevation 360 masl, about 100 m in grade change, peaking at elevation 360 masl within the Expansion Landfill footprint.

Under Alternative Method 3 the existing approved waste disposal footprint area of the TCEC would not change, but rather, the maximum permitted height of waste would be increased by 80 m, from 280 masl (the current approved elevation for top of waste) to 360 masl, which is the maximum elevation of the top of the final cover for Alternative Method 3. The 2.5H:1V side slopes will start at the existing landfill toe slope at approximately 250 masl, continuing to a peak at elevation 360 masl, a grade change of about 110 m. The topographic form of Alternative Method 3 is described as a peak.

Alternative Method 3 would not change the existing approved landfill limit of waste, the existing property boundaries and buffer width will remain the same after the vertical expansion.

The existing vegetated screening berms are not proposed to be altered; however, the existing trees will continue to grow and will increase in height from the present day to the completion of Phase 5.

For the Visual Landscape effects assessment, the general On-site and Off-site Study Areas were defined for the EA in the approved Terms of Reference (ToR). The limits

of the Off-site Study Area for the visual landscape have been modified from the general Off-site Study Area and confirmed through field reconnaissance. The adjustments to the general 1 km Off-site Study Area for Visual Landscape include extending the limit approximately 2.5 km further westward to encompass the potential receptors that are located along Underpass Road and in the vicinity of Underpass Road and Confederation Line, approximately 2.5 km further eastward, to include potential receptors that are located along Arkona Road, and approximately 2.5 km northward to include potential receptors that are located north of Highway 402. Sixteen additional receptors were identified in comparison to the 2005 Visual Assessment. In the process of completing the net effects assessment, the extent of the Off-site Study Area was reviewed for each of the three Alternative Methods.

A net effects assessment was carried out for the three Alternative Methods following the methods outlined in the approved ToR, incorporating the information contained in the CDR and the Visual Landscape Existing Conditions Report. The results of the net effects assessment were used in a comparative evaluation of the three Alternative Methods.

Visual simulations were generated from six viewpoints for each of the three Alternative Methods. A visual assessment was completed utilizing the simulations to determine the Visible Landfill Area, Horizontal Angle of View, Distance from Site, and Visual Absorption Capacity Factor to calculate the Combined Effect Value (CEV) for each viewpoint for Alternative Methods 1, 2 and 3 respectively. The CEV is calculated based on the sum of values from the four aforementioned criteria to yield the combined visual effect value associated with each viewpoint. The scale of combined visual effect values accounts for the maximum range of value sums (4 through 20) and defines the moderate and low effect upper limits by multiplying their respective values (3, 2) by the total number of factors (4).

The CEV determines the magnitude of the visual effect related to each viewpoint with a CEV of 13-20 having a ‘high’ effect, a CEV of 9-12 having a ‘moderate’ effect and a CEV of less than 8 having a ‘low’ effect.

For the purposes of the comparative evaluation of Alternative Methods, the total CEV for all six viewpoints determined the relative magnitude of the perceived change in landscape and view for each Alternative Method.

The CEVs were applied to address the ‘Visual Impact of Facility’ evaluation criterion related to each viewpoint based upon the following:

- For receptors and viewpoints that are determined to experience a ‘High Effect’, the proposed landfill optimization project would demand the viewer’s attention.
- For receptors and viewpoints that are determined to experience a ‘Moderate Effect’, the view of the landfill optimization project would be reduced in scale as a result of the following existing conditions:
    - Distance from the site.

  - Extent and location of existing screening elements, including woodlands, topography and/or existing buildings/structures. Although the landfill optimization area would be visible, it would not dominate views. Overall shapes, patterns and details would be discernable when viewed from the viewpoint or the receptor.

- For receptors and viewpoints that are determined to experience a 'Low Effect', the proposed landfill optimization project would be expected to blend into the existing landscape and would not be identifiable when viewed from the receptor or viewpoint.

The Alternative Method that achieved the lowest total CEV score is determined to have the lowest visual effect.

The total CEV for the three Alternative Methods was determined to be:

- Alternative Method 1 – Total CEV=78
- Alternative Method 2 – Total CEV=77
- Alternative Method 3 – Total CEV=81

Alternative Method 2 was determined to be the Preferred Alternative based on the fact that it achieved the lowest total CEV score.

In the process of completing the assessment, it has been assumed that the existing trees that are located on the screening berm will have experienced approximately 20 years of growth and will have increased in height by approximately 12 m, attaining a height of approximately 22m and providing additional visual screening. In addition to the 6 m and 7 m high earthen berms along Zion Line and Nauvoo Road, the total height of these screening elements is anticipated to be 28 and 29 m, respectively. No additional visual mitigation is proposed as a component of any of the Alternative Methods due to the lack of available area within the site to accommodate visual screening of a size/configuration that would be effective in obstructing views to the Landfill Optimization landform.

An assessment was conducted to evaluate the Preferred Alternative in comparison to the 'Do Nothing Alternative'. The 'Do Nothing Alternative' is the approved Expansion Landfill at completion of Year 26 as described in the 2005 Visual Impact Assessment. The approved top of landfill cover is at an elevation of 282 masl, approximately 42 m above average ground level. The side slopes are to be graded at approximately four horizontal to one vertical (4H:1V) from the existing grade to approximately 271.5 masl, at which point slopes will transition to five percent (5%) for the remaining slope to the highest point. The topographic form of the landform of the 'Do Nothing Alternative' is described as a flattened mound.

The net effects of the 'Do Nothing Alternative' were calculated as a component of the Visual Assessment (2005). The Visual Assessment Data for the 'Do Nothing Alternative' derived from Table 7 of the 2005 Visual Impact Assessment is provided in Appendix B-1. The data was calculated with existing mitigation in place.

A summary of the net effects of the 'Do Nothing Alternative' derived from Table 7 of the 2005 Visual Impact Assessment is provided below. A total of 109 receptors were identified and assessed utilizing the methodology set out in Section 2.1.2.

- Number of high effect receptors = 39 (receptor numbers 000 to 042 and receptor number 092)
- Number of moderate effect receptors = 36 (receptor numbers 043 to 059, 061, 064 to 075, 084 to 091, 097, 102 and 103).

The net effects of the Preferred Alternative (Alternative Method 2) were determined and are summarized below.

- Number of high effect receptors = 23 (receptor numbers 002 to 009, 011, 012, 014, 015, 023, 026 to 030, 041 to 043, 064 and 112).
- Number of moderate effect receptors = 52 (receptor numbers 010, 016 to 022, 024, 025, 031 to 033, 035, 044, 047 to 049, 051,052, 058 to 063, 066, 067, 071 to 076, 079,088 to 090, 098, 102 and 103).

The differences in net effects between the Preferred Alternative and the 'Do Nothing Alternative' were used to determine the advantages and disadvantages of the Preferred Alternative.

In comparison to the 'Do Nothing Alternative', the Preferred Alternative will result in 17 fewer 'high' effect receptors but will result in an increase in number of 'moderate' effect receptors by 16. On this basis, the advantages of the Preferred Alternative outweigh the disadvantages. This outcome is not due to the characteristics of the Project itself but is attributable to changes in the landscape that will have occurred between 2031 and 2043 (within the duration of operation of the Landfill Optimization Project). It is acknowledged that these changes would reduce the visual prominence of the 'Do Nothing Alternative'.

Monitoring of the existing vegetation on the screening berm is recommended to ensure that the existing trees are healthy and perform the required visual screening function. Inspections should be undertaken annually in late spring to assess the health of the trees and determine if remedial action is required to ensure the long-term growth and sustainability of the trees.

Acronyms, Units and Glossary

Acronyms

Acronym	Definition
CEV	Combined Effect Value
EA	Environmental Assessment
MECP	Ministry of Environment, Conservation and Parks
OEAA	Ontario Environmental Assessment Act
TCEC	Twin Creeks Environmental Centre
ToR	Terms of Reference
VACF	Visual Absorption Capacity Factor
VIA	Visual Impact Assessment
WM	WM Canada

Units

Unit	Definition
Ha	hectare
km	kilometre
masl	metres above sea level
m	metre
m^3	Cubic metre

Glossary

Term	Definition
Approval	Permission granted by an authorized individual or organization for an undertaking to proceed. This may be in the form of program approval, certificate of approval or provisional certificate of approval.
Capacity (Disposal Volume)	The total volume of air space available for disposal of waste at a landfill site for a particular design (typically in m^3); includes both waste and daily cover materials but excludes the final cover.

Glossary

Term	Definition
Environment	As defined by the Environmental Assessment Act, environment means: • air, land or water; • plant and animal life, including human life; • the social, economic and cultural conditions that influence the life of humans or a community; • any building, structure, machine or other device or thing made by humans; • any solid, liquid, gas, odour, heat, sound, vibration or radiation resulting directly or indirectly from human activities; or • any part or combination of the foregoing and the interrelationships between any two or more of them (ecosystem approach).
Environmental Assessment (EA)	A systematic planning process that is conducted in accordance with applicable laws or regulations aimed at assessing the effects of a proposed undertaking on the environment.
Evaluation criteria	Evaluation criteria are considerations or factors taken into account in assessing the advantages and disadvantages of various alternatives being considered.
Indicators	Indicators are specific characteristics of the evaluation criteria that can be measured or determined in some way, as opposed to the actual criteria, which are fairly general.
Landfill site	An approved engineered site/facility used for the final disposal of waste. Landfills are waste disposal sites where waste is spread in layers, compacted to the smallest practical volume, and typically covered by soil.
Leachate	Liquid that drains from solid waste in a landfill and which contains dissolved, suspended and/or microbial contaminants from the breakdown of this waste.
Mitigation	Measures taken to reduce adverse impacts on the environment.
Proponent	A person who: • carries out or proposes to carry out an undertaking; or • is the owner or person having charge, management or control of an undertaking.
Receptor	The person, plant or wildlife species that may be affected due to exposure to a contaminant.
Terms of Reference (ToR)	A terms of reference is a document that sets out detailed requirements for the preparation of an Environmental Assessment.
Undertaking	Is defined in the Environmental Assessment Act as follows: • An enterprise or activity or a proposal, plan or program in respect of an enterprise or activity by or on behalf of Her Majesty in right of Ontario, by a public body or public bodies or by a municipality or municipalities; • A major commercial or business enterprise or activity or a proposal, plan or program in respect of a major commercial or business enterprise or activity of a person or persons other than a person or persons referred to in clause (1) that is designated by the regulations; or • An enterprise or activity or a proposal, plan or program in respect of an enterprise or activity of a person or persons, other than a person or persons referred to in clause (a), if an agreement is entered into under section 3.0.1 in respect of the enterprise, activity, proposal, plan or program ("enterprise").
Waste	Refuse from places of human or animal habitation; unwanted materials left over from a manufacturing process.

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1 Introduction

Schollen & Company Inc. (SCI) was contracted by HDR Corporation on behalf of WM Canada (WM) to prepare this Visual Landscape Effects Assessment Report as part of the Twin Creeks Environmental Centre (TCEC) Landfill Optimization Project Environmental Assessment (EA). The EA is being carried out in accordance with the requirements of the *Ontario Environmental Assessment Act* (*OEAA*) and the EA Terms of Reference (ToR), which was approved by the Ministry of Environment, Conservation and Parks (MECP) on December 13, 2022.

The *OEAA* defines the environment in a broad, general sense that comprises physical, biological, and human considerations. In this EA, the environment has been separated broadly into the natural, socio-economic, cultural, and built aspects, with environmental components and evaluation criteria identified within each aspect as listed in **Table 1-1**, consistent with the approved ToR. The organization of the Effects Assessment Reports is also provided in **Table 1-1**.

Table 1-1. Environmental Aspects, Components, and Evaluation Criteria

Environmental Aspect	Environmental Component	Evaluation Criteria	Effects Assessment Report
Natural Environment	Atmospheric Environment	• Air Quality – Dust • Air Quality – Landfill Gas and Combustion By-Products • Air Quality – Blowing Litter • Odour • Noise	• Air Quality
			• Noise
	Hydrogeology	• Groundwater Quality • Groundwater Quantity	• Hydrogeology
	Surface Water Environment	• Surface Water Quality • Surface Water Quantity	• Surface Water Quality
			• Surface Water Quantity
	Ecological Environment	• Terrestrial Ecosystems • Aquatic Ecosystems	• Ecological Environment
Socio-Economic Environment	Social Environment	• Human Health • Effects on Local Community	• Human Health
			• Socio-Economic Environment
	Economic Environment	• Economic Effects on Local Community	
	Visual Landscape	• Visual Impact of Facility	• Visual Landscape
Cultural Environment	Cultural Environment	• Cultural Heritage Resources • Archaeological Resources	• Cultural Heritage Resources
			• Archaeological Resources
Built Environment	Transportation	• Traffic Operations	• Transportation
	Current and Planned Future Land Use	• Effects on Current and Future Land Uses	• Land Use

The Visual Landscape considers the visual impact of the facility based on the rationale that the contours of the wase disposal facility may affect the visual appeal of the landscape. The indicator that determines the visual impact of the facility is the degree of predicted change in perceptions of landscapes and views. The purpose of this Effects Assessment Report is to present the potential environmental effects of the Alternative Methods on the Visual Landscape, a comparison of the net effects of each Alternative Method, the selection of a Preferred Alternative, the assessment of the environmental effects of the Preferred Alternative, and commitments and monitoring. This Visual Landscape Effects Assessment Report assesses the effects of the Project on the Visual Landscape portion of the Socio-Economic Environment.

This Visual Landscape Effects Assessment Report is one component of the EA. The EA Study Report will incorporate the information presented herein as appropriate, and this report will be included with the EA Study Report as a supporting document.

1.1 Project and Alternative Methods

There are approximately 6 years of approved landfill airspace capacity remaining at the TCEC (i.e., capacity will be reached in approximately 2031). The proposed landfill optimization would provide additional airspace of approximately 14.3 million cubic metres (m^3), which could extend the site life by approximately 12 years (from 2031 to 2043) and may be achieved through alternative landfill configurations (Alternative Methods) within the existing 301-hectare TCEC site area. No changes are proposed to the size of the TCEC site area, approved service area, haul route, or annual fill rate.

Three Alternative Methods for carrying out the landfill optimization were developed to a preliminary conceptual design level in the Conceptual Design Report (CDR) and are described below as they are relevant to Visual Landscape.

1.1.1 Alternative Method 1

Alternative Method 1 includes the increase of the final landfill side slopes from 4H:1V to 3H:1V between the original grade and elevation 320 metres above sea level (masl), about 70m in grade change, transitioning to a 20H:1V upper slope and peaking at elevation 324.5 masl within the Expansion Landfill footprint. The proposed landfill expansion consists of five stages, as shown by the different colours for the contour lines as indicated in the legend of **Figure 1-1**.

The topographic form of Alternative Method 1 is shown in plan view in **Figure 1-2**. Under the proposed vertical expansion, the existing approved waste disposal footprint area of the TCEC would not change, but rather, the maximum permitted height of waste would be increased by 44.5 m, from 280 masl (the current approved elevation for top of waste) to 324.5 masl, which is the maximum elevation of the top of the final cover for Alternative Method 1. The 3H:1V side slopes will start at the existing landfill toe of slope continuing to elevation 320 masl and then transition to a finished grade of 5% and peaking at elevation 324.5 masl.

The topographic form of Alternative Method 1 is described as a peak with a plateau. **Figures 1-3** to **1-6** illustrate the profile of the north, east, south, and west elevations

of Alternative Method 1. The key plan that illustrates the location of each elevation drawing in the context of the plan for Alternative Method 1 is provided on **Figures 1-3** to **1-6**. The area of the elevation profile of Alternative Method 1 above the approved top of landfill final cover of the Expansion Landfill is as follows:

- North elevation = 21,818.77 m²
- East elevation = 36,906.45 m²
- South elevation = 21,549.38 m²
- West elevation = 36,906.47 m²

The TCEC is bounded to the north by Zion Line, to the east by the Twin Creeks Greenhouse and agricultural lands, to the south by lands owned by WM used for agricultural production and by Confederation Line, and to the west by Nauvoo Road (**Figure 1-2**). The setbacks from the Expansion Landfill footprint to the property boundaries are 101 m to the north, about 206 to the east, 100 m to 256 m to the south, and 235 m to the west.

Alternative Method 1 would not change the existing approved landfill limit of waste, the existing property boundaries and buffer width will remain the same after the vertical expansion.

The existing vegetated screening berms are not proposed to be altered; however, the existing trees will continue to grow and will increase in height from the present day to the completion of Phase 5. The increase in the size and density of the trees will enhance the visual screening function of the vegetated berms.

Figure 1-1. Alternate Method 1 – Overall Plan

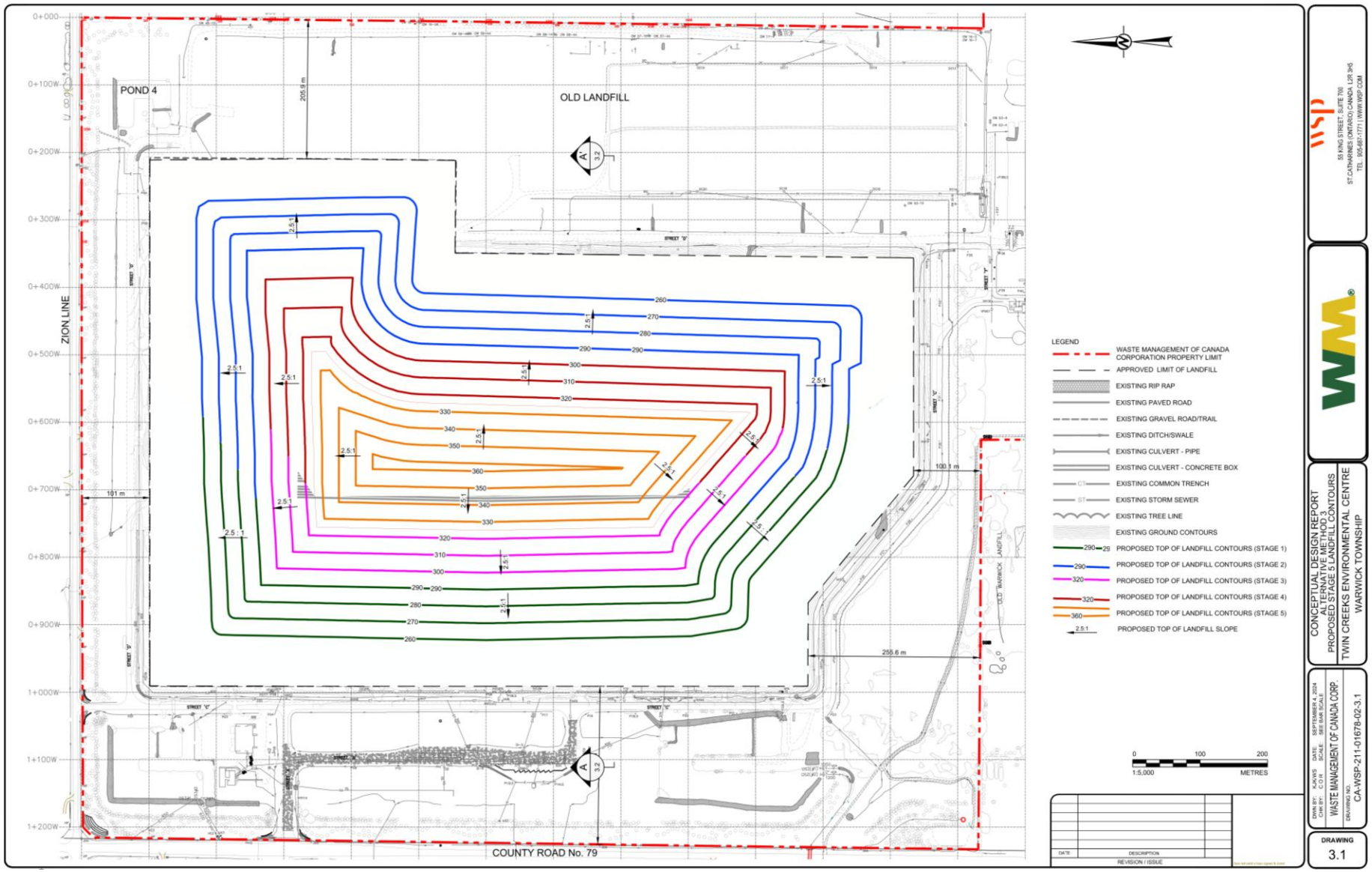


Figure 1-2. Alternate Method 1 – Key Plan – Profile Elevations Locations

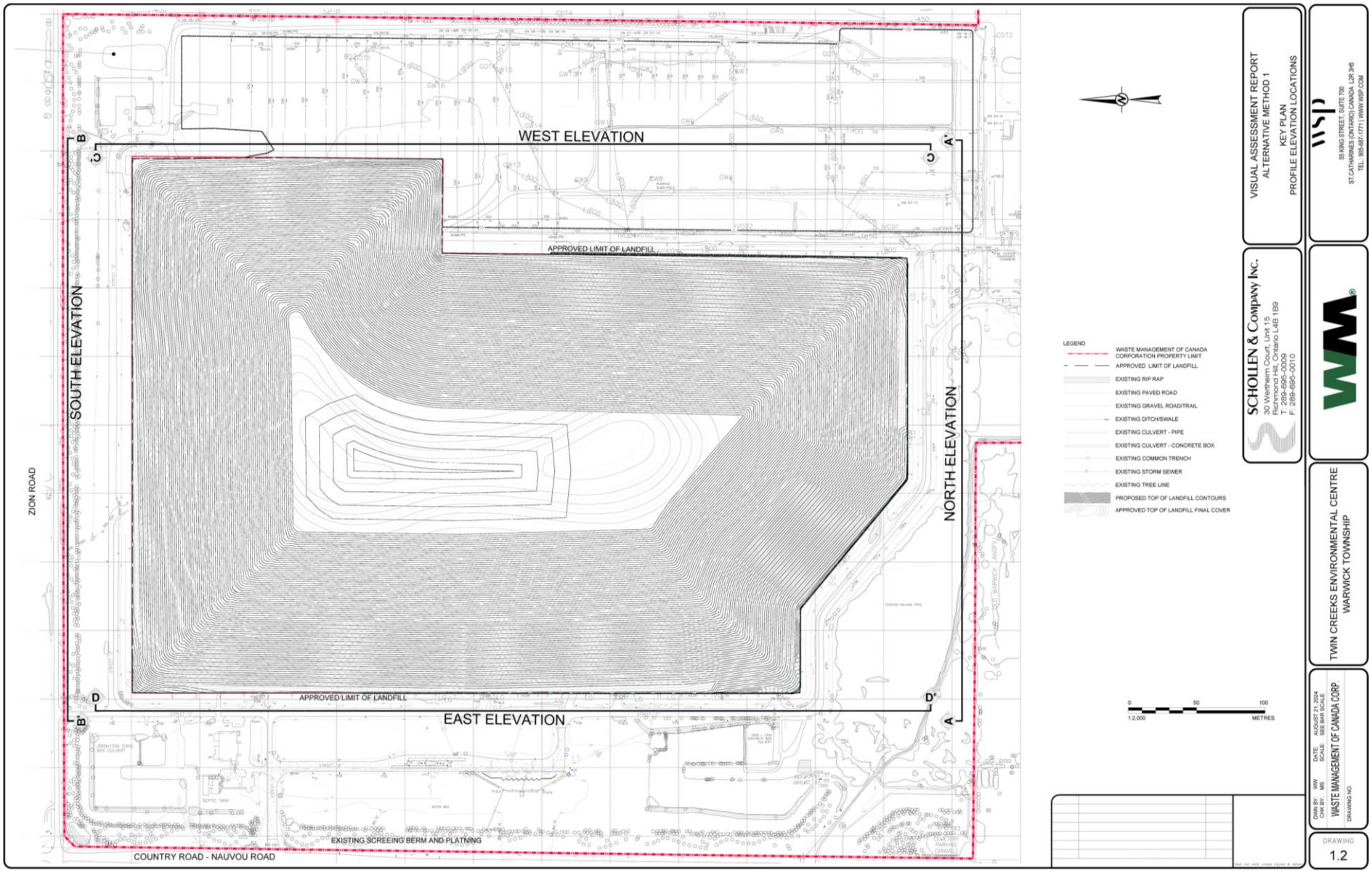


Figure 1-3. Alternate Method 1 – Profile Elevation North – Area Above Approved Top of Landfill Final Cover

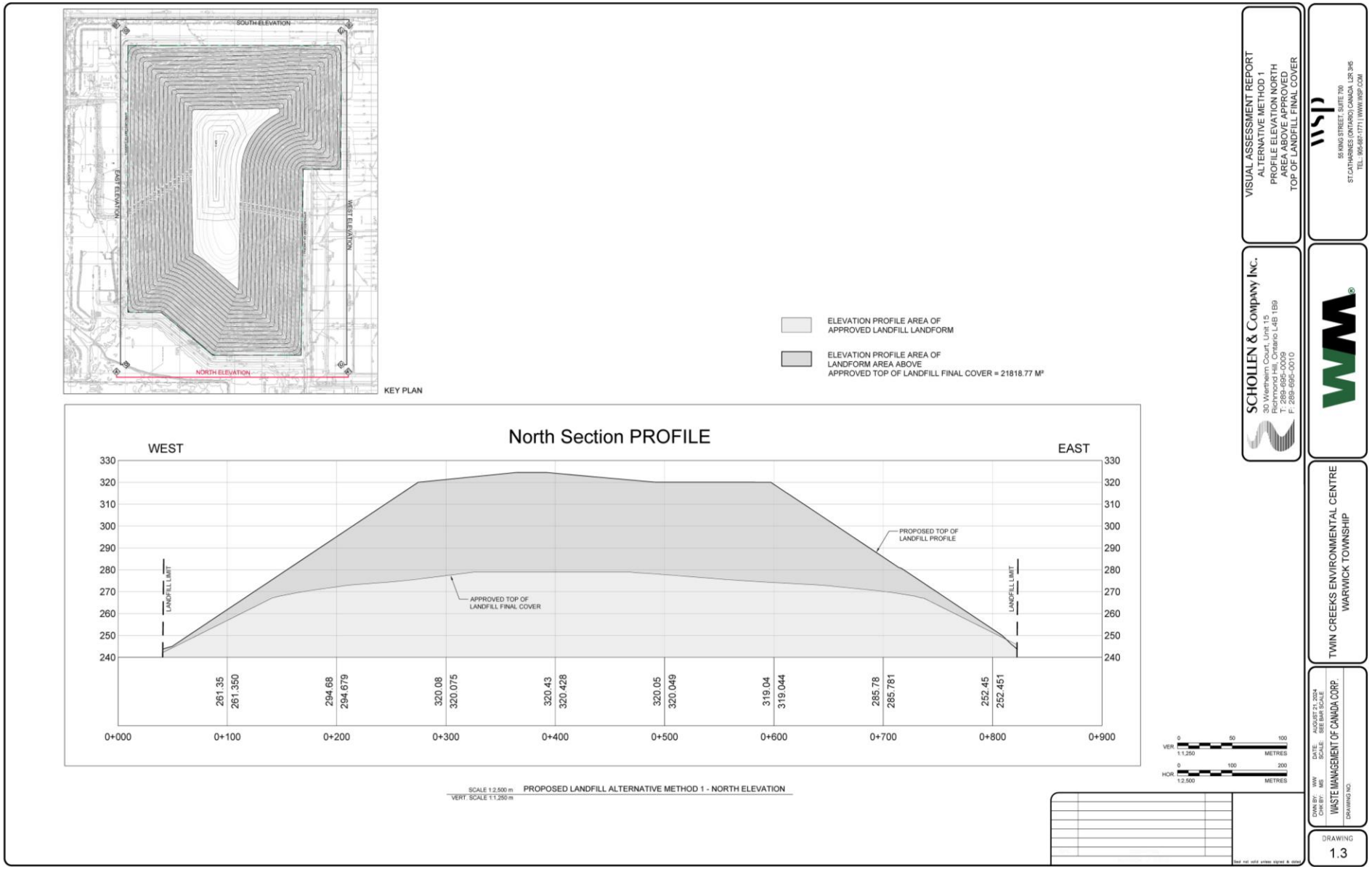


Figure 1-4. Alternate Method 1 – Profile Elevation East – Area Above Approved Top of Landfill Final Cover

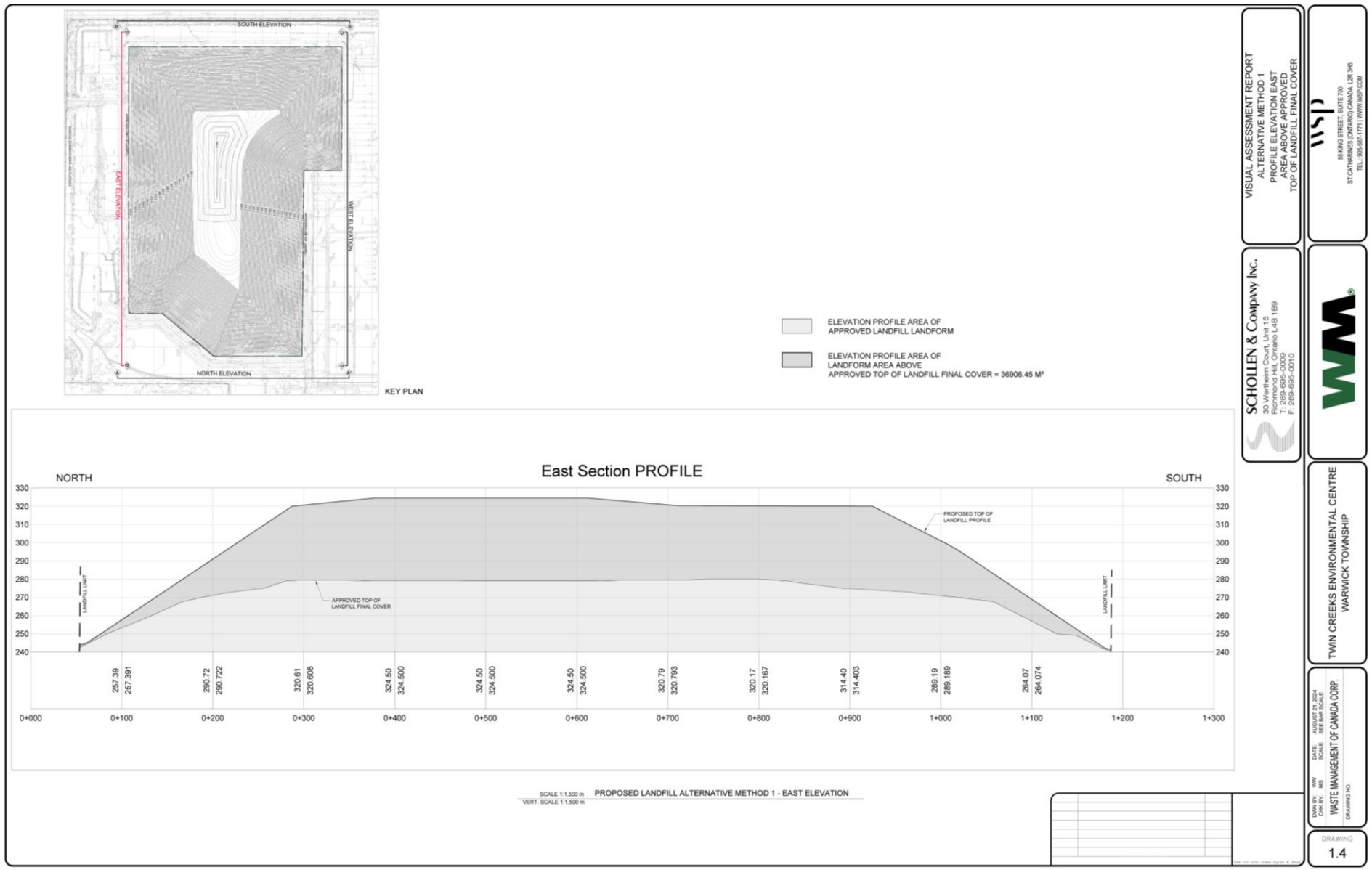


Figure 1-5. Alternate Method 1 – Profile Elevation South – Area Above Approved Top of Landfill Final Cover

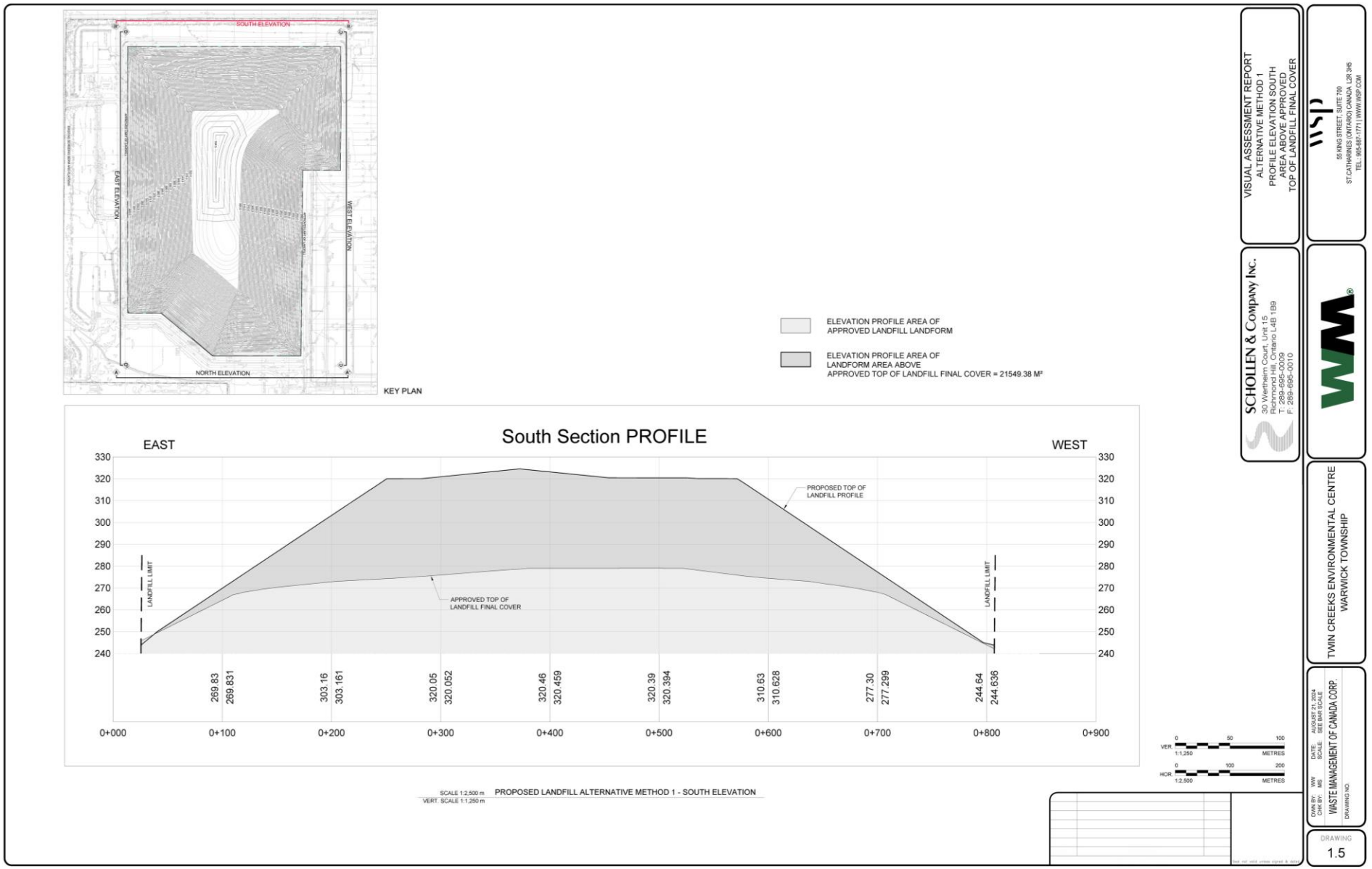
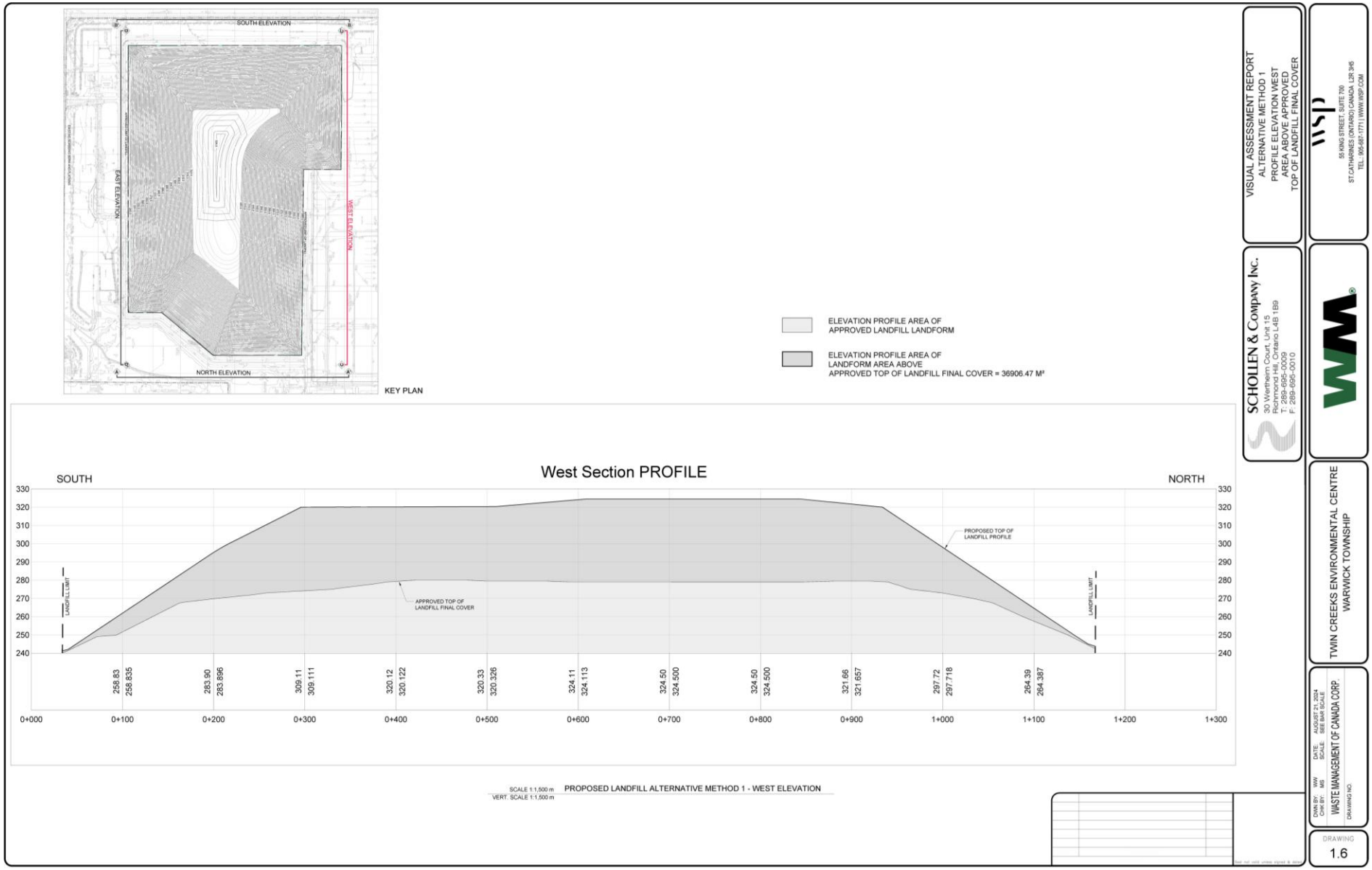


Figure 1-6. Alternate Method 1 – Profile Elevation West – Area Above Approved Top of Landfill Final Cover



1.1.2 Alternative Method 2

Alternative Method 2 includes the increase of final landfill side slopes from 4H:1V to 2.5H:1V between elevation 250 masl and elevation 310 masl, about 60 m in grade change, transitioning to a 20H:1V upper slope and peaking at elevation 319 masl (**Figure 1-7**) within the Expansion Landfill footprint. The proposed landfill expansion consists of four stages, as shown by the different colours for the contour lines as indicated in the legend of **Figure 1-7**.

The topographic form of Alternative Method 2 is shown in plan view in **Figure 1-8**. Under the proposed vertical expansion, the existing approved waste disposal footprint area of the TCEC would not change, but rather, the maximum permitted height of waste would be increased by 40 m, from 280 masl (the current approved elevation for top of waste) to 319 masl, which is the maximum elevation of the top of the final cover for Alternative Method 2. The 2.5H:1V side slopes will start at elevation 250 masl and continue to elevation 310 masl and then transition to a grade of 5% and peaking at elevation 319 masl**.**

The topographic form of Alternative Method 2 is described as a plateau. **Figure 1-9** to **Figure 1-12** illustrate the profile of the north, east, south and west elevations of Alternative Method 2. The key plan that illustrates the location of each elevation drawing in the context of the plan for Alternative Method 2 is provided on **Figure 1-9** to **Figure 1-12.** The area of the elevation profile of Alternative Method 2 above the approved top of landfill final cover of the Expansion Landfill is as follows:

- North elevation = 21,403.33 m²
- East elevation = 34,977.21 m²
- South elevation = 21,042.97 m²
- West elevation = 34,977.17 m²

Alternative Method 2 would not change the existing approved landfill limit of waste, the existing property boundaries and buffer width, will remain the same after the vertical expansion, as indicated in **Figure 1-7**.

The existing vegetated screening berms are not proposed to be altered; however, the existing trees will continue to grow and will increase in height and density from the present day to the completion of Phase 5. The increase in the size and density of the trees will enhance the visual screening function of the vegetated berms.

Figure 1-7. Alternate Method 2 – Overall Plan

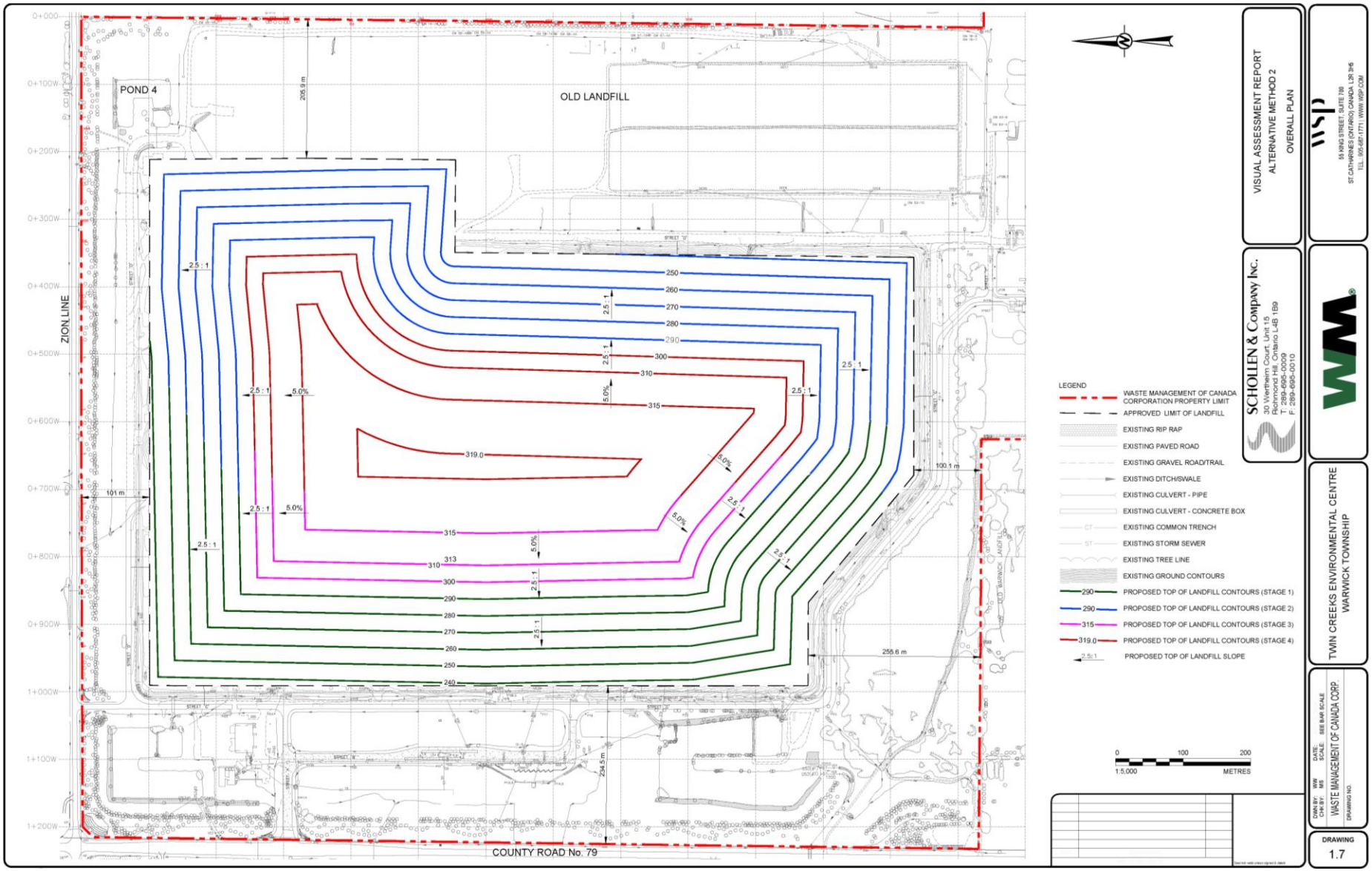


Figure 1-8. Alternate Method 2 – Key Plan – Profile Elevations Locations

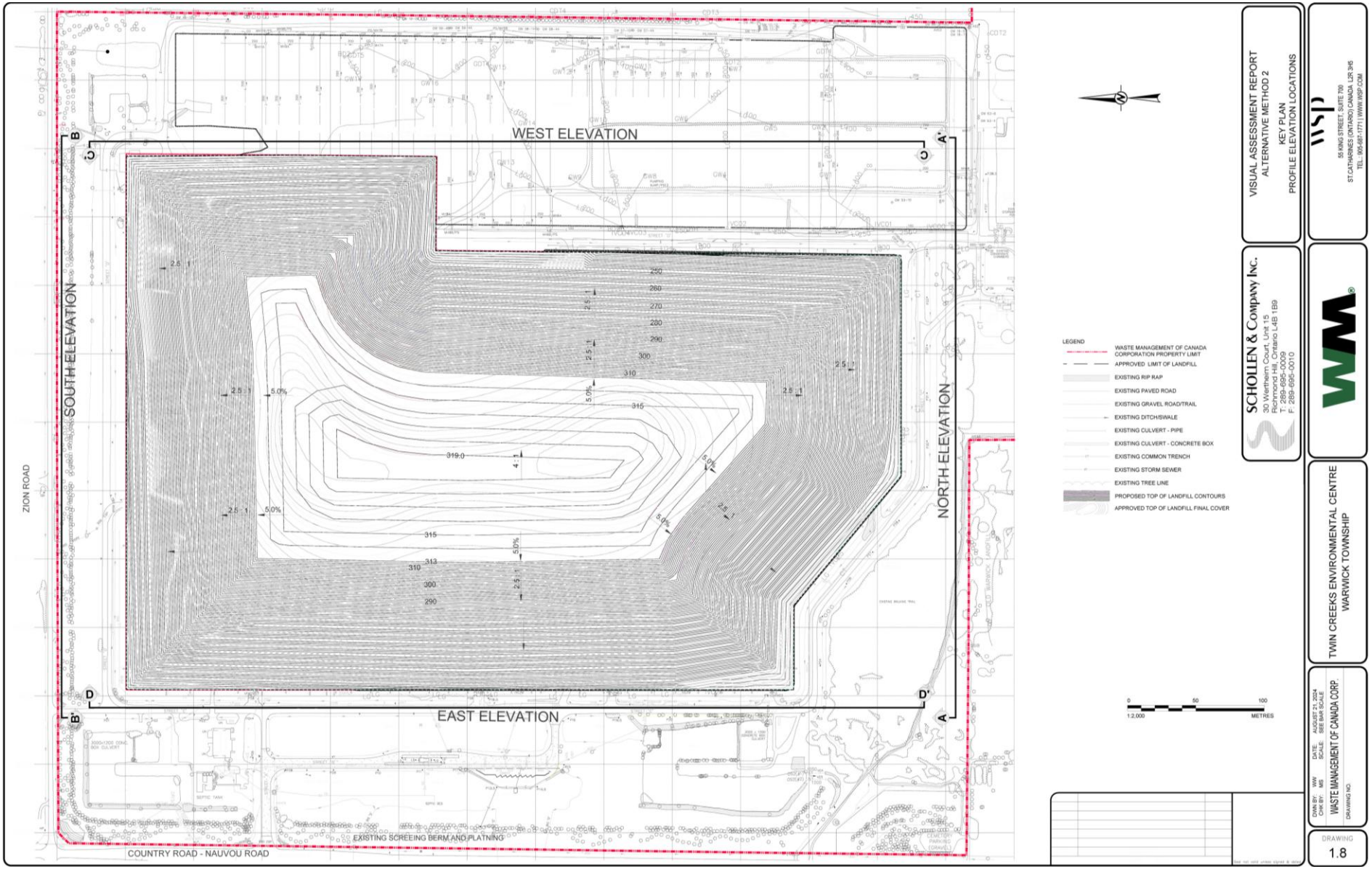


Figure 1-9. Alternate Method 2 – Profile Elevation North – Area Above Approved Top of Landfill Final Cover

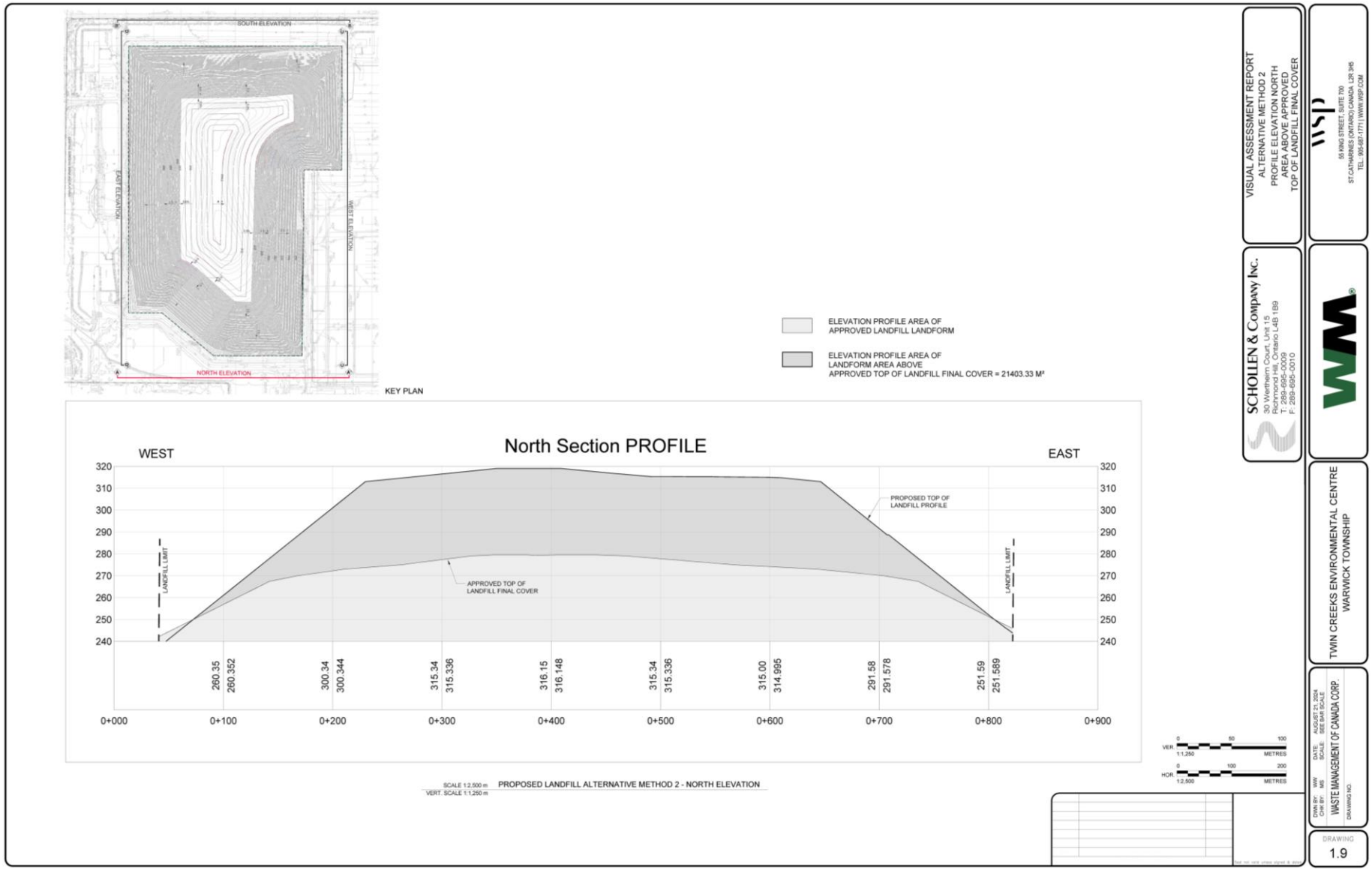


Figure 1-10. Alternate Method 2 – Profile Elevation East – Area Above Approved Top of Landfill Final Cover

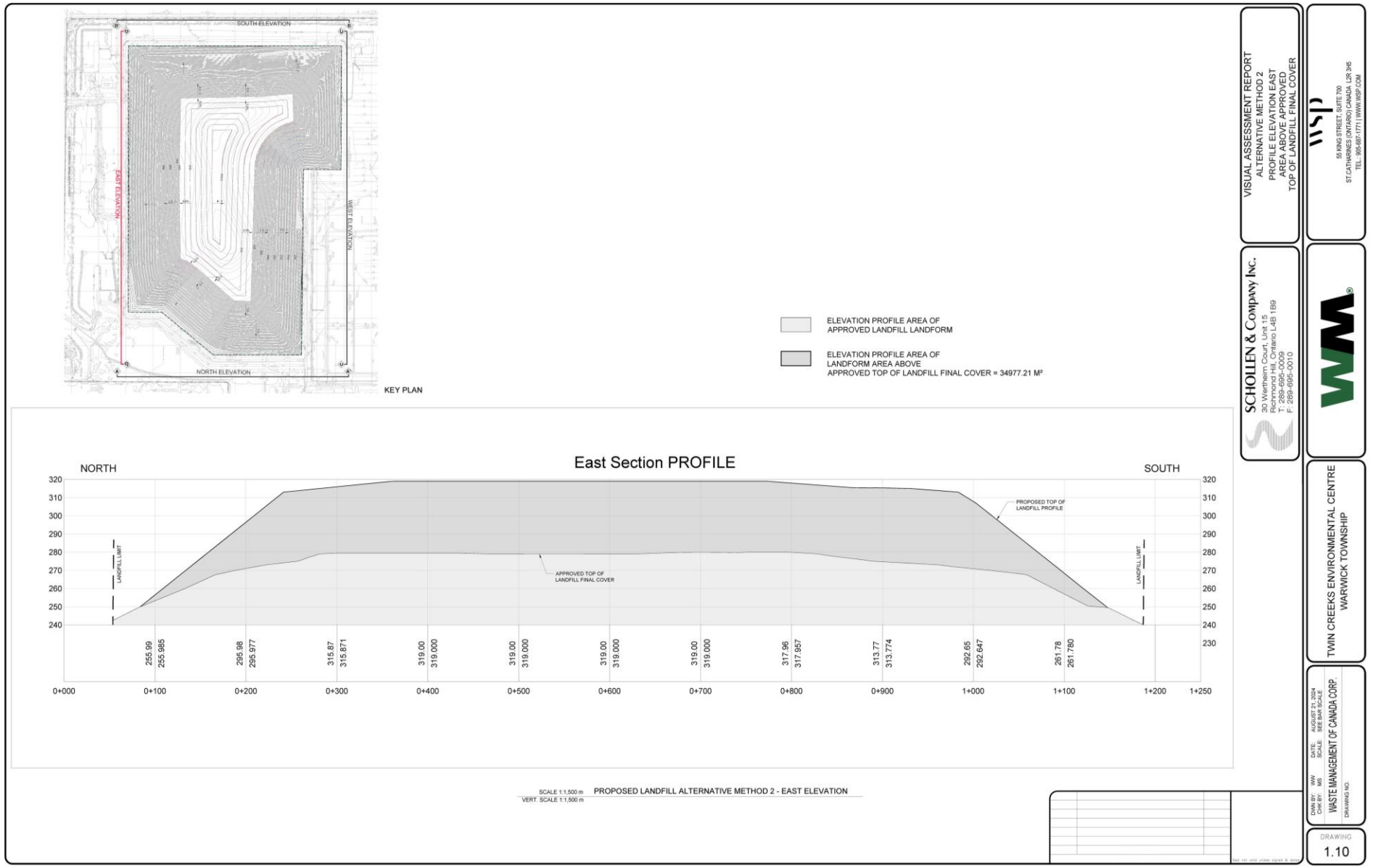


Figure 1-11. Alternate Method 2 – Profile Elevation South – Area Above Approved Top of Landfill Final Cover

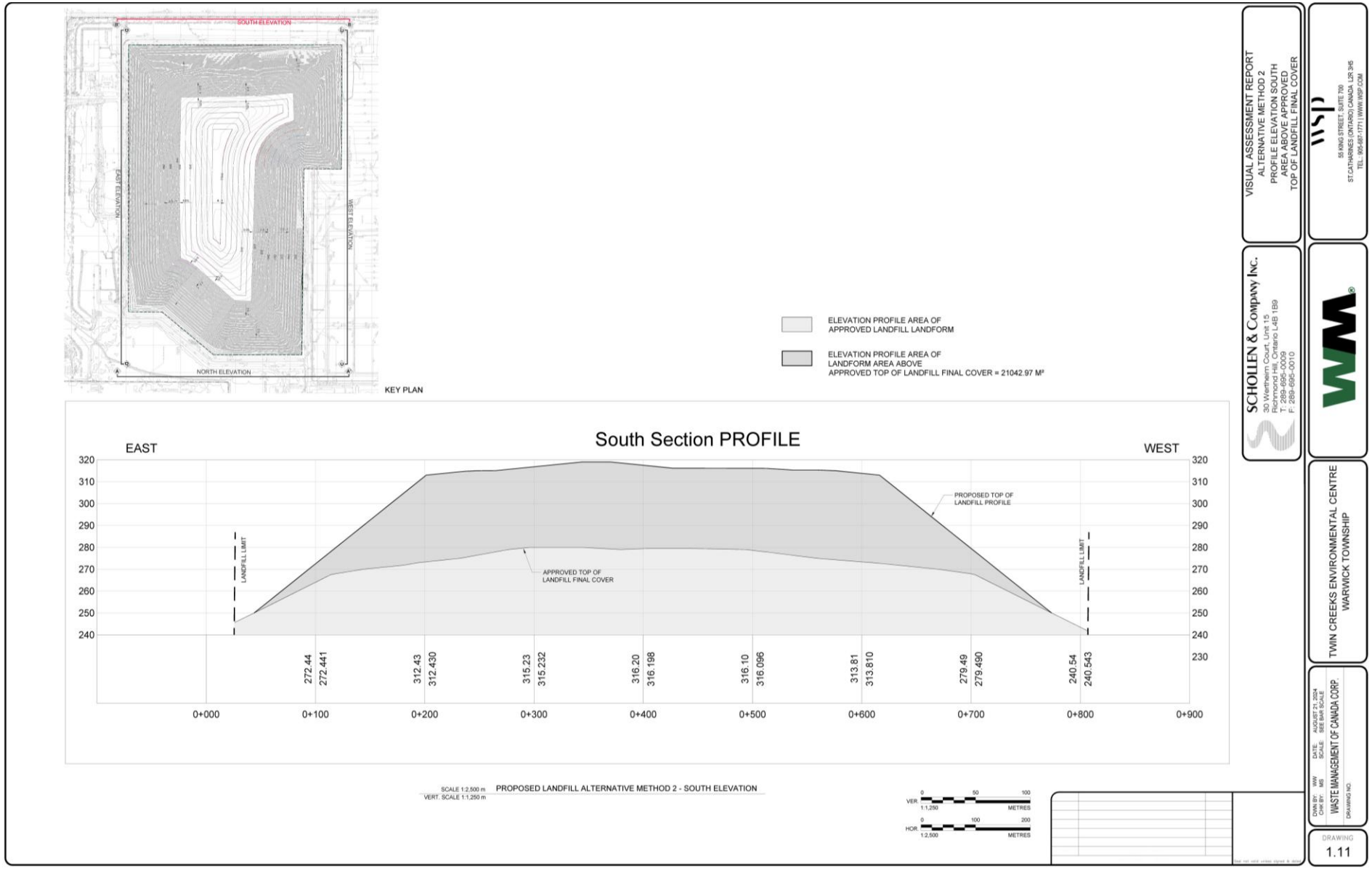
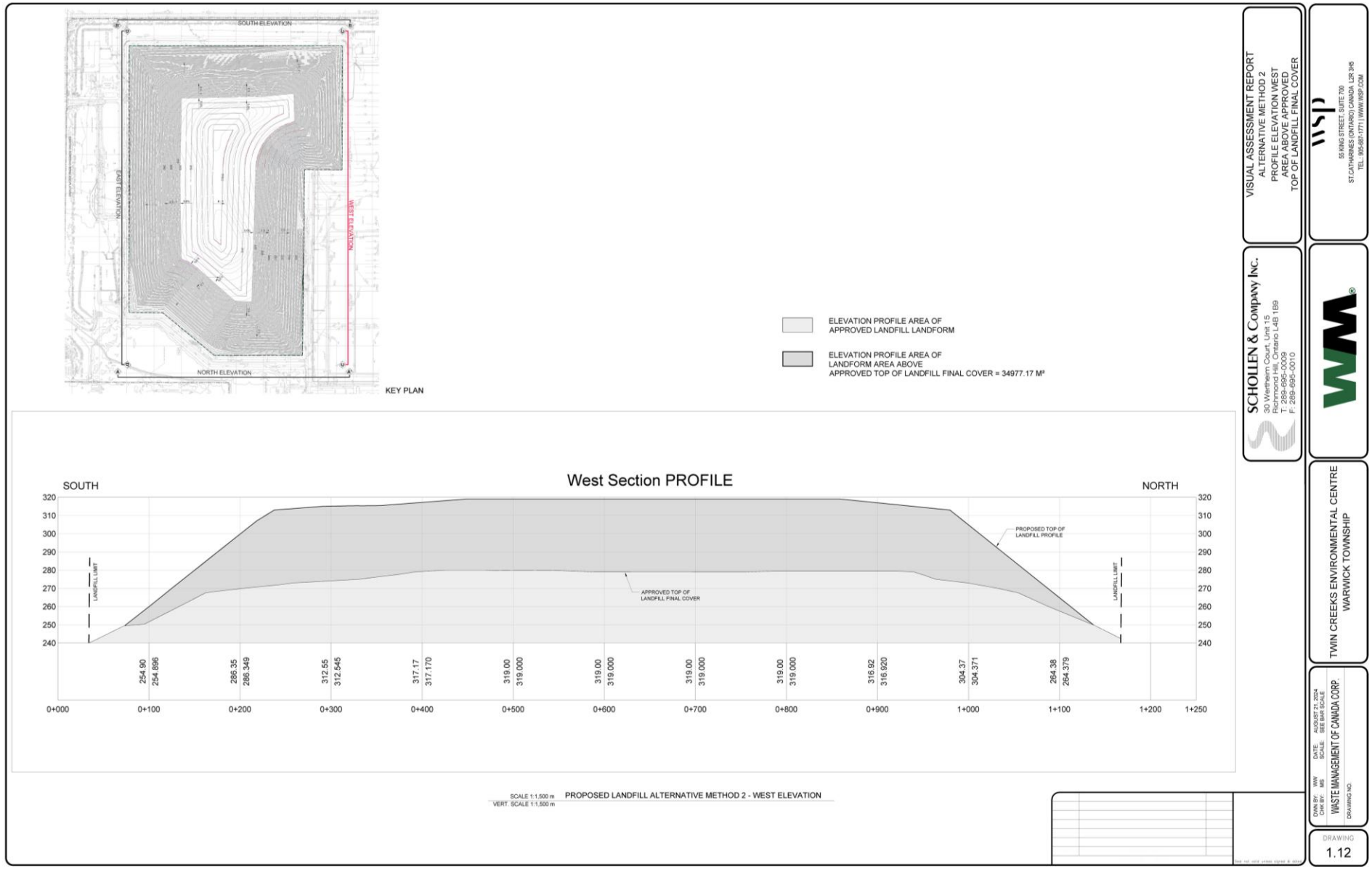


Figure 1-12. Alternate Method 2 – Profile Elevation West – Area Above Approved Top of Landfill Final Cover



1.1.3 Alternative Method 3

Alternative Method 3 includes the increase of final landfill side slopes from 4H:1V to 2.5H:1V between elevation 260 masl and elevation 360 masl, about 100 m in grade change, peaking at elevation 360 masl (**Figure 1-13**) within the Expansion Landfill footprint. The proposed landfill expansion consists of five stages, as shown by the different colours for the contour lines as indicated in the legend of **Figure 1-13**.

The topographic form of Alternative Method 3 is shown in plan view in **Figure 1-14**. Under the proposed vertical expansion, the existing approved waste disposal footprint area of the TCEC would not change, but rather, the maximum permitted height of waste would be increased by 80 m, from 280 masl (the current approved elevation for top of waste) to 360 masl, which is the maximum elevation of the top of the final cover for Alternative Method 3. The 2.5H:1V side slopes will start at the existing landfill toe of slope continuing to the peak at elevation 360 masl, a grade change of about 110 m.

The topographic form of Alternative Method 3 is described as a peak. **Figure 1-15** to **Figure 1-18** illustrate the profile of the north, east, south and west elevations of Alternative Method 3. The key plan that illustrates the location for each elevation drawing in the context of the plan of Alternative Method 3 is provided on **Figure 1-15** to **Figure 1-18**. The area of the elevation profile of Alternative Method 3 above the approved top of landfill final cover of the Expansion Landfill is as follows:

- North elevation = 29,337.17 m²
- East elevation = 59,040.93 m²
- South elevation = 29,283.05 m²
- West elevation = 59,043.98 m²

Alternative Method 3 would not change the existing approved landfill limit of waste, the existing property boundaries and buffer width, will remain the same after the vertical expansion, as indicated in **Figure 1-14**.

The existing vegetated screening berms are not proposed to be altered; however, the existing trees will continue to grow and will increase in height and density from the present day to the completion of Phase 5. The increase in the size and density of the trees will enhance the visual screening function of the vegetated berms.

Figure 1-13. Alternate Method 3 – Overall Plan

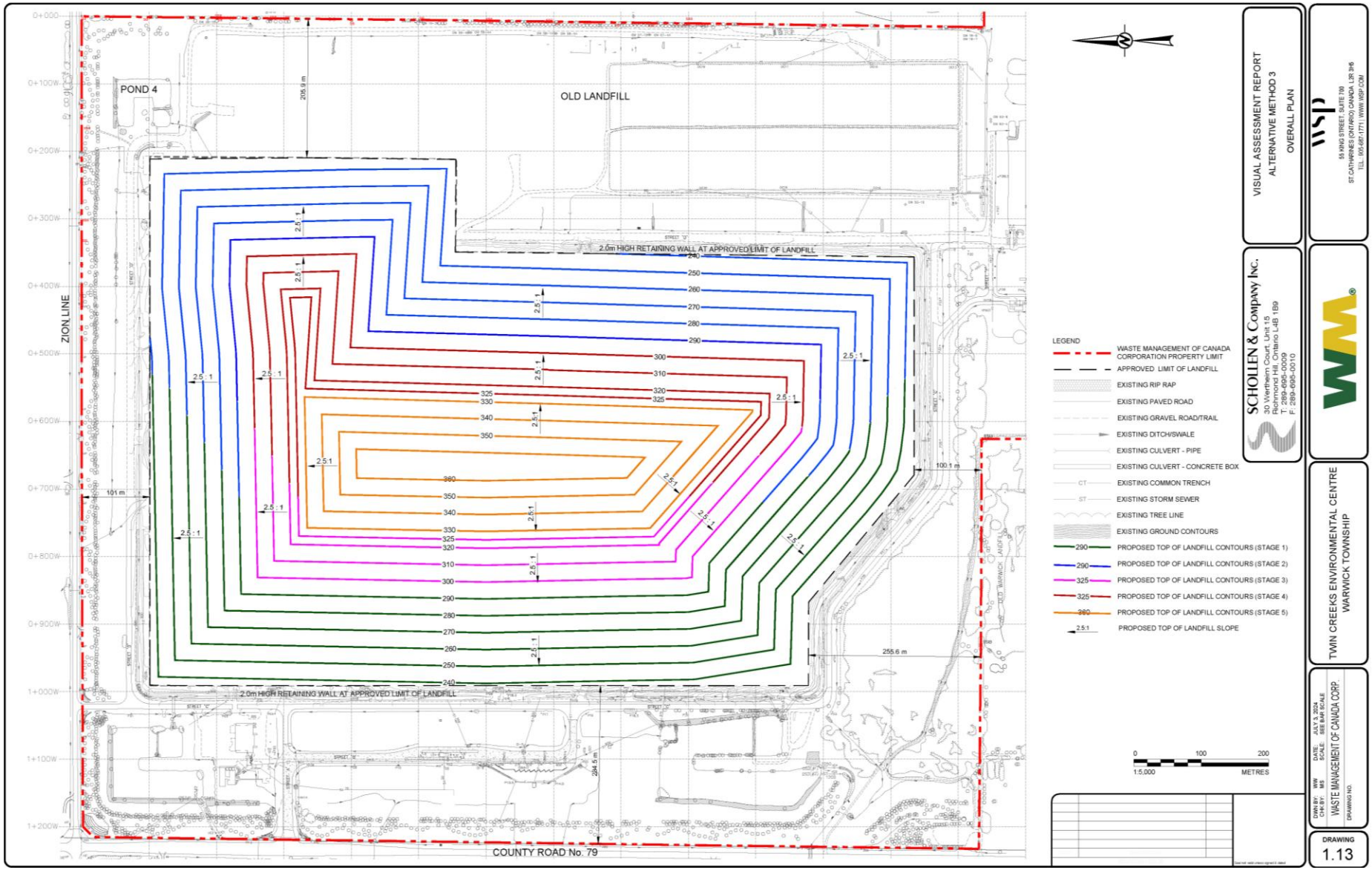


Figure 1-14. Alternate Method 3 – Key Plan – Profile Elevations Locations

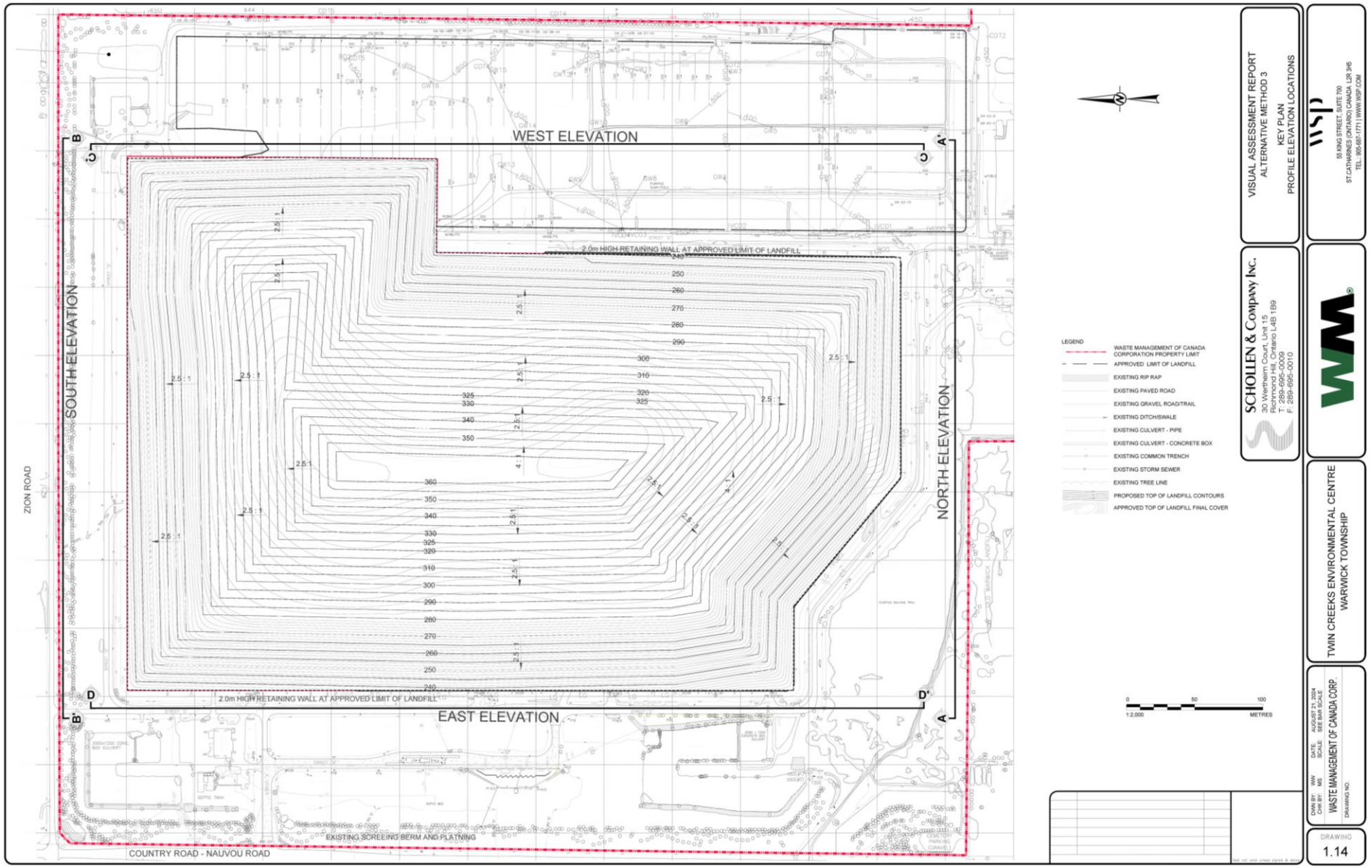


Figure 1-15. Alternate Method 3 – Profile Elevation North – Area Above Approved Top of Landfill Final Cover

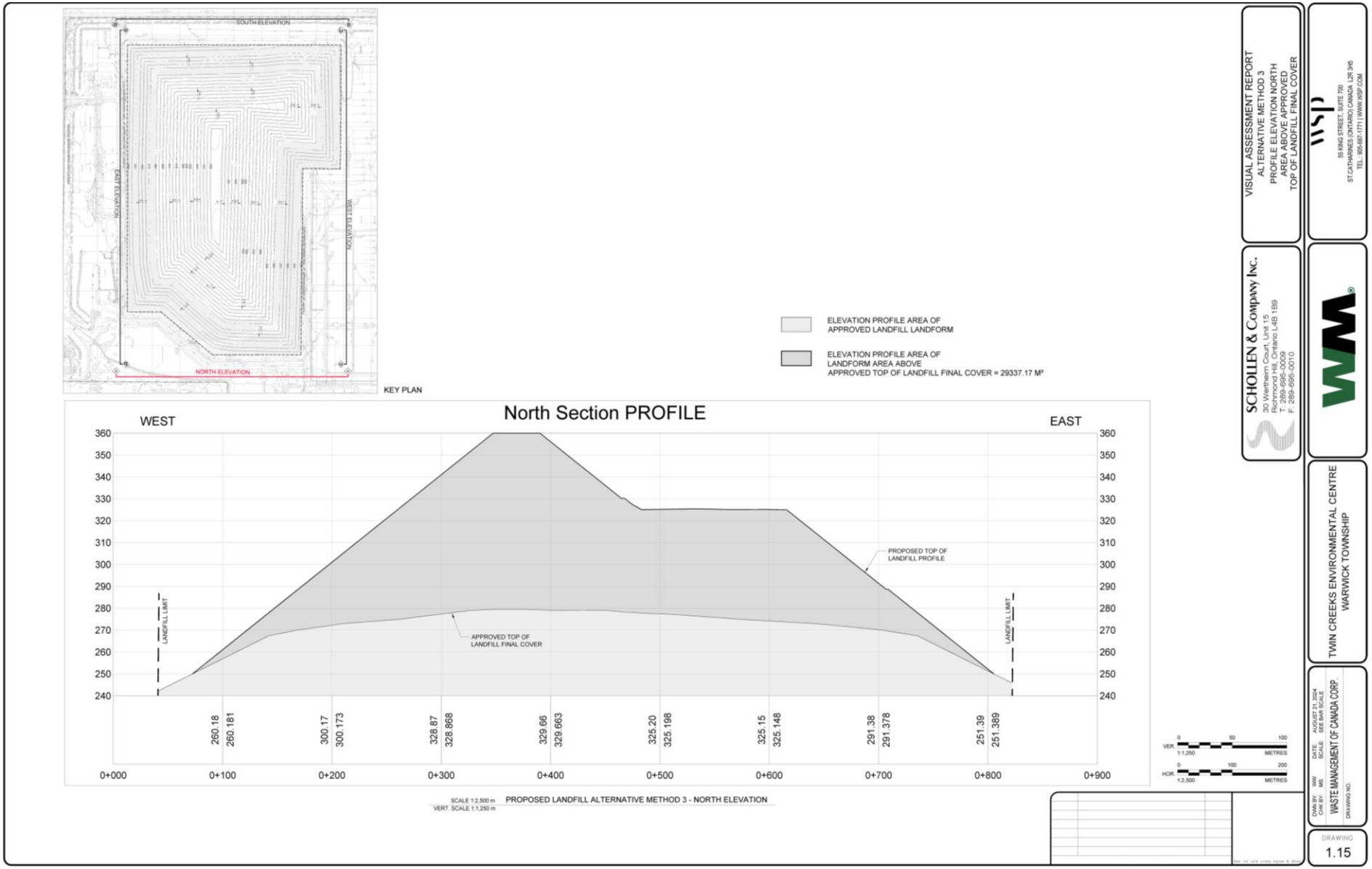


Figure 1-16. Alternate Method 3 – Profile Elevation East – Area Above Approved Top of Landfill Final Cover

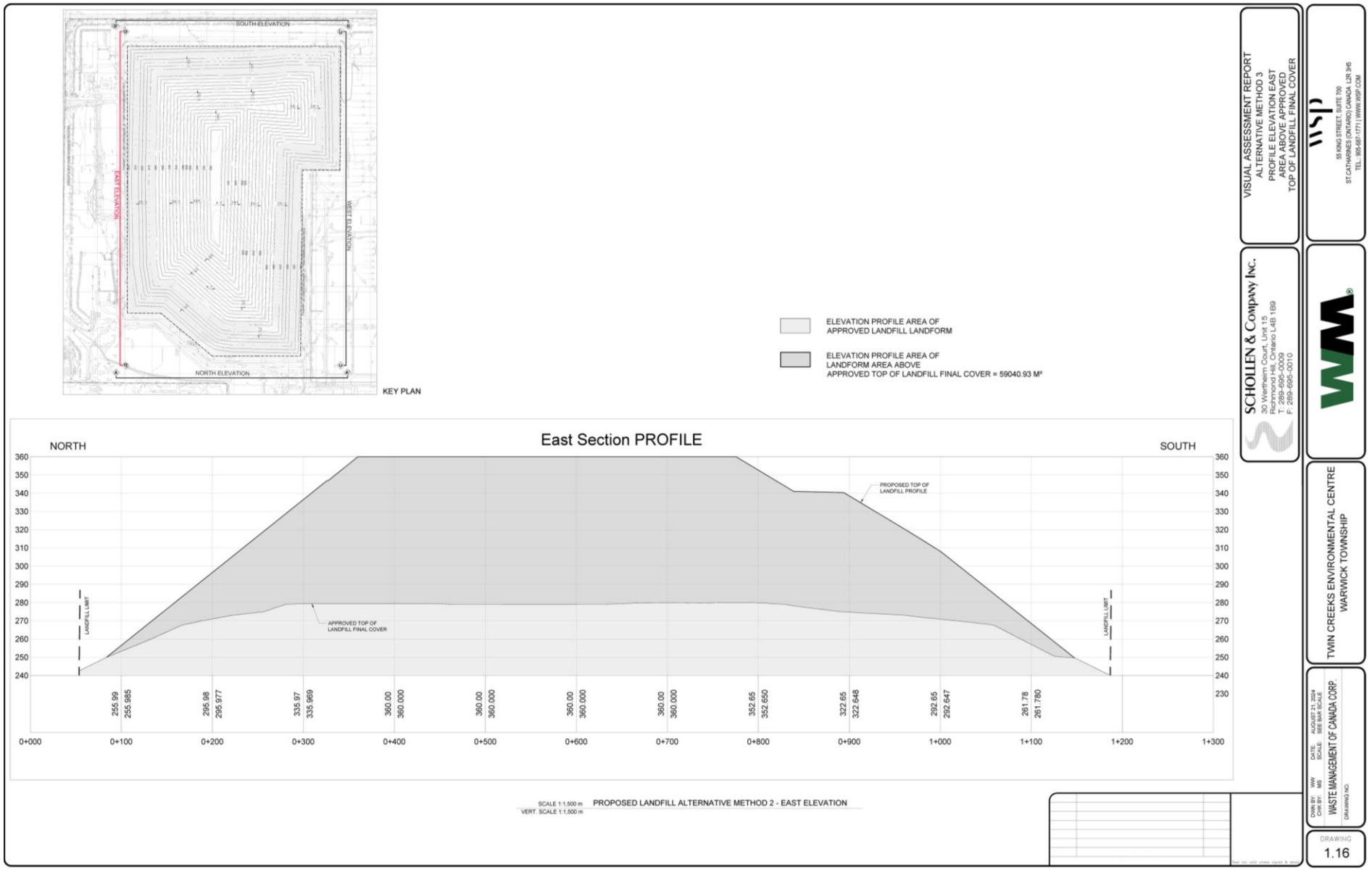


Figure 1-17. Alternate Method 3 – Profile Elevation South – Area Above Approved Top of Landfill Final Cover

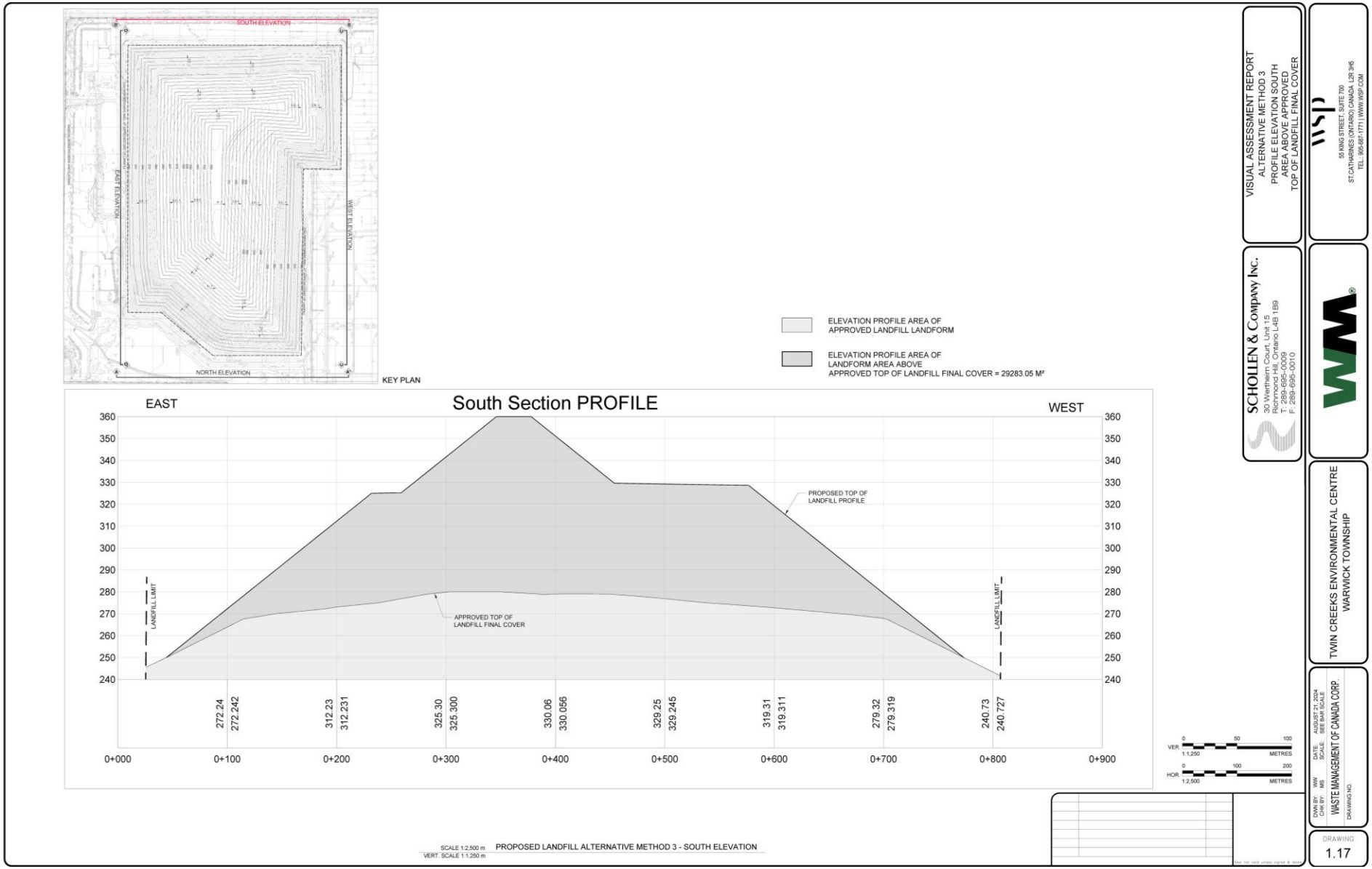
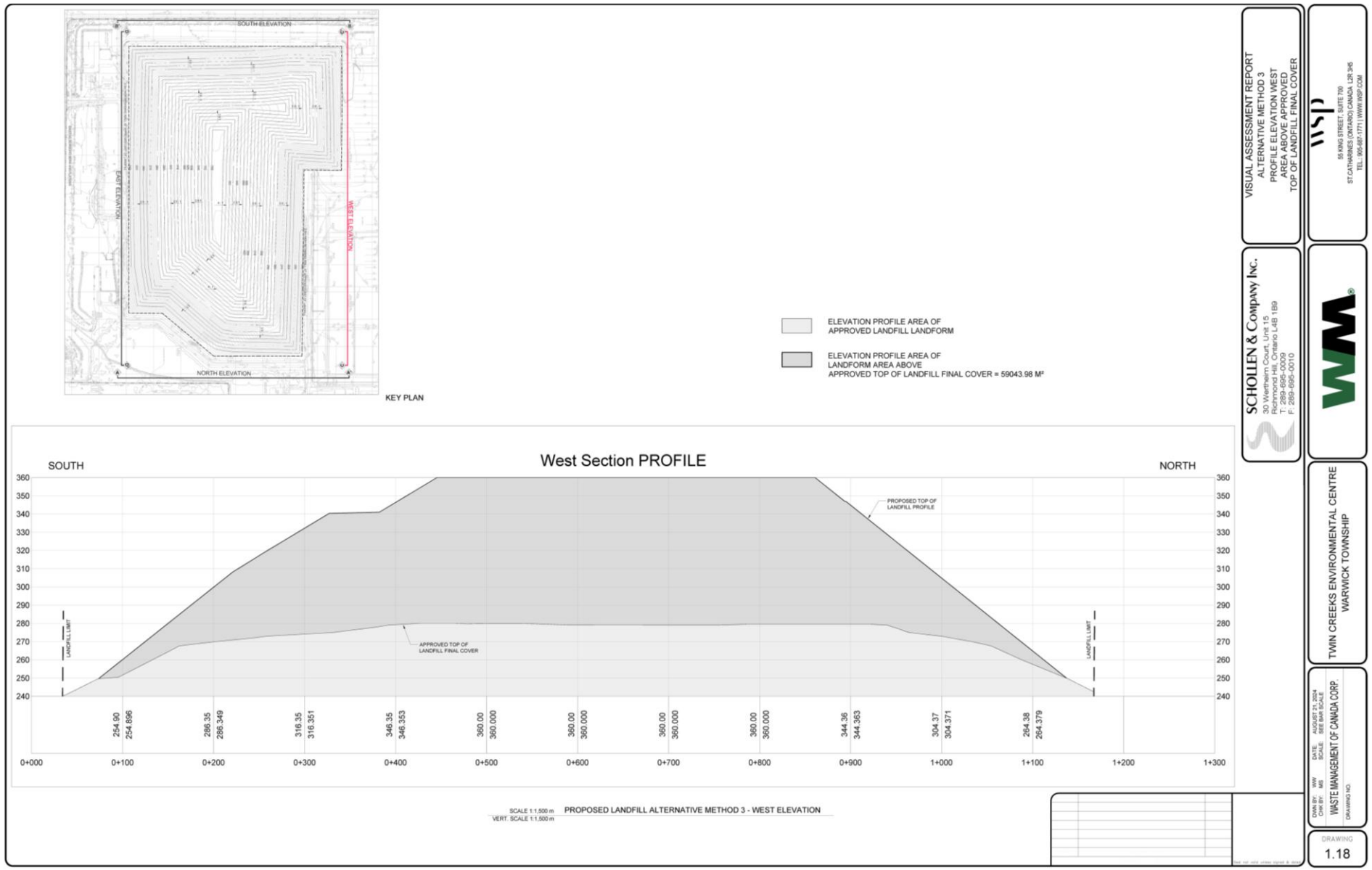


Figure 1-18. Alternate Method 3 – Profile Elevation West – Area Above Approved Top of Landfill Final Cover



2 Effects Assessment Methods

Using the evaluation criteria, indicators, rationale and data sources from the approved ToR and the existing conditions from the Visual Landscape Existing Conditions Report, the effects assessment was carried out as follows:

- predict the potential environmental effects for each Alternative Method (**Section 2.1**);
- identify the Preferred Alternative based on a comparative evaluation of the potential environmental effects of each Alternative Method (**Section 2.2**);
- conduct an effects assessment on the Preferred Alternative, including the identification of mitigation measures and monitoring programs (**Section 2.3**); and
- compare the effects of the Preferred Alternative to those of the 'Do Nothing Alternative' (i.e., the Expansion Landfill as approved) (**Section 2.4**).

2.1 Predict Potential Environmental Effects for Alternative Methods

The potential environmental effects for each Alternative Method were identified within the Study Areas based on the application of the evaluation criteria, indicators and data sources in the approved ToR and based on the maximum allowable waste receipt level for the TCEC landfill. The potential effects can be positive or negative, direct or indirect, and short- or long-term. Mitigation measures were identified to minimize or mitigate the potential effects and then the net effects were evaluated taking into consideration the application of mitigation measures. The Study Areas, evaluation criteria, indicators, data sources, and key design considerations and assumptions for Visual Landscape are provided below.

2.1.1 Study Areas

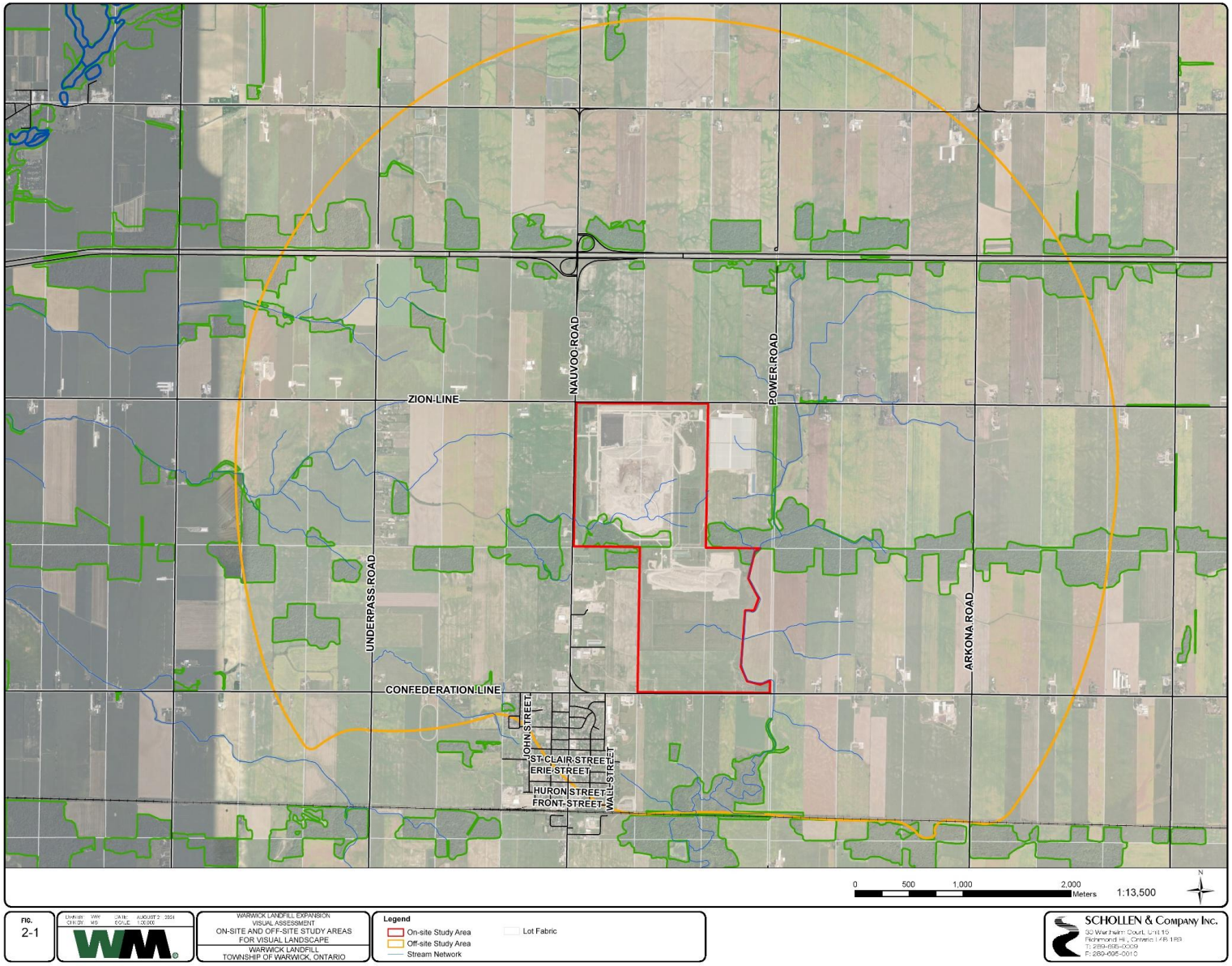
The TCEC landfill is located within the Township of Warwick, in the County of Lambton, approximately 1 km north of the Village of Watford. The TCEC is situated south of Highway 402 and southeast of the intersection of Nauvoo Road and Zion Line. The municipal street address of the TCEC is 5768 Nauvoo Road, Watford, Ontario. The area being considered for the landfill optimization is the approved Expansion Landfill footprint located within the northern portion of the 301 ha TCEC site.

The Study Areas include the existing TCEC site as well as the potentially-affected surrounding areas.

For the Visual Landscape effects assessment, the potentially-affected areas are defined based on receptor locations. The general On-site and Off-site Study Areas were defined for the EA in the approved Terms of Reference (ToR). The limits of the Off-site Study Area for the Visual Landscape have been modified from the general Off-

site Study Area and confirmed through field reconnaissance. The adjustments to the general 1 km Off-site Study Area for the Visual Landscape include extending the limit approximately 2.5 km further westward to encompass the potential receptors that are located along Underpass Road and in the vicinity of Underpass Road and Confederation Line, approximately 2.5 km further eastward to include potential receptors that are located along Arkona Road, and approximately 2.5 km northward to include potential receptors that are located north of Highway 402. Sixteen additional receptors were identified in comparison to the Visual Assessment (2205). In the process of completing the net effects assessment, the extent of the Off-site Study Area was reviewed and confirmed for each of the three Alternative Methods.

Figure 2-1. On-site and Off-site Study Areas for Visual Landscape



2.1.2 Evaluation Criteria, Indicators, and Data Sources

The evaluation criteria, rationale, indicators, and data sources used for Visual Landscape as per the approved ToR are provided in **Table 2-1**.

Table 2-1. Evaluation Criteria, Indicators, and Data Sources for Visual Landscape

Evaluation Criteria	Rationale	Indicators	Data Sources
Socio-Economic Environment			
Visual Landscape			
Visual Impact of Facility	The contours of the waste disposal facility may affect the visual appeal of the landscape.	• Predicted changes in perceptions of landscape and views.	• Site grading plans • Aerial mapping and field reconnaissance • Proposed facility characteristics • Existing Landfill design and operations data • Regional topographic mapping • Results of other discipline assessments

The implementation of the Project may result in changes in the perception of the visual landscape for certain receptors and viewpoints. The magnitude of change will be determined by the following criteria as set out in the Visual Landscape Work Plan:

1. Visible landfill area
2. Distance to the Landfill Optimization site
3. Horizontal angle of view
4. Visual Absorption Capacity Factor (VACF)

Receptors are locations where views to the TCEC are available where there is a potential for a change in the visual landscape as a result of the implementation and/or operation of the landfill optimization project. Candidate receptors include residences, businesses, public amenities (such as parks and recreational facilities, cemeteries and other land uses that may be sensitive to changes in the visual environment). Viewpoints are the locations from which the visual simulations were generated to enable the comparative evaluation of the Alternative Methods (**Section 2.2**) and represent the typical view from each of the six Receptor Zones as illustrated by **Figure 2-2**. To complete the effects assessment of the Preferred Alternative (**Section 2.3**) and the comparison of the Preferred Alternative against the 'Do Nothing Alternative' (**Section 2.4**), receptors were used to generate the Visual Assessment Data for the 'Do Nothing Alternative' (**Appendix B-1**) and for the Preferred Alternative (**Appendix B-2**). For the 'Do Nothing Alternative' 109 receptors were identified and utilized to

generate the data. For the Preferred Alternative 125 receptors were identified and assessed.

Based upon the values related to each of the above recorded for each receptor and each viewpoint utilizing a scale ranging from 1 to 5, a combined effect evaluation was calculated to determine the Combined Effect Value (CEV) for each receptor and viewpoint. The CEV defines the magnitude of the visual effect related to each receptor and viewpoint as set out in the following section.

Existing available topographic maps, aerial photographs and ground-level photographs were used to measure the visible landfill area, horizontal angle of view and distance from the landfill. AutoCAD Civil 3D software was utilized to calculate the VACF by determining the topographic slope ranges. The VACF vegetation percent coverage factor was determined using G.I.S. software and current or the aerial photography.

1. Visible Landfill Area

The Visible Landfill Area is determined by measuring the height and width of the landfill when viewed from each receptor and viewpoint. These measurements are multiplied to calculate the potential landfill area that would be visible from each receptor and viewpoint.

As the area of landfill that is exposed to view increases, the potential effect on the receptor/viewpoint increases.

The existing perimeter berms and screening vegetation as well as existing significant woodlands and structures that perform a screening function were taken into account in this calculation.

To account for the effect of diminishing scale over the distance, the landfill area determined for each receptor and viewpoint was be divided by the distance between the receptor/viewpoint and the landfill (in m). Diminishing scale refers to the phenomenon of an object's mass decreasing in size the farther it is from the viewer. Effect values for the perceived area that is visible from each receptor and viewpoint are indicated in **Table 2-2**.

Table 2-2. Perceived Visible Area and Relative Effect Levels

Perceived Area Index	Effect Level	Value
>23.0	Very high	5
18.1 – 23.0	High	4
13.1 – 18.0	Moderate	3
7.51 – 13.0	Low	2
0 – 7.5	Very low	1

2. Distance to Landfill Optimization Site

The distance to the landfill optimization site from each receptor and viewpoint was measured in m. As distance from the landfill increases, the potential visual effect decreases due to the effect of diminishing scale.

The distance in m equates to a value scale which relates to the limits of foreground, middle ground and background as defined by focal perception.

Table 2-3 illustrates the effect values associated with the distance ranges.

Table 2-3. Distance in Relation to Relative Effect Levels

Distance in Metres	Effect Level	Value
0 – 600	Very high	5
601 – 800	High	4
801 – 1500	Moderate	3
1501 – 2200	Low	2
2201 - 3500	Very low	1

3. Horizontal Angle of View

The horizontal angle of view is the measure of the unobstructed view angle from each receptor and viewpoint to the proposed Landfill Optimization site. As the horizontal angle of view increases, potential effects increase.

Horizontal angles of view are divided into the following ranges and are assigned visual effect values as indicated in **Table 2-4**.

Table 2-4. Horizontal Angle of View and Relative Effect Levels

Horizontal Angle of View	Effect Level	Value
>90°	Very high	5
50° - 90°	High	4
31° - 50°	Moderate	3
16° - 30°	Low	2
0° - 15°	Very low	1

Visual research has concluded that the central region of human vision, the region with the greatest clarity or the ‘visual cone of clarity’, is 124 degrees. Therefore, the visual effect ranges for the horizontal angle of view have been established so that the measured angles which are greater than approximately one half of the human visual cone of clarity are classified as having a ‘high effect. Those angles which are greater than one quarter of the visual cone of clarity are defined as having a ‘moderate’ effect level. The overall visual impact defined as a ‘moderate’ effect level based upon the horizontal angle of view will be informed by the overall Combined Effect Value calculation.

4. Visual Absorption Capacity Factor (VACF)

Surrounding landscape character is a consideration in the assessment. The Visual Absorption Capability is defined as the relative capacity of a landscape to absorb visual alterations and still maintain its visual integrity. VACF parameters include slope and vegetation cover. Existing vegetation and landform determine the extent to which the alteration to the landscape can be visually absorbed. To determine the VACF, the

average slope of the land and percent of significant vegetative cover was calculated based on an analysis utilizing aerial photography and topographic mapping in order to discern slope gradients and vegetation type and cover for each 500m x 500m grid square within the angle of view and a numerical value was assigned in accordance with the scales that are set out in **Table 2-5**.

Table 2-5. VACF Parameters

Factor	Range	Value	Description	Rationale
Slope	0 percent > 0-5 percent 6-20 percent > 20 percent	(0) (1) (2) (3)	Water Flat Rolling Rugged	No absorption Less absorptive More absorptive
Vegetation (percent coverage)	0 percent 1-10 percent 11-40 percent > 40 percent	(0) (1) (2) (3)	Open Sparse Moderate Dense	Less absorptive More absorptive

The two values for each grid square were added together to yield the absorption capability value for that square.

The VACF value for each viewpoint and receptor is the average of the visual absorption capability values for all grid squares within the horizontal viewing angle. The possible spread of averaged VACF values from one to six was divided evenly into five ranges and assigned a visual effect value as set out in **Table 2-6**.

Table 2-6. VACF and Relative Effect Levels

Range	Description	Effect Level	Value
≤ 1.2	Very low VACF	Very high	5
1.21 – 2.4	Low VACF	High	4
2.41 – 3.6	Moderate VACF	Moderate	3
3.61 – 4.8	High VACF	Low	2
4.81 – 6.0	Very high VACF	Very low	1

When a VACF is ranked as ‘very low’ the Landfill Optimization landform will be visually dominant since the landscape within the view does not include factors such as slope and vegetation that are absorptive. Conversely, when a VACF is ranked as ‘very high’, the landscape within the view includes factors such as steeper slopes and a higher percentage of vegetation cover that are absorptive, rendering the Landfill Optimization landform less perceptible in the view.

Combined Effect Values

The effect values from the four aforementioned criteria were added together to yield the combined visual effect value associated with each viewpoint and receptor**.** **Table 2-7** sets out the scale of combined visual effect values accounts for the maximum range of value sums (4 through 20) and defines the moderate and low effect upper limits by multiplying their respective values (3,2) by the total number of factors (4).

Based upon the values for each of the above criteria determined for each potential receptor and viewpoint, a combined effect evaluation was conducted to determine the CEV for each receptor and viewpoint. The CEV determines the magnitude of the visual effect related to each receptor and viewpoint. The following **Table 2-7** sets out scale of the relative magnitude of visual effect based on the range of CEVs.

Table 2-7. Combined Effect Values and Relative Visual Effect Levels

Combined Effect Value Scale	Visual Effect
13 – 20	High Effect
9 – 12	Moderate Effect
4 - 8	Low Effect
0 - 4	No effect

The CEVs were applied to address the 'Visual Impact of Facility' evaluation criterion related to each receptor and viewpoint based upon the following:

- For receptors and viewpoints that are determined to experience a 'High Effect', the proposed landfill optimization project would demand the viewer's attention.
- For receptors and viewpoints that are determined to experience a 'Moderate Effect', the view of the landfill optimization project would be reduced in scale as a result of the following existing conditions:
  - Distance from the site.
  - Extent and location of existing screening elements, including woodlands, topography and/or existing buildings/structures. Although the landfill optimization area would be visible, it would not dominate views. Overall shapes, patterns and details would be discernable when viewed from the viewpoint or the receptor.
- For receptors and viewpoints that are determined to experience a 'Low Effect', the proposed landfill optimization project would be expected to blend into the existing landscape and would not be identifiable when viewed from the receptor or viewpoint.

2.1.3 Key Considerations and Assumptions

The key existing conditions elements, design considerations, and assumptions for the Visual Landscape effects assessment are described below.

2.1.3.1 Key Elements of Existing Conditions

The topography throughout the Off-site Study Area is relatively flat and the landscape is predominantly rural, with the exception of the Village of Watford. There are several Significant Woodlands within the Off-site Study Area that obstruct views to the TCEC from the lands further east, west, and southeast. The site is visible from just south of the intersection of Hwy 402 and Nauvoo Road (County Road 79). Existing buildings

do not afford a direct view of the TCEC from the Watford village centre. Land uses to the north, east, and west of the site are primarily agricultural. Several residences and businesses are located along Confederation Line to the south of the TCEC. Rural residential and agricultural properties are located along Arkona Road to the east, Zion Line to the north, and Underpass Road to the south of the TCEC. Since the time that the TCEC was constructed, several buildings/developments have been erected, including the Twin Creeks Greenhouses complex. These facilities function as visual screening elements.

Significant public amenities in the vicinity of the TCEC include the East Lambton Community Complex and YMCA, the Watford cemetery, Centennial Park, Rotary Park, and Nauvoo and Confederation Parks which were constructed as a component of the development of the TCEC. Confederation Park includes an off-leash dog park and a trailhead.

Several commercial facilities have been recently constructed along Nauvoo Road, to the southeast of the TCEC. The Settlement Boundary for Watford extends north of Confederation Line on both sides of Nauvoo Road (Schedule “C”, Township of Warwick Official Plan) and therefore it is anticipated that additional commercial enterprises will become established within this portion of the Settlement Area in the future. An industrial park is planned for the agricultural area east of Nauvoo Road to the west/southwest of the TCEC, which will provide further visual screening from Nauvoo Road and adjacent businesses.

The lands that are owned by WM include the TCEC, adjacent agricultural lands, and a significant woodland.

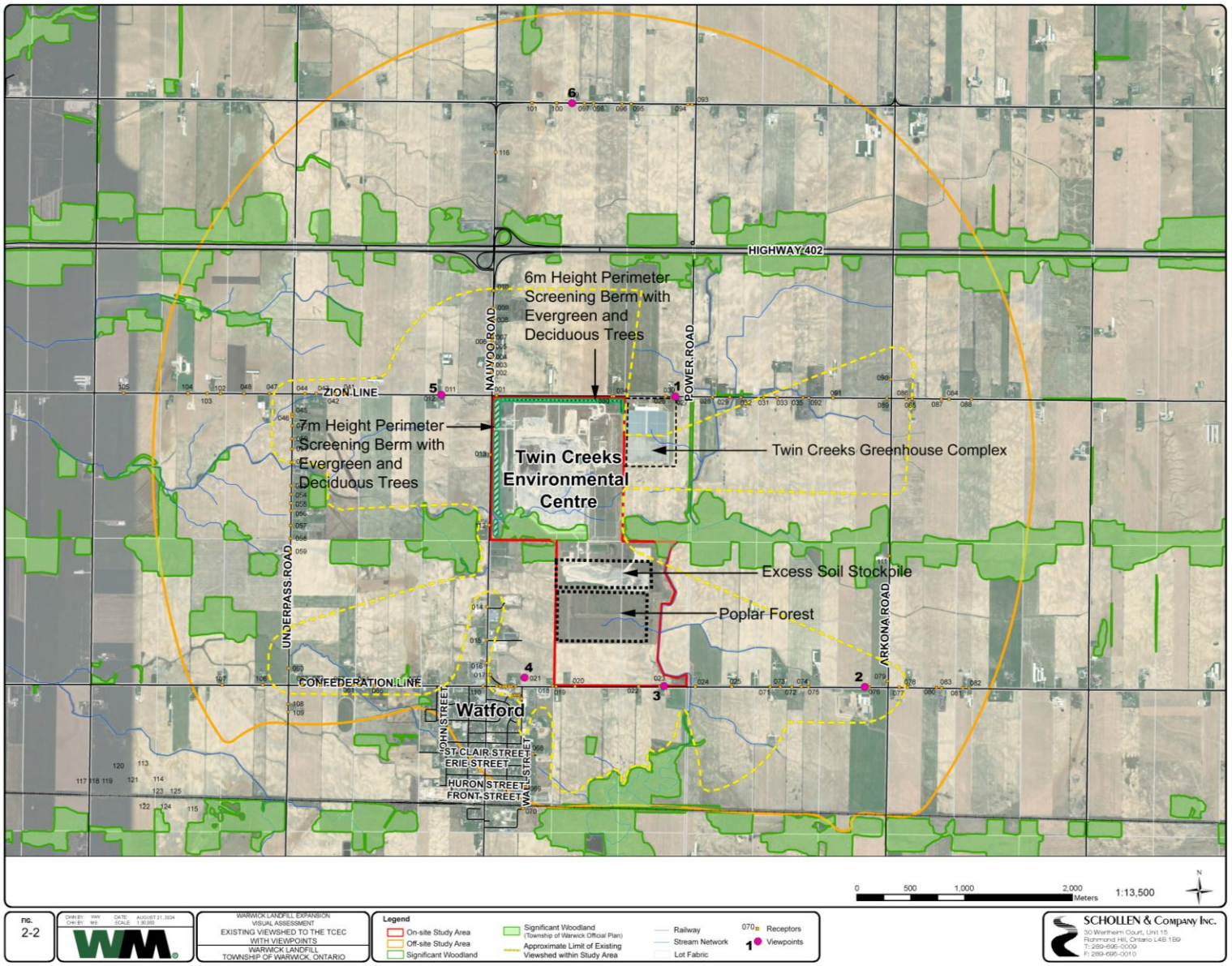
The design of the existing TCEC incorporated visual impact mitigation measures, including berms and plantings that have matured over time. The existing TCEC is framed on its west and north sides by 7 m and 6 m high earthen berms, respectively. The berms are vegetated with coniferous and deciduous trees that provide visual screening in addition to the height of the berms, effectively screening the landfill operation from both Zion Line and Nauvoo Road. These vegetated berms are visually dominant within the local landscape but are aesthetically pleasing.

The Twin Creeks Greenhouses complex is effective in screening views from the areas that are located northeast of the TCEC. The east and west sides of the TCEC are partially screened from view by the existing Significant Woodlands that are located east and west of the TCEC. To the south of the TCEC, a soil stockpile functions as an effective visual barrier that obstructs views from Confederation Line.

From the southern view, the soil stockpile and the existing woodland are the dominant landscape features.

Figure 2-2 illustrates the viewshed to the TCEC under the existing conditions. Existing Significant Woodlands, the Twin Creeks Greenhouse Complex, commercial and industrial buildings on the east side of Nauvoo Road, north of Confederation Line and the screening berms and trees that were implemented as a component of the Expansion Landfill obstruct views to the TCEC.

Figure 2-2. Existing Viewshed to the TCEC



2.1.3.2 Key Design Considerations

For the Visual Landscape, key design elements that were considered in the comparative evaluation include the following:

- Elevation of the top of the Alternative Method (**Figure 1-1**, **Figure 1-7** and **Figure 1-13**);
- Increase in height above the approved top of landfill final cover of the Expansion Landfill (**Figure 1-13** to **Figure 1-16**, **Figure 1-9** to **Figure 1-12**, and **Figure 1-15** to **Figure 1-18**);
- Topographic form of the Alternative Method (**Figure 1-1**, **Figure 1-7** and **Figure 1-13**); and
- Area of the north, east, south and west elevation profiles above the approved top of landfill final cover of the Expansion Landfill (**Figure 1-3** to **Figure 1-6**, **Figure 1-9** to **Figure 1-12**, and **Figure 1-15** to **Figure 1-18**).

2.1.3.3 Key Assumptions

The future existing condition, included in **Section 3.1**, is described in the 2005 Visual Impact Assessment corresponding with Year 26. The future existing condition was utilized as the baseline condition for conducting the comparative evaluation of Alternative Methods 1, 2 and 3. The images that were generated as a component of the 2005 Visual Impact Assessment from Viewpoints 1 to 6 were utilized to create the visual simulations of each Alternative Method to facilitate the comparative evaluation.

The comparative evaluation was based on the ultimate configuration of each Alternative Method at the completion of Phase 5. In the process of completing the assessment, it has been assumed that the existing trees that are located on the screening berm will have experienced approximately 20 years of growth and will have increased in height by approximately 12 m, attaining a height of approximately 22 m and providing additional visual screening. In addition to the 6 m and 7 m high earthen berms along Zion Line and Nauvoo Road, the total height of these screening elements is anticipated to be 28 m and 29 m, respectively. No additional visual mitigation is proposed as a component of any of the Alternative Methods due to the lack of available area within the site to accommodate visual screening of a size/configuration that would be effective in obstructing views to the Landfill Optimization landform.

In addition, the following assumptions were factored into the assessment:

- Closed and capped areas will be vegetated with turf;
- Areas of unvegetated cover would be exposed to views;
- The woodlot immediately south of the Expansion Landfill would remain;
- The large spruce trees along the east side of the Expansion Landfill would remain;
- Existing hedgerows, buildings and significant woodlands were taken into consideration;

- The poplar forests were not considered in the assessment since poplars have a limited lifespan and the forests will not be permanent on the landscape;
- Visibility of the excess soil stockpile was taken into consideration;
- There will be no operational changes, and the hours of operation will remain unchanged;
- There will be up to six approved landfill gas flares which will be fully enclosed. The vapour plume will not be visible;
- Visibility of equipment headlights will not be significant and will be superseded by the measurements based on the landfill landform; and
- The viewpoint at the receptor is at 1.5 m to 1.8 m above ground level, which corelates to the typical viewer's eye level.

Although the characteristics of the surrounding landscape within the Off-site Study Area, for example the growth and expansion of existing woodlands and the construction of new buildings that obstruct views to the TCEC, will have changed during the period of time between the present day and the completion of Phase 5, these changes cannot be anticipated with accuracy, therefore the comparative evaluation was conducted utilizing the characteristics of existing landscape within the Off-site Study Area. These changes in the visual landscape will occur gradually over time, affording viewers at certain receptors to slowly adjust to the changes in views.

2.2 Comparative Evaluation and Identification of the Preferred Alternative

The three Alternative Methods were comparatively assessed and evaluated using the criteria and indicators to determine the Preferred Alternative. The differences in the potential environmental effects remaining following the implementation of potential mitigation/management measures (i.e., net effects) were used to identify and compare each Alternative Method.

The net environmental effects were used to compare the three Alternative Methods to one another at the criteria and indicator level for each discipline. The following two step methodology was applied to carry out the comparative evaluation for the Visual Landscape:

1. Identify the predicted net effect(s) associated with each Alternative Method for each indicator and assign a preference rating (i.e., Preferred, Not Preferred, No Substantial Difference); and
2. Rate each Alternative Method at the criteria level (i.e., Preferred, Not Preferred, No Substantial Difference) based on the identified preference rating for each indicator and provide a rationale.

2.3 Effects Assessment of the Preferred Alternative

An assessment of the environmental effects of the Preferred Alternative was carried out considering the same criteria, indicators, and data sources, considering potential mitigation/management measures and cumulative effects. The effects assessment of the Preferred Alternative was compiled and is presented in the following sections.

2.4 Comparison of the Preferred Alternative against the 'Do Nothing Alternative'

The effects of the Preferred Alternative were compared against the predicted effects of the currently approved Expansion Landfill based on similar environmental criteria and indicators, with the understanding that the criteria and indicators used in the current effects assessment may differ from those used for the effects assessment of the Expansion Landfill. The effects are compared against each other in terms of magnitude, extent, and duration. The advantages and disadvantages of the Preferred Alternative compared to the 'Do Nothing Alternative' are identified. The comparison of the effects of the Preferred Alternative against the 'Do Nothing Alternative' is provided in the following section.

3 Net Effects Assessment

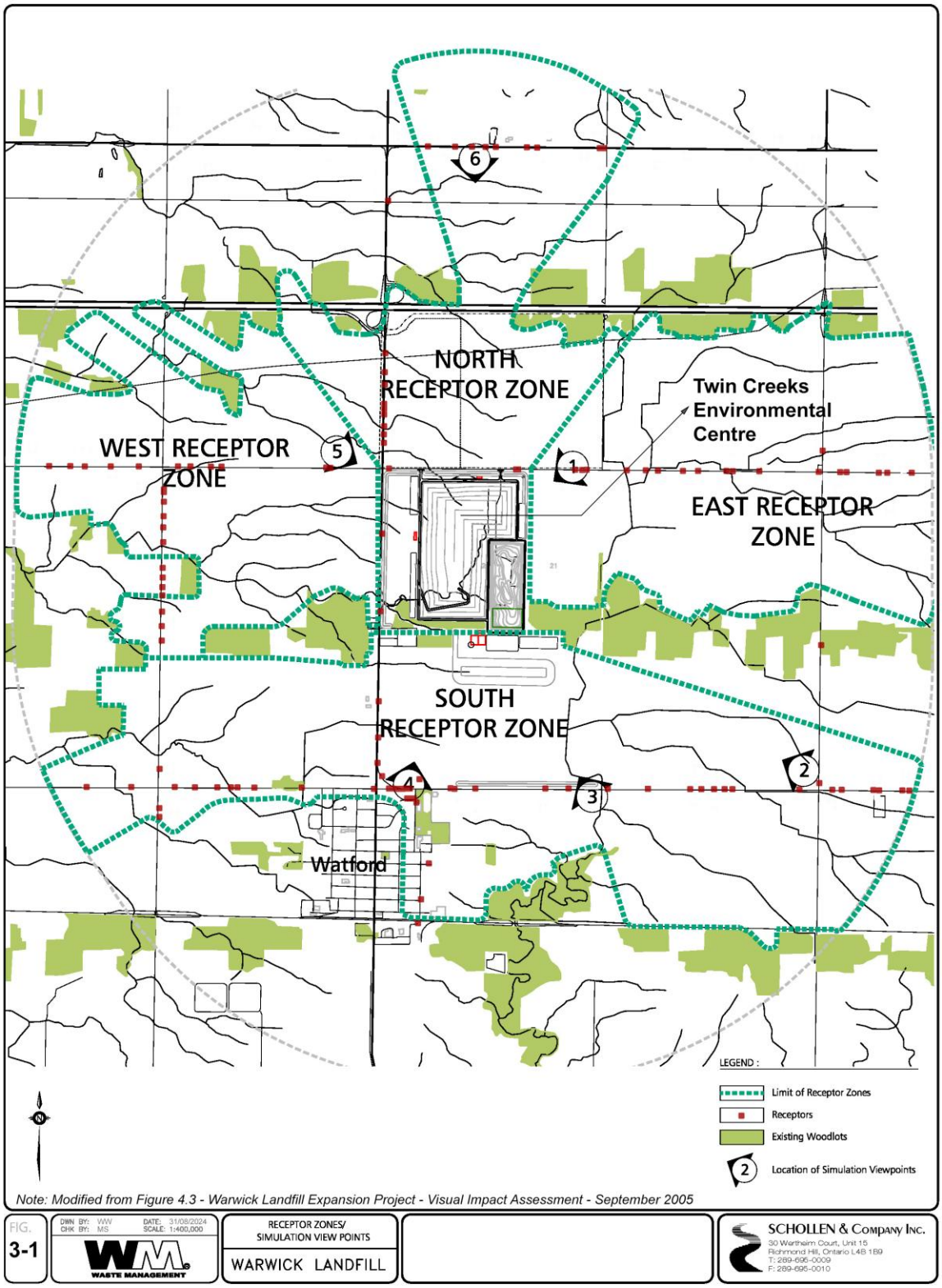
To identify the potential effects of the Project on the Visual Landscape, the conceptual design of each Alternative Method for the landfill optimization was examined to determine if it would have an effect on the visual impact of the facility through changes in perceptions of landscapes upon completion of the Landfill Optimization Project.

The method for predicting the potential environmental effects of the three Alternative Methods is provided in **Section 2.1**. The key assumptions that were relied upon to complete the comparative evaluation of the Alternative Methods are set out in **Section 2.1.3.3**.

The results of the net effects assessment for each Alternative Method are provided in **Sections 3.2** through **3.4**, below.

To complete the assessment, the visual simulations from Viewpoints 1–6 that were prepared as a component of the Visual Assessment (2005) for Year 26 were utilized as the base to generate visual simulations for each Alternative Method at the completion of Phase 5. **Figure 1-3** illustrates the locations of the six viewpoints and **Figure 3-2** to **Figure 3-19** illustrate the visual simulations for each of the Alternative Methods. The four criteria were applied to each simulation to determine the values related to each. **Table 3-1** to **Table 3-5** summarize the Visual Assessment Data for each Alternative Method. The Combined Effect Value (CEV) score was calculated for each Alternative Method to enable the comparative analysis and determine the Preferred Alternative.

Figure 3-1. Locations of Six Viewpoints



3.1 Future Baseline Conditions

The future existing condition corresponds with the completion of Year 26 of the approved Expansion Landfill, which corresponds with the conditions that will exist when construction of the Landfill Optimization Project commences. The height of the approved top of landfill cover is 282 masl (approximately 40 m above existing ground level). Seven-metre-high (7 m) screening berms exist along Nauvoo Road and six-metre-high (6 m) berms exist along Zion Line and along the north end of the east property line. The existing screening berms will remain in their present configuration. The existing trees that are located on the screening berm will have grown to a height of approximately 22 m. Consequently, the total height of the berm and trees will be 29 m along Nauvoo Road and 28 m along Zion Line.

Vehicle access to the landfill will continue to be provided at one entrance location off of Nauvoo Road. The Expansion Landfill side slopes would be approximately four horizontal to one vertical (4H:1V) from the existing grade to approximately 271.5 masl at which point slopes will transition to five percent (5%) for the remaining slope to the highest point.

Site buildings consist of maintenance buildings/equipment compound, landfill office, leachate treatment and gas treatment facilities. The landfill scale, recyclables transfer area and landfill office are located within the site.

One-hundred-metre-wide (100 m) buffer strips have been provided along the north, east and south edges of the existing Expansion Landfill.

A poplar forest that exists in the middle section of the south property and all stockpiles will continue to be located within the site boundaries.

3.2 Alternative Method 1

The assessment of effects for Alternative Method 1 is described below for the environmental criteria and indicators of Visual Landscape and is summarized in **Table 3-2**.

3.2.1 Visual Impact of Facility

3.2.1.1 Predicted Changes in Perceptions of Landscapes and Views

Figure 3-2 to **Figure 3-7** illustrate the simulations of Alternative Method 1 from the six viewpoints as illustrated on **Figure 3-1**. **Table 3-1** provides a summary of the assessment data for Alternative Method 1 and indicates that the CEV for the six viewpoints is three with a high effect, two with a medium effect and one with a low effect. The total CEV for Alternative Method 1 for all six viewpoints is 78.

The methodology that was utilized to calculate the CEV for Alternative Method 1 is described in **Section 2.1**.

The effects assessment of Alternative Method 1 is summarized below in **Table 3-2**.

Table 3-1. Combined Effect Value – Alternative Method 1

Viewpoint No.	Visible Landfill Area (Optimized Landfill above Approved Top of Final Landfill cover of the Expansion Landfill)			Distance from Site		Horizontal Angle of View		Visual Absorption Capability Factor (VACF)		Combined Effect Value 13-20 High 9-12 Moderate ≤8 Low
	Landfill Area Visible (m2)	Perceived Area Index - Area/Distance	Value	Distance to Visible Landfill (m) Incl. Stockpile	Value	Angle of Exposed Views (degrees)	Value	VACF	Value	
1	41688	59.6	**5**	700	**4**	40	**3**	1	**5**	17
2	40413	13.6	**3**	2972	**1**	15	**1**	1	**5**	10
3	41215	25.4	**5**	1621	**2**	20	**2**	1	**5**	14
4	20949	15.1	**3**	1387	**3**	14	**1**	1	**5**	12
5	39471	55.8	**5**	707	**4**	40	**3**	1	**5**	17
6	19259	6.8	**1**	2820	**1**	11	**1**	1	**5**	8
									Total	**78**

3.2.2 Summary

The effects assessment of Alternative Method 1 is summarized below in **Table 3-2**.

Table 3-2. Net Effects Assessment – Alternative Method 1

Evaluation Criteria	Indicator	Key Design Considerations and Assumptions	Potential Effects	Mitigation Measures	Net Effects
Visual Impact of the Facility	Predicted changes in perception of landscape and views	• Elevation of the top of the Alternative Method: 324.5 masl • Increase in height above approved top of waste elevation: 44.5 m • Topographic form: Peak with plateau • Area of landform profile: - North = 21,818.77 m² - East = 36,906.45 m² - South = 21,549.38 m² - West = 36,906.47 m² • Future existing condition corresponds with Year 26 of approved Expansion Landfill	Total CEV values for six viewpoints: • High = 48 • Moderate = 22 • Low = 8 Total CEV = 78	None proposed – Existing screen planting with increase in height and density.	Total CEV values for six viewpoints: • High = 48 • Moderate = 22 • Low = 8 Total CEV = 78

Figure 3-2. Alternate Method 1 – Visual Simulation – Viewpoint 1

Figure 3-3. Alternate Method 1 – Visual Simulation – Viewpoint 2

FIG. 3-3

DWN BY: WAV DATE: AUGUST 21, 2024
CHK BY: MS SCALE:

VIEWPOINT 2

OPTION 1

WARWICK LANDFILL

Landfill Optimization

Expansion Landfill - Approved Top of Final Cover

SCHOLLEN & Company Inc.
30 Wertheim Court, Unit 15
Richmond Hill, Ontario L4B 1B9
T: 289-695-0009
F: 289-695-0010

Figure 3-4. Alternate Method 1 – Visual Simulation – Viewpoint 3

Figure 3-5. Alternate Method 1 – Visual Simulation – Viewpoint 4

Figure 3-6. Alternate Method 1 – Visual Simulation – Viewpoint 5

Figure 3-7. Alternate Method 1 – Visual Simulation – Viewpoint 6

3.3 Alternative Method 2

The assessment of effects for Alternative Method 2 is described below for the environmental criteria and indicators of Visual Landscape and is summarized in **Table 3-4**.

3.3.1 Visual Impact of Facility

3.3.1.1 Predicted Changes in Perceptions of Landscapes and Views

Figure 3-8 to **Figure 3-13** illustrate the simulations of Alternative Method 2 from the six viewpoints as illustrated on **Figure 3-1**. **Table 3-3** provides a summary of the assessment data for Alternative Method 2 and indicates that the CEV for the six viewpoints is three with a high effect, two with a medium effect and one with a low effect. The total CEV for all six viewpoints for Alternative Method 2 is 77.

The methodology that was utilized to calculate the CEV for Alternative Method 2 is set out in **Section 2.1**.

The effects assessment of Alternative Method 2 is summarized below in **Table 3-4**.

Table 3-3. Combined Effect Value – Alternative Method 2

Viewpoint No.	Visible Landfill Area (Optimized Landfill above Approved Top of Final Landfill cover of the Expansion Landfill)			Distance from Site		Horizontal Angle of View		Visual Absorption Capability Factor (VACF)		Combined Effect Value 13-20 High 9-12 Moderate ≤8 Low
	Landfill Area Visible (m2)	Perceived Area Index - Area/Distance	Value	Distance to Visible Landfill (m) Incl. Stockpile	Value	Angle of Exposed Views (degrees)	Value	VACF	Value	
1	41722	59.6	**5**	700	**4**	41	**3**	1	**5**	17
2	37097	12.5	**2**	2972	**1**	15	**1**	1	**5**	9
3	40586	25.0	**5**	1621	**2**	21	**2**	1	**5**	14
4	21000	15.1	**3**	1387	**3**	15	**1**	1	**5**	12
5	40051	56.6	**5**	707	**4**	41	**3**	1	**5**	17
6	19228	6.8	**1**	2820	**1**	11	**1**	1	**5**	8
									Total	**77**

3.3.2 Summary

A summary of the effects assessment of Alternative Method 2 is summarized below in **Table 3-4**.

Table 3-4. Net Effects Assessment – Alternative Method 2

Evaluation Criteria	Indicator	Key Design Considerations and Assumptions	Potential Effects	Mitigation Measures	Net Effects
Visual impact of the facility	Predicted changes in perception of landscape and views	• Elevation of the top of the Alternative Method: 319.0 masl • Increase in height above approved top of waste elevation: 40.0 m • Topographic form: Plateau • Area of landform profile: - North = 21,403.33 m² - East = 34,977.21 m² - South = 21,042.97 m² - West = 34,977.17 m² • Future existing condition corresponds with Year 26 of approved Expansion Landfill	• Total CEV values for six viewpoints: • High = 48 • Moderate = 21 • Low = 8 Total CEV = 77	• None proposed – Existing screen planting with increase in height and density	• Total CEV values for six viewpoints: • High = 48 • Moderate = 21 • Low = 8 Total CEV = 77

Figure 3-8. Alternate Method 2 – Visual Simulation – Viewpoint 1

Figure 3-9. Alternate Method 2 – Visual Simulation – Viewpoint 2

Figure 3-10. Alternate Method 2 – Visual Simulation – Viewpoint 3

Figure 3-11. Alternate Method 2 – Visual Simulation – Viewpoint 4

Figure 3-12. Alternate Method 2 – Visual Simulation – Viewpoint 5

Figure 3-13. Alternate Method 2 – Visual Simulation – Viewpoint 6

3.4 Alternative Method 3

The assessment of effects for Alternative Method 3 is described below for the environmental criteria and indicators of Visual Landscape and is summarized in **Table 3-6**.

3.4.1 Visual Impact of Facility

3.4.1.1 Predicted Changes in Perceptions of Landscapes and Views

Figure 3-14 to **Figure 3-19** illustrate the simulations of Alternative Method 3 from the six viewpoints as illustrated on **Figure 3-1**. **Table 3-5** provides a summary of the assessment data for Alternative Method 3 and indicates that the CEV for the six viewpoints is four with a high effect, two with a medium effect and none with a low effect. The total CEV for all six viewpoints for Alternative Method 3 is 81.

The methodology that was utilized to calculate the CEV for Alternative Method 3 is set out in **Section 2.1**.

The effects assessment of Alternative Method 3 is summarized below in **Table 3-6**.

Table 3-5. Combined Effect Value – Alternative Method 3

Viewpoint No.	Visible Landfill Area (Optimized Landfill above Approved Top of Final Landfill cover of the Expansion Landfill)			Distance from Site		Horizontal Angle of View		Visual Absorption Capability Factor (VACF)		Combined Effect Value 13-20 High 9-12 Moderate ≤8 Low
	Landfill Area Visible (m2)	Perceived Area Index - Area/Distance	Value	Distance to Visible Landfill (m) Incl. Stockpile	Value	Angle of Exposed Views (degrees)	Value	VACF	Value	
1	63950	91.4	**5**	700	**4**	41	**3**	1	**5**	17
2	57893	19.5	**4**	2972	**1**	15	**1**	1	**5**	11
3	61476	37.9	**5**	1621	**2**	21	**2**	1	**5**	14
4	29546	21.3	**4**	1387	**3**	15	**1**	1	**5**	13
5	60574	85.7	**5**	707	**4**	41	**3**	1	**5**	17
6	26943	9.6	**2**	2820	**1**	11	**1**	1	**5**	9
									Total	**81**

3.4.2 Summary

A summary of the effects assessment of Alternative Method 3 is summarized below in **Table 3-6**.

Table 3-6. Net Effects Assessment – Alternative Method 3

Evaluation Criteria	Indicator	Key Design Considerations and Assumptions	Potential Effects	Mitigation Measures	Net Effects
Visual impact of the facility	Predicted changes in perception of landscape and views	• Elevation of the top of the Alternative Method: 324.5 masl • Increase in height above approved top of waste elevation: 44.5 m • Topographic form: Peak with plateau • Area of landform profile: - North = 29,337.17 m² - East = 59,040.93 m² - South = 29,283.05 m² - West = 59,043.98 m² • Future existing condition corresponds with Year 26 of approved Expansion Landfill	• Total CEV values for six viewpoints: • High = 61 • Moderate = 20 • Low = 0 Total CEV = 81	• None proposed – Existing screen planting with increase in height and density	• Total CEV values for six viewpoints: • High = 61 • Moderate = 20 • Low = 0 Total CEV = 81

Figure 3-14. Alternate Method 3 – Visual Simulation – Viewpoint 1

Figure 3-15. Alternate Method 3 – Visual Simulation – Viewpoint 2

Figure 3-16. Alternate Method 3 – Visual Simulation – Viewpoint 3

Figure 3-17. Alternate Method 3 – Visual Simulation – Viewpoint 4

Figure 3-18. Alternate Method 3 – Visual Simulation – Viewpoint 5

Figure 3-19. Alternate Method 3 – Visual Simulation – Viewpoint 6

4 Comparative Evaluation of Net Effects and Identification of the Preferred Alternative

The comparative evaluation of the net effects of each Alternative Method and the identification of a Preferred Alternative were carried out in accordance with the methods described in **Section 2.2**. The three Alternative Methods were comparatively assessed and evaluated using the criteria and indicators to determine the Preferred Alternative based on the visual simulations and evaluation method as described in **Section 2.1**. The differences in the potential environmental effects remaining following the implementation of potential mitigation/management measures (i.e., net effects) were used to identify and compare each Alternative Method. The comparative evaluation of the Alternative Methods for Visual Landscape is provided in **Table 4-1**, below.

Alternative Method 2 emerged as the Preferred Alternative based on the fact that Alternative Method 2 was determined to have the lowest total CEV (77) in comparison to the Alternative Method 1 (total CEV of 78) and Alternative 3 (total CEV of 81). Consequently, Alternative Method 2 will result in the smallest predicted change to perception of landscape and views for the six viewpoints within the defined viewshed for the Landfill Optimization Project.

Table 4-1. Comparative Evaluation of the Net Effects of the Alternative Methods for Visual Landscape

Evaluation Criteria	Indicator	Net Effects of Alternative Methods		
		Alternative Method 1	Alternative Method 2	Alternative Method 3
Visual Impact of Facility	Predicted changes in perceptions of landscapes and views	CEV of 78 for six viewpoints. **Conclusion: Not Preferred**	CEV of 77 for six viewpoints. **Conclusion: Preferred**	CEV of 81 for six viewpoints. **Conclusion: Not Preferred**
	Criteria Rating & Rationale	***Alternative Method 2 is preferred over Alternative Methods 1 and 3 for since the CEV for the six viewpoints a simulated and assessed is lower than the CEV for Alternative Methods 1 and 3.***		
Preferred Alternative: Alternative Method 2 is preferred since it will result in the lowest predicted change in perceptions of landscapes and views based on the six viewpoint simulations and assessment calculations.				

5 Effects Assessment of the Preferred Alternative

Figure 3-8 to **Figure 3-13** illustrate the simulations of Alternative Method 2 from the six viewpoints as illustrated on **Figure 3-1**. **Table 3-3** and **Table 3-4** provide a summary of the assessment data for Alternative Method 2 and indicate that the CEV for the six viewpoints is three with a CEV of high, two with a CEV of moderate and one with a CEV of low. The total CEV for all six viewpoints for Alternative Method 2 is 77. Based on this assessment, Alternative Method 2 will result in the least significant change in perceptions landscapes and views for the six viewpoints.

6 Comparison of the Preferred Alternative against the 'Do Nothing Alternative'

The effects of the Preferred Alternative were compared against the predicted effects of the currently approved Expansion Landfill based on similar environmental criteria and indicators, with the understanding that the criteria and indicators used in the current effects assessment may differ from those used for the effects assessment of the Expansion Landfill. Consistent with the approved Work Plan, the Visual Landscape effects assessment compared the outcome from the original EA at the completion of Year 26 with the Preferred Alternative for the Landfill Optimization Project at the completion of Phase 5. The effects were compared against each other in terms of magnitude, extent, and duration below. The advantages and disadvantages of the Preferred Alternative compared to the 'Do Nothing Alternative' were identified.

6.1 Effects of the 'Do Nothing' Alternative

The 'Do Nothing Alternative' is the Expansion Landfill at completion of Year 26 as described in the 2005 Visual Impact Assessment. **Figure 6-1** and **Figure 6-2** to **Figure 6-5** illustrate the 'Do Nothing' Alternative in plan and profile, respectively. The approved top of landfill cover is at an elevation of 282.00 masl, approximately 42 m above average ground level. The side slopes are to be graded at approximately four horizontal to one vertical (4H:1V) from the existing grade to approximately 271.5 masl, at which point slopes will transition to five percent (5%) for the remaining slope to the highest point. The topographic form of the landform of the 'Do Nothing' Alternative is described as a flattened mound.

The net effects of the 'Do Nothing Alternative' were calculated as a component of the 2005 Visual Impact Assessment. The Visual Assessment Data for the 'Do Nothing' Alternative derived from Table 7 of the 2005 Visual Impact Assessment is provided in Appendix B-1. The data was calculated with mitigation in place.

A summary of the net effects of the 'Do Nothing Alternative' derived from Table 7 of the Visual Assessment (2005) is provided below. A total of 109 receptors were identified and assessed utilizing the methodology set out in Section 2.1.2.

- Number of high effect receptors = 39 (receptor numbers 000 to 042 and receptor number 092)
- Number of moderate effect receptors = 36 (receptor numbers 043 to 059, 061, 064 to 075, 084 to 091, 097, 102 and 103).

It is acknowledged that changes in the visual landscape that will occur between 2031 and 2043 (within the duration of operation of the Landfill Optimization Project) would reduce the visual prominence of the 'Do Nothing Alternative'.

Figure 6-1. 'Do Nothing Alternative' – Key Plan – Profile Elevations Locations

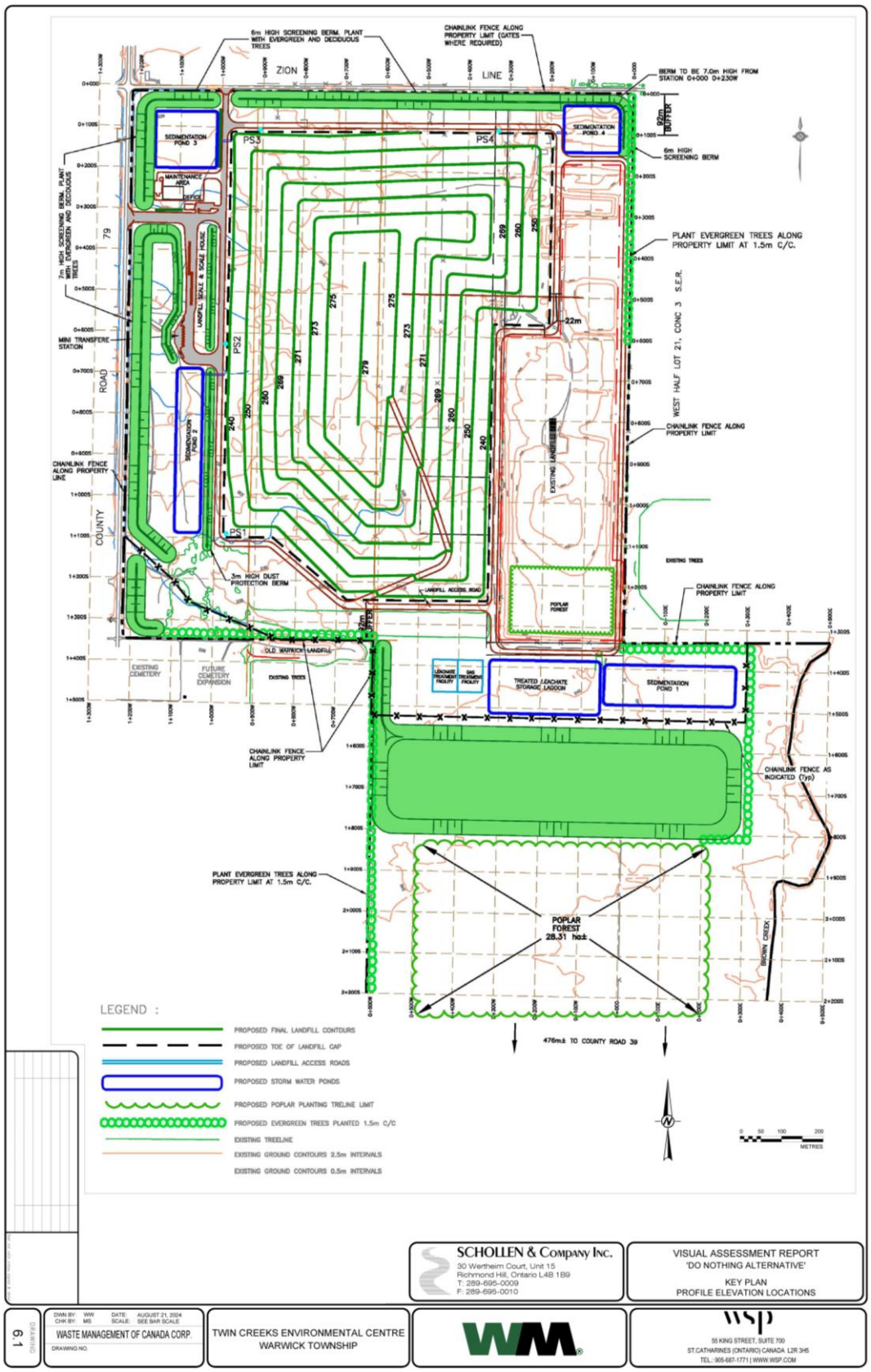


Figure 6-2. 'Do Nothing Alternative' – Profile Elevation North – Approved Landfill Expansion (Year 26)

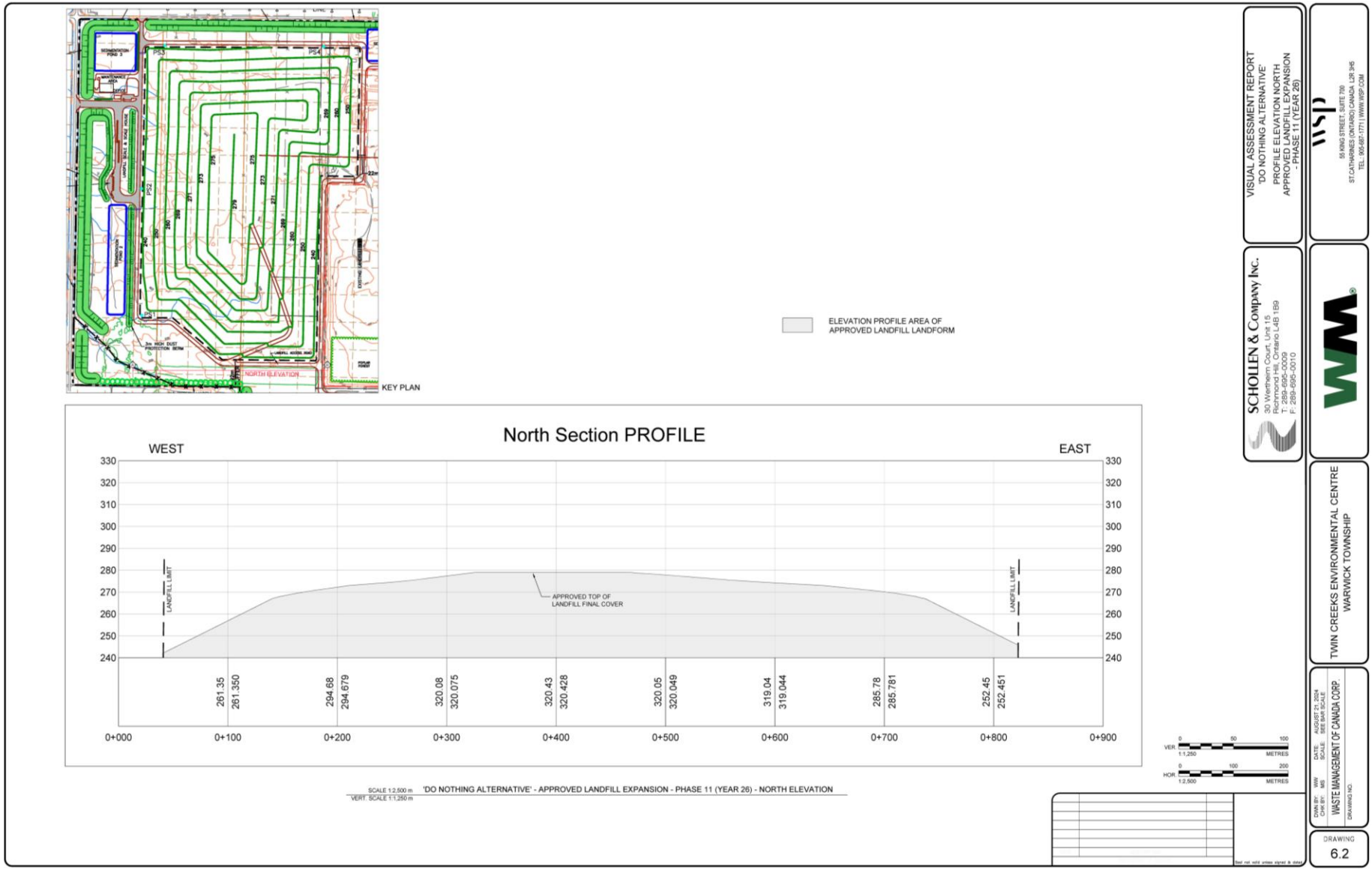


Figure 6-3. 'Do Nothing Alternative' – Profile Elevation East – Approved Landfill Expansion (Year 26)

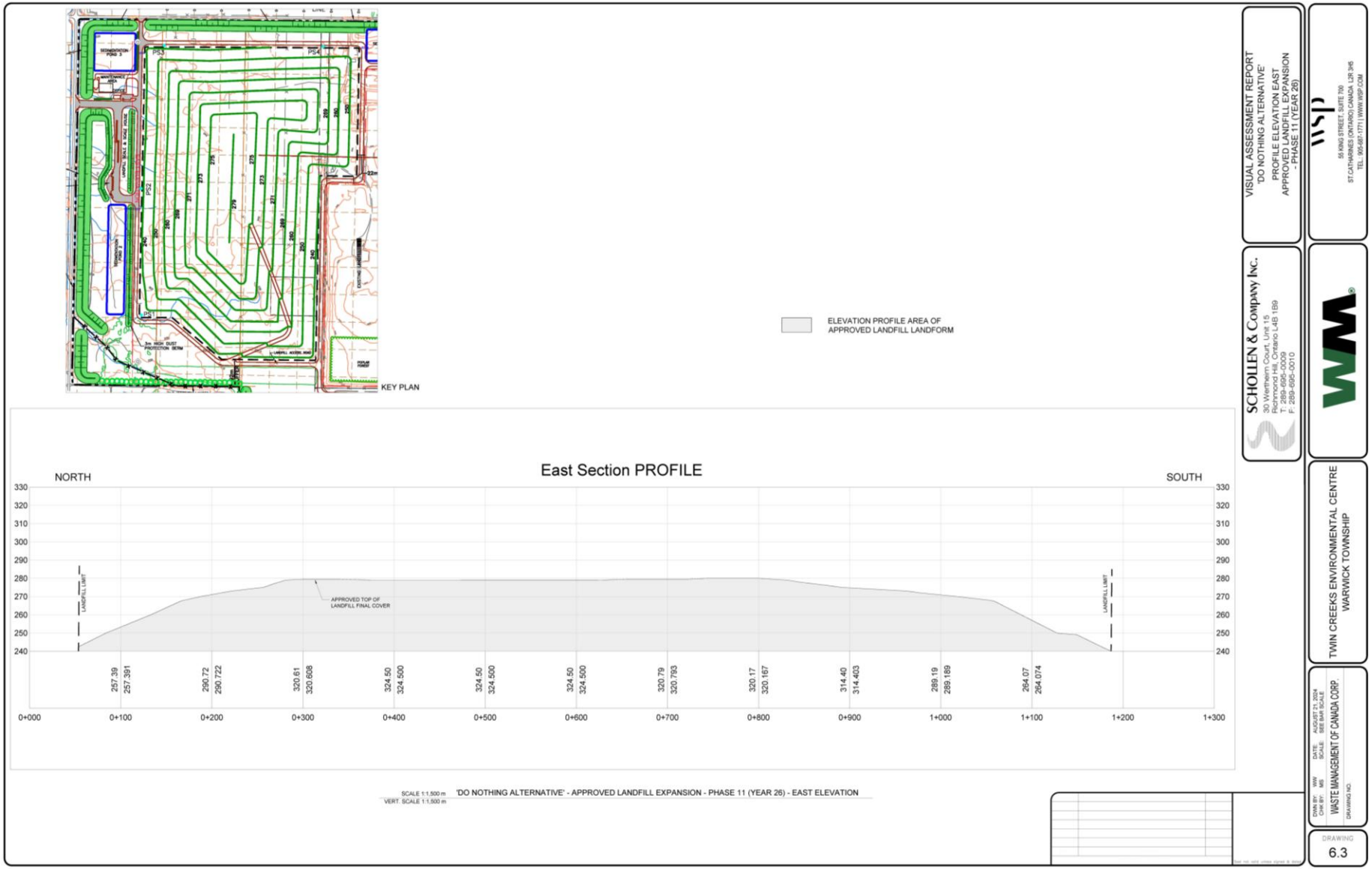


Figure 6-4. 'Do Nothing Alternative' – Profile Elevation South – Approved Landfill Expansion(Year 26)

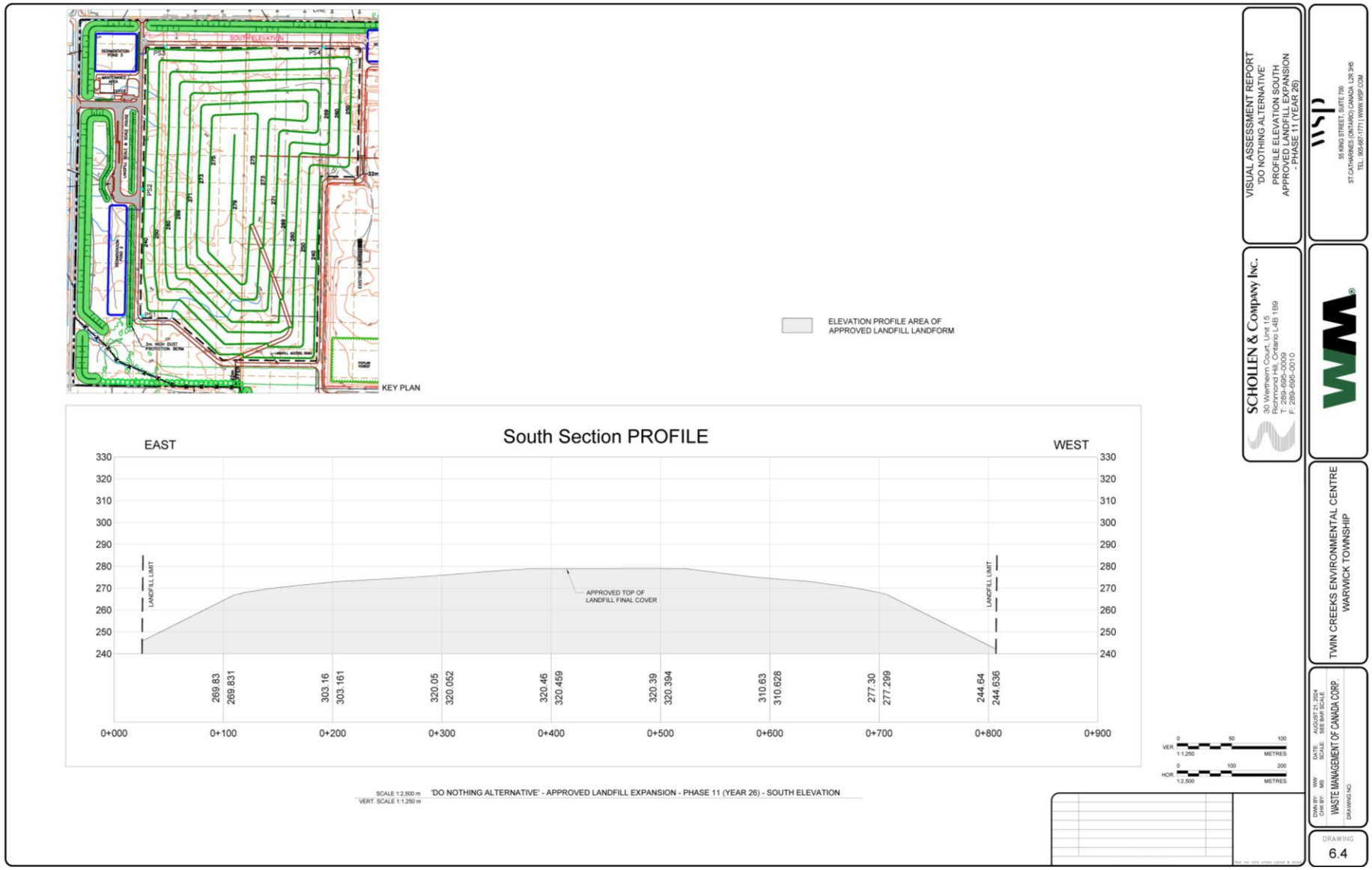
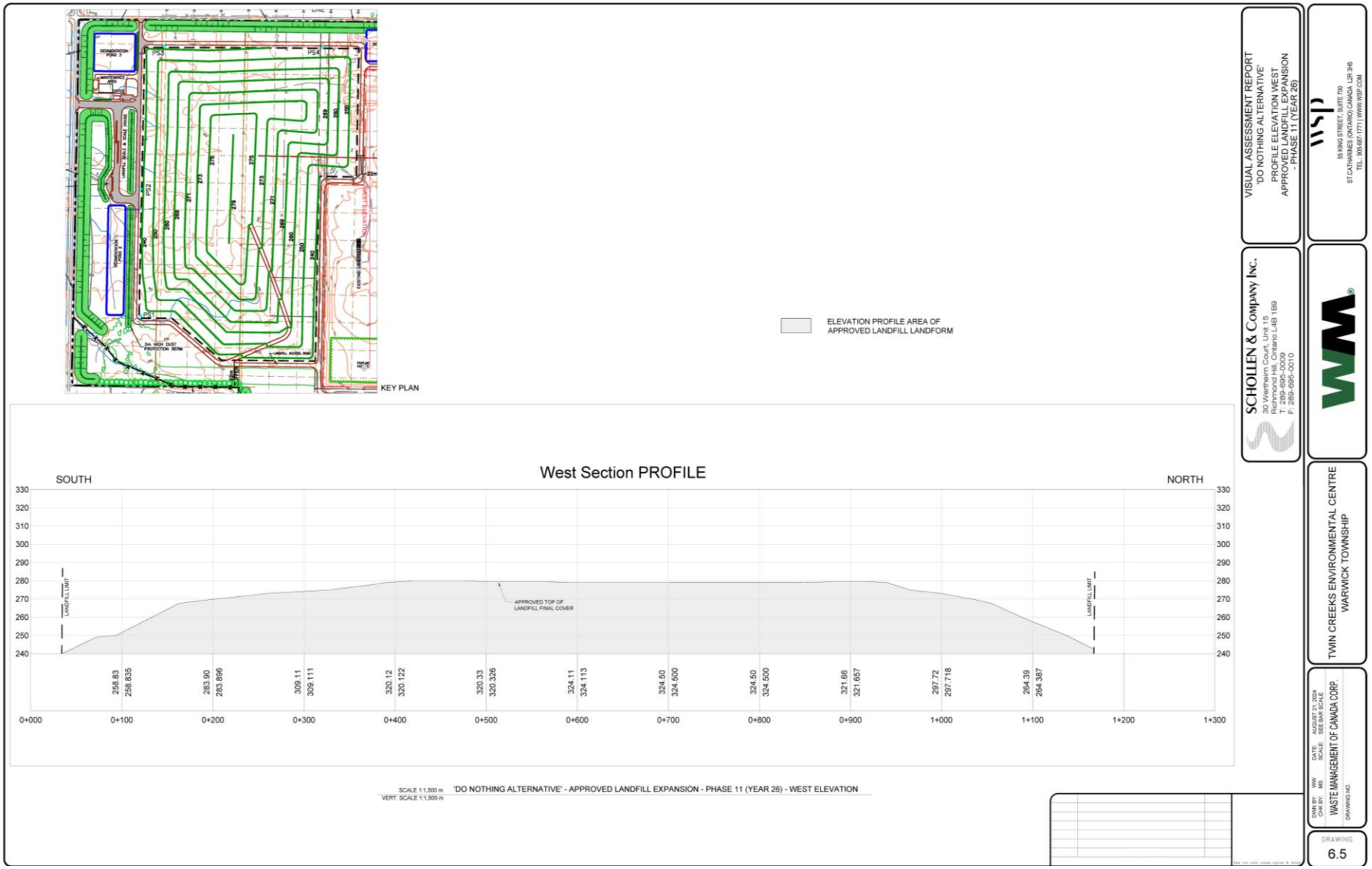


Figure 6-5. 'Do Nothing Alternative' – Profile Elevation West – Approved Landfill Expansion(Year 26)



6.2 Comparison of the Preferred Alternative against the 'Do Nothing Alternative'

The net effects of the Preferred Alternative (Alternative Method 2) are set out in **Table 6-1**and are illustrated on **Figure 6-6,** as well as being summarized below.

- Number of high effect receptors = 23 (receptor numbers 002 to 009, 011, 012, 014, 015, 023, 026 to 030, 041 to 043, 064 and 112).
- Number of moderate effect receptors = 52 (receptor numbers 010, 016 to 022, 024, 025, 031 to 033, 035, 044, 047 to 049, 051,052, 058 to 063, 066, 067, 071 to 076, 079,088 to 090, 098, 102 and 103).

Table 6-1 provides a comparison of the CEVs for the 'Do Nothing Alternative' and Preferred Alternative for each receptor.

The difference in the number of receptors that were determined to have a high or a moderate effect in comparison to the 'Do Nothing Alternative' is attributed to the following:

- Receptors 000 to 001 – For the Preferred Alternative, the increase in the height and density of the trees on the north screening berm obstruct the entire view.
- Receptor 010 – For the Preferred Alternative, the trees that are located on the lot south of receptor obstruct the view.
- Receptors 016 to 022 – For the Preferred Alternative, the Horizontal Angle of View dimensions are much smaller, since the width of the Preferred Alternative above the approved top of final landfill cover of the Expansion Landfill is smaller.
- Receptors 024 to 025 – For the Preferred Alternative, the Horizontal Angle of View dimensions are much smaller, since the width of the Preferred Alternative above the approved top of final landfill cover of the Expansion Landfill is smaller.
- Receptor 034 – For the Preferred Alternative, the increase in the height and density of the trees on the north screening berm obstruct the entire view.
- Receptors 031 to 035 – For the Preferred Alternative, the trees that are located on the lot west of these receptors obstruct the view.

There are two receptors that have been determined to have a high effect that were not assessed a high effect ranking in the Visual Assessment (2005):

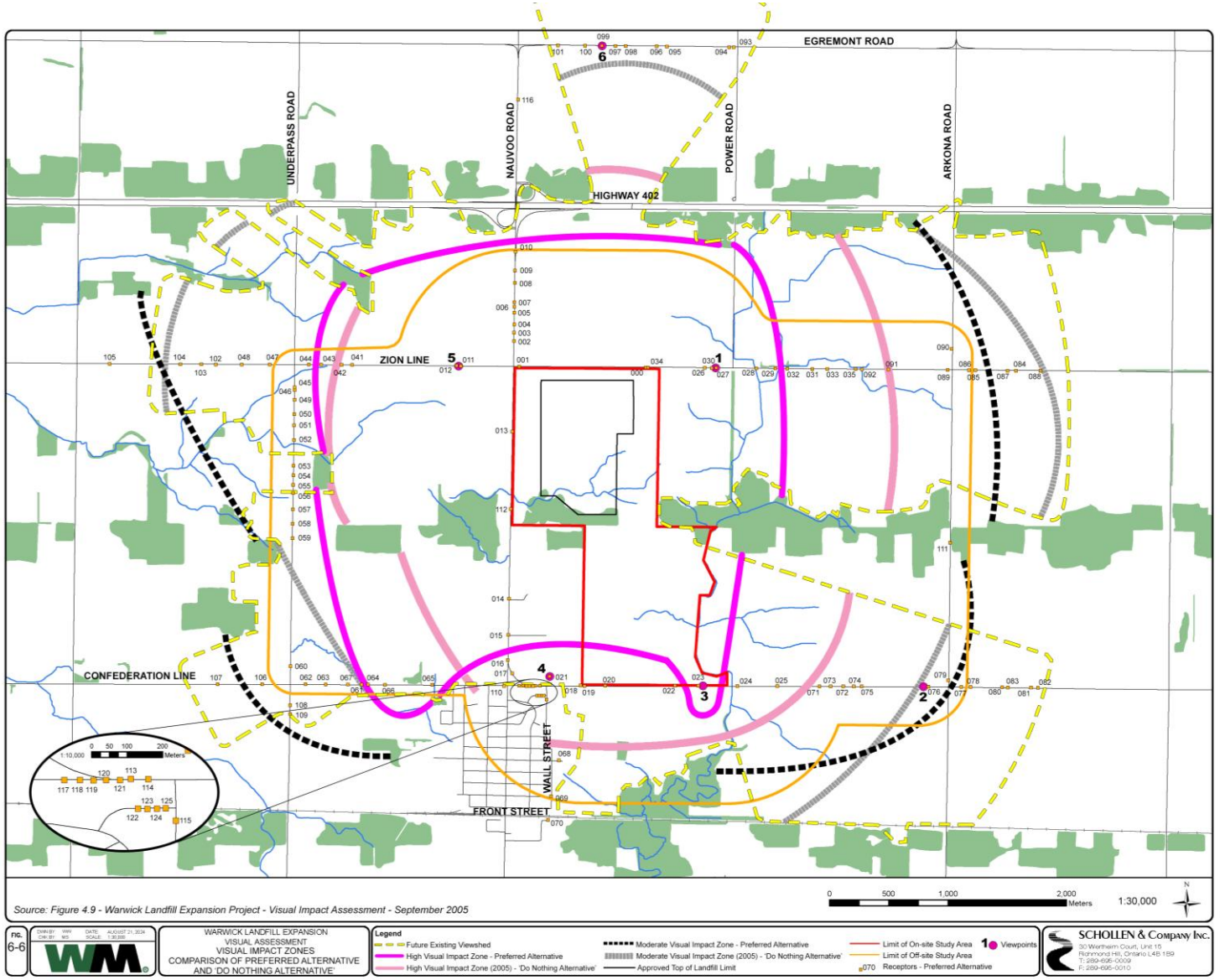
- Receptor 064 – The extent of the Visible Landfill Area increased for the Preferred Alternative.
- Receptor 112 – This receptor was not identified/assessed in the Visual Assessment (2005) but it was assessed in the evaluation of the Preferred Alternative.

Table 6-1. Comparison of Combined Effect Values for Receptors - 'Do Nothing Alternative' and Preferred Alternative

Receptor No.	'Do Nothing Alternative' Combined Effect Value 13-20 High 9-12 Moderate ≤8 Low	Preferred Alternative Combined Effect Value 13-20 High 9-12 Moderate ≤8 Low
000	19	no view
001	19	no view
002	19	18
003	19	18
004	19	18
005	18	14
006	18	13
007	17	13
008	16	16
009	16	13
010	15	12
011	18	17
012	18	17
013	20	no view
014	15	13
015	14	13
016	13	12
017	13	11
018	14	11
019	14	12
020	14	12
021	15	12
022	14	12
023	15	13
024	15	10
025	14	11
026	19	17
027	18	17
028	15	16
029	15	15
030	18	17
031	14	10
032	15	12
033	13	11
034	19	no view
035	13	10
041	13	14
042	13	14
043	12	14
044	12	11
045	12	no view
046	12	no view
047	10	11
048	10	11
049	12	10
050	12	no view
051	12	10
052	11	10
053	no view	no view
054	no view	no view
055	no view	no view
056	10	no view
057	11	no view
058	11	10
059	9	10
060	8	11
061	10	11
062	8	11
063	8	11
064	10	13
065	10	no view
066	10	12
067	8	9
068	10	no view
069	10	no view
070	10	no view
071	9	11
072	10	9
073	10	9
074	10	11
075	10	9
076	8	9
077	8	8
078	8	8
079	8	9
080	8	8
081	8	8
082	8	no view
083	8	8
084	10	8
085	10	no view
086	10	no view
087	9	8
088	9	9
089	10	9
090	10	10
091	11	no view
092	13	no view
093	8	8
094	8	8
095	8	8
096	8	8
097	9	8
098	8	9
099	8	8
100	8	8
101	8	8
102	10	10
103	9	10
104	8	10
105	no view	no view
106	8	no view
107	8	no view
108	8	11
109	8	9
110 *		9
111 *		no view
112 *		18
113 *		11
114 *		10
115 *		10
116 *		no view
117 *		10
118 *		10
119 *		10
120 *		9
121 *		no view
122 *		no view
123 *		no view
124 *		no view
125 *		no view

* Additional receptors for Preferred Alternative assessment

Figure 6-6. Visual Impact Zones – Comparison of Preferred Alternative and 'Do Nothing Alternative'



6.3 Advantages and Disadvantages of the Preferred Alternative

The differences in net effects between the Preferred Alternative and the 'Do Nothing Alternative' were used to determine the advantages and disadvantages of the Preferred Alternative. The advantages and disadvantages of the Preferred Alternative are listed in **Table 6-2**.

Table 6-2. Advantages and Disadvantages of the Preferred Alternative

Evaluation Criteria	Advantages	Disadvantages
Visual Impact of Facility	• The Preferred Alternative will result in 17 fewer 'high' effect receptors.	• The Preferred Alternative will result in an increase of 16 'moderate' effect receptors.

In comparison to the 'Do Nothing' Alternative, the Preferred Alternative will result in 17 fewer 'high' effect receptors but will result in an increase in number of 'moderate' effect receptors by 16. On this basis, the advantages of the Preferred Alternative outweigh the disadvantages. This outcome is not due to the characteristics of the Project itself but is attributable to changes in the landscape that have occurred over the past 20 years.

7 Commitments and Monitoring

To confirm that the commitments related to Visual Landscape are carried out, and that the existing mitigation measures that are in place will address the predicted effects for Visual Landscape, monitoring is proposed for the Project.

The commitments associated with Visual Landscape are listed in **Section 7.1**. The proposed environmental effects monitoring is provided in **Section 7.2**.

7.1 Visual Landscape Commitments

The continuation of the program for monitoring of the existing vegetation on the screening berm is recommended to ensure that the existing trees are healthy and perform the required visual screening function. Inspections should be undertaken annually (late spring) to assess the health of the trees and determine if remedial action is required to ensure the long-term growth and sustainability of the trees. Should the monitoring determine that trees have failed, these dead trees will be removed and replaced to ensure that the visual screening function is maintained.

7.2 Environmental Effects Monitoring for Visual Landscape

Monitoring plans are developed as part of the detailed effects assessments carried out for the Preferred Alternative to confirm:

- the net effects are as predicted;
- unanticipated negative effects are addressed; and
- the effectiveness of the existing visual mitigation measures.

Monitoring will be implemented to assess the health of the existing trees that are located on the perimeter berms as set out in Table 7-1.

Table 7-1. Visual Landscape Monitoring

Evaluation Criteria	Potential Effect	Commitment for Mitigation	Commitment for Monitoring	Compliance Monitoring
Visual Impact of Facility	Changes in perceptions of landscapes and views	• No mitigation is proposed. Existing screen plantings will mature.	• Annual inspections (late spring) to assess health of existing trees on screening berm.	• No compliance monitoring required.

8 References

Baker Turner Inc.

2005 Visual Impact Assessment Warwick Landfill Expansion Environmental Assessment Waste Management of Canada Corporation

Schollen & Company Inc.

2025 Visual Landscape Existing Conditions Report -
Twin Creeks Environmental Centre Landfill Optimization Project Environmental Assessment WM Canada
Watford, Ontario

WSP Canada Inc.

2025 Conceptual Design Report - Twin Creeks Environmental Centre Landfill Optimization Project Environmental Assessment
Waste Management of Canada Corporation
Watford, Ontario

A

Appendix A – Figures

Figure A-1 Receptors and Visual Simulation Viewpoints – (Visual Assessment 2005)

Figure A-2 Receptors and Visual Assessment Viewpoints – 3 Alternative Methods

Figure A-3 Warwick Landfill Expansion Visual Assessment Year 26 (Complete) – Visual Impact Zones Figure 4.9 – (Visual Assessment 2005)

Figure A-1: Receptors and Visual Simulation Viewpoints – (Visual Assessment 2005)

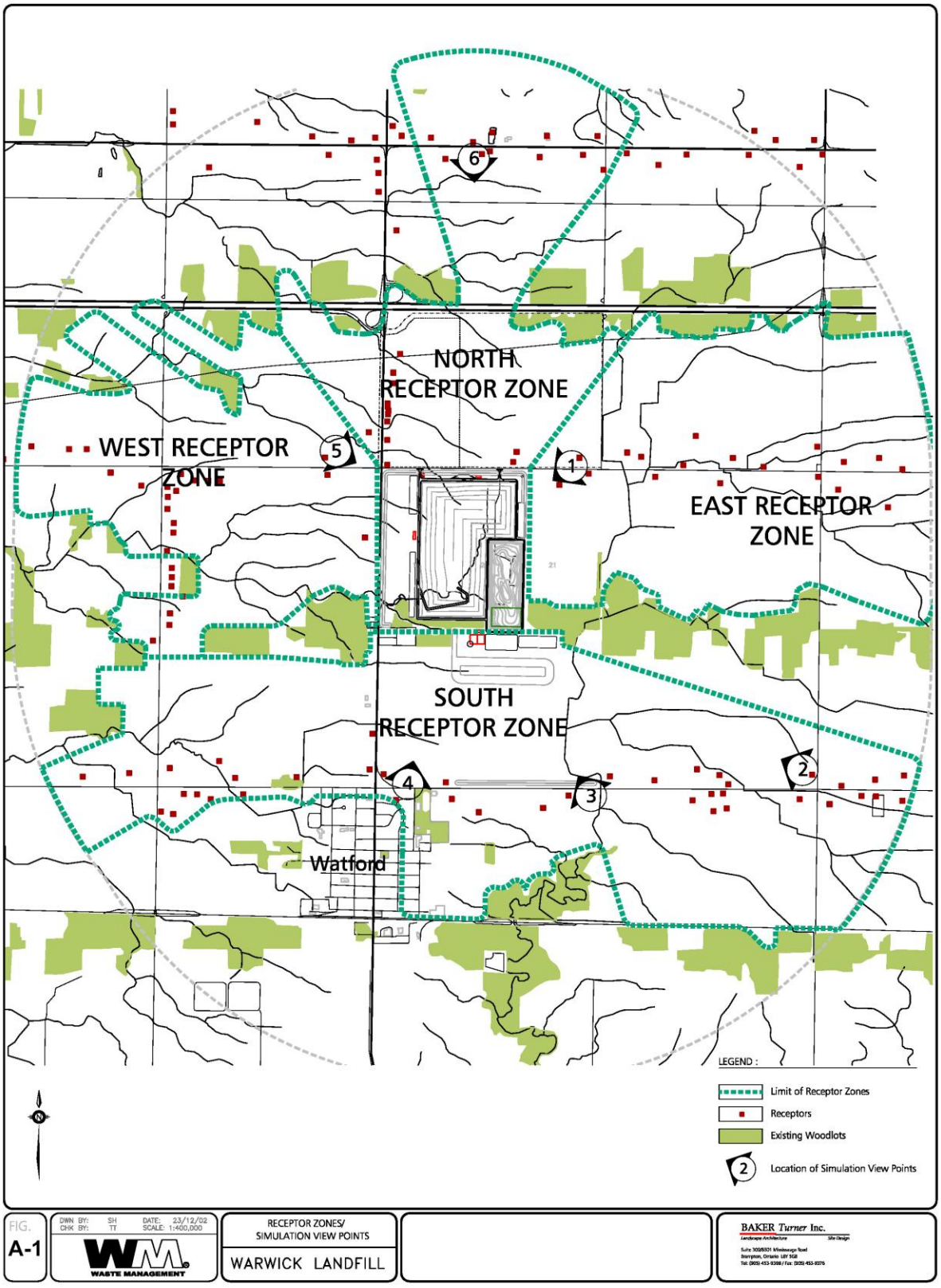


Figure A-2: Receptors and Visual Simulation Viewpoints – 3 Alternative Methods

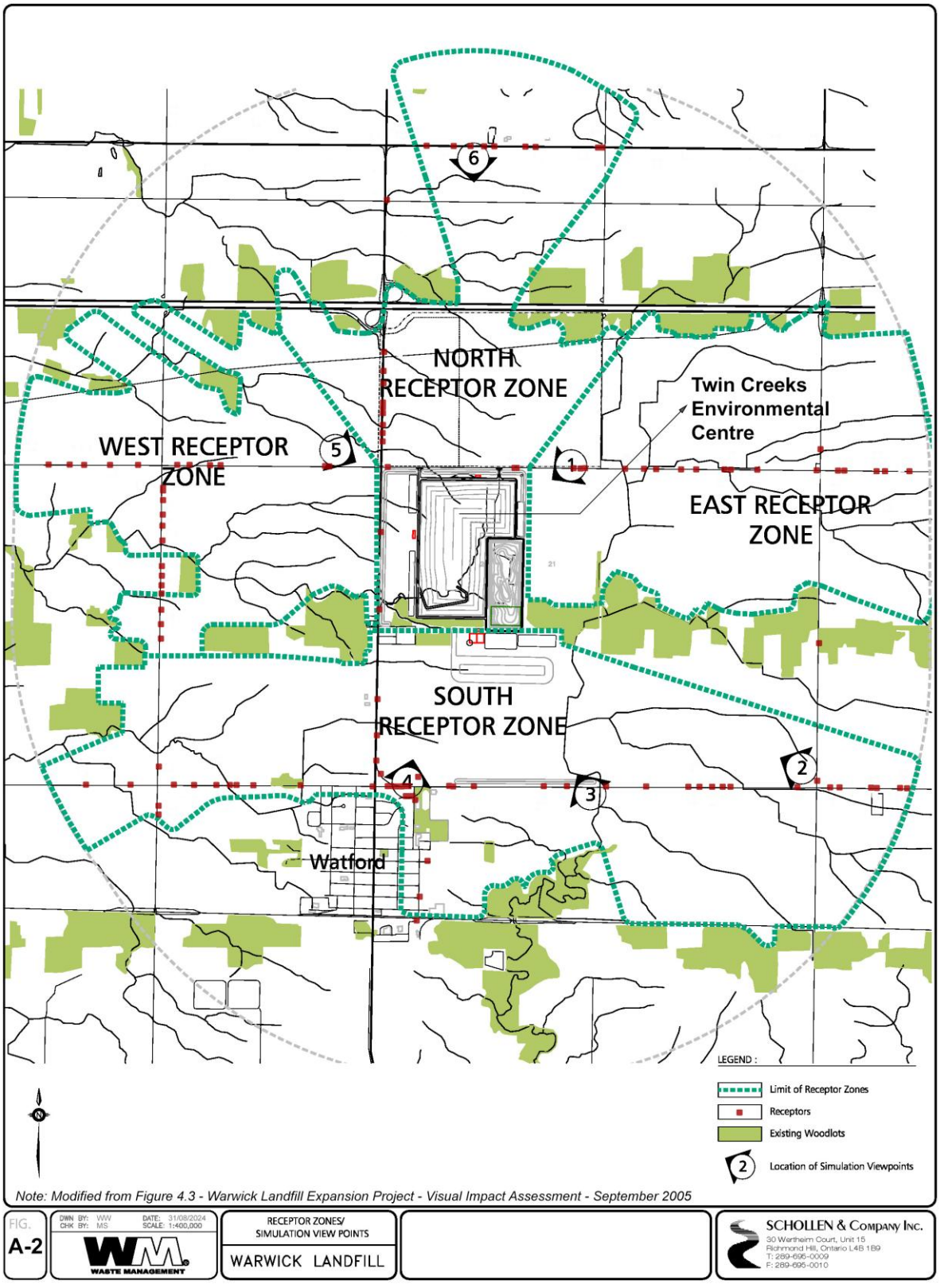
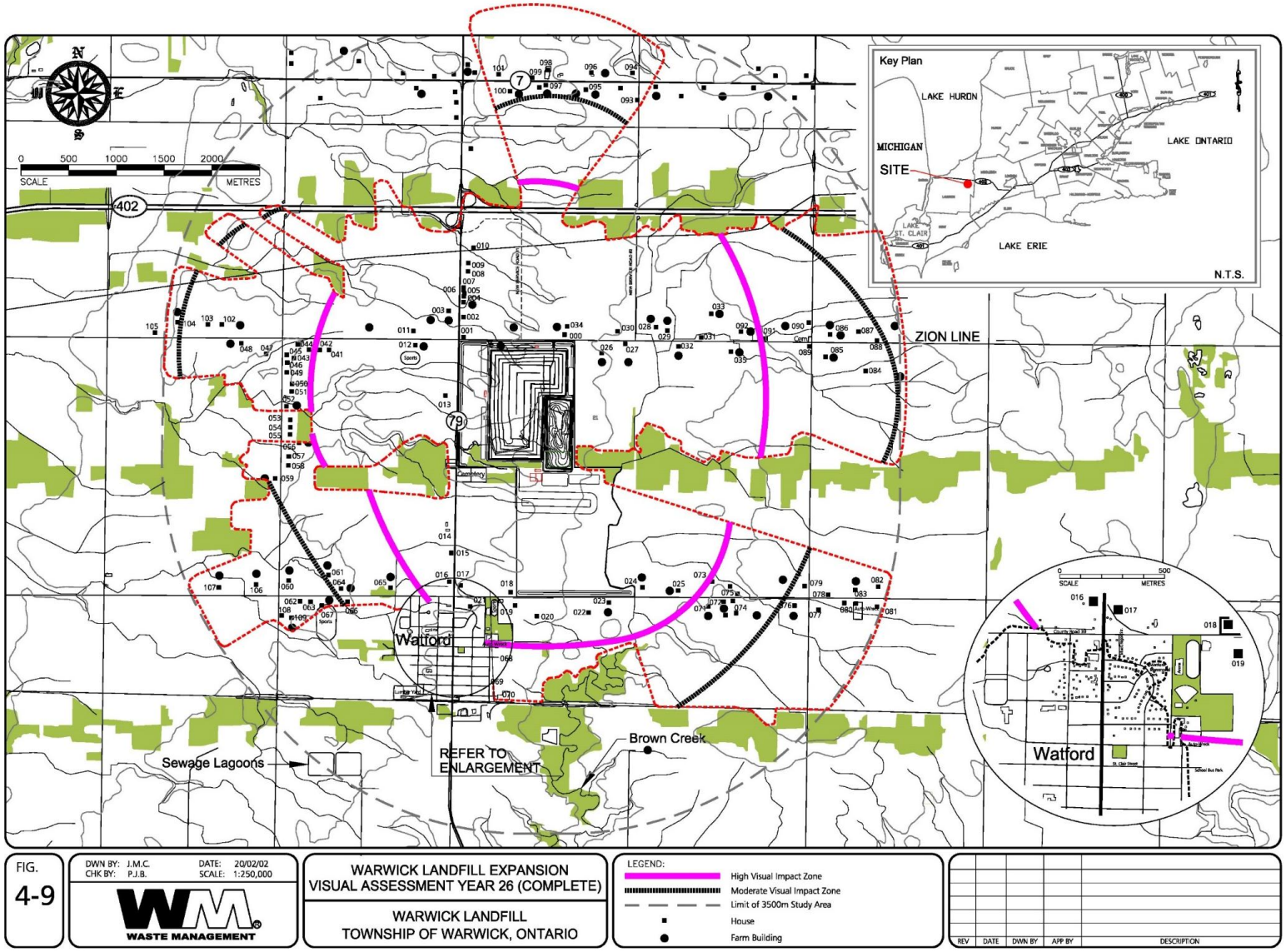


Figure A-3: Warwick Landfill Expansion Visual Assessment Year 26 (Complete) – Visual Impact Zones Figure 4.9 – (Visual Assessment 2005)



B

Appendix B – Tables

Table B-1 Visual Assessment Data – Table 7 – (Visual Assessment 2005)

Table B-2 Visual Assessment Data – Preferred Alternative

Table B-1: Visual Assessment Data – Table 7 – (Visual Assessment 2005)

TABLE #7
VISUAL ASSESSMENT DATA - YEAR 26, PHASE 11 (REFER TO FIGURE 4-9)
(BASED ON FINAL D.P. #8 SEPTEMBER 2005)

Receptor No.	Area			Angle		Distance		Visual Absorption Capability Factor		Total Visual Effect Value 13-20 High 9-12 Moderate ≤8 Low
	Landfill Area Visible (m2)	Perceived Area Index - Area/Distance	Value	Angle of Exposed Views (degrees)	Value	Distance to Visible Landfill (m) Incl. Stockpile	Value	VACF	Value	
000	5702	33	5	83	4	174	5	1	5	19
001	15045	47	5	70	4	323	5	1	5	19
002	18016	40	5	61	4	455	5	1	5	19
003	21436	40	5	56	4	535	5	1	5	19
004	21392	36	5	55	4	587	5	1	5	19
005	21002	33	5	53	4	638	4	1	5	18
006	21203	32	5	52	4	662	4	1	5	18
007	21357	30	5	50	3	718	4	1	5	17
008	22349	26	5	44	3	864	3	1	5	16
009	23095	24	5	42	3	950	3	1	5	16
010	22440	21	4	38	3	1091	3	1	5	15
011	25333	33	5	52	4	767	4	1	5	18
012	23994	30	5	55	4	797	4	1	5	18
013	27030	58	5	100	5	469	5	1	5	20
014	11770	14	3	72.6	4	862	3	1	5	15
015	12144	11	2	59.5	4	1061	3	1	5	14
016	11880	9	2	48.0	3	1351	3	1	5	13
017	11800	9	2	46.9	3	1359	3	1	5	13
018	11180	11	2	59.1	4	1021	3	1	5	14
019	10788	10	2	56.9	4	1084	3	1	5	14
020	11754	10	2	53.8	4	1191	3	1	5	14
021*	13869	15	3	73.5	4	956	3	1	5	15
022	14122	12	2	64.7	4	1199	3	1	5	14

* Represents receptors along north east fringe of the Village of Watford

Receptor No.	Area			Angle		Distance		Visual Absorption Capability Factor		Total Visual Effect Value 13-20 High 9-12 Moderate ≤8 Low
	Landfill Area Visible (m2)	Perceived Area Index - Area/Distance	Value	Angle of Exposed Views (degrees)	Value	Distance to Visible Landfill (m) Incl. Stockpile	Value	VACF	Value	
023	15445	13	3	69.0	4	1184	3	1	5	15
024	18710	15	3	72.3	4	1265	3	1	5	15
025	20610	13	3	65.4	4	1574	2	1	5	14
026	12974	35	5	63	4	372	5	1	5	19
027	18120	29	5	51	4	624	4	1	5	18
028	22285	23	4	41	3	976	3	1	5	15
029	22560	21	4	39	3	1082	3	1	5	15
030	17346	27	5	51	4	654	4	1	5	18
031	24961	18	3	34	3	1423	3	1	5	14
032	22871	19	4	38	3	1179	3	1	5	15
033	25211	16	3	31	3	1570	2	1	5	13
034	9898	38	5	70	4	259	5	1	5	19
035	25518	15	3	31	3	1726	2	1	5	13
041	29822	18	3	32	3	1701	2	1	5	13
042	30245	17	3	31	3	1799	2	1	5	13
043	30318	16	3	29	2	1911	2	1	5	12
044	29837	15	3	27	2	2029	2	1	5	12
045	29812	14	3	27	2	2144	2	1	5	12
046	30653	14	3	27	2	2135	2	1	5	12
047	30568	13	2	24	2	2361	1	1	5	10
048	31294	12	2	22	2	2622	1	1	5	10
049	30024	14	3	27	2	2137	2	1	5	12
050	28838	14	3	28	2	2082	2	1	5	12
051	28192	14	3	28	2	2084	2	1	5	12
052	26100	12	2	27	2	2135	2	1	5	11
053						no view				
054						no view				
055						no view				

Receptor No.	Area			Angle		Distance		Visual Absorption Capability Factor		Total Visual Effect Value 13-20 High 9-12 Moderate ≤8 Low
	Landfill Area Visible (m2)	Perceived Area Index - Area/Distance	Value	Angle of Exposed Views (degrees)	Value	Distance to Visible Landfill (m) Incl. Stockpile	Value	VACF	Value	
056	23730	12	**2**	4	**1**	1996	**2**	1	**5**	**10**
057	23103	11	**2**	20	**2**	2099	**2**	1	**5**	**11**
058	22936	11	**2**	18	**2**	2105	**2**	1	**5**	**11**
059	24011	11	**2**	14	**1**	2252	**1**	1	**5**	**9**
060	6600	3	**1**	15.0	**1**	2457	**1**	1	**5**	**8**
061	4700	2	**1**	18.3	**2**	2076	**2**	1	**5**	**10**
062	7220	3	**1**	15.0	**1**	2480	**1**	1	**5**	**8**
063	7027	3	**1**	15.0	**1**	2396	**1**	1	**5**	**8**
064	5900	3	**1**	18.5	**2**	2061	**2**	1	**5**	**10**
065	5500	3	**1**	18.4	**2**	1700	**2**	1	**5**	**10**
066	6700	3	**1**	18.1	**2**	2106	**2**	1	**5**	**10**
067	6200	3	**1**	15.0	**1**	2331	**1**	1	**5**	**8**
068	12642	6	**1**	29.3	**2**	1972	**2**	1	**5**	**10**
069	12239	5	**1**	33.5	**3**	2243	**1**	1	**5**	**10**
070	11869	5	**1**	41.4	**3**	2217	**1**	1	**5**	**10**
071	8443	4	**1**	19.7	**2**	1931	**2**	1	**4**	**9**
072	9320	5	**1**	20.1	**2**	2037	**2**	1	**5**	**10**
073	9470	5	**1**	23.2	**2**	1832	**2**	1	**5**	**10**
074	10697	5	**1**	21.2	**2**	2118	**2**	1	**5**	**10**
075	10792	5	**1**	22.0	**2**	2124	**2**	1	**5**	**10**
076	12293	5	**1**	15.0	**1**	2719	**1**	1	**5**	**8**
077	12123	4	**1**	15.0	**1**	2970	**1**	1	**5**	**8**
078	10318	3	**1**	15.0	**1**	3271	**1**	1	**5**	**8**
079	9606	3	**1**	15.0	**1**	2746	**1**	1	**5**	**8**
080	10882	3	**1**	15.0	**1**	3312	**1**	1	**5**	**8**
081	11397	3	**1**	16.1	**2**	3535	**0**	1	**5**	**8**
082	10138	3	**1**	15.0	**1**	3490	**1**	1	**5**	**8**

Receptor No.	Area			Angle		Distance		Visual Absorption Capability Factor		Total Visual Effect Value 13-20 High 9-12 Moderate ≤8 Low
	Landfill Area Visible (m2)	Perceived Area Index - Area/Distance	Value	Angle of Exposed Views (degrees)	Value	Distance to Visible Landfill (m) Incl. Stockpile	Value	VACF	Value	
083	9826	3	**1**	15	**1**	3263	**1**	1	**5**	**8**
084	26370	8	**2**	19	**2**	3143	**1**	1	**5**	**10**
085	26241	10	**2**	21	**2**	2720	**1**	1	**5**	**10**
086	26943	10	**2**	21	**2**	2771	**1**	1	**5**	**10**
087	26899	9	**2**	15	**1**	3070	**1**	1	**5**	**9**
088	26863	8	**2**	15	**1**	3259	**1**	1	**5**	**9**
089	26453	10	**2**	22	**2**	2552	**1**	1	**5**	**10**
090	27536	11	**2**	22	**2**	2562	**1**	1	**5**	**10**
091	25895	12	**2**	26	**2**	2093	**2**	1	**5**	**11**
092	26083	14	**3**	31	**3**	1845	**2**	1	**5**	**13**
093	15200	6	**1**	0	**1**	2734	**1**	1	**5**	**8**
094	15294	5	**1**	1	**1**	2997	**1**	1	**5**	**8**
095	17108	6	**1**	10	**1**	2746	**1**	1	**5**	**8**
096	17012	6	**1**	9	**1**	2930	**1**	1	**5**	**8**
097	17272	6	**1**	16	**2**	2784	**1**	1	**5**	**9**
098	17327	6	**1**	15	**1**	2944	**1**	1	**5**	**8**
099	17179	6	**1**	13	**1**	2861	**1**	1	**5**	**8**
100	16923	6	**1**	6	**1**	2720	**1**	1	**5**	**8**
101	16983	6	**1**	3	**1**	2897	**1**	1	**5**	**8**
102	23448	8	**2**	21	**2**	2836	**1**	1	**5**	**10**
103	31461	11	**2**	15	**1**	2981	**1**	1	**5**	**9**
104	30574	7	**1**	15	**1**	3301	**1**	1	**5**	**8**
105						no view				
106	7200	3	**1**	14.3	**1**	2775	**1**	1	**5**	**8**
107	7400	2	**1**	14.0	**1**	3137	**1**	1	**5**	**8**
108	8100	3	**1**	15.0	**1**	2724	**1**	1	**5**	**8**
109	7650	3	**1**	15.0	**1**	2657	**1**	1	**5**	**8**

Table B-2: Visual Assessment Data – Preferred Alternative

Receptor No.	Visible Landfill Area (Optimized Landfill above Approved Top of Final Landfill cover of the Expansion Landfill)			Horizontal Angle of View		Distance from Site		Visual Absorption Capability Factor (VACF)		Combined Effect Value 13-20 High 9-12 Moderate ≤8 Low
	Landfill Area Visible (m2)	Perceived Area Index - Area/Distance	Value	Angle of Exposed Views (degrees)	Value	Distance to Visible Landfill (m) Incl. Stockpile	Value	VACF	Value	
000						no view				
001						no view				
002	47991	120.0	5	49	3	400	5	1	5	18
003	39300	85.2	5	46	3	461	5	1	5	18
004	48249	92.8	5	44	3	520	5	1	5	18
005	7632	12.5	2	40	3	612	4	1	5	14
006	3298	5.0	1	39	3	657	4	1	5	13
007	4962	7.1	1	38	3	694	4	1	5	13
008	20789	24.5	5	33	3	849	3	1	5	16
009	7479	7.9	2	31	3	950	3	1	5	13
010	9563	8.7	2	28	2	1105	3	1	5	12
011	29297	40.6	5	41	3	722	4	1	5	17
012	40905	59.5	5	42	3	687	4	1	5	17
013						no view				
014	16242	17.8	3	21	2	910	3	1	5	13
015	17610	15.0	3	18	2	1174	3	1	5	13
016	17647	12.9	2	16	2	1364	3	1	5	12
017	12733	8.8	2	15	1	1451	3	1	5	11
018	8377	5.8	1	16	2	1443	3	1	5	11
019	18756	13.0	2	17	2	1448	3	1	5	12
020	17777	12.3	2	18	2	1445	3	1	5	12

Receptor No.	Visible Landfill Area (Optimized Landfill above Approved Top of Final Landfill cover of the Expansion Landfill)			Horizontal Angle of View		Distance from Site		Visual Absorption Capability Factor (VACF)		Combined Effect Value 13-20 High 9-12 Moderate ≤8 Low
	Landfill Area Visible (m2)	Perceived Area Index - Area/Distance	Value	Angle of Exposed Views (degrees)	Value	Distance to Visible Landfill (m) Incl. Stockpile	Value	VACF	Value	
021	21000	15.1	3	15	1	1387	3	1	5	12
022	22978	15.0	3	20	2	1529	2	1	5	12
023	33890	21.1	4	21	2	1604	2	1	5	13
024	5391	3.0	1	20	2	1772	2	1	5	10
025	25700	12.9	2	20	2	1987	2	1	5	11
026	41040	67.1	5	43	3	612	4	1	5	17
027	48230	68.2	5	40	3	707	4	1	5	17
028	46404	44.5	5	34	3	1043	3	1	5	16
029	22516	18.7	4	31	3	1203	3	1	5	15
030	40870	61.1	5	42	3	669	4	1	5	17
031	1071	0.7	1	27	2	1512	2	1	5	10
032	12356	9.5	2	30	2	1303	3	1	5	12
033	13260	8.1	2	26	2	1639	2	1	5	11
034						no view				
035	2163	1.2	1	23	2	1879	2	1	5	10
041	44280	27.7	5	24	2	1598	2	1	5	14
042	45895	27.2	5	23	2	1687	2	1	5	14
043	47163	25.4	5	21	2	1859	2	1	5	14
044	24275	12.4	2	20	2	1964	2	1	5	11
045						no view				
046						no view				
047	32713	14.3	3	18	2	2293	1	1	5	11
048	37856	15.0	3	16	2	2529	1	1	5	11
049	7302	3.5	1	19	2	2079	2	1	5	10
050						no view				
051	14435	6.9	1	21	2	2082	2	1	5	10

Receptor No.	Visible Landfill Area (Optimized Landfill above Approved Top of Final Landfill cover of the Expansion Landfill)			Horizontal Angle of View		Distance from Site		Visual Absorption Capability Factor (VACF)		Combined Effect Value 13-20 High 9-12 Moderate ≤8 Low
	Landfill Area Visible (m2)	Perceived Area Index - Area/Distance	Value	Angle of Exposed Views (degrees)	Value	Distance to Visible Landfill (m) Incl. Stockpile	Value	VACF	Value	
052	7856	3.8	**1**	21	**2**	2084	**2**	1	**5**	10
053						no view				
054						no view				
055						no view				
056						no view				
057						no view				
058	1699	0.8	**1**	22	**2**	2108	**2**	1	**5**	10
059	10088	4.7	**1**	22	**2**	2127	**2**	1	**5**	10
060	37858	14.8	**3**	18	**2**	2555	**1**	1	**5**	11
061	28499	13.0	**2**	19	**2**	2198	**2**	1	**5**	11
062	41891	16.5	**3**	18	**2**	2545	**1**	1	**5**	11
063	41364	17.1	**3**	19	**2**	2415	**1**	1	**5**	11
064	40552	18.8	**4**	20	**2**	2159	**2**	1	**5**	13
065						no view				
066	36831	17.8	**3**	20	**2**	2067	**2**	1	**5**	12
067	7230	3.2	**1**	19	**2**	2277	**1**	1	**5**	9
068						no view				
069						no view				
070						no view				
071	35448	15.8	**3**	18	**2**	2249	**1**	1	**5**	11
072	5969	2.5	**1**	18	**2**	2403	**1**	1	**5**	9
073	6919	3.0	**1**	18	**2**	2319	**1**	1	**5**	9
074	34889	14.1	**3**	17	**2**	2476	**1**	1	**5**	11
075	15320	6.1	**1**	17	**2**	2530	**1**	1	**5**	9
076	38723	12.9	**2**	15	**1**	3009	**1**	1	**5**	9
077	14210	4.4	**1**	14	**1**	3254	**1**	1	**5**	8

Receptor No.	Visible Landfill Area (Optimized Landfill above Approved Top of Final Landfill cover of the Expansion Landfill)			Horizontal Angle of View		Distance from Site		Visual Absorption Capability Factor (VACF)		Combined Effect Value 13-20 High 9-12 Moderate ≤8 Low
	Landfill Area Visible (m2)	Perceived Area Index - Area/Distance	Value	Angle of Exposed Views (degrees)	Value	Distance to Visible Landfill (m) Incl. Stockpile	Value	VACF	Value	
078	7687	2.3	**1**	14	**1**	3326	**1**	1	**5**	8
079	25997	8.3	**2**	15	**1**	3132	**1**	1	**5**	9
080	40218	11.3	**2**	13	**1**	3570	**0**	1	**5**	8
081	42046	11.1	**2**	13	**1**	3794	**0**	1	**5**	8
082						no view				
083	40014	11.1	**2**	13	**1**	3613	**0**	1	**5**	8
084	2195	0.7	**1**	15	**1**	3230	**1**	1	**5**	8
085						no view				
086						no view				
087	1717	0.5	**1**	15	**1**	3160	**1**	1	**5**	8
088	26059	7.6	**2**	14	**1**	3437	**1**	1	**5**	9
089	13034	4.9	**1**	18	**2**	2654	**1**	1	**5**	9
090	34919	12.9	**2**	17	**2**	2700	**1**	1	**5**	10
091						no view				
092						no view				
093	4693	1.6	**1**	9	**1**	2933	**1**	1	**5**	8
094	6163	2.1	**1**	10	**1**	2923	**1**	1	**5**	8
095	9232	3.3	**1**	11	**1**	2828	**1**	1	**5**	8
096	19914	7.1	**1**	11	**1**	2822	**1**	1	**5**	8
097	19090	6.8	**1**	11	**1**	2818	**1**	1	**5**	8
098	21646	7.7	**2**	11	**1**	2818	**1**	1	**5**	9
099	19228	6.8	**1**	11	**1**	2820	**1**	1	**5**	8
100	17703	6.3	**1**	11	**1**	2822	**1**	1	**5**	8
101	10699	3.8	**1**	11	**1**	2823	**1**	1	**5**	8
102	45221	16.5	**3**	15	**1**	2747	**1**	1	**5**	10
103	43266	15.1	**3**	15	**1**	2868	**1**	1	**5**	10

Receptor No.	Visible Landfill Area (Optimized Landfill above Approved Top of Final Landfill cover of the Expansion Landfill)			Horizontal Angle of View		Distance from Site		Visual Absorption Capability Factor (VACF)		Combined Effect Value 13-20 High 9-12 Moderate ≤8 Low
	Landfill Area Visible (m2)	Perceived Area Index - Area/Distance	Value	Angle of Exposed Views (degrees)	Value	Distance to Visible Landfill (m) Incl. Stockpile	Value	VACF	Value	
104	43432	14.2	**3**	14	**1**	3048	**1**	1	**5**	10
105						no view				
106						no view				
107						no view				
108	43234	15.7	**3**	17	**2**	2757	**1**	1	**5**	11
109	3816	1.4	**1**	16	**2**	2804	**1**	1	**5**	9
110	10681	6.8	**1**	15	**1**	1575	**2**	1	**5**	9
111						no view				
112	5794	20.8	**4**	65	**4**	279	**5**	1	**5**	18
113	2151	1.4	**1**	20	**2**	1488	**3**	1	**5**	11
114	1100	0.7	**1**	13	**1**	1481	**3**	1	**5**	10
115	18769	11.8	**2**	13	**1**	1586	**2**	1	**5**	10
116						no view				
117	18815	12.3	**2**	12	**1**	1529	**2**	1	**5**	10
118	18428	12.1	**2**	12	**1**	1519	**2**	1	**5**	10
119	16073	10.6	**2**	12	**1**	1512	**2**	1	**5**	10
120	4288	2.9	**1**	12	**1**	1504	**2**	1	**5**	9
121						no view				
122						no view				
123						no view				
124						no view				
125						no view				