

5. Alternative Methods

This section describes the reasonable alternative methods for carrying out the Project.

The rationale for the station location, station layout and the alternatives related to the connection of the existing lines to the station within the Hydro One property will be discussed.

5.1 Station Site

During the course of the Class EA process, no reasonable alternatives were identified from a technical and economic viewpoint. The *EA Act* requires consideration of reasonable alternatives and based on knowledge of the study area and the above factors, Hydro One has concluded that there are no other reasonable sites for a TS that will address the retirement of Pickering NGS.

As noted, the OPA recommended that the undertaking be located on the Clarington property (refer to **Section 1.1**). This property was identified over 30 years ago as the site for a future TS. The land was acquired through expropriation by Ontario Hydro and passed to Hydro One with the break-up of Ontario Hydro. The rationale for this site is based on the following factors:

- Use of the site is consistent with the PPS (2005) which indicates:
 - “infrastructure and public service facilities shall be provided in a coordinated, efficient and cost-effective manner to accommodate projected needs.” (Section 1.6.1 of the PPS);
 - “that the use of existing infrastructure and public service facilities should be optimized, wherever feasible, before consideration is given to developing new infrastructure and public service facilities” (Section 1.6.2 of the PPS);
- Station site meets the technical and economic criteria of the OPA;

- The property was acquired in 1978 for this purpose and has been identified in public documentation as early as 1974 as a future TS site (i.e., previously named Oshawa East TS);
- The property houses the necessary transmission infrastructure (i.e., both 500 kV and 230 kV circuits) and provides sufficient land area required to build the station (i.e. sites without 500 and 230 kV infrastructure could require the acquisition of additional lands with associated impacts on the affected communities and the undertaking would have a much greater footprint resulting from the need to construct new transmission lines);
- The property is large enough to construct and connect the station to the associated lines and transmission line structures (i.e., with the associated effects on residents and communities). An agreement has been signed to acquire a small amount of property to enable access from Townline Road North.
- The costs to purchase another site (i.e., if new transmission lines were required) would be significant and an unjustifiable expense to Ontario ratepayers;
- The time to select, approve and acquire new properties would be much longer than the Clarington site and place the local communities at risk of serious power disruptions (i.e., if Pickering is retired before new facilities are in service); and
- The site is designated “utility” and transmission facilities are a permitted use under the Municipality of Clarington Official Plan (2012), the Region of Durham Official Plan (2008), the Oak Ridges Moraine Conservation Plan (2002), and the Greenbelt Plan (2005).

As noted in **Section 4.6.2**, several sites were proposed by the EEA and were not found to be reasonable.

5.2 Station Layout

The location of the station had to be on Hydro One property to avoid property acquisition, which places it north of the 500 kV lines and east of the 230 kV lines. The dimensions of the station are approximately 300 metres by 410 metres which require it to be situated within one location, while maintaining appropriate setbacks from the adjacent woodland to the

north and creek systems to the north and west. This location also had to accommodate the connection of the existing 230 kV transmission lines to the station.

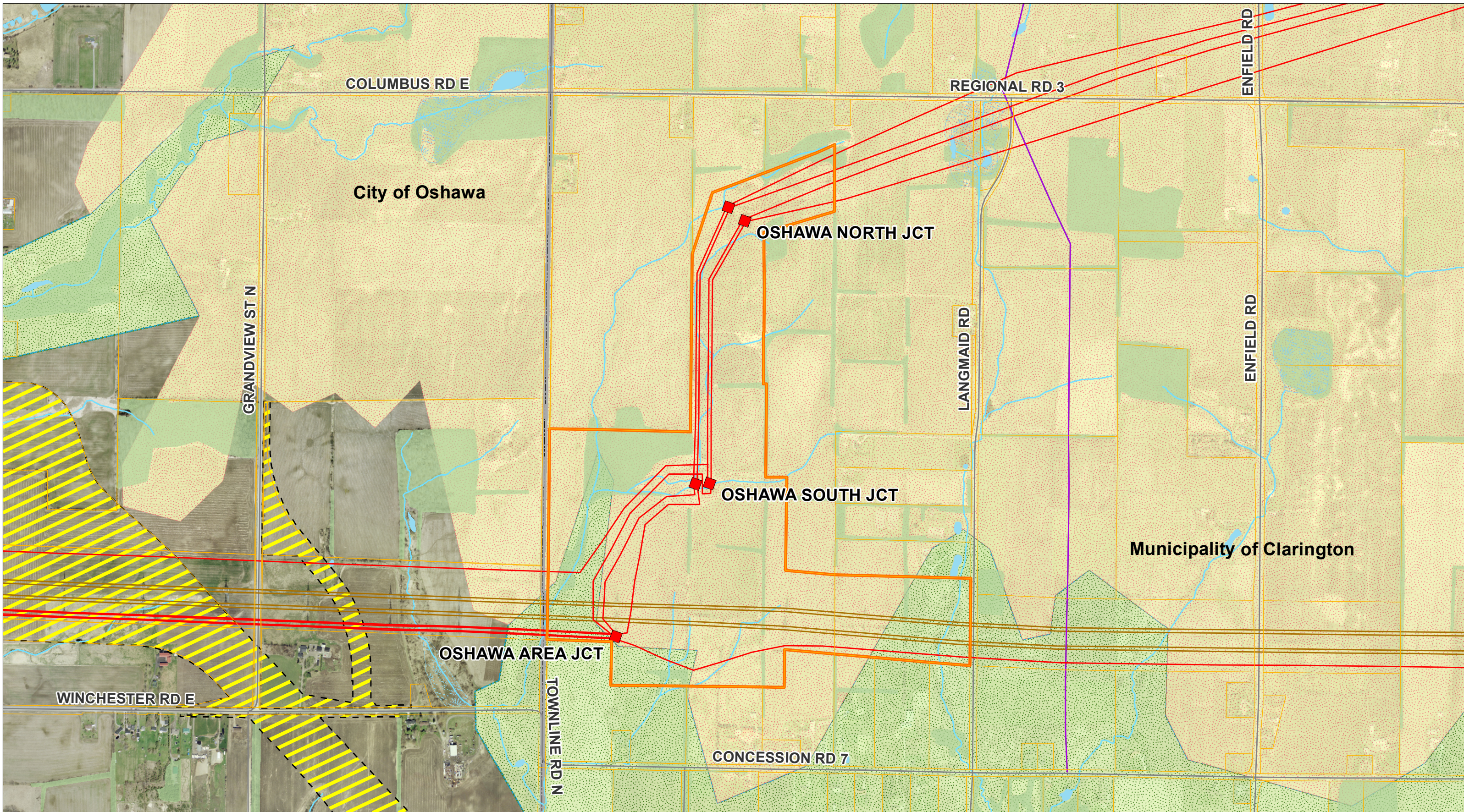
The station layout calls for the 500 kV switchyard in the south and the 230 kV switchyard in the north. This layout allows for a direct connection of the 500 kV lines to the station and a direct connection to the 230 kV lines north of the station.



Due to the limited space available of the Hydro One property and the existing configuration of the existing 500 kV and 230 kV lines, no other station layout is reasonable. See **Figure 1-3** for the conceptual layout.

5.3 Connection of Existing 230 kV Transmission Lines
















Transmission line structures occupy the land on which the station is to be built. This will require the existing 230 kV lines be relocated to accommodate the space required for the station. Relocation needs to occur between Oshawa Area Junction at the southwest portion of the site (Terminal 1) and Oshawa South Junction in the northeast portion of the site (Terminal 2). See **Figure 5-1** for an illustration of the current configuration of the existing lines and junction locations.

Three alternatives were identified and evaluated in the following sections.



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 Date: July 24, 2013
 Fig5-1_Map12-02_ClaringtonTS_ConfigurationExistingLinesJunction
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|--|---|--|--|--|
|  230 kV Junctions | Transmission Lines |  Roads |  Watercourses |  Greenbelt |
| |  44 kV |  Future Highway 407 |  Water |  Oak Ridges Moraine |
| |  230 kV |  Hydro One Property |  Wetlands |  Wooded Area |
| |  500 kV |  Land Parcels |  Municipal Boundary | |

Clarington TS - Configuration of Existing Lines and Junction Locations
Figure 5-1



5.3.1 Identification Criteria

Three alternative methods were identified using the following criteria:

- capitalize on the existing infrastructure
- allow for a direct connection to the 230 kV switchyard;
- remain in close proximity to the station in order to minimize the number of structures required and minimize the environmental footprint of the facilities; and
- remain within the limits of the Hydro One property as much as possible to be consistent with the PPS.

5.3.2 Description of Alternatives

Three alternatives were identified to meet this objective. Each alternative location and its key characteristics is sub sequentially described:

Alternative 1 – West side of station through southern portion of woodland

- remains entirely on Hydro One property
- capitalizes on existing infrastructure (i.e., 230 kV underpass of the 500 kV lines)
- Removes approximately 1.5 ha of woodland
- Removes three (3) retainable butternut
- Shortest alternative

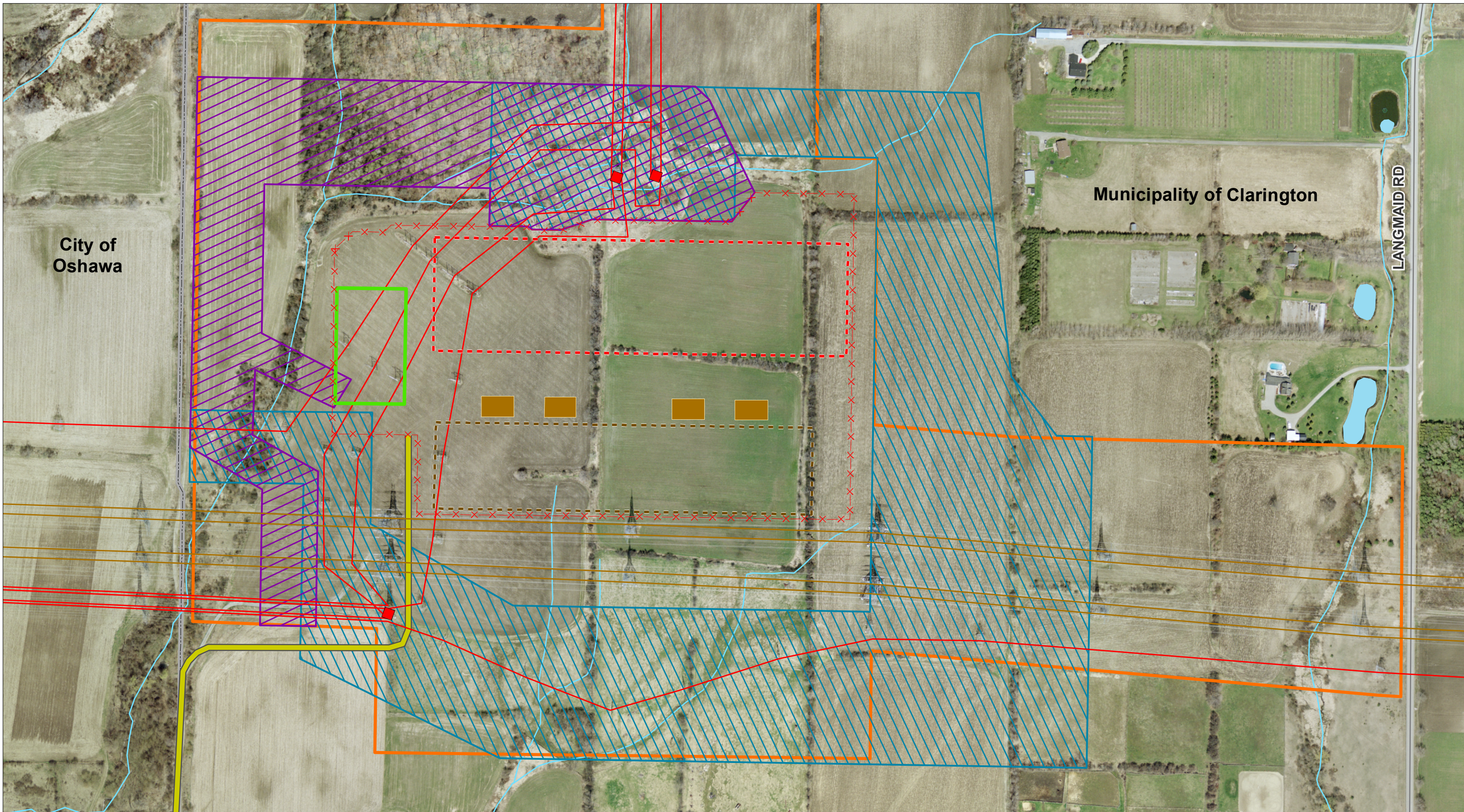
Alternative 2 – West side of station north of woodland



- requires land acquisition (1 property, approximately 25% of alternative is new ownership)
- capitalizes on the existing infrastructure (i.e., 230 kV underpass of 500 kV)
- Removes approximately 2.2 ha of woodland
- Potential removal of one (1) retainable butternut
- Slightly greater visibility than Alternative 1
- second longest alternative
- more costly than Alternative 1

















Alternative 3 – South and East side of station

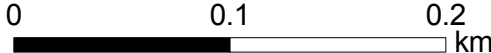

- Requires land acquisition (five (5) properties, approximately 30% of alternative is new ownership)
- Does not capitalize on the existing infrastructure (i.e., 230 kV underpass of 500 kV)
- Removal of approximately 0.7 ha of woodland
- No butternut removed
- Much greater visibility than Alternatives 1 and 2
- Longest alternative
- more costly than Alternative 1 and 2

Refer to **Figure 1-3** (Conceptual Layout with Alternative 1) and **Figure 5-2** (Alternatives 2 and 3) for a visual interpretation of the alternatives.





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|--|--|--|---|
|  230 kV Junctions |  Roads |  Access Road |  Alternative Linework Area 2 |
| Transmission Lines |  Watercourses |  500kV Transformers |  Alternative Linework Area 3 |
|  230 kV |  Water |  Station Fence Line |  Enfield TS (Future) |
|  500 kV |  Municipal Boundary |  230kV Station Switchyard | |
| |  Hydro One Property |  500kV Staton Switchyard | |

Clarington TS - Transmission Line Alternatives 2 and 3
Figure 5-2
 1:3,500  km


5.3.3 Evaluation and Comparison of Alternatives

Table 5-1 compares the three alternatives described above from an environmental, social and technical (including cost) perspective.

Table 5-1: Environmental Factors for Alternative Evaluation and Comparison

Factors	Alternative 1	Alternative 2	Alternative 3
Biological Resources	<ul style="list-style-type: none"> Removal of approximately 1.5 ha of habitat 3 crossings of intermittent Coldwater Streams 1 stream crossing spanned no vegetation removed Loss of 3 retainable butternuts (SAR) 	<ul style="list-style-type: none"> Removal of approximately 2.2 ha of habitat 3 crossings of intermittent Coldwater Streams 2 stream crossings spanned no vegetation removed Potential loss of 1 retainable butternut (SAR) 	<ul style="list-style-type: none"> Removal of approximately 0.7 ha of habitat 2 intermittent Coldwater Stream Crossings 2 stream crossings spanned no vegetation removed No effect to SAR
Human Settlement & Visual	<ul style="list-style-type: none"> 7 residences with moderate visibility 8 residences with low visibility Permitted use Adjacent to approved station (Enfield TS) Entirely within HONI owned land No property acquisition 	<ul style="list-style-type: none"> 1 residence with high visibility 6 residences with moderate visibility 10 residences with low visibility Approximately 25% of route is new property ownership 2.6 ha of property acquisition (1 properties affected) Permitted use 	<ul style="list-style-type: none"> 10 residences with high visibility 1 residence with moderate visibility 4 residences with low visibility Approximately 30% of route is new property ownership 7.5 ha of property acquisition (5 properties affected) RoW edge borders 5 residential properties Permitted use
Agricultural Resources	<ul style="list-style-type: none"> Approximately 0.07 ha of agriculture removal for tower placement (9x9-metre tower footing) Municipality of Clarington Prime Agricultural Area 	<ul style="list-style-type: none"> Approximately 0.11 ha of agricultural land taken out of production for tower placement (9x9-metre tower footing) Municipality of Clarington Prime Agricultural Area 	<ul style="list-style-type: none"> Approximately 0.25 ha of agricultural land taken out of production for tower placement (9x9-metre tower footing) Municipality of Clarington Prime Agricultural Area
Recreation, Tourism, and Forest Resources	<ul style="list-style-type: none"> No effect to recreation, tourism, forestry resources 	<ul style="list-style-type: none"> No effect to recreation, tourism, forestry resources 	<ul style="list-style-type: none"> No effect to recreation, tourism, forestry resources
Cultural Heritage Resources	<ul style="list-style-type: none"> Stage 1, 2 & 3 Archaeological Assessment was completed, no effects to archaeological resources No effect to heritage resources 	<ul style="list-style-type: none"> A Stage 1, 2, & 3 Archaeological Assessment was completed, no effects to archaeological resources on HONI land. If selected would be required to complete Stage 1&2 Archaeology on unsurveyed lands No effect to heritage resources 	<ul style="list-style-type: none"> A Stage 1, 2, & 3 Archaeological Assessment was completed, no effects to archaeological resources on HONI land. If selected would be required to complete Stage 1&2 Archaeology on unsurveyed lands No effect to heritage resources
Technical & Cost	<ul style="list-style-type: none"> Entirely on Hydro One owned property and is on utility land defined by the Municipality of Clarington Official Plan (2007). 12 new structures 850 metres of transmission lines Two ROW 26m in width 	<ul style="list-style-type: none"> 15 new structures 1.2 km of transmission lines Combined ROW is 65 metres in width Cost approximately \$2M more than Alternative 1 	<ul style="list-style-type: none"> 31 new structures 2.1 km of transmission lines Combined ROW is 65 metres in width Cost approximately \$4 M more than Alternative 1

Definitions & Acronyms

Low Visual Impact: less than 1 kilometre, but more than 500 metres from landowner’s property line to the centre of the RoW
Moderate Visual Impact: less than 500 metres, but more than 250 metres from landowner’s property line to the centre of the RoW
High Visual Impact: less than 250 metres from landowner’s property line to the centre of the RoW

5.3.4 Preferred Alternative

Table 5-2 provides an alternative comparison based on evaluation criteria relating to the natural environment, socioeconomic environment, technical considerations and cost. The criteria are based on the significant factors in **Table 5-1**. The alternatives in **Table 5-2** are ranked on the basis of 1 as best rank for the criteria, 3 as lowest rank for the criteria.

Table 5-2: Alternatives Evaluation and Comparison

Evaluation criteria	Alternative 1	Alternative 2	Alternative 3
Natural environment			
Potential terrestrial/ wildlife habitat effects	2	3	1
Potential aquatic habitat effects	2	3	1
Potential effects on SAR	3	2	1
Socioeconomic environment			
Proximity to area residents	1	2	3
Visual aesthetics	1	2	3
Property Acquisition	1	2	3
Technical & Cost			
Length	1	2	3
Alternative Cost	1	2	3

Based on the evaluation shown in **Table 5-2**, Alternative 1 was considered as the best alternative. In comparison to Alternatives 2 and 3, Alternative 1 involves:

- No additional land acquisition
- Less vegetation and habitat removed than Alternative 2
- Lowest visibility to area residents
- Not in proximity to residential properties
- Shortest distance
- Lowest cost

Overall, Alternative 1 has been selected as the preferred alternative for the connection of the 230 kV lines to the station based on environmental, social, and technical and cost criteria.