



Niagara Escarpment Commission
An agency of the Government of Ontario

Niagara Escarpment Commission Visual Impact Assessment Technical Criteria

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1.0 BACKGROUND

1.1 Purpose

A Visual Impact Assessment (VIA) is a study that evaluates the impacts of change in the landscape to ascertain if a proposal is in keeping with the *Niagara Escarpment Planning and Development Act* (NEPDA) and the *Niagara Escarpment Plan* (NEP).

This document outlines standards for the assessment of visual impacts on the scenic resources of the Niagara Escarpment. These technical criteria aim to help Applicants and their consultants prepare better quality VIAs and helps NEC and partner agencies to review VIAs more effectively so that the best possible information is made available for decision-making.

1.2 Study Requirement

The requirement for a VIA is determined on a case-by-case basis and may be one of several studies required for the proper evaluation of an application. A VIA may be required for any of the following applications where visual impact on the scenic resources of the Escarpment is identified as a concern:

- Application for Niagara Escarpment Plan Amendment
- Development Permit Application
- Master Plan or Management Plan for lands within the Niagara Escarpment Parks and Open Space System (NEPOSS)
- Public Agency Master Plan (i.e., trail master plan, transportation plan)
- Application submitted under other Province of Ontario legislation (i.e. Planning Act, Environmental Assessment Act, Aggregate Resources Act), particularly those applications within the NEP Area
- Application submitted under Federal legislation (i.e., telecommunication towers under Industry Canada, Canada's Historic Places under Parks Canada)

The requirement for a VIA may be identified by NEC staff, another agency (such as a local municipality), or by the Applicant. In all cases, the NEC VIA Technical Criteria apply. Where another agency has similar visual impact assessment requirements, the study shall address the needs of both agencies.

The study should be prepared by a registered Landscape Architect or other qualified professional with skills in landscape assessment, site analysis, and visual impact assessment. Qualified professionals working on behalf of Applicants will be referred to as Proponents in this document.

1.3 Legislative and Planning Context

The NEPDA and the NEP contain policies that relate to visual impact assessment. The purpose and objectives set out in NEPDA are contained in the NEP.

NEP Purpose:

... to provide for the maintenance of the Niagara Escarpment and land in its vicinity substantially as a continuous natural environment, and to ensure only such development occurs as is compatible with that natural environment.

NEP Objectives:

4. *To maintain and enhance the open landscape character of the Niagara Escarpment in so far as possible, by such means as compatible farming or forestry and by preserving the natural scenery*
5. *To ensure that all new development is compatible with the purpose of the Plan*
6. *To provide for adequate public access to the Niagara Escarpment*

NEP Part 1 Land Use Policies sets out objectives, designation criteria and permitted uses, many of which deal with maintaining and enhancing open landscape character, scenic resources, protection of scenic quality and types of development considered to be generally compatible with the designations.

NEP Part 2 Development Criteria provides further policy direction on how development can be implemented. Specific policy direction on scenic resources is contained in *Part 2.13 Scenic Resources and Landform Conservation* and indirectly through other Development Criteria.

As defined in the NEP, scenic resource is *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.*

Several other NEP Definitions are related to scenic resources and should be considered in the assessment of visual impacts. These include, but are not limited to the following:

Compatible, Escarpment environment, Height, Natural scenery, Negative impact, Open landscape character, Scenic quality, Skylining, Visual impact, Visual impact assessment

Reference should be made to the NEP in its entirety to determine all policies and definitions that are applicable to an application.

Background studies relating to scenic resources and scenic quality are available from the NEC upon request. The NEC Landscape Evaluation Study (LES) ranked the scenic

quality of landscape units across the Niagara Escarpment Planning Area from Outstanding to Very Low based on scoring landform, vegetative cover, land use, special features, and views. A series of area-specific viewshed analysis studies map visibility zones and provide development guidelines for the high-ranking landscape units. Terminology from the above-noted studies is relevant to visual impact assessment.

2.0 TERMS OF REFERENCE PROCESS

Proponents are required to develop a project-specific draft Terms of Reference (TOR) that sets out the scope of the VIA for NEC review. NEC staff will work with Proponents to ensure that the proposed study process is appropriate. A staged approach may be recommended by NEC staff where some preliminary investigation is warranted. NEC approval of the VIA TOR is required prior to the commencement of visual assessment work.

The TOR must contain the following minimum information:

- Proponent name and professional expertise
- Project description and details of the proposed development (i.e., site plan, building heights, rooftop elevations, etc.)
- Study area
- Study process, investigative methods and data (i.e., software applications and mapping data, camera equipment, lenses and placement, etc.)
- Applicable policies

The study area is the geographic boundary that defines the extent of the assessment. This area will vary in size depending on the nature of the proposed development, scenic resources, topography, vegetation, and other physical conditions. A radius of five (5) kilometres from the proposed development will be a suitable study area for most applications, however, in some cases, where there is potential for long-range visibility, the radius may be expanded.

3.0 STUDY PROCESS

The following steps are critical in the assessment of visual impacts:

1. Documentation of baseline conditions
2. Demonstration of the proposed physical change(s)
3. Evaluation of visual impacts
4. Recommendation of visual impact mitigation measures

Every study will follow standard investigative methods (described in Appendix A), provide a high level of detail and utilize the most accurate and up-to-date mapping, imagery, and data available to ensure that VIA findings are objective and replicable.

Not all investigative methods are required for every study. Where an alternative method is proposed, Proponents are advised to submit a detailed written description of the method in the TOR for NEC review and approval.

3.1 Documentation of Baseline Conditions

The extent and condition of existing viewsheds and associated scenic resources is the baseline against which physical changes will be compared and visual impacts evaluated. A viewshed is the total surface area visible from an observer's viewpoint.

Viewpoints may be pre-selected by NEC staff or determined by the Proponent from digital visibility mapping. All viewpoints must be investigated and documented with photographs to verify visibility of the proposed development. Site visits will be required to the subject lands, all roads, public lands, and the Bruce Trail within the study area. Upon field verification, viewpoints with predicted visibility may prove to have no visibility due to conditions not captured in the mapping. Photographic documentation of this finding is required.

Viewpoints are stationary and should represent the worst-case scenario for visibility in a given area. On roads or trails where there is a series of viewpoints with similar visibility of the proposed development, it is acceptable to select and document a representative viewpoint. In this circumstance, provide a linear measurement for the length of travel way with similar visibility of the proposed development.

For the purposes of documenting existing viewsheds, the Proponent will provide the following items unless otherwise noted in the TOR:

- Digital visibility map (Appendix A.1)
- Viewpoint locations map, to scale, showing proposed development, viewpoint numbers, and direction of view on an air photo base map, where possible
- Viewshed photographs for all numbered viewpoints, panoramic images where applicable (Appendix A.3)
- GPS/survey coordinates of each viewpoint
- Recommended viewpoints for demonstration of proposed development and analysis (see Section 3.2)

Note: Every VIA will address views from public roads, public lands and the Bruce Trail. Public lands include waterways such as Georgian Bay and Lake Ontario. NEP-related VIAs are not required to address views from private property although this may be a requirement for other agencies.

3.2 Demonstration of Proposed Physical Changes

Physical changes include the proposed built form and any associated changes to the surrounding landscape. For the purposes of demonstrating the proposed changes, the Proponent will provide the following items unless otherwise noted in the TOR:

- Site plan(s), to scale, showing the location and layout of all proposed development and including proposed site alterations, i.e., vegetation removal, grading, etc.
- Architectural plans and renderings, where possible, showing the height of all built form, ground and finished floor elevations, window placement, building materials, colours, and lighting
- Viewpoint photographs for selected viewpoints; label photos to indicate the location and extent of proposed development; indicate the direction of view and the distance to the proposed development; use flags and map bearings wherever possible to accurately locate the proposed development within the viewshed
- Field demonstration using cranes or balloons, where required, to accurately test visibility of proposed structures in areas of dense vegetation or at long distances and to improve the accuracy of photo simulations
- Photo simulation(s) for selected viewpoints (Appendix A.4)
- Line-of-sight cross section(s) for selected viewpoints (Appendix A.5)

Note: As defined in the NEP, height is the *greatest vertical distance between the point of lowest finished grade adjoining any exterior wall of a building and the highest point of the roof*. Height may be defined differently by other reviewing agencies. For accuracy purposes, the NEP definition of height will apply and, wherever possible, elevation in metres above sea level (masl) of the highest point of the structure must be provided.

3.3 Evaluation of Visual Impacts

As defined in the NEP, a visual impact is *a change to the existing cultural and natural landscape from viewing points, usually associated with proposed development*. For the purposes of evaluating the visual impact on the scenic resources of the Escarpment, the Proponent will provide the following items unless otherwise noted in the TOR:

- Visibility analysis for each selected viewpoint (i.e., development is fully visible, partially visible, not visible) and the conditions impacting visibility (i.e., distance, deciduous roadside vegetation provides screening during leaf-on conditions)
- Impact analysis for each selected viewpoint (i.e., condition of scenic resources, landscape character, scenic quality) and an explanation of the criteria applied
- Analysis of NEP policies and relevant background information (i.e., scenic ranking of landscape units as indicated in the NEC Landscape Evaluation Study)

Analysis must account for viewer height, position, and distance. The viewing height of the average observer is between 1.5 to 1.8 metres above ground level. The viewer is assumed to be stationary and looking towards the proposed development in all circumstances. Posted speed limit, speed of travel, mode of travel, direction of travel, and level of traffic are not valid considerations because they do not impact visibility for a stationary viewer.

The immediate area in front of the observer and up to a distance of approximately two (2) kilometres from the viewpoint is considered the foreground of the viewshed. In the foreground, landscape details can be easily discerned. The background of the viewshed is the distant area that lies beyond the foreground. In the background, landscape patterns rather than details or features are seen. Even at a distance of over two (2) kilometres, structures that skyline above the horizon line of the Escarpment landscape can be discerned as a distinct feature as they break the pattern of the landscape. Lands or structures hidden from view by topography or vegetation are considered to be in the visual shadow.

Note: Large-scale development (e.g., quarries) may impact the scenic ranking of one or more landscape units identified in the NEC Landscape Evaluation Study. NEC will advise when re-evaluation of landscape units is required and provide additional instruction if this is necessary.

3.4 Recommendation of Visual Impact Mitigation Measures

Certain mitigation measures can minimize the impact of development on the scenic resources of the Escarpment. Where visual impacts are identified, the VIA will include the following:

- Description of proposed mitigation measures and how they address specific visual impacts
- Design drawings illustrating proposed mitigation measures (e.g., architectural plans, landscape plans)
- Line-of-sight cross sections or photo simulations illustrating proposed mitigation measures, where required

Note: Proposed mitigation measures are subject to NEC review. Upon review, NEC staff may require additional mitigation measures be considered and/or request further examination of proposed measures through line-of-sight cross sections or photo simulations.

4.0 SUBMISSION AND REVIEW PROCESS

A VIA submission will include the following information:

- Cover page outlining project name and location, author, submission/revision date
- Written report outlining the proposed development, study area, study process, investigative methods, data, applicable policies, and findings
- Maps, plans, cross sections, and other graphics provided to-scale including a ratio and bar scale and a north arrow
- All materials provided in a non-proprietary and digital format (e.g., PDF file) at a resolution that can be viewed or printed in large formats and remain legible
- Two (2) hard copies and a digital version for each submission

In order to be considered complete, a VIA submission must meet the criteria outlined in this document. An incomplete submission will require revision and resubmission to ensure that the criteria have been met.

If a staged study has been proposed in the TOR, Proponents will submit a Stage I VIA for review prior to undertaking Stage II VIA work. Upon review, NEC staff will advise the Proponent what matters need to be addressed in the second stage of the work.

Review of the VIA by NEC staff and other agencies will occur upon receipt of a complete submission and can result in the following scenarios:

VIA is accepted

The submission is complete and NEC staff accept the findings of the VIA. The accepted VIA contributes to decision-making on the application in concert with other studies. Critical details derived from the VIA may be included in Conditions of Approval for a Development Permit or comments to partner agencies on applications under *The Planning Act* or other legislation. These conditions or comments may include specifications for building height or location, the extent of built form, and/or specific requirements for vegetative screening.

VIA is not accepted

The submission is complete, but NEC staff do not accept the findings of the VIA. NEC staff may request alterations to the development proposal to further mitigate visual impacts. Additional assessment and resubmission may be required. The Applicant's agreement on these actions is required. If no agreement can be reached, the differing conclusions on the VIA will be provided to the Commission for a decision on the application.

5.0 REFERENCES

Niagara Escarpment Plan (2017); Ontario; Order in Council No. 1026/2017; June 2017

Niagara Escarpment Planning and Development Act; Chapter N.2, R.S.O. 1990

Landscape Evaluation Study, Niagara Escarpment Planning Area; MNR and NEC; April 1976

6.0 NOTES

The Niagara Escarpment Plan (NEP) provides for the development of guidance material and technical criteria to assist the Niagara Escarpment Commission with implementing the policies of the Plan. These documents are intended to support but not add to or detract from the policies of the Plan.

The NEC will, from time to time, update the Visual Impact Assessment Technical Criteria to reflect current technology, provide clarification, or refine the processes. The revision date will be noted at the beginning of the document and the most current version will be available for download from the Niagara Escarpment Commission website at www.escarpment.org.

APPENDIX A: INVESTIGATIVE METHODS

A.1 Digital Visibility Map

A Digital Visibility Map (DVM) models visibility of a proposed structure across the landscape. A DVM is generated using software that analyzes existing topography and vegetation patterns relative to the height and position of a given structure to objectively and accurately identify areas of visibility. A DVM is a useful starting point for identifying potential viewpoints prior to field investigation.

Where a DVM is proposed, the following information is required for review in the TOR prior to the commencement of work:

- DVM process
- spatial data to be used including the metadata record (including public roads, public lands and trails, the Bruce Trail, wooded areas, lakes and waterways, NEP boundary, and other relevant data)
- software applications to be used
- details of the proposed development
- mapping radius

A five (5) kilometre mapping radius is suitable for most structures, however, vertical structures such as towers will require an extended radius.

Software applications and digital data utilized in the production of a DVM must be equal to or better than that utilized by NEC such as: Environmental Systems Research Institute (ESRI) software, ArcGIS 10x and/or ArcGIS Pro 2x with Spatial Analyst or 3D Analyst extensions)

NEC utilizes the Ontario Government's Land Information Ontario (LIO) spatial databases which includes roads, wooded areas, contours, as well as other spatial data entitled to the NEC through the Ontario Geospatial Data Exchange (OGDE), such as orthophotography and the Ontario Parcel Data. The Ontario Government has adopted an Open Data approach to the proactive release of data, therefore much of the mapping data that NEC uses is freely available via the [Ontario Government's Data Catalogue](#).

For greatest possible accuracy, the DVM will model the following details of the proposed development:

- Location and footprint of the proposed structure(s)
- Overall height of the proposed structure including mechanical suites, rooftop ornamentation, or other vertical elements that add height shown in metres above sea level (masl)
- Proposed increases or decreases to existing grade
- Location and extent of proposed removal of vegetation

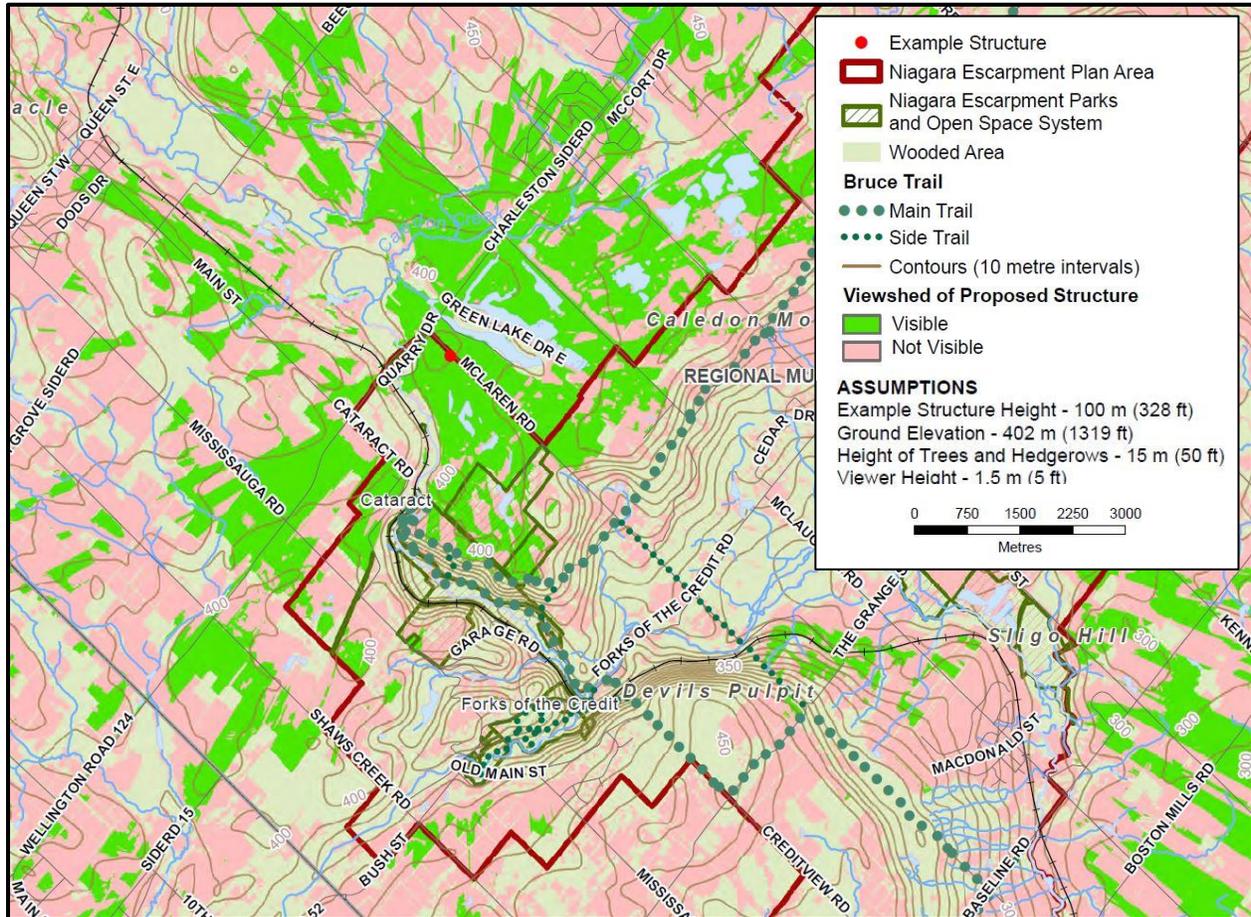


Figure 1. Sample Digital Visibility Map (DVM)

A.2 Detailed Viewshed Map

A detailed viewshed map illustrates the total surface area visible from an observer's viewpoint. This investigative method is particularly useful for smaller study areas with a radius of under two (2) kilometres, areas with complex or diverse physical characteristics (e.g., dense built form, extensive vegetation, topographic variations), or remote areas where digital spatial data is unavailable.

Where detailed viewshed mapping is proposed, the following information is required for review in the TOR prior to the commencement of work:

- Viewshed mapping process
- Area of investigation
- Sources of data being used
- Details of the proposed development
- Study area

Viewpoints and associated viewsheds are to be mapped, to scale, for the whole of the study area. Mapping is to include the subject lands and proposed development, topography, vegetation, and existing built form. The geographic extent of the visible area and/or visual shadow must be delineated on the map. Where applicable, multiple viewshed maps, one for each viewpoint, may be overlapped to create a composite viewshed map.

A.3 Viewshed Photographs

Viewshed photographs document the characteristics of a view from fixed points as observed by the expert in the field. Photographs are an important tool in recording and describing existing conditions observed on site and form the basis for photographic simulations. As such, photography must be high quality and follow these standard procedures to ensure that findings are objective and replicable.

Photography is a valuable investigative method for visual impact assessment and is required for all studies. To ensure accuracy, all photography must meet the following requirements which are to be detailed in the VIA TOR prior to the commencement of work:

- Photographs must reflect the scale of the landscape as observed by the human eye with minimal distortion. A DSLR or SLR camera with a lens setting between 35 mm and 55 mm is generally accepted as producing a photograph that best represents what the human eye can see. DSLR and SLR cameras reflect light that enters through the lens using a mirror so that an image can be seen in a viewfinder. A SLR camera records the image on film; a DSLR camera captures a digital image on a memory card. Where a different type of camera lens is proposed, technical evidence must be provided in the TOR to demonstrate that the alternate camera lens meets the minimum standard.
- Photographs must represent the view of the typical observer taken at eye level. Cameras must be set at average viewing height between 1.5 to 1.8 metres above ground level.
- Photographs must represent the entire viewshed (area visible from a viewpoint). A series of overlapping photographs stitched together into a panorama may be required. A minimum photo overlap of 30-50% is required. Panoramic photos taken on mobile devices using built-in panoramic mode are not acceptable at this time due to the potential for a high level of distortion.
- The camera field of view must be centred on the estimated location of the proposed development. Map bearings and landmarks may be used in the field to determine the location with some accuracy. Flags or cones may be used as a reference in the photo to mark a sight line to the proposed development.
- Photographs must document worst case scenario conditions affecting visibility such as leaf-off conditions for deciduous vegetation. The ideal timing for viewshed photography is in late fall/winter/early spring. Where timing does not

allow for leaf-off conditions the type and condition of existing vegetation and its potential effect on visibility is to be described by the Proponent.

- Where a viewpoint is located in an area with existing vegetation, the camera should be placed where visibility is greatest. Position the camera to look through an opening in existing vegetation wherever possible.
- Images must be high resolution to remain legible for viewing or printing in large formats (i.e., up to 558 mm x 863 mm).

Google Street View and other street-level images do not currently meet NEC standards for photographs to document existing conditions or to produce simulations. *Google Street View* images typically provide a low-resolution digital image (thus difficult to discern any detail), a high level of distortion, a viewing height significantly higher than an average human eye level, topographic information is limited, and the photographs are focused on the road and nearby roadside conditions only.

Proviso for 400 Series Highways or Similar: Following the photographic standard herein for photographs from visibility zones on 400 series highways (or similar) is not required and *Google Streetview* images can be utilized to assist in describing conditions and/or impact. This proviso is based upon safety concerns in accordance with the *Highway Traffic Act, R.S.O. 1990, c. H.8*. If highway information is required contact the appropriate regional office of the Ontario Ministry of Transportation, directly.

A.4 Line-Of-Sight Cross Section

A line-of-sight cross section is a detailed examination of proposed development in relation to landform and vegetation as viewed from a selected viewpoint. A cross section may be recommended by the Proponent or requested by NEC for a selected viewpoint that requires detailed examination.

The following information is required in a TOR for NEC review prior to the commencement of work:

- Source of data for the topography, vegetation and proposed development that is to be modeled in the cross section
- Viewpoint(s) selected for examination

Development of accurate and objective line-of-sight cross sections will follow these standard procedures:

- Provide a scaled map showing the extent and orientation of the cross section, topography, vegetation, existing and proposed built form/structures, roads, etc.
- Indicate the viewpoint number and describe the location for reference.
- Provide photographs of the existing conditions (see Proviso in Section 3.0 Viewshed Photographs).

- Create a section line, drawn to scale, between the viewpoint and the development proposal and extend to include the landform feature under examination (e.g., Escarpment brow) where applicable.
- Delineate all roads, trails, existing and proposed grades, existing and proposed vegetation, existing and proposed built form along the section line at the appropriate elevation. Show any vegetation or buildings proposed for removal. All horizontal and vertical elements must be drawn to scale (e.g., proposed building height and width).
- Draw a sight line from the viewer's eye level (1.5 to 1.8 metres) to the top of the nearest proposed structure. Extend the sight line to the landform feature under examination, where applicable.
- Indicate any existing or proposed vegetation that will mitigate visibility of the proposed structure on the section line and provide a supporting planting plan. Proposed planting must be shown at planting size.

Submit the cross section, viewpoint photo, scaled map and other supporting documentation, and recommended mitigation measures to NEC staff for review and comment.

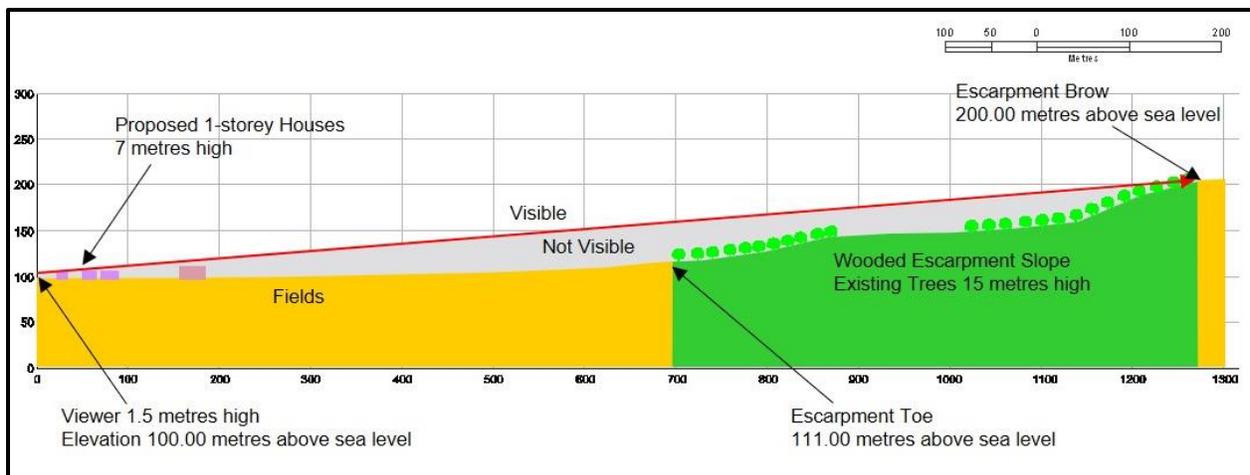


Figure 2. Sample Line-of-Sight Cross Section

A.5 Photo Simulation

A photo simulation is a photographic image that has been computer-modified to demonstrate a proposed physical change in the landscape as viewed from a selected viewpoint. Photo simulations may be recommended by the Proponent or requested by NEC for particular viewsheds that require detailed examination.

The following information is required in a TOR for NEC review prior to the commencement of work:

- Base data (i.e., topography, vegetation, proposed built form) to be used, including the metadata record
- Viewpoint(s) selected for examination and map showing viewpoint location(s)
- Detailed outline of the photo simulation process and software application to be used
- Technical details for ensuring accuracy of the photo simulation

There are many software applications available though not all are currently capable of producing accurate photo simulations. The following software applications have produced adequate results although others may be suitable: *Autodesk - AutoCAD, Civil 3D, 3D Studio, Trimble SketchUp, 3D Nature Studio, Adobe Photoshop.*

The photo simulation process may vary depending on the software used, however, the following standards apply to ensure accuracy:

- Base photo/panorama must capture the existing conditions as seen from a selected viewpoint and meet standards for viewshed photography (Appendix A.3). The photo simulation process may vary if *Google Street View* images are to be used.
- The computer-rendered image must be generated from a digital model that represents the form and colours of the proposed development as seen from the base photo point-of-view. Built form must be modelled from the most current plans and must include all elements that add to the overall height of the structure (e.g., mechanical suite, rooftop ornamentation).
- The computer-rendered image must be inserted into its proper position in the base photo using fixed locations.
- The base photo may be edited to delete existing features proposed for removal but other embellishments (e.g., enhancing existing vegetation) are not acceptable.
- Where applicable, the photo simulation may demonstrate the effect of proposed visual impact mitigation measures such as planting for visual screening. Proposed planting must be modelled using plant size at time of planting. Additional photo simulations may be provided to show plant growth over time using average projected growth rates for the proposed plant species.

Submit the base photo(s), photo simulation(s), scaled map and other supporting documentation, and recommended mitigation measures to NEC staff for review and comment.