

# **Appendix G**

**Viewshed Analysis – Tote Road Quarry  
Expansion**



# **Viewshed Analysis**

**Tote Road Quarry Expansion  
Head of St. Margarets Bay, NS**

Scotian Materials Limited

February 25, 2022





**GHD**

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# Contents

<b>1. Introduction</b>	<b>1</b>
1.1 Purpose of the Analysis	1
1.2 Geographic Setting	1
<b>2. Methodology</b>	<b>1</b>
2.1 Data Development and Analysis	2
2.2 Limitations	3
<b>3. Results</b>	<b>4</b>
3.1 Projective Mapping	4
3.2 Reflective Mapping	6
<b>4. Summary</b>	<b>8</b>
<b>5. Closure</b>	<b>8</b>
<b>6. References</b>	<b>10</b>

## Table index

Table 1	Viewshed Scenarios and Observer Locations	6
Table 2	Summary of Quarry Visibility from Observer Locations	8

## Figure index (following text)

Figure 1	Site Location
Figure 2	Site Development Plan
Figure 3	Projective View – Observer Locations
Figure 4	Projective View – Observer Locations (Detail)
Figure 5	Observer 2 Highway 103 Westbound
Figure 6	Observer 3 Summit Crescent Residence
Figure 7	Observer 4 Summit Crescent
Figure 8	Observer 5 Hammonds Plains Residence
Figure 9	Observer 6 Tantallon Crossroads
Figure 10	Observer 7 Sandy Lake
Figure 11	Observer 8 Island Lake
Figure 12	Reflective View – Quarry Undeveloped (Detail)
Figure 13	Reflective View – Quarry Developed (Detail)

# 1. Introduction

Scotia Materials Limited (Scotian) is currently operating the Tote Road Quarry at Head of St. Margarets Bay, Nova Scotia (NS). The operation requires an expansion to its existing approved 4 ha quarry to approximately 24 ha in order to continue to serve the local market with aggregate products.

## 1.1 Purpose of the Analysis

The purpose of this viewshed assessment is to identify and evaluate the potential visual impacts of the proposed Tote Road Quarry expansion (the Project). This report should be read in conjunction with any plans, reports, or observations that accompany the Environmental Assessment Registration Document or other applications for approval as required by the appropriate regulatory body.

The visual environment was identified as a Valued Component (VC) during the Environmental Assessment scoping process. The Project will result in changes to the landscape that may affect scenery as viewed by others. The landscape is the visual presentation of an area of land. Scenery refers to the aesthetic qualities of the landscape.

Stakeholders may be concerned with the potential negative visual effects associated with the Project. This analysis addresses the viewshed using a modelled approach. An aesthetic assessment of the scenery from observer locations may be undertaken from time to time to assess the validity of the model and assist in the consideration of mitigation options, if required.

Visual impacts refer to a change in the character and scenic value of the landscape and the effects of those changes on people. The direct visual impacts of any development will affect the landscape through intrusion or obstruction in some manner, the reactions of viewers, and the overall impact on visual amenity (Zhang *et al.* 2000). In the life of a Project, many different sources of impact occur at different stages, such as construction, operation, decommissioning and reclamation.

## 1.2 Geographic Setting

The Project is located at Tote Road, Head of St. Margarets Bay, Halifax County, NS (the Site), approximately 2.3 kilometres (km) west of the community of Westwood Hills, Upper Tantallon and 2.5 km northwest of the community Head of St. Margarets Bay (Figure 1).

Vegetation in this region typically consists of red spruce forest found on the slopes of hills and hummocks with hemlocks typically found on the lower parts of slopes near watercourses (Neily *et al.*, 2017). The Site was harvested for commercial forestry purposes in the past and in general, some degree of historical or current forestry activities have occurred on the adjacent crown lands. Topography at the Site ranges from 148 metres above sea level (masl) in the central portion of the Site to the low point of 120 masl at the southern property boundary. The floor of the existing quarry is at 116 masl.

# 2. Methodology

GHD completed a viewshed analysis estimate of the potential impact on the visual environment with respect to the Project. This assessment is strictly an estimate, given that visual assessment is an individual and subjective experience because it depends on preferences related to social conditioning, personal experience, temperament, sensibilities, and even formal artistic training (NSM 1996).

The visual impact assessment of a proposed development addresses three factors: spatial, quantitative, and qualitative.

- **Spatial** includes where the development is visible from or, more specifically, to what or whom it is visible.
- **Quantitative** refers to how much of the development is visible, how much of the surrounding area is affected, and to what degree.
- **Qualitative** is the visual character of the development and its compatibility with its surroundings (Zhang *et al.* 2000).

Presently, there is no legislation for visual impact assessment in Nova Scotia or in Canada. The Province of British Columbia has created a Visual Impact Assessment Guidebook (British Columbia Ministry of Forests, 2001) as a component of their Forest Practices Code. This guidebook primarily applies to forest harvesting activities, planning and development. The Canada Impact Assessment Agency provides a Case Study for a transportation corridor in its Cumulative Effects Assessment Practitioners Guide. While not directly relevant to quarry or mining projects, these guides were used to the extent possible for conceptual design of this assessment.

The analysis considers three observer activities: walking/hiking, driving and canoeing. Viewing heights of observers for the canoeing activity locations were set at 0.75 m (sitting in the boat) above the topographic height; driving 1.5 m; and walking/hiking 1.65 m (average height of a Canadian) were used.

## 2.1 Data Development and Analysis

Geographic Information System (GIS) software (ESRI ArcGIS® and ESRI Spatial Analyst®) was used to create projective (views-from) and reflective (views-to) mapping of the area. The Study Area for the analysis was defined by the topography and the potential distance to the horizon from the Site. (Figure 1). The viewshed analysis used a 360° view due to the elevation of the Site (high point) but mainly focusses on the potential impact to the south and east, which has a higher aesthetic viewshed value due to the residential receptors. Directly to the east, approximately 2.3 km across the Indian River valley is Westwood Hills subdivision which is visible from areas of the existing quarry and the southeastern access road to the Site (Photo 1).



**Photo 1** View towards Westwood Hills from southeast access road

Reflective mapping was initiated from the chosen viewpoints in the surrounding landscape (outside looking in) with the objective of determining whether and to what extent the development is visible from its surroundings. For this method, both the bare tree quarry and developed quarry scenarios were used.

The following assumptions and factors were built into the model.

- No vegetative cover within the quarry boundaries.
- Forest cover and vegetation height as per the current digital surface model (GeoNova 2020).
- Complete footprint of the expanded Quarry.

- No progressive reclamation of the Site.
- Observer viewing radius is 360°.

Using these assumptions and factors, the model is intended to be a worst-case scenario, since the Project will be developed in a gradual manner and other factors such as viewing direction and weather can greatly affect what is seen. For example, a foggy or snowy day may result in less than 1 kilometre viewing distance over prolonged periods.

GHD used several elevation models to support the viewshed assessment. A Digital Elevation Model (DEM) was used for a quantitative representation of the topography of the bare Earth, removing all natural and anthropogenic features in a digital format. A Digital Surface Model (DSM) was used as an elevation data set to provide both natural and anthropogenic features (e.g., buildings, tops of trees) of the environment.

The Province of Nova Scotia has an extensive, publicly available LiDAR and associated products (i.r. *DEM*, *DSM*) data set. There is complete coverage of DEM and DSM products available for the viewshed study area. Two additional DSMs were created: 1) trees removed from the quarry expansion area; and 2) full quarry development.

Completing the visual analysis on the DEM would provide a worst-case scenario. Utilizing the DSM provides additional screening between the Observer and the Site.

The ArcGIS (ESRI 2019) tool *Visibility* was used to determine the surface locations visible to a set of observer features. Each Observer location was analyzed independent of other locations.

Projective mapping (inside looking out) was initiated from a viewpoint on the Site to reveal the potential extent of visibility of the Project to the surroundings, and therefore, inferring from where the Project may potentially be visible.

Reflective mapping (outside looking in) was based on the Observer locations developed from the projective mapping and considered both the undeveloped (trees removed) and developed quarry scenarios.

## 2.2 Limitations

A GIS-generated viewshed analysis has been conducted to assess potential visual impacts to resources that are located near the Site. The analysis was based on the parameters of the proposed quarry expansion, and the topography and forest height within the viewshed. The projected viewsheds as indicated in yellow on the enclosed maps. A few observer locations were field verified as indicated in the results discussion.

A digital viewshed analysis is only as good as the data and methods that are used. Every effort is made to include the most up-to-date and accurate data that have the most relevant resolution for the task. The DSM data was spot checked in the Westwood Hills area to ensure that any new development was represented by the data (i.e. loss of tree cover, open areas) in the Observers general locations.

LiDAR does provide a highly accurate terrain (1 m resolution). The method used is an off the shelf ArcGIS solution. Other methods or tools may provide similar or differing results depending on application and data requirements.

The analysis does not consider the curvature of the earth and thus provides a worst-case scenario for visibility in this application. For an Observer with a height of 1.5 m (5 ft) standing on the seashore, the horizon would be at a distance of 4.37 km. For an Observer 1.85 m (6 ft) tall, the horizon would be at a distance of 4.85 km (Line of Sight Calculator 2020). As elevation increases, the distance to the horizon increases. As one moves inland from the shoreline, the distance to the horizon may decrease based on the obstructions to the view, such as topography and tree cover, that may block one's viewplane to the natural horizon.

# 3. Results

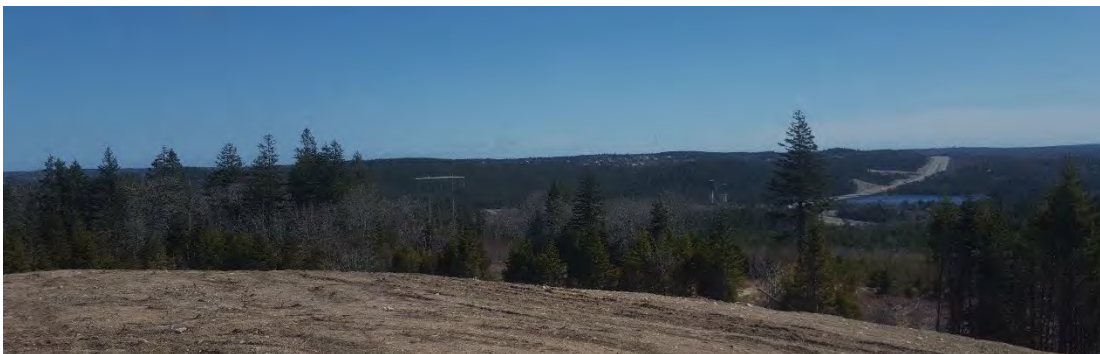
## 3.1 Projective Mapping

From the vantage point at the top of the quarry looking out (projective) (Figure 3), the analysis has determined that there are several locations that an Observer may be able to see. Since the Site is more than 2.3 km from any development, one must consider what this means in interpreting the viewplane. A good portion of the view is of treetops; however key visible areas are the Westwood Hills subdivision, Highway 103, and some areas of Upper Tantallon south of the Highway. Other areas such as Sandy Lake may be visible; however, given the distance to the lake the scene may be blended with its surrounding environment. Cottages on Island Lake are not visible from this Observer location.

Several photos were taken from vantage points at the Site that show these projective views. Photo 2 taken near the Observer 1 location is partially blocked by existing forests to the east but has a long view south to the horizon. No development can be seen in these photos or from the vantage point in general.



**Photo 2**      ***Near Observer 1 location looking southeast***



**Photo 3**      ***General view from existing quarry (looking east)***





**Photo 4**      ***Zoomed view from existing quarry (looking east)***



**Photo 5**      ***Tantallon Crossroads Commercial District (center of photo)***

Table 1 summarizes the Observer locations that were selected during the projective mapping exercise and will be used in the reflective view analysis.

Table 1 Viewshed Scenarios and Observer Locations

Observer / Location		Activity	Viewer Height (m)	Figure No.	Elevation (masl)	Rationale for location
2	Hwy 103 West Bound	Driving	1.5	5	90	Aesthetic value
3	Summit Crescent Residence Westwood Hills	Home	1.65	6	121	Aesthetic value
4	Summit Crescent Westwood Hill	Walking	1.65	7	139	Aesthetic value
6	Hammonds Plains Residence	Home	1.65	8	141	Aesthetic value
6	Tantallon Crossroads	Walking	1.65	9	31	Recreational value
7	Sandy Lake	Canoeing	0.75	10	65	Recreational value
8	Island Lake	Fishing (shore)	1.65	11	89	Recreational value

Viewing heights of observers for the canoeing activity locations were set at 0.75 m (sitting in the boat) above the topographic height; driving 1.5 m; and standing 1.65 m (average height of a Canadian) were used.

## 3.2 Reflective Mapping

Reflective mapping was based on Observer locations chosen from the projective mapping exercise.

Figures 5 to 11 represent the results of viewshed analysis for a homeowner in their yard in Westwood Hills, a canoeist on Sandy Lake, a driver westbound on Highway 103, or a person walking in the parking lot at a gas station in Tantallon. Viewpoints were chosen to give the longest open view across water or a cleared area. In all cases the high vantage point of the Project and the height of trees surrounding it, effectively screen it from view.

The Observer locations/viewpoints are summarized below.

### **Observer 2 – Highway 103 Westbound**

Highway 103 was recently upgraded (2020) to a divided highway from Exit 5 to Exit 5A. This effectively opened up the sight lines along the highway, especially northeast of the existing highway in this area. The Observer location (Figure 5) was chosen at elevation of 90 masl (approximately 50 m below the quarry elevation) in the westbound lane of the highway 3.5 km from the Site.

It is expected that the driver would only notice the quarry location for a couple of seconds and may not be able to discern any difference from the other surroundings on this horizon. Passengers may have the ability to hold the location in their gaze for a longer period of time but at the posted highway speed of 110 km/hr (max) and a decreasing elevation to Mill Lake (28 masl) the view changes constantly and the vehicle would be out of the viewplane in approximately 1km distance (5-6 seconds). It is unlikely under normal operating conditions that a pedestrian would be found walking along the highway in this location and therefore was not considered in this analysis.

This viewpoint is not impacted by the Project.

### **Observer 3 – Summit Crescent Residence**

Other than rooftops and treetops, there are not many open areas of Westwood Hills subdivision visible from the Site. The analysis shows that a residence on Summit Crescent (Figure 6) has a large swath of front yard that is visible from the existing quarry. The area though is not visually discernible from the quarry (Photo 3). The Observer location is 3.3 km from the Site at an elevation of 121 masl.

The viewpoint is not impacted by the fully developed Project however the quarry may be visible during early stages of development although the quarry is located 3.3 km to the west and the visual impact will be negligible.

#### ***Observer 4 – Summit Crescent***

The Summit Crescent (Figure 7) Observer location was chosen because the street is clearly visible from the existing quarry (Photo 4, above). The long axis of this portion of the street is directly in line with the Site. The Site accounts for about 13° degrees of the total viewplane from Observer 4.

Analysis of the viewplane during early development (removal of trees and grubbing activity) indicates that from Observer location 4 the quarry may be visible; however, as the elevation of the quarry floor decreases only the tops of the trees are visible.

The viewpoint is not impacted by the fully developed Project. The quarry may be visible during early stages of development although the quarry is located 3.6 km to the west and the visual impact will be negligible.

#### ***Observer 5 – Hammonds Plains Residence***

The projective mapping showed some tree canopy visibility within the Hammonds Plains community. One residence was noted to have visibility in the yard. The Hammonds Plains Observer (Figure 8) is 6.7 km from the Site. The analysis shows that an observer might see treetops on either side of the developed Project; however, given that the elevations of the Site are similar to the Observer's location (140 masl) and the distance is greater than the distance to the horizon, it is unlikely that at this distance the Observer would see the Site at all.

This viewpoint is not impacted by the Project.

#### ***Observer 6 – Tantallon Crossroads***

The Tantallon Crossroads (Figure 9) is visible from the Site. Roof tops of the Superstore and other surrounding buildings can be seen from the existing quarry. This Observer viewpoint, which is located 4 km southeast of the Site, is about 100 m below the elevation of the Project and thus only the trees at the southeast edge of the Site can be seen. This Project is located on the horizon of this Observer location.

This viewpoint is not impacted by the Project.

#### ***Observer 7 – Sandy Lake***

The Sandy Lake Observer (Figure 10) is seated in a canoe/boat on a long open sight line in the direction of the Site. Much of the lake and its immediate surroundings are visible from the Observer location. The elevation of the Observer is 65 masl and therefore the Project would not be visible from this location. Trees surrounding the Site may be visible on the horizon (approximately 2°).

This viewpoint is not impacted by the Project.

#### ***Observer 8 – Island Lake***

There are several cottages located mainly on the islands of Island Lake ranging from 1.2 to 2.4 km east of the Site. A fisher standing on the western shore of Island Lake (Figure 11) has the longest sight line (960 m) across the lake in the direction of the Project than any other point on the lake and thus would provide the worst case for the viewplane analysis. The Observer location is at 89 masl elevation and therefore 50 m below the Project elevation. Only the treetops in the northeast corner of the Site would be visible from this location.

The viewpoint is not impacted by the Project. The expanded quarry may be visible during early stages of development although the quarry is located 2.3 km to the east and the visual impact will be negligible.

## 4. Summary

The analysis assumes two scenarios: 1) trees removed from the quarry development area; and, 2) full Project development. Snap shots of the Site visibility from the Observer locations are shown of the undeveloped expansion area with no trees (Figure 12) and fully developed quarry expansion area (Figure 13).

The viewshed analysis is based on forest heights from the currently available data but conditions could change over time as some forested areas are harvested and other forests areas regenerate. Also, stand heights may increase over time, thereby limiting visual impact. Viewsheds may eventually only consist of tree canopy, and any changes (e.g. growth, logging, and other development) may alter the predicted effect.

**Table 2** Summary of Quarry Visibility from Observer Locations

Observer / Location		Analysis	
		Undeveloped Site	Developed Quarry
1	Quarry	-	-
2	Highway 103 westbound	Visible /low impact	Not visible /no impact
3	Summit Crescent residence	Visible /low impact	Not visible /no impact
4	Summit Crescent	Visible /low impact	Not visible /no impact
5	Hammonds Plains residence	Not visible /no impact	Not visible /no impact
6	Tantallon Crossroads	Not visible /no impact	Not visible /no impact
7	Sandy Lake	Not visible /no impact	Not visible /no impact
8	Island Lake	Not visible /no impact	Not visible /no impact

Given the current conditions, it is expected that the Project will not visually impact the area. Given the distance from the Site to each of the Observer locations analyzed, the Project may be in the viewshed but may not be discernable on the horizon from other features. The Westwood Hills subdivision does not have a lot of open vistas that can be seen from the existing quarry. It is assumed that were the Site can be seen from residences, the viewshed is limited in size and accessibility.

## 5. Closure

All of Which is Respectfully Submitted



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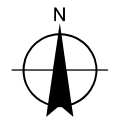
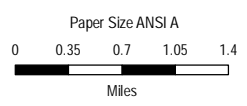
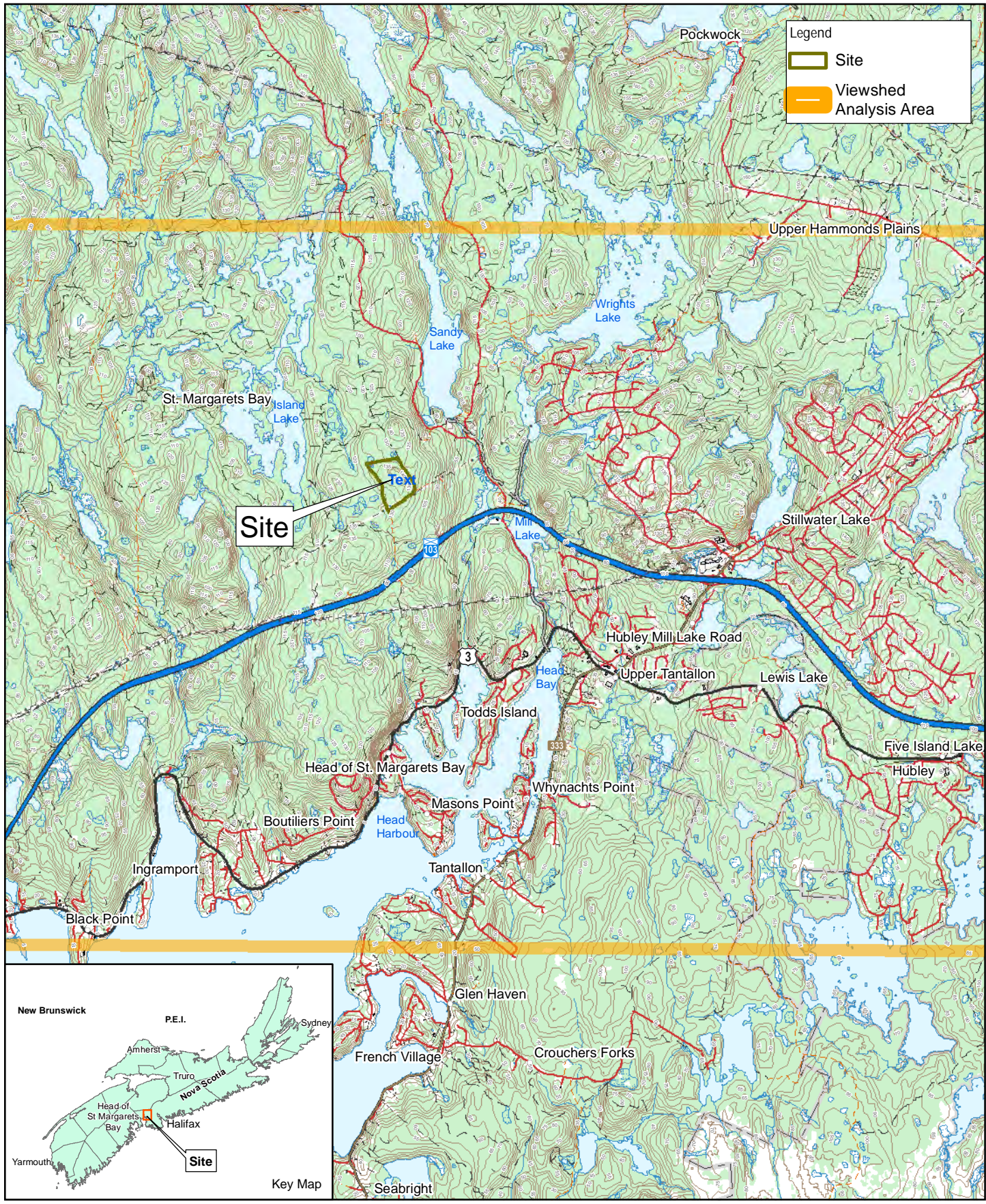


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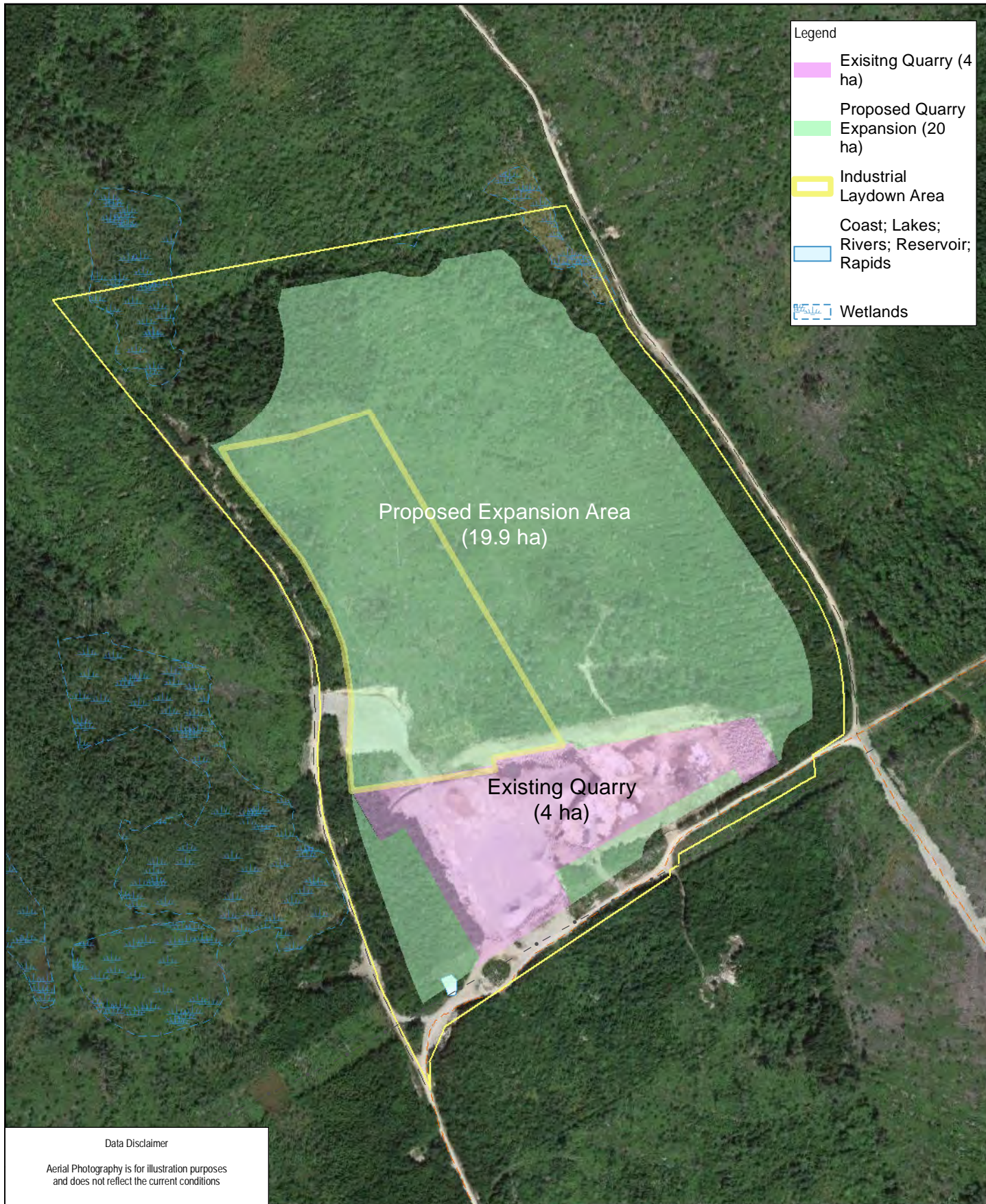
SCOTIAN MATERIALS LIMITED  
 HEAD OF ST MARGARETS BAY, HALIFAX, NS  
 TOTE ROAD QUARRY EXPANSION PROJECT

**VIEWSHED ANALYSIS  
 SITE LOCATION**

Project No. 11216599  
 Revision No. -  
 Date 04/02/2022

**FIGURE 1**  
 Data source: - Created by: jipark





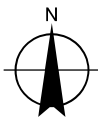
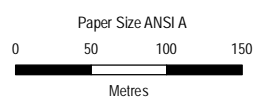
**Legend**

- Existing Quarry (4 ha)
- Proposed Quarry Expansion (20 ha)
- Industrial Laydown Area
- Coast; Lakes; Rivers; Reservoir; Rapids
- Wetlands

Proposed Expansion Area  
(19.9 ha)

Existing Quarry  
(4 ha)

**Data Disclaimer**  
Aerial Photography is for illustration purposes and does not reflect the current conditions



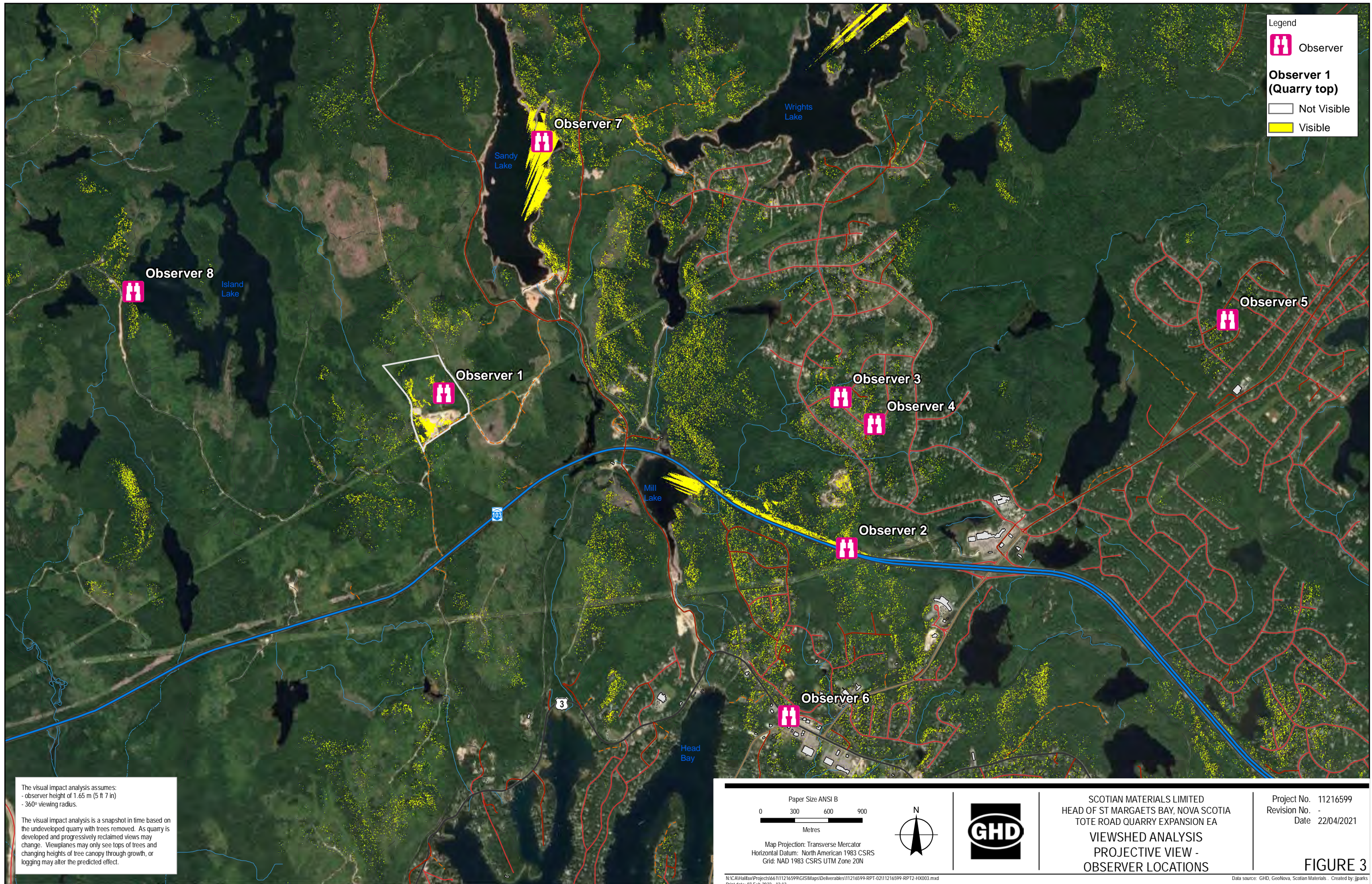
SCOTIAN MATERIALS LIMITED  
TOTE RD. HEAD OF ST MARGARETS BAY, HALIFAX, NS  
TOTE ROAD QUARRY EXPANSION PROJECT

Project No. 11216599  
Revision No. -  
Date 04/02/2022

**QUARRY PLAN**

**FIGURE 2**





**Legend**

Observer

**Observer 1 (Quarry top)**

Not Visible

Visible

The visual impact analysis assumes:  
 - observer height of 1.65 m (5 ft 7 in)  
 - 360° viewing radius.

The visual impact analysis is a snapshot in time based on the undeveloped quarry with trees removed. As quarry is developed and progressively reclaimed views may change. Viewplanes may only see tops of trees and changing heights of tree canopy through growth, or logging may alter the predicted effect.

Paper Size ANSI B

0 300 600 900

Metres

Map Projection: Transverse Mercator  
 Horizontal Datum: North American 1983 CSRS  
 Grid: NAD 1983 CSRS UTM Zone 20N

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 TOTE ROAD QUARRY EXPANSION EA

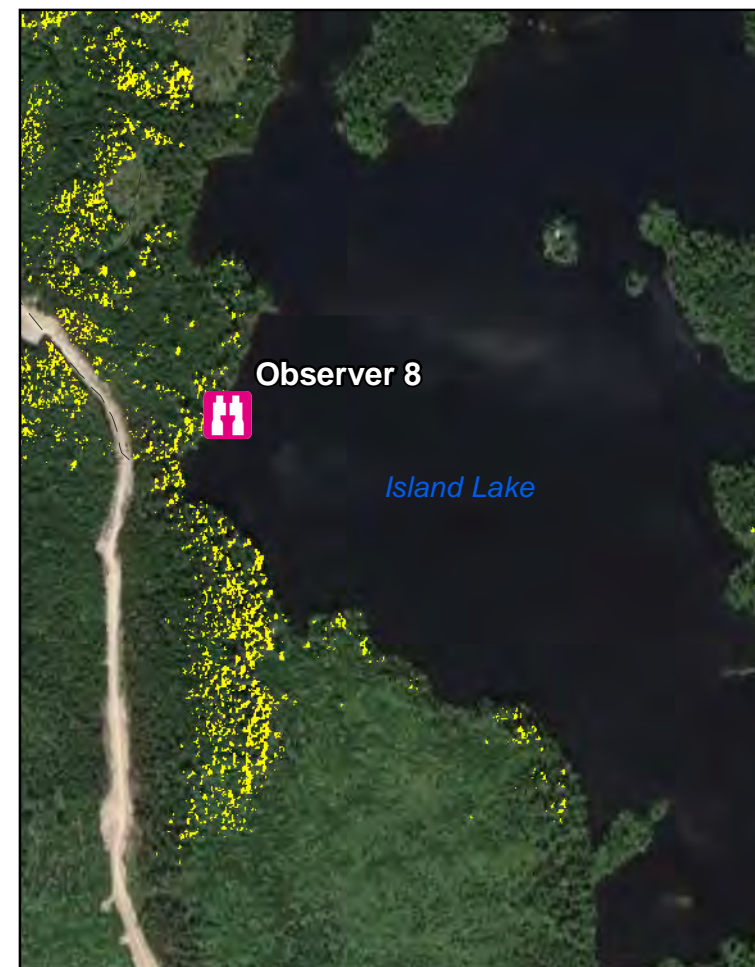
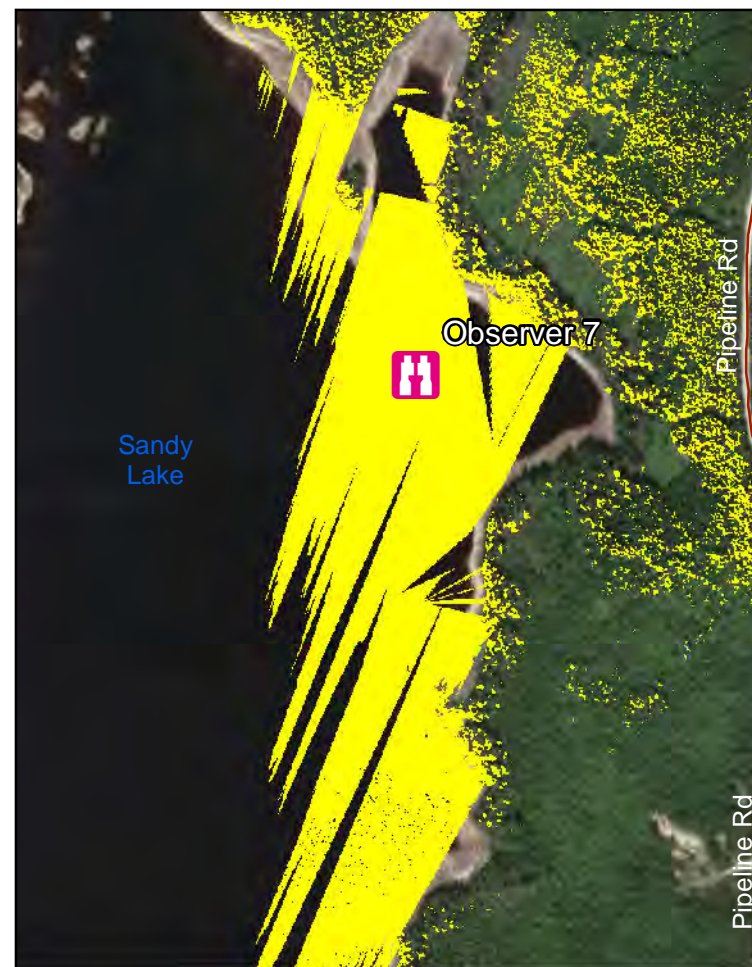
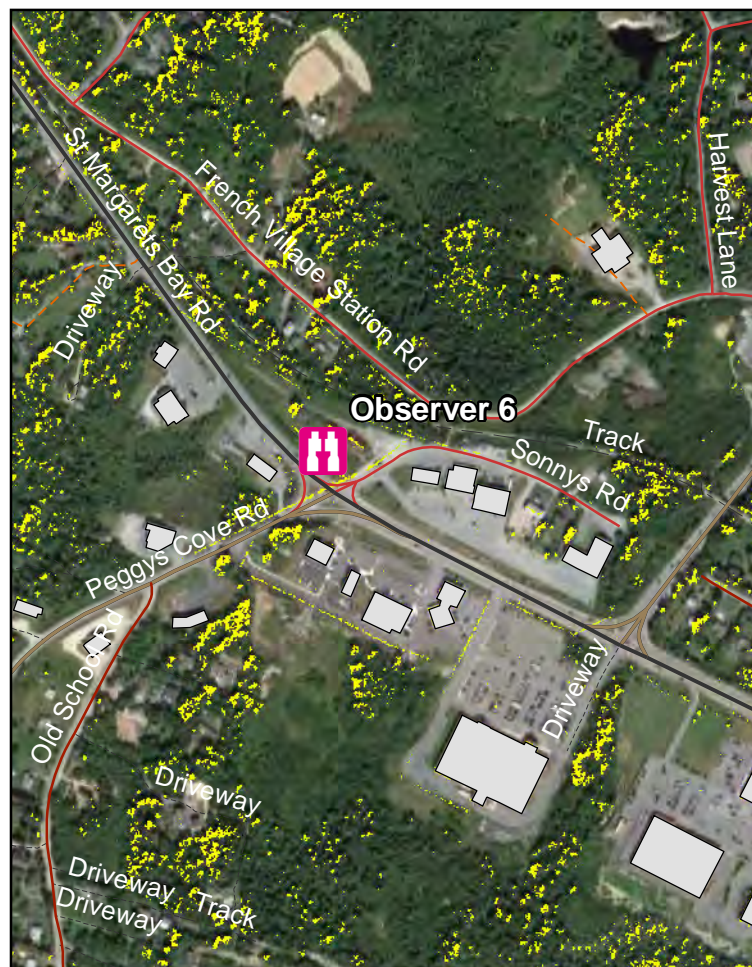
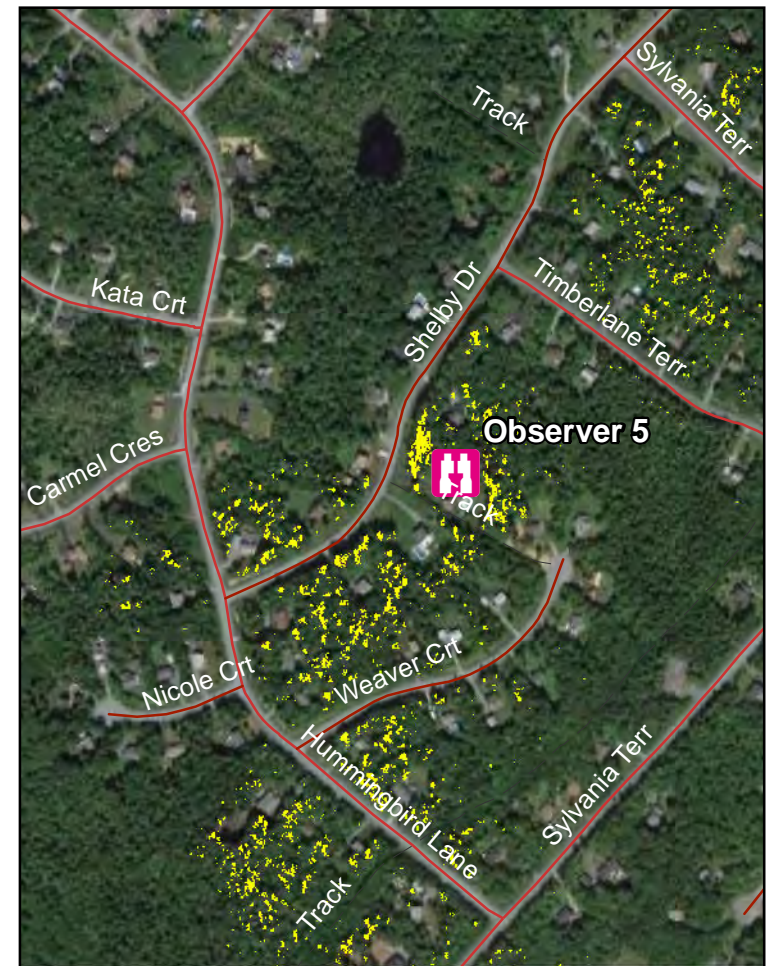
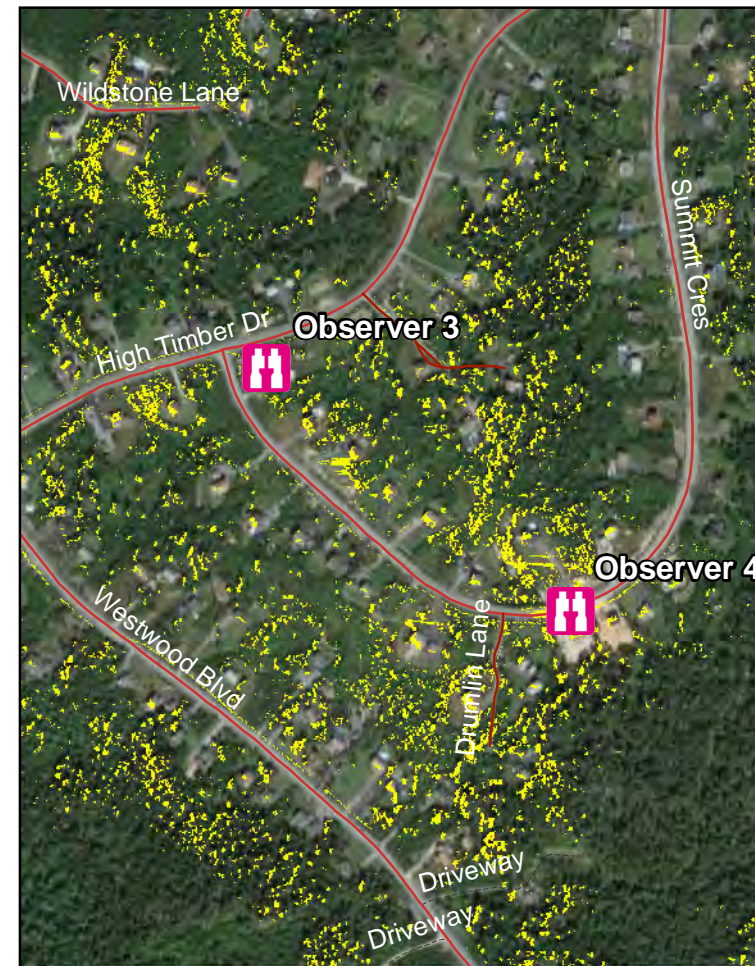
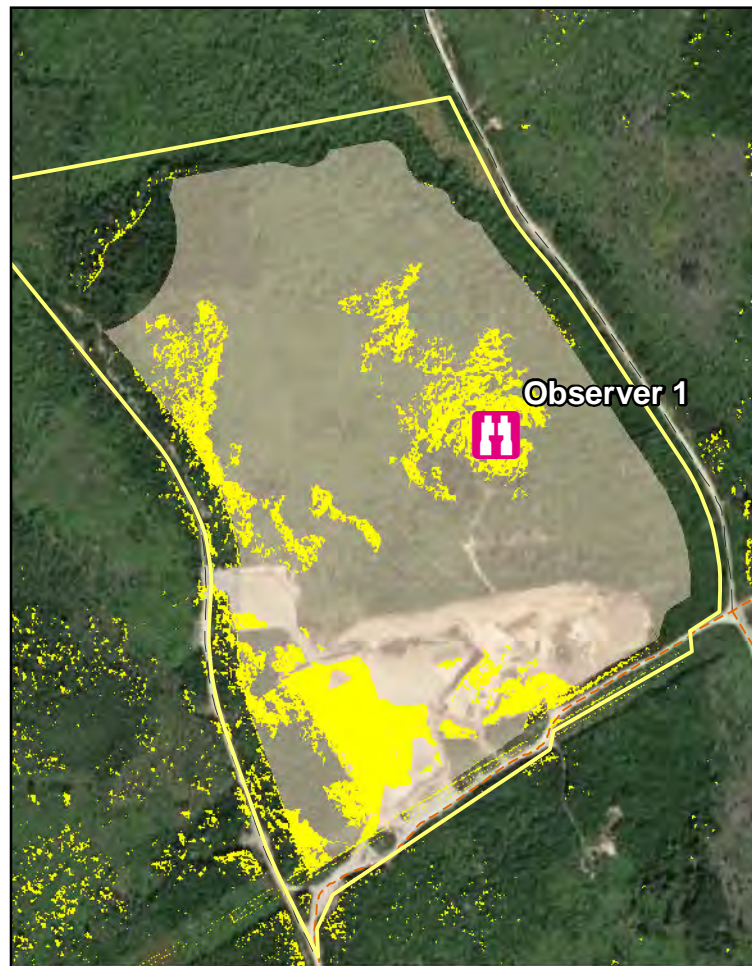
**VIEWSHED ANALYSIS  
 PROJECTIVE VIEW -  
 OBSERVER LOCATIONS**

Project No. 11216599  
 Revision No. -  
 Date 22/04/2021

**FIGURE 3**

Data source: GHD, GeoNova, Scotian Materials. Created by: jiparks





**Legend**

- Observer
- Potential Extraction Area
- Not Visible
- Visible

**Observer 1 (Quarry)**

The visual impact analysis assumes:  
 - observer height of 1.65 m (5 ft 7 in) unless noted  
 - 360° viewing radius.

The visual impact analysis is a snapshot in time based on an undeveloped quarry (trees off). As the quarry is developed and progressively reclaimed views may change. Viewplanes may only see tops of trees and changing heights of tree canopy through growth, or logging may alter the predicted effect.

Projective mapping using the quarry DSM with trees removed from the potential extraction area.

Paper Size ANSI B

0 75 150 225

Metres

Map Projection: Transverse Mercator  
 Horizontal Datum: North American 1983 CSRS  
 Grid: NAD 1983 CSRS UTM Zone 20N

**GHD**

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 HEAD OF ST MARGAETS BAY, NOVA SCOTIA  
 TOTE ROAD QUARRY EXPANSION EA

**VIEWSHED ANALYSIS  
 PROJECTIVE VIEW -  
 OBSERVER LOCATIONS (DETAIL)**

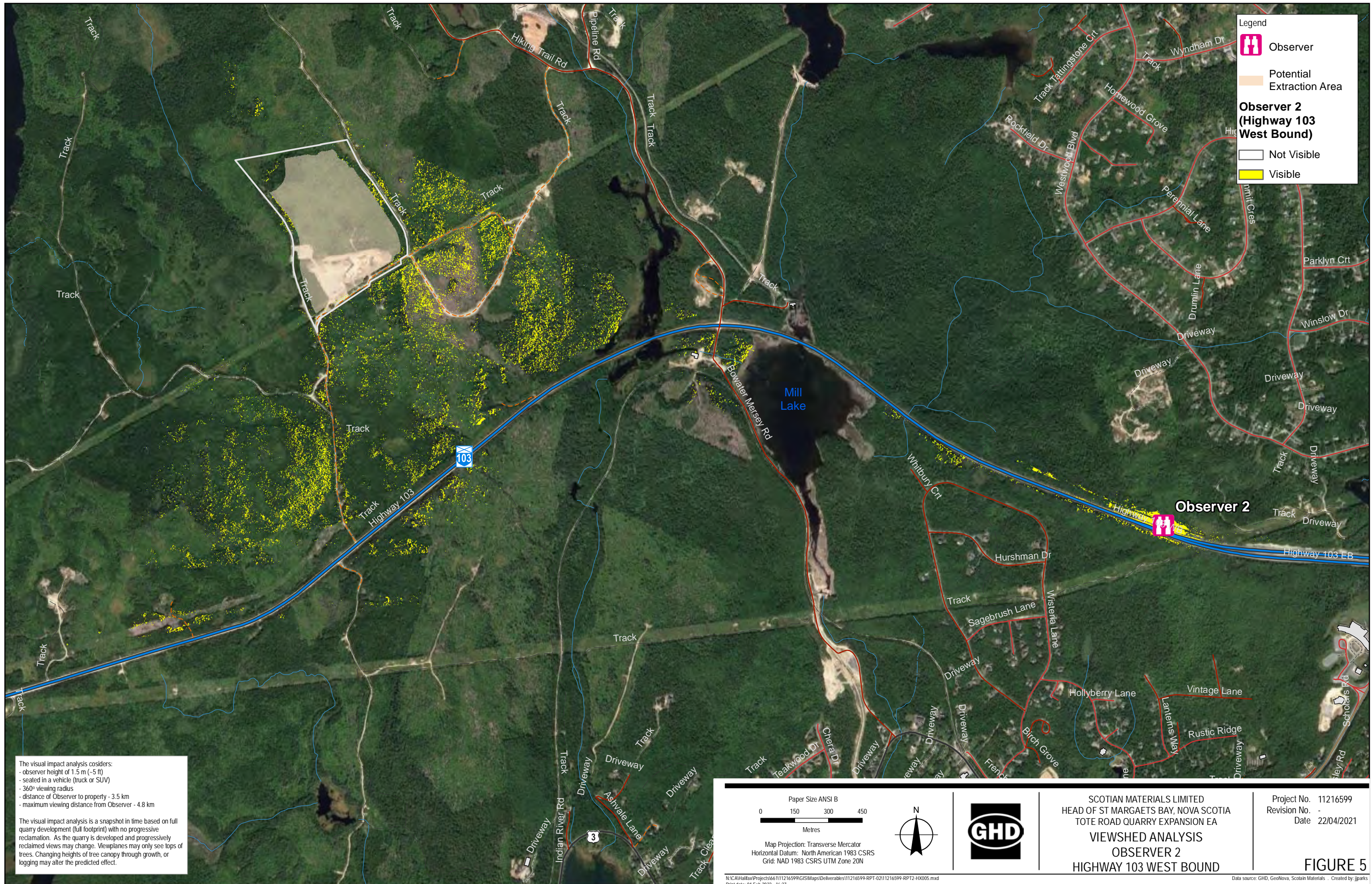
Project No. 11216599  
 Revision No. -  
 Date 22/04/2021

**FIGURE 4**





Data source: GHD, GeoNova, Scotian Materials. Created by: jiparks

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**Legend**

-  Observer
-  Potential Extraction Area
- Observer 2 (Highway 103 West Bound)**
-  Not Visible
-  Visible

The visual impact analysis considers:

- observer height of 1.5 m (~5 ft)
- seated in a vehicle (truck or SUV)
- 360° viewing radius
- distance of Observer to property - 3.5 km
- maximum viewing distance from Observer - 4.8 km

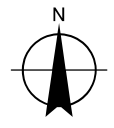

The visual impact analysis is a snapshot in time based on full quarry development (full footprint) with no progressive reclamation. As the quarry is developed and progressively reclaimed views may change. Viewplanes may only see tops of trees. Changing heights of tree canopy through growth, or logging may alter the predicted effect.

Paper Size ANSI B

0 150 300 450

Metres

Map Projection: Transverse Mercator  
Horizontal Datum: North American 1983 CSRS  
Grid: NAD 1983 CSRS UTM Zone 20N

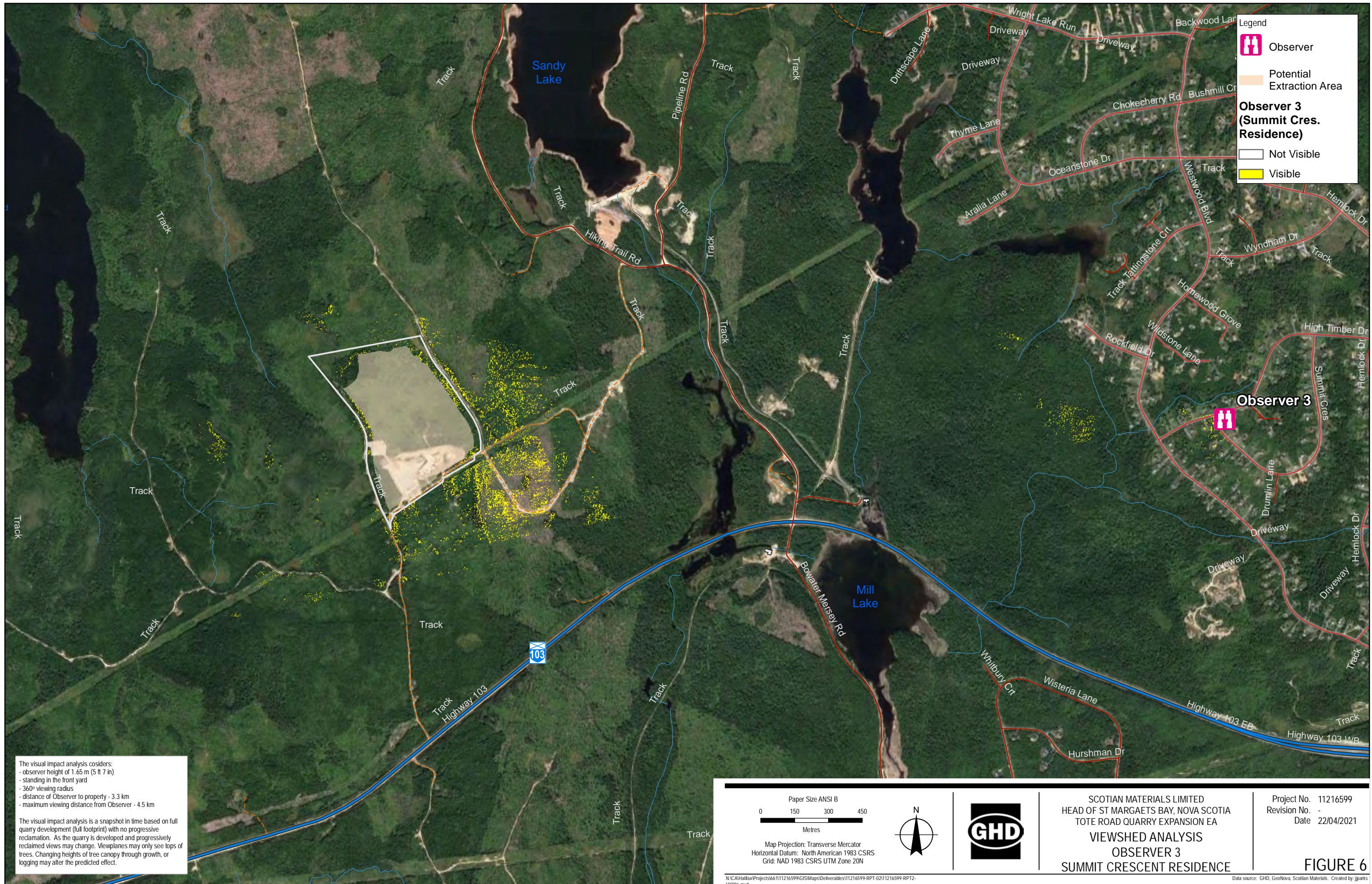



SCOTIAN MATERIALS LIMITED  
HEAD OF ST MARGAETS BAY, NOVA SCOTIA  
TOTE ROAD QUARRY EXPANSION EA  
**VIEWSHED ANALYSIS**  
**OBSERVER 2**  
**HIGHWAY 103 WEST BOUND**





Project No. 11216599  
Revision No. -  
Date 22/04/2021

**FIGURE 5**





**Legend**

-  Observer
-  Potential Extraction Area
- Observer 3 (Summit Cres. Residence)**
-  Not Visible
-  Visible

The visual impact analysis considers:

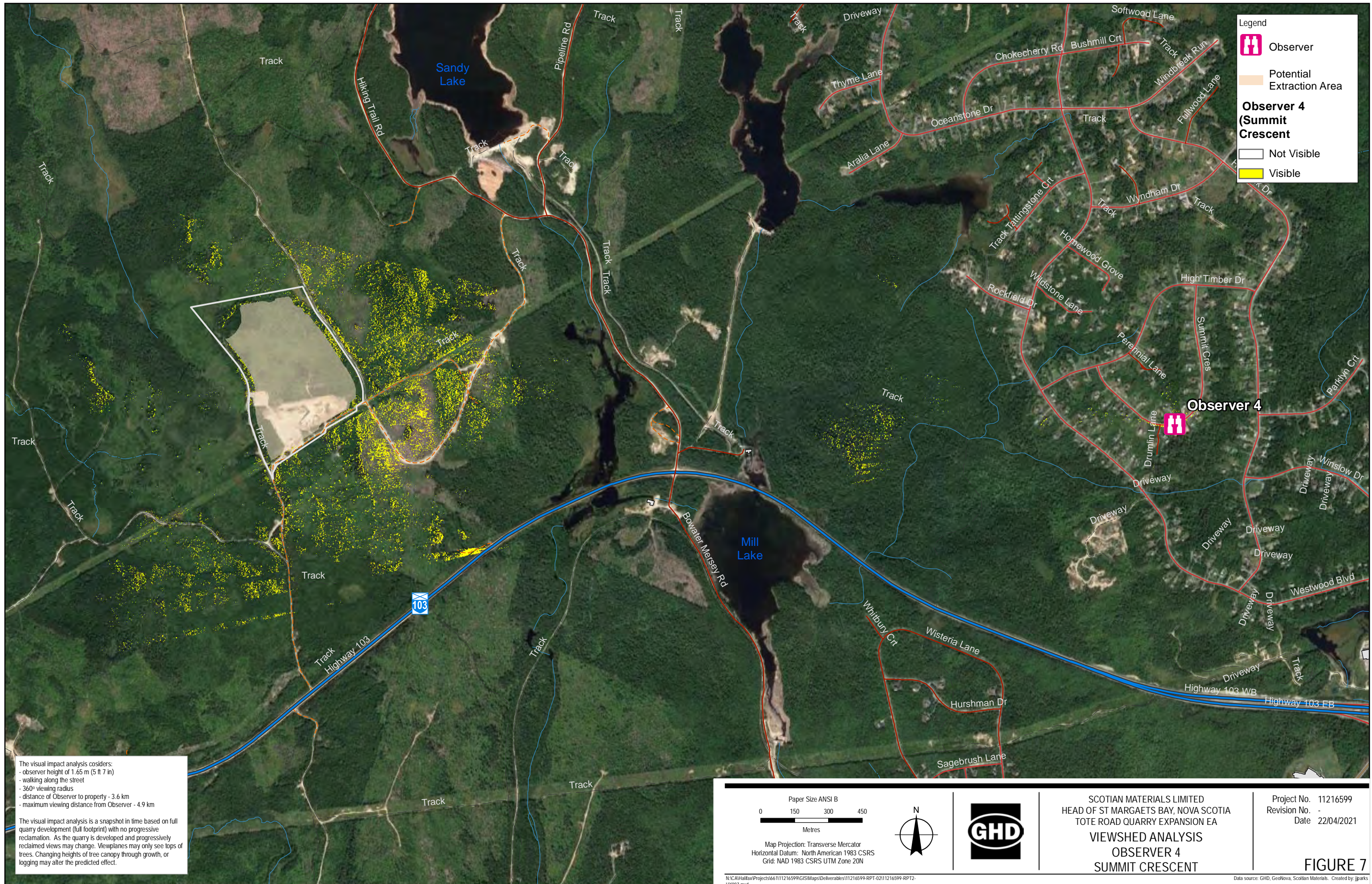
- observer height of 1.65 m (5 ft 7 in)
- standing in the front yard
- 360° viewing radius
- distance of Observer to property - 3.3 km
- maximum viewing distance from Observer - 4.5 km

The visual impact analysis is a snapshot in time based on full quarry development (full footprint) with no progressive reclamation. As the quarry is developed and progressively reclaimed views may change. Viewplanes may only see tops of trees. Changing heights of tree canopy through growth, or logging may alter the predicted effect.

<p>Paper Size ANSI B</p>  <p>Metres</p> <p>Map Projection: Transverse Mercator Horizontal Datum: North American 1983 CSRS Grid: NAD 1983 CSRS UTM Zone 20N</p>	 	<p>SCOTIAN MATERIALS LIMITED HEAD OF ST MARGAETS BAY, NOVA SCOTIA TOTE ROAD QUARRY EXPANSION EA</p> <p><b>VIEWSHED ANALYSIS OBSERVER 3 SUMMIT CRESCENT RESIDENCE</b></p>	<p>Project No. 11216599 Revision No. - Date 22/04/2021</p> <p><b>FIGURE 6</b></p>
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N:\CA\Hafax\Projects\11216599\GIS\Maps\Deliverables\11216599-RPT-02\11216599-RPT2-HX006.mxd  
Print date: 04 Feb 2022 - 16:22  
Data source: GHD, GeoNova, Scotian Materials. Created by: jiparks





**Legend**

- Observer
- Potential Extraction Area
- Observer 4 (Summit Crescent)**
- Not Visible
- Visible

The visual impact analysis considers:

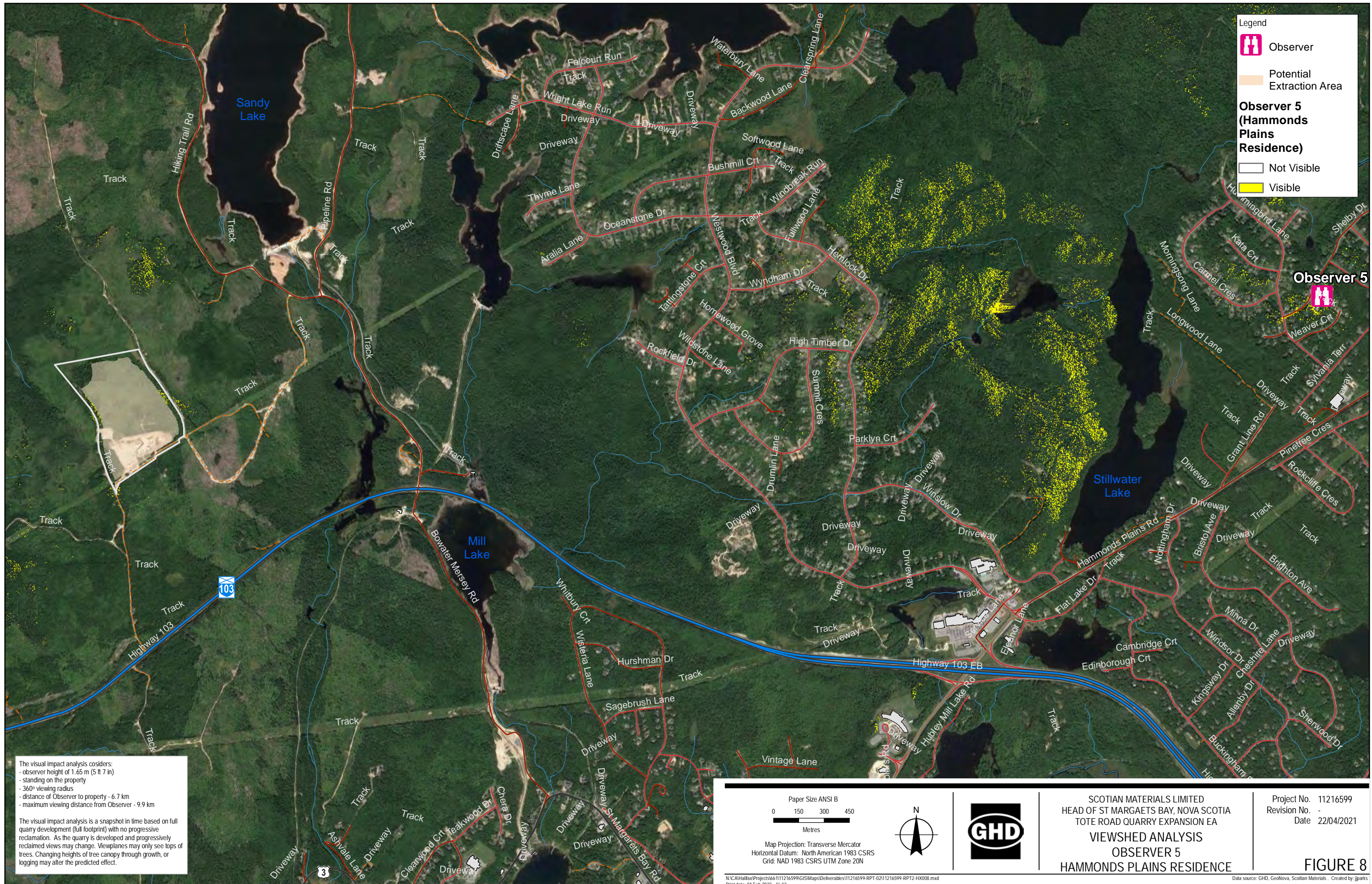
- observer height of 1.65 m (5 ft 7 in)
- walking along the street
- 360° viewing radius
- distance of Observer to property - 3.6 km
- maximum viewing distance from Observer - 4.9 km

The visual impact analysis is a snapshot in time based on full quarry development (full footprint) with no progressive reclamation. As the quarry is developed and progressively reclaimed views may change. Viewplanes may only see tops of trees. Changing heights of tree canopy through growth, or logging may alter the predicted effect.

<p>Paper Size ANSI B</p> <p>Metres</p> <p>Map Projection: Transverse Mercator Horizontal Datum: North American 1983 CSRS Grid: NAD 1983 CSRS UTM Zone 20N</p>			<p>SCOTIAN MATERIALS LIMITED HEAD OF ST MARGAETS BAY, NOVA SCOTIA TOTE ROAD QUARRY EXPANSION EA</p> <p><b>VIEWSHED ANALYSIS OBSERVER 4 SUMMIT CRESCENT</b></p>	<p>Project No. 11216599 Revision No. - Date 22/04/2021</p>
<p>N:\CA\Halfax\Projects\11216599\GIS\Maps\Deliverables\11216599-RPT-02\11216599-RPT2-HX007.mxd Print date: 04 Feb 2022 - 16:16</p>			<p>Data source: GHD, GeoNova, Scotian Materials. Created by: jlparks</p>	

**FIGURE 7**





**Legend**

- Observer
- Potential Extraction Area

**Observer 5 (Hammonds Plains Residence)**

- Not Visible
- Visible

The visual impact analysis considers:

- observer height of 1.65 m (5 ft 7 in)
- standing on the property
- 360° viewing radius
- distance of Observer to property - 6.7 km
- maximum viewing distance from Observer - 9.9 km

The visual impact analysis is a snapshot in time based on full quarry development (full footprint) with no progressive reclamation. As the quarry is developed and progressively reclaimed views may change. Viewplanes may only see tops of trees. Changing heights of tree canopy through growth, or logging may alter the predicted effect.

Paper Size ANSI B

0 150 300 450

Metres

Map Projection: Transverse Mercator  
Horizontal Datum: North American 1983 CSRS  
Grid: NAD 1983 CSRS UTM Zone 20N



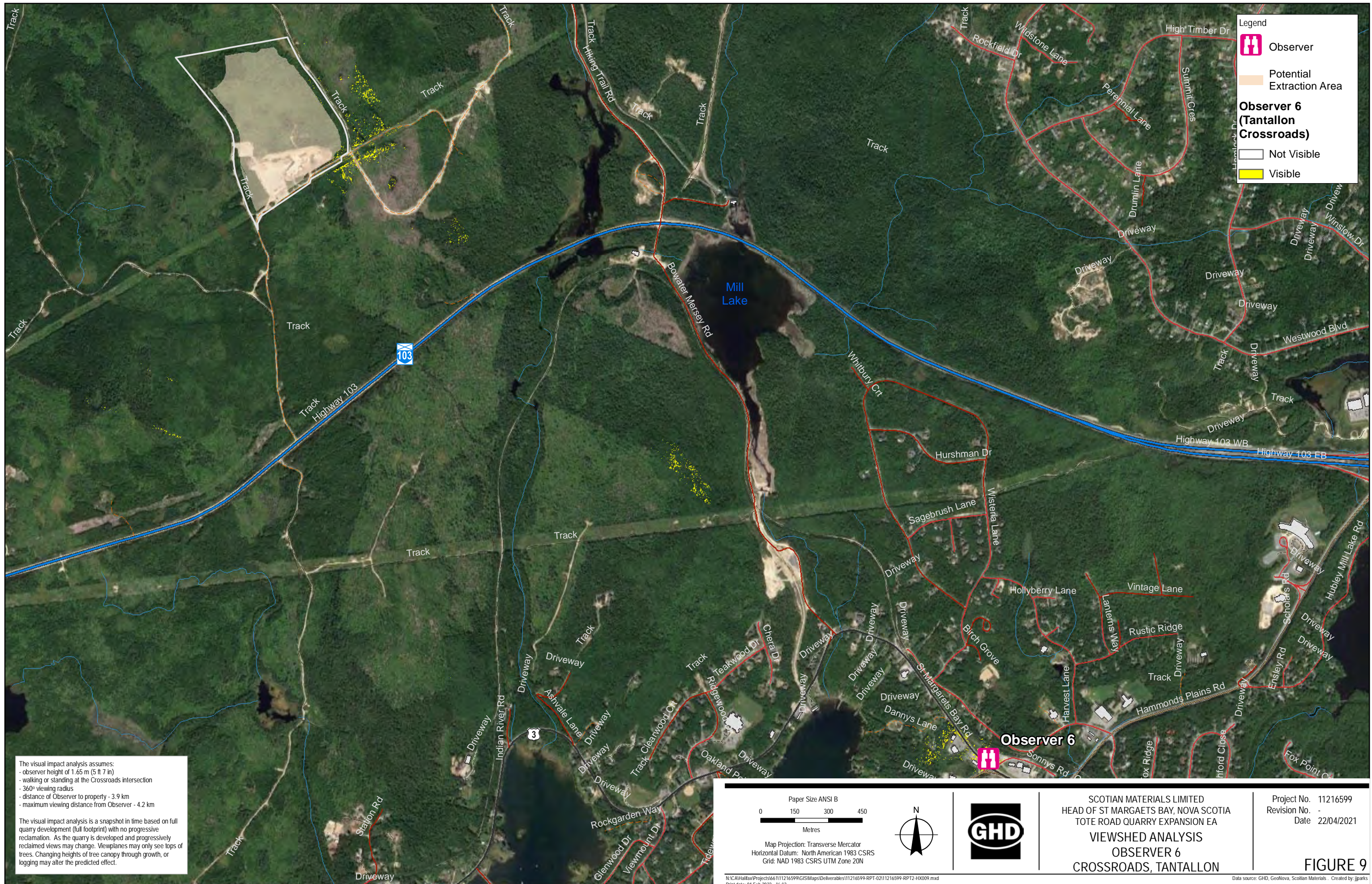
SCOTIAN MATERIALS LIMITED  
HEAD OF ST MARGAETS BAY, NOVA SCOTIA  
TOTE ROAD QUARRY EXPANSION EA

**VIEWSHED ANALYSIS**  
**OBSERVER 5**  
**HAMMONDS PLAINS RESIDENCE**

Project No. 11216599  
Revision No. -  
Date 22/04/2021

**FIGURE 8**





**Legend**

- Observer
- Potential Extraction Area

**Observer 6 (Tantallon Crossroads)**

- Not Visible
- Visible

The visual impact analysis assumes:

- observer height of 1.65 m (5 ft 7 in)
- walking or standing at the Crossroads Intersection
- 360° viewing radius
- distance of Observer to property - 3.9 km
- maximum viewing distance from Observer - 4.2 km

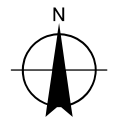
The visual impact analysis is a snapshot in time based on full quarry development (full footprint) with no progressive reclamation. As the quarry is developed and progressively reclaimed views may change. Viewplanes may only see tops of trees. Changing heights of tree canopy through growth, or logging may alter the predicted effect.

Paper Size ANSI B

0 150 300 450

Metres

Map Projection: Transverse Mercator  
Horizontal Datum: North American 1983 CSRS  
Grid: NAD 1983 CSRS UTM Zone 20N



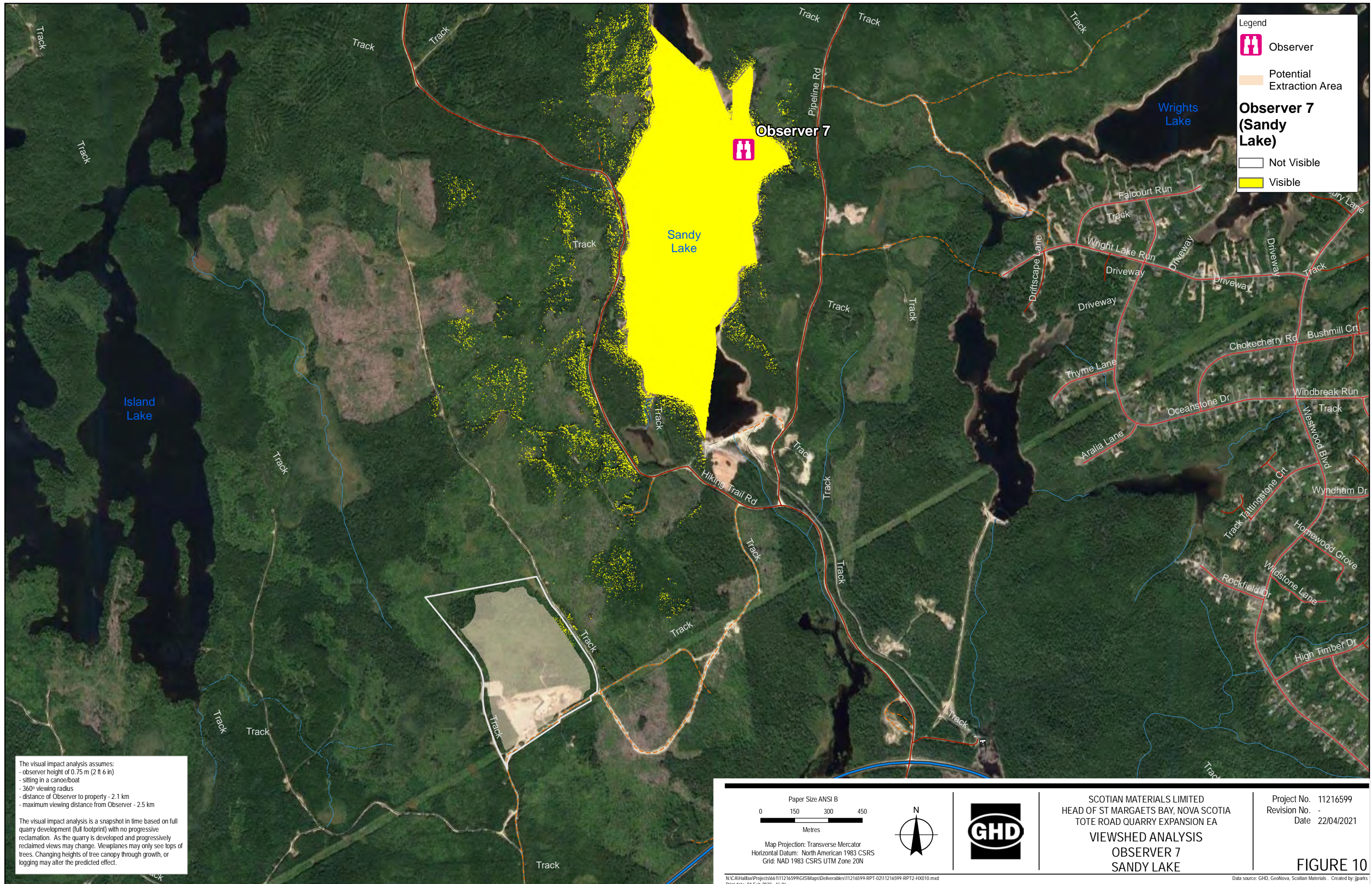
SCOTIAN MATERIALS LIMITED  
HEAD OF ST MARGAETS BAY, NOVA SCOTIA  
TOTE ROAD QUARRY EXPANSION EA

**VIEWSHED ANALYSIS  
OBSERVER 6  
CROSSROADS, TANTALLON**



Project No. 11216599  
Revision No. -  
Date 22/04/2021

**FIGURE 9**







**Legend**

-  Observer
-  Potential Extraction Area

**Observer 7 (Sandy Lake)**

-  Not Visible
-  Visible

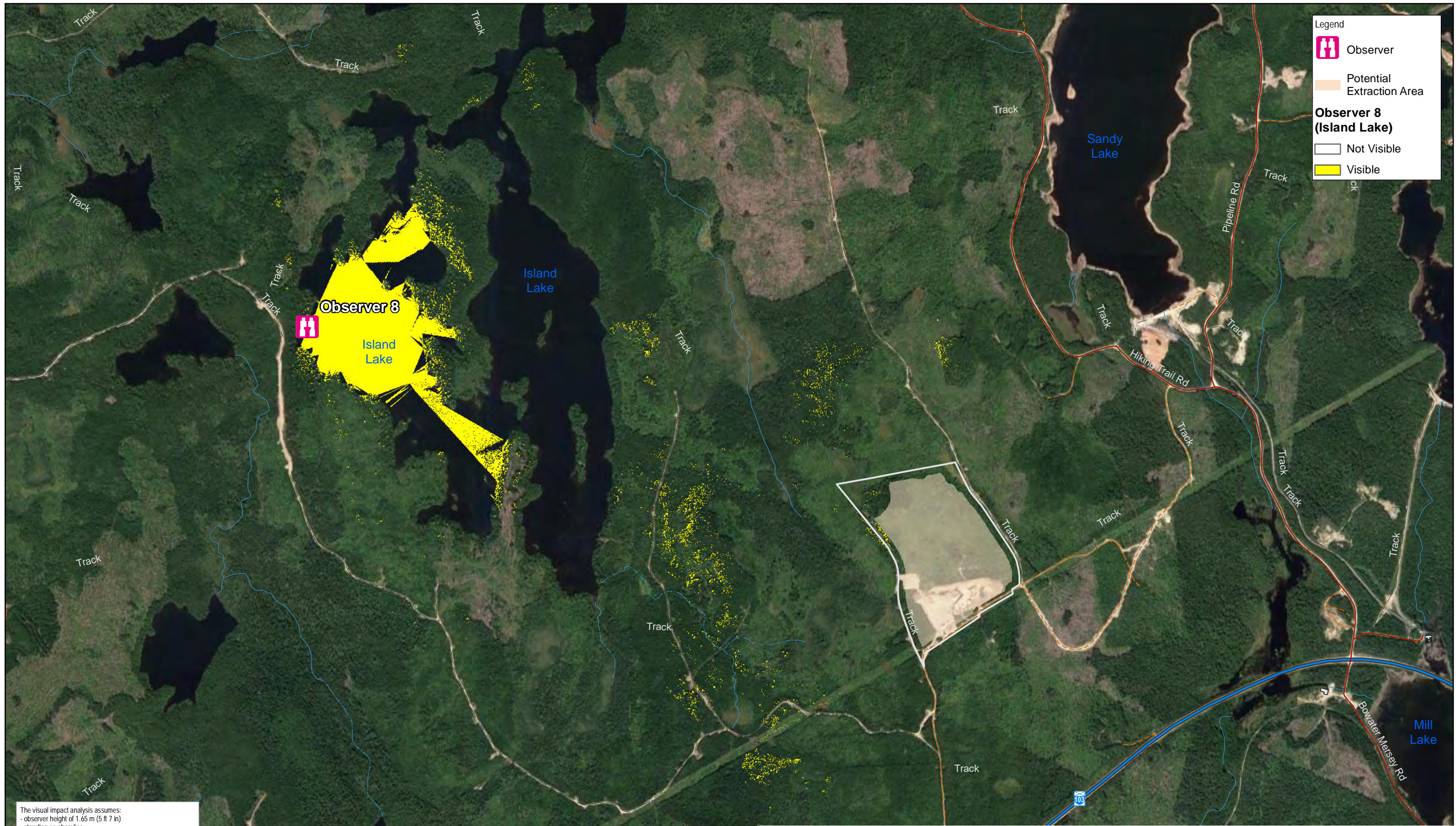
The visual impact analysis assumes:

- observer height of 0.75 m (2 ft 6 in)
- sitting in a canoe/boat
- 360° viewing radius
- distance of Observer to property - 2.1 km
- maximum viewing distance from Observer - 2.5 km



The visual impact analysis is a snapshot in time based on full quarry development (full footprint) with no progressive reclamation. As the quarry is developed and progressively reclaimed views may change. Viewplanes may only see tops of trees. Changing heights of tree canopy through growth, or logging may alter the predicted effect.

<p>Paper Size ANSI B</p>  <p>Metres</p> <p>Map Projection: Transverse Mercator Horizontal Datum: North American 1983 CSRS Grid: NAD 1983 CSRS UTM Zone 20N</p>	 	<p>SCOTIAN MATERIALS LIMITED HEAD OF ST MARGAETS BAY, NOVA SCOTIA TOTE ROAD QUARRY EXPANSION EA</p> <p><b>VIEWSHED ANALYSIS OBSERVER 7 SANDY LAKE</b></p>	<p>Project No. 11216599 Revision No. - Date 22/04/2021</p> <p><b>FIGURE 10</b></p>
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





**Legend**

-  Observer
-  Potential Extraction Area

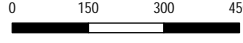
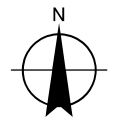

**Observer 8 (Island Lake)**

-  Not Visible
-  Visible

The visual impact analysis assumes:

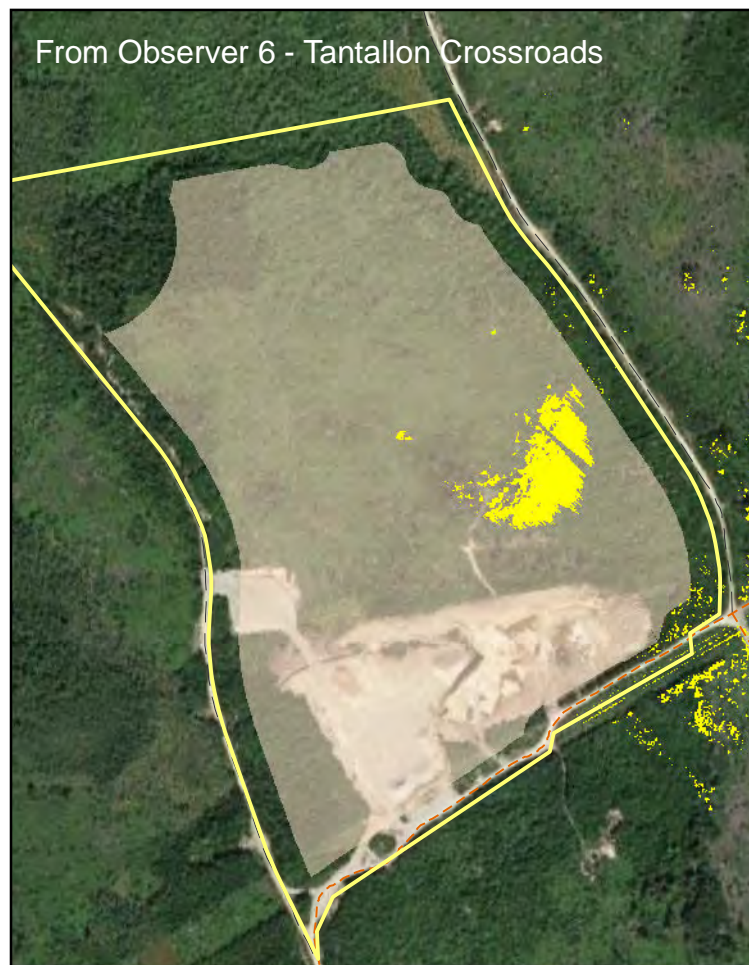
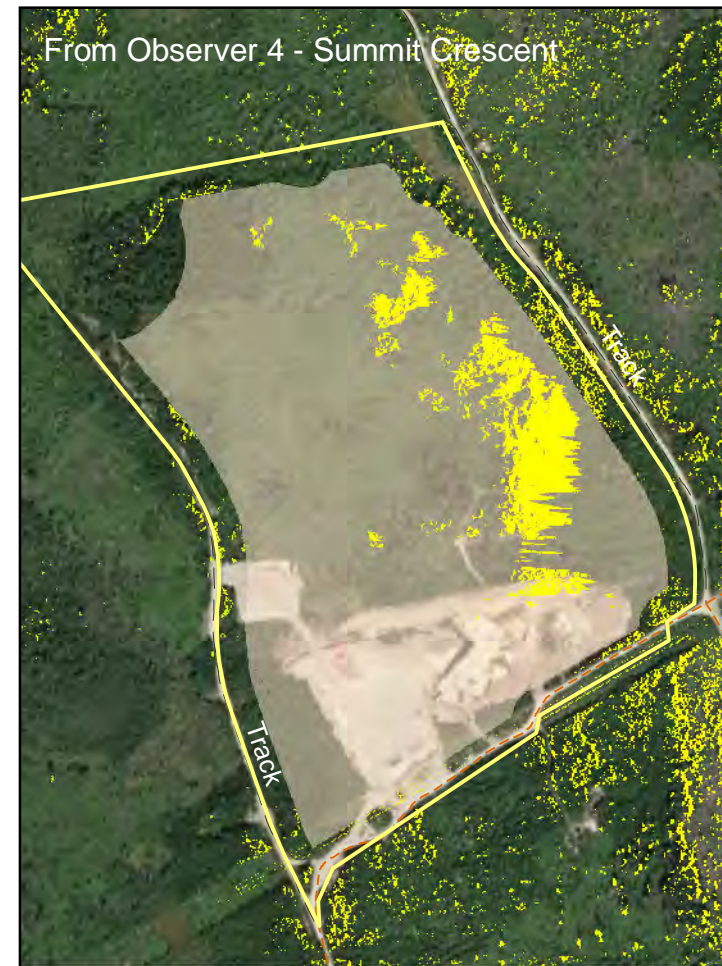
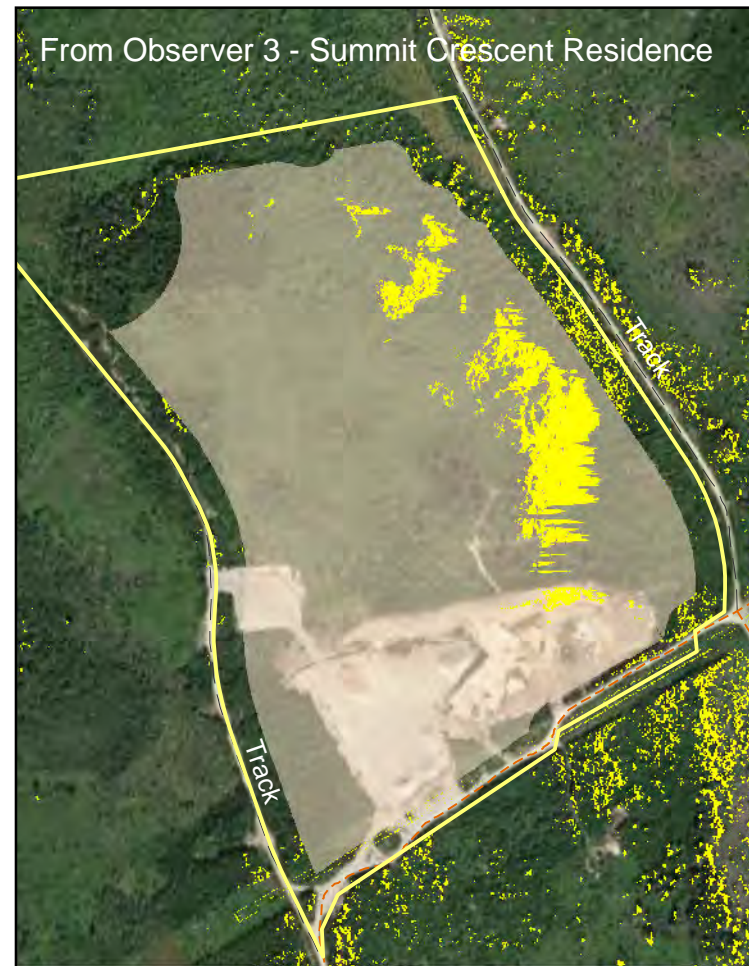
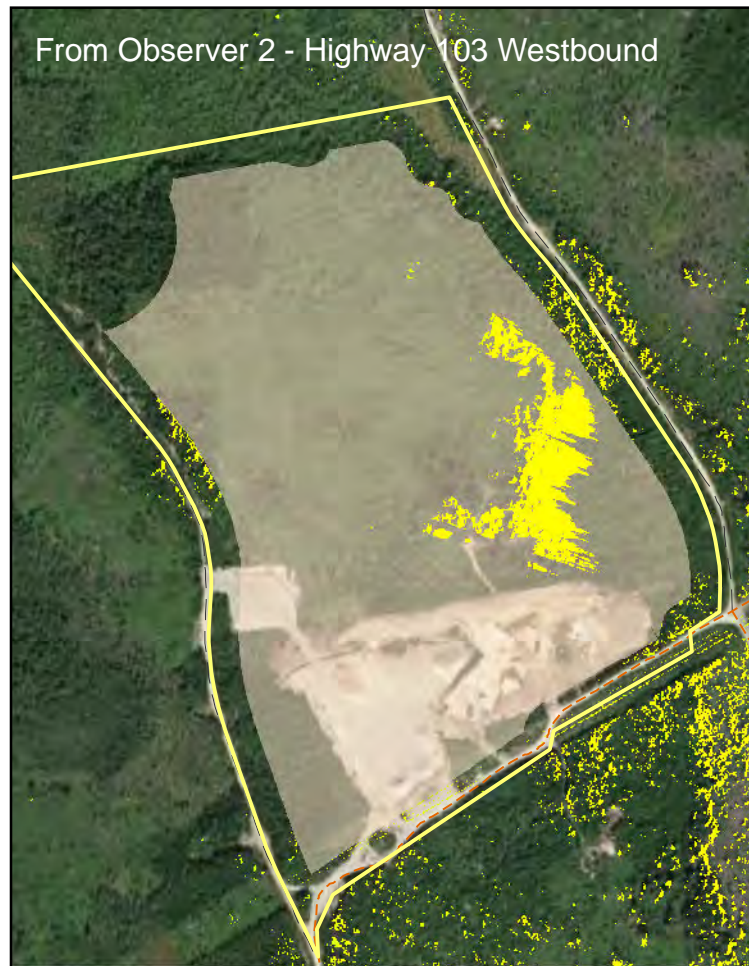
- observer height of 1.65 m (5 ft 7 in)
- standing on shoreline
- 360° viewing radius
- distance of Observer to property - 2.13 km
- maximum viewing distance from Observer - 2.7 km

The visual impact analysis is a snapshot in time based on full quarry development (full footprint) with no progressive reclamation. As the quarry is developed and progressively reclaimed views may change. Viewplanes may only see tops of trees. Changing heights of tree canopy through growth, or logging may alter the predicted effect.

<p>Paper Size ANSI B</p>  <p>Metres</p>			<p>SCOTIAN MATERIALS LIMITED          HEAD OF ST MARGAETS BAY, NOVA SCOTIA          TOTE ROAD QUARRY EXPANSION EA  <b>VIEWSHED ANALYSIS</b>  <b>OBSERVER 8</b>  <b>ISLAND LAKE</b></p>	<p>Project No. 11216599          Revision No. -          Date 22/04/2021</p>
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**FIGURE 11**





**Legend**

- Observer
- Potential Extraction Area

**Observer Results**

- Not Visible
- Visible

The visual impact analysis assumes:  
 - observer height of 1.65 m (5 ft 7 in) unless noted  
 - 360° viewing radius.

The visual impact analysis is a snapshot in time based on an undeveloped quarry (trees off). As the quarry is developed and progressively reclaimed views may change. Viewplanes may only see tops of trees and changing heights of tree canopy through growth, or logging may alter the predicted effect.

Reflective mapping using the fully developed quarry DSM in the potential extraction area.

Paper Size ANSI B

0 75 150 225  
Metres

Map Projection: Transverse Mercator  
 Horizontal Datum: North American 1983 CSRS  
 Grid: NAD 1983 CSRS UTM Zone 20N

SCOTIAN MATERIALS LIMITED  
 HEAD OF ST MARGAETS BAY, NOVA SCOTIA  
 TOTE ROAD QUARRY EXPANSION EA

VIEWSHED ANALYSIS  
 REFLECTIVE VIEW -  
 QUARRY UNDEVELOPED (DETAIL)



Project No. 11216599  
 Revision No. -  
 Date 22/04/2021

**FIGURE 12**







**Legend**

-  Observer
-  Potential Extraction Area

**Observer Results**

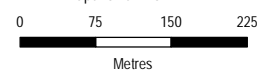
-  Not Visible
-  Visible

The visual impact analysis assumes:  
 - observer height of 1.65 m (5 ft 7 in) unless noted  
 - 360° viewing radius.

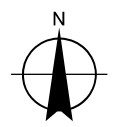

The visual impact analysis is a snapshot in time based on full quarry development (full footprint) with no progressive reclamation. As the quarry is developed and progressively reclaimed views may change. Viewplanes may only see tops of trees and changing heights of tree canopy through growth, or logging may alter the predicted effect.

Reflective mapping using the fully developed quarry DSM in the potential extraction area.

Paper Size ANSI B



Map Projection: Transverse Mercator  
 Horizontal Datum: North American 1983 CSRS  
 Grid: NAD 1983 CSRS UTM Zone 20N

SCOTIAN MATERIALS LIMITED  
 HEAD OF ST MARGAETS BAY, NOVA SCOTIA  
 TOTE ROAD QUARRY EXPANSION EA

**VIEWSHED ANALYSIS  
 REFLECTIVE VIEW -  
 QUARRY DEVELOPED (DETAIL)**

Project No. 11216599  
 Revision No. -  
 Date 22/04/2021

**FIGURE 13**



