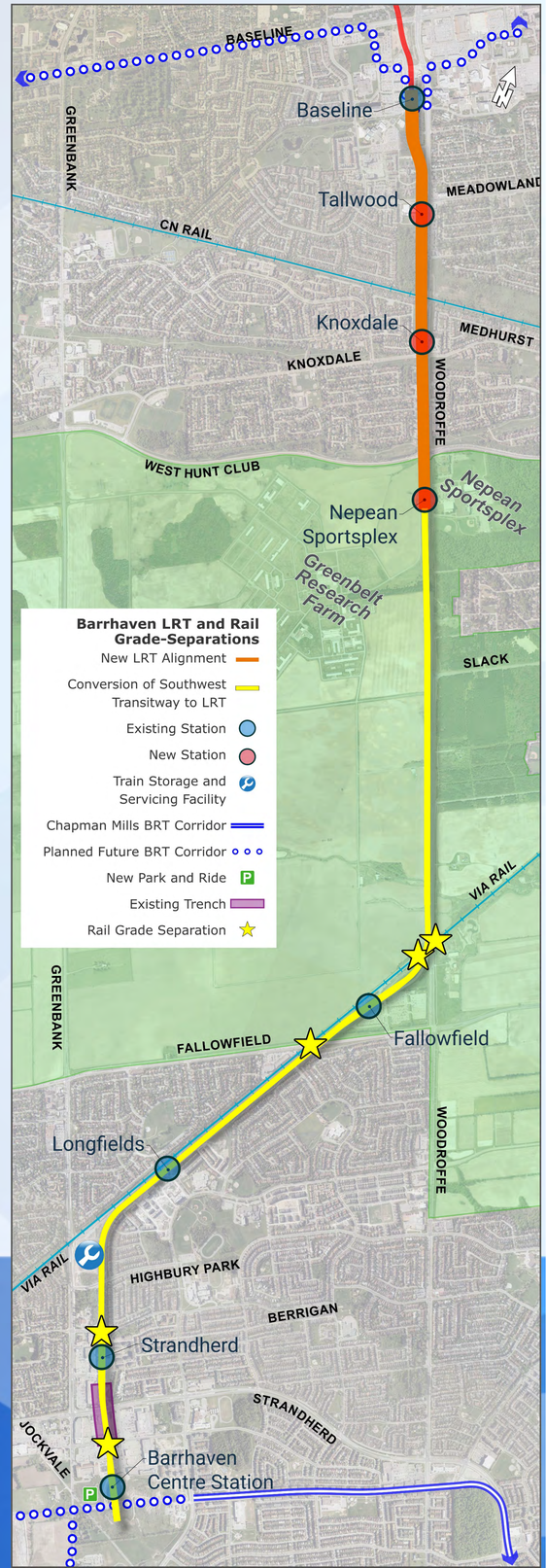
Barrhaven LRT and Rail Grade-Separations Planning and Environmental Assessment (EA) Study

Introduction

The City of Ottawa is pleased to provide an update for the Barrhaven Light Rail Transit (Baseline Station to Barrhaven Town Centre) and Rail Grade-Separations Planning and Environmental Assessment Study. The details of the **Preliminary Recommended Plan** are presented including:

1. The evaluation of alternative designs considered;
2. Preliminary assessment of project impacts, including proposed mitigation;
3. Implementation and staging considerations; and
4. Next steps in the study.

The City is welcoming feedback on the **Preliminary Recommended Plan** at this time. Feedback is encouraged on the information presented. See website for instructions on means to provide feedback.



Study Overview

In 2017, the Barrhaven and Merivale Road Rail Crossing Grade-Separation Study examined the feasibility of grade-separating four roads and the Southwest Transitway where they cross the VIA Rail Smiths Falls Subdivision rail line at-grade. These included: Merivale Road, Woodroffe Avenue/Southwest Transitway, Fallowfield Road and Jockvale Road.

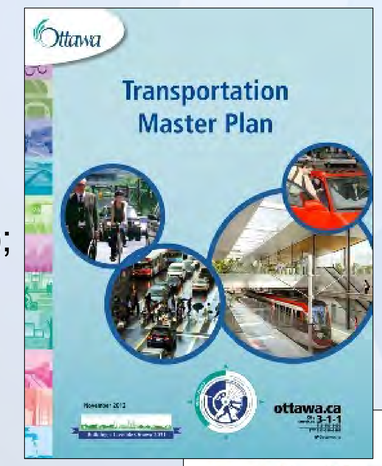
In June 2018, City Council approved a motion directing staff to undertake the Barrhaven LRT Environmental Assessment (EA) Study. In September 2018, the scope of the ongoing Barrhaven Rail Grade-Separation EA Study was expanded to include extending the Confederation Line LRT to Barrhaven by converting the Southwest Transitway from bus to rail technology due to overlapping study areas, cost saving and efficiency in the EA process. The combined study was renamed as Barrhaven LRT (Baseline Station to Barrhaven Town Centre) and Rail Grade-Separations EA Study.

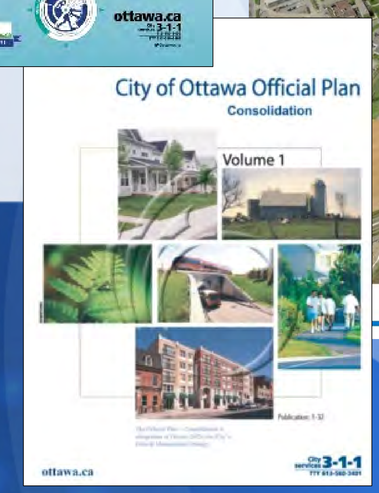
Following receipt of public feedback on the **Preliminary Recommended Plan** presented, the Study Team will further refine and confirm the **Recommended Plan**. Provincial **Environmental Assessment (EA)** approval will include:

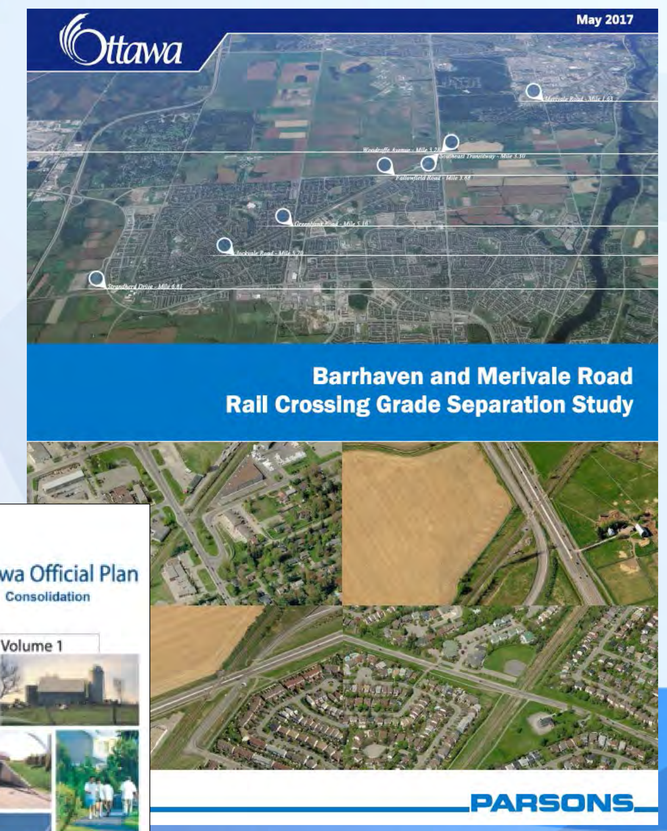
- LRT alignment and design, stations and Train Storage and Servicing Facility (TSSF);
- Woodroffe Avenue, Southwest Transitway and Fallowfield Road rail grade-separations of the VIA Rail line;
- Supporting facilities (pedestrian and cycling facilities, Park and Ride lots, traction power substations and associated property impacts); and
- Associated environmental mitigation measures, including property requirements.

An **Environmental Project Report (EPR)** will document the study findings, impact assessment and recommended mitigation measures, and identify future approvals required to implement the project.

The study results will also inform the City's upcoming Official Plan (OP) and Transportation Master Plan (TMP) updates.







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Study Process and Schedule

The study is following the Ontario Transit Project Assessment Process (TPAP) Regulation 231/08. The process is divided into two phases:

Phase 1: A Pre-Planning Phase to develop a **Recommended Plan** (underway).

Phase 2: An Environmental Assessment (EA) Phase that includes mandatory consultation, public review and Ministerial approvals phases.

At the end of Phase 1, the Recommended Plan will be presented to the City's Transportation Committee and Council for approval. Upon Council approval the EA Phase will be initiated.

Scheduled Task	Timeline
Last day for submitting on-line feedback	September 23, 2020
Study recommendations presented to City's Transportation Committee/Council for approval	November 4th, 2020
TPAP Notice of Commencement	Winter 2021 (Tentative)
TPAP Notice of Completion	Mid 2021 (Tentative)

Study Progress

The Study Team has:

- Completed three rounds of consultation with Agency, Business and Public Consultation Groups to obtain feedback.
- Numerous meetings with key stakeholders including: the National Capital Commission (NCC), OC Transpo, City LRT Office, Hydro One and VIA Rail to obtain input.
- Completed detailed natural science and geotechnical investigations to help inform the evaluation process.
- Developed the functional design for grade-separation (overpass) of Woodroffe Avenue, the Southwest Transitway, and Fallowfield Road where these corridors cross the VIA rail line.
- Evaluated and developed a Preliminary Recommended Plan to extend LRT from Baseline Station to the Nepean Sportsplex.
- Evaluated and developed a site plan layout for the train storage and servicing facility.
- Developed conceptual site plans for new LRT stations.
- Completed analysis to determine traffic and transit detours during rail grade-separation construction.
- Commenced a connectivity study to identify opportunities to enhance or complete multi-modal connections throughout the study area.

What We've Heard So Far…

Feedback received on the study to-date from Consultation Groups, Open House, stakeholder meetings and general inquiries is focused on the following areas:

- Avoiding traffic impacts to Woodroffe Avenue during construction and the resulting arrangement.
- Expressing concerns for the elevated facility due to potential noise and visual impacts.
- Overall concern for noise generated by the project.
- Providing a pedestrian bridge over Woodroffe Avenue to connect the Nepean Sportsplex and LRT Station.
- Need for and support advancing the project as sooner.
- Considering impacts on the NCC Greenbelt (pathway/ecological connectivity, property impacts, farm access, scenic views).
- Concern for water quality impacts on adjacent communities.
- Supporting the plan to fully segregate Woodroffe Avenue, the Southwest Transitway, and Fallowfield Road at VIA rail crossings.

Input was used to refine and evaluate the Preliminary Recommended Plan.

Consultation at the first Public Open House held in the Fall 2019

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Planning and Design Principles

Planning and design principles were established based on those of the City's 2013 Transportation Master Plan:

- Support a sustainable transportation system that reduces automobile dependence;
- Support a multi-modal system for all ages and abilities;
- Support adjacent land uses and future intensification;
- Sensitive to the natural environment;
- Enhance the economy;
- Deliver cost-effective services; and
- A system that can respond to/adapt to climate change.

Accessibility In The Design

- Public spaces are to be inclusive and accessible to everyone.
- The project will be designed to meet the *Accessibility for Ontarians with Disabilities Act,* the City of Ottawa's Accessibility Design Standards and in consideration of the Federal *Accessible Canada Act.*
- The City's Accessibility Advisory Committee is a participant on this study.

ACCESSIBLE CANADA ACT

Evaluation Criteria and Process

The evaluation and development of alternatives is based on the preferred solutions confirmed following the first round of consultation. The first step in the evaluation process is to develop context-sensitive criteria used to evaluate alternatives. The criteria are grouped into five (5) broad categories covering all aspects of the environment as defined in the *Environmental Assessment Act* including:

I. TRANSPORTATION SYSTEM SUSTAINABILITY

- Transit Network
- Active Transportation
- Major Road Network
- Rail Network*
- Transportation Network**
- Facility Operations**

II. ECOLOGICAL AND PHYSICAL SUSTAINABILITY

- Natural Heritage Features
- Physical Environment
- Climate Change Mitigation
- Climate Change Adaptation

III. NCC GREENBELT SUSTAINABILITY

- Agricultural Resources
- Greenbelt Environment

IV. LAND USE AND COMMUNITY SUSTAINABILITY

- Community Planning and Design
- Cultural Heritage Resources
- Noise and Vibration
- Air Quality

V. ECONOMIC SUSTAINABILITY

- Phasing and Implementation
- Life Cycle Cost

There are four (4) design aspects of the study that were subject to an evaluation process that drew from the above list of criteria groups. These are:

1. extension of LRT from Baseline Station to West Hunt Club Road;
2. grade-separation of Woodroffe Avenue and the Southwest Transitway to the VIA Rail line;
3. grade-separation of Fallowfield Road to the VIA Rail line; and
4. locations for the TSSF.

Both qualitative and quantitative indicators were used where appropriate. Evaluations were completed by subject matter experts. Following evaluation, the preliminary preferred alternative resulting from each of the four (4) evaluations formed part of the **Preliminary Recommended Plan** being presented.

Given that the Southwest Transitway is a dedicated rapid transit facility south of West Hunt Club Road to Barrhaven Town Centre additional corridors were not considered/evaluated. Different design elements will be evaluated on a subsequent analysis.

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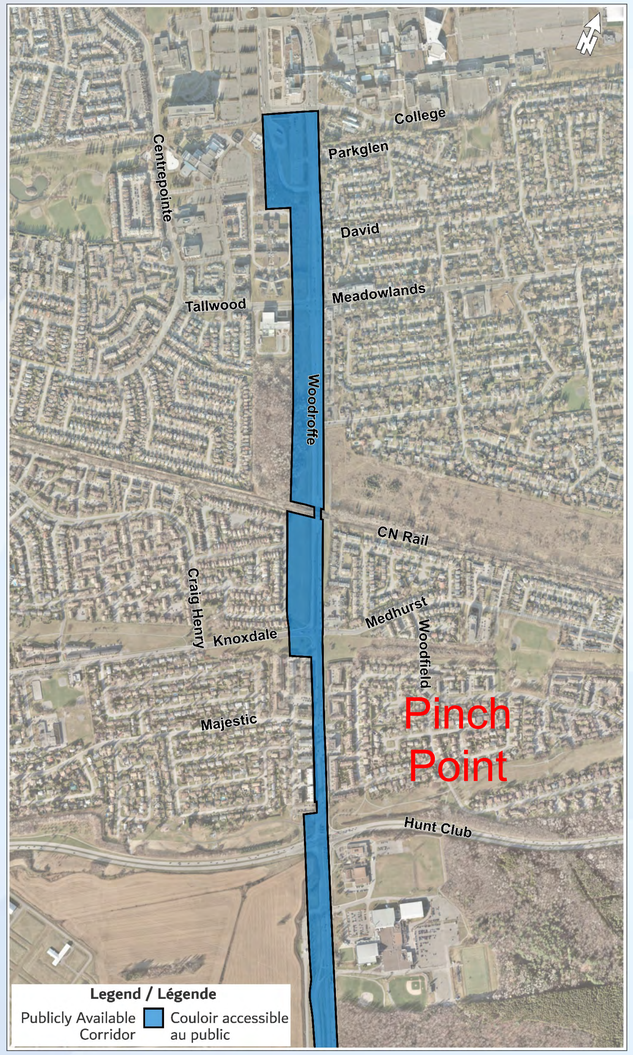
* indicates criteria specific to rail grade-separation evaluation only
** indicates criteria specific to TSSF evaluation only

Baseline Station to Nepean Sportsplex Overview:

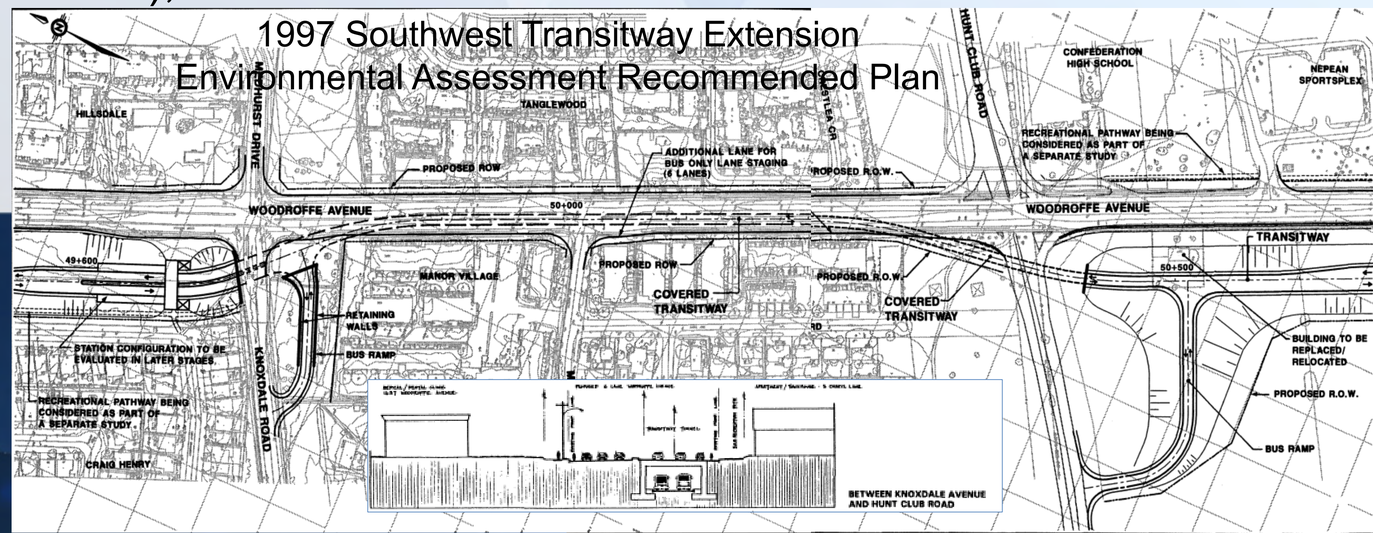
Context Overview

- The Southwest Transitway currently runs in dedicated bus transit lanes along Woodroffe Avenue between Baseline Station and the Nepean Sportsplex.
- The approved 1997 Southwest Transitway Extension Environmental Assessment (EA) protected a corridor on the west side of Woodroffe Avenue between Baseline Station and Knoxdale Road.
- Between Knoxdale Road and the Nepean Sportsplex the approved 1997 EA located the Southwest Transitway Extension in a cut and cover tunnel underneath the southbound lanes of Woodroffe Avenue.
- Knoxdale – West Hunt Club segment is a pinch point due to limited available Right-of-Way.
- This study needed to reconsider the approved 1997 EA design in light of the change to LRT technology and current environmental conditions.



Key challenges in this Part of the Study Area include:

- Geotechnical conditions/limitations;
- Limited right-of-way available (Knoxdale to West Hunt Club);
- Adjacent community impacts; and
- Transportation Operations.



Baseline Station to Nepean Sportsplex: Development of Alternatives

The Study Team examined and screened out early two alternatives from further evaluation:

1. **LRT in a bored tunnel** due to challenging soil conditions which add construction complexity and risk which results in very high cost and risk.
2. **LRT at-grade** as an extension of Confederation Line, this project must use the same design standards for an exclusive segregated corridor with the same operational and safety requirements as the rest of the network. The LRT system needs to be fully segregated at major intersections as well as at the CN Rail corridor.

Alignments along the east side of Woodroffe Avenue were not considered for the following reasons:

- Additional construction disruption in crossing the corridor between stations; and
- Additional utility conflicts with Hydro Ottawa Infrastructure located along the east side of the corridor.

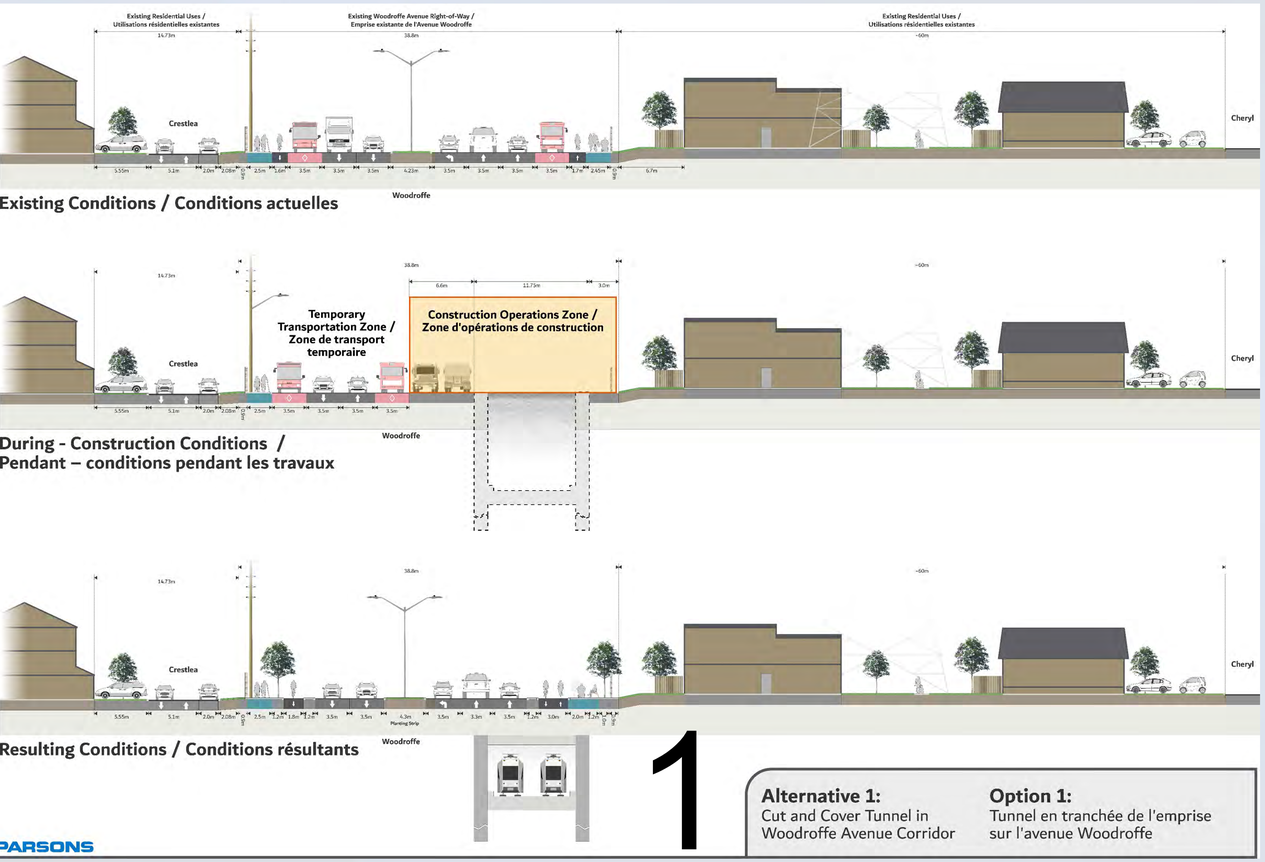
The environmental assessment study developed and evaluated **six (6) alternative alignments** within or west of Woodroffe Avenue as well as design alternatives elevated or below-grade and are illustrated on the subsequent boards.

Profile Considerations

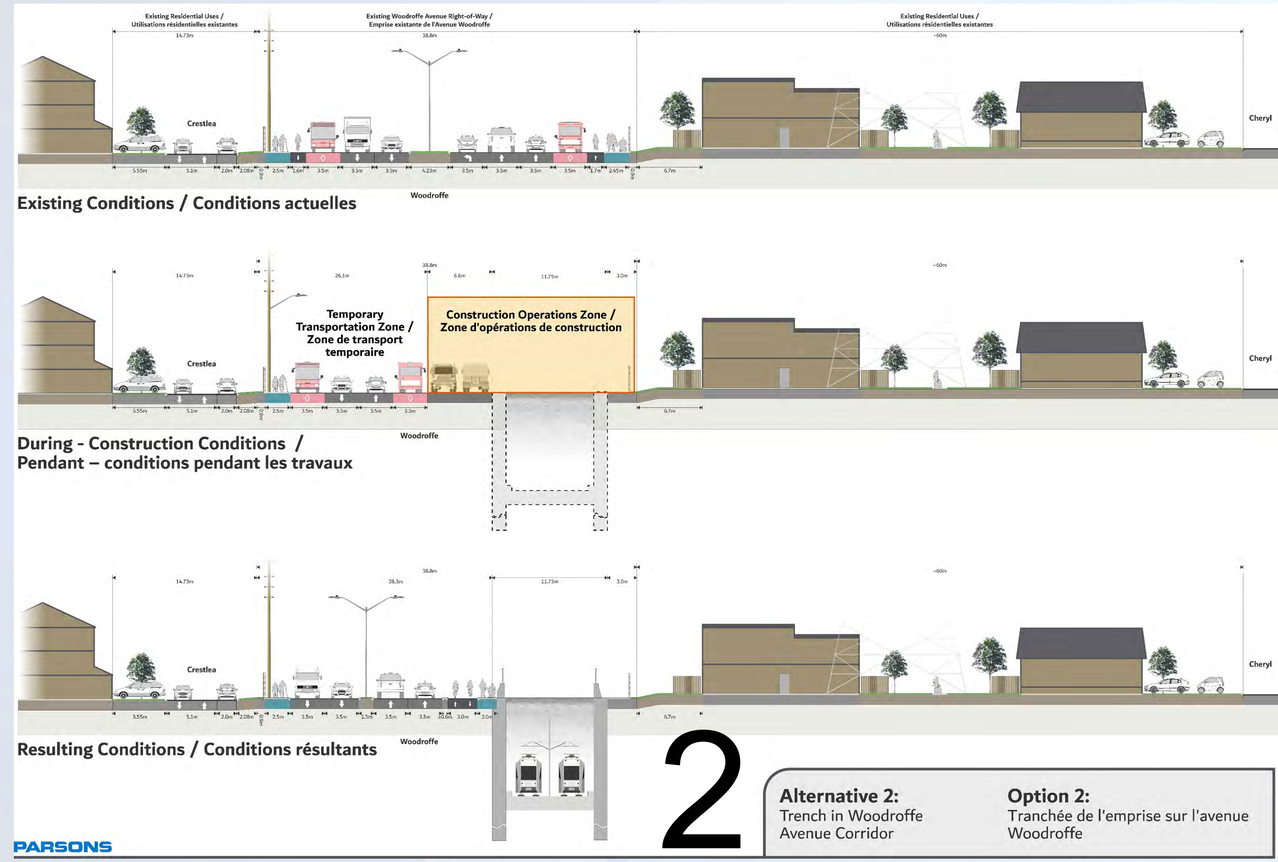
LRT geometry requirements and the need to be segregated at the CN Rail line and crossing streets dictate that the preferred configuration (elevated versus below-grade) for the Knoxdale Road - Nepean Sportsplex segment must be used for the entire length of the Baseline Station to the Nepean Sportsplex corridor. The number of and close distances between the streets and the CN Rail line that need to be crossed make it impossible to mix and match vertical design alternatives.

Barrhaven LRT and Rail Grade-Separations Planning and Environmental Assessment (EA) Study

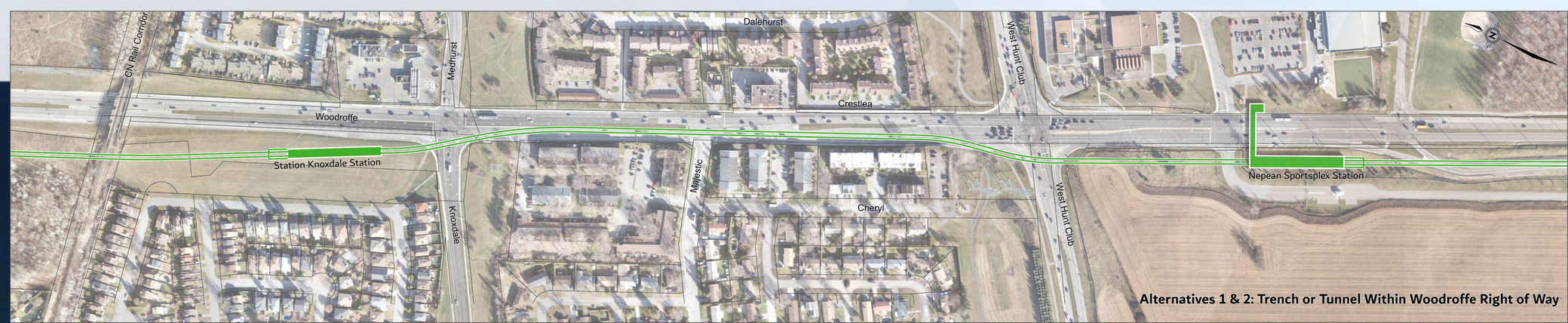
Alternative 1: Below-grade in Woodroffe Avenue right-of-way (Cut and Cover)



Alternative 2: Below-grade in Woodroffe Avenue right-of-way (Open Trench)



The figure below shows the alignment location within the corridor for both alternatives.



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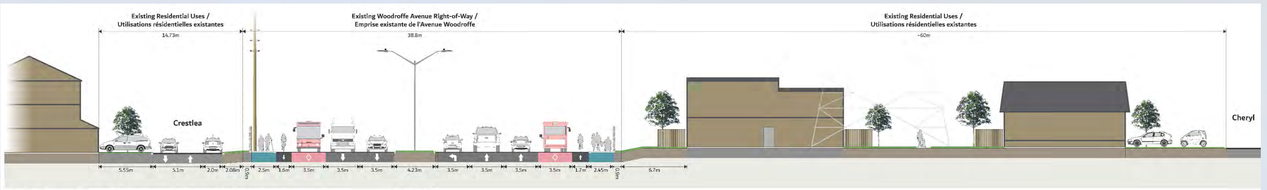
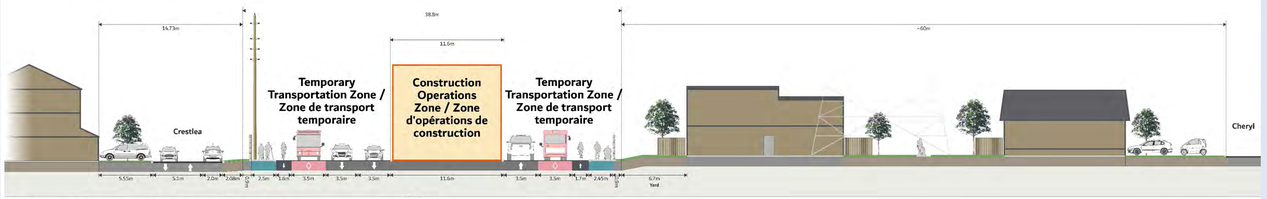
Alternative 3: Elevated in Centre Median of Woodroffe Avenue right-of-way



Existing Conditions / Conditions actuelles



During - Construction Conditions / Pendant – conditions pendant les travaux

Resulting Conditions / Conditions résultants

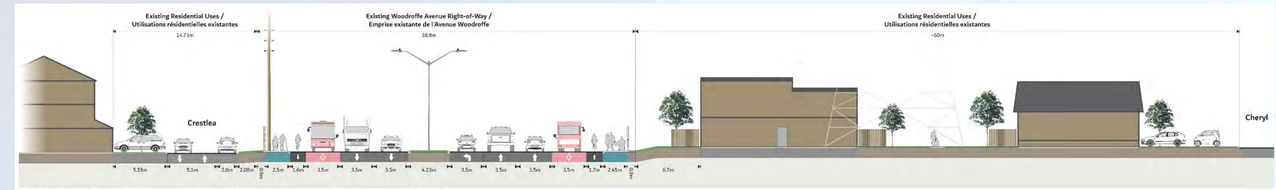
3

Alternative 3:
Elevated in Woodroffe Avenue Corridor (Median)

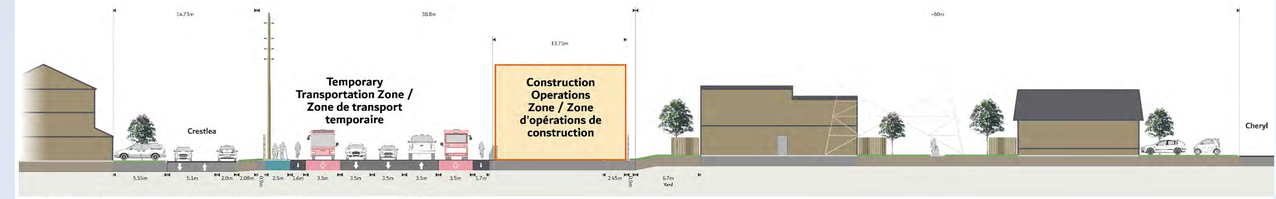
Option 3:
Tracé élevé de l'emprise sur l'avenue Woodroffe (au milieu)

PARSONS

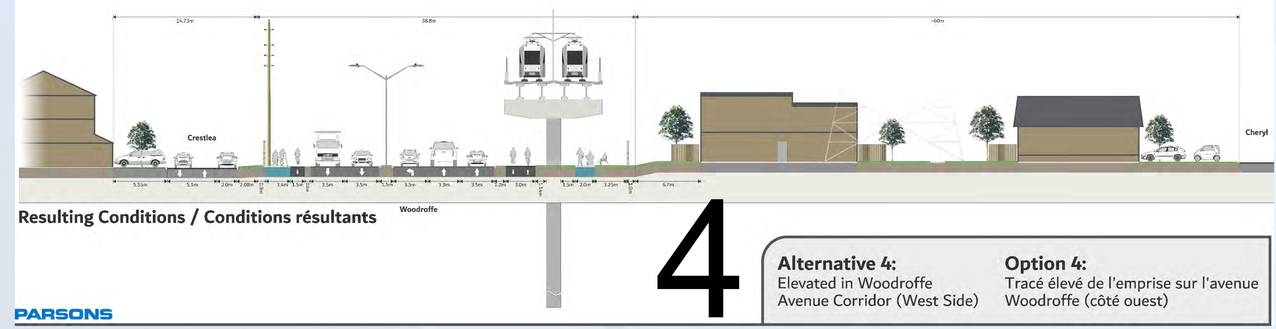
Alternative 4: Elevated on West Side of Woodroffe Avenue right-of-way



Existing Conditions / Conditions actuelles



During - Construction Conditions / Pendant – conditions pendant les travaux



Resulting Conditions / Conditions résultants

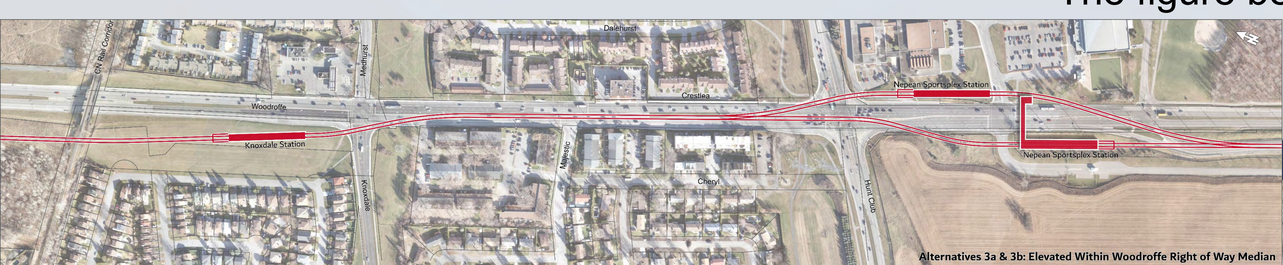
4

Alternative 4:
Elevated in Woodroffe Avenue Corridor (West Side)

Option 4:
Tracé élevé de l'emprise sur l'avenue Woodroffe (côté ouest)

PARSONS

The figure below shows the alignment location within the corridor for both alternatives.



Alternatives 3a & 3b: Elevated Within Woodroffe Right of Way Median

Alternative 4: Elevated Within Woodroffe Right of Way (West Side)

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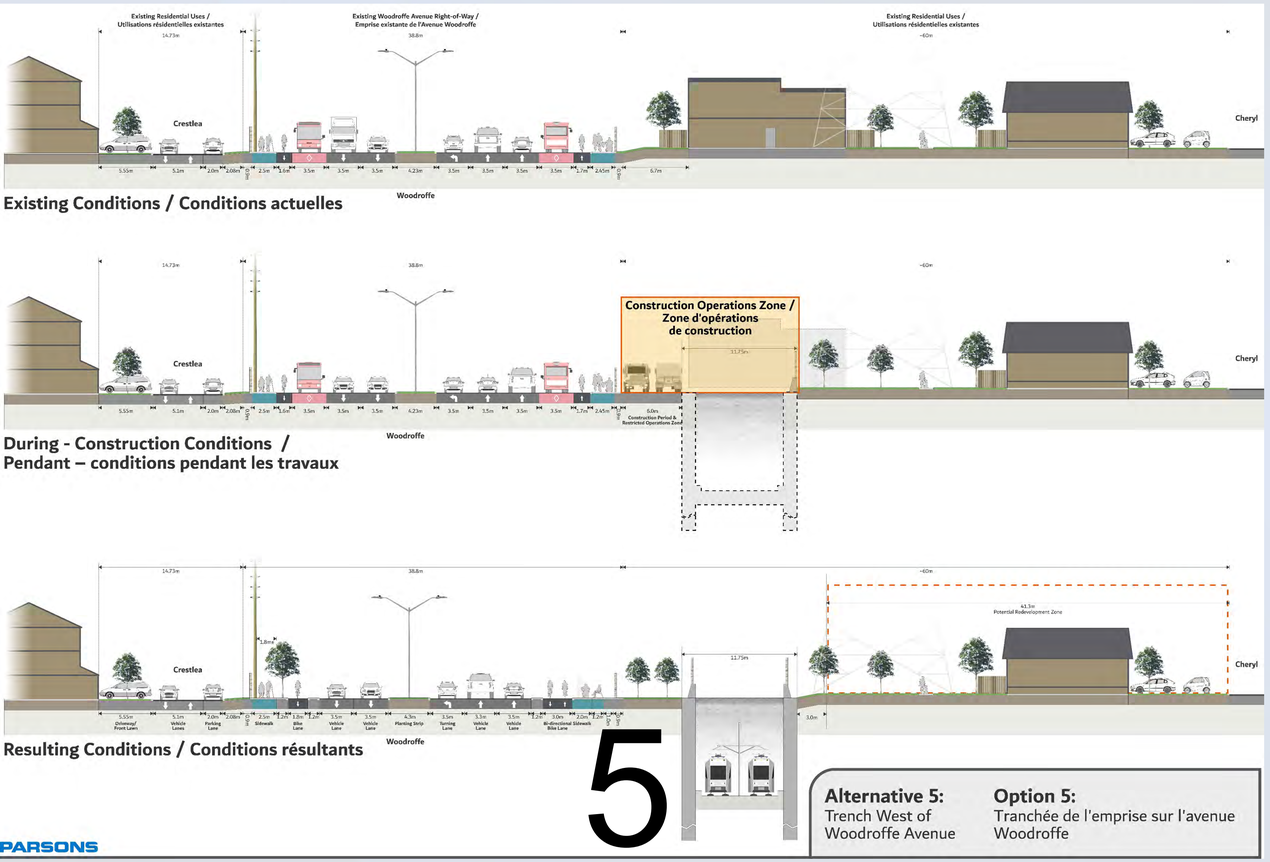
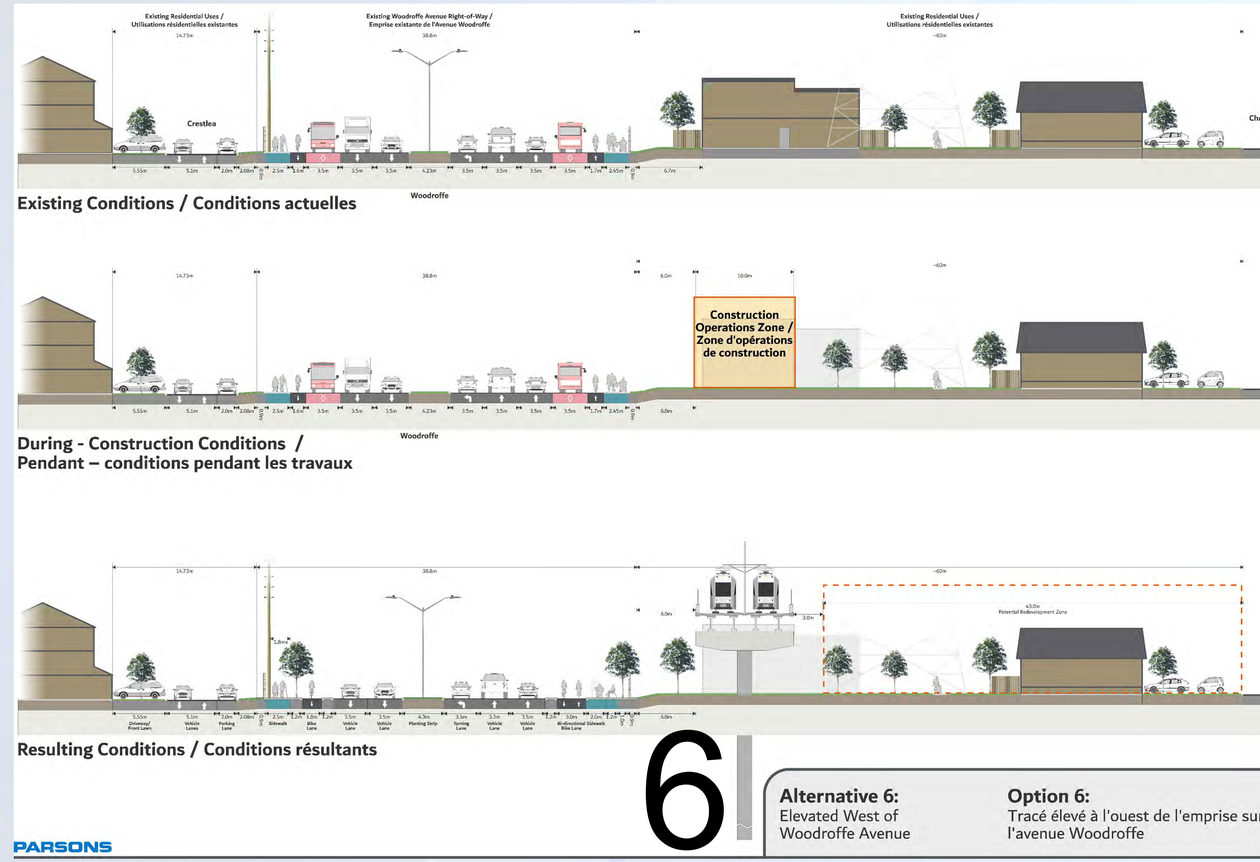
Barrhaven LRT and Rail Grade-Separations Planning and Environmental Assessment (EA) Study

Alternative 5: Below-Grade West of Woodroffe Avenue right-of-way



Alternative 6: Elevated West of Woodroffe Avenue right-of-way



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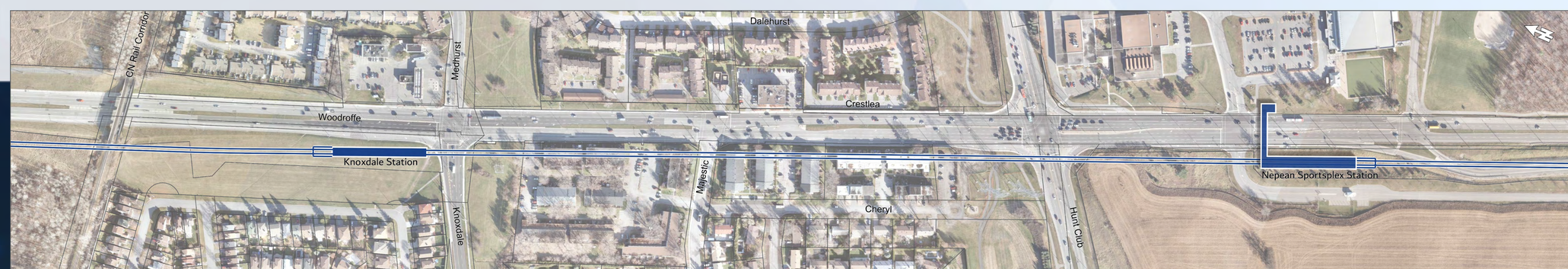
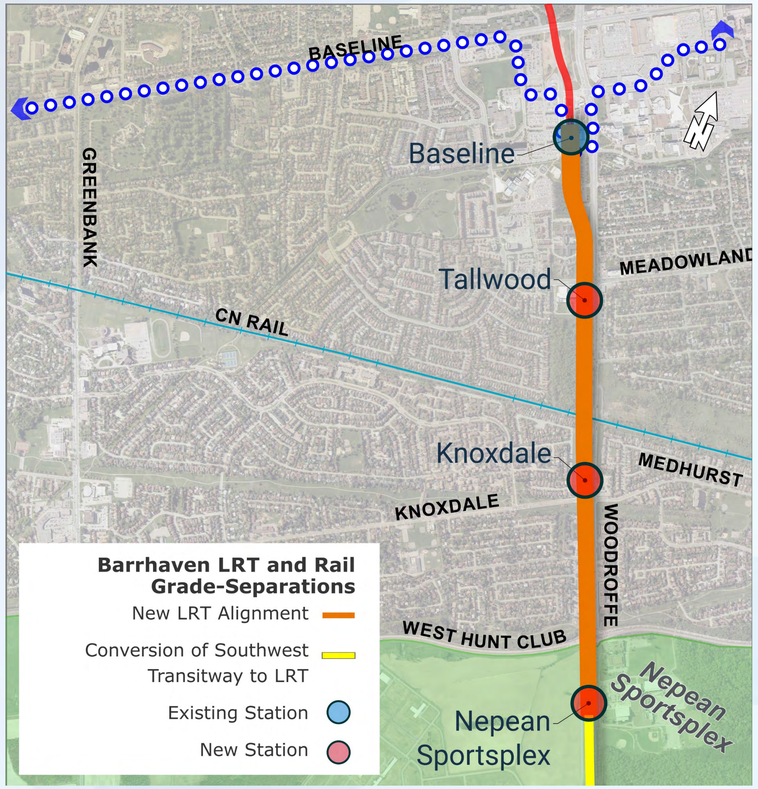


Evaluation Results - Baseline Station to Nepean Sportsplex

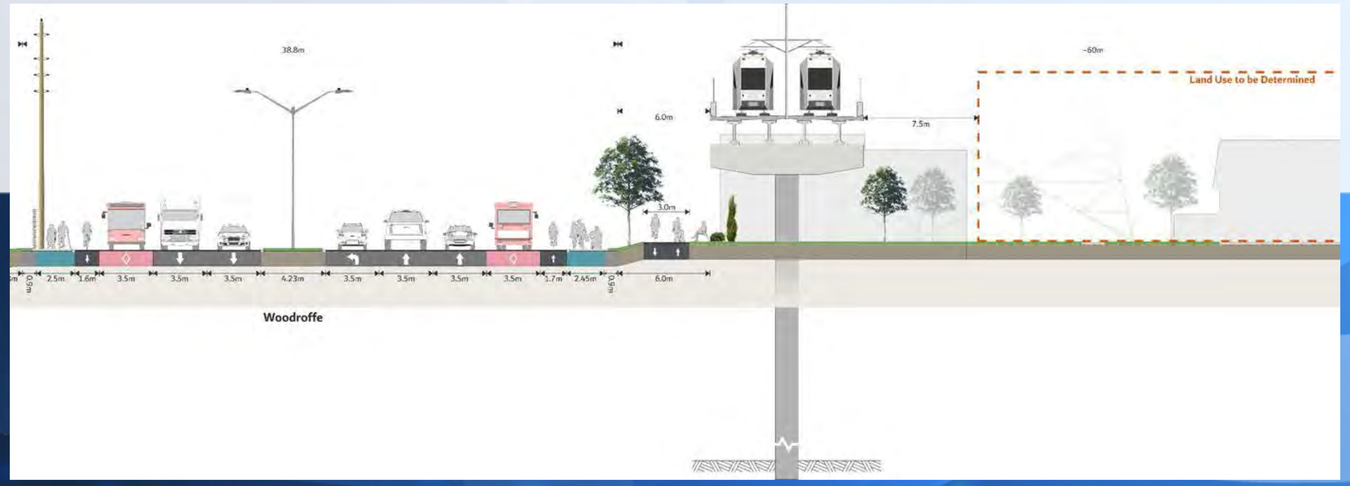
Following evaluation of the six (6) alternatives, the **Preliminary Recommended Plan** for this section is an **elevated facility west of the Woodroffe Avenue right-of-way (Alternative 6)**. The evaluation results confirmed that the recommended alternative has the following benefits:

- Manages the risk associated with challenging geotechnical conditions including a high-water table, sensitive soils and settlement issues;
- Avoids impacts to existing underground utilities including watermains crossing under the Woodroffe Avenue corridor and a planned Enbridge gas distribution main;
- Provides increased opportunities for pedestrian and cycling connectivity between the facility and communities to the west;
- Provides opportunities for multi-use pathways and programing of space sheltered under the facility;
- Avoids disruptions to the Woodroffe Avenue corridor during construction; and
- Overall lower cost to construct, operate and maintain.



The Preliminary Recommended Plan will displace some existing buildings between Knoxdale and West Hunt Club and will also require mitigation for potential noise and visual impacts of the facility on the surrounding community.

Cross-section of the elevated facility west of Woodroffe Avenue.



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Evaluation Rationale: Why Not Below-Grade?

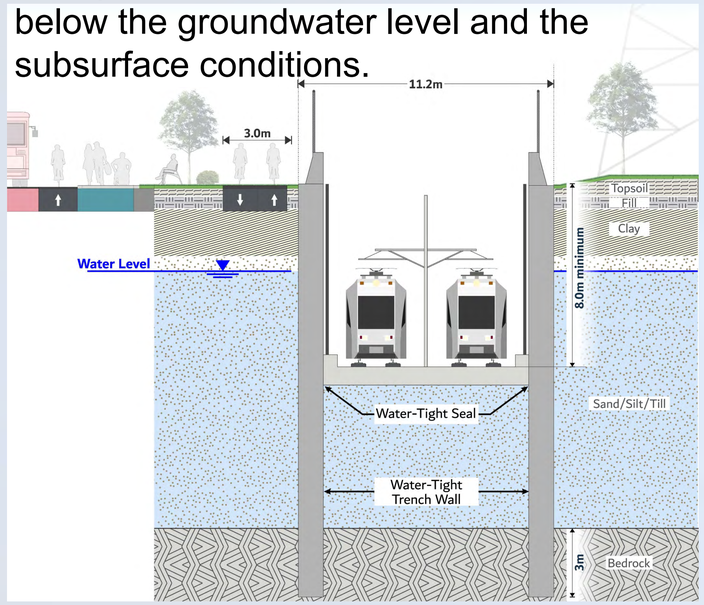
Geotechnical Conditions of Concern

- Subsurface conditions common in Ottawa area; and
- Well understood by geotechnical specialists to be very challenging to address.

Geotechnical Risks

- The below-grade facility would have to be constructed below the existing groundwater level.
- Permanent groundwater lowering would be required to construct, however, any lowering of the water table due to construction of a below-grade facility could result in the settlement of homes, buildings and underground utilities because of the presence of sensitive marine clays.
- The settlement could extend several hundred metres either side of the below-grade facility.
- Although a below-grade facility is feasible to construct, its construction is high risk, challenging and potentially very costly.
- To limit the risk of settlement, a below-grade facility would have to be constructed completely water-tight for the entirety of its length (2.4km).
- Potentially very difficult to repair or correct if leaks occur (grouting, monitoring permanent recharge, pumping).
- Leaks could cause settlement of surrounding homes, buildings and underground utilities.

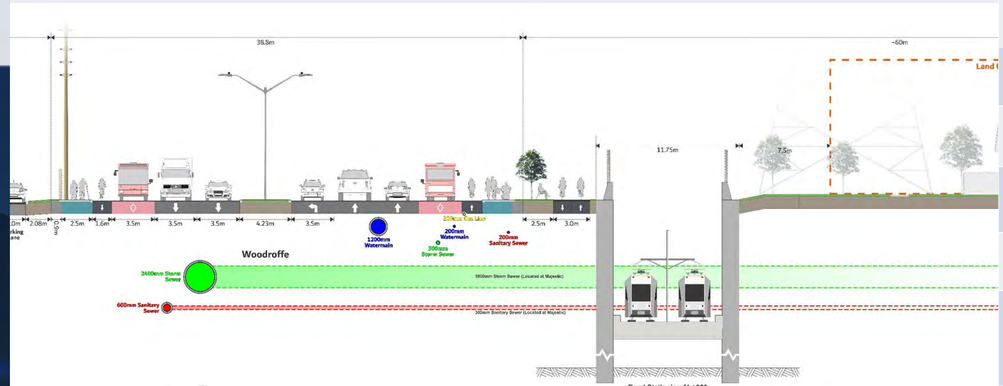
The figure illustrates how the below-grade facility would have to be constructed below the groundwater level and the subsurface conditions.



The figure illustrates the potential settlement for 250m either side of the alignment.

Land Use	Number of Buildings
Commercial	18
Institutional	13
Office	10
Residential	647
Proposed LRT Alignment	
250m LRT Alignment Buffer	
Watercourse	

The figure and table illustrate five (5) major utilities impacted from a below-grade alternative.



Tallwood Storm Collector Sewer	2100mm diameter
Lynwood Sanitary Collector	2250mm diameter
Sovereign Storm Collector Sewer	1800mm diameter
West Hunt Club Storm Collector Sewers	1350mm & 1200mm diameter
Proposed Enbridge Gas Distribution Main	

**Note: only sewers > 1000mm diameter listed, there are many smaller diameter utilities that cross the corridor*

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Activating Space Under the Guideway

An elevated facility creates opportunities for landscaping and potentially other space for programming to occur underneath the guideway. In considering the range of these available spaces, there are several different adjacent land use contexts along the corridor that include:

- Institutional land uses such as the Central Archives Building and the Peter D. Clarke Long-Term Care Facility;
- Tallwood Woods;
- Vacant residentially zoned lands along Beechcliffe Street; and
- Future redevelopment of impacted buildings.

The Study Team is consulting with various City departments to determine the opportunities and constraints to using the space created under an elevated facility. The range of opportunities include:

- Corridor landscaping;
- Multi-Use Pathways;
- Recreational uses including dog parks;
- Programming space for such things as markets and festivals/gatherings, community gardens; and
- Areas for public art.


Vancouver Expo Line Community Garden


Melbourne, Australia

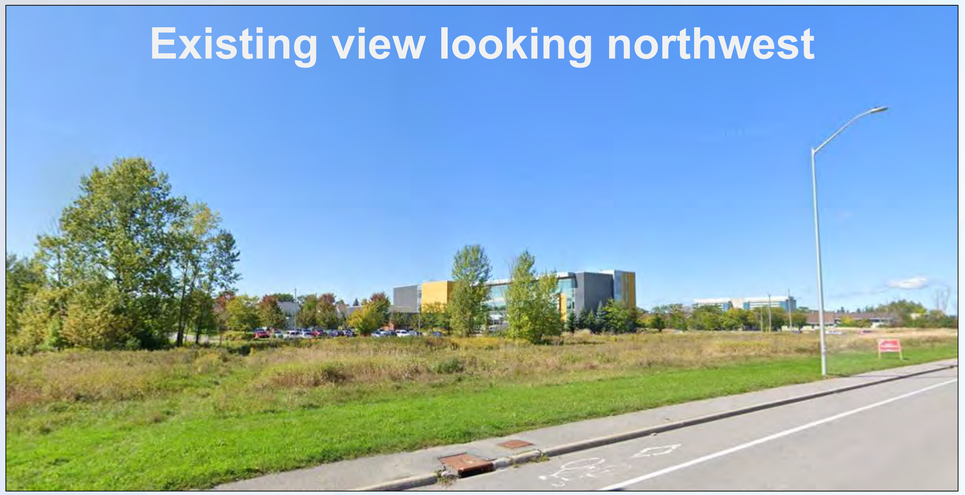

Dutch Kills Green Park, Queens NY


Ottawa, Hurdman Station

Tallwood Station

The **Preliminary Recommended Plan** for the new Tallwood Station includes the following elements:

- Located on City-owned lands adjacent to the Woodroffe/Tallwood/Meadowlands intersection (southwest corner); and
- Providing access to the City Archives building and local community.


Existing view looking northwest


Artistic rendering of proposed Tallwood Station looking southwest

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Knoxdale Station

The **Preliminary Recommended Plan** for the new Knoxdale Station includes the following elements:

- The lands are part of the protected Southwest Transitway Corridor (1997 EA);
- Planned future Multi-Use Pathway in parallel to LRT;
- Adjacent to City-owned lands zoned residential (R3Z);
- Landscaping opportunities for the adjacent lands; and
- Enhanced parkland area and buffering to residential area.

Existing View looking west from Knoxdale Road


Artistic rendering of proposed Knoxdale Station looking southeast

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Nepean Sportsplex Station

The **Preliminary Recommended Plan** for the new Nepean Sportsplex Station includes the following elements:

- Elevated station located on the west side of Woodroffe Avenue with pedestrian overpass to the east side;
- Elevated facility transitions to the Southwest Transitway corridor south of the station;
- NCC land required; and
- An accessible ramp located on east side.

Existing View looking southwest from Hunt Club


Artistic rendering of proposed Nepean Sportsplex Station looking southwest

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