

BRIEFING NOTE – SEEKING APPROVAL

To: Hilary Dunn, Director Properties
Tony S. C. Lee, Senior Manager, Real Estate Services

From: David Y. M. Chan, Manager, Acquisitions & Sales
Dmitry Sherevkulov, Property Representative

Date: September 24, 2024

RE: Willoughby Substation – ⁽²¹⁾ Properties

Purpose:

To seek approval to present a Purchase and Sale Agreement (PSA) for ⁽¹⁷⁾ for 9.5 acres of land as part of the land assembly for the future Willoughby substation.

Background:

A new Willoughby substation is required in Langley to meet the customers' load requirements and to support load growth and the electrification plan for the area after F2033. There are no BC Hydro and municipal owned properties in the area to serve as a station location. A size of the proposed acquisition is 12 acres.

A Business Case and EAR for ⁽¹⁷⁾ to acquire the substation site was approved August 26th, 2024, based on an estimated ⁽¹⁷⁾ per acre purchase price and for associated due diligence investigations.

Project Site Alternatives:

Alternative 1: This site includes two parcels owned by ^{(13), (17), (21)} in Surrey with a total area of 8.32 acres. This alternative requires an assembly with adjacent parcels to the south ^{(13), (17), (22)} in Surrey. The two northern parcels are owned by ⁽²²⁾, the southeast parcel is owned by the ⁽¹⁷⁾ family and BC Hydro has reached a tentative agreement to acquire this property. The southwest parcel is owned by an individual and negotiations are ongoing. Each of the four parcels is improved with a single-family dwelling and all properties are tenanted.

(13), (17)



Alternative 2: ⁽²¹⁾ owns two parcels located at ⁽²¹⁾ in Surrey. These two parcels provide 9.5 acres of land, but the linear configuration prohibits development of the substation without additional parcels. This alternative requires an assembly with ⁽²²⁾ ⁽²²⁾, Surrey located to the south. All owners are willing to sell. A parcel at ⁽²²⁾ is improved with a single-family house built in 2003 and is tenanted. ⁽²²⁾ is improved with a older single family dwelling and is currently listed for sale. The remaining two parcels are vacant and unimproved.

(21)



Alternative 3: This site requires assembly of 6 properties at the corner of ^{(13), (17)} in Surrey. This alternative requires a high level of effort. Currently there are two owners who are willing to sell, however, their expected price is well above the market value. Five of the six properties are improved with an older single-family dwelling and one property is vacant. One of the improved properties is owner occupied and the remaining properties are tenanted.

(13), (17)

Chronology:

- ⁽²¹⁾ expressed their interest in selling their properties in Summer 2024.
- BC Hydro Property Representative spoke to the Director of Acquisitions at ⁽²¹⁾ who indicated that their price expectation is ⁽²¹⁾ per acre. ⁽²¹⁾ also added that they ⁽²¹⁾.
- ⁽²¹⁾ purchased the two properties in 2020 for ^{(21), (17)} and the values have increased slightly in the past several years.
- BC Hydro's appraisal report indicates the current market value of the properties is ⁽¹⁷⁾.
- BC Hydro had two more meetings with ⁽²¹⁾ to discuss our internal process and the appraised value.
- Properties Manager has met with ⁽²¹⁾ and they confirmed their interest in selling. ⁽²¹⁾ lowered their asking price to ⁽²¹⁾ after reviewing the appraisal.
- BC Hydro continued negotiations and presented an informal offer at ^{(21), (17)} per acre, subject to BC Hydro executive approval in September 2024. ⁽²¹⁾ has accepted the offer.
- BC Hydro executive team approved the ⁽¹⁷⁾ offer and Properties proceeded to drafting a formal PSA.

Technical Analysis:

This 8.32-acre property is essential to purchase along with the purchase of the ^{(17), (21), (22)} in order to have sufficient land to build a 230kV/60kV substation. It is ideally located close to the WIB distribution load center and the land abuts 196 Ave on the western side, which is the dividing line between the City of Surrey and the Township of Langley. ⁽¹³⁾

. Therefore, this property is an important link in the assembly of land for the WIB substation.

This 8.32-acre property is essential to purchase along with the purchase of the ^{(21), (17), (22)} in order to have sufficient land to build a 230kV/60kV substation. It is ideally located close to the WIB distribution load center and the land abuts 196 Ave on the western side, which is the dividing line between the City of Surrey and the Township of Langley. ⁽¹³⁾

. Therefore, this property is an important link in the assembly of land for the WIB substation.

Recommendation

Properties recommendation is to proceed with acquiring the ⁽²¹⁾ properties at negotiated price of ⁽¹⁷⁾ per acre.

BRIEFING NOTE – SEEKING APPROVAL

To: Melissa Holland, VP Project Delivery
Hilary Dunn, Director, Properties

From: Tony S. C. Lee, Senior Manager, Real Estate Services
David Y. M. Chan, Manager, Acquisitions & Sales
Dmitry Sherevkuov, Property Representative

Date: November 12, 2024

RE: Willoughby Substation – (21) Property)

Purpose:

To seek approval to present a Purchase and Sale Agreement (PSA) for (21), (17), (22) for 3.769 acres as part of the land assembly for the future Willoughby substation.

Background:

A new Willoughby substation is required in Langley to meet the customers' load requirements and to support load growth and the electrification plan for the area after F2033. There are no BC Hydro and municipal owned properties in the area to serve as a station location. A size of the proposed acquisition is 12 acres.

A Business Case and EAR for (17) to acquire the substation site was approved August 26th, 2024, based on an estimated (17) per acre purchase price and for associated due diligence investigations.

The project previously considered 3 alternatives. Alternative 1 was a (21), (13), (17) which required an assembly with the two properties to the south. Alternative 2 (current alternative) is a (21) site and Alternative 3 is a 6-lot assembly at the corner of (13), (17) Street. An initial memo was presented to the senior management in October 2024 and Alternative 2 was identified as a leading alternative.

Status and Update:

In September 2024 Properties received approval from senior management and executive to proceed with Alternative 2 and acquire the (21) properties at (17) per acre. (21) owns two parcels located at Street in Surrey. These two parcels provide 9.5 acres of land, but the linear configuration prohibits development of the substation without additional parcels. This alternative requires an assembly with the properties to the south. One possible scenario is an assembly with (22) to the southeast and the other is an assembly with (22) Street, Surrey (22) Street, Surrey (22) located to the southwest.

(13), (17), (22) is a 4.77 acre vacant unimproved property. BC Hydro shared the appraisal report with (22) in September 2024 and the owner did not respond. During our phone call the owner indicated (22) (17) per acre. (22) abruptly ended the conversation and has not responded to BC Hydro's request to

arrange an in-person meeting. Properties followed up with the owner 3 times by phone and email to re-establish the contact, however, there was no response. Currently BC Hydro is not pursuing this option.

(13), (17), (22)

Owners acquired the property
Size
Appraised value
Owner's expectations
Current status
BC Hydro proposed action

(13), (17), (22) is a 3.77 acre site improved with an older single family dwelling and is currently listed for sale. BC Hydro discussed a potential acquisition of this property with the listing agent and the owner would like to see a formal offer. (13), (17), (22) is 1-acre site improved with an older rancher. BC Hydro hasn't contacted the owner yet and this property is currently being appraised.

(13), (17), (22)

Owners acquired the property
Size
Appraised value
Owner's expectations
Current status
BC Hydro proposed offer
⁽²¹⁾ appraised value
Value of the ⁽²¹⁾ acquisition (approved by executive)



Chronology:

- BC Hydro's appraisal reports indicate the values of (17) for the (22) property.
- The (22) property was (22) and transferred at (17) in 2021. It is currently for sale at (17) and Properties spoke to the owner and the owner's agent regarding Hydro's interest in acquiring this land.
- Properties shared the appraisal report with the agent and submitted an informal offer at the appraised value in early September 2024. Property Representative had a call with the agent shortly after to discuss the offer. The agent indicated that there were a few offers near (17) and the prospective buyers couldn't complete the purchase because of financing issues. Property Representative had another call with the agent in mid October 2024 and explained BC Hydro's internal process and price expectations.
- The agent discussed the offer with the owner and responded on October 29, 2024 that the owner does not wish to submit any counteroffer. (22) is (17). The owner would like to see an offer in writing and Properties recommends (13).

Technical Analysis:

The 9.5-acre ⁽²¹⁾ property is essential to purchase along with and the 3.77-acre ⁽²²⁾ property to have sufficient land to build a 230kV/60kV substation and a 25kV switching station. It is ideally located close to the WIB distribution load center as the land ^{(13), (17)} on the western side, which is the dividing line between the City of Surrey and the Township of Langley (ToL). ⁽¹³⁾

. Therefore, the ^{(21), (22)} properties are an important link in the Alternative 2 assembly of land for the WIB substation.

Recommendation

BC Hydro presented an offer to ^{(21), (17)} to acquire their properties and ⁽²¹⁾ agreed to the purchase price. BC Hydro's and ⁽²¹⁾ legal teams are currently finalizing the Purchase and Sale Agreement. The future Willoughby Heights Substation will require an assembly of the ⁽²²⁾ properties to the southwest. Properties recommendation is to proceed with an offer at ^{(13), (17)} per acre for the ⁽²²⁾ property to start the negotiations process.

TM-0592 WIB Property Acquisition Project

Willoughby Substation 414V

Structured Decision Making Support Report

Site Selection Analysis

Prepared for: Robert Hepple, Project Manager STATIONS

Prepared by:


2025-04-08

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Craig Steels, P.Eng.	Transmission Lines Engineering	Transmission Analysis
Kally Jiang, P.Eng.	Transmission Stations Engineering	Electrical Layout Analysis
Amin Kadivar P.Eng.	Transmission Stations Engineering	Civil Analysis

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Executive Summary

Due to load growth in the Willoughby area of the Township of Langley a new 230/69/25 kV 200 MVA outdoor AIS substation is to be constructed. Currently BC Hydro does not have any suitable properties for the new station. The TM-0592 Property Acquisition project is to search out and find a suitable property to purchase for the substation. This report summarizes the engineering review of the properties evaluated. Due to the dynamic nature of the current property market this report will only be able to consider properties under consideration at the time of writing. It is possible that the site selected will not be covered by this report however the information contained within will help guide the ultimate selection.

At the time of writing, offers to purchase have been made on a set of properties currently owned by ⁽²¹⁾ [REDACTED] Project Management is also requesting that additional adjacent properties be purchased to ensure sufficient space is available to fully develop the most efficient station layout while preserving land for future expansion if necessary. It is not known at this time if the sales will be completed and therefore this report does not make any specific recommendation as to the appropriate property for purchase.

1 Introduction

Due to load growth in the Willoughby area of the Township of Langley, a new substation is required. Currently, BC Hydro has no vacant properties on which to construct a new station. On November 1st, 2023, project TM-0592 was initiated to find and purchase a property to develop a new 230/25 kV 200 MVA ultimate Outdoor Air Insulated Switchgear (AIS) substation with provision for a future 60 kV yard. The station is specified as AIS due to the general rural nature of the area, although this could be changed depending on the properties available for purchase.

This report summarizes the engineering evaluations of the properties considered during the conceptual phase of the project. Initially, twenty-two (22) sites were identified as potential locations for a new station. After initial screening, the list was reduced to four (4) sites. As the project advanced some sites were dropped and others added for consideration. The following sections will discuss the properties and the various findings.

The engineering team evaluated a number of factors for each site including transmission ingress, distribution egress, proximity to load center, size of the property, potential electrical layouts, constructability issues and geotechnical conditions among other factors. This evaluation was by nature a high-level investigation with a prime focus of eliminating unsuitable sites. Due to the dynamic nature of the current property market, this report will only consider properties under consideration at the time of writing. It is possible that the site ultimately selected will not be covered by this report, however the information contained within will guide the ultimate selection.

This report does not include any evaluation of Environmental or First Nations concerns nor any financial considerations as these are covered by other groups.

2 Background

Langley is one of the fast-growing areas in Lower Mainland. It is situated within Fraser River to the North, 0 Avenue to the South, 196 Street to the West and 272 Street to the East. Three substations serve the Langley area, Port Kells (PKL), Harvey Road (HRD) and McLellan (MLN) substations. PKL and HRD are 60/25kV substations, and they are at their ultimate capacities of 100MVA in Winter and 79MVA in Summer. MLN is a 230/25kV, 200MVA (Winter)/158MVA (Summer) substation and being upgraded to 400MVA (Winter)/315MVA (Summer) with 30 feeder positions in F2030 to meet the area load growth and customers' requirement. By F2033, most of the augmented capacity and feeder positions at MLN will be used up based on Langley placemat and there will be no capacity and feeder positions available in the existing substations to supply the new area loads.

The Township of Langley (TOL) includes the Willoughby neighbourhood which bounds the City of Surrey at 196th street. Areas of service include, Willoughby, Carvolth, Milner, Willowbrook and parts the City of Langley. Development has been rapid around the 200th St. corridor and the load growth along with electrification upgrades are expected to outstrip supply by 2033. Due to electrification and the rapid growth along the 200th St corridor, the additional load increase in Willoughby area will be about 48MVA by F2033 and 130+MVA beyond F2033. To meet that demand a new substation is needed in the Willoughby area by 2032. It is proposed that a property for a new 230/69/25 kV 200 MVA station be purchased as soon as possible to meet this date.

Currently, BC Hydro has no surplus properties to use for a new station. In order to meet the timeline of the new substation, a piece of property suitable for a 230/69/25kV, 200MVA outdoor AIS substation needs to be purchased as soon as possible in a location near the load center as identified by Distribution Planning (See Figure 1)

(13), (17)

properties evaluated may not be available for purchase and other properties considered will not be covered by this report. As of the writing of this report an offer to buy has been made for a set of properties owned by (21) Additional properties will be needed to provide a site large enough for the new station. While the sales have not been finalized it is assumed that the purchase will be ultimately successful. Should the purchase not be successful the

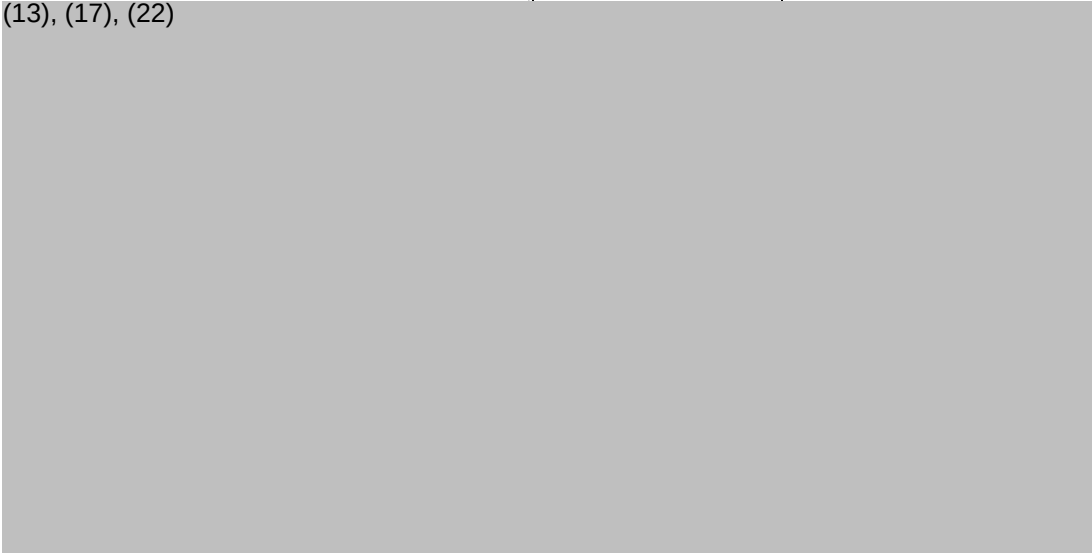
information contained in this report can be used as a baseline for assessing other options.

3 Properties Reviewed

As noted above the initial choice of sites was reduced to four for further evaluation. Those four are listed below as:

- Alternate 14B is a 12.5 Acre assembly of five residential (5) properties

(13), (17), (22)



- Alternate 18 a 8.15 Acre assembly of two properties owned by the
(21) The parcel is located at the intersection of
(21) street. An additional separate private parcel of
2.22 acres directly west of Alternate 18 would need to be considered to
allow full development of the site.

(21), (13), (17)



- Alternate 19 is a 10.9 Acre assembly of three private properties at the (13), (17), (21)



These parcels are directly south and abutting the (21) properties of Alternate 18. A fourth parcel directly west of this assembly might be required to allow full development of the site.

- Alternate 20 is a 9.5 Acre assembly of two parcels owned by the (21) (21) Additional privately held parcels directly south of the (21) parcels would need to be added to fully develop the ultimate station layout. Currently, the two parcels to the south-west of the (21) assembly are being considered to allow the full development of a substation.

(13), (17), (21)



Figure 5 Location of Alt 20

The next sections will describe the alternatives in more detail and summarize the findings of the engineering team.

3.1 Alternate 14B

3.1.1 Current Use

Currently, Alternate 14B is a collection of residential parcels with single family homes on large lots. Some of the parcels may be used for hobby farms or left fallow.

3.1.2 Electrical Assessment

The electrical design team has a “typical” layout for a 200 MVA Air Insulated Distribution station. This typical layout is 110.0 m x 198.5 m requires approximately 21,505 m² or about 5.3 Acres of land. This allows for a control building, 2-230/25 kV transformers, two line positions and up to 24 feeders. Station Planning has requested that the new stations in the lower mainland have a provision for future expansion by adding space for additional line positions and provision for a 60 kV section. As part of the analysis of other sites, the electrical design team has developed a number of layouts with this level of equipment which includes a control room, 4 -230 kV line positions, 2-230/25 kV 150 MVA transformers, 2 – 230/60 kV 150 MVA transformers and 4 - 60 kV line positions.

The layout has a minimum dimension of 181 m x 196 m or 35,476 m² or approximately 8.7 Acres. No specific layout was prepared for Alternate 14B as it was considered a lower priority alternate given that the sites were not actively for sale and it would require an assembly of multiple properties when other properties were actively for sale. The overall site is sufficiently large to accommodate the layout required by Planning. For more information refer to the electrical memo in Appendix A.

3.1.3 Civil Assessment

As this site was not considered a primary site to assess, the level of investigation was limited to preliminary site grading and access considerations. The site is located at the corner of ^{(13), (17)} and access is considered to be good. The site has a general slope of approximately 6% from east to west. An analysis by the Civil team indicates that approximately 40,000 m³ of cut and 80,000 m³ of fill would be required to fully level the site for use as a substation. For more information refer to Appendix B

3.1.4 Geotechnical Assessment

This alternative was not directly assessed in the geotechnical review as it was a lower priority as it was not one of the favoured sites. The review however did discuss the geotechnical conditions of the general area and noted that reasonable soil conditions with moderate seismic risk could be expected for alternate 14B. It was noted that if this alternative was to be considered a more thorough review would need to be undertaken with a dedicated field program before it could be recommended as a viable alternative. For more information refer to Appendix C

3.1.5 Transmission Assessment

The alternative was only considered at a high level as the site was not considered to be a leading alternative. O/H routes were plotted along a number of paths using Google Earth however ultimately it was determined that like all other sites under review, the most likely routes were underground from ^{(13), (17)}

^{(13), (17)}

3.1.6 Suitability for use as a substation

As other sites were actively for sale this site was considered a lower priority for review it only received a cursory examination from the various disciplines. Based on the level of review, the general site conditions and proximity to the load center this site would possibly be suitable for a substation however more investigation would be required before a final decision could be made.

3.2 Alternate 18

3.2.1 Current Use

Alternate 18 is a two-parcel assembly owned by ⁽²¹⁾ [REDACTED]
Currently the site holds residences and farm buildings. It is being held until financial conditions for development improve.

3.2.2 Electrical Assessment

As noted in Section 3.1.2 the preferred size for the required development is 181 m x 196 m or 35,476 m² or approximately 8.7 Acres. The site currently is not large enough for the ultimate development but is large enough for a first stage. If the station is expanded in the future, the property to the west would need to be obtained. A second scenario would be if the parcels directly south that comprise Alternate 19 were obtained, the full station could be easily accommodated. However, a decision on this path would need to be made before final design of the initial stage begins so as to make the most efficient use of the properties. Finally, a third scenario would be to develop a GIS station on the ⁽²¹⁾ [REDACTED] parcels. This is not preferred due to costs and is noted only to provide all options for consideration in the event additional properties cannot be obtained. For more information refer to the electrical memo in Appendix A.

3.2.3 Civil Assessment

The site is generally flat east to west with an average slope of 4.7% running north to south. Site development to bring the site to an average grade of 3% would require approximately 22,700 m³ of cut and 45,300 m³ of fill. Access is less favourable for this site as ^{(13), (17)} [REDACTED] has not been extended and the only access is from the frontage on ^{(13), (17)} [REDACTED]. The city of Surrey or the Township of Langley may require completion of 196th as part of the project construction cost. There is a creek to the west on the property not owned by ⁽²¹⁾ [REDACTED] that could complicate the full development of the site if it is obtained. High water flows in the creek could introduce flooding or erosion of the substation. Environmental setbacks could reduce the available area such that the station is not viable and runoff from the station could potentially contaminate the creek. These conditions would need to be carefully considered before development of the substation. For more information refer to Appendix B

3.2.4 Geotechnical Assessment

The geotechnical team conducted a desktop review of the area with added attention to some of the sites. Alternative 18 was included in the review. The site is in the Clayton area of Surrey. The surface soils in this area were assessed by reviewing the stratigraphy observed during ground well installation in the area and reviewing the Geologic Survey of Canada Map 148A. The surface soils are comprised of Capilano Sediments with Vashon Drift or Pre-Vashon tills below. These surface deposits consist of marine and glaciomarine stony (including till-like deposits) to stoneless silt loam to clay loam with minor sand and silt usually less than 3 m thick but up to 30 m depth in areas. Below this layer can be found Pre-Vashon till deposits. The static ground water table in the area varies between 18 m and 53 m below surface grade and there is potential for parts of the groundwater to be part of a pressurized Aquifer. The seismic site classification is likely to be site class C or D and liquefaction is not expected. As the expected foundations for the substation would likely be shallow footings there does not appear to be any major issue in developing this site for a substation. A more detailed confirmatory exploration program consisting of two or three augered drill holes and seismic cone penetration testing is recommended before a final decision on purchase of the site is completed. For more information refer to Appendix C

3.2.5 Transmission Assessment

For this site, a review of potential Overhead line routes was conducted. O/H routes were plotted along a number of paths using Google Earth and it was determined the only viable route for O/H would be along ^{(13), (17)} [REDACTED]. This would be a challenge as much of ^{(13), (17)} [REDACTED] serves newer residential areas, and the corridor is not very wide nor is it continuous. The only solution would be a double circuit monopole however Transmission planning is not comfortable with this due to reliability issues with both circuits supplying the station on the same set of structures. Ultimately it was determined that like all other sites the most likely routes were underground from McLellan generally along ^{(13), (17)} [REDACTED] to the local area and from there minor rerouting of the ^{(13), (17)} [REDACTED] path along

(13), (17)

to bring the line to the site. For more information refer to Appendix D

3.2.6 Suitability as a substation

Based on the review by each discipline, the general site conditions and proximity to the load center this site would be suitable for a substation provided additional lands can be obtained to develop the ultimate station. However as noted in section 3.2.4 a confirmatory geotechnical investigation is recommended prior to final purchase of the site.

3.3 Alternate 19

3.3.1 Current Use

Alternate 19 is a three parcel assembly of private properties at the corner of (13), (17) street in Surrey. This assembly is directly south and abutting Alternate 18. The assembly is currently occupied by private homes. Much of the land has been cleared in the past and some of the land has naturally revegetated with some second growth forest.

3.3.2 Electrical Assessment

As noted in Section 3.1.2 the preferred size for the required development is 181 m x 196 m or 35,476 m² or approximately 8.7 Acres. The Alternate 19 assembly at 44,122 m² (10.9 Acres) is large enough for the ultimate site development based on the layouts prepared by electrical design. If Alternate 19 were reduced to two of the three parcels (assuming the third was not available) it would be necessary to obtain other lands to complete the ultimate station. This could be managed by purchasing Alternate 18 directly to the North. As noted in Section 3.2.3 a decision on purchasing Alternate 18 would need to be confirmed before design of the station to ensure an efficient design. As with Alternate 18, a third scenario would be to develop a GIS station on the two Alternate 19 parcels. This is not preferred due to costs and is noted only to provide all options in the event

additional properties cannot be obtained. For more information refer to the electrical memo in Appendix A.

3.3.3 Civil Assessment

The site is generally flat with a slope of approximately 2.5% from east to west. No significant cut or fill is required to level the site. Access is less favourable as like Alternate 18, ^{(13), (17)} is not complete and access is only available from ^{(13), (17)} Avenue which is a single lane road at the parcel frontage. The creek noted in section 3.2.3 is not expected to be a concern as it is further west than at Alternate 18 however it would need to be investigated further if this property is selected for purchase. For more information refer to Appendix B

3.3.4 Geotechnical Assessment

Due to the proximity of Alternate 19 to Alternate 18 the general conditions listed in section 3.2.4 would apply to this site as well. For more information refer to Appendix C

3.3.5 Transmission Assessment

Due to the proximity of Alternate 19 to Alternate 18 the general conditions listed in section 3.2.5 would apply to this site as well except that diversion of the transmission route would be along ^{(13), (17)} For more information refer to Appendix D

3.3.6 Suitability as a substation

Based on the review by each discipline, the general site conditions and proximity to the load center this site would be suitable for a substation with some caveats. The potential costs to extend ^{(13), (17)} street to improve access as well as the potential impact of the creek to the west of the site would need to be studied and as noted on section 3.2.4 a confirmatory geotechnical investigation is recommended prior to final purchase of the site.

3.4 Alternate 20

3.4.1 Current Use

Alternate 20 is a five-parcel assembly consisting of two lots owned by ⁽²¹⁾ properties, and three parcels owned by individuals. The final assembly is not determined as not all the private owners are willing to sell. The ⁽²¹⁾ properties are available and an offer to purchase was made by BC Hydro. Two of the other lots are under negotiation with the third owner holding out. Currently all the lots are occupied with at least one home and potentially farm buildings or left naturally vegetated.

3.4.2 Electrical Assessment

As noted in Section 3.1.2 the preferred size for the required development is 181 m x 196 m or 35,476 m² or approximately 8.7 Acres. For this site, the initial property configuration only consisted of the two ⁽²¹⁾ Properties with total dimensions of 390.3 m x 99.05 m. This complicated the design as the site was very long and narrow. The layout developed (WIB-E05-SK004 R0A) was an inefficient layout which included indoor 25 kV and 60 kV Gas Insulated Switchgear (GIS) sections and outdoor 230 kV bus and transformers. The layout required transmission connections on the North boundary. This would have required ROW across private properties. This is not an optimal solution, and the acquisition of adjacent properties was looked at.

The first adjacent property considered was the private parcel to the south and east of the ⁽²¹⁾ lands. A number of layouts were considered culminating in WIB-E05-SK006-Op2. This layout located the outdoor 230 kV yard and four transmission terminals on the east side of the assembly and the Air insulated (AIS) 25 kV yard on the western portion of the eastern ⁽²¹⁾ property with the future AIS 60 kV yard located on the western ⁽²¹⁾ property. This layout requires cables to supply the 60 kV yard and while it makes better use of the property it is still not optimal. What it did prove was that a substation could be constructed if an additional adjacent parcel were purchased along with the ⁽²¹⁾ property. Since that layout was completed the focus of additional property has been on adding the parcel on the southwest boundary of the ⁽²¹⁾ properties as that owner is willing to sell the land. A revised layout will be prepared for the new assembly however it will not be ready for the completion of this report. The new

layout will effectively be a mirror image of the WIB-E05-SK002-Op2 and will show the site comprising ^{(21), (22)} properties can host a substation however as noted previously it will not be optimal.

It is understood that efforts to purchase the parcel to the east of the ⁽²²⁾ site will continue and if it becomes available a more efficient station layout will be able to be prepared. For more information refer to the electrical memo in Appendix A.

3.4.3 Civil Assessment

The site has a general slope of 4% from east to west. Some cut and fill work will be required to level the site to an average of 3% grade. Volumes are 13000 m³ of cut and 27000 m³ of fill. Access is better than the Alternate 18 and 19 as 196th while only a single lane fronting the ⁽²¹⁾ Property does extend to full width of the site. 194th extends past the full frontage of the site and there is a spur road called 194a St that reaches the southern boundary of the site. There are no water courses near the site. For more information refer to Appendix B

3.4.4 Geotechnical Assessment

Due to the proximity of Alternate 19 to Alternate 18 the general conditions listed in section 3.2.4 would apply to this site as well. However, as the site is under offer to purchase, BC Hydro will be conducting a due diligence geotechnical investigation prior to completion of the purchase. The results of the investigation will not be known before completion of this report. For more information refer to Appendix C

3.4.5 Transmission Assessment

Due to the proximity of Alternate 20 to Alternate 18 and 19 the general conditions listed in section 3.2.5 would apply to this site as well except, that the diversion

from ^{(13), (17)} For more information
refer to Appendix D

3.4.6 Suitability for use as a Substation

Based on the review by each discipline, the general site conditions, and proximity to the load center, this site would be suitable for a substation with some caveats. While an electrical layout will be prepared for the ^{(21), (22)} properties it won't be ready for this report. However, it is expected to be a mirror image of that prepared for the ^{(21), (22)} property as the assemblies are both the same size. As shown for ^{(21), (22)} layout, a station could be constructed on the assembly but would not be an efficient design. If the ⁽²²⁾ property could be purchased a much more efficient layout could be prepared for the site. However, if it is not available the ^{(21), (22)} site would be suitable for a station. As noted, offers to purchase the ^{(21), (22)} properties have been made and a confirmatory geotechnical investigation is being prepared in the event that purchase agreements are completed.

4 Conclusions

The project team investigated several potential sites for the new Willoughby substation. The original selection of 22 sites was reduced to four sites for this stage of the project. The sites were Alternate 14B, Alternate 18, Alternate 19, and Alternate 20. Alternate 14B and Alternate 19 would require assembly by BC Hydro and for this reason they are less preferable. Alternate 18 and 20 were leading as both were assemblies held by developers who were willing to sell. While neither site was large enough on its own for the ultimate substation the project team determined it was likely that adjacent properties could be purchased to make up the required lands.

The team reviewed all the properties and determined that there were no major technical issues that would prevent the development of a substation subject to a confirmatory Geotechnical investigation for each site. Before the project team investigations were complete, senior management made a decision to make an offer on the ⁽²¹⁾ properties of Alternate 20 based on the reasonable price and its availability. Purchase negotiations continue at the time writing and further offers have been made for adjacent properties. It is expected that Alternate 20 will be selected provided the Geotechnical investigation scheduled for January 2025 does not find a disqualifying condition.

Appendix A

Electrical Memo - Willoughby Substation (WIB)

Property Purchase Project

Willoughby Substation Property Purchase Project

Electrical Evaluation

Memo Number	Revision	Information Security Classification	
000-TEM-00088	0	BC Hydro Internal	
To:	David Chwaklinski, Project Engineer Specialist, Lines and Interconnections		Date 2024 Dec 17
From:	Kally Jiang, Sr. Engineer, Electrical Design		
Copy:	[Comments]		

Related Facilities	Willoughby Substation
--------------------	-----------------------

1 Purpose

The purpose of this memo is to provide information to the project team to support a decision to purchase property to construct a new BC Hydro Willoughby Substation in Township of Langley load center. The memo summarizes and documents the process of site selection and the physical electrical layouts developed based on the selected parcels to support carrying on the purchase.

2 Introduction

Load growth in the Willoughby area of the Township of Langley requires the development of a new 200 MVA substation (WIB) in the area. Currently there are no BC Hydro owned properties available to serve as a station site. The objectives of this project are to purchase a suitable property for the future development of a 200 MVA substation to serve the Willoughby area and future development in the Clayton district of Surrey.

3 Background

During Needs phase eleven (11) properties were initially identified as potentially suitable. Some properties were consolidated with others to make a total of thirteen (13) alternatives for

consideration. An SDM table was prepared with initial screening criteria and the number of properties was narrowed down to three (3) for further investigation. At the late date during negotiations towards purchasing, another parcel has been added as the fourth one for evaluation.

4 General

Transmission Stations Engineering had been involved to provide engineering support for this property purchase project. Stations Electrical Design has developed high-level 2D ultimate layouts when carrying on design. The layout design is based on all potential available properties and the Conceptual design is based on following four (4) parcels (See maps for details on Attachment 1) to support the selecting of the most suitable property for purchase.

1. Alternative 14B

Alternate 14B consists of six (6) privately held properties at the corner of (21), (13), (17) of Surrey. The land slopes from east to west at a grade of approximately 8 %. The land is occupied by homes and in some areas is heavily treed with the remainder covered in brush. A 25 kV distribution line runs along (21), (13), (17)

2. Alternative 18

Alternate 18 is a privately held assembly of two parcels owned by (13), (17), (21) and a private parcel owned by the (22). It is located at the corner of (13), (17), (21) St. Combined the parcels aggregate to 8.15 acres. This would be large enough for the initial stage but to complete the ultimate more property would be required. An addition of the (22) to the west would allow the ultimate station to be constructed. Distribution lines of unknown voltage run on (13), (17), (22)

3. Alternate 19

Alternate 19 consists of a three individually owned parcels directly south of the (21) parcels at corner of (13), (17), (21) St. The sites are home sites and have houses and barns and are partially cleared with trees and shrubbery. The sites are generally flat with decent access. Distribution lines of unknown voltage run on (13), (17), (21)

4. Alternate 20 and 20a

On July 17, 2024, a new set of properties has been taken into consideration as Alternate 20. It consists of two adjacent long narrow lots, (22). The two parcels are owned by (21) Properties. (21) is interested in selling both lots, less interested in selling only one. BCH has made an offer to purchase both properties on Sep. 17, 2024, although alone the lots do not provide for an efficient station layout. From a stations design perspective, the (21) lots on their own are not a recommended option. After making an offer to purchase the (21) properties, a layout design was requested to consider Alternate 20a using (21) properties and the two other potential properties adjacent and South of the (21) properties. See maps on Attachment 1 and Emails on Attachment 4 for details.

5 Scope of Work for the New Willoughby Substation

The new 230/25kV outdoor or indoor substation, designated as Willoughby Substation (WIB), will be constructed on the property acquired. The initial stage capacity of the substation is 100MVA, with provisions for future expansion to 200MVA and to add a 60 kV yard at some time in the future. As shown in the Appendix 2 – Station Planning One Line, the scope includes the following:

➤ Initial Stage

- Installation of an outdoor or indoor 230kV ring bus with four (4) circuit breakers, two (2) transformer positions, and two (2) 230kV line positions.
- Installation of two (2) 230/25kV, 150MVA transformers T1 and T2 with dual secondary windings.
- Installation of two (2) 50MVA, 25kV air-insulated (AIS) outdoor feeder sections, each with nine (9) feeder positions with incoming line CBs and sectionalized CB.
- Construction of a control building and other associated infrastructure.
- Installation of station service, protection & control (P&C), civil, mechanical, and other related station facilities.
- Construction of a duct bank extending from the feeder section to the nearest distribution manhole, either inside or near the station boundary.
- Installation of a grounding system, lightning shield wires cable trench and conduit system.

To provide power to the new Willoughby Substation, two (2) new 230kV transmission lines will be constructed from nearby substations. The solution will be based on recommendations from Transmission Planning, Transmission Line Planning and Design.

➤ Ultimate Stage

- Installation of an expanding 230kV ring bus by adding four (4) circuit breakers.
- Installation of two (2) 230/60kV transformers T3 and T4.
- Installation of ten (10) 25kV air-insulated (AIS) outdoor indoor feeder positions similar to the feeders installed at initial stage.
- Installation of an outdoor or indoor 60kV ring bus with six (6) circuit breakers, two (2) transformer positions, and four (4) 60kV line positions.

Two (2) new extra 230kV transmission lines will be constructed from nearby substations to the new Willoughby Substation. The solution will be based on recommendations from Transmission Planning, Transmission Line Planning and Design.

6 Electrical Design Consideration

Many options were explored as requested. Principles for electrical design are as below:

- Latest applicable standards are conformed for design.
- Minimum distance between a driven vehicle and the high voltage bus: 2.5m for 230kV, 1.5m for 25kV.
- Minimum corridor between the perimeter fence and any switchyard equipment: 6m.
- 20m separation between transformers.
- 18m separation from transformer edges to all buildings and property lines.
- 6m separation from station service transformer to Control Building.
- Minimum 6m wide access roads.
- Minimum 6m between substation perimeter fences and property lines for drainage and grounding.
- Minimum 10m turning radius within the substation.
- 27m turning radius for main access roads into substation for transformer transportation.

7 Assumptions And References

The Willoughby (WIB) Substation electrical layout design is based on the following assumptions:

- All electrical conceptual layouts design hereby serve for evaluate property feasibility only.
- All related transmission line entrance supports the current electrical design layouts and will coordinate with Transmission Lines when carry on further design stages.
- The electrical conceptual design for Willoughby substations is based on draft Station Planning One-Line as shown on Attachment 2 that provided on March 06, 2024, by Project Engineer, David Chwaklinski.
- The 230kV ring bus layout spacing is designed according to BC Hydro standard ES44-C0280.
- The future 60kV ring bus layout spacing is based on NKL 60kV Ring Bus layout DWG 414K-E05-00002.
- The 25kV feeder section design is in line with BC Hydro standard ES44-C0186.
- The control building size is based on the size of MLE new control building, as shown on drawing 472R-E05-10041 with some margin in the total length.
- The orientation and positioning of the 230 and 60 kV lines will be determined by Transmission Planning.
- The orientation and positioning of 25kV feeder will be determined with input from Distribution. The location of the first distribution manhole is not yet determined.
- It is assumed that the transmission line egress will be via cable until Transmission's final confirmation.

- 27m turning radius for main access roads into substation for transformer transportation could be met.

8 Electrical Design Layouts and Recommendations

A number of various electrical layouts were explored to try and fit the required equipment onto the parcels identified. In some cases, a combination of AIS and GIS were required to fit the equipment. While the Project called for AIS only it was important to show that for some property assemblies the only way to develop the site was to include GIS. After review by the project team and updates to the Properties, some preferred layouts were selected to consider. The selected a few electrical design layouts are shown on Attachment 3.

Based on all the layouts, Alternative 18 is considered the most feasible and recommended option. It should be noted that there is a creek running through part of the property to the west of Alt 18 that could impact the overall layout of the station.

Alternate 20 will not be suitable without the addition of additional properties to the south or a switch to a GIS station configuration. It is understood that an offer to purchase has been made although the final decisions could take some time to finalize. Alt 20 on its own won't be suitable to develop a substation based on BCH current standards and practices. It is also understood that further negotiations are being conducted with property owners directly south of the ⁽²¹⁾ property to obtain an assembly that will be large enough for any conceivable layout. See maps on Attachment 1 and Emails on Attachment 4 for details.

At the time of writing this Memo, the properties listed above under section 4 were actively being reviewed. The purchasing process to obtain parcels #3 and #4 for the Alternate 20a is on going. Due to the dynamic nature of property acquisition, changes to the parcels may occur which will not be captured in this memo.

9 Attachments

See Pages 7 to 17 for details.

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Accepted by:

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2024-12-17

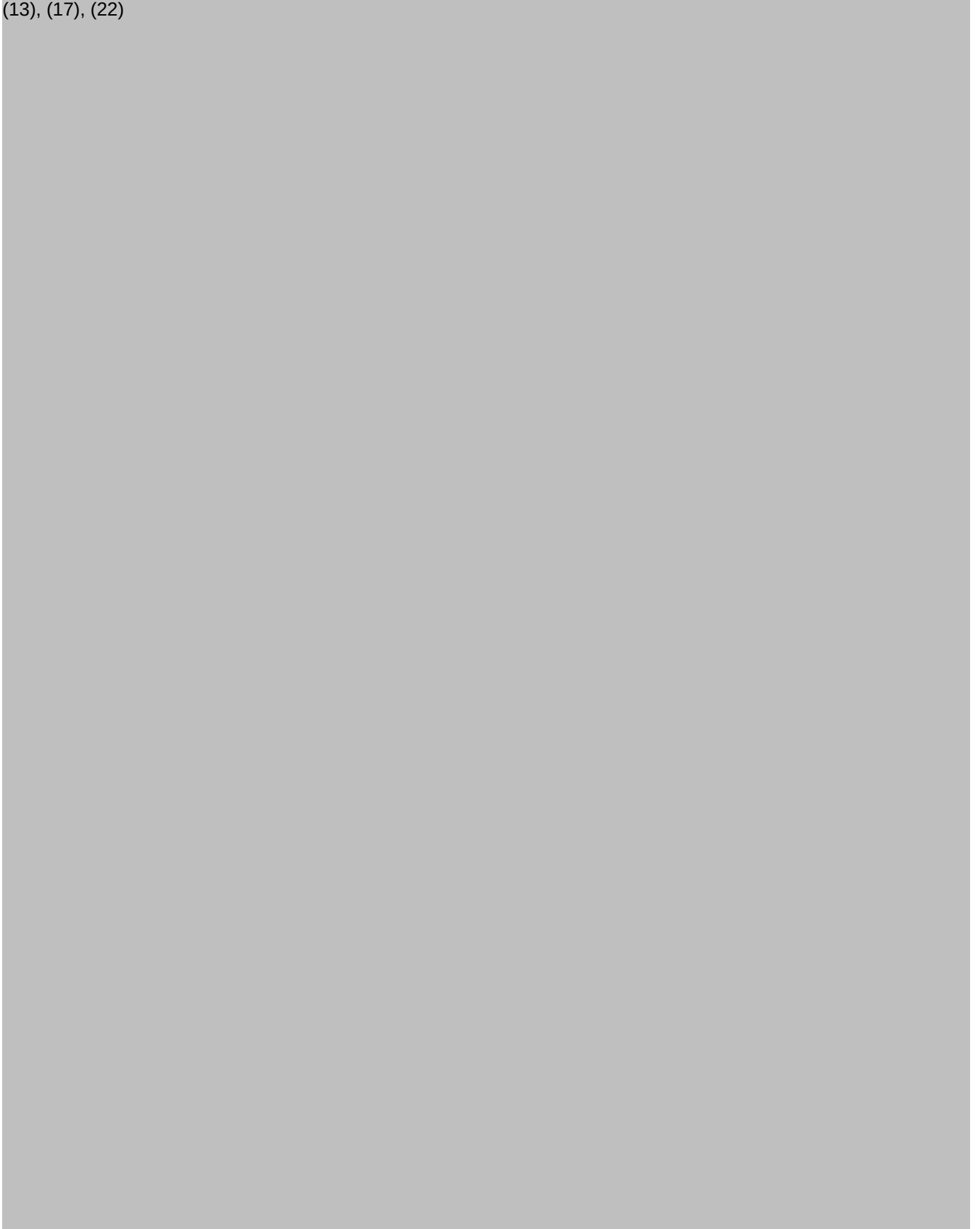
David Chwylinski, P.Eng,
Project Engineer Specialist
Lines and Interconnections

Baleo
2025-01-09



Attachment 1 – Map for the Alternate Properties

(13), (17), (22)



Attachment 2 – Station Planning One-Line

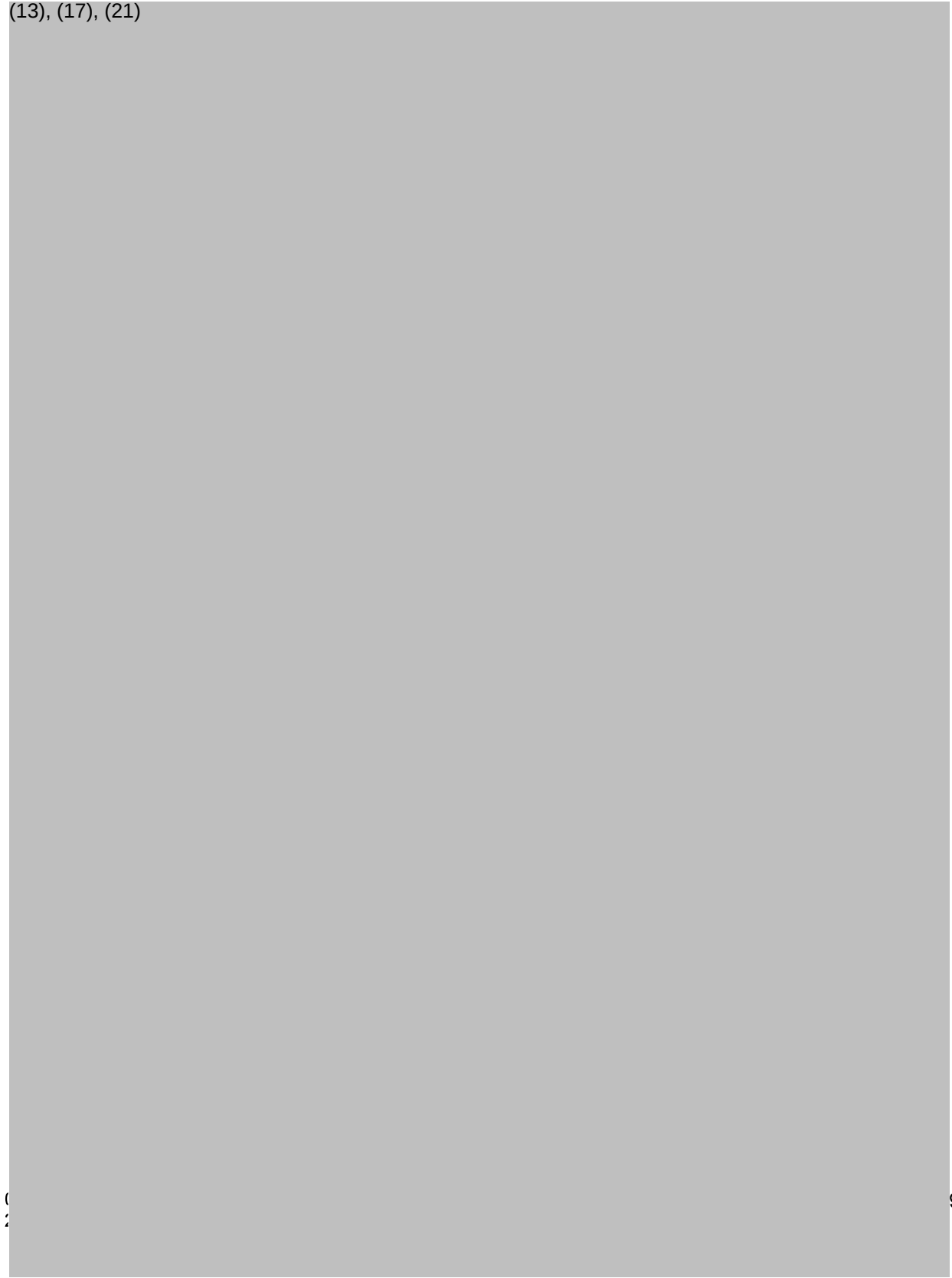
(13), (17)



Attachment 3 – Station Electrical Layouts

General Layout for Original AIS (Air Insulated Switchgears) Without 60kV

(13), (17), (21)



➤ **General Layout for AIS (Air Insulated Switchgears)**

(13), (17), (21)



➤ **General Layout for GIS (Gas Insulated Switchgears)**

(13), (17), (21)



Willoughby Substation Property Purchase Project
Electrical Evaluation

➤ **Alternate 14B** – Property is not easy to be acquired, no layout had been created.

➤ **Alternate 18** – extra⁽²²⁾ Property + 10 meters would be needed for AIS layout.
(13), (17), (22)



(13), (17), (21)



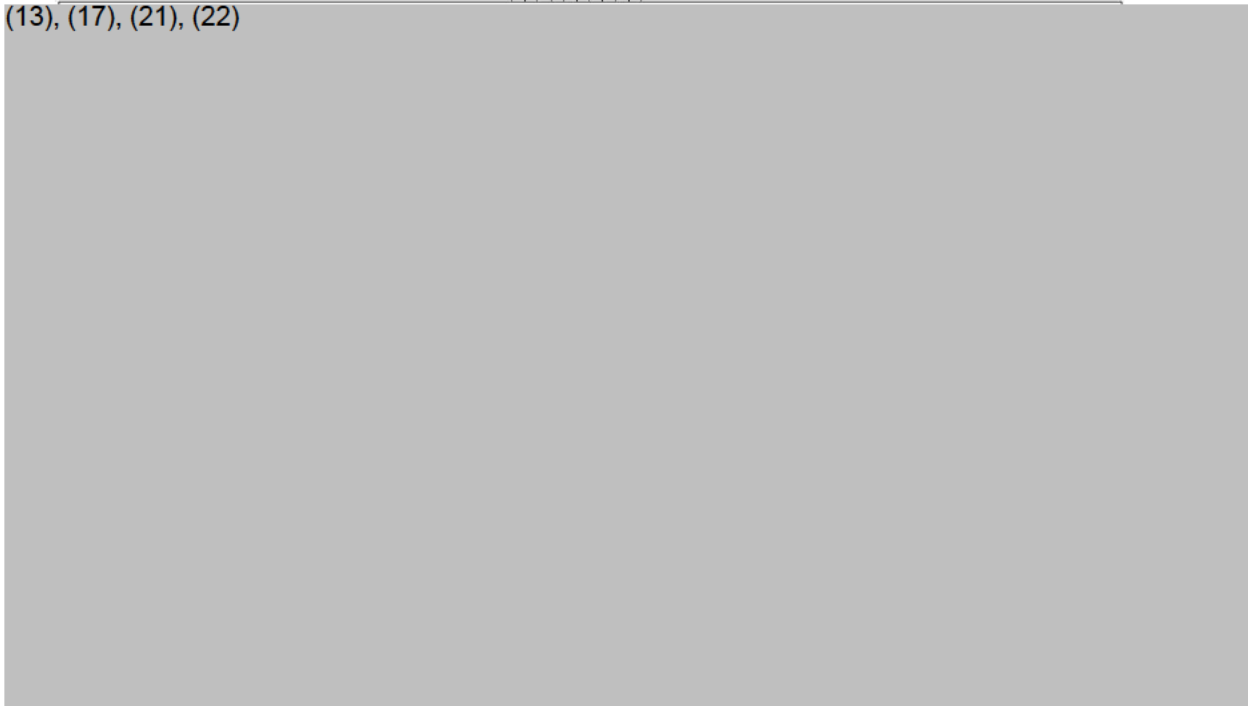
- **Alternative 18 + 19 (Partial, one Property names** (22)
Properties are not enough for AIS layout.
(13), (17), (22)

Willoughby Substation Property Purchase Project
Electrical Evaluation

- **Alternate 19** - It is not easy to acquire both properties, no layout had been created.
- **Alternate 20, ⁽²¹⁾ Property**
Property is not enough for AIS layout. It may be possible to squeeze in an AIS+GIS layout but not a recommended option.
(13), (17), (21)

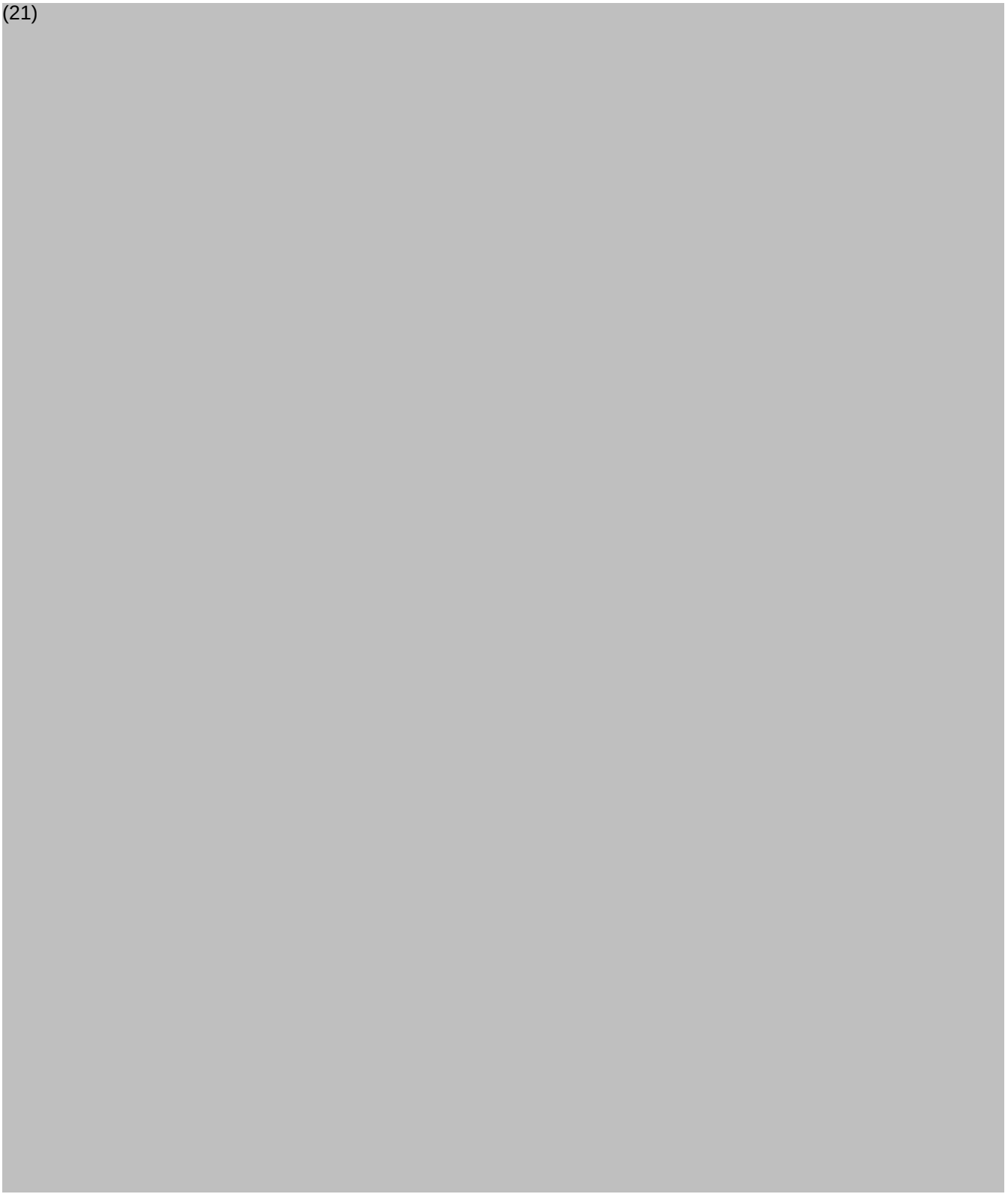


- **Alternative 20a, ^{(21), (22)} Properties**
(13), (17), (21), (22)



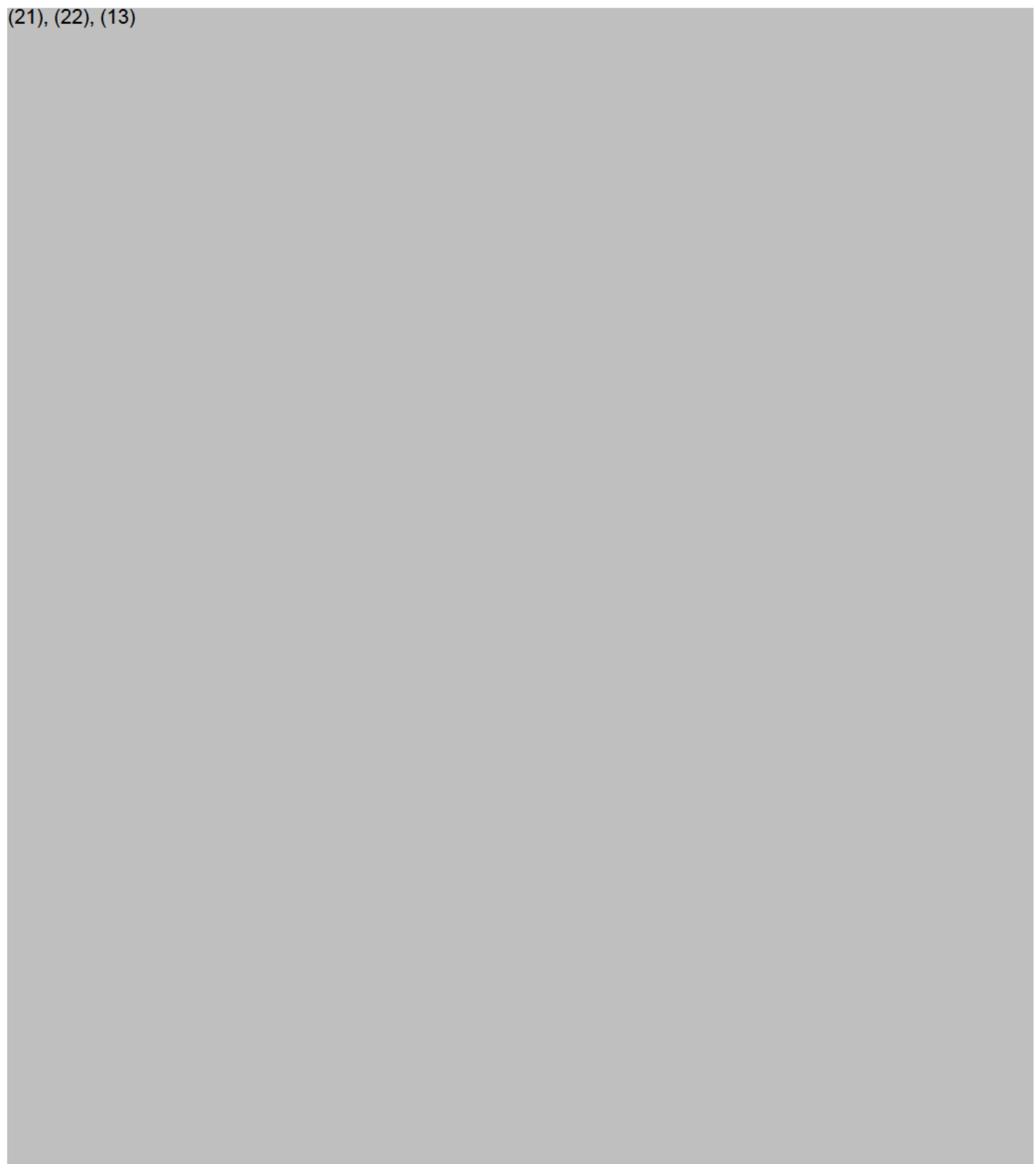
Attachment 4-1 – Information related to Alternative 20, ⁽²¹⁾ Property

(21)



Attachment 4-2 – Information related to Alternate 20a ^{(21), (22)} Properties

(21), (22), (13)



(21), (13)



(21), (13)



Appendix B

Willoughby Substation – Civil Memo

Willoughby Substation Property Purchase Project

Civil Evaluation

Memo Number	Revision	Information Security Classification
000-TEM-00092	0	BC Hydro Internal
To:	David Chwaklinski, Project Engineer	Date 2024 Sep 12
From:	Feng Liu, Sr. Engineer	
Copy:	[Comments]	

Related Facilities	Willoughby Substation
--------------------	-----------------------

1 Introduction

Load growth in the Willoughby area of the Township of Langley requires the development of a new 200 MVA distribution substation (WIB) in the area. Currently there are no BC Hydro owned properties available to serve as a station site. The objectives of this project are to purchase a suitable property for the future development of a 200 MVA substation to serve the Willoughby area and future development in the Clayton district of Surrey.

2 Background

The project team selected several potential sites located near 200th avenue. After further review and evaluation, four (4) sites were identified as potentially suitable.

The sites are identified as follows:

Alternative 14B

Alternate 14B consists of six (6) privately held properties at the corner of ⁽²²⁾ St. in the Clayton area of Surrey. The PID's are ^{(13), (17)}

^{(13), (17)}

(21), (13), (17)



Alternative 18

Alternate 18 is a privately held assembly of two parcels owned by ⁽²¹⁾ developments and a private parcel. The ⁽²¹⁾ with Civic address ^{(21), (13), (17)} Combined the parcels aggregate to 8.15 acres.



(13), (17), (21)

Alternative 19

Alternate 19 consists of a three individually owned parcels directly south of the ⁽²¹⁾ parcels.
^{(13), (17), (21)} with Civic addresses ^{(21), (13), (17)}

^{(21), (13), (17)}

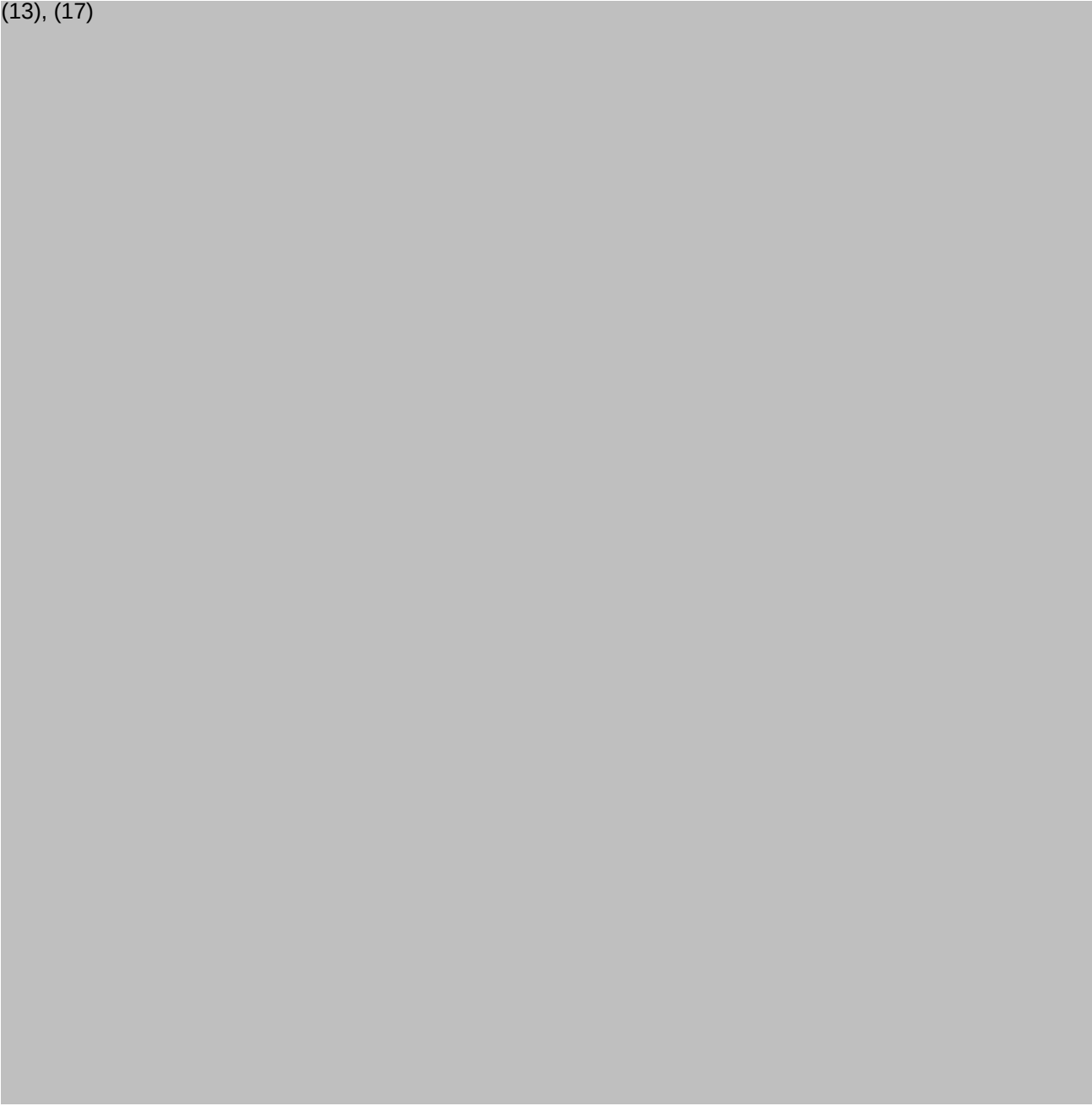
^{(13), (17), (21)}

Alternative 20

Alternate 20 originally consisted of three properties, two parcels owned by ⁽²¹⁾ developments
and a private parcel located at south of the ⁽²¹⁾ properties. Since the initial assessment two
additional properties have been added to Alt 20. The ⁽²¹⁾ parcels are ^{(17), (13)}

^{(13), (17)}

(13), (17)



At the time of writing, the properties listed above were actively being reviewed. Due to the dynamic nature of property acquisition changes to the parcels may occur which will not be captured in this memo.

3 Geographic Evaluation

Alternative 14B

The natural slope of the land is approximately 6% from east to west, and 6% from south to north. Cut and fill work is required to reduce the slope to 3%. The estimated volume of cut and fill is shown in the table below.

Volume of cut	Volume of fill
40000 m ³	80000 m ³

Geotechnical analysis is required to assess the soil and ground conditions.

Alternative 18

The land is almost flat from east to west, with a natural slope of approximately 4.7% from south to north. Cut and fill work is required to reduce the slope to 3%. The estimated cut and fill volumes are shown in the table below.

Volume of cut	Volume of fill
22700 m ³	45300 m ³

There is a creek located to the west of the site. This has a negative impact on the location of the future substation. The creek may increase the likelihood of flooding, potentially damaging the substation. Runoff from the substation may potentially contaminate the creek, leading to environmental concerns. Geotechnical analysis is required to assess the soil and ground conditions.

Alternative 19

The land is approximately flat from east to west, with a natural slope of approximately 2.5% from south to north. No significant cut and fill work is required for this site.

Like Alternative 18, the same creek is located west of the Alternative 19 site. This has a negative impact on the location of the future substation. The creek may increase the likelihood of flooding, potentially damaging the substation. Runoff from the substation may potentially contaminate the creek, leading to environmental concerns. Geotechnical analysis is required to assess the soil and ground conditions.

Alternative 20

BC Hydro management team has made an offer to purchase the ⁽²¹⁾ properties and to negotiated with other landowners in the vicinity. The natural slope of the land is approximately

4% from east to west, and 2.5% from north to south. Cut and fill work is required to reduce the slope to 3%. The estimated volume of cut and fill is shown in the table below.

Volume of cut	Volume of fill
13000 m ³	27000 m ³

Geotechnical analysis is required to assess the soil and ground conditions.

4 Access Evaluation

Alternative 14B

The land is located at the corner of (13), (17), (21) are city roads, so there is adequate space for large construction and maintenance vehicles. The access point could be at (13), (17), (21)

Alternative 18

The land is located south of (13), (17), (21) The substation requires access for large construction and maintenance vehicles. This can be challenging on a narrow lane, which does not have sufficient space for these vehicles. Dead-end street limits construction and maintenance traffic, making it difficult to access the substation.

Alternative 19

Like Alternative 18, Alternative 19 also has limited access. The land is located (13), (17) avenue is a dead-end narrow lane, limiting construction and maintenance vehicles, making access to the substation difficult.

Alternative 20

The land is located between (13), (17) (13), (17) are all city roads, so there is adequate space for large construction and maintenance vehicles. The access points can be locate (13)

5 Conclusion

Alternative 14B

The land has a natural land slope of 6%, with large earthwork (cut and fill) requirements. The site's advantageous positioning at the intersection of two city roads ensures adequate access for large construction and maintenance vehicles, enhancing its operational feasibility.

Alternative 18

The land requires a moderate amount of cut and fill. However, its proximity to a creek poses negative impacts and potential environmental concerns. Additionally, the site is located on a dead-end narrow lane, making access challenging for construction and maintenance activities.

Alternative 19

The land has a favorable natural slope of 2.5%, with no significant earthwork (cut and fill) required, indicating a more straightforward construction process. However, similar to Alternative 18, it is also located near a creek. The dead-end narrow lane access further complicates the logistics of construction and ongoing maintenance.

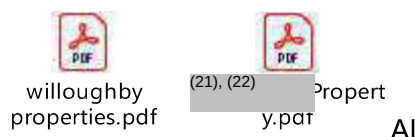
Alternative 20

The land requires a moderate amount of cut and fill, which is less extensive than that of Alternative 14B and 18. Its location between two city roads provides adequate space for large vehicle access, facilitating easier construction and maintenance.

In summary, Alternative 14B and Alternative 20 emerge as the most favorable options due to their accessible locations and manageable earthwork requirements. Alternative 18 and Alternative 19 are hampered by access challenges and potential environmental impacts (proximity to a creek). Therefore, it is recommended to prioritize Alternative 14B and Alternative 20 for further development considerations.

Attachments

- Attachment A – Willoughby Properties Map



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David Chwackinski, P.Eng,
Project Engineer



Appendix C

TM0592 Willoughby Sub Geotechnical Desktop

Proposed Willoughby Substation

Preliminary Desktop Geotechnical Assessment

TM0592

Memo Number		Revision	Information Security Classification	
000-TEM-00095		0	BC Hydro Internal	
To:	David Chwaklinski		Date	2024 Dec 19
From:	Dylan Lee			
Copy:	Shokooh Meshkinfar			
Related Facilities		Proposed Willoughby Substation		

1 Introduction

As requested by David Chwaklinski, P.Eng., FEC., PMP, Project Engineer Specialist, the Geotechnical Section of the Transmission Civil Department carried out a desktop level preliminary geotechnical assessment of a potential site for the proposed new Willoughby Substation in Surrey. At the time of this report several sites in Surrey and Township of Langley have been or currently undergoing consideration for property purchase. The following properties are discussed in this memo: Alternative 20^{(13), (17), (22)} Alternative 18^{(13), (17), (21)} and Alternative 19^{(13), (17)} Alternative 18^{(13), (17), (21)} and Alternative 19^{(13), (17)} Surrey. Alternative 14B was also under consideration but not formally assessed in this memorandum. Alternative 14B consists of^{(13), (17)}

The key geotechnical considerations for substation development are soil characterization to determine if unfavorable soft/loose soils exist on this site which may warrant special foundation design or significant ground improvement works; if geohazard issues (landslide, flooding, settlement, etc.) exist on the property; identify potential civil works (clearing, road construction, excavation, and regrading) required for the substation development; and identify potential impacts from surrounding third party works. The purpose of this assessment is to screen for these hazards and determine if there are significant geotechnical challenges with developing on these sites.

This desktop level assessment is limited to publicly available data sources acquired through the City of Surrey and Township of Langley's Geographic Information System, Province of British Columbia Groundwater wells inventory, Google Earth, review of nearby BC Hydro and third-party

000-TEM-00095
2024 Dec 19

building structures, and surficial geology mapping. A field reconnaissance was not completed at part of this original scope.

2 Geotechnical Assessment

2.1 Site Characterization and Background

An overview map of the properties discussed in the Clayton area is shown in Figure 2-1.

(13), (17), (21), (22)



(22), (21)

Alternative 20

The properties are rectangular and include four lots: northwest (22) (22) The lots are fronting (13), (17) Avenue which are classified local sub-urban roads. All four lots are zoned as suburban residential – urban reserve.

According to historical air photos dating back to 1949 to 2023¹ and hill shade LIDAR surfaces between 2009 and 2003, the following land use features were noted for each lot:

(13), (17)

- No additional historical buildings are apparent except for the main residential building located on the southwest corner of the lot fronting (13), (17)
- A small section of land around the building has been cleared and grassed. The remaining portion of land on the property has remain undeveloped and heavily vegetated.
- The ground natural slopes northwest at approximately 3 percent but is nearly flat within the northwest quadrant of the property. Site drainage may be poor where the grade is near flat

(13), (17)

- This property appears undeveloped and heavily treed. No historical buildings or veg clearing work observed in the historical photos.
- The ground naturally slopes down to the northeast at approximately 2 percent.

(13), (17)

- This property has been subdivided in 1957, and the rectangular plot of land (13), (17) Street) has been developed into a residential dwelling and no longer part of (13), (17)
- There is a main residential building and a large stand-alone shed located in the southwest corner of the lot. Smaller auxiliary sheds, cars and containers are spread across the property.

¹ Accessed through the City of Surrey Mapping Online System (2024 July 8)
000-TEM-00095
2024 Dec 19

- The southwest corner of the lot front (13), (17) Street has been cleared and grassed. The remaining portion of the property remains vegetated and treed.
- Significant redevelopment was observed to the south (a new lane road (13), (17) street, green belt and townhouse development).
- The ground naturally slopes down to the northwest at approximately 1 percent.

(13), (17)

- This property appears undeveloped and heavily treed. No historical buildings or veg clearing work observed in the historical photos.
- The ground naturally slopes down to the north and northeast at approximately 2 percent.

Alternative 18 and 19 (13), (17) Properties

The properties are rectangular and include four lots: (13), (17)

(13), (17)

The lots are fronting (13), (17)

which are classified local sub-urban roads. All four lots are zoned as suburban residential – urban reserve.

According to historical air photos dating back to 1949 to 2023² and hill shade LIDAR surfaces between 2009 and 2003, the following land use features were noted for each lot:

(13), (17)

- Multiple detached buildings existed on the north half of the property. Throughout the years the buildings have been demolished and replaced.
- Current building footprints include a main residential building on the northwest corner of the lot; possible caretaker building and garage at the centre of the lot; and a large standalone barn at the west centre of the lot. Historical buildings since demolished were located between the caretaker building and the barn.
- Northeast corner of the lot had been used for agriculture.
- Possible horse pen is located south of the main residential building.
- The gravel lot south of the barn may have been an additional pen, historically.

² Accessed through the City of Surrey Mapping Online System (2024 July 8)

- Natural trees and uncleared areas are located along the southern extent of the property line and on the southeast corner of the lot.
- There are soil stockpiles on the east centre and the southwest corner of the lot.
- There is a possible interceptor swale and pond on the north side of the greenbelt at the southeast corner of the lot. This has possibly been infilled.
- No licensed ground water wells³ recorded in the provincial groundwater well inventory.
- The ground naturally slopes downward to the north between 3 to 4 percent gradient.
- ⁽²¹⁾ runs south to north between 40 m to 80m from the western property line.

(13), (17)

- No additional historical buildings on this lot are apparent except for the main residential building on the northwest corner of the lot.
- The north third of the lot has been cleared with selective use for agriculture and garden use.
- The remaining two-third of the lot on the south remain undeveloped and naturally vegetated.
- There exists a minor swale to the east of main building and possibly infilled.
- There exists a possible pond that has been infilled at the treeline.
- There exist possible soil stockpiles at the treeline and on the east side of the cleared lot.
- No licensed ground water wells³ recorded in the provincial groundwater well inventory.
- The ground naturally slopes downward to the northeast at between 5 to 6 percent.
- There is a large townhouse complex being proposed to the east.

(13), (17)

- Historical building that appeared to be a standalone shed was located on the east property line, approximately 53 m north of the south property line. This building appeared demolished at the current time. There is a main residential dwelling located on the southeast quadrant fronting ^{(13), (17)}

³ It is possible a groundwell was installed on this lot but not shown in the groundwater inventory.

- The south half of the property had been cleared of vegetation in the past for agriculture and garden use.
- The remaining north portion of the lot remains undeveloped and mostly overgrown.
- The ground naturally slopes down to the north at approx. 2 percent.
- Currently surrounded by rural residential development on adjacent lands.
- There used to exist a man-made stormwater detention pond on the west property line, 100m north of the south property line. The pond appeared to be filled in.
- There is an unlicensed ground well located approximately 40 m north of the south property line.

(13), (17)

- No additional historical buildings are apparent except for the main residential building and shed near the centre of the lot.
- The entire property had been cleared of vegetation in the past for agriculture and garden use.
- The remaining portion of the lot is undeveloped and mostly overgrown.
- The ground naturally slopes down to the north at approx. 4 percent.
- Currently surrounded by rural residential development on adjacent lands.
- There is an unlicensed ground well located north of the building.

(13), (17)

- No additional historical buildings are apparent except for the main residential building and shed near the southern portion of the lot.
- The southern half of property had been cleared of vegetation and mainly grassed.
- The north half of the lot is heavily vegetated and undeveloped.
- The ground naturally slopes down to the northeast at approx. 6 percent.
- Currently surrounded by rural residential development to the north and west; except to the east where this is recent townhouse development.
- There is an unlicensed ground well located north of the building.

3 Surficial Geology and Groundwater

According to Geological Survey of Canada Map 1484A, the surficial soils at all sites under assessment consist of Capilano Sediments (Cd), marine and glaciomarine stony (including till-like deposits) to stoneless silt loam to clay loam with minor sand and silt normally less than 3 m thick but up to 30 m thick containing marine shells. Possible thin veneer of Ca, raised marine beach poorly sorted sand to gravel, in upland areas sediments. At greater depths, Vashon Drift Tills (Va,b) and Pre-vashon till deposits (PVa-h) are likely to exist. The soft clay unit also known as the Fort Langley Formation (FLa-e) which is glacial and deltaic in nature exists south of all the sites towards City of Langley.

Licensed and unlicensed ground water wells have been installed in this region to service residential dwellings and farming needs. An illustration of historic ground wells in proximity to the sites are shown in Figure 3-1 and Figure 3-2. Soil stratigraphy and static groundwater for each well are summarized in Table 3-1 and Table 3-2 for Alternative 20 and Alternative 18/19, respectively. Based on the soil stratigraphy from the ground water wells, the main geological units encountered are Cd, Marine and glacio marine stoney till-like soils, underlain by mainly PVf, pre-vashon Seimahmoo till consisting of glaciofluvial, glaciomarine, and glaciolacustrine deposits. It is likely some thickness of Vashon Drift Till (Va,b) exists between Cd and PVf given some of the soil descriptive indicating hard pan till was observed. The Pre-vashon drift soils are generally interpreted as the sediments that are deposited in front of the glacier as the ice sheet advances and then overridden by the glaciers. PVf soils are typically well draining coarse soils that is likely to contain an established aquifer. The Fort Langley Formation (FLa-e) is likely absent at all these sites since the location is further upland from the glacial basin and at the boundary of where the FLa-e was deposited; however, this can not be totally discounted as the soil logs are not detailed enough.

Due to the fine grained and stiff nature of the upper soil units observed in the Cd, the soils are generally not conducive of drainage (poor permeability). There is potential for limited and isolated sand and gravel units with the Cd as indicated in two of the water wells east and south of the Alternative 18. The Cd can generally be considered as an aquitard in this area. The ground wells were installed with screen depths that penetrate Cd and were set inside the well draining sand and gravel soil units of PVf. The static groundwater table has been observed between 18 m (60 ft) and 53 m (175 ft) for groundwater wells installed between 34 m (111 ft) and 92 m (303 ft) screen depth for all the sites under consideration. This may suggest the aquifer may be pressurized as the static water rises within the aquitard Cd soil unit and above PVf. The fluctuation in groundwater is not completely well understood based on the limited information available and in the absence of a hydrological study that is beyond the scope of this report; however, the following reasons may explain the difference in groundwater:

- There are multiple water bearing aquifers within PVf unit. The higher elevation static groundwater table may correspond to a pressurized aquifer as the screen depths for the shallow wells are targeted within the upper strata of the PVf; while the lower elevation static ground water corresponds to a less or unpressurized aquifer as the screen depths for the deeper wells are targeted much lower in the soil strata compared to the shallow wells; or,
- There is only a single aquifer within PVf and the groundwater has changed over time indicating the aquifer had been depleting. The deeper wells with the deeper groundwater table were observed to be installed approximately one to two decades after the shallow wells were installed.

Given the extensive historic groundwater well use in this region before the 90's, the latter theory is likely more plausible given the chronological installation of the groundwater wells resulting in deeper wells and lower groundwater table through time.

Table 3-1: Alternative 20 Properties - Groundwater wells Lithology and groundwater

Well 58737 (ft)	Well 15844 (ft)
0-1 Subsoil	0-50 Not recorded
1-15 hard pan stoney	50-81 till
15-45 till	81-101 tight sand and gravel
45-49 sandy soil	101-108 grey clay
49-174 boulder and till	108-142 tight sand and gravel
174-195 damp till	142-147 hard pan
195-235 till wet with sand lenses	147-158 sand, and silt
	158+ clay and till
<i>Static water – 155ft</i>	<i>Static water – 140 ft</i>
<i>Screen Interval – N/A</i>	<i>Screen Interval – N/A</i>
<i>Bottom of casing 235</i>	<i>Bottom Casing @ 297</i>

Figure 3-1 (bottom):
Groundwater wells (BC
Water Resources Atlas)

Alternative 20 Properties

(13), (17)

Table 3-2: Alternative 18 and 19 Properties - Groundwater wells Lithology and groundwater

Well 23863 (ft)	Well 30989 (ft)	Well 74141 (ft)	Well 74140 (ft)	Well 7419 (ft)
0-103 Till	0-20 Stoney grey clay boulder	1-17 brown clay to grey clay	2-10 brown clay and gravel	0-2 Top soil
113-111 Clay	20-44 Cemented gravel	17-39 till and boulders	10-48 Till and boulders	2-15 Brown Clay
111-114 Till	44-85 stoney grey till	39-43 dry sand and gravel	48-147 Clay and gravel to sand and gravel	15-47 Till and cobbles
114-123 Sand and Gravel	85-104 Clay	43-120 sandy to hard packed till	147-228 Water bearing till/sand and gravel	47-53 Stoney clay
123 -127 fine sand and gravel	104-115 Sand medium gravel	120-192 sand and gravel		53-150 Gravels and cobbles, layer of clay
	115-121 Coarse sand, grey clay	192-303 Till		150-177 Hard packed silt and sand
		303-306 sand and gravel		177-186 Water bearing sand and gravel
<i>Static water – 60ft</i>	<i>Static water – 80 ft</i>	<i>Static water – 175 ft</i>	<i>Static water – 138 ft</i>	<i>Static water – 136 ft</i>
<i>Screen Interval 122-127, Bottom of casing 127</i>	<i>Screen Interval 110-115, Bottom Casing @ 111</i>	<i>Screen interval 199-306, Bottom Casing @ 303</i>	<i>No screen, Bottom Casing @227</i>	<i>No screen, Bottom Casing @186</i>

(13), (17)

Figure 3-2 (left):
Groundwater wells
(BC Water
Resources Atlas)

Alternative 18 and
19 Properties

4 Discussions

The information provided in this desktop study indicates that Alternative 18, 19, and 20 properties are considered feasible for substation development and there are no significant geotechnical concerns at any of the properties being considered for purchase based on this screening level assessment. We would expect properties nearby of the studied sites that similar conditions exist based on surficial geology mapping, terrain, and groundwater well logs.

Shallow foundation for substation development for *Alternative 18, 19, and 20 properties* is considered feasible if constructed below frost depth (minimum 450 mm depth). No deep ground improvement works are required with exception of general site prep works that include clearing, grubbing, and stripping to expose the shallow native till-like soils. The actual depth of stripping to expose suitable subgrade will depend on site specific conditions ascertain from future site investigative works. The upper till-like soils are likely over consolidated and not prone to long term settlement unless subject to significant long term and excessive surcharge. The native fine grained, cohesive till-like, organic free soils may be rehandled and reused for non-structural loading use such as general landscape fill if moisture controlled and compacted with appropriate

compaction method such as sheepsfoot roller. Stringent erosion and sediment control measures using sediment tanks, sediment ponds, swales, gravel pads, and erosion control mattings will be required during construction to manage runoff and effluents on this site due to large scale civil works and soil disturbance expected for this development. Road improvement works adjacent to the properties will likely be required to facilitate the construction and maintenance equipment for the substation; and transmission/distribution assets. There may be additional civil constraints from nearby re-development (townhouse development and greenways) that may impact the substation development. It is assumed site servicing will be through external infrastructures and a groundwater well for domestic use will not be required.

Natural geotechnical hazards (flooding, liquefaction, and landslides) are unlikely to exist on this site. There are no classified drainage water courses on the properties and the land are not subject to flooding based on the City of Surrey's Hazard Lands Development Permit Area. The gentle gradient on this site suggest that re-levelling works would be minimal; hence the final grades may be supported by short landscape retaining walls or using stable slope configuration.

Foundation settlement risks are possible if the footings are designed with excessive loads or the site is significantly surcharged due to fine grained compressible (clay) soils at this site. A detailed site investigation will be required to ascertain suitable bearing capacity and expected settlement for the footings.

The seismic site class on these properties is likely a Site Class C or D as defined in the 2020 National Building Code and based on Soil Hazard Map of the Lower Mainland of the lower mainland of British Columbia for assessing the earthquake hazard due to lateral ground shaking⁴. The sites are considered to have very low susceptibility to liquefaction based on recent micro-zonation mapping⁵ of the lower mainland; however, there can be local soil conditions that may not be captured in the mapping. This will need to be confirmed in a subsequent detailed geotechnical investigation. Buildings in the generally vicinity (ex. townhouses, residential dwelling), including BC Hydro's Fraser Valley Operation Centre approximately 1 km away, were constructed using conventional shallow footings without structurally tied and/or ground improvement works, suggesting the soils are competent.

⁴ Monahan, Patrick, 2005. Soil hazard map of the lower mainland of British Columbia for assessing earthquake hazard due to lateral ground shaking

⁵ A. Javanbakht, S.r., Adhikari, M.Salsabili, A. Bilson Darko, S., Molnar, 2024. MVSMMP Map 03, Level 1-2 Liquefaction Susceptibility Map

Due to the poor draining soils at (13), (17) Alternative 18, an appropriately sized storm water management system (water detention system) and oil water separator system is recommended for the substation development. It is very likely any storm runoff from the site will discharge into a municipal storm system which then drains into (13), (17)

(13), (17) Significant changes to natural flow regimes into (13), (17) can have significant impacts downstream (ex. erosion, landslide, loss of natural habitat and vegetation, etc.).

For Alternative 20 and portions of land in Alternative 18 and 19, there are historical land residential/light farming use that may result in the following non-exhaustive risks:

- Oil tanks,
- Buried demolished building foundation,
- Buried septic systems,
- Unlicensed groundwater well,
- Buried irrigation systems,
- Buried contaminated soils or building material,
- Reclamation, and deleterious soils (stockpiled or buried), and last but not least,
- Buried stormwater system that are filled with compressible sediments (ponds and swales)

(22) appear undeveloped and are unlikely to have pre-existing non-natural imported fill or buried infrastructures; however, this should be confirmed at a later time through detailed discussions with the landowner and subsequent geotechnical investigation.

5 Recommendations

We recommend engaging with the landowners to identify whether these risks exist, completing shallow test pits and drill holes to estimate stripping requirements and soil class, and facilitating an utility locate (electromagnetic and ground penetration radar) where necessary. Soil sampling and testing for contaminated soils is recommended. It may be favorable to rehandle and stockpile deleterious soils on the property should there be sufficient real-estate with the proposed substation development.

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Prepared by:



Dylan Lee, P.Eng. Geotechnical Engineer

Checked and
Reviewed by:

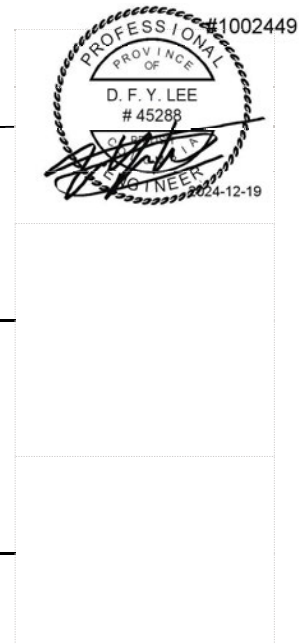

2024-12-19

Shokooh Meshkinfar, P.Eng. Geotechnical Engineer

Accepted by:


2024-12-19

David Chwacklinski P.Eng., FEC., PMP,
Project Engineer Specialist



Appendix D

TM0592 Willoughby Substation Property Purchase Overhead Transmission Assessment

TM-0592 Willoughby Substation Property Purchase Overhead Transmission Assessment

Engineering Memo

Subtitle

Memo Number	Revision	Information Security Classification
414V-TEM-00002	0	BC Hydro Internal
To:	David Chwackinski, Project Engineer	Date 2025 Mar 04
From:	Craig Steels, Consultant, BC Hydro	
Copy:	[Comments]	

Related Facilities

1 Background

Refer to statement of needs document ID 5096. From that document:

Willoughby is a fast-growing area of the Township of Langley which is presently supplied by MLN substation. MLN will have no station capacity and feeder positions available after F2032. A new substation is required by F2032 in the area to meet the future load growth and electrification needs. In order to meet the timeline of a new substation, a piece of property suitable for 230/25kV, 200MVA outdoor substation needs to be purchased as soon as possible.

2 Statement of Needs Overhead Transmission Requirements

The statement of needs document lists the overhead transmission requirements as follows:

The property should have acceptable egress/ingress on at least three sides for 230kV transmission lines and 25kV distribution feeders.

3 Transmission Planning Scope Notes

None.

4 Details

4.1 Substation connection(s)

The new substation will be connected to Maclellan substation (MLN).

4.2 Circuit Requirements

Two 230 kV connections are required between the new substation and MLN. Provision for two future 230 kV circuits has been requested by Transmission planning however other than provision for line terminal space in the station no route analysis is conducted as part of this memo.

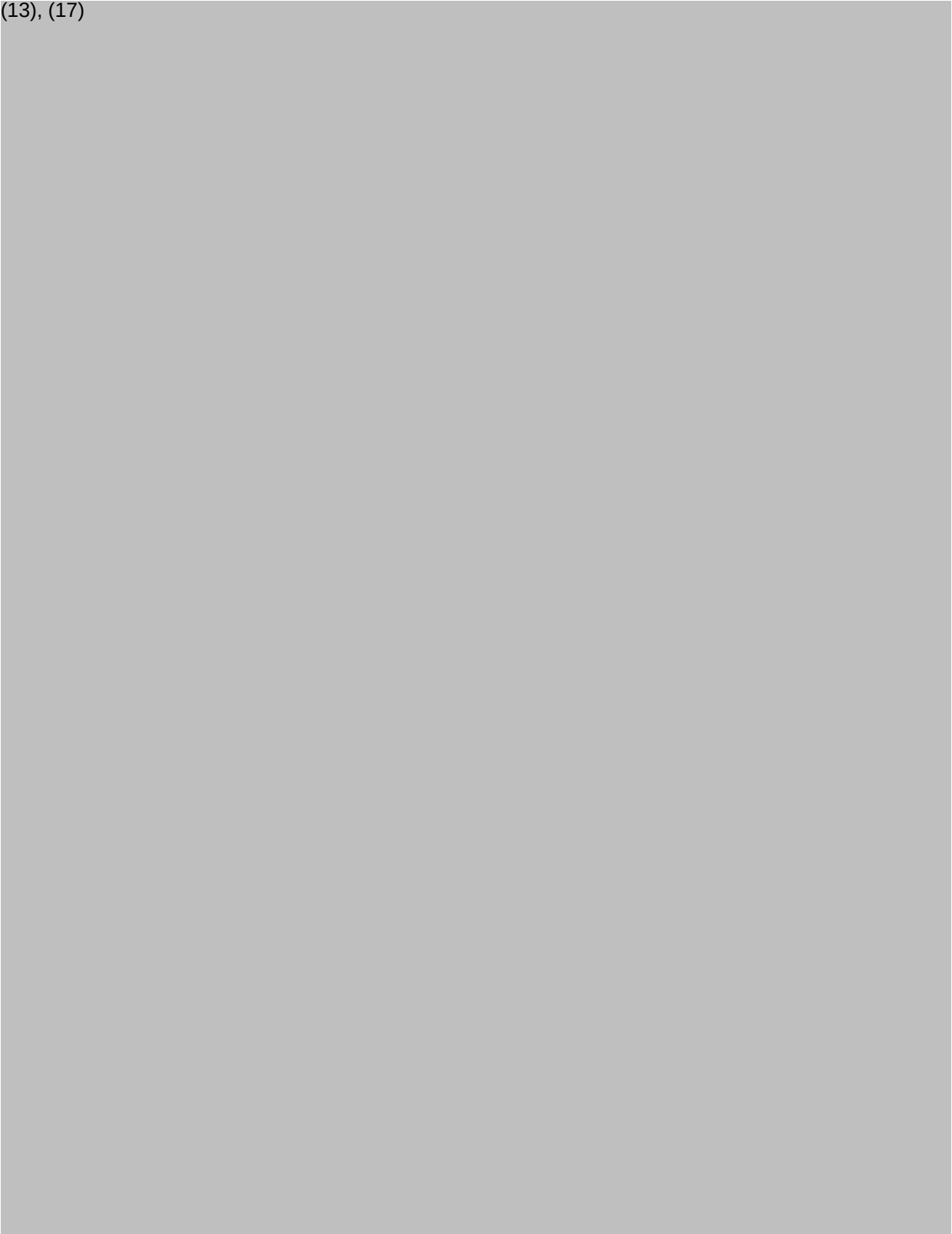
5 Prospective Properties and Routing Options

A Google Earth screenshot of the project location is below. The target properties are located North of MLN. Prospective properties are shown with Google Earth pins. The red areas on the map are high-density areas where routing overhead transmission lines is unlikely.

Transmission planning has indicated a desire to connect at MLN and not to route overhead to the west to FLW. Due to the dense urbanization between the target area and MLN, overhead transmission is unlikely and underground transmission cables are likely required. The most direct route appears to be along ⁽²²⁾ 

At the time of this memo, there are three properties under consideration: alternative 14b, alternative 18, and alternative 20. They are shown as google earth pins in figure 1 below, along with a yellow box for the load centre.

(13), (17)



The proposed property/properties as of this memo are:

5.1 Alternative 14b

5.1.1 Location description

The property is located at ^{(13), (17)} [REDACTED] It appears generally flat.

5.1.2 Ingress/Egress for transmission circuits

This property appears to be open on all sides and to have the best potential overhead transmission access of all the properties considered.

5.1.3 Notes

- This property is close to the Agricultural Land Reserve to the North and the West.
- This option appears to be the most favourable from an overhead lines perspective

^{(13), (17)} [REDACTED]

- This property likely meets the requirement for overhead transmission and distribution connections outlined in the statement of needs document listed in section 2 above.

^{(13), (17)} [REDACTED]

^{(13), (17)} [REDACTED]

(13), (17)



5.2 Alternative 18

5.2.1 Location description

The property is located a ^{(13), (17)} . It appears flat.

5.2.2 Ingress/Egress for transmission circuits

It appears that overhead transmission connections may be possible on the North, East, South, West side(s).

5.2.3 Notes

- This property appears to be blocked on the east side by high-density housing.

^{(13), (17)} 

- This property does not likely meet the requirement for overhead transmission and distribution connections outlined in the statement of needs document listed in section 2 above. Underground transmission cables will likely be required to route to MLN.

(13), (17)



5.3 Alternative 20

5.3.1 Location description

The property is located at ^{(13), (17)}  It appears flat.

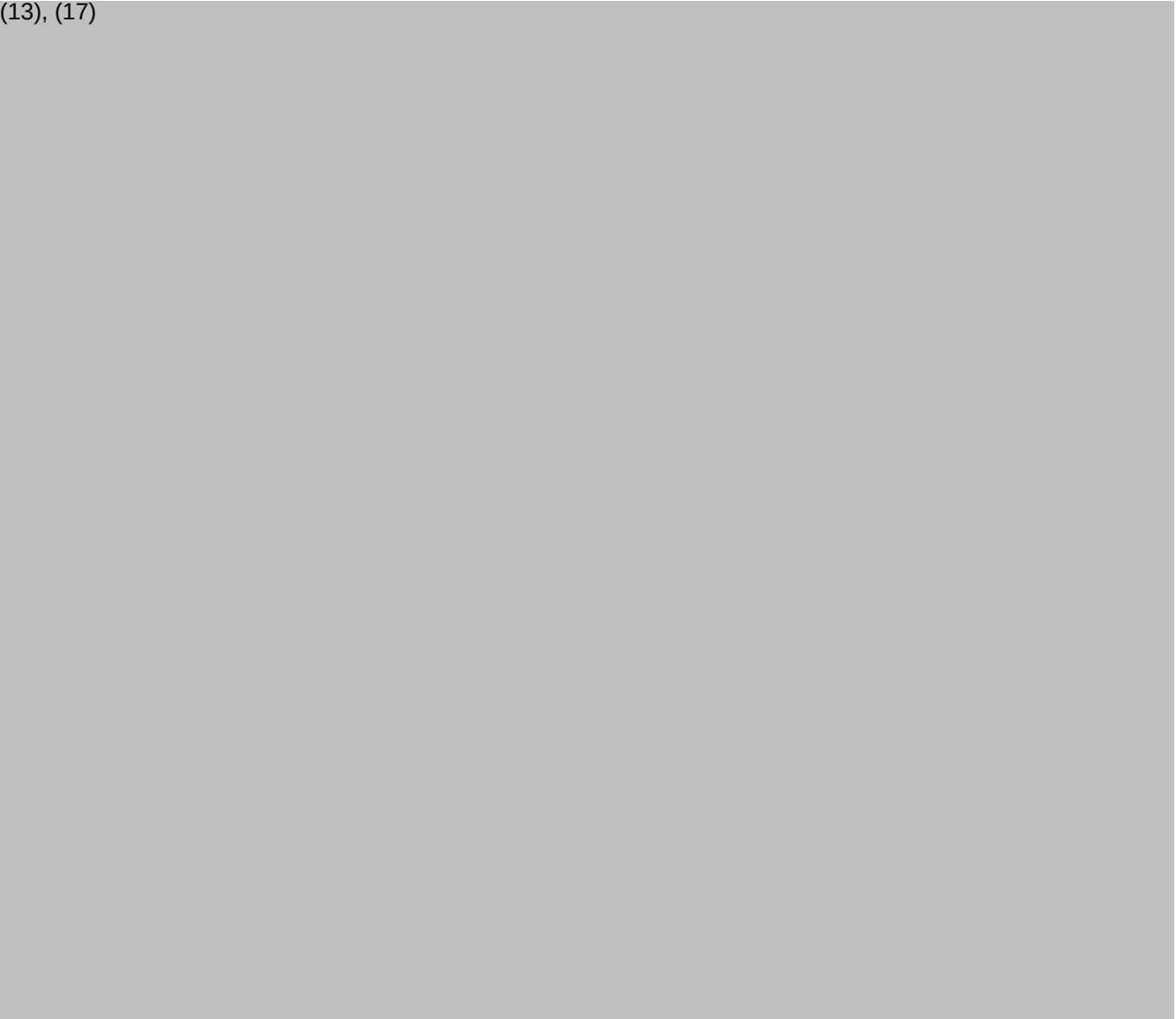
5.3.2 Ingress/Egress for transmission circuits

It appears that overhead transmission connections may be possible on the North, and West side.

5.3.3 Notes

- This property appears to be “hemmed in” by high-density housing development on the East and South sides, and ^{(13), (17)}
- Overhead transmission connections (and any additional overhead connections) may not be possible.
- This property does not likely meet the requirement for overhead transmission and distribution connections outlined in the statement of needs document listed in section 2 above. Underground transmission cables will likely be required to route to MLN.

(13), (17)



6 Conclusion

The area between McLellan substation and the service area is highly-densified. This makes transmission routing difficult. Underground cables are likely required but overhead options should still be considered.

The most likely transmission routes are along major corridors: (13), (17) street. Crossings include CPKC railway and 60L007MLN/60L008MLN which run in the same corridor, as well as the future SkyTrain extension. Project experience on these circuits in Langley for Surrey Langley Skytrain project indicates that the soil is weak/sensitive clay which may pose some difficulty for foundations construction for tall overhead transmission structures. Geotech team should be consulted early on.

A transmission connection from McLellan on (13), (17) to alternatives 18 or 20 may be difficult for two lines. (13), (17) may be a better route for at least one circuit making site 14B preferable over 19/20 which is hemmed in by on-going development and more restricted roads/ paths passing through the area to the south and east. Alternative 20 is not accessible from the south, east or north due to existing housing and the proximity of (13), (17). Alternative 18 is partially blocked on the west by (13), (17) and is blocked on the east by housing, and is likely to become blocked to the south by future housing development. Alternative 14b is the most accessible site as it is not blocked on any side by high density housing, although it may become so in future.

A more likely overhead connection is to (13), (17) but Transmission Planning has indicated the connection shall be to (13), (16). (13), (17) Alternative 14b gives the best possibility for a future connection to FLW in case that is considered for more inter-connectivity of the system.

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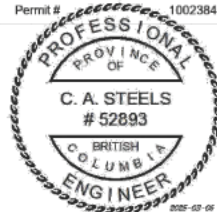
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Reviewed by:



Himanshu Mathur, P.Eng, Team Lead,
Overhead Lines, BC Hydro

Accepted by:



David Chwacklinsky, Project Engineer, BC
Hydro

BRIEFING NOTE – SEEKING APPROVAL

To: Shanna Mason, Director, Properties
Tony S. C. Lee, Senior Manager, Real Estate Services

From: David Y. M. Chan, Manager, Acquisitions & Sales
Dmitry Sherevkulov, Property Representative

Date: August 12, 2025

RE: Willoughby Substation – Acquisition of the (22) Property (Property)

Purpose:

To seek approval to present an Offer to Purchase (Offer) for (22), (17) for the 1-acre Property to complete the land assembly for the future Willoughby substation.

Background:

In March 2025, BC Hydro acquired the majority of the site for the future Willoughby substation consisting of three properties. Two properties to the north (9.5 acres combined) were purchased from a developer (21), (17) per acre. The parcel to the south (3.77 acres) was acquired from a private owner (17), (22) per acre.

(22), (17)



The Property located at (13), (17), (22) properties. BC Hydro contacted the owner in late 2024, however, the owners informed us (22). In July 2025 the owner reached out to BC Hydro and indicated their willingness to sell.

The property acquisition strategy was to re-engage the owner and complete the land assembly after the completion of the (21) and (22) acquisitions.

Integrated Planning is supportive of purchasing the Property and Project Delivery has confirmed there is funding this fiscal. The project team has confirmed no further site investigations are required for the purchase of the Property as results from the (21) and (22) properties will be similar and are adequate to proceed.

Value justification:

BC Hydro obtained an appraisal in November 2024 indicating the value of the Property to be (17). Properties contacted the owner in December 2024 and shared the appraisal.

The appraisal was completed in November 2024, and some of the comparable sales data included are now dated. At the time of the appraisal there was a limited pool of recent and directly comparable sales. As a result, the appraiser relied in part on active listings including two examples: the (22)

(17) Surrey. This example is a 1.18-acre parcel situated approximately one block west of the Property and was described in the appraisal as overall similar in nature. The appraiser noted it was listed for (17)

(17) Given the strong similarities between the two properties and the recency of this sale, it is reasonable to adjust the valuation of the (22) property accordingly. While the owner is initially asking for (17) is achievable and supported by this comparable transaction.

There is an older home located on the Property, which is tenanted. (13), (17)

Recommendation

Properties recommends proceeding with acquiring the Property and presenting a subject condition free Offer at (17)



Power smart

A handwritten signature in black ink, appearing to read "David Y.M. Chan", written over a horizontal line.

David Y.M. Chan, Manager, Acquisitions and Sales

August 13, 2025

Date

A handwritten signature in black ink, appearing to read "Tony S.C. Lee", written over a horizontal line.

Tony S.C Lee, Senior Manager, Real Estate Services

August 13, 2025

Date

A handwritten signature in black ink, appearing to read "Shanna Mason", written over a horizontal line.

Shanna Mason, Director, Properties

August 13, 2025

Date

Finance Memo – Willoughby Property Purchase Project

(internal purposes only)

Funding Request Summary

To obtain financial approval for Implementation Phase funding of (17) Project Reserve for the Willoughby Property Purchase Project.

Investment Summary:

Project Name	Initiating Group	Initiator	Sponsor	Current Phase	Requested Phase	Forecast ISD
Willoughby Property Purchase Project	Stations	Maureen	Charlotte	IDN Conceptual	Full Implementation	30-Oct-2026
IPID/EAR # TX90258 / Project ID # TM-0592		Daschuk	Mitha			
Cost Summary Table (\$K)						
Cost Type	LTD Costs	Prior Requests	Current Request	Expected Amount	Project Reserve	Authorized Amount
Capital Costs	(17)					
O&M Costs						
Provision Costs (PCB, Asbestos, etc.)						
Dismantling Cost						
Total Gross Investment Cost						
Asset Net Book Value write-off						
Project Cost Write-off						
Total Gross Investment Cost with Write-off						
Government Funding						
CIA / CIK						
Net Investment Cost						

Due Diligence Highlights to Support Financial Approval

Item	Response	Additional Comments / Explanation
1. In-Plan or Unplanned	In-Plan	The latest Capital Forecast estimate is (17) higher than the current total project F25-F34 Capital Plan estimate of (17)
2. Capital or OMA?	Capital	The cumulative Expected Amount includes the following: (17) costs for Identification Phase Conceptual Design Stage work and (17) with a conditional offer to purchase the properties required for 12-acre land assembly. - The costs associated with the preferred site(s) after all the conditional purchase agreements are signed will be capitalized. This work will include due diligence investigations and any other work required to remove subjects and finalize the purchase. - Finance will release capital funding only after reviewing the confirmation from the project team on (17) of the preferred sites.
3. IR Adequacy of Consultation Reviewed by IR?	N/A	As part of BC Hydro's IR practices, consultation is required as part of the larger substation new build project that will include the acquisition of property or property rights which is the case here. (13) (17) An Adequacy of Consultation assessment will be

Finance Memo – Willoughby Property Purchase Project

(internal purposes only)

		completed before subject conditions are removed. To date the project has sent out information sheets.
4. FAAP Approver	Chris O'Riley	Based on the Total Authorized Amount of ⁽¹⁷⁾ .
5. Finance Review	Complete	See key items noted in section below.
6. Policy Compliance	Yes	None.
7. Gate Meeting	N/A	This is a property purchase project, following the soft gate approach that is approved by the Electrification Steering Committee.

Financial Review Summary

Overall: Finance endorses the funding request based on the Business Case, and the Finance review. See below for items to note and additional details of the Finance review.

Finance Items to Note:

1. Investment Drivers: Load Growth:

- There are two fast growing areas in the Langley area, one is Campbell Heights and the other is Willoughby. Both areas are presently supplied by McLellan Substation (MLN), which will have no station capacity and feeder positions available after F2032. Two new substations are required in the area, one in Campbell Heights and another in Willoughby, to meet the future load growth and electrification needs. Based on the current load forecast, the additional load increase in the Willoughby area will be about 48 MVA by F2033 and exceed 130 MVA beyond F2033.
- Load growth in the Willoughby area of Langley requires the development of a new 200 MVA substation which requires 10.3 acres for the substation with an additional provision of two acres for a switching station for a total of approximately 12 acres. Currently there are no BC Hydro owned properties available to serve as a station site. This project has been initiated to purchase a new property for the future substation at Willoughby in order to meet the timeline for a new 230/25 kV, 200 MVA outdoor substation by F2032.

2. Site Selection Process:

- CPI funding of ⁽¹⁷⁾ was approved in September 2023 to initiate the property acquisition project. During the Identification Phase Needs Stage, twenty-two properties or property groups were initially identified as potentially suitable. A Structured Decision Making (SDM) analysis was prepared with an initial screening criteria using environmental and engineering requirements.
- During the Conceptual Design Stage, an additional ⁽¹⁷⁾ of CPI funding was approved for engineering work focused on desktop analysis of geotechnical and geohazard conditions, impact on neighbouring properties and assets if deep excavation is needed, allowance for routing of transmission and distribution underground cables to enter and exit the substation, hydrotechnical assessment of the flooding risk for the sites, ground resistivity assessment and proximity to a practical transmission supply. The project team was able to narrow down to two groups of properties for further investigation.
- The project team confirmed that the two groups of properties are large enough to accommodate the required equipment and ancillary works for the future station. Each group of properties involves multiple properties that can be assembled to meet the 12-acre requirement, with the largest ones owned by ⁽²¹⁾ as described in the table below.

Finance Memo – Willoughby Property Purchase Project

(internal purposes only)

Site	Acerage	Remaining Land	Current Status	Risk
------	---------	----------------	----------------	------

(13), (17), (21)

- Because there are limited properties available in the area that meets all the requirements, negotiations are ongoing with both (21) at this stage. The key issue with the property purchase is that the properties which meet BC Hydro's preferences may not be available for sale or could be purchased by other parties before the project can obtain funding approval. The land price may fluctuate as well in a competitive market. As a result, to address this issue approval on capital funding is being requested to allow the project team to make conditional offers on these properties in a timely manner, and the capital funding will not be released until Finance has reviewed and confirmed that the project is eligible for capitalization. (13), (17)

(17)

(13), (17)

3. **Current Request:** Part of the CPI funds will be used for negotiations with (21) and other property owners for the selected sites. The trigger for capitalization is that once the conditional purchase agreements have been signed for the preferred 12-acre assembly, the incremental Implementation Phase funds of (17) will be used to complete due diligence investigations on the preferred properties and finalize/ remove subjects from the purchase agreements. The purchase price is estimated to be (17) acre for a total of (17) for 12 acres plus (17) for due-diligence, land assembly and closing costs. A Special Reserve of (17) is requested to cover market risk associated with the purchase price. The In-Service Date of October 2026 is a high-level estimate of the time required to complete all the due diligence and legal requirements for the closing of the properties purchase.

4. **Project/Investment Risks:**

- Load Growth Risk:** (13), (17)

- Stranded Asset and Write-Off Risk:** (13), (17)

- Regulatory:** (13), (17)

5. **Delegations:** The project team has requested the following delegations:

- Special Reserve amount of (17) to Maureen Daschuk, EVP, Integrated Planning.

¹ 80% certainty will be reached when the conditional offers have been signed for the selected properties.

Finance Memo – Willoughby Property Purchase Project
(internal purposes only)

- For contract commitments and payments up to the Total Expected Amount delegated to Al Leonard, EVP of CIPD.

Prepared by: Rochelle Presgrave R.P.

Reviewed by: Leon Tan (For Michael Wynne) _____

ACTION REQUIRED:

1. Al Leonard to approve the Business Case.
2. Maureen Daschuk to approve the Business Case and EAR Form.
3. Charlotte Mitha to approve the Business Case and EAR Form.
4. Ryan Layton to approve the EAR Form.
5. Chris O'Riley to approve the EAR Form, Project Reserve and Contract delegations.
6. Marlaine Gajo to inform Project Team (Robert Hepple, Lauren Simpson) and Finance (Rochelle Presgrave, CES EAR Processing) that package has been approved via e-mail.

**CAPITAL PROJECT INFRASTRUCTURE DELIVERY****SMALL CAPITAL PROJECT BUSINESS CASE****(COMBINED STATEMENT OF OBJECTIVES AND BUSINESS CASE) FOR THE****IMPLEMENTATION PHASE****FOR EXPENDITURE AUTHORIZATION REQUEST (EAR)**

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WILLOUGHBY PROPERTY PURCHASE PROJECT**TM-0592****TX902958****31-JULY-2024****PROJECT SPONSOR: CHARLOTTE MITHA****PROJECT INITIATOR: MAUREEN DASCHUK****PROJECT MANAGER: ROBERT HEPPLE**

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- (b) The intellectual or other property rights of any person or party in, or
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Document Author:

Version	Author	Role
1	Lauren Simpson	Commercial Manager

Documentation History:

Version	Reason for Version	Date
1	Business Case for Implementation phase	2024-Jul-31

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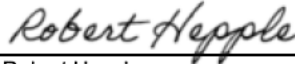
Approval

This Small Capital Business Case (SCBC) is approved and complies with the Project Management and Management & Accounting Policies and Procedures of BC Hydro.

Robert Hepple is appointed Project Manager with authority and responsibility in accordance with the Project Management Policies and Procedures of BC Hydro, Capital Infrastructure Project Delivery and Engineering.

An IR Adequacy of Consultation Assessment will be completed before subject conditions are removed to finalize the property purchase.

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Prepared by:	 _____ Robert Hepple Project Manager	Aug 13, 2024 _____ Date
Reviewed by:	 _____ Surinder Parmar Project Independent Reviewer Manager, Capital Projects	Aug 13, 2024 _____ Date
Approved by:	 _____ AI Leonard EVP Capital Infrastructure Project Delivery	Digitally signed by AI Leonard Date: 2024.08.20 09:53:25 -07'00' _____ Date
Approved by:	Maureen Daschuk _____ Maureen Daschuk Project Initiator EVP Integrated Planning	Digitally signed by Maureen Daschuk Date: 2024.08.20 10:47:03 -07'00' _____ Date
Approved by:	Charlotte Mitha _____ Charlotte Mitha Project Sponsor EVP Operations	Digitally signed by Charlotte Mitha Date: 2024.08.20 17:53:06 -07'00' _____ Date

To be completed by Finance
FAAP Approver: _____
Only for EAR Exempt CIPD projects <\$500k where the Statement of Objectives (SoO) is used in place of SCBC and where an EAR form is not prepared by Finance

*This is a property purchase project and this approval approach is approved by the Electrification Steering Committee

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procure a suitable property to meet the planned timeline for the future substation build. To meet this timeline, a property suitable for an ultimate 230/60kV & 230/25kV, 200MVA outdoor switching and distribution substation (WIB substation) needs to be purchased as soon as possible.

The Willoughby area of Surrey and Langley is growing rapidly due to electrification and city developments (see **Figure 1**). This area is presently supplied by three substations, Port Kell (**PKL**), Harvey Road (**HRD**) and McLellan (**MLN**) substations. PKL and HRD are 60/25kV substations, and are at their ultimate capacities of 100MVA in Winter and 79MVA in Summer. MLN is a 230/25kV, 200MVA (Winter) / 158MVA (Summer) substation and being upgraded to 400MVA (Winter) / 315MVA (Summer) with 42 feeder positions in F2030.

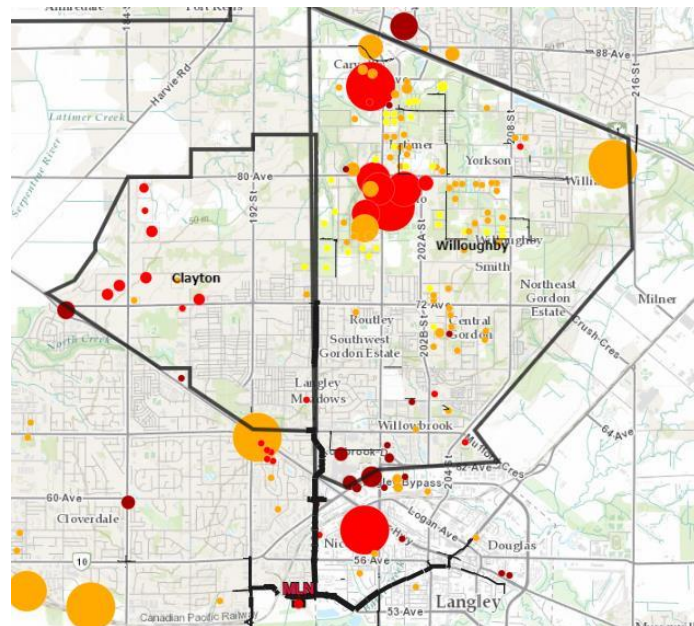


Figure 1 Willoughby Load Growth Map

Based on the present load forecast, the load in the Willoughby area will increase by approximately 48MVA by F2033. After the planned upgrade of MLN, capacity will be sufficient to meet the areas load requirements until F2033. With projections for additional load of more than 130MVA in the Willoughby area beyond F2033, a new substation will be required in the area to meet this future load growth.

The size of the property was determined based on the ultimate requirement for a 200MVA outdoor WIB substation. Based on the proposed WIB station layout, a minimum property size of 42,000 square meters (10.3 acres) is required for the 230/25 kV substation, with provision of 2 acres for a 230/60kV switching station. The ultimate WIB station will require four 230kV line positions; a minimum of eight 230 kV breakers; two 230/25 kV 150 MVA transformers; two 230/60 kV 150 MVA transformers; twenty-four 25 kV feeder positions; and a 60 kV section that includes six 60 kV breaker rings³.

³ [Willoughby Design Plan](#) - WIB-E05-SK001-Option 1

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Project Alternatives

The Project team investigated over 22 properties to identify suitable locations that could be acquired for the future WIB substation (Appendix C). The Project team also contacted the City of Surrey and the Township of Langley to inquire if they own lands that might be suitable, and both responded that they do not have any land available in the Willoughby area. Some properties were excluded from consideration due to existing or planned use, general unsuitability based on engineering and environmental screenings, feedback from the City of Langley and unfavourable initial communications with landowners. The results provided two viable locations, as described below.

(13), (17), (21)

(21)

(13), (17), (21), (22)

(17), (21)

(21)

(21)

(21) These two parcels provide 9.5 acres of land (see Appendix D, Figure 3), but the linear configuration prohibits development of the substation without additional parcels to the north or south. BC Hydro has initiated discussions with (21), (17)

The additional acreage required for the substation can be acquired from the property owner to the south. BC Hydro has made contact with this property owner and they are willing to sell and have requested that BC Hydro submit a conditional property purchase agreement for consideration.

Investment Recommendation

Due to the limited availability of suitable properties in the area and the requirement to assemble properties to achieve the required minimum of 12 acres, the Project team recommends proceeding (21) immediately while these properties are still available. The Project team has confirmed that the properties meet the requirements for the future WIB substation and has estimated the upper limit of the potential purchase price based on early communications with the property owners.

(21), (13), (17)

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landowners to work towards assembling a minimum of the required 12-acres. The Project team will remain in the Conceptual stage and will draw on Conceptual (OMA) funding until a conditional offer to purchase has been signed with all property owners associated with the 12-acre assembled property. Once those are signed, the Project will be advanced into the Implementation phase, and due diligence investigations will be performed in the Implementation phase.

There is a risk that BC Hydro will be unable to purchase all the properties to assemble the required acreage. However, the proposed locations provide multiple options and conditional purchase agreements will be made to manage the risk.

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(13), (17)

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Project Summary

A.2 Scope

Project

The objective of the Project is to purchase (or assemble) a minimum of 12-acres of property in the Willoughby area of Surrey/Langley to allow a new ultimate 230/60kV and 230/25kV, 200MVA outdoor substation to be built as part of a future project. The Project's objective is to purchase properties at a suitable location to ensure the station's capacity can meet customers' requirements and support load growth in the area.

Current Phase/Stage:

- Conceptual Stage:
 - Identify suitable locations for the future WIB substation and confirm availability from the landowner.
 - The project will advance directly into the Implementation phase once negotiations of a conditional property purchase agreement are completed in the Conceptual Stage.

Schedule

The Project is utilizing the Atypical PPM scaling model and will commence directly to the Implementation Phase.

The target dates for milestone events for the Project are:

Date	Description	PPM Milestone UID
December 31, 2024	Feasibility Design stage and Definition phase complete	2.01, 2.02
October 30, 2026	Project ISD	1.01
January 22, 2027	Project Completion & Evaluation Report Signed & Accepted	3.08
April 15, 2027	Project Financial Close	3.58

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A.3 Project Cost

1.1.1 Funding Request and Project Cost Forecast

TM-0592		
Willoughby Property Purchase		
Current Funding Request		
INI Phase	(17)	
Initiation Phase		
IDN Phase		
IDN Phase Needs Stage		
IDN Phase Conceptual Stage		
IDN Phase Feasibility Stag		
DEF Phase		
IMP Phase		
Project Mgmt		
Engineering Desig		
Construction and Contract Mgmt		
Environmen		
Properties		
Indigenous Relation		
Procurement and Q		
Supply/Instal		
Property Purchase and Tax		
Subtotal Direct		
Contingenc		
Subtotal with Contingenc		
Loadings:		
Capital Overhea		
Interest During Constructio		
Total Expected Amount (P50		
Project Reserve		
Total Authorized Amount (P90		
Previous Amoun		
Incremental Funding Reques		

Cost information is based on initial _____ and their expectation of a purchase price of up to ⁽¹⁷⁾ _____

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Any dismantling costs associated with the properties being purchased through this Project will be estimated and included in the future WIB Substation Construction Project.

1.1.2 Capital Plan Variance

The net capital amount from the F25 to F34 Power System Capital plan for the WIB Property (17) The Project capital EAC is estimated based on the expected purchase price and property transfer tax.

A	B	C = B-A
Capital Plan Amount A	Project Capital EAC B	Variance
(13), (17)		

The difference between the Capital Plan and the Project Capital EAC is due to the current market conditions resulting in a highly competitive real estate market.

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Post-Project Incremental Costs and/or Savings

There are no post-project incremental operating costs or savings.

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Appendix A Project Initiator's Statement of Summary Requirements

A.4 Safety, Security (Critical Infrastructure Protection) and Confidentiality Requirements

- Incorporate Safety by Design (to be incorporated in the Construction project)
- Review any applicable MRS standards.

A.5 Maintenance and Operational Requirements

- Project User Requirements: User requirements to be developed upon funding approval.

A.6 Indigenous Relations Business Strategy Requirements

With the intention of gaining First Nations' support for the project through relationship building, listed below are Aboriginal Relations Business Strategy Requirements expected to be delivered by this project:

- To be developed during Definition phase upon funding approval

A.7 Project Initiator's Design Requirements

The Project Initiator has the following high level Design Requirements for the project:

- Project is seeking funds for property purchase(s) for an ultimate station layout for the WIB Substation project.

A.8 Project Initiator's Interim Decision Requirements

The Project Initiator requires the following items, in addition to the above requirements, for the current project phase(s)/Stage(s). The list includes the Project Initiator's requirement for approval, acceptance, or permission to proceed for each item.

- Provide IP planner and IP Director project updates at least once every 3 months.

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Appendix B Gating Plan

This project will utilize the soft paper gate process.

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Properties Considered and Dismissed as Non-Viable

(13), (17)	Justification for exclusion		
	The existing use as community centre (Langley Events Centre) makes this property undesirable for development as a substation.		
	The existing use as a community park (Willoughby Community Park) makes this property undesirable for development as a substation.		
	The existing use as a community school (Peter Ewart Middle School) makes this property undesirable for development as a substation.		
	The existing use as a community school (Mountain Secondary School) makes this property undesirable for development as a substation.		
	(13), (17)		
	This property is too small for the proposed substation and multiple properties would need to be added to the north making this location undesirable for development as a substation.		
	This property is in pre-sale as a multi-family development.		
	This property is too small for the proposed substation. New alternatives 13		
(17), (21)			
			F al
			1 1
			a g e 17
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(13), (17), (21)

7), (21)

The owner is not interested in selling.

There is a new home on this parcel and the owner is not interested in selling.

The property is not large enough and there is a wetland present.

Property would require assembly of 6 private parcels. Significant difficulty was encountered attempting to contact landowners, suggesting assembly of all 6 parcels is unlikely.

There is an option to purchase on this property.

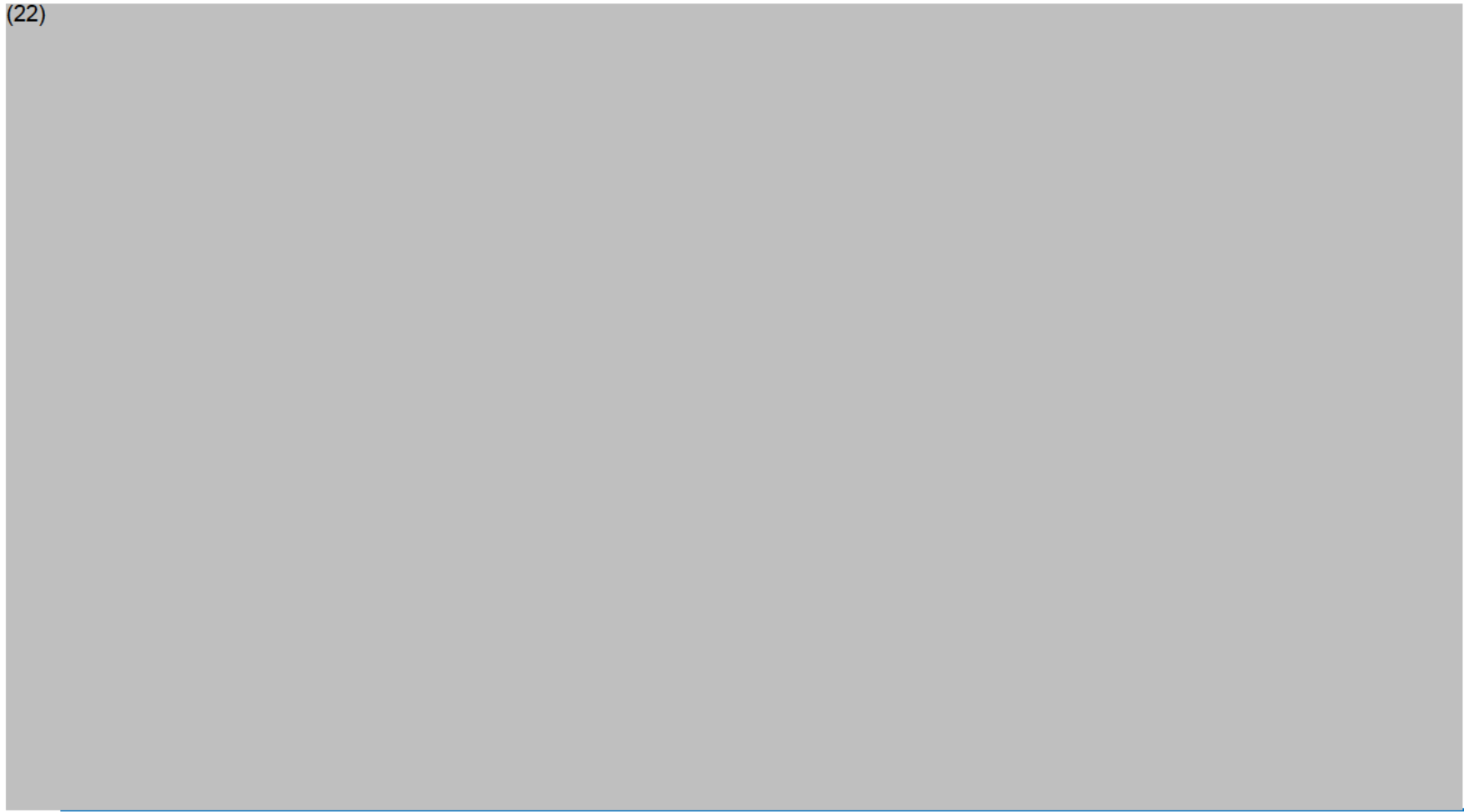
Too far from the load centre and the neighbourhood plan has this location identified for townhouses .

who plans to develop lands and is not interested in selling.

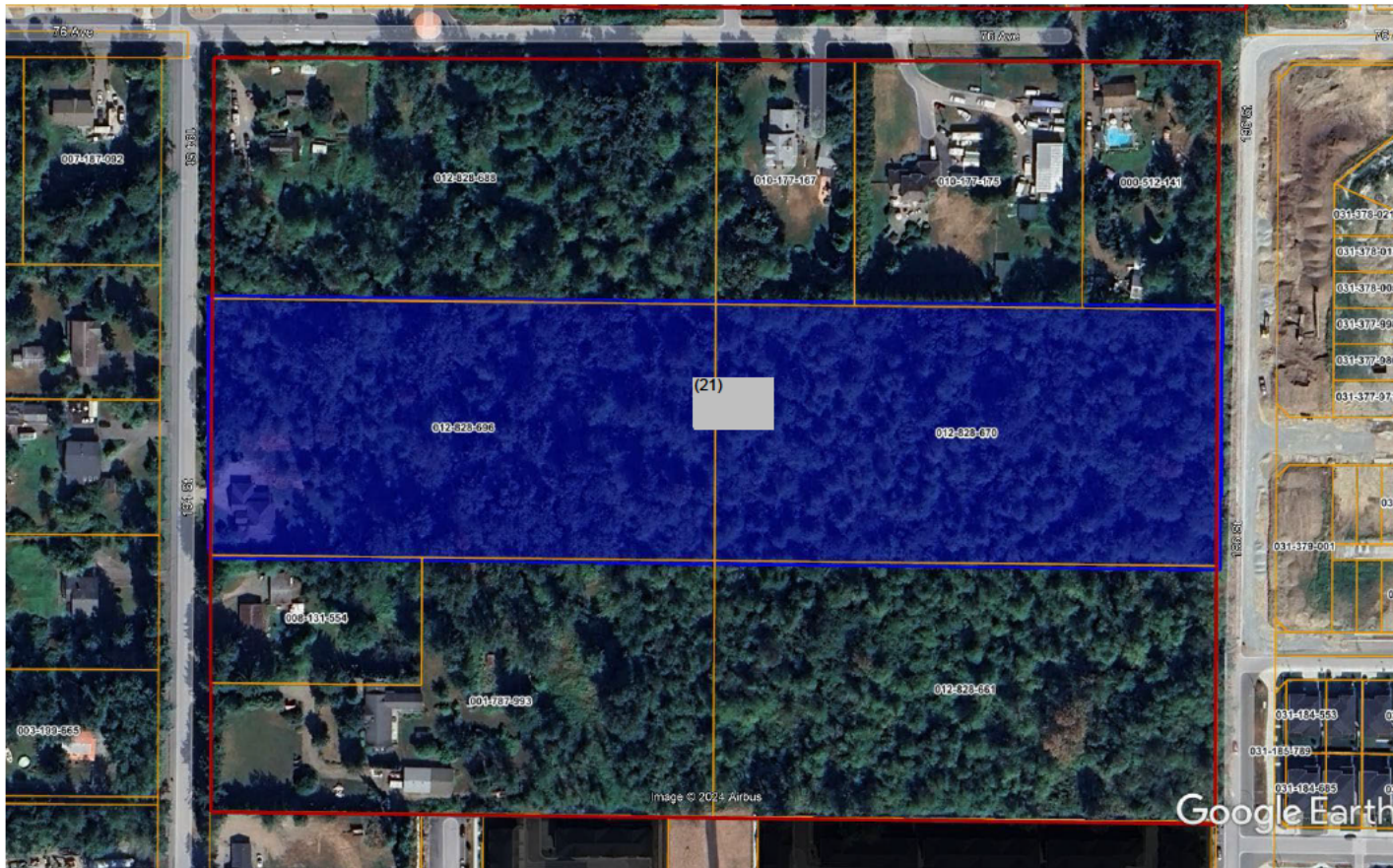
who plans to develop lands and is not interested in selling.

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(22)



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(21)

owned parcels identified (blue).

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