Eagle Heights

CITY OF BURLINGTON

Visual Impact Assessment

August, 2018

Prepared By:
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Appendix A **Draft Terms of Reference and Visual Assessment Guidelines**
Appendix B **Excerpts from Planning Documents**
Appendix C **Methodologies for Viewshed Mapping and Photo Simulation**

1.0 Introduction

1.1 Background

Penta Properties Inc. (Penta) is undertaking development planning and engineering works in support of applications to amend the approved Draft Plans of Subdivision located in the Central Sector of the North Aldershot area of the City of Burlington.

This development is comprised of two draft plans: Eagle Heights (93.26 ha, see draft plan in pocket) and the former Taylor lands (8.95ha, see draft plan in pocket), The Penta ownership parcels are also known collectively as the Eagle Heights lands. Together, these two ownership parcels cover lots 7, 8 and 9, Concession 2 and the unopened road allowance between lots 7 and 8 respectively.

Within the approved draft plan lands; 3.7 ha of the Eagle Heights Draft Plan is situated north of a Hydro One Networks Inc (HONI) corridor; located within Niagara Escarpment Plan (NEP) area. Approval for a development permit issued by the Niagara Escarpment Commission (NEC) will be required, and to fulfill this requirement the NEC requires a Visual Impact Assessment (VIA). The NEC is also providing technical assistance to the City of Burlington in the review of the VIA for lands outside the NEP areas.

The Eagle Heights draft plan lands are bounded by the Grindstone Creek valley to the west and northwest and are situated north of Flatt Road, west of Waterdown Road, and south of Horning Road. The most northerly part of the Eagle Heights lands extends north of the Dundas-Burlington Hydro Corridor. The former Taylor property is located south of Flatt Road approximately 300m north of the 403; this property is bounded on the east and west by creek tributaries and is crossed by an 86m wide Mount Hope Hydro corridor (from east to west). Per the City of Burlington's Official Plan the area is defined as the Central Sector of North Aldershot.

The development area is characterized by rolling topography that slopes down southerly from the Niagara escarpment. Several valleys and watercourses including Grindstone Creek run through the area ultimately draining to Burlington Bay. The valley lands are heavily vegetated whereas the table lands vary in vegetation density. There are several open areas currently being farmed, and several residential dwellings. In the immediate areas around the subject lands residential settlement is predominately single-family homes, roughly 135 units occurring intermittently along Waterdown Road, Horning Road, Nevarc Drive, Craven Avenue, Flatt Road and Flatt Road Extension. Other notable buildings are the Woodview Learning and Child Centre on Flatt Road as well as Aldershot Landscape Contractors also on Flatt Road.

1.2 Scope of Works

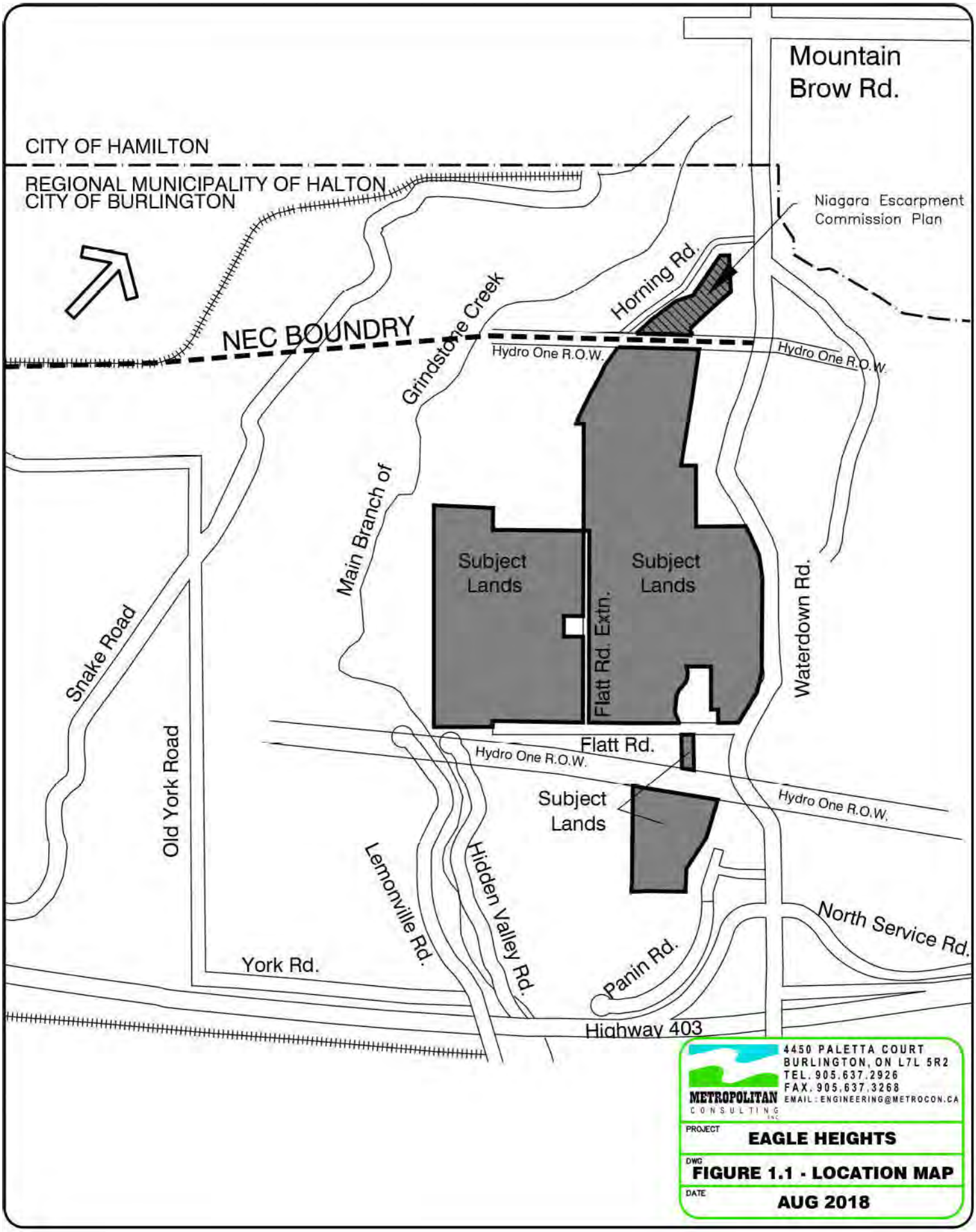
The area of development is shown on Figure 1.1, in accordance with the NEC Visual Assessment Guidelines (VAG, See Appendix A). The VIA will address the Purpose and Objectives of the Niagara Escarpment Plan, the principles of the North Aldershot Inter-Agency Review (NAIR) and the policies of the City of Burlington Official Plan Amendment 197 (OPA 197) with respect to visual impact. The Planning and Environmental Analyses carried out by Scott Burns Planning Consultants (SPBC) and Envision – The Hough Group (ENVision) suggests that views are being maintained by the development proposal. The VIA provides the documentation and basis for this conclusion.

The purpose of this report is to show the visual changes to the landscape of the Escarpment, through the construction of the proposed structures. Of particular interest are the proposed 4-storey cluster housing units and those units/structures which are located within the NEP lands. The report will compare the visual impact of the conceptual designs of these structures against the existing conditions. It will detail the methodology, and resources utilized. The report will detail any findings, and make recommendations based upon those findings.

In conjunction with the NEC a draft terms of reference (see Appendix A) was completed for this report. This report proceeds on the basis of the draft terms of reference and standard guidelines in the VAG published by the NEC in August, 2017.

In addition part of the VIA as outlined in the 2018 Functional Servicing Report (FSR) prepared by MCI, the installation of a water storage site for the purpose of water distribution is required. 3 possible sites for the water structure have been identified as suitable, through discussion with Regional of Halton (Region) staff. Investigated separately, this chapter aims to examine all 3 alternatives for visual impact. The potential impacts of the various locations have been investigated in Section 7.0 of this report.

The proposed development within and outside NEP lands and water reservoir alternatives will be evaluated against the following documents: the NAIR, OPA 197 and the NEP (see Appendix B). OPA 197 has been utilized as the main document. OPA 197 was derived from the recommendations of NAIR such that both documents share the same views and overall direction. Likewise the NEP states that the proposed Eagle Heights development has been deemed a “special policy area”, and development can proceed under OPA 197.



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PROJECT **EAGLE HEIGHTS**

DWG **FIGURE 1.1 - LOCATION MAP**

DATE **AUG 2018**

1.3 General Methodology

As recommended within the VAG there are different methods for completion of a VIA. The investigative methods that will be utilized in this study will comply with these guidelines. Those methods include:

1. Viewshed Mapping
2. Perform a Field check of Viewshed Mapping
3. Aerial Models
4. Photographic Simulation
5. Line of sight cross sections

In conjunction with the draft terms of reference relating to the development as a whole, an overall approach was determined. The method for analyzing any potential visual impact of any proposed structure was carried out as follows:

1. Generate a Viewshed for the desired area, to determine any potential areas of concern. If there are visually affected areas, these areas were then considered from the standpoint of public interaction with the structures.
2. A field check was performed to check areas of visibility from the Viewshed Mapping. Verification of these areas through photographic means, and selection of areas to further investigate visibility impacts.
3. Provide accurate Aerial models of the proposed development to visualize the proposed changes. Buildings are based on envelopes and are an estimate of final size.
4. For these areas where visibility and public use overlap, a photographic simulation or line of sight cross section was completed to determine the resultant potential visual impacts. Buildings are based on envelopes and are an estimate of final size.
5. Review the resultant visual impacts (if any) to determine if additional study is required, or other areas of impact should be reviewed.
6. Determine results of the proposed development and present findings.

The specific methodologies for Viewshed maps and photo simulations are explained further within Appendix C of this report.

Part 1 Visual Impact Analysis for Lands Outside NEP

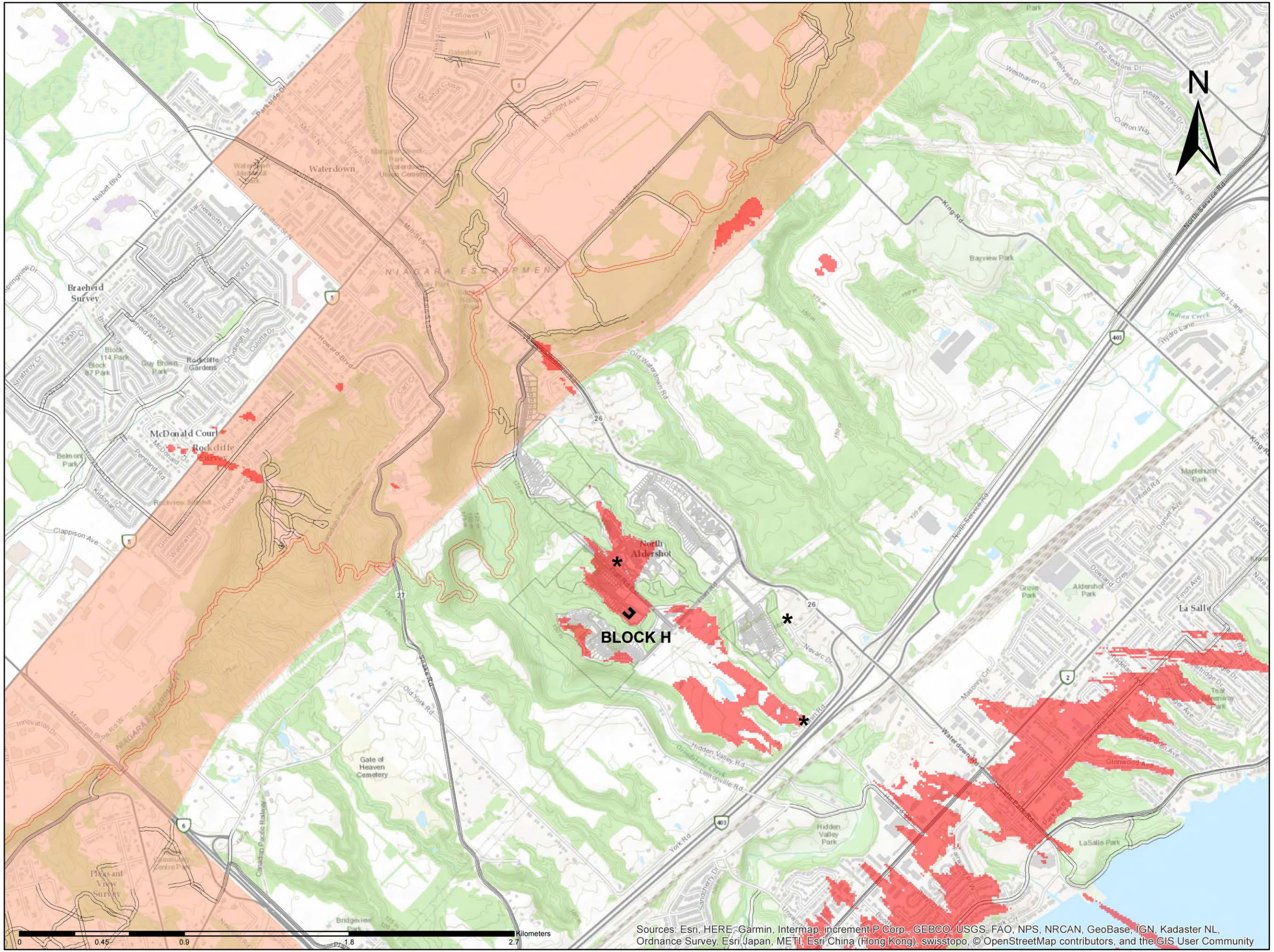
2.0 Viewshed Analysis

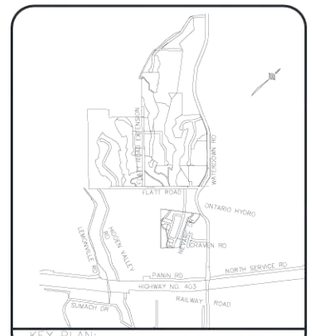
Based on the terms of reference, the main visual concern for the proposed development location are 3 low-rise apartment blocks at 4 storeys in height and Cluster housing throughout the site. The initial stage of the investigation is the construction of a Viewshed map. The Viewshed map for these structures is generated to provide a mathematical visualization of where they may be visible in the surrounding environment. Specific steps and information regarding the software and process in the creation of the various Viewsheds can be found in Appendix C. Viewshed maps were created for each apartment block and cluster housing block as well as a combined map for the 3 apartment blocks to show the overall visibility of those structures. The various figures showing the viewshed mapping are listed below.

Viewshed Mapping:
Figure 2.1 – Viewshed for Block H (Low rise 4 storey apartment)
Figure 2.2 – Viewshed for Block OO (Low rise 4 storey apartment)
Figure 2.3 – Viewshed for Block P (Low rise 4 storey apartment)
Figure 2.4 – Viewshed for Block D & E (2 storey cluster housing)
Figure 2.5 – Viewshed for Block CC & DD (2 storey cluster housing)
Figure 2.6 – Viewshed for Block JJ & K (2 storey cluster housing)
Figure 2.7 – Viewshed for Block SS (2 storey cluster housing)
Figure 2.8 – Viewshed for Block G (2 storey cluster housing)
Figure 2.9 – Viewshed for combined Block OO, H and P low rise apartments

Each of the figures displays the potential visibility area of each proposed structure by comparing elevation values of the terrain to the structure. Field checks were necessary because the terrain model data can not completely detail surrounding; more complicated environments such as developed downtown Burlington. With guidance from the NEC and set out in the Terms of Reference points of concern were identified, referred to as Key Viewpoints going forward. These views were chosen to represent and include views from Waterdown Road into the site, views from the Escarpment looking south, views from Flatt Road and Panin Road looking north and views through the site to determine the effect of the development on the landscape character of the North Aldershot area. Views from the Bruce Trail are not required in this instance due to the lack of site visibility. The scope of the viewshed study area is generally between Highway 403 and the Escarpment.

Each figure shows the Key Viewpoints, where further investigations through field observation, photo simulations and line of sight analysis are carried out.





ASSUMPTIONS

HEIGHT OF PROPOSED BUILDINGS - 16.0m
HEIGHT OF TREE CANOPY - 15.0m
HEIGHT OF VIEWER - 1.7m

LEGEND

- CLUSTER HOUSING BLOCK H
- KEY VIEW POINT
- NIAGARA ESCARPMENT POLICY AREA
- VISIBLE AREA
- WOODED AREA
- BRUCE TRAIL
- TRAIL NETWORK

CLIENT

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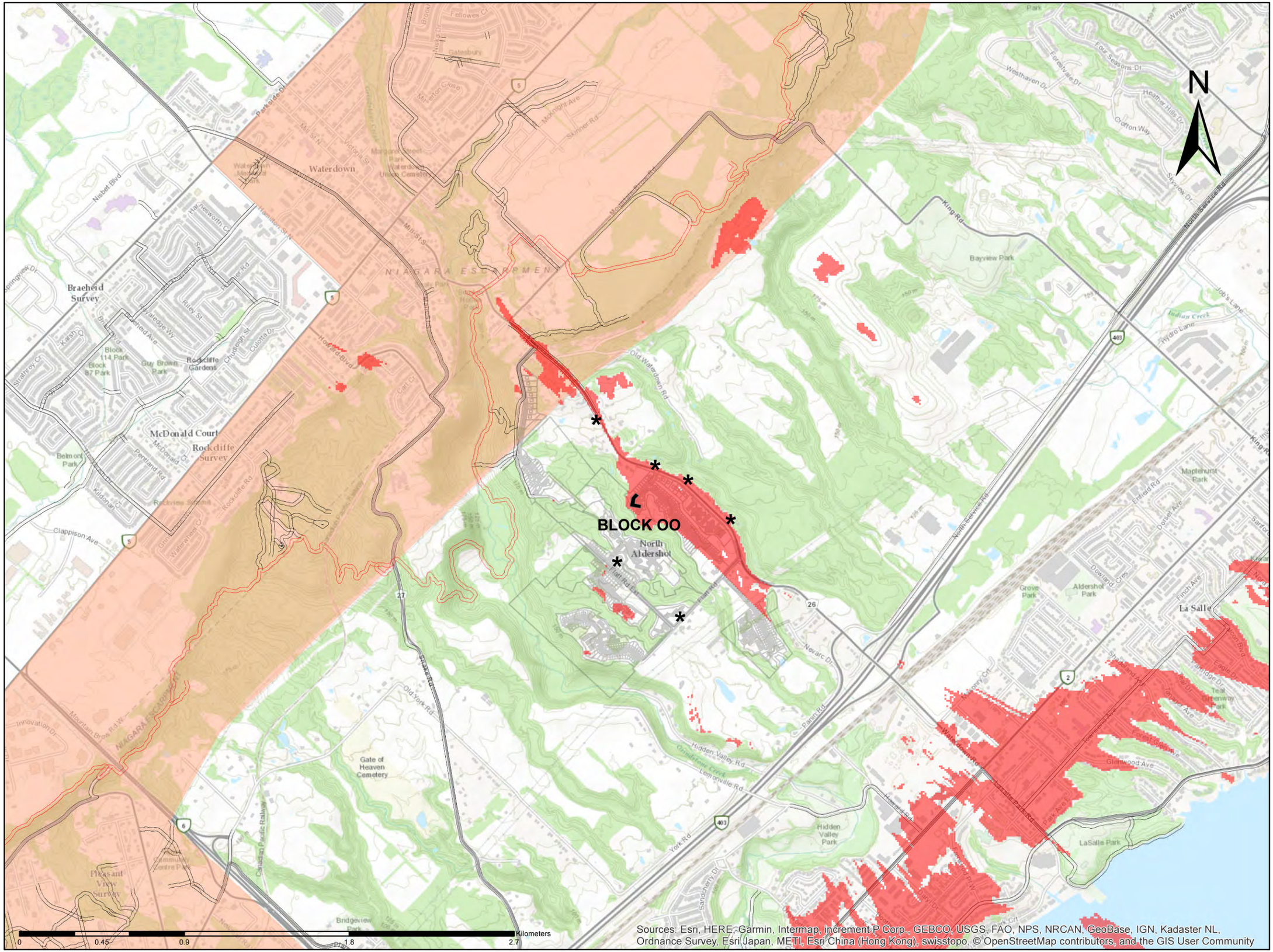
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VISUAL IMPACT ASSESSMENT

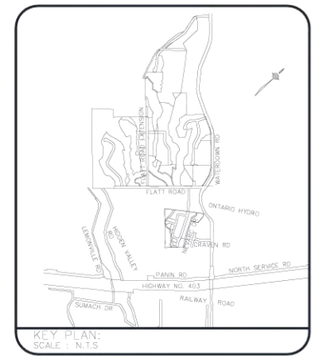
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VIEWSHED MAPPING FOR BLOCK H (LOW RISE 4 STOREY APARTMENT)

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FIGURE 2.1





ASSUMPTIONS

HEIGHT OF PROPOSED BUILDINGS - 16.0m
HEIGHT OF TREE CANOPY - 15.0m
HEIGHT OF VIEWER - 1.7m

LEGEND

- CLUSTER HOUSING (BLOCK OO)
- KEY VIEW POINT
- NIAGARA ESCARPMENT POLICY AREA
- VISIBLE AREA
- WOODED AREA
- BRUCE TRAIL
- TRAIL NETWORK

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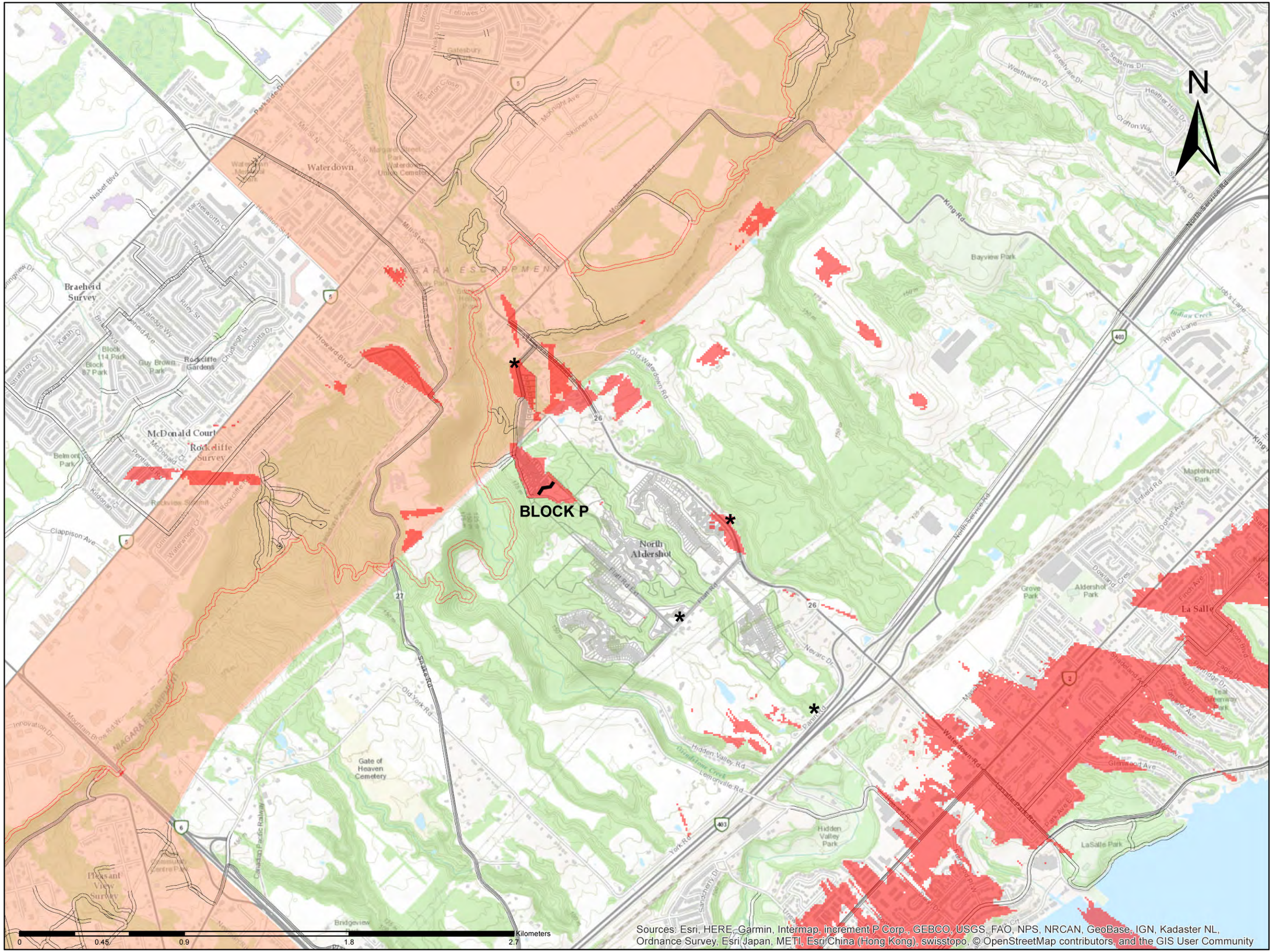
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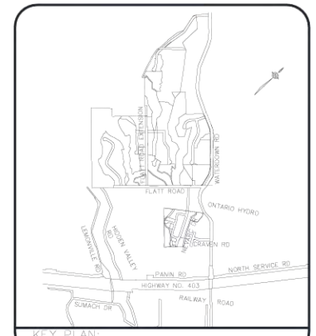
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VIEWSHED MAPPING FOR BLOCK OO (LOW RISE 4 STOREY APARTMENT)

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FIGURE 2.2





ASSUMPTIONS

HEIGHT OF PROPOSED BUILDINGS - 16.0m
HEIGHT OF TREE CANOPY - 15.0m
HEIGHT OF VIEWER - 1.7m

LEGEND

- CLUSTER HOUSING BLOCK P
- **KEY VIEW POINT**
- NIAGARA ESCARPMENT POLICY AREA
- VISIBLE AREA
- WOODED AREA
- BRUCE TRAIL
- TRAIL NETWORK

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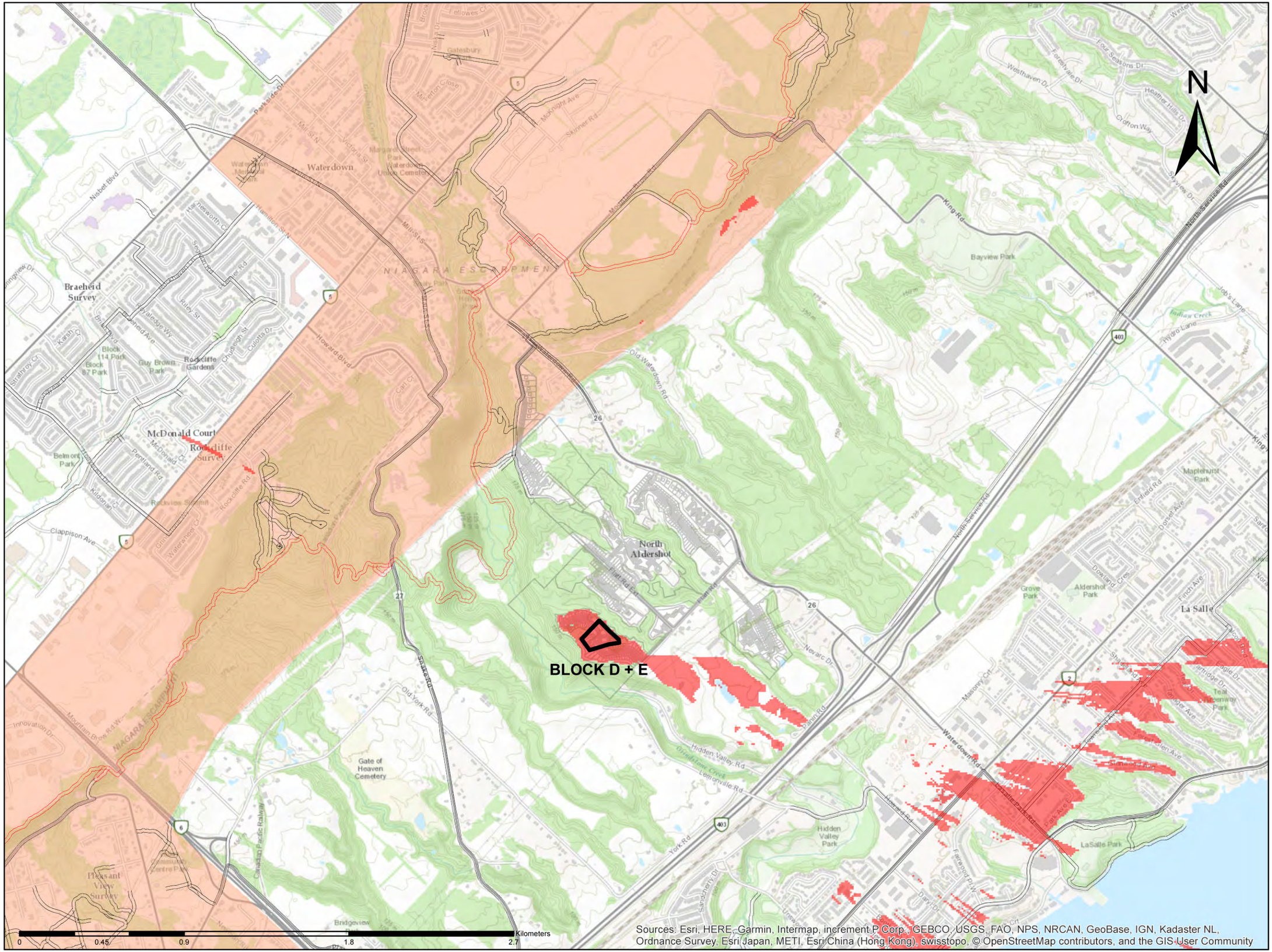
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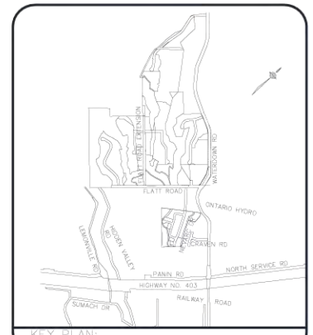
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VIEWSHED MAPPING FOR BLOCK P (LOW RISE 4 STOREY APARTMENT)

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FIGURE 2.3





ASSUMPTIONS

HEIGHT OF PROPOSED BUILDINGS - 8.0m
HEIGHT OF TREE CANOPY - 15.0m
HEIGHT OF VIEWER - 1.7m

LEGEND

- CLUSTER HOUSING BLOCK D + E
- **KEY VIEW POINT**
- NIAGARA ESCARPMENT POLICY AREA
- VISIBLE AREA
- WOODED AREA
- BRUCE TRAIL
- TRAIL NETWORK

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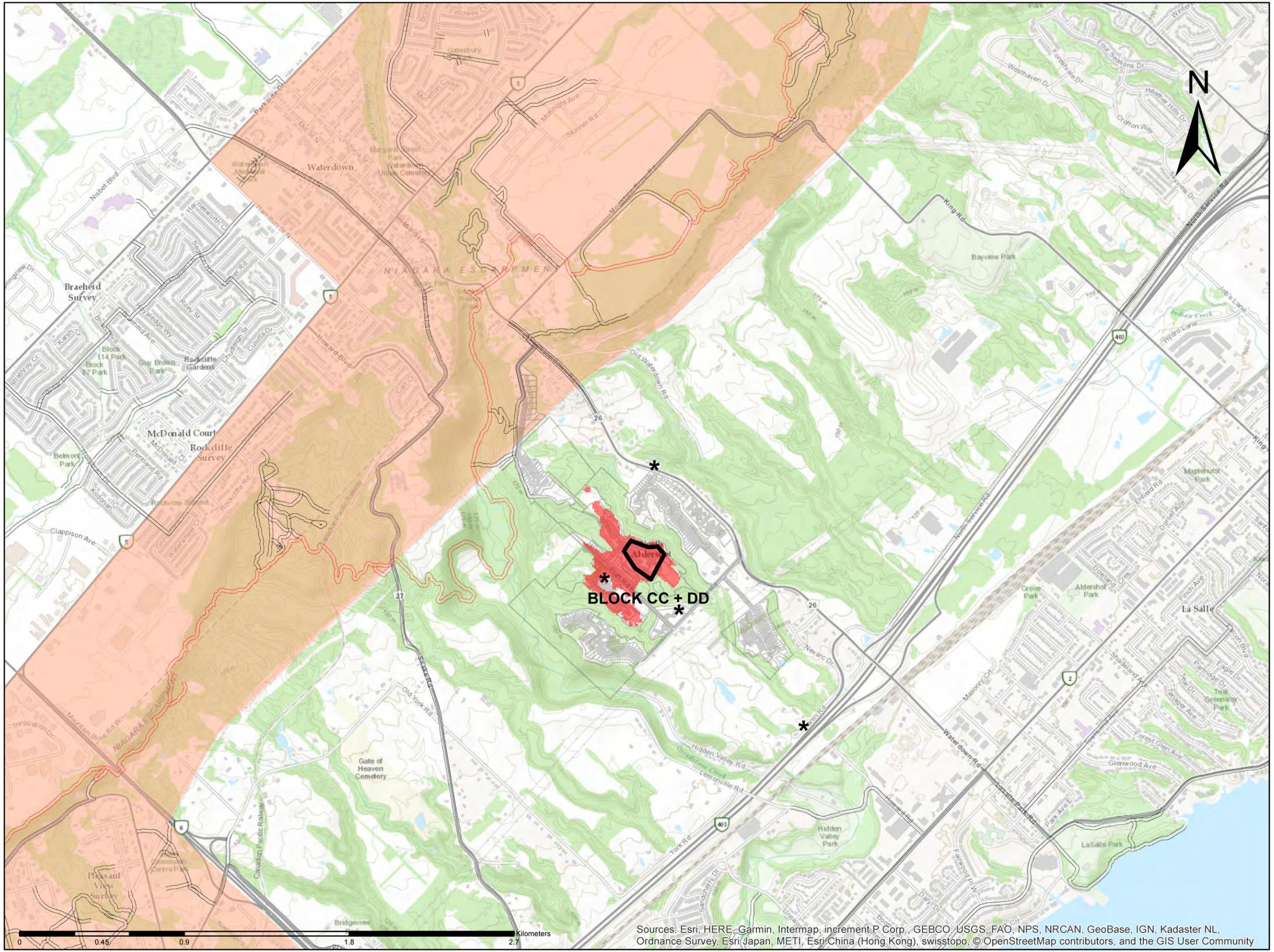
EAGLE HEIGHTS VISUAL IMPACT ASSESSMENT

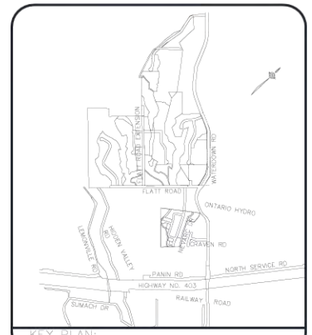
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VIEWSHED MAPPING FOR BLOCK D + E (2 STOREY CLUSTER HOUSING)

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FIGURE 2.4





ASSUMPTIONS

HEIGHT OF PROPOSED BUILDINGS - 8.0m
HEIGHT OF TREE CANOPY - 15.0m
HEIGHT OF VIEWER - 1.7m

LEGEND

- CLUSTER HOUSING BLOCK CC + DD
- KEY VIEW POINT
- NIAGARA ESCARPMENT POLICY AREA
- VISIBLE AREA
- WOODED AREA
- BRUCE TRAIL
- TRAIL NETWORK

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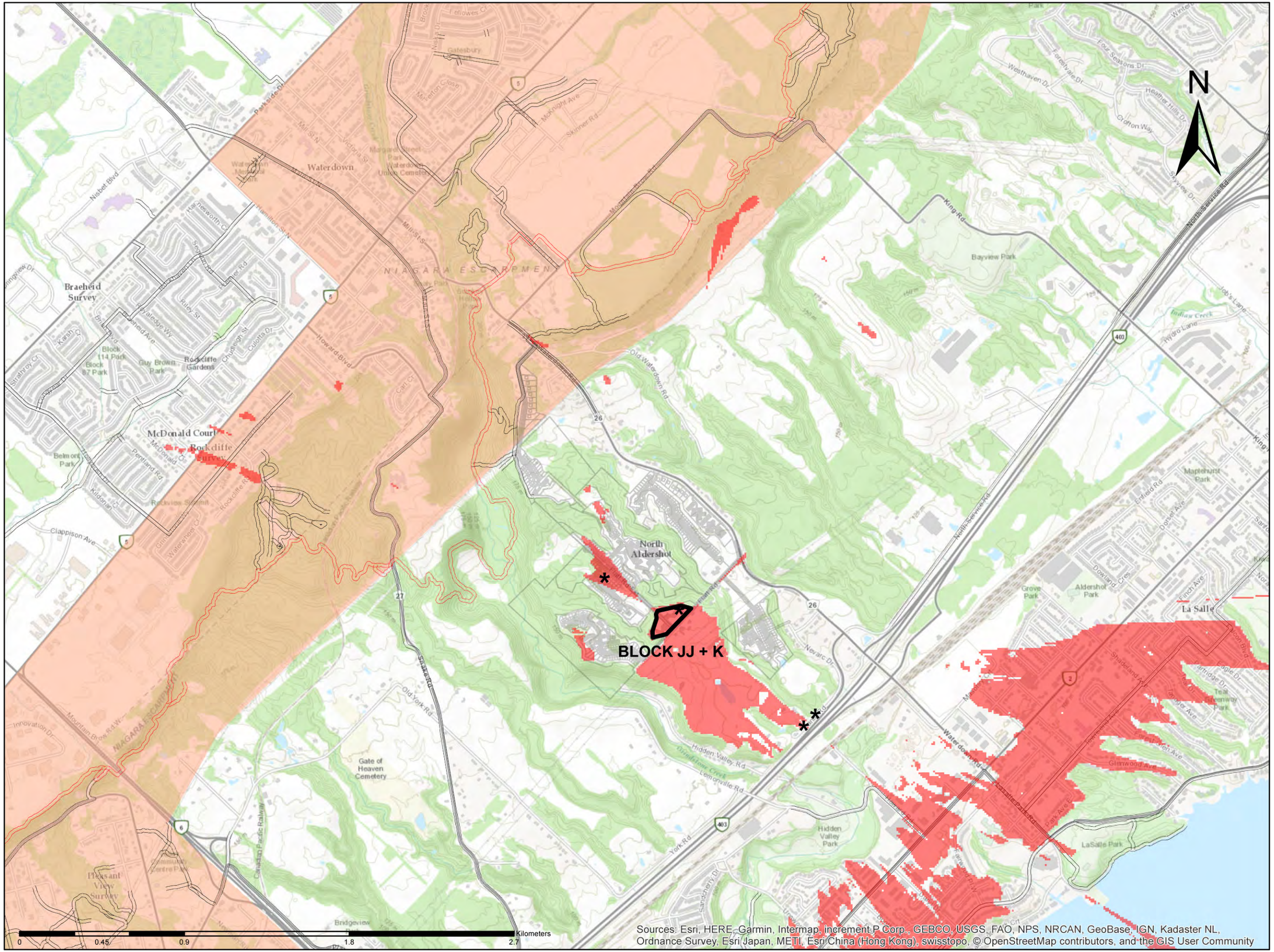
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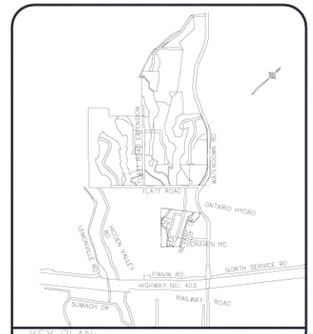
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VIEWSHED MAPPING FOR BLOCK CC + DD (2 STOREY CLUSTER HOUSING)

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FIGURE 2.5





ASSUMPTIONS

HEIGHT OF PROPOSED BUILDINGS - 8.0m
HEIGHT OF TREE CANOPY - 15.0m
HEIGHT OF VIEWER - 1.7m

LEGEND

- CLUSTER HOUSING BLOCK JJ + K
- KEY VIEW POINT
- NIAGARA ESCARPMENT POLICY AREA
- VISIBLE AREA
- WOODED AREA
- BRUCE TRAIL
- TRAIL NETWORK

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VISUAL IMPACT ASSESSMENT

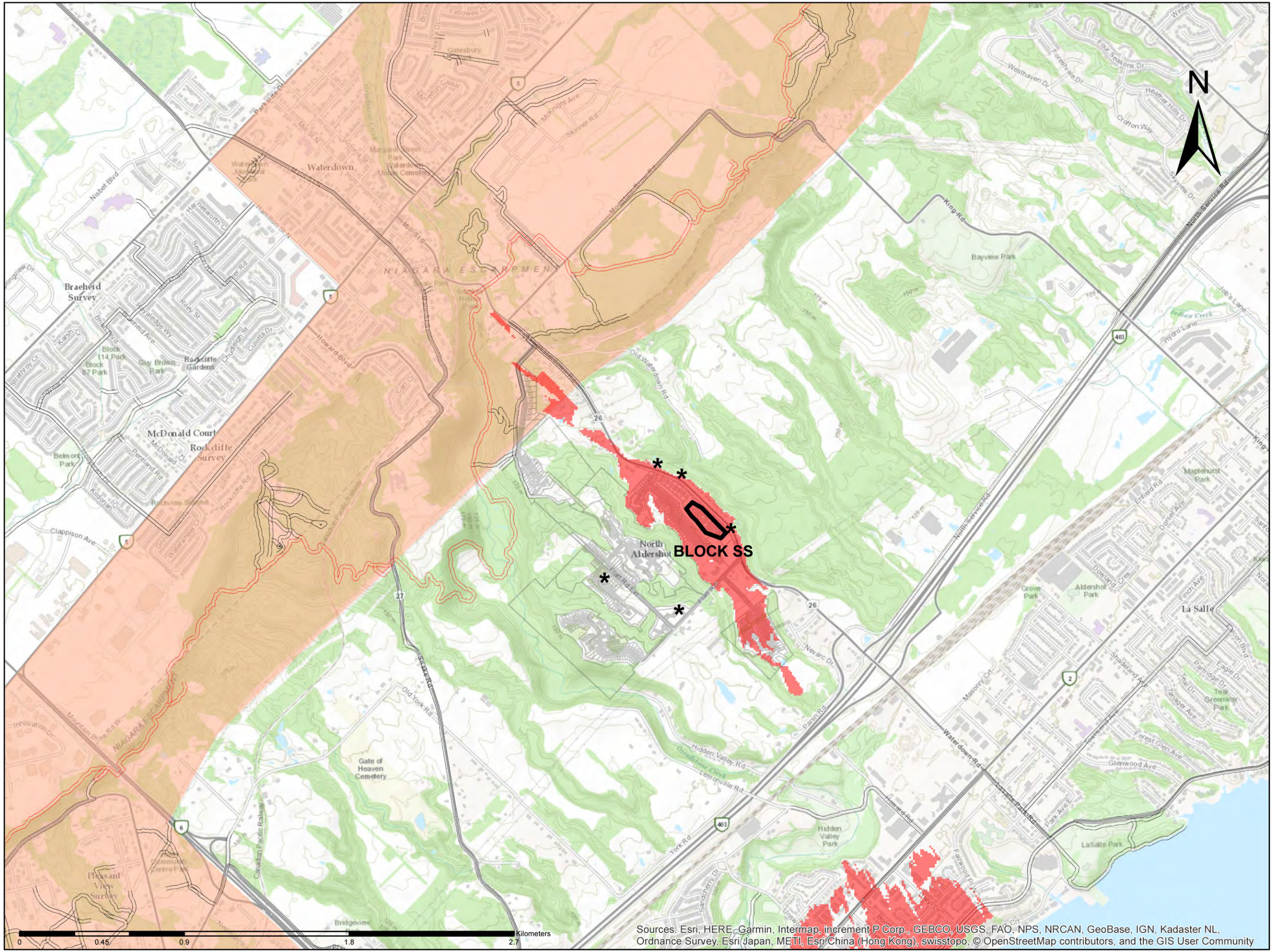
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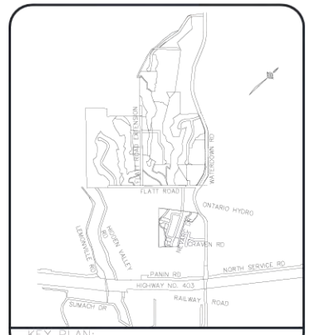
VIEWSHED MAPPING FOR BLOCK JJ + K (2 STOREY CLUSTER HOUSING)

DATE: **AUG 2018**

PROJECT NO.: **P09006**

FIGURE 2.6





ASSUMPTIONS

HEIGHT OF PROPOSED BUILDINGS - 8.0m
HEIGHT OF TREE CANOPY - 15.0m
HEIGHT OF VIEWER - 1.7m

LEGEND

- CLUSTER HOUSING BLOCK SS
- KEY VIEW POINT
- NIAGARA ESCARPMENT POLICY AREA
- VISIBLE AREA
- WOODED AREA
- BRUCE TRAIL
- TRAIL NETWORK

CLIENT

PENTA PROPERTIES INC.
4480 PALETTA COURT
BURLINGTON
ON L7L 5R2

MUNICIPALITY

CITY OF BURLINGTON, ONTARIO, CANADA

SCALE

1:20,000

METROPOLITAN CONSULTING
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TEL. 905.637.2926
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PROJECT

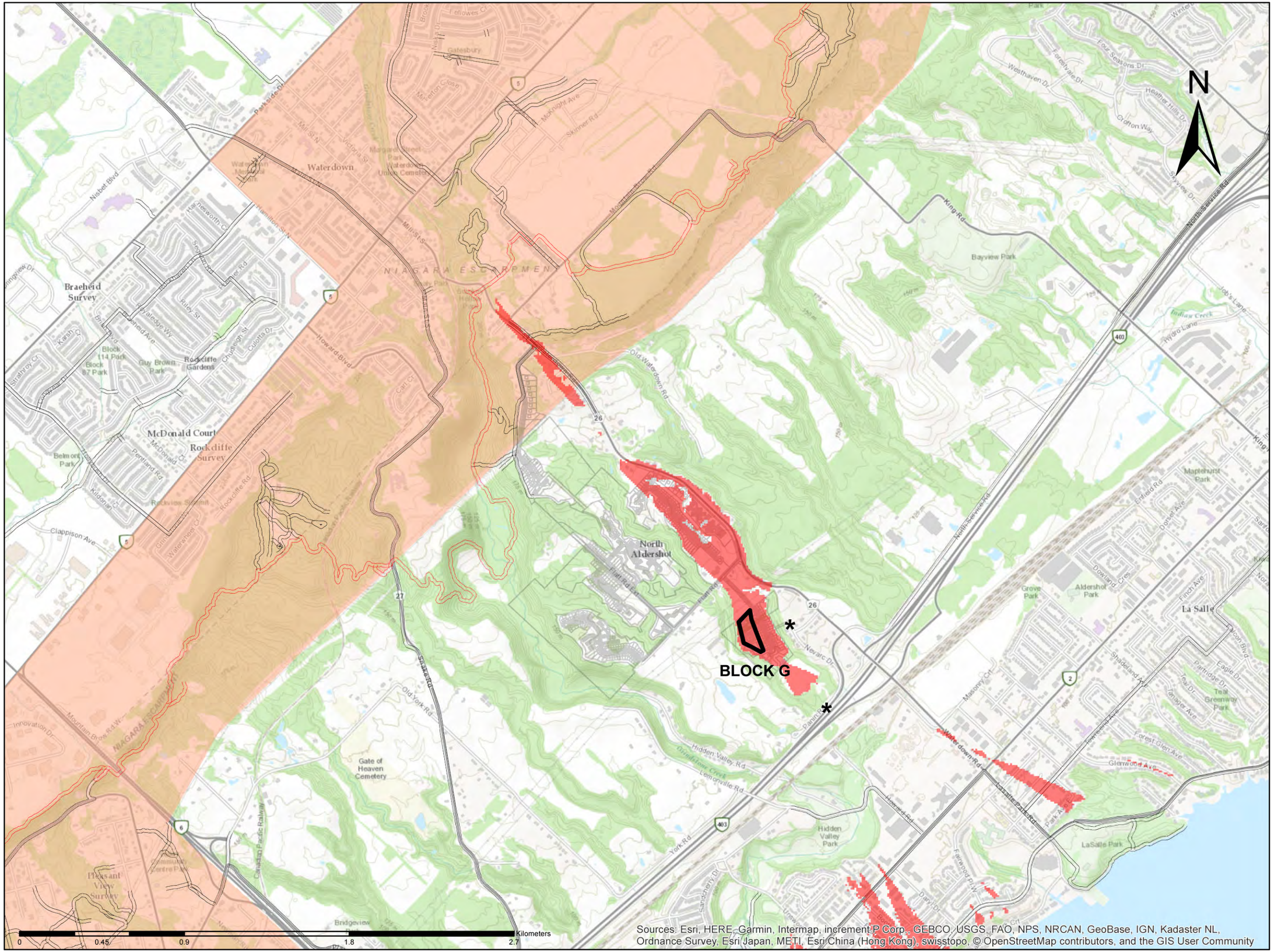
EAGLE HEIGHTS
VISUAL IMPACT ASSESSMENT

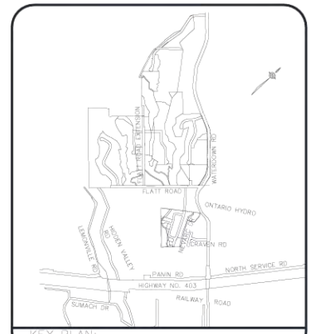
DWG

VIEWSHED MAPPING FOR BLOCK SS (2 STOREY CLUSTER HOUSING)

DATE	PROJECT NO.
AUG 2018	**P09006**

FIGURE 2.7





ASSUMPTIONS

HEIGHT OF PROPOSED BUILDINGS - 8.0m
HEIGHT OF TREE CANOPY - 15.0m
HEIGHT OF VIEWER - 1.7m

LEGEND

- CLUSTER HOUSING BLOCK G
- KEY VIEW POINT
- NIAGARA ESCARPMENT POLICY AREA
- VISIBLE AREA
- WOODED AREA
- BRUCE TRAIL
- TRAIL NETWORK

CLIENT

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ON L7L 5R2

MUNICIPALITY

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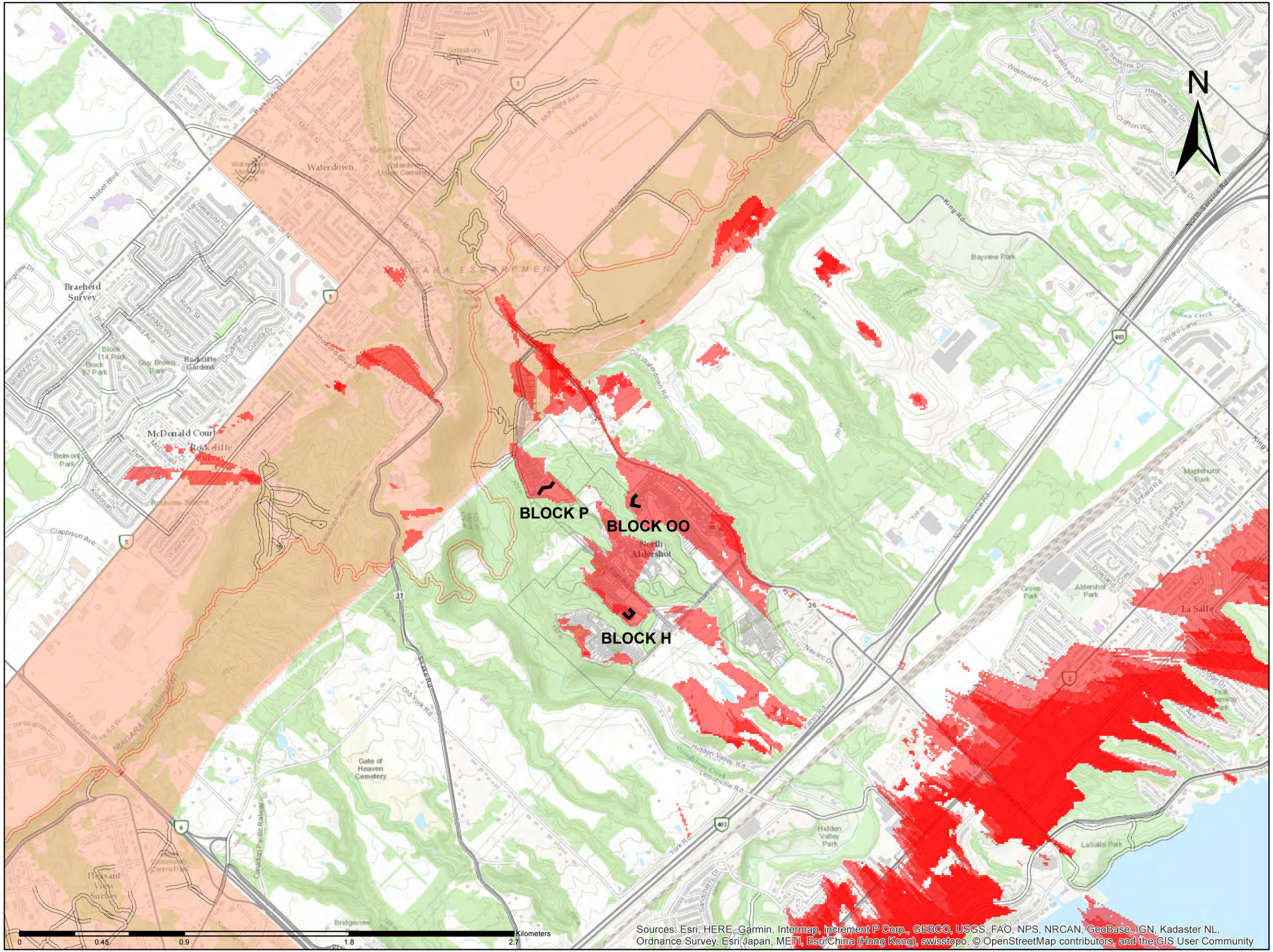
EAGLE HEIGHTS
VISUAL IMPACT ASSESSMENT

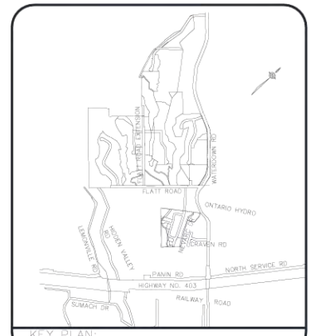
DWG

VIEWSHED MAPPING FOR BLOCK G (2 STOREY CLUSTER HOUSING)

DATE	PROJECT NO.
AUG 2018	**P09006**

FIGURE 2.8





ASSUMPTIONS

HEIGHT OF PROPOSED BUILDINGS - 8.0m
HEIGHT OF TREE CANOPY - 15.0m
HEIGHT OF VIEWER - 1.7m

LEGEND

- CLUSTER HOUSING BLOCK H, OO, P
- KEY VIEW POINT
- NIAGARA ESCARPMENT POLICY AREA
- VISIBLE AREA
- WOODED AREA
- BRUCE TRAIL
- TRAIL NETWORK

CLIENT

PENTA PROPERTIES INC.
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MUNICIPALITY

CITY OF BURLINGTON, ONTARIO, CANADA

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PROJECT

EAGLE HEIGHTS
VISUAL IMPACT ASSESSMENT

DWG

COMBINED VIEWSHED MAPPING OF BLOCK H, OO, AND P

DATE **AUG 2018**

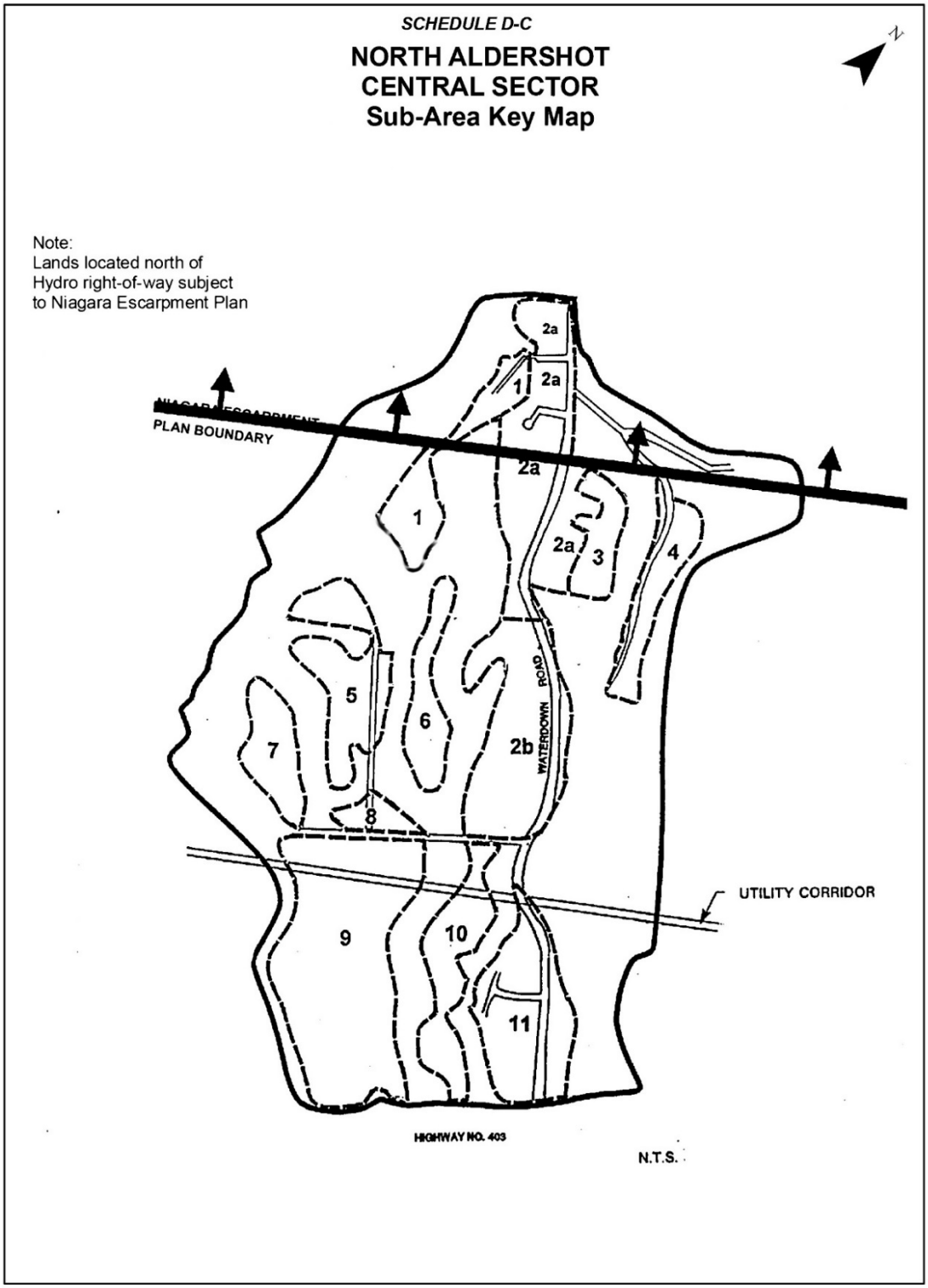
PROJECT NO. **P09006**

FIGURE 2.9

3.0 Assessment of Existing Conditions and Proposed Development Impacts

OPA 197 locates the proposed development within the 'Central Sector' of North Aldershot and further breaks down the area into sub areas (Figure 3.1). The existing visual character of these areas is documented through photographs, aerial models, and site visits. The proposed changes in each sub area are explored through their impact on the landscape and viewers.

The assessment of each Sub-Area, based upon the Key Viewpoints from previous Viewshed mapping have been completed in order to examine the visual impacts of the development. In order to facilitate the investigation, parameters were chosen as well as the weighting of the impacts, as well as the possible mitigation to minimize these impacts for each Sub-Area.

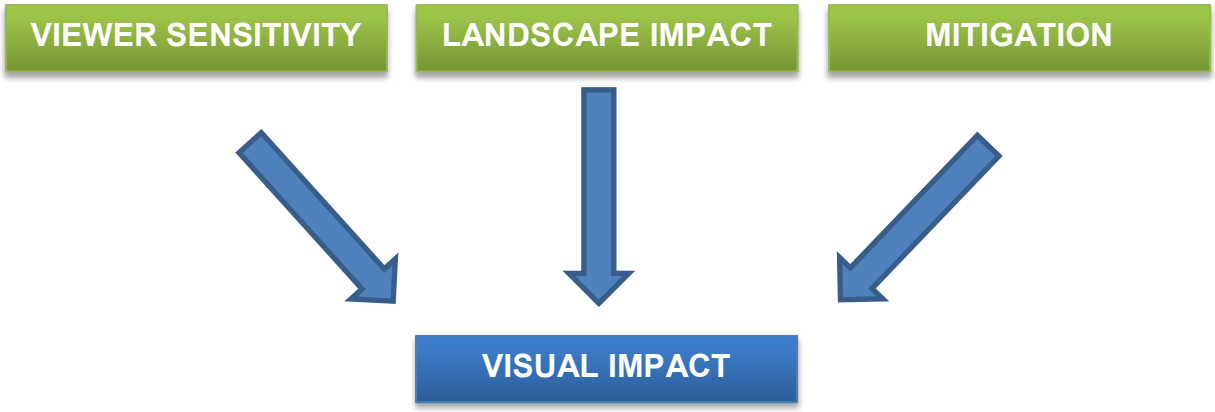


From City of Burlington Official Plan OPA 197 – North Aldershot Central Sector. Figure 3.1

Landscape Impact

3.1 Sub-Area Characterisation

To quantify the visual impact of the development, this assessment will first take the factors of viewer sensitivity, landscape impact and mitigation to be used as a matrix to quantify the resultant visual impact.



In order to weigh the potential impacts of development in a sub-area it is necessary to understand the existing character of the land. Assessing the existing characteristics requires review of it from a Scenic Resource standpoint, assessing the Landscape Impact level, determining whom will be viewing or experiencing the area, the viewers' sensitivity, and weighing the effectiveness of any possible mitigations techniques.

A matrix of these considerations has been applied to each Sub-Area, after the simulations to assess the potential impacts each development may have at a local level. The following sections detail the range of interactions that the potential development may have with the existing lands, as well as providing visual aids used in making these assessments.

3.2 Definitions of Visual Impact Considerations

Definitions used for this assessment are as follows:

3.2.1 Scenic Resource

The NEP defines a Scenic Resource as:

"The general appearance of a place or landscape, or the features of a landscape, taking into consideration the visual condition and scenic quality, which vary by location and are dependent on features such as geology, vegetation, landforms, and human developments. The heritage attributes of protected heritage properties may also include or be, in themselves, scenic resources."

Each of the Sub-Area assessments identifies and describes the Scenic Resource potentially impacted.

3.2.2 Landscape Impact Level

The Landscape Impact Level is a measure of how an existing landscape will be visually affected by a change to existing patterns, character, topography and features.
Impact takes into account the ability of the landscape to accommodate the change, i.e. a downtown urban area is less impacted by new construction of a building than an open coastal area landscape. Each Sub-Area has been assessed on a scale defined below:

Table 1 Landscape Impact Level

Landscape Impact Level	
High	·Significant change to the landscape from removal or altering of defining features, characteristics or elements ·View of landscape is negatively altered for 10+ years and its quality reduced.
Moderate	·Noticeable change to the landscape from removal or altering of defining features, characteristics or elements ·Partial Mitigation is possible. ·Changes to landscape are conflicting and inconsistent with existing character and form. ·Will have a negative effect on sensitive landscape. ·View recovery in 5-10 years.
Low	·Minor change to the landscape from removal or altering of defining features, characteristics, elements or addition of visible elements that are compatible with existing landscape. ·Some negative impact on view, recovery in 0-5 years
Negligible	·Insignificant or no change to landscape defining features, characteristics or elements ·Existing landscape quality maintained with slight inconsistencies.

3.2.3 Viewer Sensitivity

Defined as how sensitive the viewer of the proposed change is to any visual changes from proposed development based on things such as location of the viewer, duration of their view and extent of view. Assessed on a scale defined below:

Table 2 Viewer Sensitivity Level

Viewer Sensitivity Level	
High	·Outdoor recreational users where their attention is focused on the landscape. ·Residents of homes that are in close proximity of the changes
Moderate	·Outdoor workers with recurring views of the changes while their attention is on work. ·Outdoor recreational users whose attention is more focused on their activity but have recurring views of the changes.
Low	·Motorists driving through or near the area of development exposed to short term views ·Indoor workers with possible views of the changes.
Negligible	·Motorists driving through or near the area of development exposed to short term views and are partially screen. ·Short term viewers where there is screening though vegetation or buildings present.

3.2.4 Mitigation

Any means, procedure, design or process to reduce, prevent, compensate or correct negative impacts to the landscape or Viewshed caused by development. Individual mitigation recommendations are provided for each Sub-Area.

3.2.5 Visual Impact

The overall significance of the visual impact as a product of Landscape Impact, Viewer Sensitivity and Mitigation, weighted by factors such number of different viewers, extent of view, and duration of view.

3.3 Overall Visual Characteristic

The following Figure 3.1 represents the existing conditions present in the development area. As per the NAIR preserving the visual characteristics of the area is to be of great import. Specifically:

" Have regard for the visual experience of the landscape of the North Aldershot area as a single entity, e.g. significant views of North Aldershot from Hamilton and other areas, visual quality as generally experienced throughout the area;"
• Reinforce predominantly rural characteristics of the North Aldershot area;"

"• Minimize forest fragmentation, and to the greatest extent possible, retain significant trees and significant vegetation... Creeks, Valleys and Ravines"

"• Do not permit extensive areas of contiguous urban development;
• Have regard for the "view from the road" for vehicles passing through the area, e.g. character of Waterdown Road, Snake Road, character of Highway 403 corridor.
• Acknowledge "gateways" to the area from Burlington, Hamilton, and Flamborough; locate identifiable boundaries; and reserve utility corridors, e.g. hydro, pipeline."

As the site is large, each Sub-Area has different characteristics to be considered. Each Sub-Area has visual representations of the proposed development completed in order to aid in the characterization of the Visual Impact. Each Sub-Area has also been provided with a table to collect the Visual Impact Considerations.



Figure 3.1 - Existing Condition Overall site

3.4 Sub area #1 -Horning Road (North section)

As shown on the attached Draft Plan of subdivision, the approved development north of the hydro corridor in Sub-Area 1 is comprised of 10 lots fronting onto a public roadway. Of note is two of the proposed lots are currently being considered for use for infrastructure to service the development as well as the existing North Aldershot Area. Information specific to this infrastructure can be found in both Part 2 - Water Reservoir Alternatives of this report, and the FSR prepared by MCI. Briefly stated, two of the approved lots are being considered separately for repurposing as a proposed water reservoir.

Figure 3.2 shows an aerial view of the existing development area around Sub-Area 1 (North). The following Figure 3.3 and Figure 3.4 show the proposed development and its interaction with the surrounding area.

The detailed visual impact considerations have been collected into Table 3 Sub-Area 1 (North) Visual Impact Considerations, including potential mitigation options.

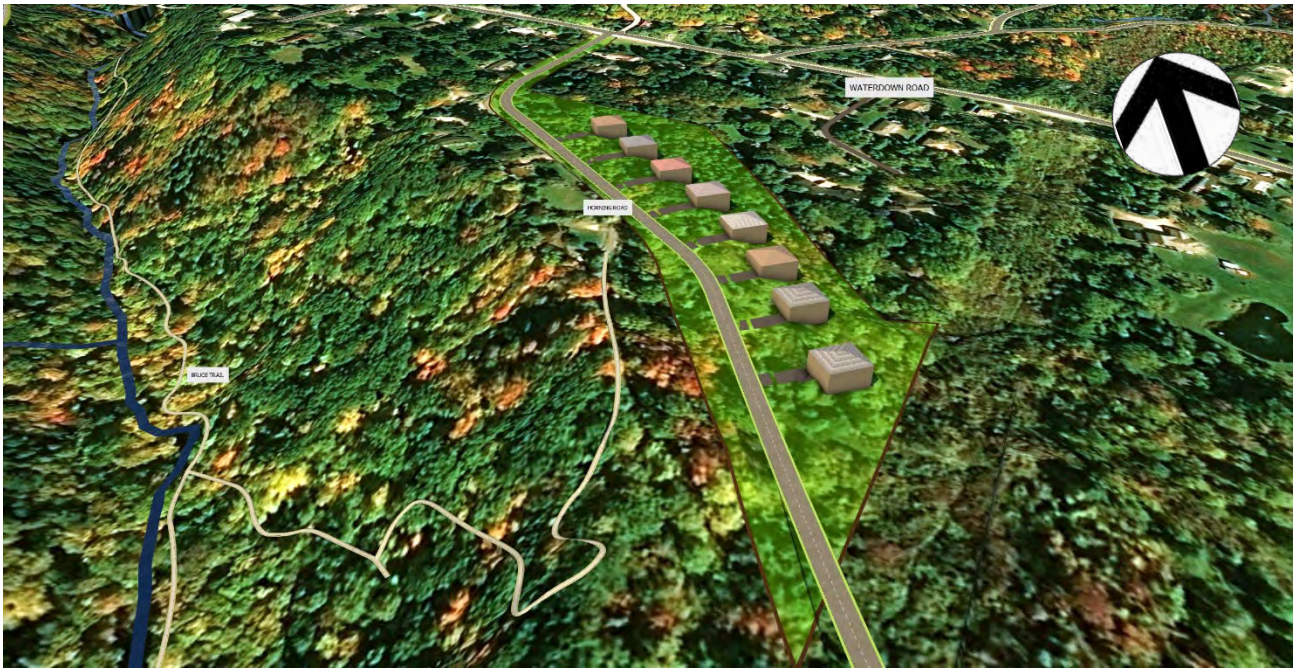
An assessment of the proposed water reservoirs has been completed as previously stated under Section 7.0 of this report.



Figure 3.2 - ***Existing Site - Sub Area 1(North Section)***



Figure 3.3 - ***Approved Development – Sub Area 1(North Section)***



Approved Development – Sub Area 1(North Section)



Figure 3.4 - ***Approved Development – Sub Area 1(North Section)***

Table 3 Sub-Area 1 (North) Visual Impact Considerations

Sub Area 1(North Section)

Scenic Resources

Cultural heritage resource in the historic home at existing road bend. Existing homes with mature gardens and tree coverage. Views to Burlington Bay and Hamilton from elevated north end of road and existing homes. Medium density wooded area on East side of Road with noticeable hydro lines and yellow guy wires. Unkempt Trail head access.

Landscape Impact:

Moderate-High

Topography grade is left mostly intact, road extension to follow existing ground profile.
High impact on vegetation within the building envelopes for the area.

Viewer Sensitivity:

Moderate-High

The potential viewers of the proposed development in this sub area are current residents of the 10 single family homes on Horning Road, Possible hikers using the Norman Pearson side trail access at end of existing road although unlikely due to main trail head with parking on nearby Mill Street and difficulty of trail. 4 of the homes on Horning Road face front opposite to development and will be sensitive to any changes.

Recommendations for Mitigation

Any vegetation removed from this area should be replanted elsewhere on site, any slash piles should be kept out of view during construction phase. Building site plans should be set to maximize space between homes to maximize possible views to Lake Ontario and downtown area. Buildings should be clad with earth tones to be compatible with environment for any possible views from Waterdown road. Any slopes cut for proposed Horning Road extension should be scarified and roughened to promote visual unity and accelerate vegetation growth. Existing overhead powerlines on street should be buried as per standard City of Hamilton right-of-way. Side trail access should be rehabilitated.

Visual Impact

Moderate

Proposed vegetation clearing could open views between proposed buildings to Lake Ontario from north end of Road creating net-neutral or net-positive outcome and keeping with the NAIR and OPA197 policy "*Facilitate views from the Escarpment brow, e.g. to Lake Ontario, Hamilton Harbour."*

Negligible changes to views to Hamilton and Burlington Bay, No change to existing homes. Low rise apartment 'Block P' which shows as visible in this area from viewshed map (Figure 2.3) does not appear visible when photographic simulation is performed (see Figure 5.12 – Key View #9). The extent to which changes in visual resources are visible should be confined to sub-area.

3.5 Sub area #1 -Horning Road (South section)

The proposed development south of the hydro corridor in Sub-Area 1 is comprised of 18 single detached lots fronting onto a public roadway. At the south end of this roadway is proposed a cluster housing block. As the potential for this block to house a multi-unit styled building the Viewshed analysis shown on Figure 2.3 was performed.

Figure 3.5 depicts an aerial view of the existing development area around Sub-Area 1 (South). The following Figure 3.3 and Figure 3.4 show the proposed development and its interaction with the surrounding area.

The detailed visual impact considerations have been collected as Table 4 Sub-Area 1 (South) Visual Impact Considerations, including potential mitigation options.

The Point of Interest as identified on Figure 2.3 was also further investigated through field observation and photographic simulation found in 5.0 of this report.

Sub area #1 -Horning Road (South section)



Figure 3.5 - ***Existing Site - Sub Area 1(South Section)***



Figure 3.6 - ***Proposed Development - Sub Area 1(South Section)***

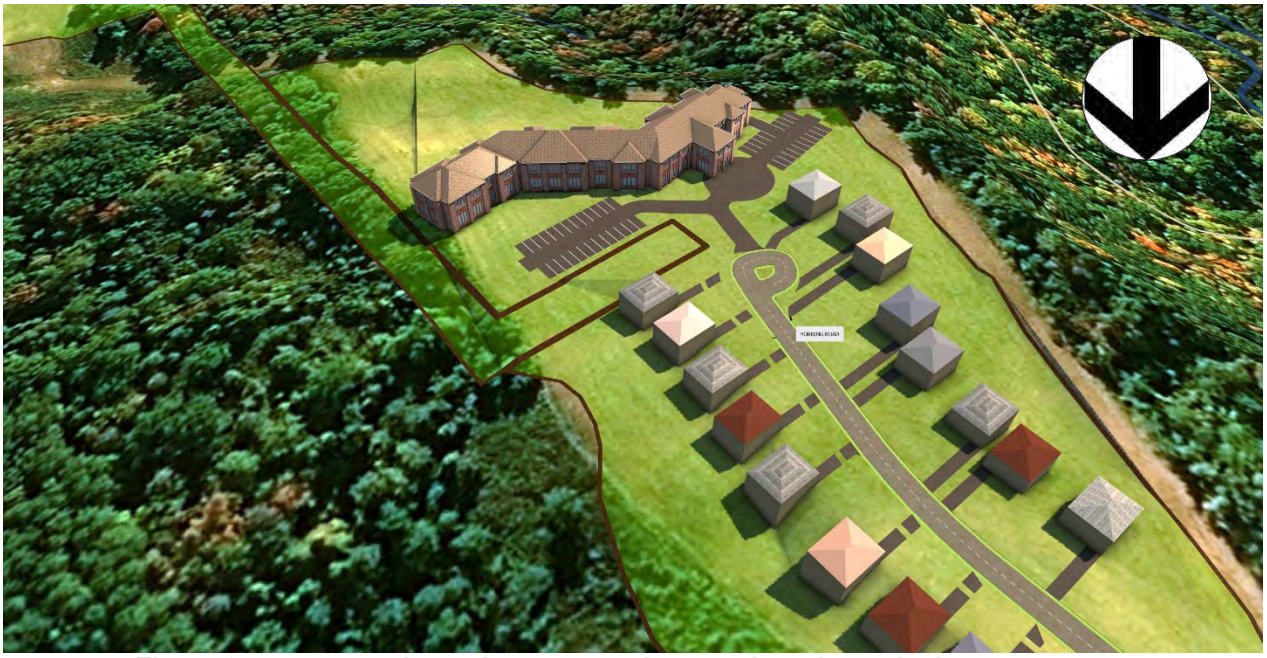


Figure 3.7 - ***Proposed Development - Sub Area 1(South Section)***

Table 4 Sub-Area 1 (South) Visual Impact Considerations

Sub Area 1(South Section)

Scenic Resources

large open plateau, views to escarpment, Burlington Bay and lake Ontario, cleared utility corridor

Landscape Impact

Low

Impact on topography in the area due to the development. Open nature of area is kept.

Viewer Sensitivity

Negligible

The current viewers of this area are farming workers in the field, Users of the Bruce trail to the west have their views obscured by the vegetation between the proposed development and the trail.

Recommendations for Mitigation

Site plan for low-rise apartment block should specify landscaping that provides vegetation screening of building and paved parking areas, additionally building should be clad with neutral earth tones and non-reflective materials. Any vegetation removal for the service easement to sub area 6 should be kept to a minimum and vegetation should be replanted elsewhere on subject lands. Construction staging plans should specify minimizing disturbance to any area near the outside of the open field 'pod' of development.

Visual Impact

Low

Introduction of 4 storey building block will introduce new architectural element to Subject lands but is mitigated by being set back to rear of development 'pod' and not exposed to any significant views. Although Viewshed mapping (See Figure 2.3 - Viewshed for Block P (Low rise 4 storey apartment)) shows Block P being visible on areas to the north near Main St, Rockcliffe Road, North section of Horning Road and East on Waterdown Road, field checks and photographic simulation contradict this, see figures:
Figure 5.3 - Key view point 8, heavy vegetation screening
Figure 5.12 – Key View #9
Figure 5.16 – View from Snake Road and Main Street South
Figure 5.17 – View from Bruce Trail entrance on Rockcliffe Road

Line of sight cross sections investigating any visibility of Block P from Flatt Road and Panin road/Highway 403 were performed with results pointing to no visibility present, see figures:
Figure 5.8 – Line of Sight Cross Section Flatt Rd to Block P
Figure 5.9 - Line of Sight Cross Section Panin Rd to Block P

Limiting the view of the development from main roads in the area and not interfering with any escarpment views or the brow of the Niagara Escarpment accomplishes NAIR and OPA197 directives, specifically:
"Have regard for the "view from the road" for vehicles passing through the area, e.g. character of Waterdown Road, Snake Road, character of Highway 403 corridor"

And

"Preserve the brow of the Niagara Escarpment;"

3.6 Sub area #2b -Waterdown Road

Sub-Area 2b lies directly west of Waterdown Rd. It is comprised of 71 single detached lots fronting onto two public roadways. Within Sub-Area 2b are two proposed cluster housing blocks. Fronting Waterdown Rd in Block SS is a proposed cluster housing site. This block is proposed to have townhouse styled homes. At the West end of Street D Block OO shows a proposed cluster housing block with a multiple unit building type. A viewshed analysis was completed and is shown on Figure 2.7, as its proximity to Waterdown Rd makes it highly visible to the roadway. As a multi-unit styled building is proposed on Block OO a Viewshed analysis shown on Figure 2.2 was performed.

Figure 3.8 depicts an aerial view of the existing development area around Sub-Area 1. The following Figure 3.9 thru Figure 3.14 show the proposed development and its interaction with the surrounding area.

The detailed visual impact considerations have been collected as Table 5 Sub-Area 2B Visual Impact Considerations, including potential mitigation options.

Multiple Points of Interest as identified on Figure 2.2, and Figure 2.7 are further investigated through field observation and photographic simulation found in 5.0 of this report.



Figure 3.8 - ***Existing Site - Sub Area 2b***

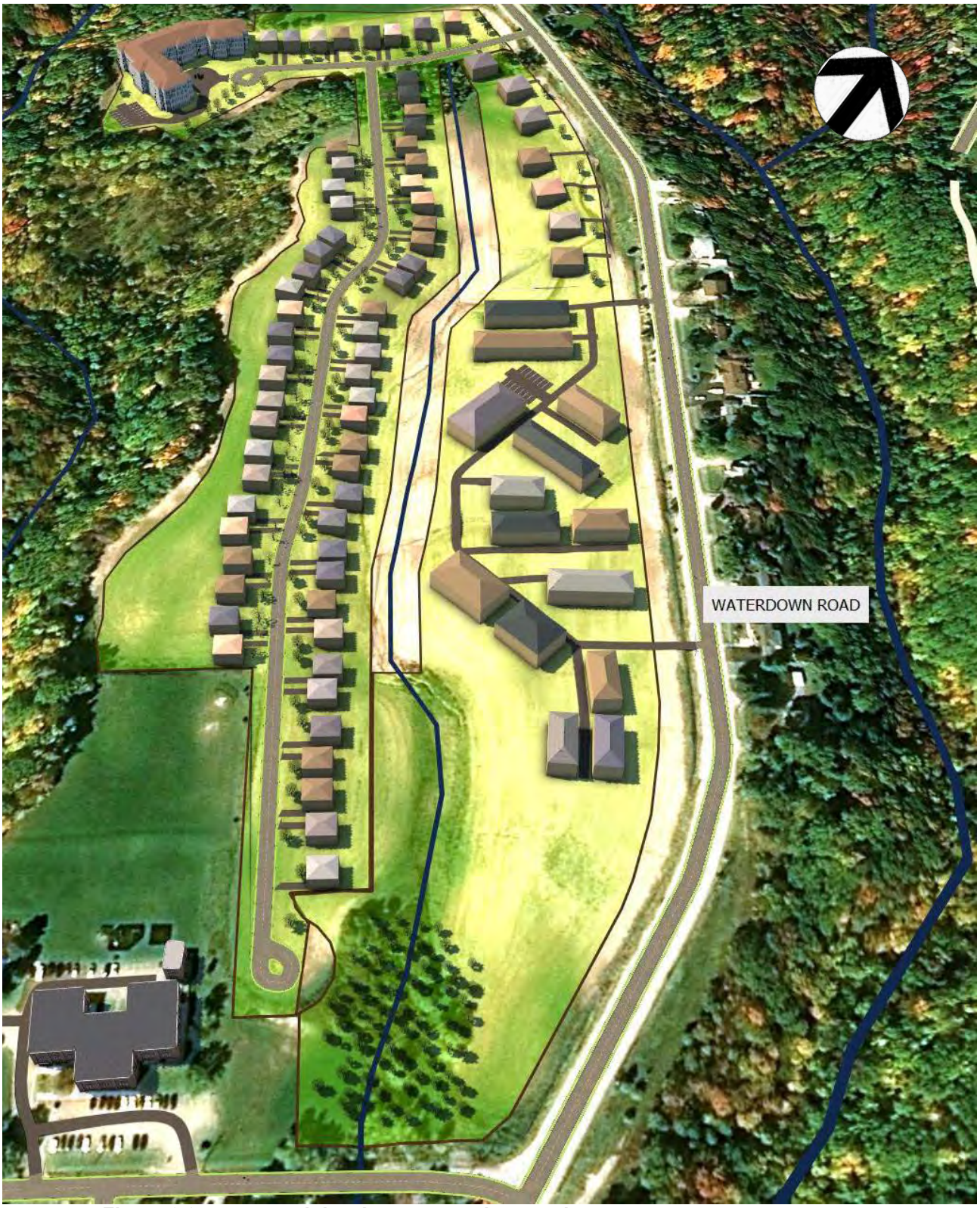


Figure 3.9 - ***Proposed development - Sub Area 2b***



Figure 3.10 – Proposed development Sub-Area 2b (Block OO) Looking North



Figure 3.11 – Proposed development Sub-Area 2b (Block OO) Looking South



Figure 3.12 – Proposed Development Sub-Area 2b Looking South



Figure 3.13 - Proposed Development Sub-Area 2b Looking North-West



Figure 3.14 - Proposed Development Sub-Area 2b Looking South-West

Table 5 Sub-Area 2B Visual Impact Considerations

Sub Area 2b

Scenic Resources

Waterdown Road corridor, a winding rural road. Prominent views to south of Burlington Bay, Lake Ontario and natural landscape. Open rolling fields ended by a wooded valley feature. Sassafras Woods on the Eastern side of the road.

Landscape Impact

Moderate

The open nature of area is retained with parkland and use of cluster housing which is in keeping with the NAIR

”Cluster homes refer to groupings of attached units with minimal private open space and a large natural area, often requiring a condominium management arrangement. Such relatively large natural areas can provide additional open space, preserve topographic or natural feature characteristics”

Proposed grading is to follow existing rolling landscape.

Viewer Sensitivity

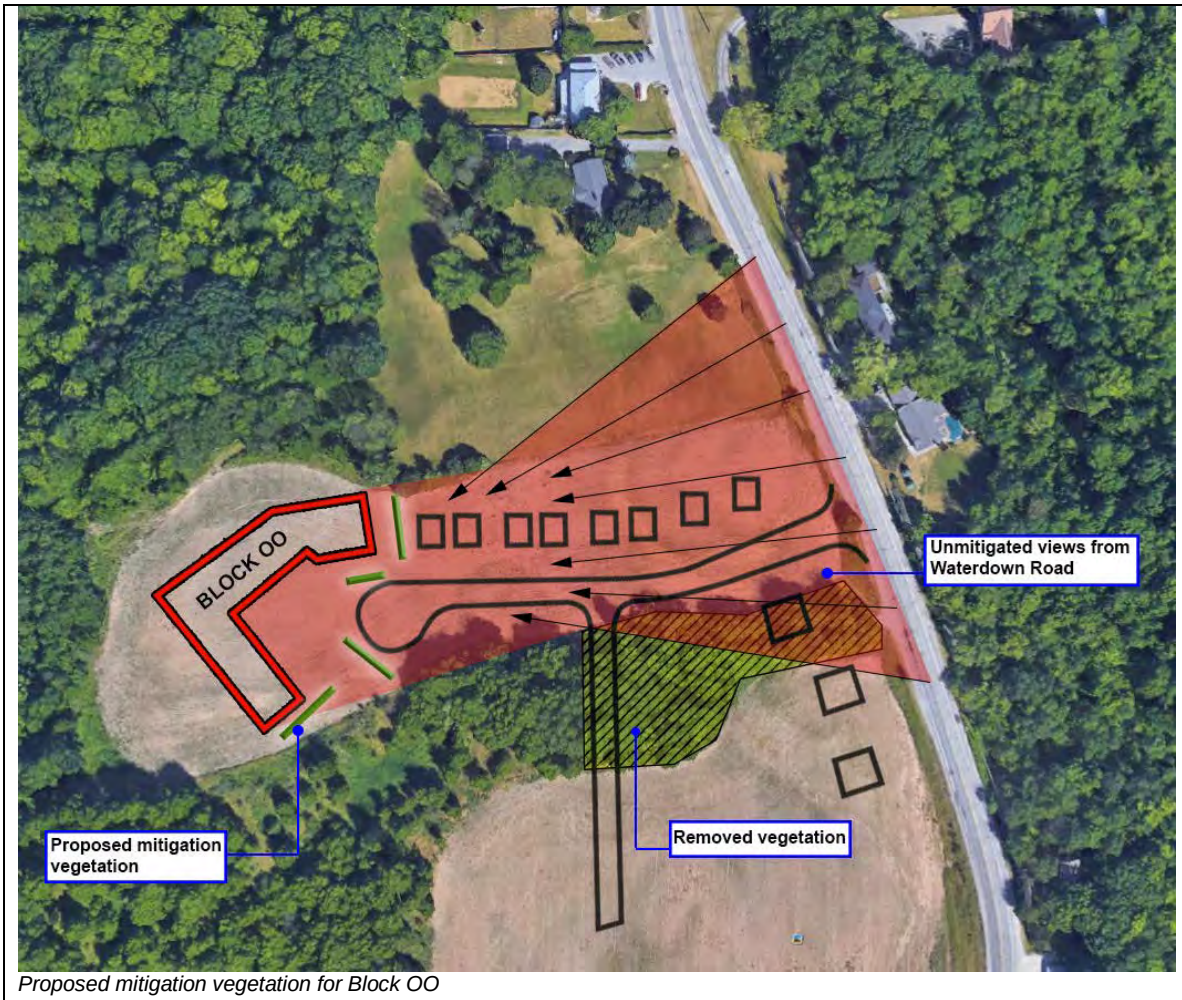
Moderate-high

The viewers of this area include approximately 13 single family homes fronting on the opposite the Waterdown Road, Motorists that frequently use the road, typically commuters from Waterdown using the 403 access. Infrequent tourist traffic is far less common.

Residents will be sensitive to proposed changes opposite of their homes. Motorists are likely to be moderately sensitive, travelling at Waterdown Road’s posted speed of 60km/h the section of road with proposed development will have a shorter duration view of approximately 45 seconds. The winding nature of the road also provides less of an opportunity to look around.

Recommendations for Mitigation

Site plan for low-rise apartment block should specify landscaping that provides vegetation screening of building and paved parking areas, additionally building should be clad with neutral earth tones and non-reflective materials. Homes fronting on Waterdown road should be specified to emulate the style makeup of the existing buildings on the opposite side by being varied and non-uniform in regards to facades, colour, setback etc. A height restriction on buildings front Waterdown Road should be designated in the site plan to match existing development. Vegetation should be planted to provide screening of buildings but not in open areas to preserve open nature of terrain.



Proposed mitigation vegetation for Block OO

Cluster housing parking areas should be done with permeable pavement to provide effect of open terrain. Site plans for cluster housing should specify a non-uniform building layout that is varied but cohesive. Park area should be kept open but vegetation at southern area near culvert on Flatt road should be left intact. Any slopes cut for watercourse should be scarified and roughened.



Example-Permeable Pavement



Permeable Pavement –©Urbandesign (CC BY-NC-SA 2.0)

Visual Impact

Moderate

Introduction of 4 storey building block OO and cluster housing will introduce new architectural element to sub area. 4 storey building block is mitigated by being set back to rear of development 'pod' and screened by trees in both north and south directions as well as proposed buildings from a view perpendicular to road to reduce visual mass. Although viewshed mapping (See Figure 2.2 - Viewshed for Block OO (Low rise 4 storey apartment)) shows visibility of Block OO along large sections of Waterdown Road field checks, line of sight cross sections and photographic simulations refute this data, see figures:

Figure 5.3 - Key view point 8, heavy vegetation screening
Figure 5.7 – Key View #4
Figure 5.11 – Line of Sight Cross Section Waterdown Rd to Block OO

Block OO is likely to have a small visual impact overall and adheres to NAIR and OPA197 objective *"Have regard for the "view from the road" for vehicles passing through the area, e.g. character of Waterdown Road,"*

Proposed cluster housing will add a new element to views of natural landscape looking towards Grindstone Creek while keeping intact views of Burlington Bay and Lake Ontario as well as keeping open rural characteristic intact satisfying NAIR and OPA197 objectives: "*Have regard for the rural character of existing roads as identified, e.g. Waterdown Road, Snake Road*;" and "*Have regard for topographical character of the landscape, e.g. rolling terrain, deep ravines."*

Proposed single family buildings fronting on Waterdown Road will be compatible with existing homes and consistent with current settlement patterns.

3.7 Sub area #5 -Flatt Road Extension

Sub-Area 5 has a reduction in proposed housing from the approved 1996 plan. The previous cluster housing to the north and west of street B has been removed from the plan. The resultant development is comprised of 35 single detached lots fronting onto two public roadways. Also proposed is a multi-use building cluster housing block located on Block H at the South end of proposed Street B. A viewshed analysis was completed and is shown on Figure 2.1, for the building proposed on Block H.

Figure 3.15 depicts an aerial view of the existing development area around Sub-Area 5. The following Figure 3.16thru Figure 3.19 show the proposed development and its interaction with the surrounding area.

The detailed visual impact considerations have been collected as Table 5, including potential mitigation options.

Multiple Points of Interest as identified on Figure 2.1 are further investigated through field observation and photographic simulation found in 5.0 of this report.



Figure 3.15 - ***Existing Site - Sub Area 5***



Figure 3.16 - ***Proposed Development - Sub Area 5***



Figure 3.17 - Proposed Development Sub-Area 5 Looking South-East



Figure 3.18 - Proposed Development Sub-Area 5 Looking South



Figure 3.19 - Proposed Development Sub-Area 5 Looking North-East

Table 6 Sub-Area 5 Visual Impact Considerations

Sub Area 5

Scenic Resources

Historic buildings, red brick farmhouse on Flatt road and a large well maintained homestead on the northern limits. Views to adjacent sub areas, North East to escarpment and south to Hamilton. Hedge-row lined rural road with open space beyond.

Landscape Impact

Moderate

Impact on vegetation in the area due to the development. Proposed grading is to follow existing features closely leaving landscape characteristics intact.

Viewer Sensitivity

High

The viewers of this area are the 2 existing residential homeowners, the existing residents will be very sensitive to extensive changes in close proximity to homes.

Recommendations for Mitigation

Site plan for low-rise apartment block should specify landscaping that provides vegetation screening of building and paved parking areas particularly in direction of existing homes on Flatt Road, additionally building should be clad with neutral earth tones and non-reflective materials. During construction equipment operator should be advised to minimize disturbance to existing homes by leaving idle equipment out of close proximity. A staging plan should prioritize development in vicinity of existing homes to be completed quickly. Any vegetation removed from this area should be replanted elsewhere on site or spread as mulch on any open areas. Building frontages and flankages should be densely vegetated.



Proposed mitigation vegetation for Block H

Visual Impact

Moderate

Visual impact of this area is considered lower due to the small number of viewers present; however, the introduction of 4 storey building block will introduce new architectural element to Subject lands. It is mitigated from surrounding area by being set back to rear of development 'pod' with vegetation screening. Viewshed mapping (See Figure 2.1 - Viewshed for Block H (Low rise 4 storey apartment)) shows visibility of Block H on areas close to Panin Road and Highway 403, field checks and line of sight cross sections were performed and show no visibility of Block H being possible in those areas, see figures:

Figure 5.2 - Key view point 6/7, extensive vegetation screen and bank
Figure 5.10 - Line of Sight Cross Section Panin Rd to Block H

Block OO was also investigated for visibility along Flatt Road extension through photographic simulation (Figure 5.14 – Key View #11) and shows up in a negligible manner along the tree line.

Proposed buildings fronting on street will impact views from directly on Flatt Road extension to adjacent areas and to Hamilton, views of escarpment are less impacted in areas not directly on Flatt Road Extension. Residents of proposed development on Flatt Road extension will have views to Escarpment brow, acknowledging the characteristics of the landscape.

3.8 Sub area #6 -Central Area

Sub-Area 6 has proposed development consisting of two cluster housing blocks, and one block of Single family home condominium units. Both of the Cluster housing blocks area received analysis by way of Viewshed mapping as shown on Figure 2.5. Multiple points of interest were identified and further investigation has been conducted in section 5.0 of this report.

The following Figure 3.20 shows the existing conditions of this sub-area, via aerial photography. Further to this Figure 3.21 and Figure 3.22 depict the proposed development simulated in situ for the purposes of completing the Visual impact considerations.

The detailed visual impact considerations have been collected as Table 7 Sub-Area 6 Visual Impact Considerations, including potential mitigation options.

Multiple Points of Interest as identified on Figure 2.5 are further investigated through field observation and photographic simulation found in section 5.0 of this report.



Figure 3.20 - ***Existing Site - Sub Area 6***



Figure 3.21 - ***Proposed Development - Sub Area 6***



Figure 3.22 - Proposed Development Sub-Area 6 Looking North

Table 7 Sub-Area 6 Visual Impact Considerations

Sub Area 6
Scenic Resources
Large hedge row in middle of open field. Wooded Valley areas surround the space.
Landscape Impact
Low-moderate Impact on vegetation in the area due to the development in northern section.
Viewer Sensitivity
Negligible 2 existing residential homes on nearby Flatt Road Extension would have partial views to this area.
Recommendations for Mitigation
Any vegetation removed from northern part of this area should be replanted elsewhere on site. The vegetation out cropping in the middle of the open space should be preserved. Vegetation planting should be used to bolster existing tree lines on outsides of the development 'pod'. The storm pond should be naturalized under the direction of a landscape architect and established as a feature. Site plans for cluster housing should specify a non-uniform building layout that is varied but cohesive and maximize open space.
Visual Impact
Negligible Openly spaced cluster housing among the open field achieves NAIR objective to *"Have regard for topographical character of the landscape, e.g. rolling terrain, deep ravines."* A naturalized storm pond helps achieve NAIR and OPA197 objective to *"Reinforce predominantly rural characteristics of the North Aldershot area;"* Development in this sub area is screened well by existing vegetation. A low number of viewers and the nature of the development in the area create net-neutral to net-positive visual impact.

3.9 Sub area #7 -Grindstone Creek Valley/Flatt Road

Sub-Area 7 has proposed development consisting of two cluster housing blocks, situated both east and west of Street A on blocks D and E. Additionally fronting along Street A are 51 single family homes. Both of the Cluster housing blocks area received analysis by way of Viewshed mapping as shown on Figure 2.4.

The following Figure 3.23 shows the existing conditions of this sub-area, via aerial photography. Further to this Figure 3.24 and Figure 3.25 depict the proposed development simulated in situ for the purposes of completing the Visual impact considerations.

The detailed visual impact considerations have been collected as Table, including potential mitigation options.



Figure 3.23 - ***Existing Site - Sub Area 7***



Figure 3.24 - ***Proposed Development - Sub Area 7***



Figure 3.25 - Proposed Development Sub-Area 7 Looking West

Table 8 Sub-Area 7 Visual Impact Considerations

Sub Area 7
Scenic Resources
Prominent knoll in North West corner of area. Wooded edge of Grindstone Valley on West side. Wooded ravine on east side. Views from knoll area to Burlington Bay and surrounding area.
Landscape Impact
Low-moderate Impact on topography and vegetation in the area due to some clearing of vegetation. Views to and from knoll can be kept through careful cluster housing layout.
Viewer Sensitivity
Negligible There are not any significant viewers in this area.
Recommendations for Mitigation
Building site plans should maximize space for view of the prominent knoll towards Waterdown Road. Any vegetation removed from northern part of this area should be replanted elsewhere on site or spread as mulch on any open areas.
Visual Impact
Low Development in this sub area is screened well by existing vegetation in 'pod'. This area is a clear example of the pocket infilling development envisioned by the NAIR that preserves views of the surrounding area and escarpment. Openly spaced cluster housing among the open field achieves NAIR and OPA197 objective to *"Have regard for topographical character of the landscape, e.g. rolling terrain, deep ravines."*

3.10 Sub area #8 -Flatt Road/Flatt Road Extension Intersection

Sub-Area 8 has proposed development consisting of two multi–unit style cluster housing blocks situated either side of Flatt Road Extension, on blocks JJ and K. Both of the Cluster housing blocks area received analysis by way of Viewshed mapping as shown on Figure 2.6. Multiple points of interest were identified and further investigation has been conducted in section 5.0 of this report.

The following Figure 3.26 shows the existing conditions of this sub-area, via aerial photography. Further to this Figure 3.27 and Figure 3.28 depict the proposed development simulated in situ for the purposes of completing the Visual impact considerations.

The detailed visual impact considerations have been collected as Table 9 Sub-Area 8 Visual Impact Considerations, including potential mitigation options.

Multiple Points of Interest as identified on Figure 2.6 are further investigated through field observation and photographic simulation found in section 5.0 of this report.



Figure 3.26 - ***Existing Site - Sub Area 8***



Figure 3.27 - *Proposed Development - Sub Area 8*

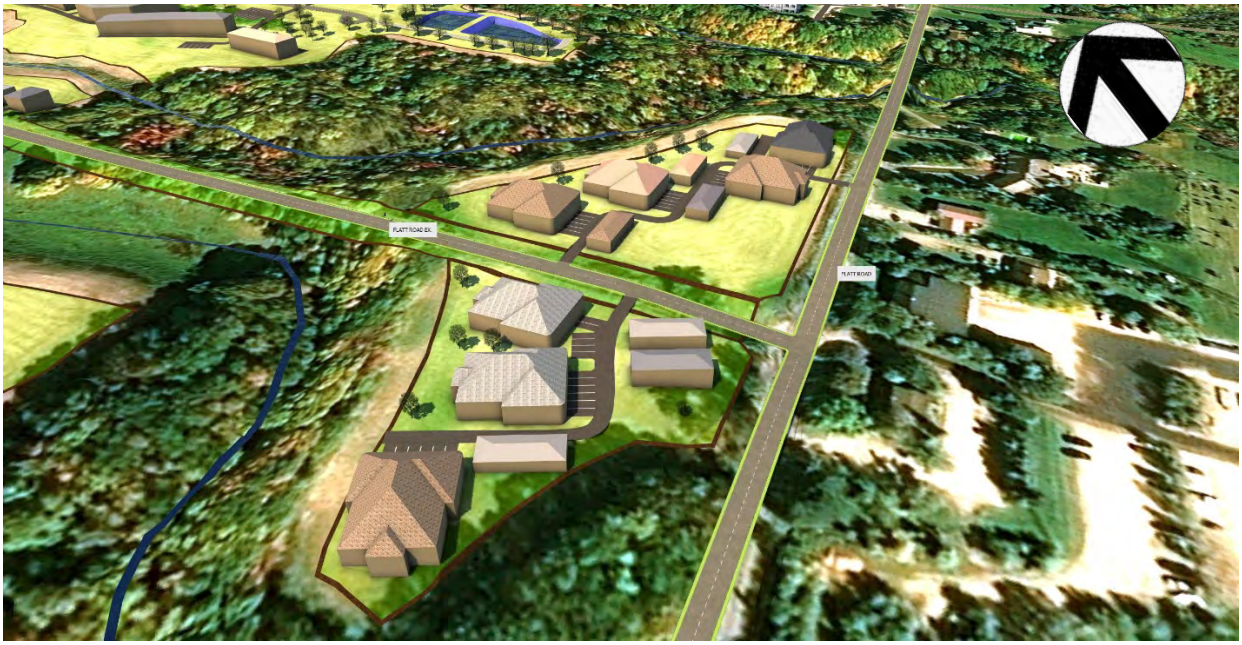


Figure 3.28 - Proposed Development Sub-Area 8 Looking North-East

Table 9 Sub-Area 8 Visual Impact Considerations

Sub Area 8

Scenic Resources

Small intersection of Flatt Road and Flatt Road Extension. Wooded valley features surround area.

Landscape Impact

Low

Impact on topography in area due to development. Cluster housing helps retain open characteristic of landscape.

Viewer Sensitivity

Moderate

Viewers of development in this area include residents, 4 single family homes front opposite the proposed changes and some road traffic for customers and workers of Aldershot Landscape Contractors on Flatt Road.

Residents will be sensitive to proposed changes opposite of their homes. Road users are likely to be infrequent enough to not be very sensitive to proposed changes.

Recommendations for Mitigation

Vegetation should be placed to screen buildings on eastern section, tree line fronting on Flatt Road on Western side should be left intact and bolstered. Existing overhead powerlines on street should be buried. Existing fire hydrant connection at intersection should be cleaned up. Site plans for cluster housing should specify a non-uniform building layout that is varied but cohesive and keeps open space to a maximum.

Visual Impact

Low-moderate

Proposed cluster housing on eastern side of Flatt Road Extension will affect some of the residents on Flatt Road, localized to immediate area due to ‘pod’ tree line.

Openly spaced cluster housing among the open field achieves NAIR and OPA197 objective to *“Have regard for topographical character of the landscape, e.g. rolling terrain, deep ravines.”*

3.11 Sub area #10 -South of Flatt Road, East

Sub-Area 8 has proposed development consisting of multi–unit style cluster housing blocks situated west of the proposed street X, on block G. In addition to the cluster housing are an additional proposed 32 Single Family residential lots fronting onto Street X.

The Cluster housing block area received analysis by way of Viewshed mapping as shown on Figure 2.8. Multiple points of interest were identified and further investigation has been conducted in section 5.0 of this report.

The following Figure 3.29 shows the existing conditions of this sub-area, via aerial photography. Further to this Figure 3.30 and Figure 3.31 depict the proposed development simulated in situ for the purposes of completing the Visual impact considerations.

The detailed visual impact considerations have been collected as Table 10 Sub-Area 10 Visual Impact Considerations, including potential mitigation options.

Multiple Points of Interest as identified on Figure 2.8 are further investigated through field observation and photographic simulation found in section 5.0 of this report.



Figure 3.29 - ***Existing Site - Sub Area 10***



Figure 3.30 - ***Proposed Development - Sub Area 10***



Figure 3.31 - Proposed Development Sub-Area 10 Looking South-West

Table 10 Sub-Area 10 Visual Impact Considerations

Sub Area 10
Scenic Resources
Existing vegetation, smaller homes fronting Flatt Road. Wooded valleys to East and West of area. Limited views.
Landscape Impact
Low Impact on vegetation in the area due to development, area kept mostly intact.
Viewer Sensitivity
Negligible. No current viewers in area
Recommendations for Mitigation
Any vegetation removed from northern part of this area should be replanted elsewhere on site or spread as mulch on any open areas. Tree line on lower Eastern boundary should be bolstered to protect views from Nevarc Avenue.
Visual Impact
Low A photographic simulation was performed from Nevarc Avenue (see Figure 5.13 – Key View #10), it shows development is concealed from surrounding area to the East by existing vegetation in ravine. This area is another example of the pocket infilling development envisioned by the NAIR, with development surrounded by 2 ravines conforming to characteristics of the area described in the NAIR "*The co-existence of the natural environment and human settlement is part of the sense of place."*

4.0 General Site Mitigation Recommendations

Building Architecture and Form:

A key component of preserving the character of the North Aldershot area will be making building forms compatible to the existing area. To achieve this, the development should follow the City of Burlington's site plan guidelines for North Aldershot.

Excerpt from City of Burlington's *Site Plan Requirements and Urban Design Guidelines-Low Density Residential Zones and North Aldershot*

"New development shall complement the qualities established by existing neighbouring buildings and the overall character of the setting through the use of common architectural elements and design cues such as rooflines, dormers, porches, fenestration, etc...



Figure 4.1 – *Preferred Qualities*



Figure 4.2 *Not Preferred Qualities*

Elevations of dwellings shall not be the same as adjacent dwellings. Repeating patterns are strongly discouraged.



Figure 4.3 – ***Preferred Patterns***



Figure 4.4 - ***Not Preferred Patterns***

Modern buildings often feature primary cladding materials such as stucco that are out of keeping with the local vernacular. Materials for new dwellings and additions to existing dwellings shall complement the existing materials in the neighbourhood.

Primary cladding materials that are compatible with the existing community and surrounding structures shall be used."



Figure 4.5 –*Brick Cladding*



Figure 4.6 - ***Wood Cladding***



Figure 4.7 – *Siding Cladding*



Figure 4.8 - *Stone Cladding*



Figure 4.9 - *Combination of Materials*



Figure 4.10 - *Combination of Materials*

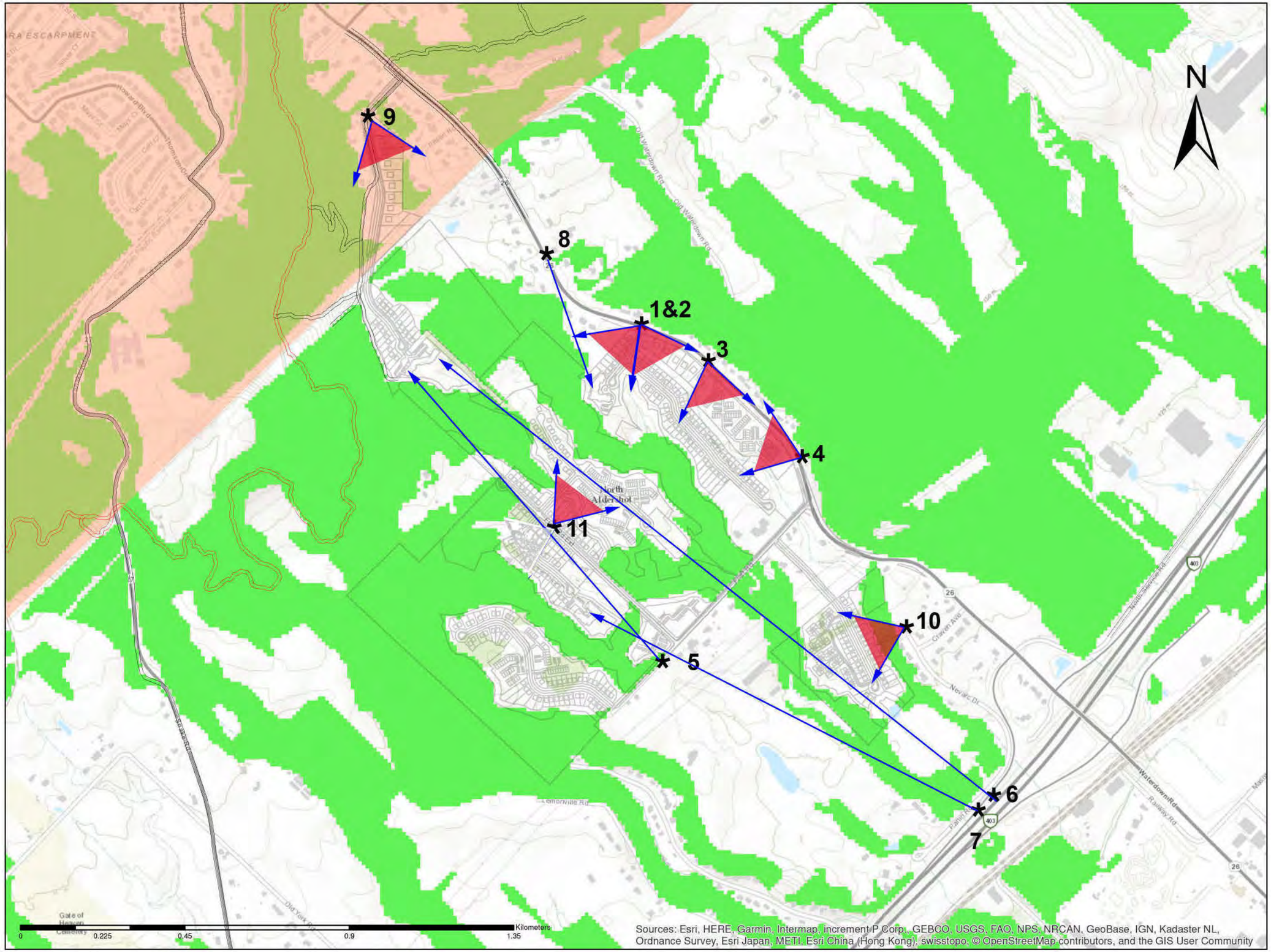
Lighting: Street lighting of any kind should be kept to a minimum to preserve a rural characteristic, where necessary it should be a full cutoff luminaire to eliminate up-lighting. Lights should be amber instead of blue-white to reduce sky glow. During construction phase lighting should be kept to a minimum, used only where work is occurring and shut off when not needed.

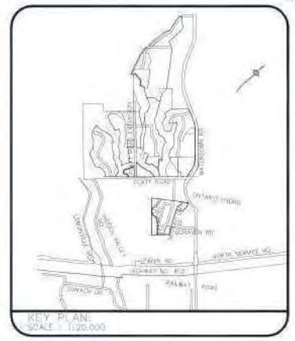
Construction Phase: Housekeeping procedures should be implemented to reduce visual disturbance while work is ongoing. The use of exit tire washers and vehicle track pads to keep mud off local roads. Material storage sites should be carefully planned out, debris and waste should be monitored throughout. Equipment operators should be made aware of visual guidelines and sensitive areas.

Vegetation: Vegetation acting as mitigation and screening should be planted as soon as possible to allow for growth time and stabilization. Vegetation screening should be monitored and maintained to ensure growth. Existing vegetation areas acting as screening should be augmented and bolstered by new planting.

5.0 Photographic Simulation and Line of Sight Cross Sections

The results of the Viewshed analysis shown in Section 2.0 of this report helped identify various Key Viewpoints that were chosen in the draft terms of reference with guidance from the NEC. After evaluation of the Sub-Areas for visual impact, assessment of visual impacts (Section 3.0), potential mitigation alternatives (Section 4.0), and field study, those areas requiring further investigation have been identified. A brief description of the chosen locations follows Figure 5.1 which shows their location in plan.





ASSUMPTIONS
HEIGHT OF WATER TOWER - 19.0m
HEIGHT OF TREE CANOPY - 15.0m
HEIGHT OF VIEWER - 1.7m

LEGEND
- KEY POINT OF VIEW
- NIAGARA ESCARPMENT PLAN AREA
- WOODED AREA
- BRUCE TRAIL
- TRAIL NETWORK

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PROJECT
EAGLE HEIGHTS/TAYLOR PROPERTY
VISUAL IMPACT ASSESSMENT

DWG
KEY VIEW POINTS
REFERENCE MAP

DATE
AUG 2018

PROJECT NO.
P09006

FIGURE 5.1

Key Viewpoint Description:

1. Figure 5.4- View looking South along Waterdown Road towards proposed single unit residences fronting on the West side of Waterdown Road.
   UTM position of camera - Northing: 4797148.336m Easting: 591305.682m Elevation: 165.74 MASL

2. Figure 5.5 - View from Waterdown Road looking west towards building block OO.
   UTM position of camera - Northing: 4797168.9870m Easting: 591247.793m Elevation: 167.90 MASL

3. Figure 5.6 - View looking South along Waterdown Road towards proposed cluster housing on the West side of Waterdown Road. UTM position of camera - Northing: 4796965.107 Easting: 591549.426 Elevation: 156.97 MASL

4. Figure 5.7 - View looking North along Waterdown Road from slight north of Flatt Road towards proposed cluster housing and Block OO on the West side of Waterdown Road.
   UTM position of camera - Northing: 4796790.991m Easting: 591696.835m Elevation: 148.82 MASL

5. Figure 5.8 – Cross Section from Flatt road slightly west of Flatt Road Extension intersection looking north to Block P (Line of sight cross section)
   UTM position of viewer - Northing: 4796367.575m Easting: 591424.133m Elevation: 142.41 MASL

6. Figure 5.2 & Figure 5.9 – Cross section from Panin Road towards block P. (Line of sight cross section)
   UTM position of viewer - Northing: 4795827.347m Easting: 592146.933m Elevation: 110.71 MASL



Figure 5.2 - ***Key view point 6/7, extensive vegetation screen and bank***

7. Figure 5.10 – Cross section from Panin Road towards block H. (Line of sight cross section)
   UTM position of camera - Northing: 4797508.353m Easting: 590915.650m Elevation: 179.33 MASL

8. Figure 5.3 & Figure 5.11 – Cross section from northern Waterdown Road in sub area 2a looking South towards block OO. (Line of sight cross section)



Figure 5.3 - ***Key view point 8, heavy vegetation screening***

9. Figure 5.12 - View from Horning road looking south towards proposed development on Horning Road.
   UTM position of camera - Northing: 4797726.580m Easting: 590492.624m Elevation: 202.53 MASL

10. Figure 5.13 - View from North end of Nevarc Drive looking west to proposed former Taylor development.
    UTM position of camera - Northing: 4796331.694m Easting: 591980.216m Elevation: 131.18 MASL

11. Figure 5.14- View from Flatt Road Extension slightly north of existing homes looking east.
    UTM position of camera - Northing: 4796605.077m Easting: 591024.763m Elevation: 155.76 MASL

On site, field checking the accuracy of the Viewshed was performed at locations throughout the Viewshed map as well as a drive through of map areas and noted areas of concern. Locations are noted Figure 5.15Figure 7.13. Reference photos are provided as, Figure 5.16, Figure 5.17, Figure 5.18 and Figure 5.19



Key view #1 existing conditions

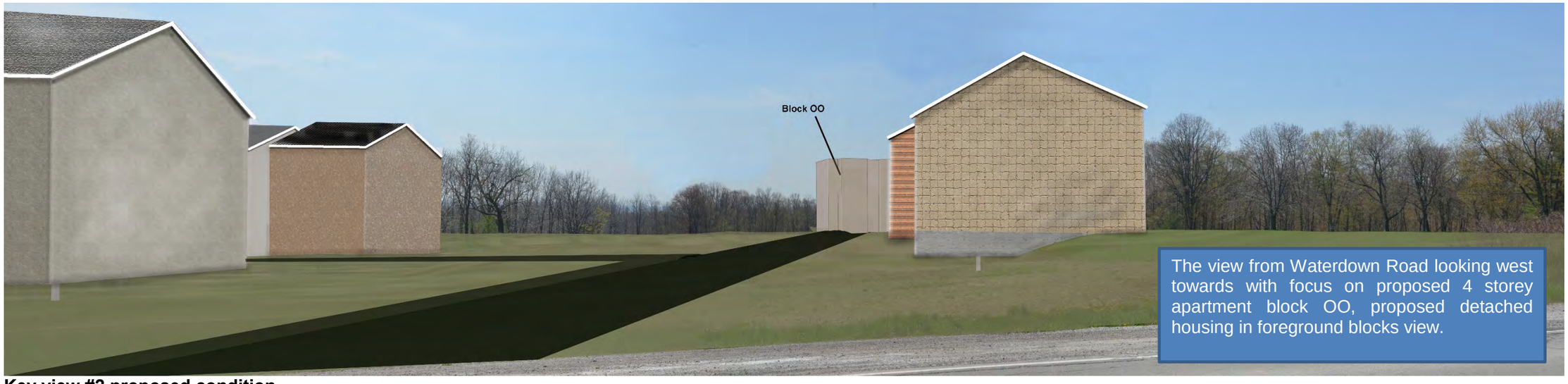


Key View #1-proposed conditions

Figure 5.4 – Key View #1



Key view #2 Existing condition



Key view #2 proposed condition

Figure 5.5 – Key View #2



Key view #3 existing condition



Key view #3 proposed condition

Figure 5.6 – Key View #3

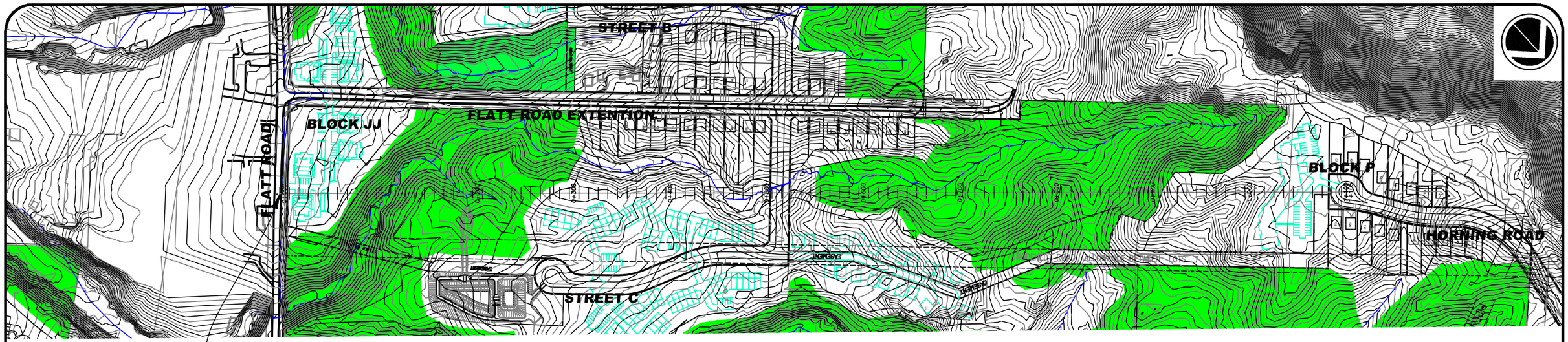


Key view #4 existing condition



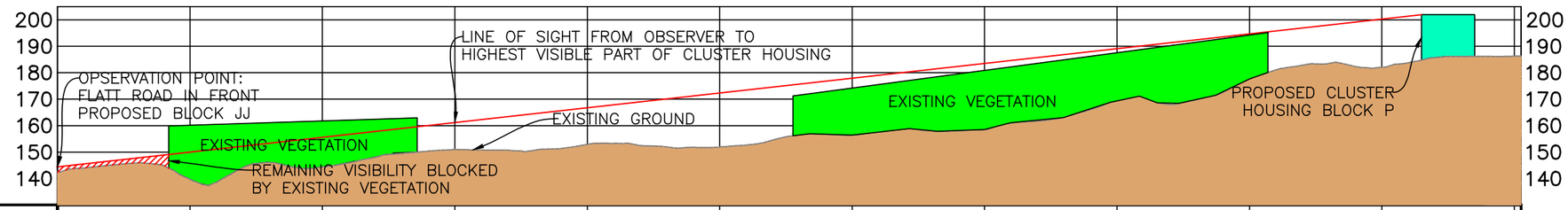
Key view #4 proposed condition

Figure 5.7 – Key View #4



OBSERVATION POINT:
FLATT ROAD IN FRONT
OF PROPOSED BLOCK JJ

LINE OF SIGHT CROSS SECTION: FLATT ROAD TO BLOCK P



ELEVATION	142.44	139.67	144.32	150.92	152.91	151.89	156.39	158.49	169.41	177.68	182.06	186.25
CHAINAGE	0+000	0+100	0+200	0+300	0+400	0+500	0+600	0+700	0+800	0+900	1+000	1+100

LEGEND
- PROPOSED LOCAL WATERMAIN
- VEGETATION
- PROPOSED TRUNK WATERMAIN
- PROPOSED RESERVOIR LOCATION
- LINE OF SIGHT
- VISIBLE AREA

CLIENT
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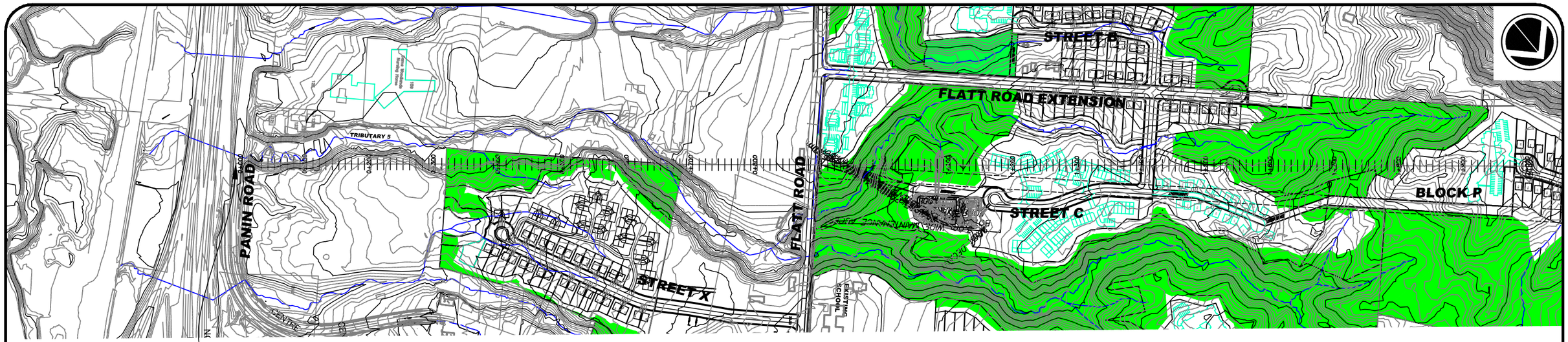
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LINE OF SIGHT CROSS SECTION
FLATT RD TO BLOCK P

DATE
MAY 2018

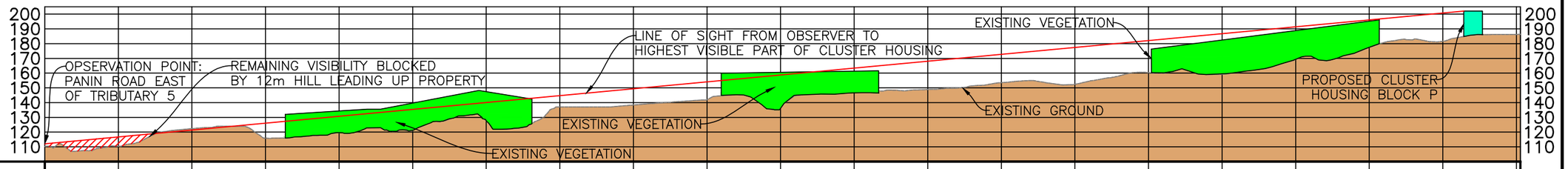
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FIGURE 5.8



OBSERVATION POINT:
PANIN ROAD EAST OF
OF TRIBUTARY 5

LINE OF SIGHT CROSS SECTION: PANIN ROAD TO BLOCK P



ELEVATION	110.33	110.44	122.33	115.89	119.63	121.00	127.89	137.00	138.37	141.94	136.23	147.80	148.91	153.52	152.40	160.24	159.18	169.29	177.48	181.52	186.24
CHAINAGE	0+000	0+100	0+200	0+300	0+400	0+500	0+600	0+700	0+800	0+900	1+000	1+100	1+200	1+300	1+400	1+500	1+600	1+700	1+800	1+900	2+000

LEGEND
- PROPOSED LOCAL WATERMAIN
- PROPOSED TRUNK WATERMAIN
- PROPOSED RESERVOIR LOCATION
- LINE OF SIGHT
- VISIBLE AREA

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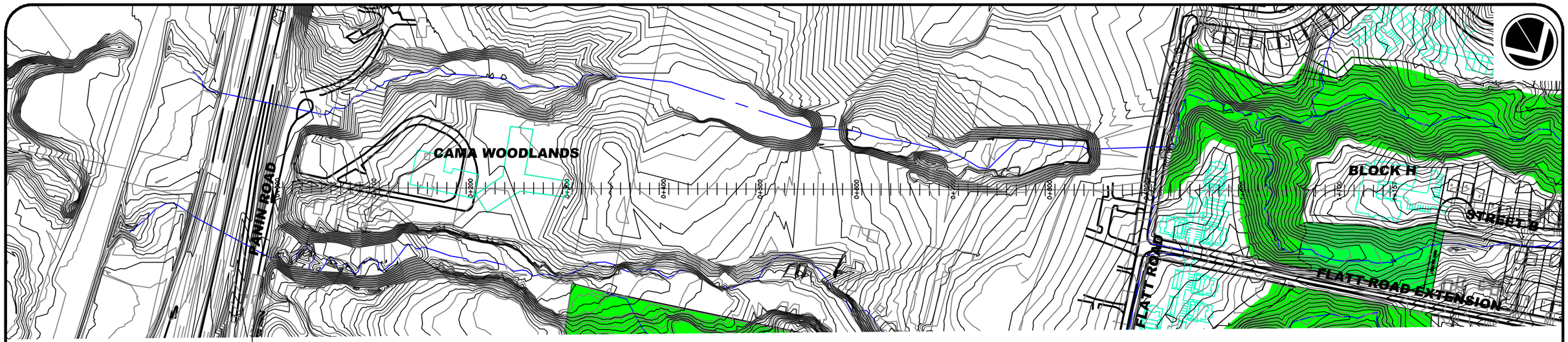
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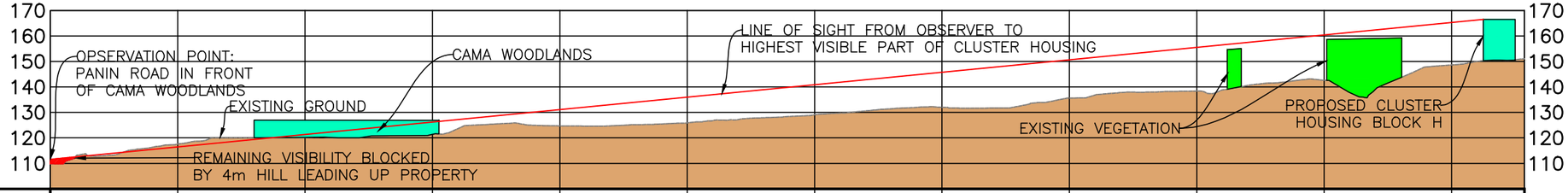
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FIGURE 5.9



OBSERVATION POINT:
PANIN ROAD IN FRONT
OF CAMA WOODLANDS

LINE OF SIGHT CROSS SECTION: PANIN ROAD TO BLOCK H



ELEVATION	109.87	117.57	120.19	121.41	124.73	125.90	129.11	132.01	135.61	138.37	142.61	148.62	151.05
CHAINAGE	0+000	0+100	0+200	0+300	0+400	0+500	0+600	0+700	0+800	0+900	1+000	1+100	1+157.32

LEGEND
- PROPOSED LOCAL WATERMAIN
- VEGETATION
- PROPOSED TRUNK WATERMAIN
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- LINE OF SIGHT
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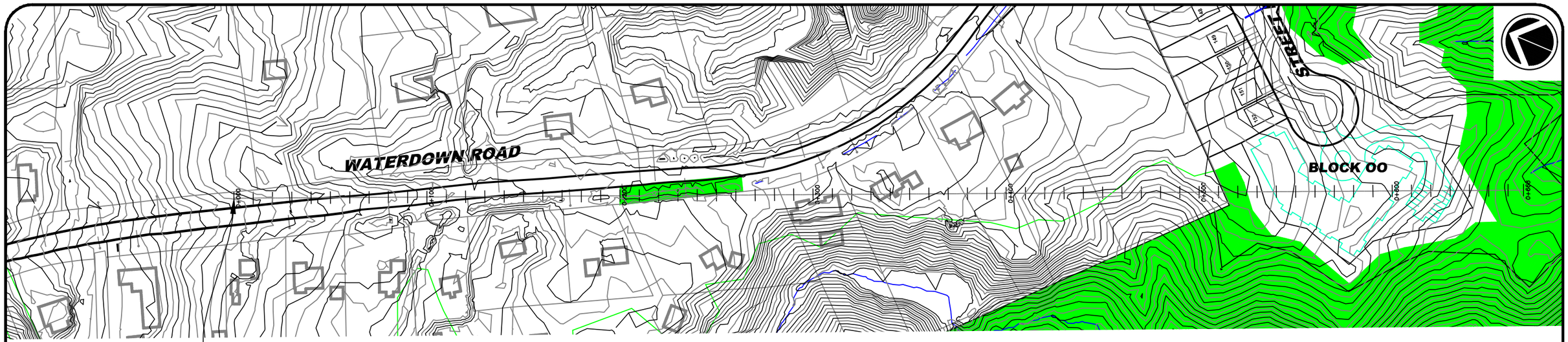
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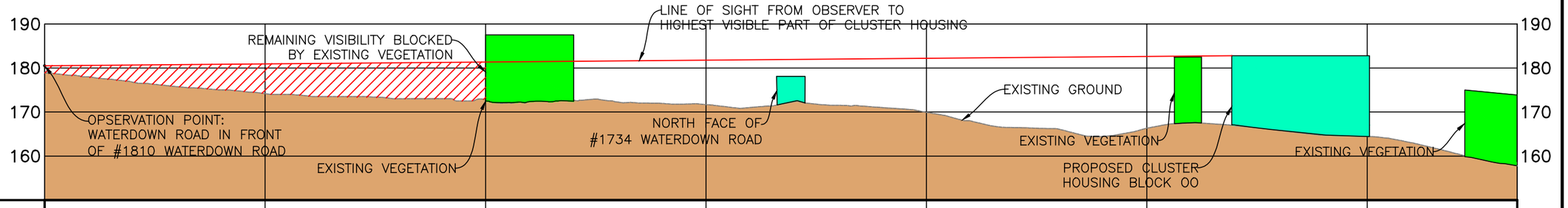
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FIGURE 5.10



OBSERVATION POINT:
WATERDOWN ROAD IN FRONT
OF #1810 WATERDOWN ROAD

LINE OF SIGHT CROSS SECTION: WATERDOWN ROAD TO BLOCK OO



ELEVATION	178.91	174.18	172.79	171.69	169.92	166.32	164.45	157.78
CHAINAGE	0+000	0+100	0+200	0+300	0+400	0+500	0+600	0+668.05

LEGEND
- PROPOSED LOCAL WATERMAIN
- VEGETATION
- PROPOSED TRUNK WATERMAIN
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- VISIBLE AREA

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WATERDOWN RD TO BLOCK OO

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FIGURE 5.11



Key view #9 existing condition



Key view #9 proposed condition

Figure 5.12 – Key View #9



Key view #10 existing condition

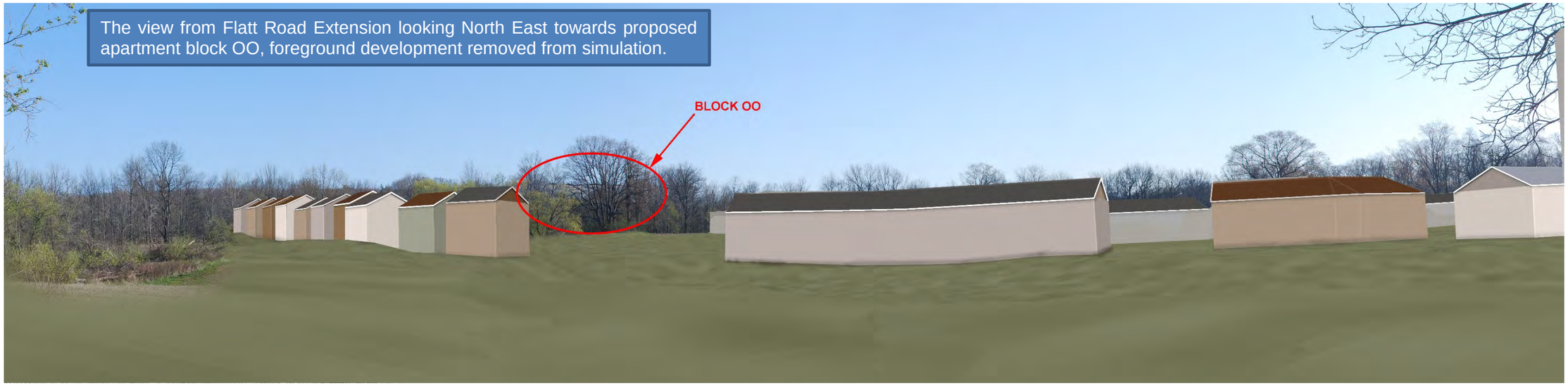


Key view #10 proposed condition

Figure 5.13 – Key View #10



Key view #11 existing condition



Key view #11 Proposed condition with foreground housing removed from view

Key view #11 was chosen in conjunction with the NEC in the draft terms of reference, the view point is located directly on a proposed development street. The limitation of picking viewpoints on roads limits the effectiveness of clearly representing the area, the view is located in very close proximity to proposed homes causing interference in assessing the area accurately. The foreground housing is removed to provide a view of Block OO.

Figure 5.14 – Key View #11

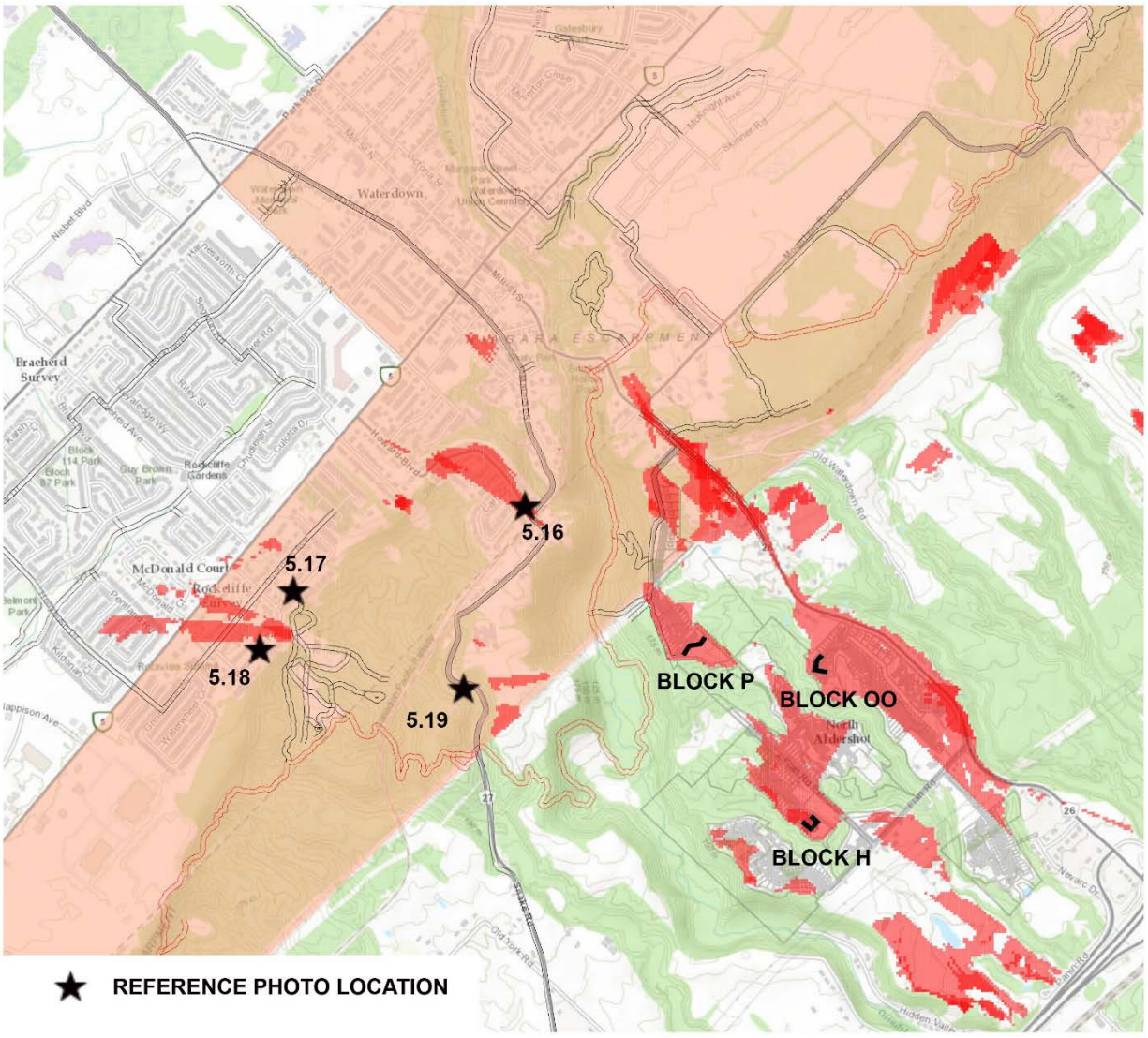


Figure 5.15 – Reference photo locations



Figure 5.16 – View from Snake Road and Main Street South



Figure 5.17 – View from Bruce Trail entrance on Rockcliffe Road



Figure 5.18 - View from Rockcliffe Road, typical



Figure 5.19 - View from Snake Road, typical

6.0 Conclusion

It is the opinion of this report that with the mitigation measures indicated that the Eagle heights Development can meet the guidelines set out by the City of Burlington Official Plan, the NAIR and the Niagara Escarpment Plan 2017. Admittedly, impact will be felt by neighbouring residents and views of low-rise building blocks will not be completely eliminated from key areas such as Waterdown Road. However the nature of these impacts are very localized to a handful of residents and brief views on Waterdown Road.

Landscapes are maintained by limiting tree removal; 89% of vegetation on site (54.21 Hectares total vegetation, 48.11 retained) is maintained before factoring any new planting or transplanting. Proposed grading is closely matched to existing elevations to maintain the rolling topography. All deep ravines are maintained.

Escarpment views are largely maintained and views from/to the escarpment and Lake Ontario are opened up on Horning Road. New roads are minimized to minor roads and extensions to existing minor roads. All maintain a rural style cross section.

Deliberately maintaining open spaces within cluster housing and apartment blocks helps preserve the rural character of the area. By making the development compatible with the existing settlements through the site plan stage the area retains a rural character while being distinct, keeping its role as the transition from urban Burlington.

The following figures show the typical existing settlement pattern visualized by the NAIR compared to the typical infilling with development and finally the model of proposed Eagle Heights development. Subjectively the proposed development parallels and is appropriately similar to the development envisioned by NAIR.

Prepared By:



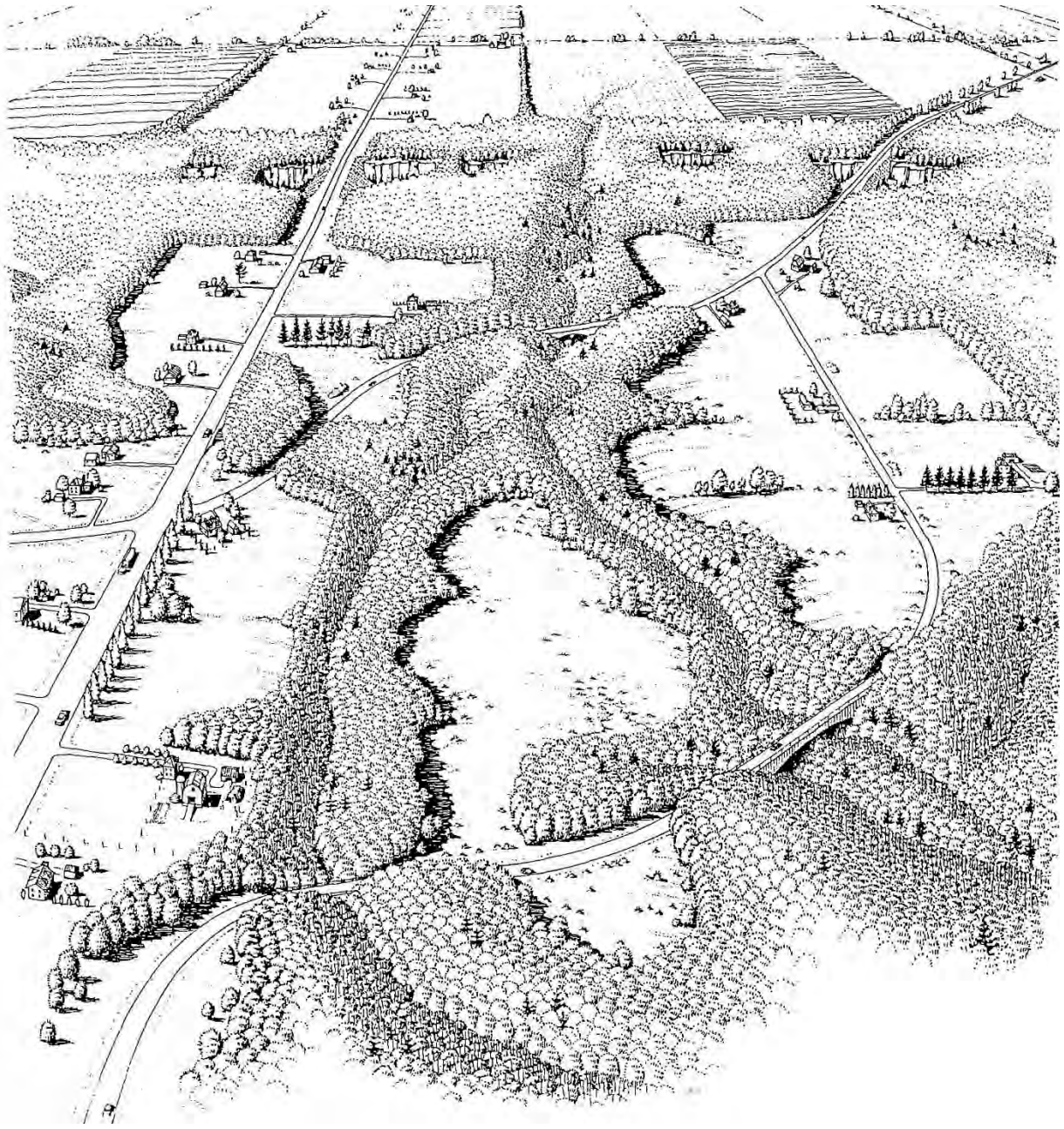
Tyler Fowler, C.E.T.



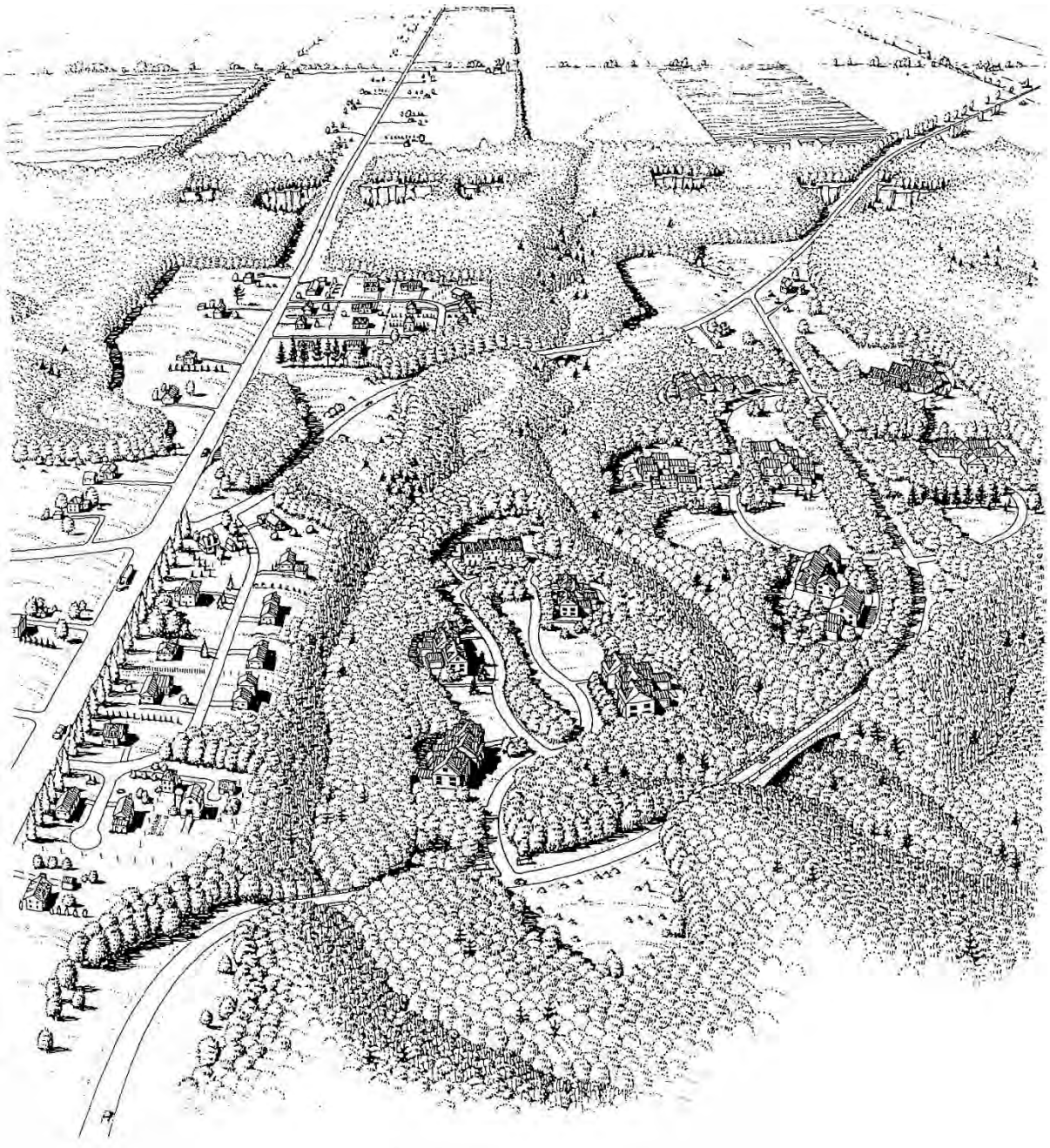
Karl Gonnsen, P.Eng.,
M.C.I.P., R.P.P.



Martin Rohde
OCAD



North Aldershot Interagency Review-Typical Aerial View of Existing Settlement Pattern



North Aldershot Interagency Review-Typical Aerial View of Infilling with Individual Houses, Estate Residential and Cluster Residential



Typical Aerial View of Proposed Eagle Heights Development

Part 2 - WATER RESERVOIR ALTERNATIVES

7.0 Water Reservoir Alternatives

In recognition of the Draft approval granted by the OMB (Tribunal) in 1996 the 2012 Halton Sustainable Water & Wastewater Master Plan has included the need for a water reservoir located at the north end of the Eagle Heights development. This reservoir will service the Eagle Heights lands, aid in reducing high pressures to existing homes in the North Aldershot Area, as well as remove the use of City of Hamilton sourced water within the Region of Halton. Further to this the 2017 Development Charges background study identifies the requirement to reserve funds to construct the reservoir. Both of these projects are identified by the project identifier of ID 7570, in both respective documents.

The siting of the reservoir is determined through the formation of Pressure Zones. These zones are determined by their physical elevation, and the potential pressures that will be present in the zone through a gravity fed system. Details of the evaluation of the alternative locations can be found in the 2018 FSR prepared by MCI.

The first site considered for water storage is an in-ground reservoir structure adjacent to Horning Road located on a Draft approved lot. It is 4.5 meters in height but buried so only 1.5 meters extends above the ground. Water reservoir alternative site 2 is an elevated tank design also adjacent to Horning Road on a Draft approved lot. It is 12 meters in height. Both of these alternatives are located on Draft Approved lots within the NEP lands. The urbanization of Horning Rd is also part of the Draft approved plan. The alignment of Horning Rd has been modified from the approved plan to respect the evaluated environmental constraints as allowed per Draft plan condition. Water reservoir alternative site 3 is also an elevated storage tank with pedestal south of the other 2 sites; it is 19 meters in height. See Figure 7.1 for the proposed locations of the storage sites.

WATERDOWN ROAD

300mmØ

P.R.V.

WATERMAIN ON WATERDOWN RD BETWEEN FLATT RD AND HORNING RD IS SHOWN FOR INFORMATION ONLY AND IS DESIGNED BY OTHERS

WATERDOWN ROAD

IRESON

150mmØ

Alternative Site 1

300mmØ

400mmØ

HYDRO EASEMENT

HYDRO CORRIDOR

Alternative Site 2

PIPELINE EASEMENT

Alternative Site 3

400mmØ

300mmØ

400mmØ

HORNING ROAD

EASEMENT

KEY PLAN:
SCALE : N.T.S

LEGEND

– PROPOSED LOCAL WATERMAIN

– PROPOSED TRUNK WATERMAIN

– PROPOSED RESEVOIR LOCATION

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PROJECT
EAGLE HEIGHTS
VISUAL IMPACT ASSESSMENT

DWG
WATER RESEVOIR
ALTERNATIVE LOCATIONS

DATE
AUG 2018

PROJECT NO.
P09006

FIGURE 7.1

7.1 Viewshed and Mitigation Measures

7.1.1 Alternative 1 In-ground Water Reservoir:

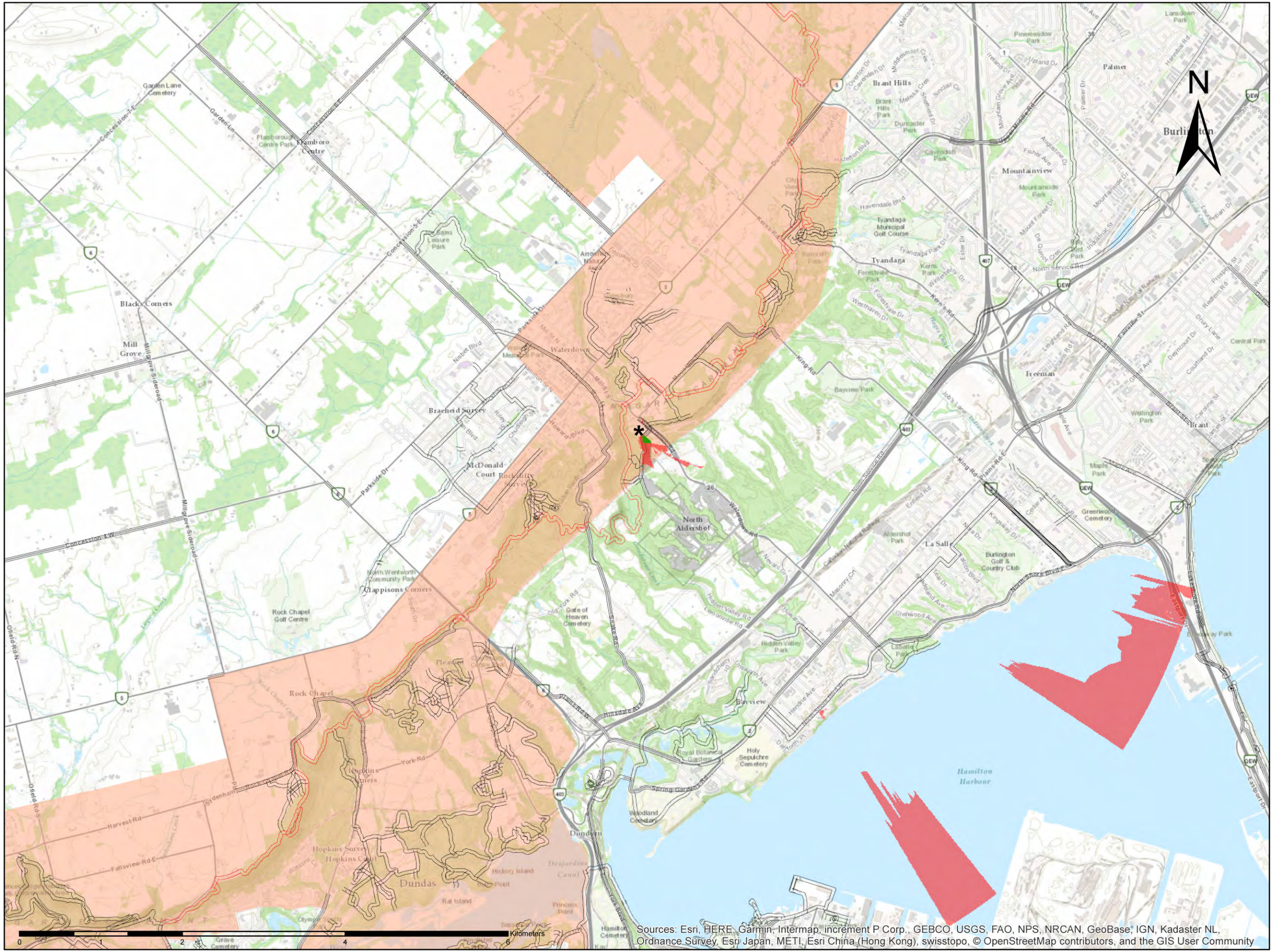
Figure 7.3 displays the Viewshed analysis results for the in-ground reservoir site 1; visual impact is localized to Horning Road and the immediate vicinity of the structure. As the overall visibility is localized Figure 7.4 has been provided to more clearly show the potentially impacted area. Further mitigation is proposed through landscaping the top and sides of the structure to blend with the landscape. An example of the landscaping which can be applied is shown below in Figure 7.2. Table 11 – Alternative 1 Visual Impact Considerations showing the visual impact considerations can be found on the following page.

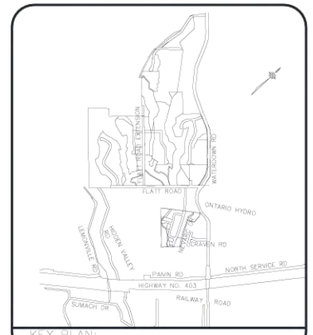


Figure 7.2 - ***Example of larger scale reservoir in Hamilton between Highway 403 & Scenic Drive – Google Earth***

Table 11 – Alternative 1 Visual Impact Considerations

Alternative 1 Visual Impacts
Scenic Resources
Light to Moderately vegetated area, alongside an existing roadway servicing existing residences.
Landscape Impact
Low Impact on the surrounding topography due to the proposed infrastructure being buried below ground. Open nature of area is kept.
Viewer Sensitivity
High Potential viewers of the structure include residential homeowners, users of the Bruce trail to the west may use this roadway as a link to trails to the east.
Recommendations for Mitigation
Reestablishment of vegetation, in conjunction with new plantings should minimize the disturbance in less than 5 years to all viewing the proposed infrastructure.
Visual Impact
Low Introduction of a buried water reservoir would require the removal of some vegetation during construction, mitigation and revegetation could be reestablished within approximately 5 years.





ASSUMPTIONS

HEIGHT OF WATER RESEVOIR - 1.5m
HEIGHT OF TREE CANOPY - 15.0m
HEIGHT OF VIEWER - 1.7m

LEGEND

- WATER RESEVOIR
- POINT OF INTEREST
- NIAGARA ESCARPMENT POLICY AREA
- VISIBLE AREA
- WOODED AREA
- BRUCE TRAIL
- TRAIL NETWORK

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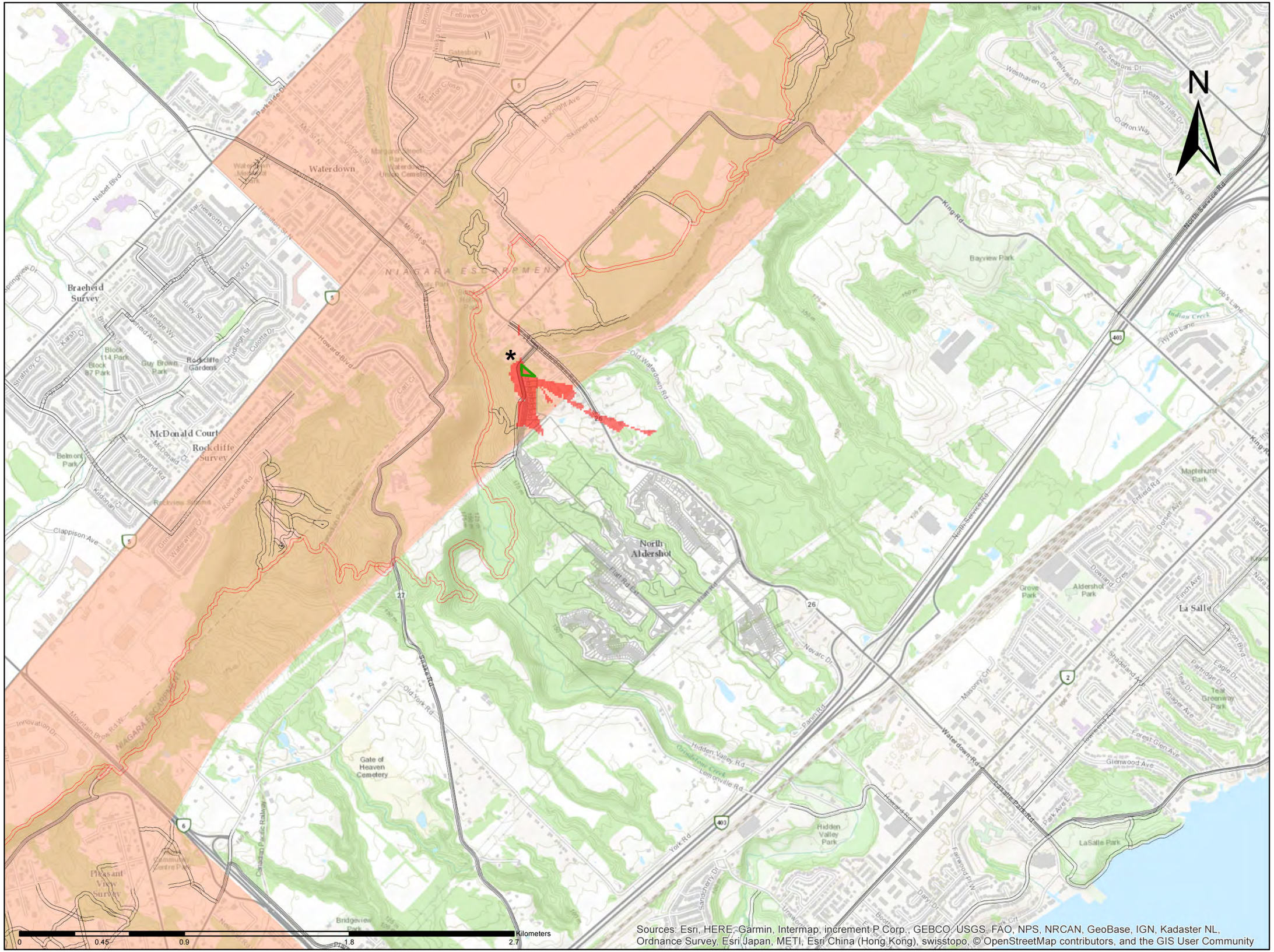
EAGLE HEIGHTS
VISUAL IMPACT ASSESSMENT

DWG

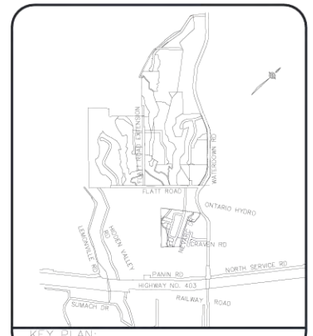
VIEWSHED MAPPING FOR WATER RESEVOIR SITE 1

DATE	PROJECT NO.
AUG 2018	**P09006**

FIGURE 7.3



Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community



ASSUMPTIONS

HEIGHT OF WATER RESEVOIR - 1.5m
HEIGHT OF TREE CANOPY - 15.0m
HEIGHT OF VIEWER - 1.7m

LEGEND

- WATER RESEVOIR
- POINT OF INTEREST
- NIAGARA ESCARPMENT POLICY AREA
- VISIBLE AREA
- WOODED AREA
- BRUCE TRAIL
- TRAIL NETWORK

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PROJECT

EAGLE HEIGHTS
VISUAL IMPACT ASSESSMENT

DWG

VIEWSHED MAPPING FOR WATER RESEVOIR SITE 1 (ZOOMED)

DATE: **AUG 2018**

PROJECT NO.: **P09006**

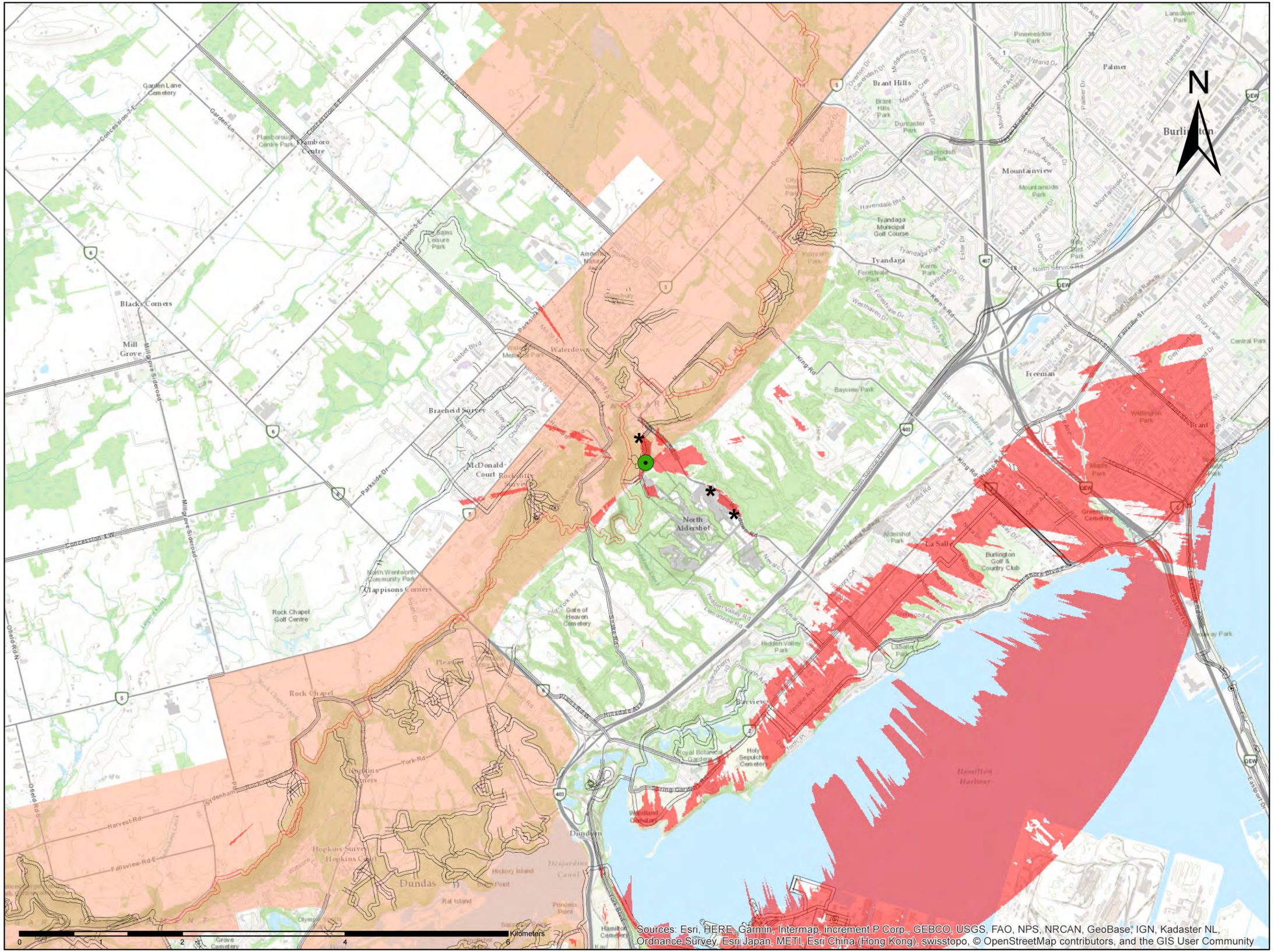
FIGURE 7.4

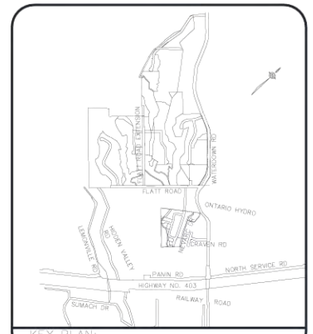
7.1.2 Alternative 2 Elevated Water Tower:

Figure 7.5 displays the Viewshed analysis results for the elevated reservoir alternative site 2. The largest impact occurs along Waterdown Road. The existing clearing for Horning Road provides lanes of visibility. This clearing is likely to widen after development increasing impact northward. There are small areas on Howard Boulevard and possible visibility extending south east near Lake Ontario and the Skyway Bridge of the Queen Elizabeth Way. With a structure height of 12 meters some mitigation is possible through vegetation planting but would require a long term (10+ years) to mature and recover the scenic quality. Appropriate colour studies should be undertaken to determine a compatible exterior colour for the structure. Table 12 – Alternative 2 Visual Impact Considerations summarizes the visual impact considerations.

Table 12 – Alternative 2 Visual Impact Considerations

Alternative 2 Visual Impacts
Scenic Resources
Moderately vegetated area, alongside an existing farm laneway/hiking trail
Landscape Impact
Low-moderate Impact on the surrounding topography due to the proposed infrastructure being elevated to approximately 12 meters above the existing ground elevation.
Viewer Sensitivity
High Residential homeowners, the proposed residents are the primary viewers of this area, Users of the Bruce trail to the west have their views obscured by the vegetation between the proposed development and the trail.
Recommendations for Mitigation
Reestablishment of vegetation, in conjunction with new plantings should minimize the disturbance to all viewing the proposed infrastructure but would take over 10 years to be established.
Visual Impact
High Hikers whom use the proposed roadway to continue their east-west routes will pass adjacent to this structure. Structure is not cohesive with character of area and existing settlement patterns. Out of place with NAIR and OPA197 objective to *"Respect the scale and character of the existing community;"*





ASSUMPTIONS

HEIGHT OF WATER TOWER - 12.0m
HEIGHT OF TREE CANOPY - 15.0m
HEIGHT OF VIEWER - 1.7m

LEGEND

- WATER TOWER
- POINT OF INTEREST
- NIAGARA ESCARPMENT POLICY AREA
- VISIBLE AREA
- WOODED AREA
- BRUCE TRAIL
- TRAIL NETWORK

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VIEWSHED MAPPING FOR
WATER RESEVOIR SITE 2

DATE

AUG 2018

PROJECT NO.

P09006

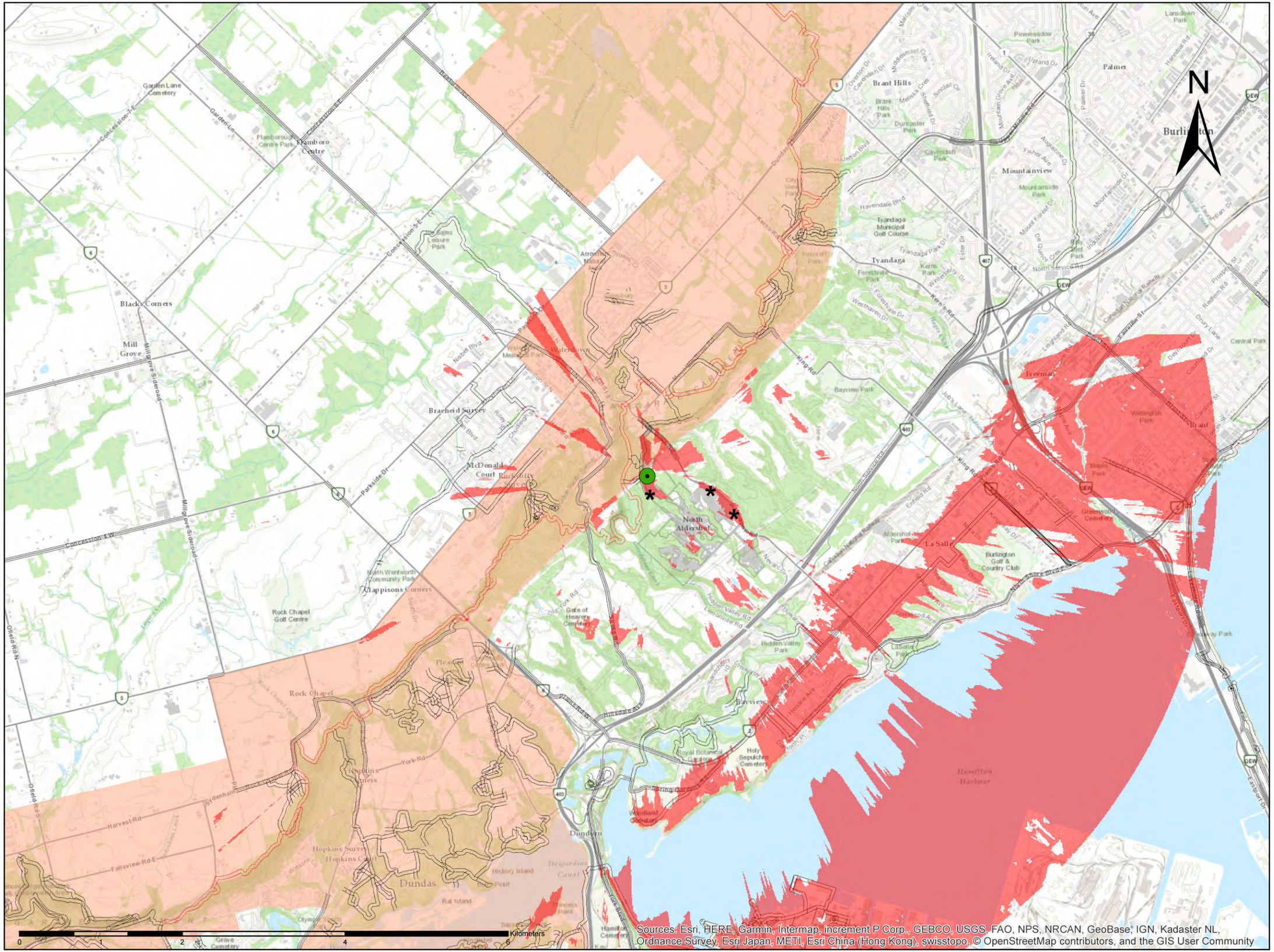
FIGURE 7.5

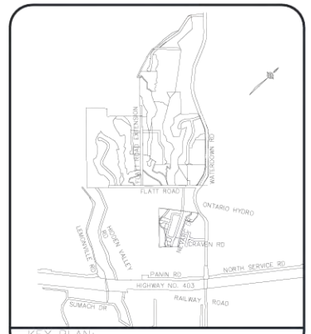
7.1.3 Alternative 3 Elevated Water Tower:

Figure 7.6 displays the results for the elevated tank design on alternative site 3. Two large areas of Waterdown Road are affected; there are also areas on Snake Road, Main Street South and Dundas Street that appear to be impacted. Areas extending southeast along Plains Road as well as the QEW approaching the interchange are all affected. With a structure height of 19 meters mitigation through vegetation is not feasible. The measures available include colour studies of area to identify an appropriate pedestal colour and tank colour to camouflage the structure, pursuing a wooded exterior option to better fit the character of the area. Table 13 – Alternative 3 Visual Impact Considerations summarizes the visual impact considerations.

Table 13 – Alternative 3 Visual Impact Considerations

Alternative 3 Visual Impacts
Scenic Resources
Moderately vegetated area, adjacent to existing agricultural farm lands.
Landscape Impact
Low-moderate Impact on the surrounding topography due to the proposed infrastructure being elevated to approximately 12 meters above the existing ground elevation
Viewer Sensitivity
Moderate-High Residential homeowners, the proposed residents are the primary viewers of this area, Commuters along the QEW will also likely be able to view this structure. Users of the Bruce trail to the west have their views obscured by the vegetation between the proposed development and the trail. due to the adjacent Bruce trail, and commuter traffic,
Recommendations for Mitigation
Due to the height of the structure vegetation has a limited use in mitigation, colour choice for the pedestal and tank may be used to blend the structure into the surrounding landscape.
Visual Impact
Moderate Users of the Bruce trail to the west have their views obscured by the vegetation between the proposed development and the trail, but the structure will be visible to commuters along the QEW. Structure is not cohesive with character of area and existing settlement patterns. Out of place with NAIR and OPA197 objective to *"Respect the scale and character of the existing community;"*





ASSUMPTIONS

HEIGHT OF WATER TOWER - 19.0m
HEIGHT OF TREE CANOPY - 15.0m
HEIGHT OF VIEWER - 1.7m

LEGEND

- WATER TOWER
- POINT OF INTEREST
- NIAGARA ESCARPMENT POLICY AREA
- VISIBLE AREA
- WOODED AREA
- BRUCE TRAIL
- TRAIL NETWORK

CLIENT

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PROJECT

EAGLE HEIGHTS
VISUAL IMPACT ASSESSMENT

DWG.

VIEWSHED MAPPING FOR WATER RESEVOIR SITE 3

DATE: **AUG 2018**

PROJECT NO.: **P09006**

FIGURE 7.6

7.2 Photographic Simulation of Potential Visual Impacts

After the review of the Viewsheds was completed, 5 key viewpoints were chosen based upon the apparent visibility areas for further investigation. The photographic simulation at these locations was performed to confirm the validity of the Viewshed, and to review areas of potential concern. These have been identified as the Key Viewpoint locations as shown on Figure 5.0.

The results of the Viewshed analysis shown in Section 7.1 of this report identified various Key Viewpoints. After evaluation for visual impact, assessment of visual impacts, potential mitigation alternatives, and field study, those areas requiring further investigation have been identified. A brief description of the chosen locations follows, and Figure 7.7 – Key Points Water Reservoir Sites which shows their location in plan.

Five Key View Points were chosen; locations for Figure 7.8, Figure 7.9, Figure 7.10, and Figure 7.11 coincide with viewpoints from the terms of reference. Location for Figure 7.12 was determined from the Viewshed as an additional point of interest to be investigated. These were chosen to confirm findings of the Viewshed, and to confirm areas of concern for potential visibility.

Key View Points

1. Figure 7.8 - View looking South East from elbow on Horning Road looking towards alternative 1 reservoir structure.

2. Figure 7.9 - View from North section of Waterdown Road looking North West to alternative 2 and 3.

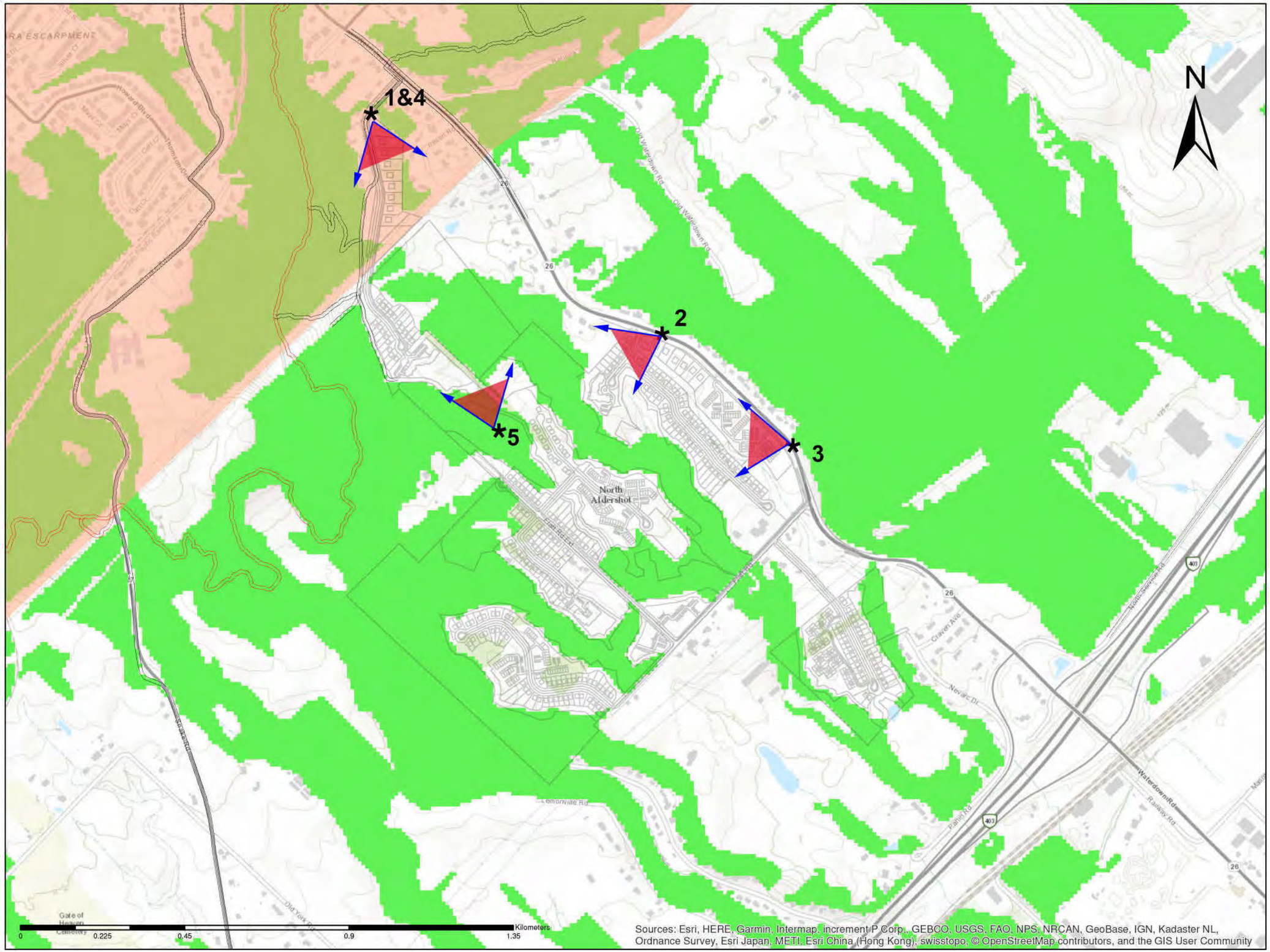
3. Figure 7.10 - View from South section of Waterdown Road looking North West to alternative 2 and 3.

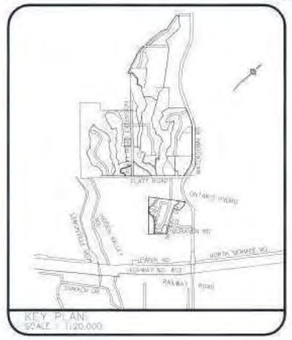
4. Figure 7.11 - View looking South from elbow on Horning Road looking towards alternative 2 standpipe.

5. Figure 7.12 - View from sub area 1(South section) looking North towards Alternative 3 water reservoir.

See appendix A 1.3 and for photographic simulation resources and 1.4 for methodology.

On site, field checking the accuracy of the Viewshed was performed at locations throughout the Viewshed map as well as a drive through of map areas and noted areas of concern. Locations are noted Figure 7.13. Reference photos are provided as Figure 7.14, Figure 7.15, and Figure 7.16





ASSUMPTIONS:
HEIGHT OF WATER TOWER - 19.0m
HEIGHT OF TREE CANOPY - 15.0m
HEIGHT OF VIEWER - 1.7m

LEGEND:
- KEY POINT OF VIEW
- NIAGARA ESCARPMENT POLICY AREA
- WOODED AREA
- BRUCE TRAIL
- TRAIL NETWORK

CLIENT:
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PROJECT:
EAGLE HEIGHTS/TAYLOR PROPERTY
VISUAL IMPACT ASSESSMENT

DWG:
KEY VIEW POINTS
WATER STORAGE SITES

DATE: AUG 2018
PROJECT NO: P09006

FIGURE 7.7



FIGURE 7.8
HORNING ROAD RESERVOIR DETAIL
UTM: 590497.0360, 4797727.6400
203.955 MASL(INCLUDING 1.7mVIEWER HEIGHT)

METROPOLITAN CONSULTING INC.



FIGURE 7.9
WATERDOWN ROAD NORTH LOCATION
UTM: 591372.4820, 4797120.5810
165.389MASL(INCLUDING 1.7m VIEWER HEIGHT)



FIGURE 7.10
WATERDOWN ROAD SOUTH LOCATION
UTM: 591658.2040, 4796860.2530
153.444 MASL(INCLUDING 1.7M VIEWR HEIGHT)

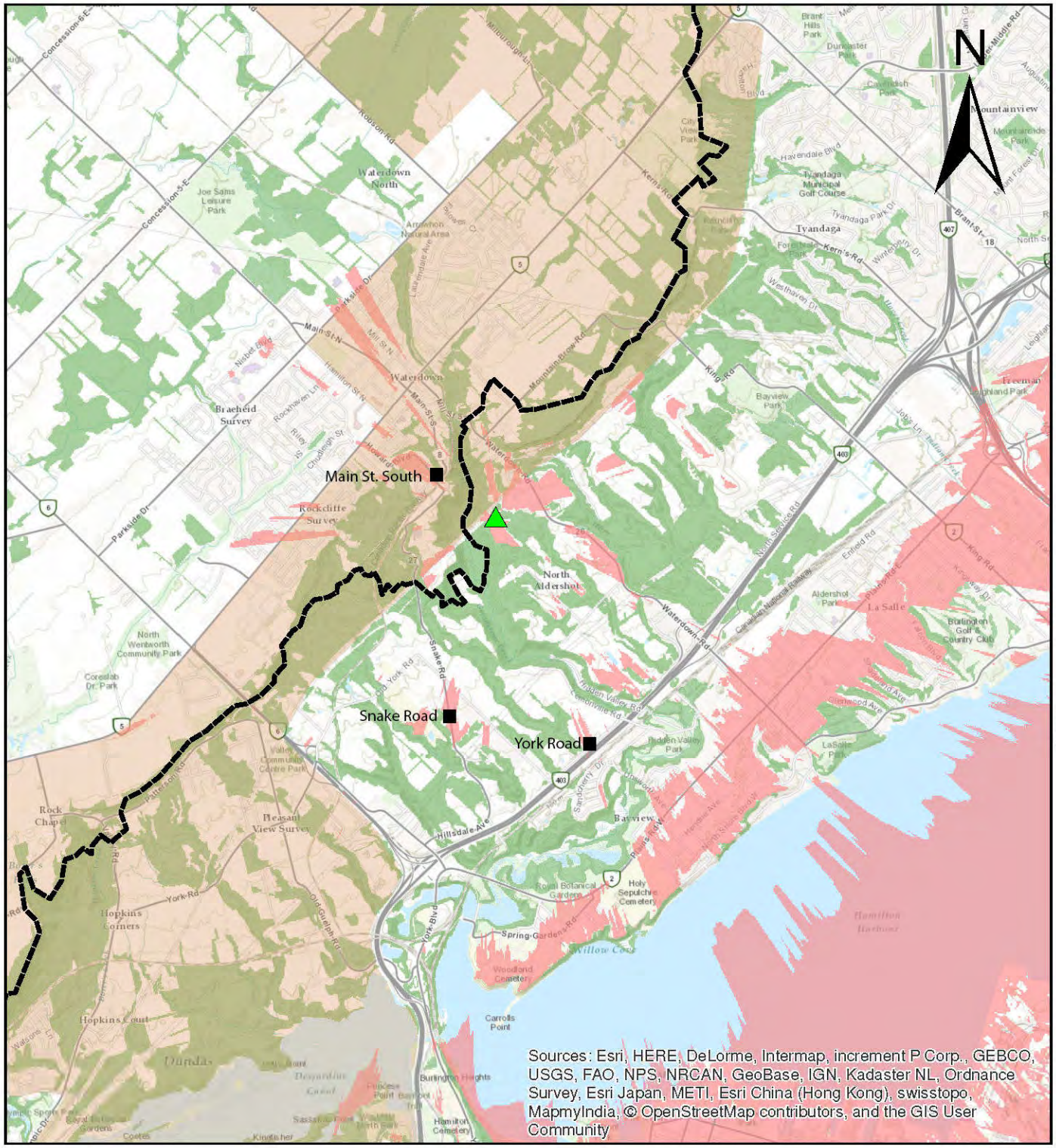
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FIGURE 7.11
HORNING ROAD NORTH LOCATION
UTM: 590497.0360, 4797727.6400
202.955 MASL(INCLUDING 1.7m VIEWER HEIGHT)



FIGURE 7.12
HORNING ROAD SOUTH LOCATION
UTM: 590601.5997, 4797105.7580
187.06 MASL(INCLUDING 1.7m VEIWER HEIGHT)



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VIEWSHED MAPPING RESULTS VERIFICATION LOCATIONS

Legend

- Watertower Alt 3
- Reference Photo Location
- Visible Area
- Niagra Escarpment Policy Area
- Wooded Area
- Bruce Trail

Kilometers
0 0.35 0.7 1.4 2.1 2.8

FIGURE 7.13



Figure 7.14 - ***Area of likely visibility for water reservoir site 3 on Main Street South.***

Figure 7.14, 7.15 and 7.16 are reference field check photographs for an area of interest, a simulation was not performed from these points however viewshed analysis and the nature of the treeline and landscape in the photos point to probable visibility of reservoir site 3 from these areas.



Figure 7.15 - ***Area of visibility for water reservoir site 3 on Snake Road, near Old York Boulevard looking north.***



Figure 7.16 - ***Visible area for water reservoir 3 on York Road.***

7.2.1 Photographic Simulation Observations

Figure 7.9 and Figure 7.10 show simulations of both water reservoir sites 2 & 3.The treeline obscures views of both structures at these specific points on Waterdown Road. They may however, be visible throughout the year due to seasonal foliage.

Figure 7.12 shows water storage alternative site 3 as it would appear from the proposed development. The view of the reservoir is completely unmitigated and creates a large visual impact.

Figure 7.11 shows water reservoir alternative site 2 as it appears from Horning Road facing south, the existing clearing for the road creates a clear view of the reservoir.

Figure 7.8 shows a mock-up of the in-ground reservoir from roughly 15 meters away; grass planting on top provides mitigation even at point blank distances.

8.0 Water Storage Conclusion and Recommendations

After completion of the Viewshed analysis, and the investigation of alternative locations through the use of Photographic Simulation, we conclude that the visual impact of the proposed in-ground water reservoir at Alternative 1 presents the best case by a large margin compared to either above ground reservoir designs in terms of visual impact.

Although not evident in photo simulation of the specific locations; both above ground water reservoir sites present the possible risk of visible areas along Waterdown Road as well as visibility from areas on the Queen Elizabeth Way.

Further, site 3 has possible negative impacts on Snake Road and Main Street. Based on both Viewshed maps and photo simulation we also conclude that site 3 has an undesirable impact on the proposed development area itself and is visible from outside the development area.

Site 2 has negative impacts on residents of Horning Road as well as recreational users of the lands. It may also be visible to commuters external to the development.

In contrast, the in-ground reservoir design limits any visibility to only the immediate area surrounding it, there are no risks of visibility in any of the areas the other sites may impact. Being in-ground also provides the opportunity to integrate the structure into the existing landscape from a visual impact perspective.

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Karl Gonnsen, P.Eng.,
M.C.I.P., R.P.P.



Martin Rohde
OCAD

Appendix A – Draft Terms of Reference and Visual Assessment Guidelines

EAGLE HEIGHTS PROPERTY
CITY OF BURLINGTON

Visual Impact Assessment
Terms of Reference

Prepared By:
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Burlington, ON
L7L 5R2

June 2018

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1.0 Introduction

This development is comprised of two draftplans: Eagle Heights (93.26 ha, see Attached) and the former Taylor lands (8.95ha, see attached), The Penta ownership parcels are also known collectively as the Eagle Heights lands. Together, these two ownership parcels cover lots 7, 8 and 9, Concession 2 and the unopened road allowance between lots 7 and 8 respectively.

Within the approved draftplan lands; 3.7 ha of the Eagle Heights Draft Plan is situated north of a Hydro One Networks Inc (HONI) corridor; located within Niagara Escarpment Plan (NEP) area. Approval for a development permit issued by the Niagara Escarpment Commission (NEC) is being sought, and to fulfill this requirement the NEC requires a Visual Impact Assessment (VIA). The NEC are also providing technical assistance to the City of Burlington in the review of the VIA for lands outside the NEP areas.

The City is responsible for reviewing the applications for the subject lands. The goal of the Terms of Reference (TOR) is to provide assistance to the applicants in preparing supplementary information to be used in the review of the applications.

The purpose of this report is to show the visual changes to the landscape of the Escarpment, through the construction of the proposed structures. Specifically the proposed 4-storey cluster housing units, and those units/structures (including infrastructure) which are located within the NEP lands. It will compare the visual impact of the conceptual designs of these structures against the existing conditions. It will detail the methodology, and resources utilized. The report will detail any findings, and make a recommendation based upon those findings.

2.0 Overview

Penta will undertake a VIA for the development outlined on draft plans of subdivision 24T-04006/B and 24T-04007/B (attached) in accordance with the NEC Visual Assessment Guidelines (VAG, attached) which will address the Purpose and Objectives of the NEP (In particular Sections 1.4, and 2.13), the principles of the North Aldershot Inter-Agency Review (NAIR) and the policies of the City of Burlington Official Plan 197 (OPA) with respect to visual impact. While the Planning and Environmental Analyses (SPBC, ENVision, June 2007) suggests that views are being maintained by the development proposal, the VIA must provide the documentation and basis for such a conclusion.

The VAG were endorsed by the NEC in 2008 and provide guidance to applicants completing a VIA for lands on or adjacent to the NEP area. The TOR serves to scope the overall VIA to this particular site and development proposal.

The purpose of the VIA is to determine the impact of the proposed 4-storey buildings on the Escarpment landscape together with any proposed water tower/reservoir, and vegetation removal related to the extension of Horning Rd, as well as conduct analyses of the views into and from the development at selected viewpoints, assessment of the cumulative impact of additional density and determination of mitigation measures (from a visual point of view).

These include views from Waterdown Road into the site, views from the Escarpment looking south, views from Flatt Road and Panin Road looking north and views through the site to determine the effect of the development on the landscape character of the North Aldershot area. Views from the Bruce Trail are not required in this instance due to the lack of site visibility. The scope of the viewshed study area is generally between Highway 403 and the Escarpment.

3.0 Methodology

The VIA methodologies selected to best demonstrate the proposed changes to built form (4-storey buildings), proposed infrastructure, and vegetation removal, will involve the following steps:

1. Completion of a Viewshed Analysis;
2. A review of the results of the Viewshed with field observation verification of said results;
3. Line of sight cross-sections and photographic simulations from the key View-points determined in the viewshed;
4. Assesment of the existing Conditions and Proposed development impacts, and potential mitigation techniques if required;

3.1 Viewshed Analsis

A Viewshed has been completed by Penta and is attached to evaluate the areas where development could affect views to and through the site, and which may require mitigation. At select locations also noted on the Viewshed figure are the Key viewpoints in which further investigations will be performed. These viewpoints were selected based on potential impacts to the landscape, and in comparison with the viewshed mapping undertaken by the NEC in review of draft plans of subdivision dated December 2010 (see attached NEC Viewshed). Below follows the methodology for the completion of the Viewshed analysis.

3.1.1 *Construct a Surface to investigate:*

The 2015 SWOOP was imported into ArcMap. The UTM coordinates of the site were used to verify against the MCI field survey the accuracy of the raster information. It was determined that the proposed center of the water reservoir alternate location 2 is at

Easting 590543.5810 and Northing 4797421.8670 has an existing surface elevation (SWOOP 2015) of 192.5m. Water reservoir alternate location 3 is at Easting 590564.7337 and Northing 4797257.7107 has an existing surface elevation (SWOOP 2015) of 184.8m. When comparing this to the MCI field elevation of 192.50 and 184.3 it is felt this is an insignificant differential.

3.1.2 *Vegetation*

Vegetation must be considered as it is a part of the existing surface. It was incorporated using a height of 15.0 m. This value is an average canopy height and will be applied across all vegetation. This value was obtained from the NEC, as a standard unit to be used for this purpose.

To add vegetation data to the surface, the aforementioned 2015 Wooded area OBM data (LIO) is added, a new field titled 'Elevation' is added to the dataset and has a value of 15 set to it to represent the height. The data is then converted to a raster dataset with ArcMap's Feature to Raster (conversion) script with the following settings:

Field:	Elevation
Output cell size:	10

Before being able to perform an addition operation on the two rasters, the ArcMap's Reclassify script is run with the Wood Area raster; values where there is no data or null are changed to 0. To finish adding the Wood Area data to the surface raster the ArcMap's Plus script is run with the surface raster and the reclassified Wood Area raster as the operands. Areas where vegetation removal occurs are subtracted from the raster. The resultant output raster is the one, which will be subjected to the Viewshed analysis.

3.1.3 *Create Proposed Structures*

Points are created in ArcMap to represent the proposed structures. They have the following fields set:

Water Tower alternative site 2:

Point_X: 590564.7337
Point_Y: 4797257.7107
OFFSETA: 12
OFFSETB: 1.7

Water Tower alternative site 3:

Point_X: 590564.7337
Point_Y: 4797257.7107
OFFSETA: 19
OFFSETB: 1.7

The water reservoir, apartment block and cluster housing are added as .shp files as their shape and sizing is more complex.

Water Reservoir	OFFSET A: 1.5
	OFFSET B: 1.7
Block P	OFFSET A: 16
	OFFSET B: 1.7
Block OO	OFFSET A: 16
	OFFSET B: 1.7
Block H	OFFSET A: 16
	OFFSET B: 1.7
Block D & E	OFFSET A: 8

	OFFSET B: 1.7
Block CC & DD	OFFSET A: 8
	OFFSET B: 1.7
Block JJ & K	OFFSET A: 8
	OFFSET B: 1.7
Block SS	OFFSET A: 8
	OFFSET B: 1.7
Block SS	OFFSET A: 8
	OFFSET B: 1.7

Point_X and Point_Y are numbers that define the UTM coordinates of the proposed structure.

OFFSETA is used as an argument for ArcMap's viewshed function, this number represents the height of the proposed water reservoir in meters.

Water reservoir alternative site 2 is an elevated storage tank design 12 meters in height, there is no lighting or additional apparatuses on top so a value of 12 is chosen. The base is situated 191.00 meters above sea level (MASL), the resultant height of the top of the tank is 202.50 MASL.

Water reservoir alternative site 3 is an elevated storage tank design 18.5 meters in total height, a 12.5m pedestal and 6.0m tank. There is no lighting or additional apparatuses on top so a value of 18.5 is chosen. The base is situated 184.00 MASL, the resultant height of the top of the tank is 202.50 MASL.

The in-ground water reservoir structure is 4.5m in height and protrudes 1.5m from the existing ground at its worst point in regards to visibility, the bottom of the structure is situated 198.00 MASL, the resultant height is 202.50 MASL. Reservoir alternative 1 is a

largely underground structure and will be covered with grass on the top to help mitigate its visual impact.

All block apartments and cluster housing lack site plans therefore heights are based on the 4 storeys in height (4m per storey), shapes are defined as best guess for the purpose this report, with a projected roof to determine a worst case from a visual perspective

OFFSETB is used as an argument for ArcMap's Viewshed function; it represents the height in meters of an observer viewing the proposed water reservoir. An observer height of 1.7m was used. This value is a typical one outlined by the Visual Assessment Guidelines.

3.1.4 *Create Viewshed*

The Viewshed analysis' are performed using ArcMap's visibility script with the raster that represents the surface with tree canopy heights added as the input raster, the input observer feature is changed between the structures for the Viewsheds. The following arguments are inputted to the function:

The resultant rasters show where the proposed water tower will be visible based on surface provided, because this surface has wooded areas added to its elevations, visibility is calculated assuming there are observers on top of the tree canopy. To better reflect the reality that the proposed structure would not be visible when an observer is located within a wooded area we remove the false areas of visibility. Using ArcMap's raster calculator we determine the areas where wooded areas are present on the Viewshed raster and subtract them with the following expression.

Output = Viewshed raster – Con(Wooded area raster, 1, 0, "Value =15")

The expression subtracts from the Viewshed raster on the condition that there is a wooded area present based on the 15 value used previously for the elevation calculation. The output raster is the final result for the Viewshed analysis.

3.2 Field Obersvation Verification

Photographs that show the viewpoints of concern as identified from the Viewshed analysis will be taken. These photos will be taken using an SLR or DSLR camera with a 50-52mm lens. The goal is to simulate what the human eye sees at these locations. Google Streetview, camera phones, etc. do not achieve this goal, and will not be used. These photos will be geo-located using a Global Positioning System (GPS) and a catalogue will be constructed. This catalogue will form the existing views at these points of interest. If when at a location where the Viewshed indicated visibility is possible, but field observation does not confirm a photo will be taken as demonstration/confirmation of an obstructed field of view. For complete technical specifications on photography see section 3.3 below.

The proposed structures and infrastructure will need to be considered in the context of these views. The resultant effect on vegetation and landform for the proposal must also be identified as part of the physical changes. As an example, if a wooded area or hedgerow will be partially eliminated as a result of the proposal, this must be included as physical change and modeled for the impact.

For viewpoints which are then determined to require further investigation, in an accurate and replicatable manner, the proposed physical changes due to built form, installation of infrastructure, or vegetation removal will be shown.

The results of the VIA will determine the need for mitigative measures to address the cumulative impact of additional density including urban design guidelines relating to matters such as building colour, roof details, glazing, zoning (building setbacks, height, orientation) and conditions of draft plan of subdivision or site plan approval relative to

the need for additional visual impact assessment for precise buildings, as well as the construction of infrastructure.

Submission format requirements are identified within the NEC VAG. Should the proponent wish to utilize alternate methodologies, they are advised to contact the NEC to ensure that the methodology and final product proposed will be considered acceptable to the NEC prior to commencement of the work. One of the goals for any study will be to produce a well documented process that is replicable with a sufficient level of detail and accuracy to enable the NEC and City of Burlington to assess the impact of the proposal on the Escarpment environment.

3.3 Line of sight cross-sections and photographic simulations

For all line of sight cross-sections and photographic simulations looking north, the brow of the Escarpment (treed or otherwise) is to be included to ensure the built form is shown in the context of the Escarpment.

3.3.1 *Resources for Photograph Simulation*

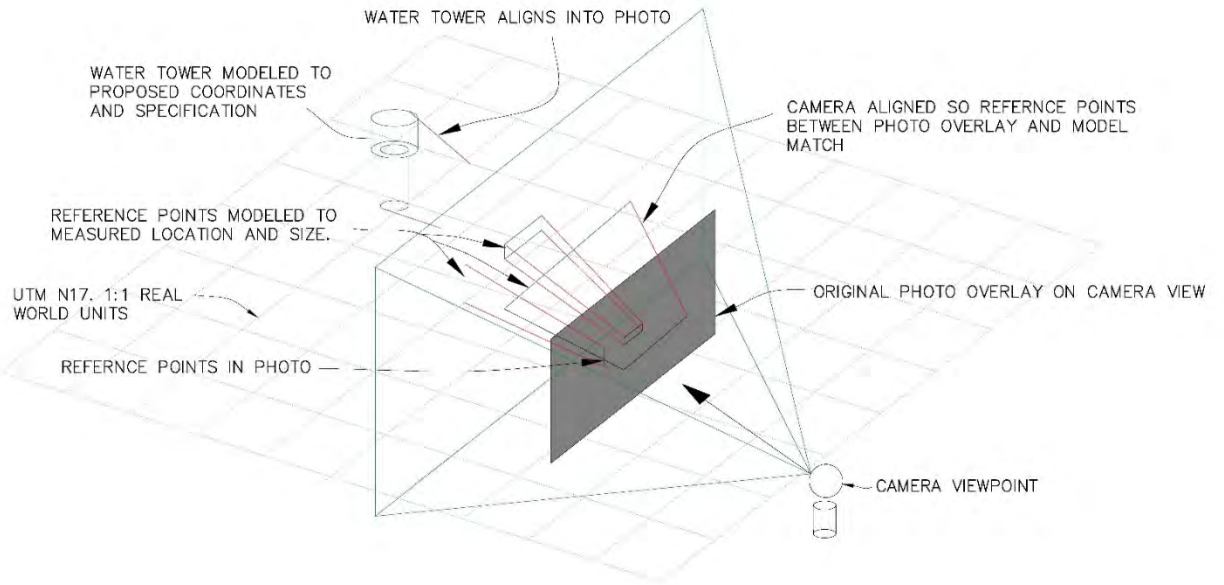
•For completion of Photography, photographs will be taken with a Canon EOS Rebel T4i, 55mm lens or Nikon D7000 with 35mm lens and a tripod with offset plate and bubble level;
•All photo locations will be geodetically measured utilizing a Trimble R8 GPS receiver, connected to CAN-net accurate to 3-5 millimeters horizontally and vertically;
•All points of vertical reference will be measured with a tape measure, to 1-2 millimeter level accuracy;
•Proposed models are to be constructed in Autodesk Civil 3d Version 2016;
•Photographic rendering will be completed using Autodesk 3d Studio Max Version 2016;
•Photo manipulation will be completed using Adobe Photoshop version CC 2015;

All photographs will be taken at previously determined sites. The use of GPS ensures that when occupying a site, the camera will point towards the proposed structure. A

height of 1.7m will be maintained for all photographs taken. This is slightly higher than recommended and will ensure clear line of sight, as a worst-case scenario.

3.3.2 *Rendering Photos*

Various markers within the photographs identified below will be modeled in Autodesk CIVIL 3D based on GPS elevation, northing and easting. A model of the proposed structures is then included to extrapolate its position compared to the photo references. The shots and physical measurements will be then observed on location for comparison. Original photos are set as background images for the camera and the 3D model is then aligned to the photo.



Civil 3D models are imported to 3D Studio Max, cameras are placed on points photographs were taken, offset 1.7m higher to adjust for measured eye level height and camera focal length is matched to photograph. A viewport is set to display camera view and the photo taken from that spot is set as the viewport background. Camera is rotated until the modeled line work from the Civil 3D model matches locations in the background image. Since the proposed structures are part of the model its location and

size are extrapolated in regards to the photo view. The camera view is then rendered with the background photograph using Nvidia Mental Ray renderer.

3.3.3 *Photo Manipulation*

The Rendered images are to be edited in Adobe Photoshop to place appropriate foreground and background of original image in relation to the model. This manipulation does not change the nature of the visibility of the proposed structure. Its purpose is to ensure that the onsite view is represented accurately in the photos.

3.3.4 *Selected Viewpoints for Analysis*

The viewpoints listed are denoted in an approximate location on the attached viewshed map. It is intended the viewpoints be more precisely located in the field by staff of the NEC, City of Burlington and the proponent. As investigation proceeds additional viewpoints may be added.

1. Investigate the impact on the viewshed from the increased number of lots and building placement fronting Waterdown Road south of Street D. The viewshed was initially identified in the 1994 (photo #7) and 1995 (photo #6) Visual Assessment studies that informed NAIR. The updated Penta viewshed has matching areas of visibility in the areas previous examined, the viewpoint is denoted in the updated viewshed as to be investigated. An alternative method (photographs with building stake out) was discussed; alternatively photographic simulations can be utilized. Additionally, a photographic simulation from Waterdown Road westerly toward Block OO along Street D north of existing tree line.
2. Photographic simulation from Waterdown Road westerly toward Block OO along Street D.
3. Update the photograph taken of the panoramic viewshed south from Waterdown Road (1994 #1) to demonstrate current / 2018 conditions. Visual impact of

proposed homes fronting on Waterdown Road to be estimated using approximate built forms. Final built forms are yet to be determined therefore a site plan condition preserving the majority of this viewshed is recommended.

4. Photographic simulation looking north west from Waterdown Road toward Block OO and Block P, northbound perspective of item 3.
5. Line of sight cross section from Flatt Road looking north to Block P
6. Line of sight cross section from Panin Road to block P.
7. Line of sight cross section from Panin Road to block H.
8. Line of sight cross section from Waterdown Road at the viewpoint of photo #8 from the 1995 Visual Assessment, investigating possible visibility of block OO shown in Penta viewshed.
9. Investigating the impact of vegetation removal on Horning Road, a photographic simulation from Horning Road looking south/west across to Block P.
10. Photographic simulation from Nevarc Drive looking across to Block G.
11. Photographic simulation from the mid-segment point of Flatt Road Extension looking south to block H, north to block OO and east.
12. Subject to the results of items 5, 6 and 7 there is a possibility one photographic simulation may be required to investigate the impact of the built form.

3.4 Assessment of the existing Conditions and Proposed development impacts

In order to assess the impacts of the proposed development features a matrix of visual impact considerations is proposed. These assessments will be broken into the Sub-Areas as defined in OPA. This matrix will weigh the Existing scenic resource of the area as defined in the NEP.

"The general appearance of a place or landscape, or the features of a landscape, taking into consideration the visual condition and scenic quality, which vary by location and are dependent on features such as geology, vegetation, landforms, and human developments. The heritage attributes of protected heritage properties may also include or be, in themselves, scenic resources."

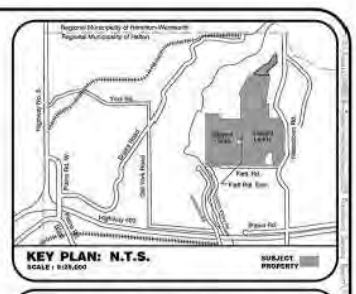
Against this will be weighed the Impact the development will have on the surrounding area, the Viewer type to be affected, the sensitivity of the viewer, and potential mitigation techniques. After these items are considered the overall visual impact to the area being examined can be assessed. These assessments will form as a collective the determination for the visual impacts of the proposed development.

The findings of the VIA should assist the NEC with review of a required Development Permit application. This application will be made with respect to sections 1.4 (Escarpment Protection Area) and 2.13 (Scenic Resources and Landform Conservation) of the NEP. The VIA should also assist the City and the NEC in understanding how the proposed development respects the NAIR, City Official Plan policies with respect to visual impact and provide a rationale for the Zoning By-law provisions with respect to building height, lot layout and siting of proposed buildings, as well as subdivision or site plan conditions and a residential development agreement.

Attachment 1: Draftplan 24T-04006/B Revised
Attachment 2: Draftplan 24T-04007/B Revised
Attachment 3: Niagara Escarpment Commission Visual Assessment Guidelines
Attachment 4: Penta Viewshed
Attachment 5: NEC Viewshed

WITHOUT PREJUDICE





REQUIREMENTS OF THE PLANNING ACT, R.S.O. 1990, c. P.13 SECTION 51(17)

(a) See Plan	(g) See Plan
(b) See Plan	(h) Municipal Water
(c) See Plan	(i) Sandy Silt
(d) Residential	(j) See Plan
(e) See Plan	(k) Full Services
(f) See Plan	(l) See Plan

SCHEDULE OF LAND USE

PROPOSED LAND USE	UNITS	HA.	AC.
RESIDENTIAL LOTS – 1-105, 126-152	192	13.49	33.33
SINGLE FAMILY CONDOMINIUM – LOTS 106-125	21	2.39	5.91
RESIDENTIAL – CLUSTER HOUSING BLOCKS – B,E,H,K,N,A,C,D&G,O,Q,S	578	12.99	31.40
SWM POND – Block EE		0.79	1.79
OPEN SPACE – BLOCKS F,Q,T,V,VV		12.25	30.27
OPEN SPACE/PARK – BLOCKS – C,M,U,NN,TT		1.97	4.87
OPEN SPACE/COMPENSATION LAND – BLOCK I		0.82	2.02
VALLEY LANDS – BLOCKS A,S,HH, & II		33.71	83.30
CREEK BLOCK – BLOCK BB		0.26	0.64
BUFFER AREA – BLOCKS B,G,J,N,Y,Z,FF,GG,MM,PP		7.71	19.05
TRAIL/SERVICING CORRIDOR BLOCK R		0.52	1.29
LANDSCAPED BUFFER BLOCK L		0.01	0.03
DAYLIGHT TRIANGLE BLOCKS J,KK & UU		0.006	0.015
PARK – BLOCKS TT		1.34	3.31
FUTURE R.O.W – BLOCK W		0.20	0.49
0.3m RESERVE BLOCK X		0.005	0.012
TOTAL UNIT COUNT	**791**		
PROPOSED ROADS		**HA.**	**AC.**
20m RIGHT OF WAY – STREETS A,B,C,D,E & HORNING ROAD		4.80	11.86
TOTAL SITE AREA		**93.26**	**230.44**

PROPOSED ROADS	METRES	FEET
20m RIGHT OF WAY – STREET A,B,C,D,E & HORNING ROAD	2161	7089.87
TOTAL ROAD LENGTH	2161	7089.87

REVISIONS

NO.	DATE	BY	REVISIONS

OWNER'S CERTIFICATE

I/We _____ being the registered owners of the subject lands described in this application, have examined the contents of this application and hereby certify that the information submitted with the application is correct insofar as I have knowledge of these facts and I hereby authorize Metropolitan Consulting Inc. to act in my stead in this matter.

Signature(s) _____ Day _____ Month _____ Year _____

Print Names _____

SURVEYOR'S CERTIFICATE

I hereby certify that the boundary of the lands to be subdivided and their relationship to the adjacent lands are accurately and correctly shown on this plan.

DATE: _____

Wayne Pearce
Pearce Surveying Inc.
PHONE No. (905) 335-0521

MUNICIPALITY

CITY OF Burlington

SCALE 1:2,000

0 20 40 60 80 100 120 140 160 180 200

METROPOLITAN CONSULTING INC.
2290 QUEENSWAY DRIVE
BURLINGTON, ON L7R 3T2
TEL. 905.637.2926
FAX. 905.637.3268
EMAIL ENGINEERING@METROCON.CA

TITLE

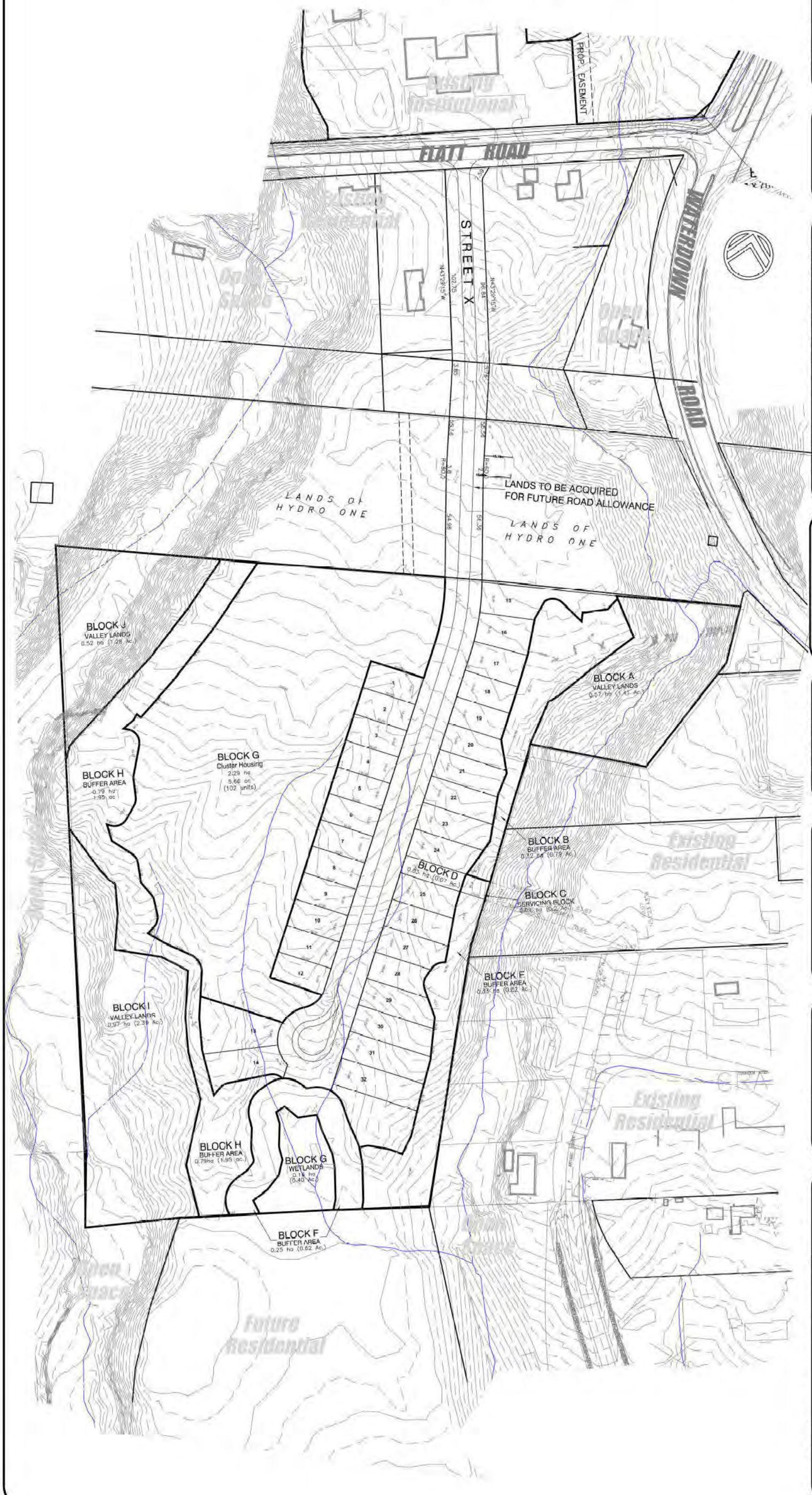
DRAFT PLAN OF SUBDIVISION

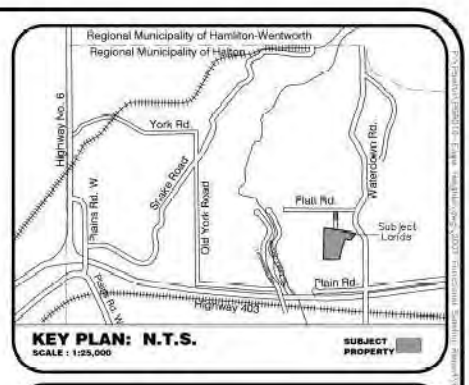
of Part of Lots 7, 8 and 9 Concession 2 and Part of the Unopened Road Allowance Between Lots 7 and 8
Formerly in the Township of East Flamborough, now in the
CITY OF BURLINGTON
REGIONAL MUNICIPALITY OF HALTON

TITLE **EAGLE HEIGHTS**
24T-04006/B REVISED

DATE **FEB. 2018** | PROJECT **P98019**

WITHOUT PREJUDICE





REQUIREMENTS OF THE PLANNING ACT, R.S.O. 1990, c. P.13 SECTION 51(17)

(a) See Plan	(g) See Plan
(b) See Plan	(h) Municipal Water
(c) See Plan	(i) Sandy Silt
(d) Residential	(j) See Plan
(e) See Plan	(k) Full Services
(f) See Plan	(l) See Plan

SCHEDULE OF LAND USE

PROPOSED LAND USE	UNITS	HA.	AC.
RESIDENTIAL LOTS – 1–31	32	1.69	4.18
RESIDENTIAL – CLUSTER HOUSING – BLOCK G	102	2.29	5.66
VALLEY LANDS – BLOCKS A,I,J		2.18	5.38
BUFFER AREAS – BLOCKS B,E,F,H		1.69	4.17
SERVICING BLOCK – BLOCKS C,D		0.04	0.1
PROPOSED ROADS		**HA.**	**AC.**
20m RIGHT OF WAY – STREET X		1.06	2.62
TOTAL UNIT COUNT	**134**		
TOTAL SITE AREA		**8.95**	**22.10**

PROPOSED ROADS	METRES	FEET
20m RIGHT OF WAY – STREET A	491	1610.88
TOTAL ROAD LENGTH	491	1610.88

REVISIONS

NO.	DATE	BY	REVISIONS

OWNER'S CERTIFICATE

I/we _____ being the registered owners of the subject lands described in this application, have examined the contents of this application and hereby certify that the information submitted with the application is correct insofar as I have knowledge of these facts and I hereby authorize Metropolitan Consulting Inc. to act in my stead in this matter.

Signatures _____ Day Month Year

Print Names _____

SURVEYOR'S CERTIFICATE

I hereby certify that the boundary of the lands to be subdivided and their relationship to the adjacent lands are accurately and correctly shown on this plan.

DATE _____

Wayne Pearce
Pearce Surveying Inc.
PHONE No. (905) 333-5623

MUNICIPALITY

CITY OF Burlington

SCALE 1:1,000

0 20 40 60 80 100

METROPOLITAN CONSULTING INC.
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TEL. 905.637.2926
FAX. 905.637.3268
EMAIL : ENGINEERING@METROCON.CA

TITLE

DRAFT PLAN OF SUBDIVISION

of Part of
Lot 7, Concession 1

Formerly in the Township of East Flamborough, now in the
CITY OF BURLINGTON
REGIONAL MUNICIPALITY OF HALTON

24T-94012/B

TITLE

TAYLOR PROPERTY
24T-04007/B REVISED

DATE	PROJECT
FEB. 2018	P98019

Please see the policies contained in the June 1, 2017 Niagara Escarpment Plan found at www.escarpment.org; contact Niagara Escarpment Commission staff if there are any questions.
This document will be updated in the future to align with the Plan that is now in effect.

August 1, 2017

Ontario's Niagara Escarpment
l'Escarpement du Niagara de l'Ontario

Ontario

Niagara Escarpment Commission
232 Guelph Street
Georgetown ON L7G 4B1
Tel. No. (905) 877-5191 - Fax No. (905) 873-7452

Commission de l'escarpement du Niagara
232, rue Guelph
Georgetown ON L7G 4B1
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www.escarpment.org

July 17, 2008

Niagara Escarpment Commission
VISUAL ASSESSMENT GUIDELINES

Introduction:

The purpose of the Guidelines is to outline standards for the preparation of Visual Assessment Studies when required to assess a proposed development. Visual Assessment Studies assist in identifying and evaluating change in the landscape in order to ascertain whether a proposal is in keeping with the *Niagara Escarpment Planning and Development Act* (NEPDA) and the Niagara Escarpment Plan (NEP).

The Visual Assessment Study process sets out initially to establish a baseline for the existing conditions and then identify the physical changes in an accurate and objective manner. With a baseline and an accurate identification of the physical changes, an assessment of the impact of change on the Escarpment visual, landscape and scenic resources, in keeping with the NEPDA and NEP, can be conducted.

The steps and methods identified herein are intended to set out a standard protocol; where alternative methods are proposed, proponents will be advised to contact the NEC to ensure that the methodology and final product proposed will be considered acceptable to the NEC prior to commencement of the work. One of the goals for any study will be to produce a well documented process that is replicable with a sufficient level of detail and accuracy to enable the NEC to assess the impact of the proposal on the Escarpment environment.

General:

When the NEC receives a proposal for development, a determination is made, as early in the process as possible, as to whether there is concern that the potential visual impact on the Escarpment landscape and scenic resources requires that a Visual Assessment be conducted. Subsequently, the proponent is advised of the requirement and various steps or methods outlined in keeping with the type of proposed development and potential impact. Not all of the investigative methods outlined in the Guidelines would necessarily be required for a given study.

All of the investigative methods indicated are reliant on the detail and accuracy of available data such as the topography, vegetation, property and road fabric as well as the details for the proposal under review.

A higher level of detail/accuracy for the data = a higher level of accuracy available for identifying change.

The proposal for development, to be assessed, can take many forms such as utilities, telecommunication towers, recreational facilities, agricultural buildings, wind turbines and various types of residential buildings. The proposal may be for a single element, such as a tower, or contain multiple elements of built form. Further, the resultant effect on vegetation and landform for a proposal must also be identified as part of the physical changes. As an example, if a hedgerow will be partially eliminated as a result of the proposal, this must be included as physical change and modeled for the impact.

All of the methods are focused on investigating the visibility of the proposal when viewed from public roads, public lands and the Bruce Trail. Public lands also include public waterways such as Georgian Bay and Lake Ontario. Studies undertaken to fulfill the requirements of the NEP are not intended to address views from private property.

Investigative Methods to Identify Change in the Landscape:

As noted, not all of the investigative methods outlined herein would necessarily be required for every study. It is however intended that where deemed necessary by the NEC, all of the methods listed may be necessary for the accurate identification of change in the landscape. The NEC will advise the proponent of the requirement for a study and the various steps or methods best suited for the investigation in keeping with the type of proposed development and potential impact.

1. Viewshed Mapping: A digital viewshed analysis is the preferred method. The purpose of viewshed mapping is to objectively and accurately identify where proposed structures or built form would be visible from existing and proposed roads, public lands and from the Bruce Trail. The specifics of a proposal will dictate the distance out from the structure to be mapped. However, as a guide, for most built form, mapping should extent out from the structure a minimum of five (5) kilometres. Vertical structures such as towers would typically require this distance be extended.

   a) The viewshed mapping applications and data utilized must be identified and should be equal to or better than that utilized by the NEC; an example and details of the applications used by the NEC is as follows:

      - Digital modeling program: Environmental Systems Research Institute (ESRI) software, ArcGIS 9.1 with Spatial Analyst.

      - NEC viewsheds are produced drawing upon MNR's Natural Resources and Values Information System (NRVIS) digital base data (roads, topography, vegetation etc) as well as other digital data entitled to the NEC through the Ontario Geospatial Data Exchange (OGDE) such as orthophotography and parcel boundaries along with the physical (location, height, width) description of the item or items to be modeled.

      - See Figure # 1, which is an example attached for reference purposes. On the example, the colour green means the elements being modeled are visible, the pink colour identifies areas where the elements would not be visible.

b) The viewshed map must be field checked for accuracy and the findings/ revisions modeled into the program for a final viewshed map.

c) The methodology, base data and digital applications utilized, by the proponent, to produce the viewshed mapping must be identified within the study documentation or the submission shall be considered incomplete.

2. Subsequent to the production of the final viewshed map, viewpoints and individual viewsheds are to be selected in concert with the NEC for further study including:

- Photographic simulations;
- Line of sight cross sections;
- Detailed viewshed mapping from significant viewpoints; and,
- Detailed viewshed mapping along continuous traveled routes for public roads, waterways or the Bruce Trail.

3. Photographic Simulations: Photographs from the selected viewpoints and individual viewsheds are to be taken, when possible, during non leaf conditions (worst case scenario) for the purposes of documenting existing conditions and producing simulations. There are various acceptable methodologies and digital photographic simulation applications available. Prior to producing the photographic simulations, the proponent is to provide the NEC with a detailed outline of the methodology and applications proposed to ensure that the process will be satisfactory. Submissions shall ensure the following:

- Simulations are to be produced by accurately registering the proposed built form to fixed locations within a photograph showing existing conditions.
- Details on the methodology utilized to fix the location spatially as well as extent of the built form horizontally and vertically are to be described.
- Viewing height: 1.5 to 1.6 metres.
- Type of camera lens utilized, i.e., 50mm/52mm.
- Photo locations / viewpoints, as well as the built form location, are to be provided in plan form (to scale). All locations are at a minimum to be GPS or OLS surveyed, including the topographic elevations, to allow for field visits and to ensure accuracy of the simulations (potentially as a landscape monitoring location as well).
- Each simulation must be accompanied by the original, unaltered photograph indicating existing conditions.
- Photographs or photographic simulations where the existing vegetation is embellished by illustration or graphics are not acceptable.
- The methodology and digital applications utilized, by the proponent, to produce the photographic simulations must be identified within the study documentation or the submission shall be considered incomplete.

Where mitigation is proposed the proponent may be asked to, or may chose to, prepare simulations to demonstrate the effect of elements such as new planting. It is recommended new planting be modeled at planting height. Subsequent images identifying later conditions should be based on average projected growth rates for the specific plant species, plant character and the local environment.

4. Line of Sight Cross Sections: Line of sight cross sections are to be selected in concert with the NEC and are to include the following:

- A plan view (to scale) indicating the legal property boundaries, existing topography (elevations and contours), vegetation, other features, the location of the proposed structure(s) and the alignment of the line of sight cross section.
- A cross section (to scale) of the existing topography with the proposed structure, grade changes and vegetation. Vertical and horizontal ratio of 1:1 for all cross sections.
- A line of sight from a viewing height between 1.5 to 1.6 metres drawn from the viewer's eye level to the nearest and highest elevation of the proposed structure or natural obstruction, i.e., row of trees.
- Subsequently, on a separate drawing, the proponent may wish to demonstrate the effect of mitigation such as proposed screening; see item # 3 herein.
- Source of base data including year, resolution or contour interval.

5. Detailed viewshed mapping would be applied as an investigative method when a higher level of scrutiny is required to assess change. This process would incorporate the details associated with features, such as the topography and vegetation as well as the proposal, mapped and modeled at greater detail. Digital applications such as 3D Nature Studio incorporating photographs of the site can be utilized to demonstrate /simulate the physical changes to the landscape. This type of investigation is site and project specific as such the appropriate methodology and applications would be determined on an individual basis.

6. Detailed viewshed mapping along continuous traveled routes of public roads or the Bruce Trail. As with item 5 herein this type of investigation is applied when a higher degree of scrutiny is required. The NEC has on hand a number of studies as examples to be provided should this method be identified as a necessary component of the investigation. This type of investigation is site and project specific. As such, the appropriate methodology and applications would be determined on an individual basis.

7. Visual assessment studies within the Municipality of Northern Bruce Peninsula shall also address the impact of illumination.

- The Municipality of Northern Bruce Peninsula has been proclaimed a "Dark Sky Community". Information on the Dark Sky Proclamation is available at www.northbrucepeninsula.ca/dark-sky.htm and www.bpeg.ca/code/darksky. php. The Niagara Escarpment Commission supports this proclamation and recommends that the applicant obtain information on shielding the night sky from excessive residential lighting through the use and operation of appropriate lighting fixtures. This information is available at www.darksky.org/programs/fixture-seal-of-approval.

The NEC may expand this requirement if other municipalities adopt a Dark Sky program or if the site is unique and seems to require such an assessment.

Assessment of the Impact of Change on the Escarpment Environment:

The next step in the Study seeks to assess the impact of change on the Escarpment landscape. With a baseline and an accurate identification of the physical changes, an assessment of the impact on the visual, landscape and scenic resources of the Escarpment environment, in keeping with the NEPDA and NEP, as well approved Policy Papers, would be prepared by the proponent.

The assessment of the impact may also include evaluating whether the change has effect on the results reported in previous studies, including but not limited to:

- The Landscape Evaluation Study undertaken in 1976 by the NEC whereby all of the lands, under consideration for inclusion in the Plan area, were evaluated and ranked for scenic quality. The ranking included six categories: Outstanding, Very Attractive, Attractive, Average, Low and Very Low. The Study and Maps are available from the NEC.

- Other NEC Landscape Evaluation or Viewshed Studies where applicable.

NEC Review:

The review of a Visual Assessment Study can result in the NEC requesting that the proponent alter the proposal so that the impact is minimized or mitigated. The proponent would be requested to alter the proposal and the revisions modeled utilizing the agreed upon methodologies. Should the impact of the change to the visual and landscape conditions that results be acceptable to the NEC, the Report would be approved.

Critical details derived from the Visual Assessment Study such as building heights and locations as well as the extent of built form or screening would be identified in the approval and/or implementation process that follows. This could include the Development Permit Application review process, Conditions of Approval or Plan Amendments.

Submission Format:

The Visual Assessment Study submitted for review shall include the following:

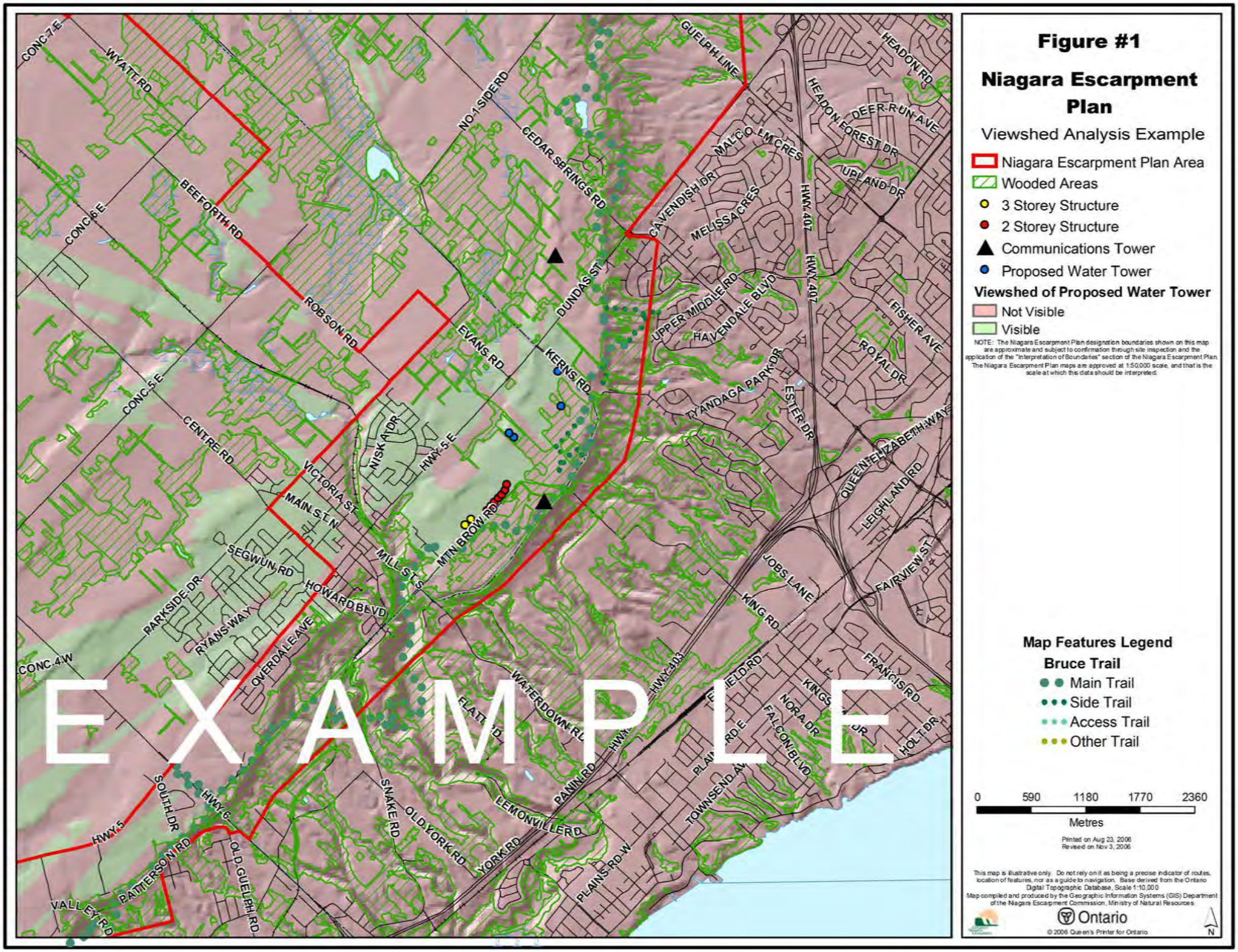
- 2 hard copies of the study.
- 1 digital copy of all the study components compatible with NEC programs.
- All hard copy and digital drawings shall identify a standard engineering ratio scale (ie 1:1000) and include a bar scale.
- Orthophotography or aerial photography - source and date flown.
- All data sources for elements such as topography and vegetation are to be identified and the date compiled.
- Digital applications utilized to produce drawings and simulations.
- Detailed process followed per investigative method.
- Proposal title, owner, consultant and application number.
- Location map indicating the lot, concession, County/Region, street address and legal description of the subject property.
- Contact person and methods to access, i.e. telephone, email address, fax, mailing address and company name.

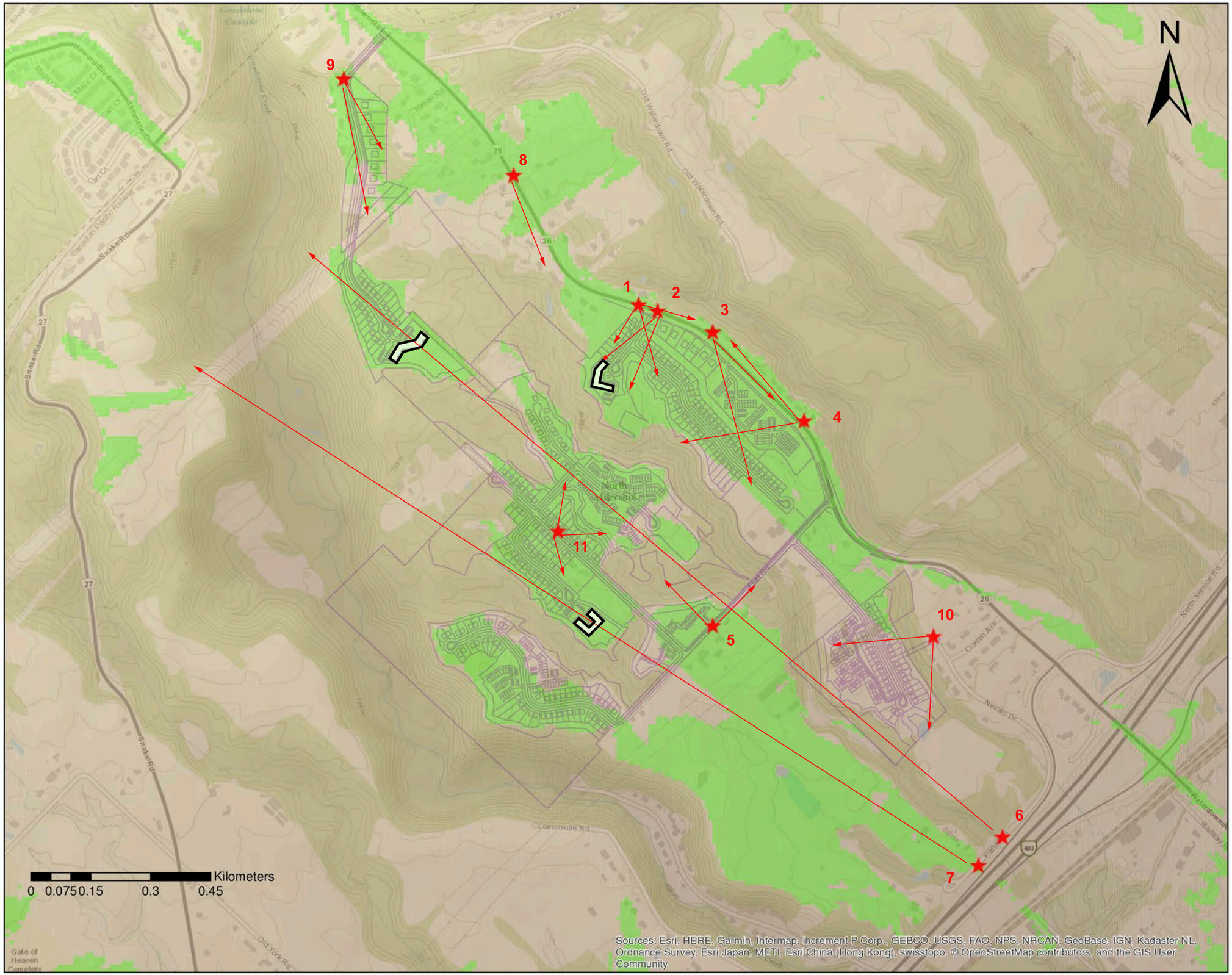
END

Note: The NEC will, from time to time, update the Guidelines to reflect current technology or refine the processes identified herein. The revision date will be noted at the beginning of the document and the most current version available from the Niagara Escarpment web site at www.escarpment.org. Alternatively, hard copies can be provided by contacting either the Georgetown or Thornbury offices.

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Figure #1
Niagara Escarpment Plan
Viewshed Analysis Example
Niagara Escarpment Plan Area
Wooded Areas
3 Storey Structure
2 Storey Structure
Communications Tower
Proposed Water Tower
Viewshed of Proposed Water Tower
Not Visible
Visible
NOTE: The Niagara Escarpment Plan designation boundaries shown on this map are approximate and subject to confirmation through site inspection and the application of the "Interpretation of Boundaries" section of the Niagara Escarpment Plan. The Niagara Escarpment Plan maps are approved at 1:50,000 scale, and that is the scale at which this data should be interpreted.
Map Features Legend
Bruce Trail
Main Trail
Side Trail
Access Trail
Other Trail
0
590
1180
1770
2360
Metres
Printed on Aug 23, 2006
Revised on Nov 3, 2006
This map is illustrative only. Do not rely on it as being a precise indicator of routes, location of features, nor as a guide to navigation. Base derived from the Ontario Digital Topographic Database, Scale 1:10,000
Map compiled and produced by the Geographic Information Systems (GIS) Department of the Niagara Escarpment Commission, Ministry of Natural Resources
Ontario
© 2006 Queen's Printer for Ontario
N
EXAMPLE
CONC 7 E
WYATT RD
BEEFORTH RD
CONC 6 E
ROBSON RD
CONC 5 E
CENTRE RD
CONC 4 W
NO 1 SIDE RD
CEDAR SPRINGS RD
GUELPH LINE
DUNDAS ST
EVANS RD
KERNS RD
NISKA DR
HWY 5 E
VICTORIA ST
MAIN ST N
MILL ST S
MTN BROW RD
SEGWUN RD
PARKSIDE DR
RYANS WAY
HOWARD BLVD
OVERDALE AVE
WATERDOWN RD
HWY 403
HWY 5
SOUTH DR
HWY 6
PATTERSON RD
VALLEY RD
OLD GUELPH RD
SNAKE RD
OLD YORK RD
YORK RD
LEMONVILLE RD
PAINE RD
PLAINS RD W
TOWNSEND AV
FALCON BLVD
NORA DR
HOLT DR
FRANCIS RD
KINGS
KING RD
JOBS LANE
FAIRVIEW ST
LEIGHLAND RD
QUEEN ELIZABETH WAY
ESTER DR
TYANDAGA PARK DR
ROYAL DR
FISHER AVE
HAVENDALE BLVD
UPPER MIDDLE RD
HWY 407
MELISSA CRES
CAVENDISH DR
MALCOLM CRES
HEADON FOREST DR
DEER RUN AVE
HEADON RD
URLAND DR



METROPOLITAN CONSULTING INC.

VIEWSHED OF PROPOSED BUILDINGS EAGLE HEIGHTS

CITY OF BURLINGTON,
REGION OF HALTON

LEGEND

PROPOSED BUILDING

VIEWPOINT TO BE INVESTIGATED

VISIBLE

ASSUMPTIONS
Height of proposed buildings -16m
Height of tree canopy -15m
Viewer height -2m

Source of information
2015 South Western Ontario Orthophotography Project DEM (Used as bare-earth scenario Vegetation added.)

Coordinate System: NAD 1983 UTM Zone 17N
Projection: Transverse Mercator
Datum: North American 1983
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: -81.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

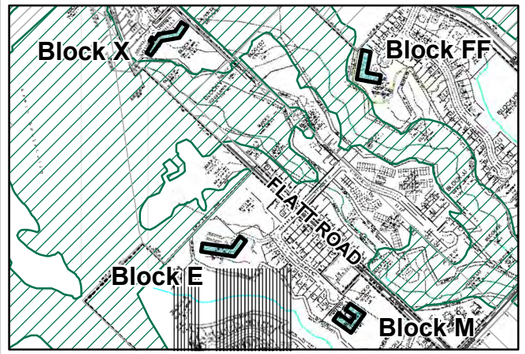
19/03/2018

Niagara Escarpment Plan

Viewshed of Proposed Buildings

Eagle Heights

City of Burlington, Region of Halton



- Subject Property
- Proposed Buildings
- Niagara Escarpment Plan Area
- Wooded Area
- Viewpoints to be investigated per August 23, 2011 TOR

Viewshed of Proposed Buildings

- Not Visible
- Visible (within area of interest)

Bruce Trail

- Main Trail
- Side Trail

NOTE: The Niagara Escarpment Plan maps are approved at 1:50,000 scale, and that is the scale at which this data should be interpreted.

ASSUMPTIONS

Height of Proposed Buildings - 16 m (52 ft)
4 metres per storey
Height of Trees and Hedgerows - 15 m (50 ft)
Viewer Height - 1.5 m (5 ft)

Tree height was added to the digital elevation model and is taken into account in the viewshed model

Source of Information

5 m Digital Elevation Model (DEM) 2002 First Base Solutions and Ontario's Ministry of Natural Resources
The information displayed on this map has been compiled from various sources. While every effort has been made to accurately depict the information, this map should not be relied on as being a precise indicator of locations of features nor as a guide to navigation.

0 150 300 450 600

Metres

Printed on August 9, 2011

Map Created by Daniel Ventresca

This map is illustrative only. Do not rely on it as being a precise indicator of routes, location of features, nor as a guide to navigation. Base derived from the Ontario Digital Topographic Database, Scale 1:10,000
Map compiled and produced by the Geographic Information Systems (GIS) Department of the Niagara Escarpment Commission, Ministry of Natural Resources

Ontario

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N

#1 through #11
See draft terms of reference (NEC) Dated August 23, 2011

Appendix B – Excerpts from Planning Documents

Excerpts from NAIR

"1. North Aldershot as a distinct, identifiable area in the context of Burlington and the Toronto-Hamilton built-up area - Keep It

Distinctive

• Have regard for the visual experience of the landscape of the North Aldershot area as a single entity, e.g. significant views of North Aldershot from Hamilton and other areas, visual quality as generally experienced throughout the area;
• Reinforce predominantly rural characteristics of the North Aldershot area;

Enhance Special Characteristics of the Area

• Acknowledge that there are areas within North Aldershot that are clearly different from each other due to the nature and quality of the natural setting and settlement history.

Escarpment

• Preserve the brow of the Niagara Escarpment;
• Preserve the visual and open space character of the Escarpment brow;
• Acknowledge the visual, physical and natural character of the Escarpment slopes;
• Acknowledge North Aldershot as a single landscape unit;
• Preserve significant views of Escarpment brow; and
• Facilitate views from the Escarpment brow, e.g. to Lake Ontario, Hamilton Harbour.

Topography

• Have regard for topographical character of the landscape, e.g. rolling terrain, deep ravines.

Vegetation

• Recognize Environmentally Sensitive Areas; and
• Minimize forest fragmentation, and to the greatest extent possible, retain significant trees and significant vegetation... Creeks, Valleys and Ravines
• Protect existing watercourses;
• Provide for adequate consideration of public access to natural areas; achieve an appropriate balance between access and preservation; and
• Minimize negative impacts from physical overuse.

Settlement Patterns

• Respect the scale and character of the existing community;
• Recognize and protect cultural heritage;

• Have regard for the rural character of existing roads as identified, e.g. Waterdown Road, Snake Road;
• Limit construction of additional major roads; and
• Limit upgrading of existing roads.

Retain Urban Separator Function

• Do not permit extensive areas of contiguous urban development;
• Have regard for the "view from the road" for vehicles passing through the area, e.g. character of Waterdown Road, Snake Road, character of Highway 403 corridor.
• Acknowledge "gateways" to the area from Burlington, Hamilton, and Flamborough; locate identifiable boundaries; and reserve utility corridors, e.g. hydro, pipeline."

Excerpts from Burlington Official Plan Amendment 197

> *"Urban Separator Function - To maintain the urban separator function between the Waterdown urban area of the City of Hamilton and the urban area of Burlington, performed by North Aldershot.*
>
> *Urban Boundary - To confirm the North Service Road as Burlington's northern urban boundary in the west part of the City.*
>
> *Distinct area - To retain North Aldershot as a distinct, identifiable area in the context of the City of Burlington and the surrounding built-up area to the north and south.*
>
> *Retain special Characteristics- To ensure that development and re-development in North Aldershot retains and, where possible, enhances the special characteristics of the area and to ensure the preservation and enhancement of existing significant environmental and physical features.*
>
> *Existing character -To permit development and re-development which is compatible with the predominant characteristics of North Aldershot such that the scale and character of the existing community is respected and regard is had to the rural character of the existing roads.*
>
> *Topography - To respect the topographical character of the area so that slopes are protected from major cutting, major filling and erosion.*
>
> *Cultural Heritage - To recognize and reflect the cultural heritage of the area.*
>
> *Roads - To limit the construction of additional major roads and the upgrading of existing roads.*

Niagara Escarpment - To preserve the brow of the Niagara Escarpment as well as its visual and natural open space character.

Escarpment views - To preserve significant views of the Escarpment brow as well as from the Escarpment.

Other views - To ensure that significant views of North Aldershot from outside the area reinforces its context as a distinct, identifiable area different from the surrounding urban area."

Excerpts from Niagara Escarpment Plan

Section: 1.1.2 Special Policies

"Special policies (site specific amendments) have been incorporated into this Plan in the form in which they were originally approved. They should be interpreted having regard for the policies of the Plan in effect when they were approved and given effect according to the original intent. "

Section: 2.2.17 Special Provisions for North Aldershot Policy Area

"Notwithstanding the policies of Part 2.2, development may occur in accordance with the land use policies set out in Amendment No. 197 to the City of Burlington Official Plan in the area identified as the North Aldershot Policy Are on Map 3 to the Niagara Escarpment Plan."

Section: 2.4.21 Special Provisions for North Aldershot Policy Area

"Notwithstanding the Lot Creation provisions of Part 1.3 for the Escarpment Natural Area and the Lot Creation provisions of Part 1.4 for the Escarpment Protection Area, new lots may be created in accordance with the land use policies set out in the City of Burlington Official Plan in the area identified as the North Aldershot Policy Area on Map 3 to the Niagara Escarpment Plan."

Section: 2.13 Scenic Resources and Landform Conservation

"The objective is to ensure that development preserves the natural scenery, and maintains Escarpment Related Landforms and the open landscape character of the Escarpment.

Scenic Resources

1. *Development shall ensure the protection of the scenic resources of the Escarpment.*

2. *Where a visual impact on the scenic resources is identified as a concern by the implementing authority, a visual impact assessment shall be required.*

3. A visual impact assessment shall:

a) establish a baseline for the existing conditions;

b) identify the proposed physical changes; and

c) assess the impact of the proposed change on the scenic resources of the Escarpment; and

d) propose measures to minimize any visual impacts.

4. Appropriate siting and design measures shall be used to minimize the impact of development on the scenic resources of the Escarpment, including:

a) establishing appropriate setbacks and maximum building heights;

b) changing the orientation and height of built form to reduce visibility and sky lining;

c) clustering buildings where appropriate;

d) minimizing the development footprint and changes to the existing topography and vegetation;

e) using natural topography and vegetation as screening for visual mitigation;

f) where there is minimal existing screening or vegetation that cannot be retained, providing new planting of native species to screen development;

g) using non-reflective materials on roofs and walls along with measures to reduce reflectivity associated with windows; and

h) minimizing the effect from exterior lighting (e.g., lighting directed downward).

Landform Conservation

5. Planning, design and construction practices shall ensure that Escarpment Related Landforms are maintained and enhanced, and that development is visually compatible with the natural scenery and open landscape character of the Niagara Escarpment.

6. Use of impervious surfacing should be minimized and limited to areas of the site where it is necessary to the Permitted Use (e.g., driveways, walkways, patios, parking, recreational surfaces).

7. Except as provided for in Part 2.9 (Mineral Aggregate Resources) , the construction of berms will only be permitted in cases where natural vegetation is insufficient to mitigate visually incompatible land uses, or where noise attenuation is required.

8. Excess excavated materials related to new development should be retained on site and integrated into the site plan so as to maintain natural drainage, protect existing vegetation, and minimize contour changes.

9. Any proposed cutting and land filling must be clearly shown on a proper grading and drainage plan. If imported fill is needed a fill management plan, prepared and overseen by a professional geoscientist or professional engineer, may be required at the discretion of the implementing authority.

10. Any fill imported onto a site must meet or exceed existing on-site soil quality conditions. The objective is that imported fill shall meet Table 1 of the Soil and Groundwater and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act, R.S.O. 1990, C.E. 19, unless, at the discretion of the implementing authority, a different Table Standard is deemed safe and appropriate. This assessment will be based on site conditions, the quality of fill proposed and a consideration of possible impact on human health and the environment."

Appendix C – Methodologies for Viewshed Mapping and Photo Simulation

Resources for Viewshed Mapping

The Viewshed was constructed using the following resources:

- ArcMap version 10.4.1

Information integrated into the Digital mapping were obtained through the Metadata Management Tool provided by Land Information Ontario (LIO), as well as GeoGratis provided by Natural Resources Canada (NRC).

- 2015 South Western Ontario Orthographic Project
- ESRI Topographic base map
- 2015 Wooded area OBM data (LIO)
- 2016 Niagara Escarpment Policy Area (LIO)

Also utilized was a completed topographic field survey of the property. This survey has been conducted over several years, ranging from 2005-present. MCI staff conducted this survey.

Methodology for Viewshed Mapping

Construct a Surface to investigate:

The 2015 SWOOP was imported into ArcMap. The UTM coordinates of the site were used to verify against the MCI field survey the accuracy of the raster information. It was determined that the proposed center of the water reservoir alternate location 2 is at Easting 590543.5810 and Northing 4797421.8670 has an existing surface elevation (SWOOP 2015) of 192.5m. Water reservoir alternate location 3 is at Easting 590564.7337 and Northing 4797257.7107 has an existing surface elevation (SWOOP 2015) of 184.8m. When comparing this to the MCI field elevation of 192.50 and 184.3 it is felt this is an insignificant differential.

Vegetation

Vegetation must be considered as it is a part of the existing surface. It was incorporated using a height of 15.0 m. This value is an average canopy height and will be applied across all vegetation. This value was obtained from the NEC, as a standard unit to be used for this purpose.

To add vegetation data to the surface, the aforementioned 2015 Wooded area OBM data (LIO) is added, a new field titled 'Elevation' is added to the dataset and has a value of 15 set to it to represent the height. The data is then converted to a raster dataset with ArcMap's Feature to Raster (conversion) script with the following settings:

Field:	Elevation
Output cell size:	10

Before being able to perform an addition operation on the two rasters, the ArcMap's Reclassify script is run with the Wood Area raster; values where there is no data or null are changed to 0. To finish adding the Wood Area data to the surface raster the ArcMap's Plus script is run with the surface raster and the reclassified Wood Area raster as the operands. Areas where vegetation removal occurs are subtracted from the raster. The resultant output raster is the one, which will be subjected to the Viewshed analysis.

Create Proposed Structures

Points are created in ArcMap to represent the proposed water reservoir structures, they have the following fields set:

Water Tower alternative site 2
- Point_X: 590564.7337
- Point_Y: 4797257.7107
- OFFSETA: 12
- OFFSETB: 1.7

Water Tower alternative site 3
- Point_X: 590564.7337
- Point_Y: 4797257.7107
- OFFSETA: 19
- OFFSETB: 1.7

The water reservoir, apartment block and cluster housing is added as .shp files.

Water Reservoir	OFFSET A: 1.5 OFFSET B: 1.7
Block P	OFFSET A: 16 OFFSET B: 1.7
Block OO	OFFSET A: 16 OFFSET B: 1.7
Block H	OFFSET A: 16 OFFSET B: 1.7
Block D & E	OFFSET A: 8 OFFSET B: 1.7
Block CC & DD	OFFSET A: 8 OFFSET B: 1.7
Block JJ & K	OFFSET A: 8 OFFSET B: 1.7
Block SS	OFFSET A: 8 OFFSET B: 1.7
Block SS	OFFSET A: 8 OFFSET B: 1.7

Point_X and Point_Y are numbers that define the UTM coordinates of the proposed structure.

OFFSETA is used as an argument for ArcMap's viewshed function, this number represents the height of the proposed water reservoir in meters.

Water reservoir alternative site 2 is an elevated storage tank design 12 meters in height, there is no lighting or additional apparatuses on top so a value of 12 is chosen. The base is situated 191.00 meters above sea level (MASL), the resultant height of the top of the tank is 202.50 MASL.

Water reservoir alternative site 3 is an elevated storage tank design 19 meters in total height, a 13m pedestal and 6.0m tank. There is no lighting or additional apparatuses on top so a value of 19 is chosen. The base is situated 184.00 MASL, the resultant height of the top of the tank is 202.50 MASL.

The in-ground water reservoir structure is 4.5m in height and protrudes 1.5m from the existing ground at its worst point in regards to visibility, the bottom of the structure is situated 198.00 MASL, the

resultant height is 202.50 MASL. Reservoir alternative 1 is a largely underground structure and will be covered with grass on the top to help mitigate its visual impact.

All block apartments and cluster housing lack site plans therefore heights are based on the number of storeys (4m per storey), shapes are defined as best guess for the purpose this report,

OFFSETB is used as an argument for ArcMap's Viewshed function; it represents the height in meters of an observer viewing the proposed water reservoir. An observer height of 1.7m was used. This value is a typical one outlined by the Visual Assessment Guidelines.

Create Viewshed

The Viewshed analyses are performed using ArcMap's visibility script with the raster that represents the surface with tree canopy heights added as the input raster, the input observer feature is changed between the structures for the Viewsheds. The following arguments are inputted to the function:

The resultant rasters show where the proposed water will be visible based on surface provided, because this surface has wooded areas added to its elevations, visibility is calculated assuming there are observers on top of the tree canopy. To better reflect the reality that the proposed structure would not be visible when an observer is located within a wooded area we remove the false areas of visibility. Using ArcMap's raster calculator we determine the areas where wooded areas are present on the Viewshed raster and subtract them with the following expression.

Output = Viewshed raster – Con(Wooded area raster, 1, 0, "Value =15")

The expression subtracts from the Viewshed raster on the condition that there is a wooded area present based on the 15 value used previously for the elevation calculation. The output raster is the final result for the Viewshed analysis.

Resources for Photograph Simulation

For completion of the Photography, photographs were taken with a Canon EOS Rebel T4i, 55mm lens or Nikon D7000 with 35mm lens and a tripod with offset plate and bubble level.

All photo locations were geodetically measured utilizing a Trimble R8 GPS receiver, connected to CAN-net accurate to 3-5 millimeters horizontally and vertically.

All points of vertical reference were measured with a tape measure, to 1-2 millimeter level accuracy.

Proposed models were constructed in Autodesk Civil 3d Version 2016

Photographic rendering was completed using Autodesk 3d Studio Max Version 2016.

Photo manipulation was completed using Adobe Photoshop version CC 2015.

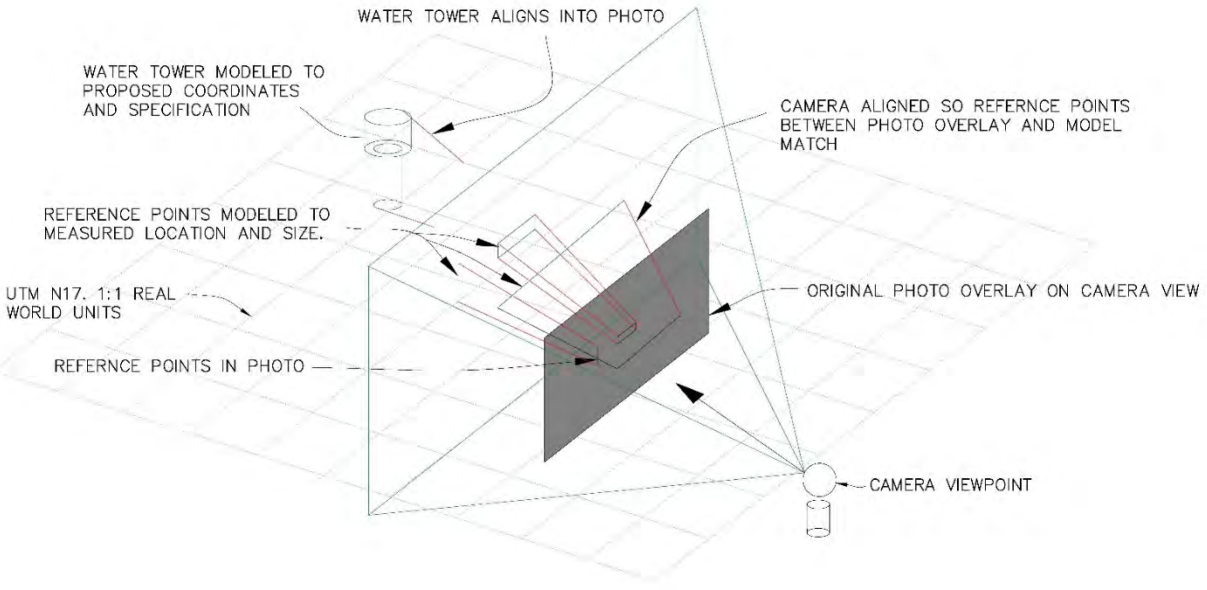
Methodology for Photographic Simulation

Photographs

All photographs are taken at previously determined sites. The use of GPS ensures that when occupying a site, the camera will point towards the proposed structure. A height of 1.7m was maintained for all photographs taken. This is slightly higher than recommended and will ensure clear line of sight, as a worst-case scenario.

Rendering Photos

Various markers within the photographs identified below were modeled in Autodesk CIVIL 3D based on GPS elevation, northing and easting. A model of the proposed structures is included to extrapolate its position compared to the photo references. The shots and physical measurements were then observed on location for comparison. Original photos are set as background images for the camera and the 3D model is then aligned to the photo.



Civil 3D models are imported to 3D Studio Max, cameras are placed on points photographs were taken, offset 1.7m higher to adjust for measured eye level height and camera focal length is matched to photograph. A viewport is set to display camera view and the photo taken from that spot is set as the viewport background. Camera is rotated until the modeled line work from the Civil 3D model matches locations in the background image. Since the proposed structures are part of the model its location and size are extrapolated in regards to the photo view. The camera view is then rendered with the background photograph using Nvidia Mental Ray renderer.

Photo Manipulation

The Rendered images were edited in Adobe Photoshop to place appropriate foreground and background of original image in relation to the model. This manipulation does not change the nature of the visibility of the proposed reservoir. Its purpose is to ensure that the onsite view is represented accurately in the photos.

Other Resources

Aerial model views created with Autodesk Infraworks.

Aerial Topographic photos from Microsoft Bing Map platform and Google Earth Mapping.