7 Recommended Plan and Assessment

This section of the EPR describes the Recommended Plan for the Barrhaven LRT and Rail Grade-Separations project, which encompasses all elements required to support design, construction and operation of the extension of the Confederation Line southwest from Baseline (proposed to be renamed Algonquin) Station to Barrhaven Centre Station, as well as the rail grade-separations of the existing Woodroffe Avenue, Southwest Transitway and Fallowfield Road crossings of the VIA Rail Smiths Falls Subdivision in the vicinity of Fallowfield Station. An impact assessment follows the description of the Recommended Plan including recommended mitigation and monitoring measures as required.

In accordance with Section 9.2 (2) of the TPAP regulation, the project elements described in this section are considered to be the final description of the Recommended Plan, to the functional design level. The preferred method of carrying out the undertaking is described and other potential methods, if considered, are also discussed. Consult **Section 8** for the associated alignment drawings, renderings, general arrangement drawings and other supporting material for the final description of the Recommended Plan.

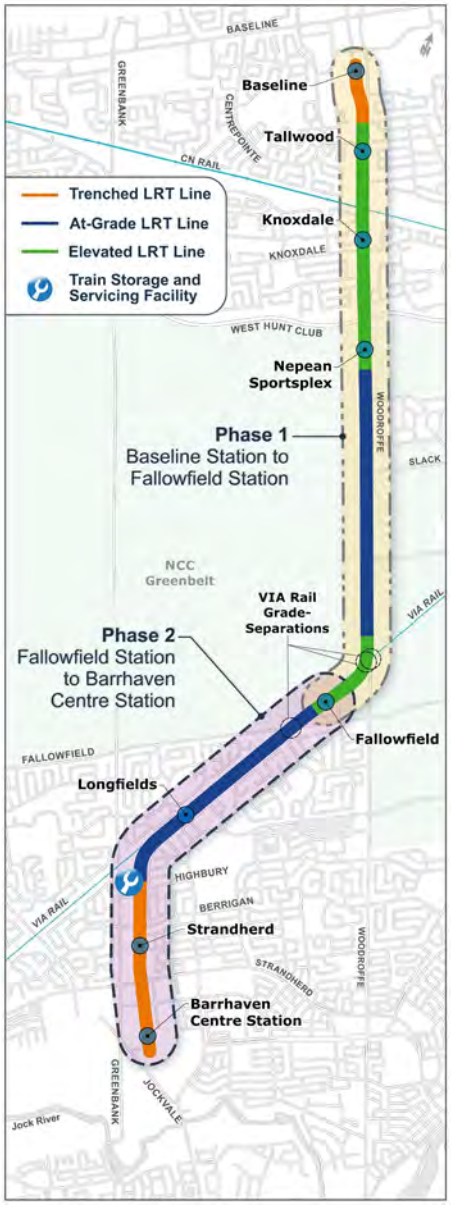
Upon MECP approval and subject to project funding, preliminary engineering and detailed design will begin to advance the final description to a higher level of detail. The footprint of the alignment, the study corridor examined, and the impact assessment will remain the same. The Transit Project that is to be implemented and exempted from Part II of the *Environmental Assessment Act* will be consistent with the description of the Transit Project presented herein.

Should any changes be made in subsequent design phases that are inconsistent with this final description and change any potential impacts of the project, the proponent will be subject to the addendum process and subject to MECP approval. The proponent will, as per the regulation, be required to complete either an addendum, or a revised Environmental Project Report. This process is described in full detail in **Section 9.8**.

7.1 Recommended Plan Overview

Development of the Recommended Plan was based on the preferred design alternatives identified in **Section 6** of this EPR and consists of the major elements outlined below. **Figure 7-1** illustrates the planned alignment and station locations.

Figure 7-1 Recommended Plan Overview



Most of the proposed LRT corridor has been defined, protected and constructed as a bus rapid transit corridor through previous studies dating back to the mid-1990s. Approximately 7.6km of the proposed project represents a conversion of an existing rapid transit corridor from bus to light rail technology, with the remaining 2.4km new alignment, along which approximately 1.6km of right-of-way has been protected for rapid transit through previous study. Key elements of the project include:

- 10km of twin-track, fully segregated electric LRT generally, of which:
  - 2.4km consists of new alignment on an elevated structure west of Woodroffe Avenue between Baseline Station and Nepean Sportsplex.
  - 7.6km consists of converted alignment along the existing Southwest Transitway between Nepean Sportsplex and Barrhaven Town Centre, including 1.7km of below-grade open trench at the southern end of the alignment.
- Seven LRT stations:
  - Three new stations – Tallwood, Knoxdale and Nepean Sportsplex.
  - Conversion of four existing BRT stations to LRT – Fallowfield, Longfields, Strandherd and Barrhaven Centre.

- Improved and new facilities for pedestrians and cyclists along the corridor, including a pedestrian bridge over Woodroffe Avenue at Nepean Sportsplex Station;
- Three new rail grade-separations (overpasses) at the VIA Rail Smiths Falls Subdivision where it currently crosses Woodroffe Avenue, the Southwest Transitway and Fallowfield Road;
- Three new underpasses for the LRT line crossing beneath Berrigan Drive, Marketplace Avenue and Chapman Mills Drive;
- A TSSF located on City-owned land (1005 and 1045 Greenbank Road) bounded by Greenbank Road, the Southwest Transitway, the VIA Rail corridor and Highbury Park Drive; and,
- A new off-street bus terminal and 250 space Park and Ride facility at Barrhaven Centre Station.

7.2 Recommended Design

This section provides a more detailed description of the project elements, including alignment, stations, structures, and multimodal connections. Functional design drawings (plates) illustrating the horizontal and vertical alignment, stations, and ancillary facilities and property necessary to support the project are included in **Section 8**.

The proposed LRT corridor, station locations, and TSSF are broadly illustrated in **Figure 7-1**. The Recommended Plan has been advanced to a functional level of design, which permits identification of infrastructure footprint, property requirements, project impacts, and cost estimates which can be evaluated as part of the assessment of effects, with appropriate mitigation measures developed where necessary.

7.2.1 LRT ALIGNMENT AND STATIONS

7.2.1.1 Baseline (Algonquin) Station to Tallwood Station

Baseline Station will be the terminus of the Stage 2 LRT project, with revenue service expected to commence in the later part of 2025. The Barrhaven LRT extension will start at the south end of Baseline Station running in a below-grade open trench south of College Avenue and south through the future bus terminal area, which has been designed to accommodate future LRT extension. A connecting bus-only roadway along the south side of the future bus terminal will need to be relocated and shifted north slightly to accommodate the LRT extension and provide sufficient vertical clearance as the LRT alignment exits the Baseline Station area.

Immediately south of the station area, the LRT alignment will curve to the east to run parallel to Woodroffe Avenue and begin to climb out of the open trench and onto an elevated guideway before crossing over Tallwood Avenue and entering Tallwood Station.

7.2.1.2 Tallwood Station

Tallwood Station, located approximately 600m south of Baseline Station, will be an elevated station on the southwest corner of the Woodroffe/Tallwood/Meadowlands intersection, with the station entrance and platforms located south of Tallwood Avenue. A station entrance building will provide access from street level, with stairs, escalators and elevators provided to connect to the elevated LRT station platforms. A small public plaza outside the ground-level station entrance will accommodate elements such as hardscaping, landscaping, benches, public art, and bicycle parking. Connections to local bus routes will be made via on-street stops.

Passenger pick-up and drop-off activity will be accommodated on-street, likely on Tallwood Avenue. Opportunities to provide an off-street facility integrated with the adjacent City of Ottawa Central Archives (James K. Bartleman Centre) may be further explored during future design phases. However, issues with respect to traffic impact and circulation on and around the Archives facility will need to be addressed with the operators of the Centre as during consultation they expressed that this was not seen as compatible with their operation.

Figure 7-2 illustrates the proposed design concept for Tallwood Station. Future design work will confirm station-specific requirements.

Figure 7-2 Artistic Rendering of Proposed Tallwood Station Looking Southwest

South of Tallwood Station, the LRT alignment remains elevated along the west side of Woodroffe Avenue, in the corridor previously identified and protected for rapid transit. The elevated alignment provides opportunities for a parallel MUP to be integrated into the corridor and has a reduced impact on Tallwood Woods as compared to the 1997 Southwest Transitway EA recommended plan. A Landscaping and Open Space Programming strategy has been developed to provide high level concepts and direction for future design phases of the project to consider the proposed elevated LRT alignment and structure and ways the space around and under the elevated guideway and can be purposed for community uses (Section 7.4).

7.2.1.3 Knoxdale Station

Knoxdale Station will be located approximately 800m south from Tallwood Station, on the northwest corner of the Woodroffe/Knoxdale/Medhurst intersection, with the station entrance and platforms located north of Knoxdale Avenue. A station entrance building will provide access from street level, with stairs, escalators and elevators provided to connect to the elevated LRT station platforms. A small public plaza will be created at the station entrance, extending to the adjacent Woodroffe/Knoxdale intersection and providing opportunities for landscaping and public art. Bicycle parking will be integrated with the station entrance area with separate pedestrian and cycling routes to minimize conflicts in the station entrance zone. New pathway connections to the residential community fronting onto Beechcliffe Street will also be provided details of which to be worked out during detail design phase of the project. Connections to local bus routes will be via on-street curbside stops in the vicinity of the station.

Passenger pick-up and drop-off activity will be accommodated on-street, with short-term parking spaces designated in the vicinity of the station. Additional traffic measures including signage and physical measures will be considered during future design phases to address the concerns for spillover parking and neighbourhood traffic impacts as noted from stakeholder feedback.

Figure 7-3 Artistic Rendering of Proposed Knoxdale Station Looking Southeast

South from Knoxdale Station, the LRT alignment will continue to run parallel and to the west of Woodroffe Avenue on an elevated structure. The location of the LRT alignment will affect three existing residential properties located on the west side of Woodroffe Avenue between Knoxdale Avenue and West Hunt Club Road. A 20m wide Right-of-Way is required from these properties to accommodate the LRT guideway and maintain sufficient setbacks on either side to allow for future maintenance and inspection of the structure. The three properties contain 179 rental units of which 100 units are estimated to be affected when the project proceeds for implementation. Acquisition of property required to construct the Barrhaven LRT Extension will follow the guidelines described in the City's *Real Property Policies and Procedures*.

At West Hunt Club Road the elevated LRT alignment remains on the west side of Woodroffe Avenue. A 20m wide Right-of-Way is required from the NCC-owned land to implement the LRT facility on the south side of West Hunt Club between West Hunt Club Road and the existing access road serving the NCC Greenbelt lands.

7.2.1.4 Nepean Sportsplex Station

Nepean Sportsplex Station is located approximately 1km south from Knoxdale Station, on the west side of Woodroffe Avenue just south of the main access road to the Nepean Sportsplex and NCC Greenbelt lands. The station will incorporate an enclosed pedestrian bridge allowing safe passage over Woodroffe Avenue, connected by elevators and stairs on the west (station) side and stairs and ramps on the east (Sportsplex) side. The planned parallel MUP facility alongside the LRT alignment will switch from the west side of Woodroffe to east side at the northerly signalized intersection and connect with the existing NCC MUP which runs along the east side of Woodroffe Avenue to Fallowfield Road and into Barrhaven. Connections to local bus routes remaining on Woodroffe Avenue will be on-street.

South of the station, the LRT alignment returns to grade to run along the existing Southwest Transitway alignment, which will be converted from BRT to LRT. At the VIA Rail Smiths Falls Subdivision, a new overpass (LRT over rail) will be constructed. The overpass structure is planned to be compatible with construction as either a BRT or LRT facility to allow flexibility in project phasing and implementation.

Figure 7-4 Artistic rendering of proposed Nepean Sportsplex Station Looking Southwest

7.2.1.5 Fallowfield Station

Fallowfield Station is located approximately 3.3km south from Nepean Sportsplex Station southwest of the new rail grade-separations over the VIA Rail crossing. This station will support integration of multiple modes and provide access to local transit, rapid transit, and inter-city travel.

After crossing over the VIA Rail tracks, the LRT alignment and station will remain elevated to allow and maintain access to the existing VIA Rail Fallowfield Station, immediately to the north of the LRT. Although currently planned as two separate station facilities, as VIA Rail develops plans for its High Frequency Rail (HFR) project, the opportunity to develop a single, integrated station facility serving both VIA Rail and OC Transpo services could be considered.

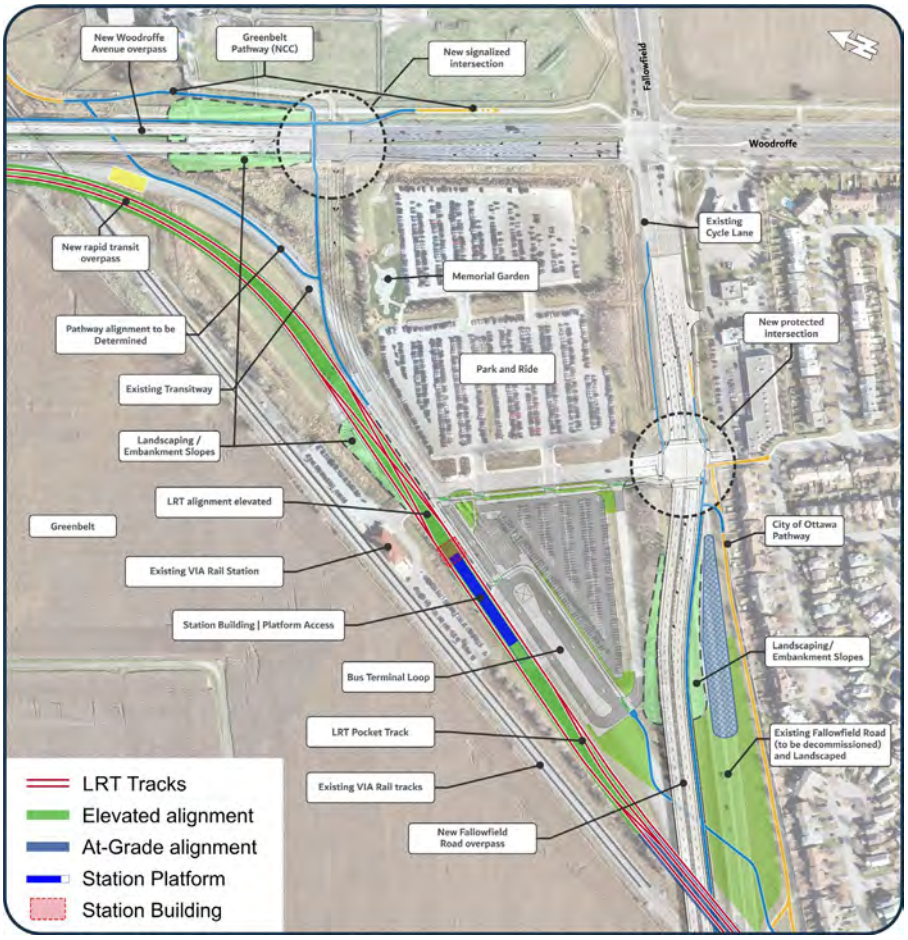
The LRT station will be integrated with the existing Park and Ride facility and designed to minimize impacts on the existing number of spaces. A new bus terminal will be constructed at ground level adjacent to the LRT station, with direct connections accommodated between the two facilities within a fare paid zone. A bus lay-up and operator facility will be provided.

A formal passenger pick-up and drop-off facility will be provided close to the station entrance, adjacent to the bus terminal area.

A new signalized intersection on Woodroffe Avenue will provide another entrance to the station and Park and Ride facility, which will ease pressure/congestion at the existing Fallowfield/Park and Ride access. It will also enable a safe crossing for pedestrians and cyclists pathways on the east side of Woodroffe Avenue and support more direct access to the station for local bus routes on Woodroffe Avenue as well as rail replacement bus services when required.

New or improved pathway connections will be provided to the station, including direct links from communities on the south side of Fallowfield Road and connections to an existing NCC Greenbelt pathway which extends east from Woodroffe Avenue. Within the immediate station area, separate pedestrian and cycling facilities will be provided to reduce conflicts between the pathway users.

Figure 7-5 Plan View of the Proposed Fallowfield Station



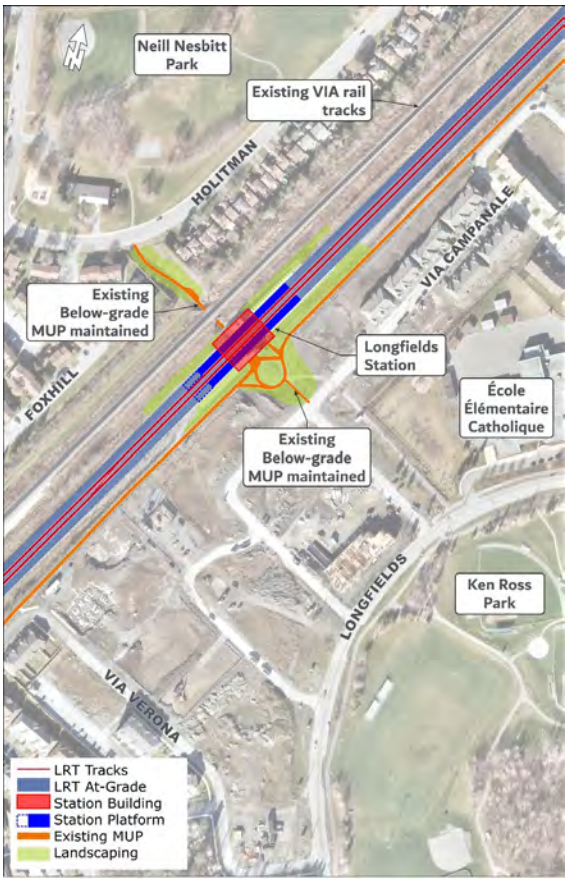
Southwest of Fallowfield Station, the elevated LRT alignment will transition back to at-grade to follow the existing BRT corridor while crossing under the new Fallowfield Road overpass which will span both the LRT and VIA Rail corridors. A pocket track will be provided in this area to support LRT operations by allowing for temporary train storage and reversing of trains at Fallowfield Station as an intermediate turnback point.

Southwest of Fallowfield Road, the alignment continues at-grade along the existing BRT corridor which will be converted to LRT.

7.2.1.6 Longfields Station

Longfields Station is located approximately 1.7km southwest from Fallowfield Station and is an existing BRT station which will be converted to LRT station as part of this project. It remains a side platform configuration to make use of existing station's stairs and elevators. The lower level of the station will need to be enlarged to accommodate space for ticket vending machines, additional vertical circulation (e.g. redundant elevators), fare gates and service rooms. The existing MUP which passes through the station's lower level, providing connections from both the north and south sides of the rapid transit/VIA Rail corridor will be maintained, with informal curbside passenger pick-up and drop-off activity occurring on adjacent streets. Additional traffic measures, including signage and physical measures will be considered during future design phases to address potential parking spill-over.

Figure 7-6 Plan View of the Proposed Longfields Station



Southwest from Longfields Station the LRT alignment will continue within the existing transitway corridor. East of Greenbank Road it curves to the south and the LRT alignment will continue to follow it to its terminus in Barrhaven Centre.

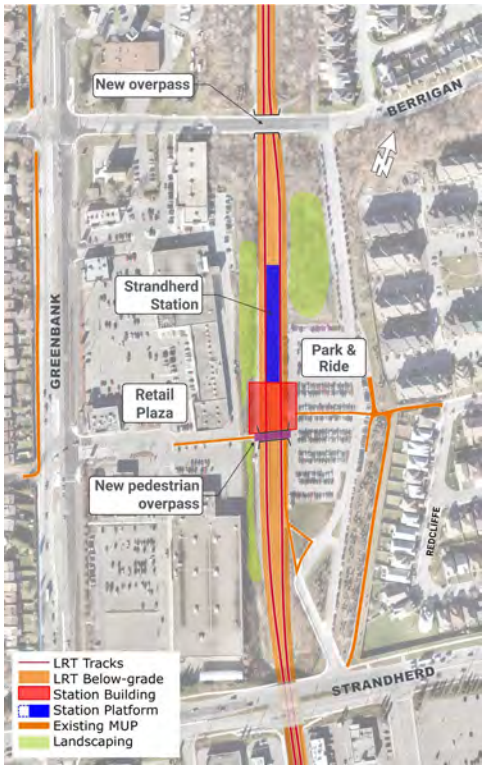
On the west side of the corridor, on lands bounded roughly by Highbury Park Drive, Greenbank Road, the VIA Rail corridor and existing Southwest Transitway/future Barrhaven LRT corridor, a Train Storage and Servicing Facility (TSSF) will be constructed to support LRT operations along the Barrhaven LRT extension.

South of the existing Highbury Park Drive underpass, the existing at-grade transitway corridor will be modified as part of the conversion to LRT to become a below-grade open trench. This will permit grade-separation at Berrigan Drive, with the LRT passing under the roadway before entering Strandherd Station.

7.2.1.7 Strandherd Station

Strandherd Station is located approximately 1.3km south and west from Longfields Station and is an existing BRT station which will be converted to LRT as part of this project. The below-grade open trench alignment will continue through the station area to match up with the existing underpass at Strandherd Drive, 250m south of the station. A centre platform configuration is proposed at this station, with vertical circulation (stairs, escalators, and elevators) providing platform access from a station house located at-grade and on a structure spanning over the tracks. This structure would also serve as a through link for pedestrian and cycling movement over the LRT, replacing the existing at-grade pedestrian crossing of the Transitway.

Figure 7-7 Plan View of Proposed Strandherd Station

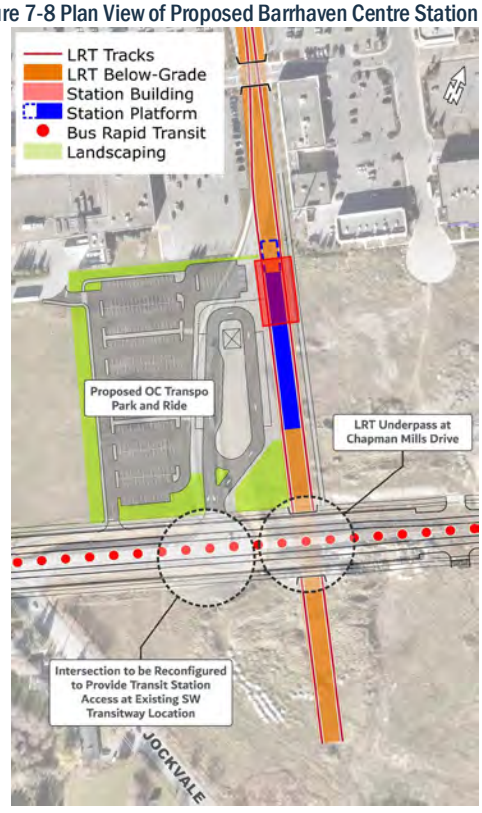


The existing Park and Ride lot, including passenger pick-up and drop-off facility will be integrated into the station, with only minor modifications needed to improve access for all modes. South of Strandherd Station, the LRT alignment remains in a below-grade open trench, crossing under Strandherd Drive via the existing transitway underpass. The open trench will be extended further south to cross under Marketplace Avenue and through the existing Marketplace Station, which will be decommissioned as part of this project in favour of a relocated and expanded Barrhaven Centre Station. The LRT will pass under the existing internal access road located approximately 100m south of Marketplace Avenue and proceed south into the proposed terminus at Barrhaven Centre Station.

7.2.1.8 Barrhaven Centre Station

Barrhaven Centre Station is located approximately 800m south from Strandherd Station and will be a below-grade station located in the general area of the existing Barrhaven Centre transitway Station. As part of the conversion from BRT to LRT, the rapid transit alignment will diverge from the existing transitway at a point approximately 200m south of Marketplace Avenue and continue in a straight alignment towards Chapman Mills Drive to provide sufficient tangent length for LRT platforms and tail tracks beyond the station. The station incorporates a new off-street bus terminal located west of the LRT alignment and station platforms on lands currently occupied by the transitway, with direct connections between bus and rail modes accommodated within a fare paid zone. This layout supports efficient transfers between future LRT, BRT and local bus routes within a single fare-paid area, providing for better customer experience.

Figure 7-8 Plan View of Proposed Barrhaven Centre Station



The bus terminal will be accessed from a new signalized intersection on Chapman Mills Drive, located where the existing Southwest Transitway meets Chapman Mills Drive. The proposed layout supports the ability for buses terminating at this station to lay-up between runs and also provides space to support bus staging before and during peak hours. This is critical to supporting bus transit operations. The Study Team examined the ability to have all buses serving Barrhaven Centre Station use the future Chapman Mills median BRT, however this is not a feasible solution for the following main reasons:

- There are existing bus routes that terminate at Barrhaven Centre station, which will continue to need a bus loop facility in this vicinity.
- The existing planned median bus platforms on Chapman Mills would likely not be capable of supporting the volume of buses and passengers anticipated, requiring longer/wider bus platforms and possibly bus by-pass lanes (i.e. a four-lane median Transitway through the station area).
- All bus services originating from the west and south of the station would need to run through the station and terminate elsewhere, incurring potentially significant operational cost for OC Transpo given it is expected most customers will be transferring to LRT or be destined to the Barrhaven Centre retail area. Similarly, all bus services originating

from the north and east would also need to find an alternate location to terminate. There would be no ability to stage buses during peak periods.

- On-street bus platforms would require customers to cross a public roadway to transfer between buses and LRT, negating the ability to have transfers occur within a fare-paid zone and introducing passenger safety issues.
- The study team looked at the ability to provide for a fare-paid zone between median bus stops on Chapman Mills Drive and the LRT platforms by adding vertical circulation elements to the median bus stops, however this poses the following issues:
  - It would require pushing the LRT deeper to provide a mezzanine (intermediate) level underground to allow for transition between a centre-platform LRT and side-platform BRT station areas, or alternatively;
  - It would require two sets of stairs and four elevators on each BRT platform to provide redundant access and necessitate a change to a side platform configuration for the LRT station which is not efficient for a terminal station operation; and,
  - Both alternatives would increase the complexity and cost of Barrhaven Centre Station.
- In the shorter term, before LRT is built but after Chapman Mills Drive is extended between Longfields Drive and Greenbank Road, the existing Barrhaven Centre bus loop will be impacted by the extension of Chapman Mills Drive. There is a need to relocate this facility so that transit routes which terminate at this location can lay-up and turnaround to support efficient transit operations. Locating this facility on the north side of Chapman Mills is preferable and supports a phased approach to the future development of Barrhaven Centre Station by making use of the existing Southwest Transitway connection to Chapman Mills Drive.
- There is potential to examine alternative configurations for the bus terminal (e.g. stacking it over the LRT platforms) during detailed design, including the ability to have the LRT station and bus terminal integrated into future development, including the proposed Civic Building. The bus terminal has been set back far enough from Chapman Mills Drive to allow for development frontage along this roadway, potentially spanning over the future LRT trench to provide a continuous street frontage.

A new Park and Ride lot (250 spaces) is proposed as part of this station, initially on lands identified west of the existing Southwest Transitway. Ultimately, this facility may be integrated with a proposed “Civic Complex” to be located in the Town Centre area and incorporating the future Barrhaven Centre LRT Station. Its configuration can be modified as part of negotiation with the affected landowner to provide development frontage along Chapman Mills Drive if desired. The design for this facility will be undertaken in coordination with the adjacent landowner and the City’s planning department regarding the potential for a future development block facing onto Chapman Mills Boulevard while maintaining the requirement for 250 parking spaces. This document provides a conceptual layout for the purposes of determining impacts and property requirements. This EA provides the flexibility to modify the design for the Park and Ride including driveway location or road access, aisle arrangement or number of parking spaces without the need for an addendum. The Park and Ride lot will be designed to support phased implementation of rapid transit network in this area and potential implementation prior to the LRT project in the following sequence:

1. Existing BRT station (Southwest Transitway);
2. Implementation of Chapman Mills BRT, with reconfiguration of Barrhaven Centre Station to support increased bus operations; and,
3. Implementation of the Barrhaven LRT Extension.

Tail tracks will be provided beyond the LRT station platforms to permit temporary storage of trains during revenue operations. To accommodate sufficient length of tail track, the LRT alignment will extend south of Chapman Mills Drive approximately 70m, crossing through a new grade-separation structure under Chapman Mills Drive.

7.2.2 SPECIAL TRACKWORK

Special trackwork is required along the LRT alignment to support reliable train operations during regular revenue service and reduced operating conditions. Special trackwork facilities and locations were determined based on conceptual LRT

operational requirements and will be further refined during detailed design phase of the project. Initial special trackwork facilities identified include:

- Crossover tracks located south of Nepean Sportsplex Station to support single track working at reduced train frequencies;
- Crossover tracks located immediately north of Fallowfield Station to allow this station to operate as a temporary terminus or intermediate turnback point and/or support single track working at reduced train frequencies;
- A pocket track located south of Fallowfield Station to allow temporary storage of one train for operational flexibility;
- Crossover tracks located north and south of the proposed TSSF to allow trains to enter/exit the facility from either direction;
- Crossover tracks located immediately north of Barrhaven Centre Station to support terminal operations; and,
- Tail tracks located beyond Barrhaven Centre Station to allow for temporary storage of trains (1 per track) during off-peak hours or in the event a disabled train needs to be removed from service.

7.2.3 TRACTION POWER SUBSTATIONS

A dedicated electrical supply is required to provide power to the trains that will run along the line, as well as for the operation of station facilities, communications and safety equipment and lighting. The connections between the Hydro Ottawa power distribution grid and the LRT system occur at regularly spaced electrical substations (referred to as Traction Power Substations - TPSS). These substations house the electrical machinery (transformer/rectifiers, switches, and circuit panels) needed to convert high voltage AC power supplies from the main electrical grid to support operation of the LRT system. They are housed in single story buildings sized approximately 60m^2 and require service vehicle access. Substations will be provided at-grade and must be located close to the LRT line.

To meet power requirements, multiple TPSS are required along the line to distribute power in an efficient manner. The Confederation Line uses 1500 V DC power to power the trains. A maximum spacing of 1.5km to 2.0 km between electric substations is estimated. Based on the Recommended Plan, seven TPSS are likely to be required as follows:

- Knoxdale Station;
- Pineland Avenue (approximate);
- North of Fallowfield Station;
- Oriska Way;
- Highbury Park Drive (approximate);
- Train Storage and Servicing Facility (dedicated TPSS for facility operations); and,
- Barrhaven Centre Station.

The final location and configuration of electrical substations will be determined during subsequent phases of design and in collaboration with staff from Hydro Ottawa. Wherever possible, the co-location of substations with station facilities will be pursued. A technical memo regarding the TPSS is provided in Appendix B.

7.2.4 LIFE SAFETY

Provision of life safety features and systems will be governed predominately by standards developed through implementation of Stages 1 and 2 of Ottawa's LRT network, which reflect those developed by the National Fire Protection Association (NFPA). This includes fire detection and voice alarm systems, smoke control and ventilation systems, communications systems, firefighting equipment and fire-fighting facilities, emergency lighting, and construction materials. NFPA 130: Standard for Fixed Guideway Transit and Passenger Rail Systems (NFPA 130) provides fire and life safety requirements for passenger railway stations and guideways. Detailed requirements of these systems will be investigated at the preliminary design stage of the project. Below is an overview of the major elements to be provided.

7.2.4.1 Emergency Access and Egress

Each LRT station will have two separate and independent means of egress from the platform to street level to permit evacuation of passengers during emergency events. These may be configured as regular access routes or emergency-only routes.

A walkway will be provided along the LRT alignment to allow for passenger egress along the line in the event of an emergency. This walkway will also allow maintenance workers to access the corridor without obstructing normal LRT operations. The ballast serves as the walkway away from structures along at-grade running way segments, while in stations and other structures, the walkway surface will be of a uniform, slip resistant design and constructed of non-combustible materials.

Intermediate access points will be provided along the LRT alignment in accordance with NFPA guidelines to allow for emergency and service vehicle access to the rapid transit corridor.

7.2.4.2 Communications

A centralized Operation Control Centre (OCC) will already be in place at the time of Barrhaven LRT extension implementation to support operation of the Confederation Line. The OCC will communicate with, supervise, and co-ordinate all personnel and trains operating on the system during normal operations and be responsible for incident management in co-operation with Emergency Services personnel. Communications points will be provided on all trains and at multiple points within stations to allow passengers to contact operating staff in the event of an emergency. Emergency operating plans and contingencies will be developed as part of implementation of the system.

7.2.5 STATION ELEMENTS

7.2.5.1 Location and Spacing

There will be seven LRT stations included as part of the Barrhaven LRT extension.

- Tallwood (new station);
- Knoxdale (new station);
- Nepean Sportsplex (new station);
- Fallowfield (existing BRT station);
- Longfields (existing BRT station);
- Strandherd (existing BRT station); and,
- Barrhaven Centre (existing BRT station).

Station designs will have a common look and feel to those being built for the Confederation Line, including:

- Provide for safe, efficient and accessible access to rapid transit;
- Have convenient pedestrian and cycling connections to and from surrounding communities;
- Integrate with the character of existing residential and green space areas; and,
- Fulfill AODA, Building Code and City of Ottawa Accessibility design standards including the implementation of redundant accessibility.

7.2.5.2 Entrances

Station entrances will be located to provide efficient access to stations from surrounding communities and streets. Access from a public right-of-way and through public lands and green spaces will be provided, with additional access through existing or future private lands or developments considered to improve integration of LRT with the community.

7.2.5.3 Accessibility

All stations will be fully accessible and designed to meet universal access requirements, including elevator redundancy (meaning a suitable alternate to be used in the event of an elevator breakdown, such as a second elevator or a suitable ramp structure). Depending on anticipated passenger volumes, installation of redundant accessibility features may be deferred in some stations, but all stations will be designed to accommodate eventual installation of redundant accessibility.

7.2.5.4 LRT Platform

At each station platform facilities will be provided for passengers to board or alight from the trains. There are two possible configurations: side platforms or centre platform. Each site has been evaluated to determine which configuration provides the best passenger service with minimal impacts to track geometry, existing and future structures, utilities, connectivity, and property. Platform configuration will be reviewed further during future design phases.

The platforms will provide a common set of passenger amenities including waiting areas, seating, sheltered areas for weather protection, passenger information (including signage and next train arrival messages), passenger security features (including designated waiting areas) and vertical circulation to concourse or station entry buildings.

7.2.5.5 Multi-modal Connections

Station Connectivity to surrounding communities is a key consideration in project planning:

- The main priority for station access is pedestrian and cycling activity;
- New/improved links to be identified; and,
- Parallel pathway facilities to be provided via a combination of existing and new linkages.

Between the existing south access to Baseline Station and Norice Street, the City is planning a MUP along the west side of Woodroffe Avenue, with construction anticipated during 2021. This facility will remain in place and form part of the parallel pathway facility to be associated with the Barrhaven LRT. During detailed design, integration of this MUP facility with the elevated guideway, Tallwood Station and any intersection modifications required will be undertaken. During construction, the MUP may need to be closed at times to accommodate construction of Tallwood Station and the elevated guideway. Traffic management plans to be completed during detailed design will further assess the need for temporary closures or detours to accommodate pedestrians and cyclists.

Bicycle Facilities

Bicycle parking will be provided at all station locations. The number of spaces will be determined through detailed design and stakeholder input, however, space has been reserved at each station to provide the facilities. In addition to bicycle parking, other supporting facilities such as bicycle repair stands will be considered.

Future opportunities to provide space for bike-share facilities will be considered as part of detailed design

Bus Connections

Bus connection activity will occur at most stations. Off-street bus terminals are provided at Fallowfield and Barrhaven Centre stations, where large volumes of passengers will be transferring and local services begin/end. In busier transfer stations, specifically the terminus stations, a fare paid area can be provided for multimodal connections to be made with ease. Where transfer volumes are low or where local services continue past the station (rather than terminating) on-street bus stops outside the fare paid area may be used. OC Transpo have provided preliminary ideas for the modification of area bus routes once the LRT is operational, and the locations and scale of bus connection facilities will match OC Transpo needs and the community context.

Passenger Pick-up and Drop-off

Passenger pick-up and drop-off exists in a formal or informal way at the majority of transitway stations and is being planned for as part of the Barrhaven LRT Extension. Formal facilities will be provided at major stations to serve broader needs, with off-street facilities proposed where space is available. Informal, limited facilities will be available at other stations to serve more local needs and to spread activity and limit scale at any one location. These facilities may include designated curb space on adjacent streets in the vicinity of an LRT station.

Life Safety Features

Providing a safe and secure system for passengers and others in the station areas is important. Stations have been designed using the CPTED (Crime Prevention Through Environmental Design) guidelines, which encourage designers to create spaces that are naturally safe, free of blind corners, dead ends, or areas where people can congregate without being seen. Stations should also provide for long sightlines so passengers can see their next destination and see if there are others on the route or at that destination. In addition to the physical layout of the station, they will be equipped with features to assist persons in the event of emergency, including CCTV, communications, designated waiting areas and public telephones. Live connections to transit control staff will also be provided in the fare collection zone so that passengers experiencing difficulties with accessing the line can communicate with OC Transpo staff.

Fare Collection

Stations will be designed to accommodate fare collection equipment (fare gates, ticket vending machines, and help point). Stations will be unstaffed, with customer assistance provided remotely.

Community Integration

Stations function best when they are integrated in their adjacent communities. Stations should connect to local streets, pathways and sidewalks and entrances should be constructed in a way to help passengers orient themselves. Station facilities will be sized to meet the passenger needs and to be compatible with other buildings in the area. Lower volume community stations will be smaller than high volume stations with large bus transfer facilities.

Public Art

Public art is an important component of the project and will be accommodated within station and running way elements of the system. The City of Ottawa has policy requiring that an amount equal to 1% of an infrastructure project's hard costs be dedicated to the provision of public art. An allowance has therefore been included in project costing for public art. In addition to the provision of stand-alone pieces of artwork throughout the system, public art will be integrated into the architectural elements of stations and running ways.

7.2.6 RUNNING WAY ELEMENTS

The LRT running way will consist of new at-grade, elevated and below-grade segments.

7.2.6.1 Track

In at-grade segments, track will generally be laid on ties and ballast. In below-grade and elevated segments, track may be directly fixed to the concrete deck. Where vibration control is required, measures such as ballast mats and resilient track fasteners will be used.

7.2.6.2 Service/Emergency Access

Access points to allow service or emergency vehicles to gain access to the LRT corridor will be provided at key points along the LRT corridor.

7.2.6.3 Overhead Power Supply

LRT trains will run on electrical power, delivered along the line from electrical substations via overhead wires commonly referred to as an Overhead Catenary System (OCS). LRVs obtain power from the OCS by means of a device called a pantograph, attached to the roof of the LRV.

The OCS will be mounted on support poles located between or to the side of the tracks. Exact location of support poles will be determined during detailed design of the alignment.

7.2.7 TRANSIT OPERATIONS

LRT service will operate as an extension of the Confederation Line. The design of the line will support frequent operation of trains. In practice, the splitting of service at Lincoln Fields between trains for Kanata and Barrhaven will limit service frequency on each branch, generally to half of the combined level of service which can be provided east of Lincoln Fields (e.g. 3 minute peak service on the combined section of line will result in 6 minute service on each branch). Given that the core of the line through downtown is designed to permit ultimate train operation as frequent as every 1 minute and 45 seconds, train frequencies as high as 3.5 minutes could be operated on each branch. This would result in a line capacity of 12,000 persons per hour per direction (pphpd) for the Barrhaven LRT Extension, which is more than sufficient to meet anticipated demand beyond the City's 2031 TMP horizon year.

Train frequencies in off-peaks and weekends on the Barrhaven LRT extension will range from 10-15 minutes. Cross-over tracks will be provided at key locations along the line to permit turnback of trains or single track working during maintenance periods.

Bus routes (both local and rapid transit) will connect to the LRT at key locations to facilitate passenger transfers and provide a seamless transit experience.

7.2.8 TRAIN STORAGE AND SERVICING FACILITY

To support rail operations along the Barrhaven LRT extension, a TSSF has been included to accommodate overnight storage and servicing of trains. This facility will assist in supporting efficient rail operations by reducing non-revenue train mileage given the long distance between Barrhaven Centre and the maintenance and storage facilities at Belfast Road and Moodie Drive. It will also provide the flexibility to scale service up or down at the beginning or end of the peak service times.

As outlined in Section 6.2.4, the TSSF will be located on the Greenbank Road site (1005 and 1045 Greenbank Road), adjacent to the existing Southwest Transitway, north of Highbury Park Drive.

The TSSF will accommodate up to eight trains (16 individual light rail vehicles) and provide for mid-day and overnight storage as well as servicing of trains (e.g. cleaning, inspection, minor "running" repairs).

Facility elements include:

- Covered storage tracks (6);
- Enclosed service building for train servicing (2 tracks);
- Hi-rail vehicle access point for inspection/maintenance of the LRT corridor;
- Dedicated TPSS;
- Administration building for staff;
- Access road and surface parking; and,
- Fencing, landscaping, noise barrier walls and stormwater management facility.

7.2.9 FEEDER MAIN (WATERMAIN) RELOCATION

The preferred alternative for rail grade-separation from the VIA Rail line for Woodroffe Avenue and the Southwest Transitway/LRT requires the relocation of a vital 1220mm feeder main (watermain). The construction of these bridges and approach embankments, including the abutments and piers, requires the feeder main to be relocated outside of the footprint of these structures. Consultation with City Asset Management is recommended to coordinate rehabilitation/replacement of portions of the feeder main with the construction of the grade-separation. The following describes why the feeder main cannot be located under the bridges within the City Right-of-Way:

- The 1220mm feeder main is considered a major component in the City's watermain network as it supplies the majority of drinking water to Barrhaven, therefore, risk to its integrity and service disruptions must be avoided.
- At the VIA Rail crossing, the feeder main is approximately 4m deep to provide the required protection below the railway, Blacks Rapids Creek and local frost protection. Approximately 8m of backfill material would be added over the feeder main in order to construct the bridges. At a depth of 12m below the bridge embankment, maintenance of the feeder main would be nearly impossible.
- Construction of a feeder main through light weight fill embankments, concrete abutments, and/or piers is not recommended due to the potential for differential settlement as based on geotechnical soils analysis, the soil and groundwater conditions through this area are considered poor.
- A watermain break below the bridge embankment would cause large structural issues to the bridges and lengthy roadway disturbances at the bridges.

To construct the new bridges with the proposed embankments, a widening of the existing Woodroffe Avenue Right-of-way is required. The lands adjacent to the Right-of-Way along this segment are currently owned by the NCC with tenants (Royale Equestrian Centre) operating. The proposed property widening along the east side of Woodroffe Avenue would provide the required clearance to minimize loading from the bridge onto the feeder main, would allow space for drainage and access for future maintenance. Regular maintenance activities would include bi-annual inspection of valve chambers (which would be accessible at the surface) by pick-up truck type vehicle. Activities necessitating excavation would only be due to an emergency event, not part of regular maintenance. Based on this, the suggestion that the feeder main alignment could be within an easement with existing farm operations on the surface following relocation.

A 10m wide allowance is required to provide sufficient space for future maintenance/repairs to the watermain via trenching without compromising the structural integrity of the bridges and components while minimizing potential disruptions to adjacent lands.

Consideration was given to relocating the feeder main to the west side of Woodroffe Avenue. The following are reasons why this is not recommended:

- The feeder main cannot be located between Woodroffe and the Southwest Transitway bridges because there is not enough space between them;
- The feeder main diversion would be longer to be able to swing further to the west side of the Southwest Transitway;
- A west alignment would also impact and require additional NCC Greenbelt lands;
- The feeder main would have to cross under the Southwest Transitway (future LRT) at two locations, which would require additional protection and increase the difficulty for future maintenance access; and,
- Providing access to the west for City staff to do routine maintenance inspections is challenging due to LRT crossings.

To meet the above noted clearances, approximately 700m of the 1220mm feeder main will be relocated in an easement along the east side of Woodroffe Avenue. The relocation would start approximately 350m north of the VIA Rail line, near Blacks Rapids Creek. The location in plan-view is shown on functional design drawing sheets 21 and 22 provided in Section 8. The proposed profile for the relocated feeder main will be nearly identical to the existing 1220mm as shown on drawing sheets 9 and 10 (Section 8). The feeder main shall be designed and constructed to meet the latest versions of the City of Ottawa – Water Distribution Guidelines and include but not limited to items such as, valve chambers, air

relief chambers and steel casing Pipes. The feeder main crossing the VIA Rail line shall also meet requirements outlined under the Transport Canada – Standard Respecting Pipeline Crossing Under Railways.

More details of the impact to the feeder main and mitigation measures are described in **Section 7.8.2**.

7.2.10 RAIL GRADE-SEPARATIONS

The proposed project includes three new rail grade-separations of the VIA Rail Smiths Falls Subdivision in the vicinity of Fallowfield Station. Functional design of these grade-separations are provided in **Section 8**. These are located where the VIA Rail line currently crosses:

- Woodroffe Avenue;
- Southwest Transitway; and,
- Fallowfield Road.

As outlined in **Section 6**, all three rail grade-separations will be overpasses, and designed as open structures and the Woodroffe Avenue and Southwest Transitway overpasses incorporate eco-crossings and all incorporate new MUP facilities as well as connections to existing/proposed NCC pathways. The structures have been planned to proceed as a separate project in advance of the Barrhaven LRT extension based on available funding.

7.2.10.1 Woodroffe Avenue Rail Grade-Separation

This overpass will be a long multi-span bridge located within the existing Woodroffe Avenue Right-of-Way. It will have two traffic lanes in each direction (**Figure 7-9**). Twin spans carrying the northbound and southbound traffic lanes are proposed. This will allow light to penetrate between the two spans down to ground level, to provide a sense of openness beneath the structure where a new pathway connection will be provided between the existing NCC Greenbelt pathway and Fallowfield Station. The existing NCC MUP which runs parallel to Woodroffe Avenue on its east side will be relocated onto the east side of the new structure, with connections provided to the existing network.

7.2.10.2 Southwest Transitway Rail Grade-Separation

This overpass is located adjacent and to the west of the Woodroffe Avenue rail grade-separation, in the existing Southwest Transitway corridor (**Figure 7-9**). This rail grade-separation will be designed to allow construction as a BRT facility if the rail grade-separation proceeds in advance of the LRT implementation, with future conversion to LRT accommodated at a later date.

Both the Woodroffe Avenue and Southwest Transitway bridges will be built at the same time and a temporary detour will be required while they are built. This detour will be located west of existing Woodroffe Avenue, largely on NCC property. It will include a new signalized at-grade crossing of the VIA Rail, and will be six lanes wide accommodating with one exclusive bus-only lane and two general purpose lanes in each direction and the NCC MUP on the east side. Bus operations will transition into general traffic north of the crossing.

During construction, northbound and southbound bus queue-jumps will be built at the Slack Road intersection, and between Vaan Drive and the Nepean Sportsplex where they will tie into the existing dedicated bus-only lanes to the north to minimize transit delays.

Figure 7-9 Artistic Renderings of the Woodroffe Avenue and Southwest Transitway/LRT Overpasses

It is anticipated that the existing 1220mm watermain will need to be protected during construction of the overpasses and may require realignment. Overhead utility lines will need to be relocated to accommodate the Woodroffe Avenue overpass structure.

The Woodroffe Avenue rail grade-separation will require reconstructing approximately 1km of Woodroffe Avenue and includes a new signalized intersection south of the VIA Rail line. This intersection will serve to provide an additional roadway access to Fallowfield Station as well as to the NCC farmland (Royale Equestrian Centre) located on the east side of Woodroffe Avenue.

To accommodate required side slopes associated with the north and south overpass approach embankments, NCC property is required. This will impact existing farm operations on the east side of Woodroffe Avenue. Future design will consider ways of reducing the footprint of the proposed rail grade-separation while balancing functional requirements and NCC land requirements.

7.2.10.3 Fallowfield Road Rail Grade-Separation

The Fallowfield Road overpass will cross over the VIA Rail and Barrhaven LRT tracks approximately 40m north of the current crossing and have two traffic lanes in each direction plus a relocated MUP on the south side of the structure (**Figure 7-10**). This relocation to the north creates greater separation from the existing neighborhood, reducing noise, vibration, and air quality impacts. It avoids building a temporary detour during construction, which would be complex to undertake given the skewed crossing of the VIA rail tracks and the existing Southwest Transitway.

The overpass has been designed as a long multi-span bridge with lower approach embankments that reduce the project footprint and associated impact on NCC lands. The abandoned roadbed will be rehabilitated and provide space for landscaping, stormwater management and for potential community use. A new pathway connection linking to Fallowfield Station from the south will run under the overpass.

The existing intersections providing access to Fallowfield Station and the adjacent shopping plazas on the south side will be reconfigured to a protected intersection configuration.

Figure 7-10 Artistic Rendering of the Fallowfield Road Overpass

7.3 Corridor Drainage and Stormwater Management Approach

A detailed Corridor Drainage and Stormwater Management Plan shall be developed during the detailed design phase of the project. A high-level analysis during the EA process was conducted to confirm Right-of-Way requirements. During the detailed design stage, opportunities for employing Low Impact Design (LID) and Best Management Practices (BMP) of the day for stormwater management will be considered further. The objectives would be to manage stormwater within the Right-of-Way infrastructure as much as possible. Potential low impact design measures to consider may include:

- enhanced bioswales;
- open-bottom pipes; and/or,
- bioswales.

Depending on the measures used and their effectiveness given the localized subsurface conditions, the need for and size of proposed stormwater management facilities can be confirmed at that time.

All future stormwater management systems should provide an 'enhanced' level of stormwater quality protection as defined by the MECP in the *Stormwater Management Planning and Design Manual (2003)* or current BMP's depending on the time lapse to implementation. A more detailed understanding of the soil conditions and groundwater table, to be undertaken at detailed design, will assist in informing this approach.

Preliminary analyses and suggested approach to corridor drainage and stormwater management for the various sections of the Recommended Plan are described below. The full technical memo of analyses can be found in **Appendix B**.

7.3.1 BASELINE STATION

Water quantity control for Baseline Station and Southwest Transitway extension is being accommodated in the Baseline/Woodroffe Stormwater Management Retrofit Pond in lieu of underground storage. Quality control for the Southwest Transitway extension and upgraded Baseline Station has been provided on-site and the Baseline Transit tunnel has installed oil and grit separators. Further analysis of the existing oil and grit separator capacity is required during detailed design to confirm if additional oil and grit separators are required to meet quality requirements for this area.

7.3.2 BASELINE STATION TO NEPEAN SPORTSPLEX STATION

Figure 7-11 Enhanced Grass Swale with Check Dams (TRCA, 2016)

The elevated guideway is to be designed to prevent surface drainage from running off the edge of the deck or crossing the rail. The depth of surface flow in a 100-year storm event should not exceed the elevation of the bottom of the rail at any location on the elevated guideway or adversely affect the use of the guideway's emergency pathway. Flow to be intercepted in the 100-year event. Preferably, drainage will be collected by a series of drains that ultimately outlet through the guideway's columns. Cleanouts are to be provided for downspout system in a manner as to provide access of the deck drainage system. Spread analysis should be undertaken during detailed design to confirm drain spacing.

The downspout system can be connected to the existing storm sewers within Woodroffe Avenue. However, there is an opportunity to incorporate LID into the drainage design by constructing an enhanced grass swale system in place of a traditional ditch system underneath the elevated structure. Incorporating grass swales into the landscaping design alongside the MUP can provide stormwater treatment while improving site aesthetic and irrigation. Enhanced grass swales are vegetated open channels that convey, treat and attenuate stormwater runoff. The enhanced grass swale design decreases the velocity of the stormwater, allowing for sedimentation, filtration through the root zone and soil, evapotranspiration, and infiltration into the underlying soil. Check dams can temporarily pond water to further improve contaminant removal rates (TRCA, 2016). Enhanced grass swales are designed to not pond water for longer than 24 hours following a storm event and not have standing

water. The enhanced grass swale system would ultimately drain to ditch inlets that drain to the existing storm network in Woodroffe Avenue.

To further enhance water balance and water quality benefits, dry swales could be a more appropriate alternative. A dry swale is a design variation of the enhanced grass swale that incorporates an engineered soil media bed and optional perforated pipe underdrain system (TRCA, 2016). Depending on the choice to outlet the elevated guideway to the swale, dry swales can provide additional water quality improvement and infiltration to reduce standing water over shorter periods of time. Choosing the most appropriate swale type will depend on soil conditions and swale design velocity.

7.3.3 NEPEAN SPORTSPLEX STATION TO VIA RAIL

It is recommended that the existing rural cross-section be maintained in this area. The existing grass swales will continue to reduce runoff volumes and reduce pollutant loads by filtrating stormwater through the grass vegetation and promoting infiltration into the native soil. The post-development drainage will match the existing drainage patterns and ultimately discharge to Black Rapids Creek. Changes to the existing peak flow patterns will be minor and are considered negligible, therefore no proposed quantity or quality additional treatment will be required.

7.3.4 WOODROFFE AVENUE AND SOUTHWEST TRANSITWAY/LRT OVERPASSES

Woodroffe Avenue and Southwest Transitway/LRT will overpass VIA Rail as two separate bridge structures. To accommodate the proposed embankment footprint, the existing box culvert at Black Rapids Creek tributary will be extended. The culvert will be retrofitted with a suspended platform to provide a new eco-crossing for small terrestrial wildlife.

By maintaining the existing rural cross-section, the existing grass swales will continue to reduce runoff volumes and reduce pollutant loads by filtrating stormwater through the grass vegetation and promoting infiltration into the native soil. The post-development drainage will match the existing drainage patterns and ultimately discharges to Black Rapids Creek.

The elevated guideway is to be designed to prevent surface drainage from running off the edge of the deck or crossing the rail. The depth of surface flow in a 100-year storm event will not exceed the elevation of the bottom of the rail at any location on the elevated guideway or adversely affect the use of the guideway's emergency pathway. Drains will ultimately outlet through the guideway's columns to the relocated or existing ditch system and continue draining towards Black Rapids Creek. Cleanouts are to be provided for downspout system in a manner as to provide access of the deck drainage system. Water quantity control should be incorporated within the ditch system using LID.

7.3.5 FALLOWFIELD STATION

The eastern portion of the park-and-ride will continue the use the existing sewer and ditch network that outlets to a dry pond in the northeastern corner of the site. Drainage from the new signalized intersection and MUPs just south of the parking lot area is to be routed to this system. To avoid retrofit of the existing dry pond, drainage from the western side of the park-and-ride should be relocated to the proposed Fallowfield stormwater ponds, detailed in the Realigned Fallowfield Road Overpass section. Further water quantity control can be accommodated through roof storage, LID, and/or oversized pipes as needed. Additional water quality control can be enhanced by installing an oil and grit separator.

7.3.6 REALIGNED FALLOWFIELD ROAD OVERPASS

North of the current VIA Rail and Fallowfield Road crossing, the roadway is to be realigned as an overpass that will cross over the VIA Rail and proposed LRT corridor. The abandoned roadway will be rehabilitated to implement stormwater management features, landscaping, and potential community use. Existing sewer and ditch systems along Fallowfield Road and the western side of the Fallowfield park-and-ride facility are to be redirected to the new stormwater management features.

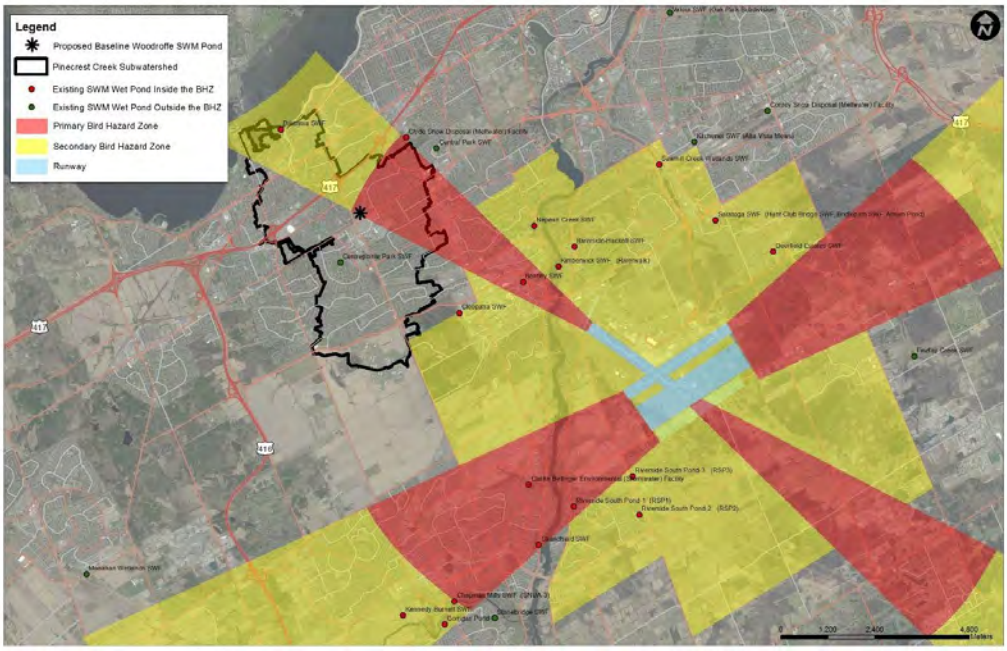
This area provides great opportunity to introduce an end-of-pipe stormwater management to treat stormwater runoff for the future configuration. However, since the proposed area is located on the western side of the primary bird hazard zone of the Ottawa MacDonald Cartier International Airport (OMCIA) (**Figure 7-12**) as per 2010 Airport Zoning Regulations, activities or land use that attract birds within the limits of the bird hazard zone are not permitted.

An end-of-pipe stormwater management facilities receives stormwater from a conveyance system, such as a ditch or a sewer, and discharges the treated water to a receiving watercourse or water body. The purpose of end-of-pipe stormwater management practices is to control the impacts of urbanization which remain after lot level and conveyance controls have been applied. To ensure the stormwater management solutions remain in-line with these regulations, a dry pond is proposed along the old Fallowfield Right-of-Way. Creative design is suggested to incorporate with the landscaping and create a community space.

Discharges from the dry stormwater management ponds will ultimately outlet to the existing transitway ditch system flowing south.

Dry ponds can only achieve a basic level of protection (60% suspended solid removal rate). To achieve an enhanced protection level (80% suspended solid removal rate) a treatment train system could be incorporated into the stormwater management solution by additional features such as grass swale and/or an oil-grit separator prior to discharge into the receiving watercourse.

Figure 7-12 OMCIA Primary Bird Hazard Zone



7.3.7 CONSTRUCTION DETOUR

A temporary detour will be built west of the future structures (Woodroffe and Southwest Transitway/LRT) to accommodate general traffic, transitway buses, and the NCC MUP. The detour will require a temporary water passage system to ensure flow through Black Rapids Creek and its tributary are accommodated. The proposed temporary culverts are to be equivalent to the Woodroffe Avenue crossings. Erosion and sediment control measures would be required to ensure water quality in the downstream water bodies is protected.

7.3.8 FALLOWFIELD TO HIGHBURY PARK

The post-development drainage along the transitway corridor is to match existing drainage patterns. Changes to the existing peak flow patterns along the transitway corridor will be minor and are considered negligible. Along the track, no proposed quantity or quality treatment will be required.

7.3.9 TRAIN STORAGE AND SERVICING FACILITY

Post-development runoff flows from the TSSF area requires the existing stormwater management facility be re-sized to accommodate both quantity and quality water control requirements from the site while accommodating its existing demands.

The proposed pond is located on the western side of the primary bird hazard zone of the Ottawa MacDonald Cartier International Airport. As per 2010 Airport Zoning Regulations, activities or land use that attract birds within the limits of the bird hazard zone are not permitted. To ensure the stormwater management solutions remain in-line with these regulations, the proposed pond shall remain a dry pond.

Based on MECP's Stormwater Management Planning and Design Manual (March 2003), only a basic removal rate of 60% can be achieved in a dry pond where the detention time is 24 hours. This could be improved with a detention time of 48 hours.

7.3.10 HIGHBURY PARK TO BARRHAVEN CENTRE STATION

The reuse of the existing transitway infrastructure will allow the post-drainage to match the existing drainage patterns. Changes to the existing peak flow patterns will be minor are considered negligible, therefore no proposed quantity or quality treatment will be required. The existing storm pipe infrastructure will need to be lowered to handle the new track elevation. The pipes will continue to outlet to Jock River.

7.3.11 BARRHAVEN CENTRE STATION

Underground storage chambers are recommended below the paved area to meet the required quantity storage requirements and an oil and grit separator would provide the required quality control prior to discharging into the 1650mm diameter pipe located along the future Chapman Mills. The large diameter pipes have been constructed to discharge stormwater from the Southwest Transitway Land and discharge into the Nepean South Stormwater Ponds.

It is recommended that underground chambers and an oil and grit separator be constructed below the new parking and roadways to meet the quantity and quality requirements.

7.4 Corridor Landscaping and Space Programming Strategy

The existing landscape context within the Study Area is complex and variable. The attributes shift rapidly as one passes north to south along the corridor from the low density residential and commercial and institutional developments in Centrepointe, Crestview and Tanglewood, Craig Henry, Manordale, Merivale Gardens and Barrhaven, past the edges of the urban natural area of Tallwood Woods and Pinhey Forest and through active agrarian lands within the NCC Greenbelt. Vegetation along this route today serves to enhance, frame and screen these forms from existing infrastructure. A Corridor Landscaping and Space Programming Strategy is recommended for the Barrhaven LRT facility to guide the future design of landscape features at each station location and other contexts along the corridor to assist in enhancing the transit rider experience, provide shelter for those using adjacent multi-use pathways and those accessing the corridor as well as to provide a buffer for the adjacent land uses from the facility. The landscape strategy includes consideration of the following contexts and approaches.

7.4.1 PARALLEL TO THE CORRIDOR ADJACENT TO EXISTING LAND USES

Landscaping elements to be provided to enhance existing elements along the corridor would serve to create a greener edge, buffer adjacent land uses as required, and provide shelter from the weather and extreme storm events. The development of future landscape plans in this context should consider the following:

- Minimize the removal of existing landscaping through compact footprints and choice of staging areas;
- Landscape corridor / edge conditions that may offer visual screening of the elevated guideway, shade for corridor users, and the added benefit of sound attenuation;
- Landscape elements should be chosen to provide functional and aesthetic value throughout the seasons;
- Landscape elements should include native tree and shrub species, use non-invasive species, and consider species that are urban and salt tolerant; and,
- Landscape elements should include rest and seating areas that are designed to include soft landscape features that provide protection from the weather to the degree possible.

7.4.2 TALLWOOD WOODS EDGE TREATMENT

Tallwood Woods is an approximately 5.4ha urban woodlot located between Tallwood Avenue (beyond the City Archives building) to the CN Rail line. The woodlot is designated as an Urban Natural Feature in the City of Ottawa's Official Plan and hold both ecological and aesthetic value within the existing urban landscape and the community. An existing multi-use pathway connects Woodroffe Avenue to the community through this natural area. As a portion of the woodlot will require removal to implement the project, a new edge treatment will be required to protect the remainder of the area. The development of future landscape plans in this context should consider the following:

- Completion of a tree inventory prior to construction to determine species composition that can be further considered in development of a detailed landscape plan;
- Planting lists are to include non-invasive species that are native to Ottawa and will emulate natural characteristics consistent with the existing woodlot;
- Minimize the removal of existing landscaping through delineation of the "limit of site alteration" and marking in the field, using visual means so that construction teams can clearly see the limit of site alteration during the clearing and grubbing processes;
- Installation of new edge plantings as soon as possible following the site alteration processes to both protect the exposed woodlot edge and to mitigate the spread of invasive species;
- Consideration for greening of guideway piers that may serve as a gateway to the multi-use pathway connection to the community;
- Consideration for additional plantings within city boulevard to form a "green tunnel" appearance that the woodlot extends to street; and,
- Development of a monitoring plan to ensure that the newly planted materials survive and fulfils the intended function and to ensure that the inadvertent spread of invasive species is appropriately managed.

7.4.3 STATION LOCATIONS

As was the design of the existing Confederation Line Stage 1 light rail stations that have used similar architectural elements and stylings, it is anticipated, the branding for individual stations will continue to roll out across the Stage two and three locations, forming a recognizable entity at all points in the City. It is envisioned that each station would have a subtly or overtly recognizable treatment which reflects its neighbourhood attributes or destination. In this way, landscape choices can build familiarity and confidence across the transit ridership or add individuality to reach location. The development of future landscape plans in this context should consider the following:

- Landscape features should also include plantings & site furniture to respond and strengthen characteristics of the individual stations;

- Use landscape design as wayfinding elements to assist and provide guidance to station entrances and connections to the adjacent pedestrian and cycling networks;
- Landscape design should be subordinate to station architectural design only assisting to articulate shape, form and providing functional elements such as nodes, shade, screening, define direction of travel and accentuate access/egress point; and,
- Give consideration to the type and location of landscaping elements in proximity to the stations to minimize the attraction and risk to birds.

7.4.4 NCC GREENBELT INCLUDING AROUND THE GRADE SEPARATIONS

The Greenbelt is an iconic cultural landscape defining Ottawa as the Nation's capital. The area surrounding the Barrhaven LRT and the rail-grade separations around Woodroffe Avenue and Fallowfield Road is a pastoral context with active farm operations including horse riding, cultivated lands and research farms. The community facility of the Nepean Sportsplex and the Ottawa Sound Stage development located within the Greenbelt serve as additional destinations along the line. A landscape design in this context should consider the following:

- Landscape intervention should be subtle to maintain view sheds of agricultural landscape and edge condition especially at Nepean Sportsplex Station, the northern edge of the Greenbelt;
- Greenbelt pathways edges should be re-naturalized and include shade trees at strategic respite location. Consideration should be given to incorporating rest and seating areas;
- Slopes/embankments around the rail grade-separations should be naturalized with appropriate grass and shrub species to assist in slope stabilization/erosion control, and integration with surrounding landscape; and,
- Identified creek culverts to be designed as eco-crossings for wildlife should be enhanced for terrestrial animals and aquatic species with native, non-invasive vegetation along the edges with natural substrates as much as possible. Fencing to guide approach and movements of wildlife to the eco-crossings should also be included.

7.4.5 SPACE PROGRAMMING UNDERNEATH THE ELEVATED GUIDEWAY

In consultation with various City departments a number of opportunities were identified to animate the space that will be created underneath elevated portions of the facility between Baseline Station and Nepean Sportsplex Station. A range of space animation strategies should be considered during the detailed design of the project with the objective of creating welcoming spaces, softening the appearance of the elevated facility, and provide valuable community-servicing uses. As with the stations themselves, these areas can be unique to their specific location and context. In addition to considering these areas for corridor landscaping, the range of opportunities to be examined could include:

- Location for Multi-Use Pathways;
- Recreational uses such as playgrounds, skate parks, and dog parks;
- Open Space Markets;
- Areas for festivals and community gatherings;
- Public Art installations; or,
- Community Gardens.

7.5 Description of Project Activities

7.5.1 PRECONSTRUCTION PHASE

A key requirement of the pre-construction phase will be the acquisition by the City of the required right-of-way within the project limits. The specific requirements are illustrated on the Recommended Plan (**Section 8**). The City will employ its approved process of contacting landowners and working with them towards acquisition, using the standard methods that are available to the City.

This phase includes the completion of preliminary and detailed engineering and landscape designs and preparation of contract drawings and specifications. The phase also involves obtaining all necessary permits as well as approvals from regulatory agencies. Future consideration during the design phase should include but not be limited to:

- Confirming existing conditions through detailed survey;
- Confirmation of project geometry, overpass, elevated LRT and station locations;
- Confirmation of approach to project procurement;
- Determination of intersection designs;
- Finalizing detours for all modes where applicable;
- Stormwater management design;
- Landscape materials and tree planting details;
- Confirming locations and design(s) of eco-crossings;
- Location/width of multi-use pathways;
- Lighting design, frequency and location of light poles;
- Traffic plant design;
- Station design;
- TSSF design;
- Finalizing locations of TPSS;
- Submission of Property Management Proposal to Hydro One for approval;
- Completion of a separate EA following the Class EA for Minor Transmission Facilities for modifications/relocations of existing Hydro One infrastructure, as required (Section 9.5.2.7);
- Accessibility features;
- Strategy for management of impacted materials (if applicable);
- Obtaining approvals for construction access and working areas;
- Identification of all existing utilities in the area and preparing utility reconstruction/relocation plans;
- Detailed construction staging and phasing plans;
- Coordination with other projects in the vicinity of the corridor; and,
- Development of all mitigation plans and strategies.

7.5.2 CONSTRUCTION PHASE

This phase involves activities related to construction. Physical construction activities for the LRT, overpasses, stations, TSSF, MUPs and associated greenscaping and streetscaping will include but not be limited to:

- General activities applicable to all elements:
  - Installation of construction fencing and required protection measures for trees, wildlife and sediment / erosion control
  - Clearing and grubbing of trees or any vegetation within the grading limits for construction of the project;
  - Stripping of topsoil within the grading limits;
  - Management of impacted materials (if applicable);
  - Relocation of utility and piped underground infrastructure;
  - Installation of storm catch basins and storm sewers as well as ditch drainage and other stormwater management features;
  - Implementation of traffic management measures. The work will be sequenced and timed to minimize impacts on the transit network, cycling routes, pedestrian pathways and adjacent local roads and access;
  - Installing landscaping features; and,
  - Restoration and rehabilitation of any disturbed areas extending beyond the project limits.

- Activities applicable for the realignment and construction of the Fallowfield Road overpass:
  - Excavation of road surface;
  - Removal of existing asphalt, re-use where possible, and disposal at an approved facility;

- Pouring concrete curbs; and,
- Rehabilitation of existing Fallowfield Road alignment.

- Activities applicable for the construction of the Woodroffe Avenue and Southwest Transitway overpasses:
  - Construction of the detour;
  - Installing eco-crossings and exclusion fencing;
  - Preparing base for LRT/overpasses including cutting and filling (potentially salvaging existing granular for re-use); and,
  - Rehabilitation of farmlands as part of decommissioning of the construction detour.

- Activities applicable to road works:
  - Laying granular and application of hot mix asphalt;
  - Construction of Park and Ride at Barrhaven Town Centre (may proceed in advance of LRT);
  - Applying pavement markings and installing traffic signs; and,
  - Installing lighting and traffic signals.

- Activities applicable for LRT works:
  - Construction and conversion of existing transitway from BRT to LRT technology;
  - Elevated LRT components will be constructed in such a way as to minimize community disruption;
  - Elevated LRT segments will generally be constructed using a viaduct system rather than embankments;
  - At-grade sections will employ typical track on tie and ballast, with sub-grade to provide drainage;
  - From north of Berrigan Drive to south of Chapman Mills drive a below-grade LRT will be constructed. These sections will both be open cuts or trenched. Functionality of existing roadways and parking lots impacted will be maintained during construction using temporary decking, typically consisting of timber decking or precast concrete panels, supported by the excavation shoring system;
  - Raising hydro lines as required in partnership with Hydro One;
  - Constructing pier foundations to bedrock, installation of precast girders, concrete deck and rail tracks;
  - Transit priority measures on Woodroffe Avenue to reduce bus delays during construction;
  - Elevated stations will include at-grade station facilities (entrance buildings, service rooms) with stairs, escalators and elevators providing vertical circulation between the station entrance and elevated platform at track level. Fully enclosed platform canopies spanning over the platforms and tracks will be provided;
  - For stations converted to accommodate LRT, they will remain largely in their current configuration, existing platforms will be lengthened and widened. Station amenities will need to be upgraded;
  - New station construction (Tallwood, Knoxdale and Nepean Sportsplex, Barrhaven Centre);
  - Decommissioning of Marketplace Station;
  - Ancillary works including construction of special trackwork (pocket track, crossovers) and TPSS; and,
  - Construction of the TSSF
    - Site excavation and grading, installation of overhead electrical supply, track laying, construction of maintenance and storage structures/buildings, associated road access and parking lot, installation of security features, lighting and communication systems, transportation and storage of construction materials and equipment, installation of landscaping elements.

7.5.3 OPERATIONAL PHASE

This phase begins with the first day of corridor operation and covers the general operational activities such as maintenance and monitoring, on an as-required basis. Once construction is complete, monitoring of the project, as it will be completed in phases, will be initiated as part of the normal City practices. In addition, warranty reviews (such as landscape health) will be completed.

Light Rail Operation

Activities associated with the operation of the Barrhaven LRT Extension include general operation of trains along the alignment which will occur in accordance with the operating standards developed and agreed to between the City and contractor selected to maintain the LRT system. Operations will generally be from early morning to late evening, 365 days a year. Service levels will vary through the day to reflect demand, with more trains during weekday peak periods and fewer during off-peak, late evening and weekend time periods.

A detailed operating plan will be developed prior to opening of the line for revenue service and adjusted as ridership patterns develop and establish themselves. Operating plans will address LRT operations under a variety of different scenarios (normal, emergency, special events) and will be consistent with those developed for the Confederation Line.

Bus Operation

The Barrhaven LRT Extension will be fully integrated with the City's existing transit network. Existing bus routes which currently operate along the Southwest Transitway between Baseline Station and Barrhaven Town Centre will largely be replaced by the new LRT. Some routes will need to be adjusted to connect with the LRT at Fallowfield or Barrhaven Centre Stations.

While the final bus route configuration cannot be planned in detail at this time, as the exact arrangement of routes and service frequencies are dependent on the level and types of services being operated when the system opens, preliminary planning at each station has identified the need for bus connection facilities. Each of the stations has sufficient space to meet the likely demand for connecting bus routes.

Near the end of the construction period, OC Transpo, as part of on-going service planning processes, will finalize the BRT and local bus routings to provide connections with the new LRT line, reflect the new operating philosophy, respond to ridership growth and changes in ridership patterns and meet the operating budget requirements in place at the time. After construction ends and the LRT is in service changes to the bus network will be part of OC Transpo's annual service planning process.

Corridor Maintenance

Maintenance activities in accordance with current City standards will include:

- Spring sweeping of the roads and pathways;
- Maintenance of stations;
- General maintenance to ensure public safety (changing lights, security checkups);
- Maintenance of rails, LRT infrastructure and overhead electrical system;
- Routine vehicle cleaning and light maintenance;
- Ditch cleanouts;
- Snow and ice removal in winter;
- Winter maintenance will include snow clearance and salting/sanding pedestrian areas;
- Routine vehicle cleaning, inspection and minor repairs and vehicle storage (TSSF);
- Landscaping maintenance including grass cutting, tree pruning (optimally in Fall or Winter); and,
- Replacement of any landscape materials.

7.5.4 PROJECT PHASING AND PRIORITIZATION

The extension of LRT to Barrhaven is identified in the TMP for implementation post 2031. The project is not part of the City's affordable network. The rail grade-separation of Woodroffe Avenue, Southwest Transitway and Fallowfield Road is not identified with a timeline for implementation in the TMP. No funding has been committed from senior levels of government to implement the project. Notwithstanding, there may be opportunities to build sections of the project in two phases. These phases are:

Phase 1: Recommended for construction first to address the critical safety issue in the Barrhaven area and more critical travel demand:

- Extension of LRT from Baseline Station to Fallowfield Station including the three rail grade-separations of Woodroffe Avenue, the Southwest Transitway and Fallowfield Road from the VIA Rail line.

Phase 2: Based on availability of funding and future demand:

- Extension of LRT from Fallowfield Station to Barrhaven Centre Station including construction of the TSSF.

Additionally, the City could elect to proceed with the three VIA Rail grade-separated crossings, independent of the Barrhaven LRT project. The Recommended Plan for the overpass of the Southwest Transitway has been designed in consideration of implementation initially as a BRT facility with later conversion to LRT technology.

Although this Study identifies a proposed two-phased approach, the actual implementation strategy will be determined by the City as part of its ongoing TMP and infrastructure planning practices.

7.5.5 CONSTRUCTION STAGING

Primary tasks associated with construction of the project have been identified above. The varying conditions along the corridor will require that several different construction methods be used to complete the project, including excavation for below-grade segments and overhead structures for elevated LRT segments and the rail grade-separations. Temporary staging areas will be required at multiple locations to support stockpiling of materials and equipment needed to construct the project in an efficient manner.

Construction of the Barrhaven LRT Extension is likely to follow the same process as the current Confederation Line, with a private sector partner responsible for the final design, construction, and maintenance of the project, with OC Transpo operating the service. The contractor selected by the City will be responsible for developing construction plans and designs which meet contractual requirements, which includes defining the means and methods of construction.

7.6 Built-in Mitigation Measures

For this project, “built-in mitigation” is defined as actions and design features incorporated in the pre-construction, construction, and operational phases, which have the specific objective of lessening the significance or severity of environmental effects which may be caused by the project. They include standard construction practices and BMPs.

The Project will be designed and implemented with the benefit of contemporary planning, engineering, and environmental management practices. Regard shall be had for the legislation, policies, regulations, guidelines, and best practices of the day. Where possible, mitigation measures will be prescribed in the construction contracts and specifications. Examples of practices that should be employed, based on current standards, are described below. These measures can be considered “built into” the preferred design for the roadway. They will be updated and refined during the pre-construction, construction, and operation phases of the project, as early as possible.

7.6.1 EROSION AND SEDIMENT CONTROL PLAN

A detailed plan will be prepared by the Contractor, to manage and mitigate the flow of sediment into storm sewers and watercourses resulting from project construction including excavation. This plan will include preventative measures (e.g. covering excavated soils) to deter opportunistic species such as Bank Swallow from nesting on stockpiled materials within construction areas. The plan shall include drawings, standard notes and reports depicting and describing the site conditions (e.g. grades, locations of natural features, soil stockpiles) during a particular phase of construction and based on BMPs. Individual ESC plans should be generated for each phase of construction to manage and mitigate the flow of sediment into storm sewers and watercourses resulting from project construction. The plan should have regard for the

sensitive nature of the lands north of West Hunt Club Road to Baseline Station which are located within an IPZ-2 area. This plan may include the following twelve (12) elements:

- Preserve existing vegetation and mark clearing limits.
- Establish construction access.
- Control flow rates.
- Installed sediment controls specific to the site topography.
- Stabilize soils.
- Protect slopes.
- Protect drain inlets.
- Stabilize channels and outlets.
- Control pollutants.
- Control de-watering.
- Maintain best management practices.

7.6.2 ENVIRONMENTAL PROTECTION PLAN

It will be the responsibility of the contractor to ensure that no contamination, waste or other substances which may be detrimental to aquatic life or water quality, will enter a watercourse as either a direct or indirect result of construction or site preparation. In this regard, any floating debris resulting from construction which accumulates on watercourse banks is to be immediately cleaned up and disposed of. Any spills or contamination, waste or other substances which may be detrimental to aquatic life or water quality will also be immediately cleaned up.

Any work which will cause or be the cause of discharge to watercourses is to be prohibited. At all times, construction activities are to be controlled in a manner that will prevent entry of deleterious materials to watercourses. In particular, construction materials, excess materials, construction debris and empty containers are to be stored away from watercourses, the banks of watercourses and steep slopes.

Any required staging areas should avoid sensitive areas such as Black Rapids Creek or Tallwood Woods, to the extent possible and be located as far away as possible.

7.6.3 AIR QUALITY, NOISE AND VIBRATION

A detailed air quality, noise and vibration assessment was conducted for the Recommended Plan. The full report can be found in **Appendix B**. Analysis found noise levels throughout the Study Area are dominated by area road traffic. Established ambient noise levels in the Study Area are more than 60 dBA. Implementation of the project will marginally increase noise levels above existing conditions. Should there be changes in guidelines and best management practices in the future or changes in LRT design, further noise analysis may be required at detailed design. If future residential developments are proposed within proximity to the project, the requirement for noise attenuation measures will be evaluated at that time and any necessary mitigation will be included as a condition of development approval.

Varied construction activities throughout the corridor are expected to create isolated and short-term noise, air quality and vibration impacts on the environment. The construction manager will be required to develop a strategy for mitigating the effects according to BMPs intended to satisfy, as feasible, the fugitive dust limits specified in O. Reg. 419, the noise limits specified in MECP NPC-115 and NPC-118 and City of Ottawa By-laws for Noise; and MECP NPC -119 and NPC-207 for ground vibrations or the regulating standards of the time. A list of common mitigation strategies adapted to the current project includes, but is not limited to, the following:

Air emissions BMPs:

- Monitor wind conditions, and plan operations to take advantage of calm wind periods;
- Minimize site storage of granular material in height and extent;

- Locate storage piles in sheltered areas that can be covered;
- Provide movable wind breaks;
- Use water spray and suppression techniques to control fugitive dust; and,
- Cover haul trucks and keep access routes to the construction site clean of debris.

Noise and vibration BMPs:

- Limit speeds of heavy vehicles within and approaching the site;
- Provide compacted smooth surfaces, avoiding abrupt steps and ditches;
- Install movable noise barriers or temporary enclosures, around blast sites for instance;
- Keep equipment properly maintained and functioning as intended by the manufacturer; and,
- If required, implement a blast design program prepared by a blast design engineer.

7.6.4 EMERGENCY RESPONSE PLAN

The preparation of an Emergency Response Plan to be used by the contractor will be needed to allow full emergency service access at all times during the construction period, such that there is a method to access all residential, commercial and other land uses in the event of an emergency. Additionally, the Emergency Response Plan should include provisions for providing temporary services to end users in the event of a construction related service outage or other service disruption.

7.6.5 SPILLS RESPONSE AND REPORTING PLAN

A Spills Response and Reporting Plan will be prepared and adhered to by the contractor. A response plan is to be implemented immediately in the event of a sediment release or spill of a deleterious substance and include keeping emergency spill kits on site (and in heavy machinery) in case of emergency.

The Contractor must also ensure that:

- Materials such as paint, primers, rust solvents, degreasers, grout, poured concrete or other chemicals do not enter the watercourse.
- Ensure that building material used in a watercourse has been handled and treated in a manner to prevent the release or leaching of substances into the water that may be deleterious to fish.

All spills shall be reported to the Ministry of Environment (MOE) Spills Action Centre (1-800-268-6060). Management of Contaminated Materials.

Studies will be completed to confirm the potential for the project to interact with contaminated soil or groundwater, where existing conditions are not known. Where the potential has been confirmed, a plan to remediate the environment to the applicable standards will be prepared. The MECP and Construction Project Manager would be notified immediately upon discovery of any contaminated material encountered within the construction area. If contaminated material or contaminated groundwater is encountered within the construction limits, these are to be removed and disposed of in accordance with all applicable Acts and Regulations and reported to applicable authorities. Treatment and discharge of contaminated groundwater are to also be in accordance with applicable legislation and regulations.

7.6.6 LIGHTING TREATMENT PLAN

A Lighting Plan in accordance with City of Ottawa standards (City of Ottawa, 2016) will be prepared as part of the detailed design. The Lighting Plan will include lighting fixtures and illumination along the corridor. Within the Greenbelt, consultation with the NCC to develop context sensitive lighting.

7.6.7 CONSTRUCTION WASTE MANAGEMENT PLAN

During construction there will be some excess materials that will require disposal off the project site. These could include concrete rubble, asphalt, waste steel/metal structural components, earth, and road right-of-way appurtenances such as signs, lighting and utility poles. During the detailed design stage, a Construction Waste Management Plan will be developed to ensure that surplus material is recycled wherever practical and to describe the methods to be used by the Contractor for disposal of all other surplus material in accordance with provincial or local municipal practices and guidelines. MECP's guideline *Management of Excess Soil – A Guide for Best Management Practices* (MOECC, 2014) should be referenced once this management plan is being prepared.

7.6.8 ARCHAEOLOGICAL RESOURCES

During the course of construction, if unexpected archaeological resources are discovered, the site should be protected from further disturbance until a licensed archaeologist has completed the assessment and any necessary mitigation has been completed. Applicable authorities should be notified according to the guidelines and land ownership at the time.

7.7 Site Specific Mitigation Measures

Once potential effects were predicted as part of this EA study, mitigation measures were identified. Often these mitigation measures were sufficient to reduce potential negative effects to an insignificant or negligible status. Mitigation included environment rehabilitation and replacement. Localized site-specific mitigation measures are summarized below.

7.7.1 PROPERTY ASSESSMENT AND ACQUISITION PROCESS

The EA study resulted in a Class C cost estimate for project implementation that followed the City of Ottawa's Project Delivery Review and Cost Estimating procedure. Costs associated with acquiring property and property rights on which to build or provide construction easements for the construction of the project will need to be estimated. These will include, in addition to actual property value, the cost of right-of-way preparation, legal and appraisal services and land survey.

7.7.2 RESIDENT DISPLACEMENT MITIGATION PLAN

The Recommended Plan will require the acquisition of a 20m wide strip of land for the LRT Right-of-Way from three (3) private properties adjacent to the west side of Woodroffe Avenue with municipal mailing addresses of: 1, 3, 5, 19 and 23 Cheryl Road, 1668 Woodroffe Avenue and 5 Majestic Drive as illustrated in (**Figure 6-17** and **Figure 6-18**). Construction of the LRT will require the removal of 100 of the existing 179 rental units spread across these three private properties affected. In the intervening years between the approval of this environmental assessment and construction, it is possible that these lands could be redeveloped by the landowners which would require relocation of residents in advance of the LRT project implementation. Notwithstanding, the City has committed, by way of council motion, to keep landowners and residents informed of the project status and timelines. Further, the City has committed to establishing an Interdepartmental Task Force on Affordable Housing to find suitable housing alternatives to limit impacts to the tenants residing in the rental units well in advance of the commencement of construction for this LRT project. More details of the impact (**Section 7.8.2**) and future commitments related to the impacted tenants are provided in **Section 7.9 and Section 9.3.1.2**.

7.7.3 PUBLIC COMMUNICATIONS PLAN

The requirement for a Public Communications Plan stems from the need to keep the public informed about the work in progress and the end result of the construction activities. Businesses, institutions, residents, tenants and other stakeholders including emergency service providers must be aware of scheduled road closings and other disruptions to normal service ahead of time in order that their activities can be planned with minimum disruption. The Public Communications Plan will follow the standard established by the City including detail on how to communicate the

information to the public, information to be disseminated, and at what project stage the communication should take place.

7.7.4 ARCHAEOLOGICAL ASSESSMENT

Areas within and adjacent to the corridor identified as having archaeological potential will be subject to subsequent (Stage 2/3/4) Archaeological Assessment prior to construction should these lands be required to be disturbed through implementation of the Recommended Plan. Subsequent stages of archaeological assessment should be completed as early as possible in the detailed design phase as the results may impact design details and schedules. Indigenous communities will be involved as required based on best practices and governing municipal, provincial and federal legislation and policies.

7.7.5 CONSTRUCTION AND TRAFFIC MANAGEMENT PLAN

A Construction and Traffic Management Plan will be developed to manage the transportation function for all travel modes including equipment and material deliveries at various times during the construction period. The objective will be to maintain clear walking routes and to maintain as much functionality for traffic as possible. The plan will also outline the road signage program.

7.7.5.1 Traffic and Transit Diversions during Construction

During construction of the LRT system, traffic diversions will need to be implemented to permit construction work to occur on various project elements. The duration and extent of traffic diversions will vary from location to location and include lane closures and temporary detours. Complete closure of existing roadways is not anticipated based on the current level of design; however, the Southwest Transitway between Nepean Sportsplex and Barrhaven Centre Station will need to be closed to permit conversion to LRT.

During the detailed design phase, the final detour plans will be closely coordinated with construction staging. Routes for any diversions will be determined in consultation with the City of Ottawa and the contractor completing the works and be communicated to the public in advance of implementation (e.g. through consultation or mobility management plans).

7.7.5.2 Confederation Line Operations during Construction

The operation of the Confederation Line should not be impacted by construction of the extension, although there may be a need for some service disruption during commissioning activities, when the entire line will need to be tested to ensure integration of systems.

7.7.6 CORRIDOR DRAINAGE AND STORMWATER MANAGEMENT PLAN

The purpose of developing and implementing stormwater management strategies is to provide adequate systems for the Recommended Plan. The purpose of the Corridor Drainage and Stormwater Management Plan is two-fold; it identifies the rate and volume of anticipated stormwater runoff and the means to accommodate it, and the means of achieving Ministry guidelines for water quality of stormwater runoff.

This includes the identification, in the detailed design phase, of the overall stormwater management system requirements, methods of retention, detention and infiltration, and any control mechanisms necessary to achieve runoff quantity and quality targets, while continuing to provide the required flows to downstream areas. Drainage systems and their components are sized and designed in conjunction with the overall project, and retention or detention systems are then incorporated into the design to achieve Ministry guidelines for runoff quantity and quality control. When prepared during the detailed design phase, this plan will consider the opportunity to treat stormwater runoff within the identified right-of-way prior to further off-site (i.e., outside the right-of-way) treatment following those measures outlined in the Corridor Drainage and Stormwater Management Approach outlined in this EPR (**Section 7.3**).

7.7.7 HYDRO ONE INFRASTRCTURE CONFLICT RESOLUTION

Through consultation with Hydro One, mitigation is required for work in and around the two main Hydro One lines that intersect with the Recommended Plan. Should the Project trigger the requirement for a separate EA as described under the Class EA for Minor Transmission Facilities (Hydro One, 2016) costs associated with modification or relocation of Hydro One facilities will be the proponent's responsibility. This EA process will require a minimum of 6 months to be completed. As such, the following commitments are to be carried out to mitigate the impacts to the Hydro One infrastructure during the pre-construction planning and design and project construction phases of the project.

- Submit a Property Management Proposal to Hydro One for approval.
- Confirm required modifications/relocations to existing Hydro One infrastructure and associated studies, permits and approvals (i.e. EA, archaeology).
- Survey to determine if the 15m buffer zones around the tower legs will be encroached by placement of permanent infrastructure. If the supporting structures from the elevated LRT facility are within 15m to the towers, the impact to the towers/foundations may need further investigation.
- Hydro One requires 15m of clearance on all sides around its transmission structures as measured from the tower legs in order to carry out maintenance operations. This clearance must be maintained at all times, no storage or staging activities should occur within this area during construction.
- A 3m radius around Hydro One structures must be left unpaved for tower access.
- Construction equipment and personnel working underneath the Hydro One conductors must satisfy OSHA clearance requirements.
- All proposed plantings in the vicinity of the Hydro One lines must be reviewed and approved by the Forestry Technician and Land Use Agent.
- No grading/excavation work is to be carried out using heavy machinery within 10m of the tower footings. Hydro One may permit grading/excavation work within 10m of the tower footings provided this work is carried out by hand or by using a vacuum truck system.
- Access to Hydro One facilities must not be obstructed at any time during construction, or after the proposed facilities are in service. The site must be kept free of all debris and equipment which could prohibit access to Hydro One facilities.
- Hydro One requires a minimum of 6m wide route longitudinally along the corridor to access each transmission structure. The access route should not have a slope greater than 10%. If the proponent fails to maintain the required access route, they will be liable for any costs incurred by Hydro One in regaining access to perform maintenance or repairs.
- No fill material must be placed on the Hydro One corridor, except with prior approval from Hydro One.
- If the proponent performs any construction activity within 10m of any transmission structures, they must install temporary orange snow fence erected 3m around tower footprint. This fence must be maintained in an upright position for the duration of construction.
- All underground utilities have to be designed to allow for vehicular traffic to pass over. Type of vehicles to be accommodated includes large utility vehicles and cranes.
- The proposal shall not interfere with the natural drainage patterns or result in standing water anywhere on the affected stretch of the Hydro One corridor.
- The proponent will be held liable for any damage to Hydro One facilities, as a result of flooding or standing water caused by the proposal.
- Any proposed catch basins on the Hydro One corridor must be located within a paved roadway.
- The proponent is responsible for maintaining security of the site and for the safety of the people working within the corridor.
- In the case of Hydro One emergency work, the proponent may be required to suspend their operations without notice until Hydro One crews have completed the emergency work.
- Hydro One is not responsible for any damages or injuries resulting from the effect of adverse weather conditions. This would include any damages or injuries from ice falling from structures or conductors as a result of an ice storm.

- Hydro One may, at its sole discretion, interrupt the proponent's occupation of the transmission corridor at any time during construction or post construction, to perform maintenance or emergency repairs. Hydro One will not be liable for any damages suffered by the proponent due to this interruption.

7.7.8 GEOTECHNICAL INVESTIGATIONS

A detailed geotechnical and hydrogeological program should be completed during detailed design to advise on groundwater and subsurface conditions and potential impacts that will need to be considered in the detailed design of the project. Geotechnical investigations will confirm specific construction methodologies, techniques, and processes in consideration of subsurface findings. The residents reliant on private water wells and septic services at 2069, 2086, 2191 Woodroffe Avenue and the Grenfell Glen community have expressed concern for impacts with respect to their water quality and quantity during project construction. Preliminary investigations did not anticipate impacts, however, during detailed design this should be considered as part of the detailed geotechnical investigations.

7.7.9 PHASE TWO ENVIRONMENTAL SITE ASSESSMENT

A Phase One ESA was completed to assist with the evaluation of alternatives and potential impacts that will need to be further considered in the detailed design of this project. The Phase One ESA identified several areas that have some level of risk for contamination. Additional ESA work (e.g. Phase Two ESA) may be required to assess the soil and groundwater quality associated with these areas and to assist in the planning and scoping of the construction phase of the project with regard to the cost and approach to the management of materials (soil and/or groundwater during construction).

7.7.10 LANDSCAPE PLAN

The Landscape Plan will generally be in-keeping with the Corridor Landscape Approach outlined in Section 7.4 of this EPR. A detailed Landscape Plan will be prepared to guide the species selection, location and planting details for all proposed plantings and other streetscape elements throughout the corridor. The plan will be prepared by a professional landscape architect in consultation with the NCC for planting on Greenbelt lands and lands owned/located adjacent to it. For lands adjacent to Black Rapids Creek, RVCA may need to be consulted.

All proposed plantings must be reviewed and approved by the Hydro One Forestry Technician and Land Use Agent in the vicinity of the Hydro One lines.

Hydro Ottawa should be consulted should any tree trimming be anticipated within 3m of Hydro Ottawa's overhead lines. Landscaping should not encroach any existing or proposed Hydro Ottawa overhead or underground assets or easement. Planting trees in proximity of existing power lines shall be done so in consultation with Hydro Ottawa's *Tree Planting Advice* document.

7.7.11 AGRICULTURE MANAGEMENT PLAN

The agriculture management plan is a unique plan specific to the project as it extends through highly valued NCC Greenbelt lands that are primarily used for agricultural purposes. To mitigate the impacts from the project, ongoing consultation with the NCC will be essential during the next phases of the project to find consensus of the preferred approach to mitigation. The project works has the potential to cause impacts to agricultural soils, tile drainage, farm infrastructure, the interior road network as well as loss of use of agricultural lands. Impacts are expected to be both temporary and permanent. During the pre-construction planning phase of the project, impacts to all agriculture-related infrastructure (including soils) should be minimized or avoided to the extent possible.

With respect to soils, a Soil Management and Rehabilitation Plan is recommended to be undertaken by qualified professionals in consultation with the NCC during the next phases of the project. This report will identify mitigation required to restore soils to agricultural use and same level of agricultural productivity impacted by temporary and permanent project infrastructure. As part of this plan baseline conditions for the soils in the area subject to disturbance by construction should be assessed prior to construction. The plan should include recommendations for stripping,

handling, storing during construction and replacing soil resources following construction, as well as monitoring to assess conditions and practices during and post-construction.

For tile drains, it is recommended that outlets and headers should be located prior to work and a plan developed to ensure disruption of the tile drainage system is minimized. This should also include maintaining outlets and roadside ditches to convey surface waters away from agricultural lands and ensure there's no temporary ponding of the surrounding agricultural fields. As part of the Agriculture Management Plan, any disrupted tile drainage infrastructure should be restored in consultation with the NCC following completion of project construction.

There are two retired farms and associated infrastructure that may be impacted by the project. The Recommended Plan has been designed to limit impacts to these farms. Continued avoidance should be exercised. Additional mitigation should be explored through the drafting of the Agriculture Management Plan.

The interior road network is essential to maintaining agriculture operations. Impacts to access should be avoided. Main entry/exit points and access to key properties should be established in the Agriculture Management Plan and in consultation with the NCC.

During construction, the lands required for the construction detour will result in a temporary loss of use. Agricultural activities will have to be suspended for a set amount of time to construct the rail grade-separations. The extent to which lands will be impacted and the compensation for tenants as well as the NCC will need to be negotiated during the next phases of the project.

7.7.12 ECOLOGICAL SITE ASSESSMENT

Various potential natural heritage features were identified in the Study Area under present day conditions. An Ecological Site Assessment should be carried out during detailed design and prior to construction to more thoroughly determine the presence, extent or provide an update of natural heritage features including: SAR, and habitat suitable for SAR, Significant Wildlife Habitat, wildland fire risk, significant woodlands and headwater drainage features located along the Recommended Plan corridor. Protection afforded to any identified species shall be in accordance with appropriate provincial and federal jurisdiction.

Breeding bird surveys are recommended as per the Marsh Monitoring program which will also help to identify presence of SAR birds. As per the MECP, a set of at least 3 breeding bird surveys to assess should be conducted between the last week of May and the first week of July and separated by a week or more from previous surveys.

The SAR in Ontario List (O.Reg. 230/08 under the ESA, 2007) is updated periodically to add newly listed species or revise species status. Prior to construction, the list should be reviewed and an update of the potential species present and their associated habitat should be completed. A SAR determination should be included in an Ecological Site Assessment for any affected areas. If a SAR is observed during the works within the construction zone, the MECP is to be immediately contacted and operations modified to avoid any negative impacts to the species or their habitat until they leave the area, or until further direction is provided by the MECP. If necessary, permits and/or authorizations will be obtained under the ESA.

A Wildland Fire Risk Assessment as per Wildland Fire Risk Assessment and Mitigation Reference Manual (MNRF, 2017) should be conducted to determine potential risk of wildland fire particularly in areas of the Study Area that have been identified to contain coniferous forest types. The Tree Conservation Report will also assist with the completion of this report.

During the EA, an assessment was conducted to determine if there were additional qualifying areas within the Study Area that meet the criteria for significant woodlands. In particular, Tallwood Woods was identified as a significant woodland based on criteria contemporary at the time. During the next phase of the project, it should be confirmed if Tallwood Woods or additional woodlots meet the criteria as significant woodlands or those that occur within 120 m of the project in rural

areas and 30 m in urban areas, based on the evaluation criteria at the time of detailed design. Consultation with MNRF and City of Ottawa Natural Systems and Forestry Services staff to confirm buffer width and any other additional requirements is also recommended. Undertaking the Tree Conservation Report will also support this work.

Headwater drainage features should be re-confirmed and assessed during the planning phases of detailed design. Any alteration or interference with a headwater drainage feature or other surface water feature may require a permit from RVCA and restrictions may apply.

The Ecological Site Assessment will also inform or provide guidance on the location, type and size of engineered eco-crossings as well as the location of associated exclusionary fencing.

7.7.13 TREE CONSERVATION REPORT

The purpose of the Tree Conservation Report is to retain as much natural vegetation as possible, including mature trees, stands of trees, and hedgerows. The Tree Conservation Report will identify and describe the vegetative cover on the site prior to construction and will provide a professional opinion as to the priority that should be given to the conservation of the treed areas that are beyond the grading limit. This report will also provide an assessment of trees identified for removal. Additional surveys to mark distinctive mature trees may be required. The City's Tree Protection By-law establishes minimum standards for tree protection, as well as compensation requirements for trees authorized for removal. For trees within Greenbelt lands, the NCC should be consulted as their criteria and methodology for tree conservation reports differs from the City of Ottawa's.

Together the Landscape Plan and the Tree Conservation Report will help ensure that trees will be retained where feasible and that new trees will be planted to contribute to the City's forest cover target and to address net tree loss of a project site and the tree protection measures required. The Tree Conservation Report will be prepared during detailed design prior to construction and in accordance with the City of Ottawa Guidelines.

7.7.14 CONSTRUCTION TIMING CONSIDERATIONS

All activities related to construction should avoid certain timing windows dependent on the wildlife that is present. Following SAR review and more in-depth surveys conducted prior to detailed design, there may be additional timing restrictions in addition to those listed below to protect sensitive species and/or habitats.

7.7.14.1 Breeding Birds

In order to remain in compliance with the *Migratory Bird Convention Act*, 1994 and *Fish and Wildlife Conservation Act*, 1997, it is recommended that any vegetation removal that may be required take place outside of the breeding bird season for this region (April 1st to August 31st).

In most cases nest searches during the nesting season (April 1st to August 31st) are not recommended within complex habitats, such as those occurring along the project corridor, as the ability to detect nests is low while the risk of disturbance to active nests is high. Disturbance increases the risk of nest predation and abandonment by adults. Therefore, nest searches are not recommended unless nests are known to be easy to locate without disturbing them. Nests searches may be completed during the nesting period (April 1st to August 31st) by a qualified biologist within 'simple habitats' (Canadian Wildlife Service, 2014). Simple habitats refer to habitats that contain few likely nesting spots or a small community of migratory birds.

Examples of simple habitats include the following:

- an urban park consisting mostly of lawns with a few isolated trees;
- a vacant lot with few possible nest sites;
- a previously cleared area where there is a lag between clearing and construction activities (and where ground nesters may have been attracted to nest in cleared areas or in stockpiles of soil, for instance); or,

- a structure such as a bridge, a beacon, a tower or a building (often chosen as a nesting spot by robins, swallows, phoebes, Common Nighthawks, gulls and others)" (Canadian Wildlife Service, 2014)

Similarly, nest searches can also be considered when investigating the following:

- "conspicuous nest structures (such as nests of Great Blue Herons, Bank Swallows, Chimney Swifts);
- cavity nesters in snags (such as woodpeckers, goldeneyes, nuthatches); or,
- colonial-breeding species that can often be located from a distance (such as a colony of terns or gulls)" (CWS 2014).

7.7.14.2 Fisheries Resources

Should there be in-water works confirmation of current in-water construction timing windows with MNRF is necessary prior to any construction works. For potential fish relocation work, a License to Collect Fish for Scientific Purposes is required from the MNRF as well. To protect fish spawning activity, there are specific in–water works timing window restrictions. Consultation with MNRF should be continued to provide updated information on the timing restrictions at the time of design.

Changes to the federal *Fisheries Act* implemented in 2019 focused on restoring lost protections and incorporating modern safeguards for fish and fish habitat. Its goal was also to provide enhanced compliance and protection tools to enable cross-agency partnerships and better protection of fisheries in Canada (DFO 2018). The updated *Fisheries Act* includes a prohibition against causing the death of fish or the harmful alteration, disruption, or destruction of fish habitat (Section 35 of the Act). Changes resulting from the previous update to the Act in 2012 the *Fisheries Act* still apply. These include how the process is proponent based and any in-water works requires self-assessment. From the self-assessment process, the proposed in-water works are weighed against criteria set out by the DFO. By using this criteria, it can be determined if works can avoid serious harm to fish. If works cannot avoid serious harm to fish and/or works are not included in the criteria listed on the DFO's website, a "Request for Review" will be submitted to DFO. DFO will make a determination regarding serious harm to fish and will outline, if required, approval/authorizations to be obtained from the DFO. Opportunities for habitat enhancements to watercourses should be considered.

7.7.14.3 Turtles

Turtles are actively nesting in June and early July and may be attracted to existing road shoulders or to construction zones with areas of exposed soils or stockpiles of fill. Caution should be taken during the active season (April 1 – October 30) of any given year by thoroughly sweeping the area before works begin to help encourage any turtles within the area to move away. Exclusion fencing will be installed to prevent turtle access to the work area where appropriate (e.g., near water or wetlands). Additional consultation with the MECP may also provide species-specific mitigation, if required.

7.7.15 AIR QUALITY DISPERSION STUDY

The results of analysis determined the need for a dispersion study around each LRT station to be conducted during detailed design to analyse in greater detail, the potential local air quality impacts.

7.7.16 DETAILED STATIONARY NOISE ANALYSIS

Preliminary qualitative assessment indicates that noise from the TSSF may be potentially up to 60 dBA during the daytime period at a distance of 100m, representative of the nearest noise-sensitive property. Because noise levels have the potential to exceed the ENCG criteria for stationary noise, a Detailed Stationary Noise Analysis should be undertaken during the design phase to confirm the need for mitigation. If noise levels are confirmed to exceed the ENCG criteria, the TSSF may require noise mitigation strategies in conformance with the MECP and City of Ottawa guidelines.

7.8 Assessment of the Recommended Plan

7.8.1 ASSESSMENT METHODOLOGY

The preliminary impact analysis of alternatives went only so far as to be able to determine which alternative was preferred for the Study Area; if the resulting effects for a particular criterion were the same for each alternative, or no residual effects were predicted, the results were not used to compare alternatives. This section describes the comprehensive analysis/assessment of all the identified impacts of implementing the preferred solution.

The values and conditions identified in the documentation of existing conditions were used as the basis for assessing the effects of the preferred alternative on the transportation, social, physical and biological environments. The impact analysis involved applying the steps, as presented in **Table 7-1**.

Table 7-1 Impact Assessment Approach

Step 1	Identify and analyze activities where the project, as detailed in **Section 7** interact with existing environmental conditions as detailed in **Section 3** and **5**.
Step 2	Acknowledge predetermined project activities that act as *built-in mitigation* measures as well as *site specific mitigation measures*.
Step 3	Identify the *residual* environmental effects, if any.
Step 4	Identify opportunities for further *mitigation of residual* effects, if possible/practical including monitoring.
Step 5	Determine the *significance of the residual* environmental effects, after further mitigation.

As described in the methodology, an environmental effect assessment requires consideration of the interaction of the project (i.e. project activities) with the environment. Pre-construction, construction and operational activities as described above were all assessed.

Professional judgement and experience formed the basis for identifying environmental effects and mitigation measures. The analysis was based primarily on comparing the existing environment with the anticipated future environment, during and after construction. Consideration was given to:

- the magnitude, spatial extent, and duration of effects;
- the proportion of a species population or the number of people affected;
- direct or indirect effects; and,
- the degree to which the effect responds to mitigation.

In this assessment, "residual" environmental effects are defined as changes to the environment caused by the project, and vice versa, when compared to existing conditions and taking into account all mitigation measures. Potential residual environmental effects are assessed as to their significance, including spatial and temporal considerations, and are categorized according to the following definitions:

"Positive" means an effect that exhibits a beneficial outcome.

"Negligible" means an effect that may exhibit one or more of the following characteristics:

- nearly-zero or hardly discernible effect; or
- affecting a population or a specific group of individuals at a localized area and/or over a short period.

"Insignificant" means an effect that may exhibit one or more of the following characteristics:

- not widespread;
- temporary or short-term duration (i.e., only during construction phase);
- recurring effect lasting for short periods of time during or after project implementation;
- affecting a specific group of individuals in a population or community at a localized area or over a short period; or,
- not permanent, so that after the stimulus (i.e., project activity) is removed, the integrity of the environmental component would be resumed.

"Significant" means an effect that may exhibit one or more of the following characteristics:

Widespread:

- permanent transcendence or contravention of legislation, standards, or environmental guidelines or objectives;
- permanent reduction in species diversity or population of a species;
- permanent alteration to groundwater flow direction or available groundwater quantity and quality;
- permanent loss of critical/productive habitat;
- permanent loss of important community archaeological/heritage resources; or,
- permanent alteration to community characteristics or services, or established land use patterns, which is severe and undesirable to the community as a whole.

Study boundaries serve to focus the scope of the assessment such that a meaningful analysis of potential impacts arising from the proposed project can be made. Project boundaries are defined by the spatial and temporal limits of the proposed project activities, and their zones of influence.

Once the potential effects were predicted, additional mitigation measures were identified. Often these mitigation measures were sufficient to reduce negative effects to an insignificant or negligible status.

Monitoring is important to verify the accuracy of effects predictions. Monitoring measures were recommended to determine what effects actually occurred with project implementation and may result in the modification of mitigation measures to improve their effectiveness.

7.8.2 ASSESSMENT RESULTS

Table 7-2 describes the potential effects, mitigation, residual effects and their significance, and monitoring recommendations for the Recommended Plan.

Project phases are identified as follows: P - Pre-construction/Design; **C** - Construction; **O** - Operation

Table 7-2 Impact Assessment Results

Environmental Value	Project Activity	Project Phase			Location	Analysis of Potential Environmental Effect	Mitigation Measures Built-In Mitigation Measures	Potential Residual Effect	Level of Significance after Mitigation	Monitoring Recommendation
		P	C	O						
Social Environment										
Planning Policies	Pre-construction planning and design; Project Implementation.	•			Throughout corridor	Inconsistency in Official Plan and Secondary Plan policies.	Official Plan Amendment to include the project within Annex 17: Development Zone of Influence and Schedule D: Rapid Transit and Transit Priority Network to identify as an LRT corridor. Official Plan Amendment to the Barrhaven Downtown Secondary Plan, Schedule A - Land Use Plan, Parks Designation that may be required to accommodate the facilities tail track.	None anticipated.	Positive	None required.
Planning Policies	Pre-construction planning and design; Project Implementation.	•			Throughout corridor	The project has been developed in accordance with the Transportation Master Plan.	Identification of the corridor as an LRT Corridor on Map 4: Rapid Transit and Transit Priority Network – 2031 Network Concept and consideration to timing in its implementation in TMP 2013 and future TMP.	None anticipated.	Positive	None required.
Planning Policies	Pre-construction planning and design; Project Implementation.	•			Throughout corridor	The project has been developed in accordance with relevant provincial, federal and municipal guiding documents.	None Required.	None anticipated.	Positive	None required.
Existing Land Use	Pre-construction planning and design; Project Implementation.	•			Throughout corridor.	The project will provide an enhanced level of service and thereby access to a diversity of commercial, institutional, mixed-use residential areas and other major destinations such as: • College Square • Algonquin College • Nepean Sportsplex • NCC Greenbelt • VIA Rail Fallowfield Station • Barrhaven Town Centre	None required.	None anticipated.	Positive	None required.
Future Land Use	Pre-construction planning and design; Project Implementation.	•			Throughout corridor.	The project provides opportunities for intensification and new development along the corridor and around stations.	Completion of a Transit-Oriented Development Plan or similar to study corridor specific opportunities and locations for additional land use types and densities.	None anticipated	Positive	Period reviews of plans in accordance with established review cycles
Indigenous Land Claims	Pre-construction planning and design; Project Implementation.	•			Throughout corridor.	A large portion of northeastern Ontario is subject to an unresolved land claim with the Algonquins. The Agreement-in-Principle (2016) does not identify any lands within the Study Area as subject to these consultations.	Continued engagement and consultation with Indigenous Communities in subsequent project phases.	None anticipated.	Negligible	None required.

Environmental Value	Project Activity	Project Phase			Location	Analysis of Potential Environmental Effect	Mitigation Measures Built-In Mitigation Measures	Potential Residual Effect	Level of Significance after Mitigation	Monitoring Recommendation
		P	C	O						
Property Requirements	Acquire temporary access to public and private properties to undertake pre-construction surveys and studies.	•			Throughout corridor	Permission to enter onto private and public property will be required prior to construction to obtain/update additional information on: topographical mapping, geotechnical conditions, environmental conditions, and the natural environment to assist in detailed design and inform permitting/approval requirements.	*Public Communications Plan* Consent to Enter Agreements and permissions as required prior to undertaking work. Coordinate investigation schedule with affected property owners to minimize disturbance.	Temporary inconvenience to property owners during surveys and studies.	Insignificant	As per *Public Communications Plan* and requirements negotiated through Consent to Enter Agreements as required.
Property Requirements	Acquire necessary properties for the project.	•			Throughout corridor	The project requires permanent property acquisitions from federal, private and public landowners as well as potential easements.	Acquire property as per City of Ottawa Real Property Acquisition policy and according to future land transfers and land leases. Cost, cost-sharing and requirement for compensation to be determined in negotiation with affected landowners. As per *Property Assessment and Acquisition Process.*	85 units may remain, residual lands could be redeveloped.	Insignificant	As per *Property Assessment and Acquisition Process.*
Property Requirements	Pre-construction planning and design.	•	•		VIA Rail corridor	Permission to enter onto private property will be required to support the design during pre-construction planning and construction phases. Notification to Transport Canada that the existing at-grade crossing is to be replaced with an overpass.	A Board Order may be required. Further consultation with VIA Rail/Transport Canada to determine if the removal of at-grade crossing requires any changes to formalize matters of maintenance, inspection, etc. as it relates to the new bridges.	None anticipated.	Negligible	As per Board Order and City and VIA Rail agreements.
Property Requirements	Acquire necessary permission to access/undertake work on adjacent properties owned by others.	•	•		CN Rail line	Permission to enter onto private property will be required to support the design during pre-construction planning and construction phases.	Property requirements will be respected. Plans or work methods on CN Rail's property or affecting CN Rail's structures/safety must be reviewed and approved by CN Rail prior to work. Early notifications are required to access property, flagman must be present to permit entry to CN property. Locates must be completed prior to any excavation. *Public Communications Plan* to identify any other requirements of CN Rail.	None anticipated	Negligible	As per *Public Communications Plan* and requirements negotiated through Consent to Enter Agreements as required.

Environmental Value	Project Activity	Project Phase			Location	Analysis of Potential Environmental Effect	Mitigation Measures Built-In Mitigation Measures	Potential Residual Effect	Level of Significance after Mitigation	Monitoring Recommendation
		P	C	O						
Property Requirements	Acquire necessary properties and easements for the project.	•			Nepean Sportsplex property, Greenbelt lands (agriculture properties and private residences), Royale Equestrian Farm. Realignment of Fallowfield Road, lands around rail grade-separation at Woodroffe Avenue and the Southwest Transitway.	Permanent and temporary Federal property requirements will require Federal approvals.	Early consultation and coordination with NCC and any other applicable Federal agencies at the time of project pre-planning. *Property Assessment and Acquisition Process* to acquire property as per City of Ottawa policy and according to future land transfers and land leases. Cost, cost-sharing and requirement for compensation to be determined in negotiation with affected landowners. Completion of a FLUDTA as set out in Sections 12 and 12.1 of the *National Capital Act*. Sale of National Interest Land Mass (NILM) property necessitates a Level 3 FLUDTA required. Completion of requirements consistent with the *Impact Assessment Act* of Canada.	Loss of lands.	Insignificant	As per *Property Assessment and Acquisition Process* and consultation with NCC.
Landscape and Visual Environment	Pre-construction planning and design; detailed design for roadway and associated landscape design.	•		•	Throughout corridor. Greenbelt lands. Woodroffe Avenue and Fallowfield Road	Detailed design for corridor landscaping will need to consider the various corridor contexts. Improve vistas through design and context-sensitive landscaping. Woodroffe Avenue is a scenic route in the Greenbelt Master Plan. The elevated LRT facility (Baseline Station to Fallowfield Station) will create new views and vistas of the City. Rail grade-separation overpasses will create new views and vistas of the Greenbelt lands.	*Landscape Plan* to be completed during detailed design in consideration of landscaping strategy as outlined in **Section 7.4** Corridor Landscaping Consultation with adjacent landowners, RVCA and NCC through the Greenbelt lands and Black Rapids Creek.	Temporary disruptions to the existing views. *Landscape Plan* should result in an overall improvement to existing landscape and views.	Positive	As per *Landscape Plan.*
Landscape and Visual Environment	Pre-construction planning and design; Project Implementation.	•			Lands adjacent to rail grade-separation overpasses of Woodroffe Avenue, Southwest Transitway and Fallowfield Road.	Although the overpasses will provide new views and vistas in particular, those of a greater distance, the views and vistas of the immediate adjacent farms and other land uses may become less visible.	Improving the safety for all modes by providing segregation to the VIA Rail line is paramount. Wherever possible, the *Landscape Plan* will aim to maintain or improve views and vistas in consideration of their context.	Change in the views and vistas of properties immediately adjacent to rail grade-separations.	Insignificant	As per *Landscape Plan.*
Privacy to adjacent land uses	Pre-construction planning and design; Project Implementation.	•			Lands adjacent to the elevated LRT, Baseline Station to West Hunt Club Road.	The elevated LRT facility (Baseline Station to Fallowfield Station) has the potential to impact the privacy to nearby homes.	During the next phases of the project the current land use conditions should be revisited to confirm if impacts to privacy exist and provide contemporary mitigation at that time. Any redevelopment adjacent to the corridor (Baseline Station to West Hunt Club Road) should also consider potential impacts to privacy during site planning process. Where possible, *Landscape Plan* to screen nearby land uses.	None anticipated.	Insignificant	As per *Landscape Plan.*

Environmental Value	Project Activity	Project Phase			Location	Analysis of Potential Environmental Effect	Mitigation Measures Built-In Mitigation Measures	Potential Residual Effect	Level of Significance after Mitigation	Monitoring Recommendation
		P	C	O						
Loss of Affordable Rental Units	Pre-construction planning and design; Project Implementation.	•			Lands adjacent to the corridor between Knoxdale Road and Hunt Club Road	New segment of alignment to displace approximately 100 private sector rental units. Some or all of these units may be offered at affordable market rents.	City to continue to keep residents/tenants informed of timing for implementation of LRT. City to work with its affordable housing partners and with private sector developers to encourage them to offer similar housing options on adjacent lands or in nearby communities. The landlord will need to meet the requirements of Ontario's *Protecting Tenants and Strengthening Community Housing Act, 2020* and existing rules under the *Residential Tenancies Act, 2006* in the process of giving of notice to tenants.	None anticipated	Insignificant	None required.
Loss of Affordable Housing Site	Pre-construction planning and design; Project Implementation.	•			1005-1045 Greenbank Road	Train Storage and Servicing Facility to displace an identified potential site for affordable housing.	Staff to remove the 1005–1045 Greenbank Road site earmarked for affordable housing by Council on April 10, 2019 (Report ACS2019-PIE-GEN-001) from the list of affordable housing development sites; and, Direct the Interdepartmental Task Force on Affordable Housing to undertake a comprehensive review of the planned Stage 3 LRT corridors to identify short-term alternative locations for future affordable housing development to replace the 1005-1045 Greenbank Road site.	None anticipated	Insignificant	None required.
Archaeological Resources	Pre-construction planning and design; project construction, grading and excavation for all associated infrastructure.	•	•		Areas identified as having archaeological potential.	Construction in undisturbed areas identified as having archaeological potential may disturb intact archaeological resources.	For City/Provincial lands: Conduct subsequent *Archaeological Assessment* (Stage 2, 3, 4) in identified areas in conformance with MHSTCI Standards and Guidelines for Consultant Archaeologists (2011). Archaeological Assessment must be undertaken by a licensed archaeologist. These subsequent assessments should be completed as early as possible in the detailed design process so that study recommendations can be incorporated into the project details. These reports will be circulated to MHSTCI and interested Indigenous Communities. If archaeological resources are accidentally uncovered during construction activities, the site should be protected from further disturbances until a licensed archaeologist has completed an assessment. For Federal NCC lands: Conduct subsequent *Archaeological Assessment* (Stage 2, 3, 4) in identified areas as required following direction of NCC Archaeologist.	None anticipated.	Insignificant	Additional work, if needed, as per *Archaeological Assessment* recommendations.

Environmental Value	Project Activity	Project Phase			Location	Analysis of Potential Environmental Effect	Mitigation Measures Built-In Mitigation Measures	Potential Residual Effect	Level of Significance after Mitigation	Monitoring Recommendation
		P	C	O						
Cultural Heritage Resources (including Built Heritage Resources and Cultural Heritage Landscapes (CHL)	Pre-construction planning and design; project construction, grading and excavation for all associated infrastructure.	•	•		NCC Greenbelt agricultural lands. Temporary detour for Woodroffe Avenue and the Southwest Transitway.	While the grade-separated overpasses are constructed, a temporary detour will be required. The construction of the temporary detour will alter portions of the agricultural fields at the edges of the Greenbelt, recognized by the NCC as a CHL. The detour will result in a temporary and reversible impact to the land use and agricultural character. Construction is proposed more than 50m from the nearest structure. As such, no impacts related to vibration are anticipated.	It is recommended that detailed design of the detour consider its reversibility and detour lands should, to the extent possible, be reverted to their prior form and use following decommissioning of the detour. As per *Agriculture Management Plan.*	None anticipated.	Insignificant	As per *Agriculture Management Plan.*
Cultural Heritage Resources (including Built Heritage Resources and Cultural Heritage Landscapes (CHL)	Pre-construction planning and design; project construction, grading and excavation for all associated infrastructure.	•	•		NCC Greenbelt agricultural lands. Overpass of the VIA Rail line for Woodroffe Avenue and the Southwest Transitway.	The rail grade-separation of Woodroffe Avenue and the Southwest Transitway to the VIA Rail line via overpasses will permanently alter portions of the agricultural fields at the edges of the Greenbelt, recognized by the NCC as a Cultural Heritage Landscape. Construction is proposed more than 50m from the nearest cultural heritage structure. As such, no impacts related to vibration to the cultural heritage landscape are anticipated.	Given that the Southwest Transitway and Woodroffe Avenue currently run adjacent to the Greenbelt, the overpasses are planned in their current alignment and the area is characterised by the rail corridor and station the cultural heritage value is not anticipated to be greatly altered. No significant adverse visual impacts are anticipated.	None anticipated.	Insignificant	None required.
Cultural Heritage Resources (including Built Heritage Resources and Cultural Heritage Landscapes)	Pre-construction planning and design; project construction, grading and excavation for all associated infrastructure.	•	•		NCC Greenbelt agricultural lands. 3641 Fallowfield Road.	The realignment and rail grade-separation of Fallowfield Road to the VIA Rail line and Southwest Transitway (future LRT) will result in a permanent loss of a small portion of agricultural lands at the edges of the Greenbelt, recognized by the NCC as a CHL. Construction is proposed more than 400m from the nearest cultural heritage structure. As such, no impacts related to vibration are anticipated.	Given that Fallowfield Road currently runs adjacent to the Greenbelt, the overpass is more than 400m from 3641 Fallowfield Road, the area is characterised by the rail corridor and station and no built features associated with the cultural heritage value of the Greenbelt are located in the vicinity of the proposed overpass the cultural heritage value for either cultural heritage resource (Greenbelt or listed property) is not anticipated to be greatly altered. No significant adverse visual impacts are anticipated.	None anticipated.	Insignificant	None required.
Cultural Heritage Resources (including Built Heritage Resources and Cultural Heritage Landscapes)	Pre-construction planning and design; project construction, grading and excavation for all associated infrastructure.	•	•		NCC Greenbelt. Royale Equestrian Centre - 2191 Woodroffe Avenue.	The entrance to the property will be realigned following construction of the overpass for Woodroffe Avenue. A small portion of land will be permanently lost at the property edge to construct the overpass. Construction is proposed more than 50m from the nearest structure. As such, no impacts related to vibration are anticipated.	Given that the property is currently adjacent to a transportation corridor and rail corridor and no built features associated with the cultural heritage value of the Greenbelt or property are located in the vicinity of the proposed overpass the cultural heritage value for either cultural heritage resource is not anticipated to be greatly altered. No significant adverse visual impacts are anticipated.	None anticipated.	Insignificant	None required.

Environmental Value	Project Activity	Project Phase			Location	Analysis of Potential Environmental Effect	Mitigation Measures Built-In Mitigation Measures	Potential Residual Effect	Level of Significance after Mitigation	Monitoring Recommendation
		P	C	O						
Cultural Heritage Resources (including Built Heritage Resources and Cultural Heritage Landscapes)	Pre-construction planning and design; project construction, grading and excavation for all associated infrastructure.	•	•		1081 Greenbank Road.	The LRT alignment and TSSF are more than 90m away from the church as such, no impacts are anticipated. Potential loss of or change to cultural heritage value.	None required.	None anticipated.	Insignificant	None required.
Air quality	Project construction, grading and excavation for all associated infrastructure.		•		Throughout corridor	Dust and equipment exhausts will diminish air quality during the construction period.	As per *Public Communications Plan* to inform residents of planned construction works. Contractor to implement air quality BMPs and will be responsible for implementing a mitigation strategy with the intent on satisfying the requirements for Ontario Regulation 419. These can include: • Dust suppressants will be applied as warranted. • Haul routes and nearby streets will be cleaned as per existing municipal standards. • Minimize site storage of granular material in height and context. • Locate storage piles in sheltered areas if feasible. • Provide moveable windbreaks if feasible. • Equipment to be kept in good working order and will not unnecessarily idle.	Dust may be an irritant to adjacent residents, business owners and pedestrians particularly nearby residential areas.	Insignificant	As per *Public Communications Plan.*
Air quality	Project operation.			•	Throughout corridor	Products of combustion are anticipated to fall below the MECP's Ambient Air Quality Criteria (AAQC). Over time, pollutant concentrations are expected to improve with vehicle environmental controls and newer engine technologies. Overall, the project undertaking will allow for a higher modal split of transit, thus reducing the emissions and reliance on single occupant vehicles and city buses which operate on fossil fuels, unlike the electrified LRT. Emissions are not anticipated to increase as a result of the rail grade-separations as the same number of travel lanes will replace the existing conditions as an overpass.	None Required.	Pollutant concentrations predicted below AAQC.	Positive	None required.
Air Quality	Operation of LRT.			•	Throughout corridor	Conversion from diesel to electrified LRT technology will reduce in reduced emissions and reliance on single occupant vehicles and city buses which operate on fossil fuels.	None required.	Lowered emissions throughout corridor.	Positive	None required.

Environmental Value	Project Activity	Project Phase			Location	Analysis of Potential Environmental Effect	Mitigation Measures Built-In Mitigation Measures	Potential Residual Effect	Level of Significance after Mitigation	Monitoring Recommendation
		P	C	O						
Air Quality	Operation of LRT stations and TSSF.			•	Throughout corridor, at stations.	Implementation of LRT will result in expanded activities at transit stations which may result in increased idling to coordinate LRT and bus transit service. The project undertaking will allow for a higher modal split of transit, thus reducing the emissions and reliance on single occupant vehicles and city buses which operate on fossil fuels, unlike the electrified LRT. Passenger pick-up and drop-off areas for cars are not expected to see extended idling and are considered insignificant compared to diesel buses in the area. Only light maintenance and storage is anticipated at the TSSF, significant emissions are not expected.	An *Air Quality Dispersion Study* around each station should be conducted during detailed design to assess potential local impacts.	Potential for reduced air quality around stations and TSSF.	Insignificant	As per *Air Quality Dispersion Study.*
Noise	Project construction, grading and excavation for all associated infrastructure.		•		Throughout corridor	Noise levels produced by stationary and moving construction equipment will be occasionally disruptive to adjacent landowners.	As per *Public Communications Plan* to inform residents of planned construction works. Contractor to adhere to the City By-laws (2017-255). Noise BMPs may include: • Keeping equipment well maintained, moving parts lubricated and restricting unnecessary idling. • Compliance with MECP NPC-115 and NPC-118. • Contractor to have construction noise complaint process detailed, and action plan to address noise related complaints where warranted.	Temporary increase in noise from construction.	Insignificant	As per *Public Communications Plan*. Monitor complaints during construction.
Noise	Project Construction	•			Royale Equestrian Centre - 2191 Woodroffe Avenue.	Construction equipment noise and activities near active farm may impact animal behavior.	As per *Public Communications Plan* to inform residents and tenants of planned construction works.	Temporary increase in noise from construction.	Insignificant	As per *Public Communications Plan*. Monitor complaints during construction.
Noise	Project operation.			•	Throughout corridor	The proposed Fallowfield Road realignment will move the road away from nearby receptors, reducing noise levels. Noise levels along the alignment are dominated by area road traffic. Established ambient noise levels in the Study Area are more than 60 dBA. Implementation of the project will marginally increase noise levels above existing conditions.	Noise levels fall below the City's Environmental Noise Control Guideline for provision of mitigation measures. Should there be changes in guidelines and best management practices in the future or changes in LRT design, further noise analysis may be required at detailed design. If future residential developments are proposed, the requirement for noise attenuation measures will be evaluated at that time and any necessary mitigation will be included as a condition of development approval.	None anticipated	None	None required.

Environmental Value	Project Activity	Project Phase			Location	Analysis of Potential Environmental Effect	Mitigation Measures Built-In Mitigation Measures	Potential Residual Effect	Level of Significance after Mitigation	Monitoring Recommendation
		P	C	O						
Noise	Operation of the TSSF			•	TSSF location	Preliminary qualitative assessment indicates that noise from the TSSF may be potentially up to 60 dBA during the daytime period at a distance of 100m, representative of the nearest noise-sensitive property.	Because noise levels have the potential to exceed the ENCG criteria for stationary noise, a *Detailed Stationary Noise Analysis* should be undertaken during the detailed design phase to confirm the need for mitigation. If noise levels are confirmed to exceed the ENCG criteria, in conformance with the MECP and City of Ottawa the TSSF may require noise mitigation strategies that could include equipment silencers, noise walls or berm around the perimeter of the property.	None anticipated	Negligible	As per findings of *Detailed Stationary Noise Analysis.*
Noise and Vibration	Operation of LRT	•	•	•	Traction power substation locations (TPSS)	Noise and vibration generated by TPSS may impact nearby sensitive receivers.	During preliminary and detailed design, once analysis has been completed to more accurately determine the locations of the TPSS, a noise and vibration analysis may be required to determine if there are noise and vibration impacts and mitigation will be required.	None anticipated	Negligible	As per findings of future noise and vibration studies.
Vibration	Project construction, grading and excavation for all associated infrastructure.		•		Throughout corridor	Construction activities may cause noticeable vibrations.	As per *Public Communications Plan* to inform nearby residents/businesses/institutions of planned construction works. Vibration BMPs to be implemented by contractor. Compliance with MECP NPC-119 and NPC-207. Construction vibration complaint process is detailed with an action plan to address vibration-related complaints where warranted.	Temporary vibrations from construction activities may be noticeable.	Insignificant	As per *Public Communications Plan*. Monitor complaints during construction.
Vibration	Project construction, grading and excavation for all associated infrastructure.		•		Royale Equestrian Centre - 2191 Woodroffe Avenue.	Construction activities may cause noticeable vibrations that may impact animal behavior.	As per *Public Communications Plan* to inform nearby residents/businesses/tenants/institutions of planned construction works.	Temporary vibrations from construction activities may be noticeable	Insignificant	As per *Public Communications Plan*. Monitor complaints during construction.
Vibration	Project operation			•	Throughout corridor	Predicted future vibration level conditions are anticipated below perceptible thresholds.	None required.	Vibration levels below recommended perceptible threshold.	Negligible	None Required.
Climate Change: Extreme weather events	Pre-construction planning and design.	•			Throughout corridor.	Increasing variability in temperature extremes. Increasing frequency of high-intensity and duration of weather extremes (i.e. wet weather, dry periods, windstorms).	Actions as detailed in the City of Ottawa's Climate Change Master Plan (2019) or as updated. *Corridor Drainage and Stormwater Management Plan* to consider accommodation of flash storm events and regard for Wet Weather Infrastructure Management Plan or best practices at the time of construction. *Landscape Plan* to consider possible mitigating use of trees for moderating temperatures and provide wind break.	Potential for short-term flooding. Disruptions to corridor for additional maintenance, as required.	Insignificant	As per *Corridor Drainage and Stormwater Management Plan,* and *Landscape Plan.*
Climate Change: Corridor user safety and comfort	Pre-construction planning and design.	•			Throughout corridor.	Increased risk to public safety for corridor users during extreme storm events. Reduced corridor user comfort during periods of extreme temperature.	Actions as detailed in the City of Ottawa's Climate Change Master Plan (2019) or as updated. *Landscape Plan* to consider possible mitigating effects to improve corridor user comfort through application of additional sheltering elements. Corridor to include adequate rest areas.	Temporary discomfort to corridor user.	Insignificant	As per *Landscape Plan.*

Environmental Value	Project Activity	Project Phase			Location	Analysis of Potential Environmental Effect	Mitigation Measures Built-In Mitigation Measures	Potential Residual Effect	Level of Significance after Mitigation	Monitoring Recommendation
		P	C	O						
Climate Change: Waste Management	Pre-construction planning and design. Project construction, grading and excavation for all associated infrastructure.	•	•		Throughout corridor	Construction of the project has the potential to produce a large amount of waste.	Design to consider opportunities to employ waste-reduction methods, where possible. Contractor to develop *Waste Management Plan* to the extent possible, reuse material on-site prior to the consideration for new materials or shipment off-site.	Generation of excess waste materials for disposal off-site.	Insignificant	As per *Waste Management Plan.*
Climate Change: Extreme weather events	Project operation.			•	Throughout corridor.	Increased frequency of high intensity and duration of wind and storm events may result in greater frequency of disruptions to service (i.e. temporary closure for maintenance, loss of power at traffic signals).	City to follow *Emergency Response Plan* policies and procedures. Maintenance plan to consider reducing risks to infrastructure.	Temporary disruptions to corridor function during and immediately following extreme weather events.	Insignificant	As per *Emergency Response Plan.*
Climate Change: Extreme snow and ice events	Project operation.			•	Throughout corridor.	Increased frequency and duration of extreme snow and ice events may increase risk to corridor users (i.e. pedestrians and cyclists). Increased requirement for application of de-icing agents.	City to consider pre-application techniques to prevent ice build-up and requirement for further applications as per City operating policies and processes and best practices at the time of operation.	Iced surfaces may result in accidents to corridor users.	Insignificant	As per City policies and procedures.
Transportation Network										
Pedestrian and Cycling Network	Project construction		•		Throughout corridor.	Construction will require detours for pedestrians and cyclists.	Key pedestrian and cycling routes should be maintained. Accessibility Design Standards (City of Ottawa, 2015) must be applied. Contractor to implement a *Construction and Traffic Management Plan* to minimize the effects on traffic flow and to ensure roadway safety for all users. A *Public Communications Plan* should be developed in consultation with OC Transpo to inform residents of construction schedule and changes. Construction fencing to demarcate the work area for safety.	Temporary inconvenience to pedestrians and cyclists.	Insignificant	As per *Public Communications Plan* and *Construction and Traffic Management Plans* including *Transit Operations*. Monitor complaints during construction.
Pedestrian and Cycling Network	Pre-construction planning and design. Project Operation	•		•	Throughout corridor	Improved/enhanced pedestrian and cycling connections. Opportunity to implement missing links and continuous facilities. Rail grade-separation to the VIA Rail line improving level of safety for the facilities.	BMPs during preliminary and detailed design phase. Regard for contemporary pathway design and protected intersection design. Accessibility Design Standards will be applied. Consultation with NCC for pathway design in Greenbelt lands. A *Landscape Plan* will be implemented to include pedestrian and cycling amenities.	Pedestrians and cyclists will be provided a safer, multi-modal, more accessible transportation environment.	Positive	None required.

Environmental Value	Project Activity	Project Phase			Location	Analysis of Potential Environmental Effect	Mitigation Measures Built-In Mitigation Measures	Potential Residual Effect	Level of Significance after Mitigation	Monitoring Recommendation
		P	C	O						
Road and Transit Network	Pre-construction planning and design. Project construction.	•	•		Temporary detour route, rail grade-separation to the VIA Rail line.	The temporary detour route has been planned to ensure it meets the requirements under a crossing safety review to ensure the detour configuration is acceptable.	It is recommended that during preliminary and detailed design that the detour configuration be re-confirmed to meet safety requirements. Continued consultation with VIA Rail during pre-construction planning and design as well as construction phases of the project.	None anticipated.	Negligible	As per detour crossing safety review and in consultation with VIA Rail.
Road and Transit Network	Project construction.		•		Throughout corridor.	Disruption to transit and traffic services. Construction will require transit and vehicle detours during construction.	A *Public Communications Plan* should be developed to inform residents and businesses of construction schedule and changes. A public notification program should be implemented by the City and OC Transpo for any detoured transit routes/stops. *Traffic Management Plan including Transit Operations* in consultation with OC Transpo (for Transit modifications) Contractor to ensure road safety for all corridor users. *Emergency Response Plan*.	Increased traffic on alternate routes during construction. Possible delays in travel time in peak hours during construction. Possible isolated delays in emergency response	Insignificant	As per *Public Communications Plan* and *Construction and Traffic Management Plans including Transit Operations.* Monitor complaints during construction.
Road and Transit Network	Project operation.			•	Throughout corridor.	Implementation of a higher-order facility will improve transit service throughout the corridor and increase modal-share. Improved transit user experience. Implementation of the rail grade-separations to the VIA Rail line will improve safety for all modes.	BMPs during detailed design phase. Regard for contemporary design standards. Accessibility Design Standards will be applied. *Landscape Plan* will be implemented to include pedestrian and cycling amenities.	Increased transit ridership. Improved local and regional traffic movements. Improved connections between communities.	Positive	None required.
Road and Transit Network	Project operation.			•	Throughout corridor.	Maintenance activities may result in temporary disruption to service and require detours.	*Traffic Management Plan* including Transit Operations for maintenance work requiring substantial delays. *Public Communications Plan* to notify users of potential delays/changes to service.	Temporary disruption to transit service during maintenance activities.	Negligible	*Traffic Management Plan* including Transit Operations and as per *Public Communications Plan*

Environmental Value	Project Activity	Project Phase			Location	Analysis of Potential Environmental Effect	Mitigation Measures Built-In Mitigation Measures	Potential Residual Effect	Level of Significance after Mitigation	Monitoring Recommendation
		P	C	O						
Road Network: Access	Project construction.		•		Road access to Greenbelt Research Farm, Royale Equestrian Farm (2191 Woodroffe Avenue), residences located on Greenbelt lands.	Project activities may disrupt access in the vicinity of identified properties.	Access during and post construction must be maintained at noted locations. A *Public Communications Plan* should be developed to inform residents/tenants/businesses of construction schedule and changes. *Traffic Management Plan including Transit Operations* in consultation with OC Transpo (for Transit modifications) Contractor to ensure road safety for all corridor users. Ongoing consultation with the NCC required during preliminary and detailed design.	None anticipated.	Negligible	As per *Public Communications Plan* and *Construction and Traffic Management Plans including Transit Operations.* Monitor complaints during construction. Ongoing consultation with NCC.
Road Network: Design	Project operation.	•		•	Royale Equestrian Farm 2191 Woodroffe Avenue.	Modified entrance to the Royale Equestrian Farm must maintain access/egress for large agricultural vehicles to the site.	The Recommended Plan includes a new signalized entrance to the Royale Equestrian Centre that accommodates large agricultural vehicles to access the site in similar manner to existing conditions. Additional consultation and design review during preliminary and detailed design with the NCC and tenants (REC) shall be undertaken.	A permanent small loss of land adjacent to the rail grade-separations.	Negligible	As per consultation with NCC and tenants.
Transportation Network: Safety	Project operation.			•	New signalized intersection with Fallowfield Park and Ride and Royale Equestrian Centre on Woodroffe Avenue.	The new signalized intersection provides enhanced safety for all users.	None required.	Improved safety for users.	Positive	None required.
Rail Network	Construction of the Project.		•		At the VIA Rail crossing.	Potential disruption to VIA Rail's train schedule and operations.	Consultation with VIA Rail to determine what/if any restrictions to construction must be completed in consideration of VIA Rail train operations.	Potential for short-term and/or unintentional service disruptions.	Insignificant	As per consultation with VIA Rail.
Heavy Rail Network	Pre-construction planning and design. Project construction.	•	•		CN Rail line	Construction in the vicinity of the CN Rail line may require special coordination with rail activity.	Any plans or work methods on CN Rail's property or affecting CN Rail's structure/safety must be reviewed and approved by CN Rail prior to work. CN will judge if the work is to be done in between trains with a flagman or if a workblock is needed with a flagman/supervisor. Detailed design in accordance with CN Rail standards and applicable permitting requirements.	Temporary disruption to CN railway operations.	Insignificant	As per consultation with CN Rail.
Biological Environment										
Vegetation	Pre-construction planning and design.	•			Coniferous hedgerow located west of the Southwest Transitway and just south of Vaan Drive.	This coniferous forest community has been identified as having moderate wildlife fire risk.	*Ecological Site Assessment* including Wildland Fire Risk Assessment as per Wildland Fire Risk Assessment and Mitigation Reference Manual (MNRF, 2017) *Tree Conservation Report and Landscape Plan.*	Reduced wildland fire risk.	Positive	As per *Ecological Site Assessment, Tree Conservation Report and Landscape Plan.*

Environmental Value	Project Activity	Project Phase			Location	Analysis of Potential Environmental Effect	Mitigation Measures Built-In Mitigation Measures	Potential Residual Effect	Level of Significance after Mitigation	Monitoring Recommendation
		P	C	O						
Vegetation	Pre-construction planning and design. Project construction, grading and excavation for all associated infrastructure.	•	•		Throughout corridor including Tallwood Woods, Black Rapids Creek, Fallowfield Station.	Clearing and grubbing activities will remove/alter vegetation. Loss of terrestrial/wetland vegetation due to construction activities may cause fragmentation of habitats and corridors. Accidental spills to the terrestrial environment.	*Ecological Site Assessment* prior to construction to identify existing wildlife corridors and habitats. Protection of identified features and individual specimens with exclusion fencing. *Tree Conservation Report and Landscape Plan.* Minimize vegetation clearing to the extent possible. Replacements to be with native varieties and/or salt tolerant species as appropriate. *Spills Response and Reporting Plan.* *Erosion and Sediment Control Plan* to be implemented prior to vegetation removal.	Localized loss of terrestrial/wetland vegetation.	Insignificant	As per *Ecological Site Assessment, Tree Conservation Report, Landscape Plan* and *Erosion* and *Sediment Control Plan.*
Vegetation	Project operation.			•	At-grade portions of the LRT facility.	Application of herbicides to maintain LRT track. Spread of invasive species along rail lines.	*Spills Response and Reporting Plan.*	Localized increased susceptibility to invasive species and lowered LRT operation safety issue.	Insignificant	As per *Spills Response and Reporting Plan.*
Wildlife	Pre-construction planning and design; project operation.	•		•	LRT station locations	Wildlife collisions with stations.	Follow City of Ottawa guidelines for bird-safe design. The guidelines were drafted in compliance with the CSA A460:19 and approved by City Council on November 25, 2020.	Accidental avian injury/mortality.	Insignificant	As per *City of Ottawa draft guidelines for bird-safe design*
Wildlife	Pre-construction planning and design; project operation.	•		•	Throughout corridor including Pinhey Forest and Black Rapids Creek and Tributary.	New illumination throughout the corridor may influence wildlife circadian rhythms. Increase in high frequency noises may influence wildlife behaviour including foraging and communication.	*Ecological Site Assessment* work to understand wildlife populations and specific mitigation to reduce illumination effects. *Lighting Treatment Plan* based on contemporary BMPs, research and consultation with NCC for Greenbelt areas. Best practices through design to ensure a balance of maintaining road safety (from wildlife collisions) while not over-illuminating adjacent natural areas.	Change to wildlife behaviour.	Insignificant	As per detailed design recommendations.

Environmental Value	Project Activity	Project Phase			Location	Analysis of Potential Environmental Effect	Mitigation Measures Built-In Mitigation Measures	Potential Residual Effect	Level of Significance after Mitigation	Monitoring Recommendation
		P	C	O						
Wildlife	Pre-construction planning and design. Project construction, grading and excavation for all associated infrastructure.	●	●		Throughout corridor, including Tallwood woods, Pinhey Forest, Black Rapids Creek and Tributary.	Impact to wildlife movement due to construction activities. Temporary localized disruption of wildlife habitat. General construction activities may disturb migratory birds or their habitat.	*Ecological Site Assessment* including targeted surveys to be conducted prior to construction. Delineation of construction area to limit disturbance. As per the City's Protocol for Wildlife Protection during Construction (2015). To reduce the possibility of contravention of the MBCA, vegetation removal should be scheduled to occur outside of the overall bird nesting season of April 1 to August 31. If a nest of a migratory bird is found within the active construction area at any time, vegetation removal and construction activities must cease until the young have fledged from the nest and the area is cleared by a qualified Biologist. If vegetation must be removed during the overall bird nesting season nest sweeps must be completed prior to works and cleared by a qualified Biologist. Caution should be taken during the turtle nesting season in June and early July as turtles use embankments and other terrestrial sites for nesting. During the active season MNRF recommends a thorough sweep of the area before works begin to encourage any turtles using the site to move away and the use of exclusion fencing as a best management practice. Fencing must be installed in the spring, prior to the turtle nesting season, be maintained throughout works, and checked on a daily basis.	Minor short-term localized avoidance of the area by migratory birds and transient wildlife.	Insignificant	As per City's Protocol for Wildlife Protection during Construction, and *Ecological Site Assessment*. Daily sweeps of the construction areas.
Wildlife Movement	Pre-construction planning and design. Project construction, grading and excavation for all associated infrastructure. Project operation.	●	●	●	North of VIA Rail corridor including Black Rapids Creek Tributary.	New Eco-Crossings will allow for safer and increased wildlife mobility across transportation corridor(s), and fewer collisions. New Eco-Crossings help protect a natural link between natural areas on either side of corridor. New Eco-Crossings will be designed to address the needs of small animals and large mammals.	The location of eco-crossings will be re-confirmed at the detailed design stage. It is possible that additional eco-crossings may be recommended at that time, and/or that the recommended locations may change, based on new information that may be available while having regard for funding and approval requirements and limitations. The detailed design of the eco-crossings to be confirmed through *Ecological Site Assessment* work. Wildlife exclusion fencing to be integrated with the eco-crossings as determined through *Ecological Site Assessment* work. Implementation of wildlife warning signs and other traffic signs as part of the wildlife collision prevention program and detection systems, if appropriate. Landscape strategy to consider field of views of animals that may use the corridor.	Fewer vehicle-wildlife collisions. Increased habitat connectivity for small and large animals.	Positive	As per detailed design recommendations. This is to include monitoring of the wildlife collision prevention measures and making adjustments as necessary.

Environmental Value	Project Activity	Project Phase			Location	Analysis of Potential Environmental Effect	Mitigation Measures Built-In Mitigation Measures	Potential Residual Effect	Level of Significance after Mitigation	Monitoring Recommendation
		P	C	O						
Species at Risk: Butternut	Pre-construction planning and design. Project construction, grading and excavation for all associated infrastructure.	•	•		Black Rapids Creek, west of Woodroffe Avenue and north and south of Berrigan Drive near existing Southwest Transitway corridor.	Butternut trees may be impacted by the construction of the project.	*Ecological Site Assessment* prior to construction to identify existing Butternut trees. Butternut Health Assessment should be completed as part of *Ecological Site Assessment* to determine requirements for permitting, protection, and compensation. *Tree Conservation Report, and Landscape Plan.* Protection of identified features and individual specimens with exclusion fencing. Minimize vegetation clearing to the extent possible. Compensation Butternut plantings. *Spills Response and Reporting Plan.* *Erosion and Sediment Control Plan* to be implemented prior to vegetation removal. Consultation with MECP to identify any permits/approvals required. If necessary, permits to be obtained under the ESA.	Potential for loss of Butternut trees.	Insignificant	As per *Ecological Site Assessment, Landscape Plan, and Tree Conservation Report* and in consultation with agencies.
Species at Risk - Confirmed	Pre-construction planning and design. Project construction, grading and excavation for all associated infrastructure.	•	•		Throughout corridor and within 120m (for rural areas) and 30m (in the urban area) including Tallwood Woods, Pinhey Forest, Black Rapids Creek and Black Rapids Creek Tributary	Three threatened/endangered species under the ESA and/or SARA were confirmed present within the Study Area. These include: Barn Swallow, Bobolink and Eastern Meadowlark. Species at Risk habitat may be affected during construction.	Conduct an *Ecological Site Assessment* to re-confirm presence of SAR identified. Avoidance of habitats of identified SAR where possible. Targeted surveys may be required. Protection afforded to any identified SAR or SAR habitat shall be in accordance with appropriate federal/provincial jurisdiction. Construction Timing Considerations - mitigation measures outlining timing window restrictions on construction will also help protect SAR. Consultation with MECP, CWS and ECCC, to identify any permits/approvals required. If necessary, permits or authorizations to be obtained under the ESA. Additional considerations to avoid contravention of the MBCA will also need to be considered. All on-site staff should undergo environmental awareness training to be able to identify the potential SAR that could be encountered. If SAR are observed during construction, the MECP is to be immediately contacted and operations modified to avoid any negative impacts to the species or their habitat until further direction is provided by the MECP.	Potential for short-term localized disturbance to SAR.	Insignificant	*Ecological Site Assessment* and in consultation with agencies.

Environmental Value	Project Activity	Project Phase			Location	Analysis of Potential Environmental Effect	Mitigation Measures Built-In Mitigation Measures	Potential Residual Effect	Level of Significance after Mitigation	Monitoring Recommendation
		P	C	O						
Species at Risk – Potential Species/habitat	Pre-construction planning and design. Project construction, grading and excavation for all associated infrastructure.	•	•		Throughout corridor and within 120m (for rural areas) and 30m (in the urban area) including Tallwood Woods, Pinhey Forest, Black Rapids Creek and Black Rapids Creek Tributary	Seven threatened/endangered species under the ESA and/or SARA have the potential to occur within the Study Area. These include: Bank Swallow, Chimney Swift, Common Nighthawk, Wood Thrush, Little Brown Myotis, Northern Myotis, and Tricolored Bat. Species at Risk habitat may be affected during construction.	Conduct an *Ecological Site Assessment* to confirm presence of SAR identified. Avoidance of habitats of identified SAR where possible. Targeted surveys may be required. Protection afforded to any identified SAR or SAR habitat shall be in accordance with appropriate federal/provincial jurisdiction. Construction Timing Considerations - mitigation measures outlining timing window restrictions on construction will also help protect SAR. Preventative measures (e.g. covering excavated soils) should be employed to deter opportunistic species such as Bank Swallow and Common Nighthawk from nesting on stockpiled materials within construction areas. Consultation with MECP, CWS and ECCC, to identify any permits/approvals required. If necessary, permits or authorizations to be obtained under the ESA. Additional considerations to avoid contravention of the MBCA will also need to be considered. All on-site staff should undergo environmental awareness training to be able to identify the potential SAR that could be encountered. If SAR are observed during construction, the MECP is to be immediately contacted and operations modified to avoid any negative impacts to the species or their habitat until further direction is provided by the MECP.	Potential for short-term localized disturbance to SAR.	Insignificant	*Ecological Site Assessment* and in consultation with agencies.
Significant Wildlife Habitat (SWH) - Confirmed	Pre-construction planning and design. Project construction, grading and excavation for all associated infrastructure.	•	•		Locations identified and within 30m of confirmed SWH including Pinhey Forest.	Potential loss and/or edge disturbance of confirmed SWH.	During detailed design phase of the project consultation with MNRF and an *Ecological Site Assessment* should be completed to re-confirm SWH (sand barren, woodland raptor nesting habitat and special concern and rare wildlife species habitat). Confirmed SWH within 30m of the project may require mitigation measures. Mitigation measures should follow the advice provided in the Significant Wildlife Habitat Mitigation Support Tool (SWHMist) (MNRF, 2014). *Tree Conservation Report and Landscape Plan.* Minimize vegetation clearing to the extent possible. Replacements to be with native varieties and/or salt tolerant species as appropriate.	None anticipated.	Insignificant	As per *Ecological Site Assessment, Tree Conservation Report and Landscape Plan.* Advice in the SWHMist (MNRF 2014) and consultation with MNRF.
Significant Wildlife Habitat (SWH) - Candidate	Pre-construction planning and design. Project construction, grading and excavation for all associated infrastructure.	•	•		Locations identified and within 120m (for rural areas) and 30m (in the urban area) of candidate SWH, including Tallwood Woods, Pinhey Forest, and Black Rapids Creek.	Potential loss and/or edge disturbance of candidate SWH.	During detailed design phase of the project consultation with MNRF/ECCC/NCC and an *Ecological Site Assessment* should be completed to confirm candidate SWH (waterfowl stopover and staging areas, amphibian breeding habitat, and bat maternity colonies). Candidate SWH within 120m (for rural areas) and 30m (in the urban area) of the project may require mitigation measures. Mitigation measures should follow the advice provided in the Significant Wildlife Habitat Mitigation Support Tool (SWHMist) (MNRF, 2014). *Tree Conservation Report and Landscape Plan.* Minimize vegetation clearing to the extent possible. Replacements to be with native varieties and/or salt tolerant species as appropriate.	Loss or change to SWH.	Insignificant	As per *Ecological Site Assessment, Tree Conservation Report and Landscape Plan.* Advice in the SWHMist (MNRF 2014) and consultation with MNRF.

Environmental Value	Project Activity	Project Phase			Location	Analysis of Potential Environmental Effect	Mitigation Measures Built-In Mitigation Measures	Potential Residual Effect	Level of Significance after Mitigation	Monitoring Recommendation
		P	C	O						
Aquatic Habitat	Pre-construction planning and design. Project construction, grading and excavation for all associated infrastructure.	●	●		Black Rapids Creek and Black Rapids Creek Tributary. All other watercourse crossings including agricultural drains.	Increased sedimentation during construction could impact fish habitat. Input of deleterious substances and water quality: via spills/leaks during construction and operational phase	Consult with regulatory agencies such as DFO, MNRF and RVCA regarding details of construction methodology and proposed mitigation measures. Mitigation measures proposed to reduce/eliminate potential effects to surface water resources, will also help reduce/eliminate potential effects to aquatic habitat such as: • Store all stockpiled material away from watercourses. • Remove all stockpiled material following construction. • Construction fencing at work areas near watercourses to limit the area of disturbance from encroaching on watercourses. • Minimize vegetation clearing around watercourses as much as possible, necessary to accommodate construction. • Preference for construction during low-flow periods. • Ensure machinery is in good working condition, free of fluid leaks. Inspections should be conducted daily to ensure this. • Refueling of equipment should be conducted away from slopes and at least 30m away from any surface water. Designated refueling area should be implemented for the site. Contractor to complete an *Erosion and Sediment Control Plan*, *Emergency Response Plan* and *Environmental Protection Plan*. Complete Fisheries Self-Assessment prior to undertaking in-water work. Follow current in-water construction timing restrictions provided by MNRF. Avoid in-water work to the extent possible. Headwater drainage features should be re-confirmed and assessed through *Ecological Site Assessment* during the planning phases of detailed design. Not all features were identified during the EA due to access restrictions. Any alteration or interference with a headwater drainage feature or other surface water feature may require a permit from RVCA and restrictions may apply.	Potential localized and temporary reduction in water quality and aquatic environment.	Negligible	As per *Erosion and Sediment Control Plan, Emergency Response Plan, Environmental Protection Plan* and results of *Ecological Site Assessment.*

Environmental Value	Project Activity	Project Phase			Location	Analysis of Potential Environmental Effect	Mitigation Measures Built-In Mitigation Measures	Potential Residual Effect	Level of Significance after Mitigation	Monitoring Recommendation
		P	C	O						
Aquatic Environment – Water Quality	Project construction and operation.		●	●	Black Rapids Creek and Black Rapids Creek Tributary. All other watercourse crossings including agricultural drains.	Salt, spray and drainage.	The implementation of Low Impact Design stormwater management techniques will be determined during detailed design. These techniques will assist with the management of water quality and quantity prior to infiltration to the surrounding environment. Water quality and quantity treatment as per *Corridor Drainage and Stormwater Management Plan* to implement best practices to protect the PSW near the road extension. Road drainage near the Black Rapids Creek and Black Rapids Creek Tributary crossing should be directed away from the creek to allow for infiltration and improve water quality. When snow is removed during operation, the creek should be protected/the snow should be directed into drainage swales, not directly into the creek.	Potential localized and temporary reduction in water quality and aquatic habitat.	Insignificant	None required.
Surface Water Features	Pre-construction planning and design. Project construction, grading and excavation for all associated infrastructure.	●	●		Black Rapids Creek and Black Rapids Creek Tributary. All other watercourse crossings including agricultural drains and wetlands.	The extension of the roadway may cause potential impacts to surface water features including watercourse realignments and wetlands in the Study Area.	*Erosion and Sediment Control Plan.* Consultation with RVCA through detailed design of the project. Permit requirement under Section 28 of the *Conservation Authorities Act* known as Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation (Ontario Regulation 174/06). Further consultation with RVCA and the NCC during preliminary and detailed design to ensure protection of the recent NCC wetland restoration project.	Potential impacts to surface water features.	Insignificant	As per Permit requirement, *Erosion and Sediment Control Plan.*
Significant Woodlands	Pre-construction planning and design. Project construction, grading and excavation for all associated infrastructure.	●	●		Several qualifying Significant Woodlands have been identified throughout the Study Area associated with the following areas: Tallwood woods, Pinhey Forest, Black Rapids Creek, Highbury Park Drive.	Potential localized loss and/or edge disturbance of Significant Woodlands in the Study Area including 2 in the urban area, and 7 in the rural area.	*Landscape Plan and Ecological Site Assessment* to confirm areas of significant woodlands that occur within 120 m of the project in rural areas and 30 m in urban areas, based on the evaluation criteria at the time of detailed design. *Tree Conservation Report* to determine replacement of trees identified for removal based on municipal policy that would apply. Additional surveys to mark distinctive mature trees may be required. The Natural Heritage Reference Manual (MNR, 2010) should be consulted to determine these buffer widths. Consultation with MNRF and City of Ottawa Natural Systems and Forestry Services staff to confirm buffer width and any other additional requirements. Minimize footprint of disturbance to significant woodlands during construction. Contractor to complete an *Environmental Protection Plan* and follow direction provided in the *Landscape Plan* to minimize disturbance.	Limited loss of significant woodland.	Insignificant	As per consultation with MNRF and City of Ottawa Natural Systems and Forestry Services staff. *Landscape Plan, Ecological Site Assessment, Tree Conservation Report* and *Environmental Protection Plan.*

Environmental Value	Project Activity	Project Phase			Location	Analysis of Potential Environmental Effect	Mitigation Measures Built-In Mitigation Measures	Potential Residual Effect	Level of Significance after Mitigation	Monitoring Recommendation
		P	C	O						
Physical Environment										
Geotechnical Conditions	Pre-construction surveys and investigations.	•			Throughout corridor	More detailed geotechnical and hydrogeological information is required in order to confirm engineering methods and requirements.	*Geotechnical Investigations* to be completed during detailed design to specify construction specifications.	None anticipated.	Negligible	As per detailed *Geotechnical Investigations.*
Geotechnical Conditions	Pre-construction surveys and investigations.	•			Throughout corridor	Potential sulphate attack on buried concrete or potential corrosion of exposed buried steel elements. Preliminary geotechnical results indicate the potential for corrosion following sampling of soil from a borehole located adjacent to Woodroffe Avenue. This may be indicative of conditions throughout or in portions of the Study Area.	Detailed *Geotechnical Investigations* should be completed during detailed design to identify any additional requirements.	None anticipated.	Negligible	As per detailed *Geotechnical Investigations.*
Groundwater	Pre-construction planning and design; project construction and project operation.	•	•	•	Locations of identified private water wells i.e. 2069, 2086, 2191 Woodroffe Avenue and the Grenfell Glen community.	Construction of the project may impact water quality and quantity for nearby residents.	During detailed design, recommendations will be made for monitoring during *Geotechnical Investigations.* Ongoing consultation with NCC and Grenfell Glen Community during preliminary and detailed design.	None anticipated.	Negligible	As per *Geotechnical Investigations* and consultation with NCC and the Grenfell Glen Community.
Geotechnical Conditions: Hydrogeology and Groundwater	Pre-construction planning and design. Project construction.	•	•		Throughout corridor.	Shallow groundwater table throughout corridor. Excavations will likely extend below the groundwater table. Groundwater levels are expected to fluctuate seasonally.	Detailed Geotechnical/hydrogeology assessment to be completed during detailed design which will identify subgrade specifications, foundations details and dewatering techniques. A Permit-To-Take-Water from the MECP is required for rates of groundwater inflow in excess of 400,000 L/day. All water to be removed from excavations shall be treated prior to disposal. No sediment laden water is permitted to enter any watercourse. Discharge in accordance with laws, regulations and By-laws. *Erosion and Sediment Control Plan, Wastewater Management Plan, Geotechnical Investigations.*	Minor groundwater inflow is anticipated to be manageable.	Insignificant	As per PTTW (if required) As per *Erosion and Sediment Control Plan* and *Wastewater Management Plan*, and *Geotechnical Investigations*.
Source Protection	Pre-construction planning and design; project construction and operation.	•	•	•	Portions of the Study Area identified as IPZ-2: Woodroffe Avenue area between Baseline Station to just south of Vaan Drive.	Surface waters in areas with an IPZ of 2 are more vulnerable to contamination. Activities listed as *drinking water threats* in O. Reg 287/07 under the *Clean Water Act, 2006* undertaken may impact sources of drinking water.	Drinking water threats as listed in O. Reg 287/07 should be avoided in portions of the Study Area with an IPZ-2. Source protection plan policies may apply if sufficient mitigation cannot be employed. Construction staging areas should be located outside of portions of the Study Area with an IPZ-2. As per consultation with MECP.	None anticipated.	Insignificant	As per O.Reg 287/07 and consultation with MECP.
Potentially Contaminated Land	Pre-construction planning and design; project construction, grading and excavation for all associated infrastructure.	•	•		Potentially contaminated areas (PCAs) within the project construction footprint.	Construction activities may disturb subsurface contaminants in identified PCAs.	Conduct a *Phase Two Environmental Site Assessment* during detailed design, as early as possible to better define PCAs and assist in the planning and scoping of construction and approach to the management of materials (soil and/or groundwater) during construction.	Management and removal of contaminated materials, if required.	Insignificant	As per *Phase Two Environmental Site Assessment.*

Environmental Value	Project Activity	Project Phase			Location	Analysis of Potential Environmental Effect	Mitigation Measures Built-In Mitigation Measures	Potential Residual Effect	Level of Significance after Mitigation	Monitoring Recommendation
		P	C	O						
Potentially Contaminated Land	Pre-construction planning and design; project construction, grading and excavation for all associated infrastructure.	•	•		Existing roadways and transitways.	Years of historical salt application on existing roadways may have caused shallow impacts to soil adjacent to the roadways.	Impacts should be considered in areas of deep excavation if along existing roadways/transitways. Conduct a *Phase II Environmental Site Assessment* during the next phases of the project.	None anticipated.	Negligible	As per *Phase Two Environmental Site Assessment.*
Agricultural Resources: soils	Pre-construction planning and design.	•	•		Greenbelt lands in the vicinity of the temporary rail grade-separation detour.	Temporary impacts to prime and non-prime agriculture lands for the Woodroffe Avenue and Southwest Transitway (LRT) overpasses. The overpasses address a critical safety issue.	As per *Agriculture Management Plan*, the completion of a Soil Management and Rehabilitation Plan specific to agricultural soils will be required to mitigate impacts to soil resources.	Potential for change or loss of prime and non-prime agriculture lands.	Insignificant	As per *Agriculture Management Plan.*
Agricultural Resources: soils	Pre-construction planning and design; project construction.	•	•		Greenbelt lands in the vicinity of the Fallowfield Road realignment and rail grade-separation overpass to the VIA Rail line.	Permanent loss of prime and non-prime agriculture lands for Fallowfield Road realignment. The construction and implementation of the Fallowfield Road overpass will result in a permanent loss of lands identified as having prime agriculture value. The overpass address a critical safety issue. The realignment of Fallowfield road provides the opportunity to rehabilitate the existing Fallowfield Road alignment and repurpose as greenspace and stormwater management which is of benefit to the community. Realigning the road also moves it further away from the residents located to the south of benefit to the noise and privacy environments. The realignment also eliminates the need for a detour during construction.	Where possible, impacts should be minimized during detailed design as per *Agriculture Management Plan.* Ongoing consultation with the NCC during preliminary and detailed design.	Permanent loss of prime agriculture lands.	Insignificant	As per *Agriculture Management Plan* and consultation with NCC.
Agricultural Resources: tile drainage	Pre-construction planning and design; project construction.	•	•		Greenbelt lands	Construction may cause disruption to the tile drainage system. If disrupted, ponding of the surrounding agricultural fields may occur. If tile drainage tile is damaged it is important that it is repaired as soon as possible.	Pre-construction investigations to locate and mitigate disruption to tile drainage infrastructure. *Agriculture Management Plan* to minimize impacts. *Erosion and Sediment Control Plan* to minimize impacts from potential ponding.	Temporary disruption to tile drainage infrastructure.	Insignificant	As per *Agriculture Management Plan, Erosion and Sediment Control Plan* and consultation with NCC.
Agricultural Resources: interior road network	Pre-construction planning and design; project construction.	•	•		Greenbelt lands	Main access to the interior agriculture road network appears to come from Greenbank Road and therefore should not be impacted during construction.	*Public Communications Plan* to inform and coordinate with farm operations and tenants to allow as much notice and best scheduling as possible. Ongoing consultation with NCC during preliminary and detailed design.	Potential for short-term disruptions to access.	Negligible	As per consultation with NCC. *Agriculture Management Plan* and *Public Communications Plan.*

Environmental Value	Project Activity	Project Phase			Location	Analysis of Potential Environmental Effect	Mitigation Measures Built-In Mitigation Measures	Potential Residual Effect	Level of Significance after Mitigation	Monitoring Recommendation
		P	C	O						
Agricultural Resources: loss of use	Pre-construction planning and design; Construction of the temporary construction detour.	•	•		Greenbelt lands	Temporary loss of use of some lands that are under active cultivation and crop production within the detour area.	*Agriculture Management Plan* to minimize to the extent possible the area impacted during construction to reduce impact to tenant farmers of the loss of a portion of their land use. Negotiations and compensation with NCC.	Temporary loss of use.	Insignificant	As per *Agriculture Management Plan* and consultation with NCC.
Stormwater Management	Pre-construction planning and design; project construction, grading and excavation for all associated infrastructure.	•	•		Throughout corridor	*Corridor Drainage and Stormwater Management Plan* to identify overall system requirements, methods of retention, detention, and infiltration and any control methods necessary to achieve runoff quality and quantity targets.	The *Corridor Drainage and Stormwater Management Plan* will consider low impact design alternatives and the opportunity to treat stormwater runoff within the identified right-of-way prior to outside of the right-of-way treatment in accordance with the *Corridor Drainage and Stormwater Management Approach* outlined in this EPR. As outlined in the strategy, consideration shall be made for design in proximity to the Ottawa International Airport and in-line with Airport Zoning Regulations in relation to guidelines established for Primary and Secondary Bird Hazard Zones. Secondary Bird Hazard areas in the Study Area include: east of Woodroffe Avenue between approximately Vaan Drive to south of Fallowfield Road and the Southwest Transitway from approximately Strandherd Drive to the southern limit of the Study Area. Primary Bird Hazard areas in the Study Area include: Fallowfield Road and south to Strandherd Drive. Consideration shall also be made for the impact of climate change on the associated infrastructure and specifically, extreme storm events. Environmental Compliance Approval (ECA) for new stormwater management system, if required.	Improved/new SWM infrastructure.	Insignificant	*As per Corridor Drainage and Stormwater Management Plan.*
Stormwater Management	Operation of stormwater management infrastructure.			•	Throughout corridor	Project implementation will result in an increase in the impervious surface area and increase in need to accommodate stormwater including during high storm events.	A *Corridor Drainage and Stormwater Management Plan* and requirements of Environmental Compliance Approval (ECA) as required.	New SWM infrastructure.	Insignificant	Maintenance requirements as per ECA.
Utilities	Pre-construction planning and design.	•			Rail grade-separations for Woodroffe Avenue and the Southwest Transitway.	Watermain to be relocated outside of the footprint for the overpass structures. Relocation to NCC Lands.	Footprint of relocation to be minimized to extent possible. Coordination with NCC and relevant City departments regarding the relocation and any additional rehabilitation works of the backbone watermain. Depending on land ownership decisions, Federal Land Use and Design Transaction Approval (FLUDTA) required. Utility locates completed prior to excavations. *Spills Response and Reporting Plan.* *Emergency Response Plan.* *Construction Waste Management Plan.*	Potential for short-term and/or unintentional service disruptions.	Insignificant	Monitor complaints during construction. As per FLUDTA.

Environmental Value	Project Activity	Project Phase			Location	Analysis of Potential Environmental Effect	Mitigation Measures Built-In Mitigation Measures	Potential Residual Effect	Level of Significance after Mitigation	Monitoring Recommendation
		P	C	O						
Utilities: Hydro One Lines	Pre-construction planning and design.	•			South side of Knoxdale Road.	Relocate/raise the 115kV circuit C7BM twin wood pole line to get clearance for the elevated LRT guideway running parallel with Woodroffe Ave.	As per consultation with Hydro One and *Hydro One Infrastructure Conflict Resolution.* Changes to Hydro One infrastructure may require the completion of a separate EA following the Class EA for Minor Transmission Facilities. It is recognized that the design information required to confidently confirm this will not be available until the preliminary and detailed design for the project is undertaken. At that time, the City will coordinate with Hydro One and determine if there are any additional EA requirements. If an EA is required, mitigation will be determined through the EA process. Any changes to the design will require review and approval by Hydro One prior to construction.	None anticipated.	To be determined.	To be determined.
Utilities: Hydro One Lines	Pre-construction planning and design.	•			230kV circuit M32S on south side of Knoxdale Road. Hydro One corridor on north side of West Hunt Club Road.	Elevated infrastructure potential to fall within minimum clearance requirements and/or affect location of steel transmission towers.	Potential impacts to transmission infrastructure to be evaluated. As per consultation with Hydro One and *Hydro One Infrastructure Conflict Resolution.* Any changes to the design will require review and approval by Hydro One prior to construction.	None anticipated.	To be determined.	To be determined.
Utilities: Hydro Ottawa Lines	Pre-construction planning and design.	•			Hydro Ottawa lines throughout Study Area.	The Recommended Plan will require the relocation of some Hydro Ottawa lines.	Consultation with Hydro Ottawa regarding engineering designs to ensure compliance with Conditions of Service. Proposed structures as part of the project will not hinder Hydro Ottawa's ability to access electricity meters or other distribution assets. Hydro Ottawa specifically requests to be consulted on the design of the proposed overpasses and bridges for rail grade-separation. Utility locates completed prior to excavations.	Potential for short-term and/or unintentional service disruptions.	Insignificant	As per consultation with Hydro Ottawa.

7.9 Transportation Committee and Council Meetings and Directions

The Recommended Plan was presented for approval to the City of Ottawa Transportation Committee on November 2, 2020 and to the full Council on November 25, 2020. The staff report and supporting documents were posted on the City's website prior to the meetings with the recommendation that the Transportation Committee recommend that Council:

1. Approve the functional design for the Barrhaven Light Rail Transit (Baseline Station to Barrhaven Town Centre) and Rail Grade-Separations Planning and Environmental Assessment (EA) study and interim transit priority measures as described in this report and supporting documents;
2. Direct staff to complete the Transit Project Assessment Process (TPAP) in accordance with the Regulation 231/08 of the Ontario *Environmental Assessment Act*, including the preparation and filing of the Environmental Project Report for final public review and comment; and,
3. Direct staff to remove the 1005--1045 Greenbank Road site earmarked for affordable housing by Council on April 10, 2019 (Report ACS2019-PIE-GEN-001) from the list of affordable housing development sites; and,
4. Direct the Interdepartmental Task Force on Affordable Housing to undertake a comprehensive review of the planned Stage 3 LRT corridors to identify short-term alternative locations for future affordable housing development to replace the 1005-1045 Greenbank Road site that is now recommended for the Barrhaven LRT's Train Storage and Servicing Facility.
5. Direct staff to establish a Working Group to examine options on how to assist the residents who are facing a future relocation because of the LRT project and that this working group consist of: General Manager, Planning, Infrastructure and Economic Development, General Manager, Community and Social Services, General Manager, Transportation Services, and/or their respective delegates; Ottawa Community Housing; community representatives from Manor Village and Cheryl Gardens; the ward Councillor; and the Councillor Liaison for Housing and Homelessness.
6. Direct staff to report back to the Finance and Economic Development Committee by end of 2021 on the Working Group's recommendations including justifications, and policy and financial implications

A total of 14 delegations were made to Transportation Committee by residents of Manor Village, the Barrhaven BIA and other interest groups both against and for the Recommended Plan.

Additional motions were introduced at Council to further mitigate against the loss of rental housing units and to assist in finding additional affordable housing in the City in proximity to Stage 3 LRT projects included:

7. That staff assess the site at 40 Beechcliffe Street for its development potential for affordable housing, as it is in close proximity to the 100 private rental units that will be impacted by the Stage 3 LRT expansion, and report back to Council by the end of 2021 on its suitability and potential development timeline.
8. Direct staff in Transportation Services, Housing Services, and Planning, Infrastructure and Economic Development to re-initiate the Interdepartmental Task Force on Affordable Housing to explore to explore opportunities for affordable housing in close proximity (600m) to Light Rail Transit (LRT) and Bus Rapid Transit (BRT) stations associated with Stage 3 LRT.

Further, a motion introduced as follows would be referred to and considered by the Working Group.

- Council establish a Rental Replacement Program for the residents who are facing relocation because of the LRT project and that the Working Group, identified in recommendation 5 of the Report, assist tenants in securing rental housing that is of a similar dwelling type and bedroom count to their existing rental housing;
- the City, subject to Council approval in the annual budget, provide a housing allowance to pay the difference between the rent for the expropriated property and the rent for a replacement unit, up to the Average Market Rent for the City of Ottawa as defined by the Canada Mortgage and Housing Corporation, should the replacement unit have a rent that is higher than the rent of the expropriated unit; and,
- Council direct the Working Group to identify a source of funding to support such a Rental Replacement Program set out herein and finalize the details of the Rental Replacement Program such that only tenants who are, as of the date of this motion, tenants of the land to be expropriated and continue to be tenants of the land at time of eviction, qualify for the

Program, encourage those who qualify for other housing benefits to apply for such benefits, with any other Program requirement to be brought forward to Finance and Economic Development Committee in accordance with Recommendation 6 of the Report

A further motion was raised to direct staff to report back to Transportation Committee with an alternative option that includes retaining the housing in Manor Village or Cheryl Gardens was not carried.

The staff report and supporting documents, motions presented, and the voting record for each is provided in **Appendix A.**