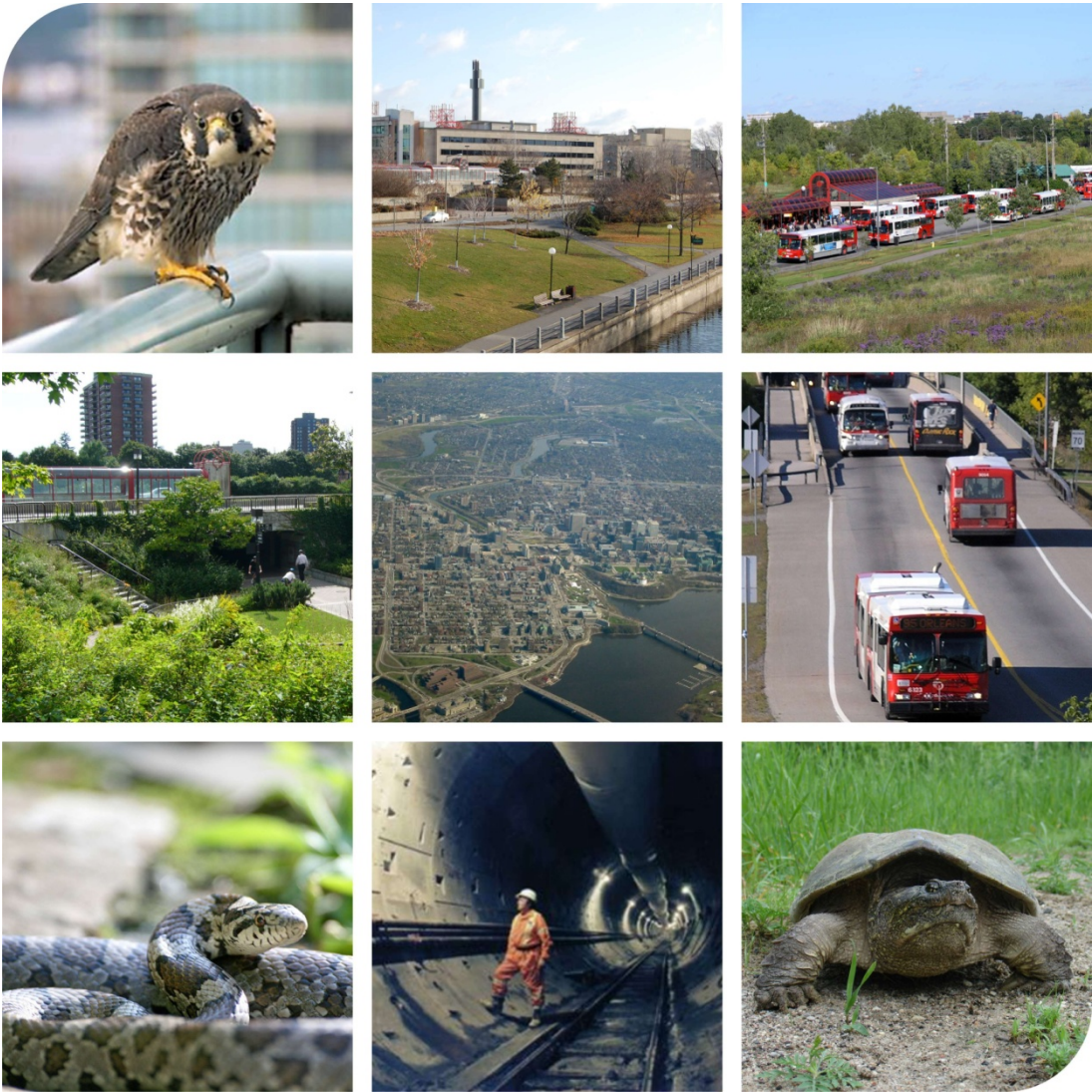


# 10.0 ENVIRONMENTAL EFFECTS, SIGNIFICANCE AND MITIGATION

To a large degree, environmental effects were avoided or minimized to the extent possible due to the nature of the project (i.e., conversion from BRT to LRT); and during the evaluation of the alternatives and the selection of the preferred alternative. Moreover, many mitigation measures have been directly incorporated into the recommended plan. This section describes the environmental benefits and potential environmental effects of the proposed project and mitigation measures for the effects that cannot be avoided.

*Sections Include:*

- 10.1 Assessment Approach
- 10.2 Project Benefits
- 10.3 Impact Assessment Results, Mitigation, Significance and Residual Effects
- 10.4 Cumulative Effects
- 10.5 Accidents and Malfunctions
- 10.6 Municipal, Provincial, Federal or Other Approvals or Permits
- 10.7 Future Commitments



### 10.1 Assessment Approach

An assessment was undertaken to describe the potential environmental effects, both positive and negative of the planning, construction and operational activities associated with the proposed DOTT project.

The assessment of effects involves applying the following steps:

- Step 1: Identify and analyze activities where the proposed project may interact with existing environmental conditions.
- Step 2: Acknowledge the project activities that act as built-in mitigation measures.
- Step 3: Identify residual environmental effects, if any.
- Step 4: Identify opportunities for further mitigation of residual effects, if possible/practical.
- Step 5: Determine the significance of the residual environmental effects, after further mitigation.

Professional judgment and experience formed the basis for identifying environmental effects and mitigation measures. The analysis was based primarily on comparing the existing environment, prior to, during and after construction. The prediction of effects considered:

- the interaction between the project and the environmental values
- the effects of the project activities on the environmental values; and
- the combined effects of multiple activities and/or multiple effects

Within this context, consideration was given to:

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

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

**Significant (S):** 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 of species diversity or population of species; permanent loss of critical/productive habitat; permanent alteration to community characteristics or services, land use or established patterns; and/or permanent loss of archaeological/heritage resources.

**Insignificant (I):** An effect that may exhibit one or more of the following characteristics: not widespread; temporary or short term duration (i.e. only during construction); recurring effect lasting for short periods of time during or after project implementation; not permanent, so that once the stimulus is removed, the integrity of the social/environmental components is resumed.

**Negligible (N):** A nearly zero or hardly discernable effect. A negligible effect would touch a population, an entity or a specific group of individuals at a localized area and/or over a short period in such a way as to be similar in effect to small random changes in the population, entity or group due to environmental

irregularities, but would have no measurable effect on the population, entity or group as a whole.

**Positive (P):** An effect that exhibits a beneficial outcome.

The definitions of significance were adopted for use in this assessment because many of the impacts cannot be quantified in absolute terms, although changes and trends can be predicted. The definitions provide guidance and were intended to minimize personal bias.

Study boundaries serve to focus the scope of the assessment such that a meaningful analysis of potential effects 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 zone of influence. For the purpose of this assessment, project boundaries were generally defined as presented below. Where these boundaries differ, they are identified in the assessment of effects.

#### Planning/Pre-Construction

*Spatial:* The physical area which may be disturbed directly or indirectly by construction activities within approximately 200 m of the work areas.

*Temporal:* The duration of the active construction phase of the project, schedule to occur over a number of years, in different location throughout the corridor.

#### Operational

*Spatial:* The physical alignment of the Transitway.

*Temporal:* The completed Transitway between Tunney’s Pasture and Blair Station is considered permanent infrastructure, which will operate as constructed for the lifespan of the facility as determined by the transportation needs of the City of Ottawa.

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

Monitoring is important to verify the accuracy of predicted effects. Monitoring measures were recommended to determine what effects would actually occur with project implementation, and could result in the modification of mitigation measures to improve their effectiveness. Identified monitoring measures included inspection, surveillance, and compliance monitoring.

### Assessment Results

An environmental effect requires consideration of the project activities and their interaction with the environment. Table 10-1 describes the project activity and its interaction with the environment at an identified location, the potential effects, mitigation measures, residual effects and their significance, and monitoring recommendations.

## 10.2 Project Benefits

The proposed DOTT project will result in substantial benefits, including increased ridership, reduced air pollutants and greenhouse gas emissions, improved mobility, substantial job creation and economic development. In addition to the tangible benefits there will be substantial improvements in the reliability, comfort and convenience of the system.

The project was designed to respond to the growth of the City, and provide increased transit capacity into the city core. The need for the project is based on the Transportation Master Plan analysis and subsequent modelling update that indicate that over the planning period (i.e. 2006 to 2031):

- Population will increase 30%, from 870,700 to 1,136,000
- Employment will increase by 35%, from 530,000 to 703,000
- Mode split will increase from 23% to 30%
- Transit ridership will increase by 78%, or from:
  - 44,500 to 80,300 trips in the AM peak hour

- 93 million to 166 million annual trips.

Various planning and transportation studies conclude that travel access into downtown Ottawa is approaching capacity and cannot handle any further growth. Since road expansions are not feasible, the transit tunnel provides the much needed additional capacity and a sustainable solution for the City to move people in and out of downtown while encouraging higher density growth.

Consequently, the purpose of the DOTT project is to add transportation system capacity in the most heavily used transit corridor and to stimulate reurbanization particularly in the Central Area, while providing greater transportation choice to the City's residents, businesses and institutions for moving within and among the City's major urban areas.

The objectives of the DOTT project are as follows:

- Increase Transit Ridership and Mobility,
- Enhance Ottawa's Urban Character and National Stature,
- Stimulate Smart Growth,
- Create Successful Rapid Transit Stations,
- Provide Safe and Efficient Linear Infrastructure,
- Provide a Safe and Efficient Tunnel and Compatible Portals,
- Be Compatible With Adjacent Communities,
- Maintain or Improve Natural and Physical Environments,
- Showcase Sustainable Design Best Practices,
- Manage Construction Disruption and Risk, and
- Result in a Wise Public Investment.

### 10.2.1 Demonstration of Project Benefits

The City of Ottawa's DOTT project will result in all of the objective outcomes identified by the Government of Canada in the Building Canada Fund template, including:

- Improve mobility, reduce travel times and increase safety and efficiency,
- Expand public access and ridership,
- Reduce the growth of GHG and other emissions, and

- Contribute to sustainable municipal development and land-use planning.

Building and widening roads alone, especially in downtown Ottawa, is not a practical or affordable solution to meet the anticipated demands and to support the projected growth on the City's transportation system. By providing greater transportation choice, attracting more riders and adding more capacity to the overall transportation network, the proposed DOTT project will help address existing congestion and aid in preventing even higher levels of congestion in the future. The growth of downtown employment will continue through the ability to increase capacity on transit service in the downtown, primarily on the DOTT LRT line. Riders will see:

- Reduced transit travel times. The average speed of the LRT system will be higher than the current BRT system primarily because of the downtown tunnel, which will remove the mixed operation through 14 traffic signals along Albert and Slater, reducing conflicts with surface traffic, service vehicles, and pedestrian crossings. Geometric improvements will also contribute.
- Reduced congestion downtown. The majority of Transitway buses will be removed from the downtown streets allowing for a reallocation of street space through the core to improve pedestrian and cycling environment. Local bus routes will be adjusted to provide good coverage and to take advantage of the additional road space.
- More efficient transit operations. Passengers will use off-board fare payment, allowing for more efficient train boarding (as all doors to all trains can be used). Simplified routing through the downtown will eliminate current confusion and also reduce wait times.
- Improved levels of comfort and convenience. Passengers will have a weather-protected environment, with access to more amenities than exist at current Transitway stations. Real-time train information, improved lighting, public address and dynamic information displays will all be used to assist passengers.

The proposed DOTT project will also allow for redevelopment and transit-integrated development in the downtown. This will help the City achieve its targets for increased intensification and the protection of agricultural and sensitive environmental areas against urban expansion pressure.

*Increased Transit Ridership*

The current Transitway serving the downtown is approaching capacity, and is expected to start to limit travel into the downtown by 2018. The DOTT project will provide a substantial increase in carrying capacity through the core and will contribute to significant ridership increases. Ridership estimates indicate that:

- Total system ridership is expected to increase from 93 million to 166 million trips per annum,
- Current ridership on the Tunney's Pasture to Blair portion of the Transitway totals 39 million. This ridership on the DOTT corridor is expected to grow in the future to:
  - 51 million trips in 2021, and
  - 76 million trips in 2031
- The TMP model indicates that there will be a ridership uplift of 9% through the introduction of LRT. This translates into 4.6 million new trips in the opening year
- Estimates from the OC Transpo Rapid Transit Network Operation Review indicate that the current network, including the existing Transitways can carry a maximum of 132 million annual trips. The growth in system ridership beyond 132 million annual trips is the result of the infrastructure investment in the DOTT project. This translate into 34 million new trips per year in 2031 (as a result of the additional capacity to be provided by the DOTT as well as due to the attractiveness of LRT system over BRT)
- Cumulative 161.4 million new trips between an opening in 2019 and 2031
- More than 40% of all transit trips taken in the city will use the DOTT project for all or part of their journey.

The downtown stations currently handle the largest number of annual trips, and represent the most congested section of the existing Transitway. Annual ridership through the four underground stations is expected to increase from 25 million to 50 million annual trips by 2031, representing 65% of the ridership on the line. These riders will see the largest benefits from the DOTT project due to travel time saving and improvements in reliability, comfort and convenience.

*Reduced Emissions of Air Pollutants and Greenhouse Gases*

Greenhouse gas emissions are reduced by transit projects in several ways. First, by replacing diesel fuelled bus trips with electrified LRT, emissions from transit vehicles themselves are reduced. Secondly and more significantly in terms of the total amount of emissions reduced, trips made by private car are replaced by transit trips, resulting in a substantial reduction in greenhouse gas emissions per kilometer.

Preliminary forecasts indicate that the DOTT project will generate considerable greenhouse gas emission savings compared to the base case scenario, where ridership growth will be constrained by capacity. The project is forecast to reduce carbon dioxide emissions by approximately 38,000 tonnes in 2031. It will also reduce criteria air contaminant emissions by approximately 1750 tonnes in the same year.

*Improved Mobility*

The DOTT project will be complemented by a number of other projects that are part of the TMP. New sections of Transitway and transit priority measures will allow service to operate at reduced travel times as compared to operations on city streets.

The DOTT project will allow for improved travel from many parts of the City, speeding journey times into and out of the core. The number of stations in the core will provide a similar level of service as the existing transitway, with improved connections to the Byward Market, north Elgin Street, LeBreton Flats and services to Gatineau. The reductions in bus service through the core will also allow for local routes to better accommodate demand and connect to all points in the core.

Pressure along Wellington can also be relived providing improved operational opportunities for STO services.

Planned improvements in accessibility and the potential to link station accesses directly to adjacent buildings will provide increased mobility in poor weather conditions. These types of connections have proven to be beneficial in other cities.

*Travel Time Savings*

- The current Transitway provides a high quality of service, except in the downtown core where on-street operations reduce both speed and reliability. Today buses travel along Albert and Slater and pass through 14 signalized intersections. The removal of this operational constraint is the major improvement in speed, and results in substantial time savings for the transit traveller.
- The majority of the 51 million trips in 2021 and 76 million trips in 2031 will see total time savings of 55 million minutes as a result of the operational improvements. Passengers who travel across the core will see the largest time savings.
- As important as travel time savings is the improvement in reliability. Service is currently scheduled at 17 minutes to cross the downtown, but regularly exceeds that by 5-10 minutes. The lack of reliability requires many passengers to add time to their journeys to prepare for potential delays. More regular service will allow them to plan for shorter journeys.
- The improved journey time will offset the additional time required to transfer from the platforms to the street level. This time is estimated at 60-120 seconds depending on the station and the use of either elevators or escalators.
- In addition to the actual in-vehicle time there are other potential time savings from off-board fare collection, accessing trains from all doors and taking the first train for their trip (rather than waiting for specific bus routes).

*Economic Development*

The DOTT project will contribute to the regeneration of the economy of the Central Area and the creation of new jobs or increased employment in the following ways:

- Jobs associated with constructing, operating and maintaining the LRT system;
- Jobs arising as a result of the improved travel conditions in the downtown and at stations along the line; and
- Increased employment in the downtown core, where offices can be more effectively serviced.

Using standard economic impact modelling (input-output modelling), the multiple account evaluation estimated the employment that will be generated by the construction of the project. The total amount of direct, indirect, and imputed employment generated associated with the investment is just over 20,000 person-years.

From an employer's perspective, what matters is the accessibility of a given location, and how the DOTT project makes that location more or less attractive for the expansion of an existing business or the establishment of a new one. These factors include:

- Access to a suitable workforce living within acceptable travel times and costs
- Access to or by customers
- Access to or by suppliers

For these reasons, the improved access to station areas will promote intensification and the clustering of higher density employment uses. Consistent with the City's growth management objectives, the increased access to employment should also allow more of the City's residents to travel to work by transit.

*10.2.2 Calculation of Economic Benefits*

The assessment of the economic benefits of the project has been undertaken using a Multiple Account Evaluation (MAE) approach. MAE provides decision-makers with a broader representation of the project's benefits by allowing the consideration of factors that could not be considered in a traditional cost-benefit analysis. The structuring of metrics into a series of separate accounts allows for a relative assessment of the project's impacts on different aspects of the economy and society.

The MAE is prepared by comparing a project case against a base case over an analysis period, on a present value basis. In the project case, the DOTT is constructed and the light rail service begins operation in 2019. The base case assumes the existing Transitway service continues, and capacity limitations begin to restrict ridership growth within the forecast period. The analysis period for the MAE is thirty years (to 2039). The discount rate is 5%.

The conduct of the economic analysis is based on assembling existing data as inputs. The inputs and assumptions used are drawn from various sources, and have not been independently audited or verified prior to their use in the MAE.

The estimates of travel time savings as reported in the MAE findings below may be considered to be conservative as they under-represent potential time saving for travellers who move from auto to transit. The estimated travel time savings is derived from transit risers having a faster average trip than the current system provides. Further, we note that all findings are based on ridership data provided by the City's TRANS model.

*Transportation User Benefits*

This account summarizes economic benefits accruing to users of the transportation system in terms of travel time savings, vehicle operating cost savings and accident avoidance savings.

Ridership forecasts for the LRT indicate 51 million riders in 2021, rising to 76 million riders by 2031. The new riders, i.e., riders that will be induced from auto to transit, was derived as a

residual of the projected riders on the OC Transpo system with the project in place and the total capacity of the OC Transpo system without the project in place, which would reach a fixed capacity of 132 million riders within the next approximately 10 years.

Travel Time Savings

Transit projects typically produce travel time savings in two ways; first, by increasing the speed of travel for transit passengers; secondly, by shifting some travel from cars to transit, which in turn relieves road congestion in the transit corridor. To be conservative, it was assumed that there are no travel time savings except for the existing riders (i.e. no travel time savings for those diverted from auto). The travel time for transit was estimated from the average trip length of 5.38 km. Travel time savings for existing riders accrue due to the improved speed with the project in place, allowing average transit speeds in the corridor to increase from existing 27 kph to 35 kph.

Vehicle Operating Cost Savings

This metric is a calculation of the operating costs avoided for car owners who travel by transit instead. The calculation is the product of vehicle kilometres travelled (VKT), and the costs per kilometre of operating a standard four-door sedan. The metric is reported as the monetary value of these savings.

Accident Avoidance Savings

This metric represents the savings to society resulting from the road accidents avoided through modal shift to transit. The calculation is performed using incident factors for accidents per vehicle kilometre, typical costs of fatal, injury, and property accidents, and the number of vehicle kilometres avoided. The metric is reported as the net present value of the monetary value of these savings for the full 30-year analysis period.

Results

Travel time savings have been reported in two ways: annual minutes saved, and the monetary value of these savings. Travel

time savings for the DOTT project indicates that a total of over 55 million minutes are saved by the transit users in comparison to the time they may have taken when travelling by the existing transit service. Once monetized over 30 years, these savings are equivalent to an estimated benefit of \$276 million for the Ottawa and area economy.

Vehicle Operating Cost savings are a function of the number of riders on transit, which in turn affects the number of vehicle kilometres travelled (VKT) on the network. The vehicle operating cost savings are estimated to be \$600 million over 30 years. Accident avoidance savings are also a result of reduced vehicle kilometres travelled (VKT) due to trips being taken by transit instead, this accounts for an additional savings of \$217 million. The results are a total user benefit of close to \$1.1 billion in present value over the 30-year analysis period.

Transportation User Benefits Account		
Travel Time Savings	AM Peak Minutes, 2031	15,938,472
Travel Time Savings	\$ (NPV)	\$276,265,200
Vehicle Operating Cost Savings	\$ (NPV)	\$599,934,133
Accident Avoidance Savings	Fatal/Injury/Property, \$ ( NPV)	\$216,681,187
Summary Metric: NPV of Annual Benefits		\$1,092,880,521

Environmental Benefits

Greenhouse Gas Reductions

Studies have shown that the transportation sector is a significant contributor of GHG emissions. Within this sector, automobiles are a significant source of emissions. GHG emissions are reduced by the DOTT project by shifting travel from cars to rapid transit. In this analysis, the reduction in vehicle kilometres travelled formed the basis for the reduction in emissions. Greenhouse gas emissions were estimated from the Urban Transport Emissions Calculator (UTEC). The volume of GHG emission savings is reported in tonnes per year for a typical year (2031). The monetary value of the GHG emission savings are calculated using a per-tonne value of \$37 per tonne, calculated by Transport Canada as reported in *Estimating the*

*Costs of Greenhouse Gas Emissions from Transportation (Transport Canada, 2007).*

Criteria Air Contaminants

Criteria Air Contaminants (CAC’s) are pollutants with a variety of impacts on the natural environmental and human health.

These are associated with vehicle emissions and as such, are also a function of vehicle kilometres travelled, as forecast by the transportation model. The CAC emissions calculated by the model are carbon monoxide (CO), volatile organic compounds (VOC), nitrous oxides (NOx), sulphur oxides (SOx), and particulate matter (PM).

Results

The greenhouse gas emission reductions and their monetary value in 2031, and the CAC reductions and their monetary values in 2031, are reported in the table below. Note that monetary savings shown are annual for the year 2031.

Environmental Account		
GhG Emissions Savings	Tonnes/Year, 2031	37,968
Vaue of GhG Emissions Savings	\$, (2031)	\$2,251,656
Critical Air Contaminents (CAC) Emissions Savings	Tonnes/Year,2031	1,758
Critical Air Contaminents (CAC) Emissions Savings	\$, (2031)	\$2,440,902
Summary Metric: NPV of Annual Benefits	\$, (2031)	\$4,692,558

Economic Development Account

Investment in downtown transit tunnel and its ancillary projects can create spinoff impacts for Ottawa’s economy. The effect of spending money on public transportation creates immediate jobs and income by supporting manufacturing, construction and public transportation operation activities.

For this analysis, input – output multipliers obtained from Statistics Canada were used to obtain the direct and indirect job impacts of the DOTT investment. The output produced by the investment has also been estimated with the use of these multipliers.

Results

The economic impact of the investment is outlined on the table below. The analysis indicates that this investment results in

creation of over 20,000 person-years of employment, and total output of some \$3.2bn.

Economic Development Account		
Output Generated	\$	\$3,243,392,964
Employment Generated (Incremental)	Direct, Indirect, Induced jobs	20,116
Taxes Generated (Incremental)	\$	\$144,438,756

10.3 Impact Assessment Results, Mitigation, Significance and Residual Effects

This section of the EPR describes the environment that will be affected or might reasonably be affected by the proposed project; describes the potential environmental effects; describes mitigation measures (to minimize, manage, prevent and avoid environmental effects); and proposes monitoring and contingency measures for the Transit Project described in Section 9.0 (if required).

To facilitate the readers understanding of this section, a synopsis of the effects on the human and biophysical environmental features is first described followed by a detailed assessment for each environmental value presented in Table 10-1.

Human Environment

Emergency Services, Transit Service, Road Network and Pedestrian and Cycling

The proposed DOTT project is fully grade-separated from other traffic and will not have any negative operational effects on general traffic in the study area during operation. Environmental effects will mostly occur during the construction phase.

Permanent displacement of emergency vehicles, ParaTranspo, VIP trips, regional bus transit and local bus transit using the Transitway will also occur.

Localized traffic detours and diversions will be required at specific locations during construction. Specific Traffic Management Plans should address issues associated with these impacts. Detailed Operational Plans for bus service detours will be developed by OC Transpo prior to any implementation.

Traffic Management Plans will be developed to assess impacts on adjacent roadways and intersections during bus diversions.

Localized construction activity may also impact pedestrian and cycling routes at specific locations. A Public Communication Plan and Traffic Management Plan will be required to inform users of localized construction impacts and provide information on traffic detours and diversions as well as future operational characteristics of the new facility.

The City will continue to work with the Ontario Ministry of Transportation regarding use of the Highway 417 corridor and any specific requirements for temporary infrastructure to accommodate bus priority measures during construction of the DOTT.

#### *Planned Capital Characteristics and Functions*

The project will enhance the urban character of downtown Ottawa and adjacent neighbourhoods and will exhibit a quality and attention to design detail that is befitting the Nation's Capital. The corridor is in close proximity to a number of federally identifiable landmarks and symbols including: Capital Arrivals and Scenic Entry Routes, Capital Pathways and Parkways, National Cultural Institutions and Symbols, Federal Nodes, and Ceremonies and Festivals. The planning stage for new stations and station accesses will be subject to further design review by review agencies including, but not limited to, the NCC, PWGSC, Parks Canada and the City of Ottawa. These design processes will ensure that these new built elements will complement the existing built form and cultural landscapes that surround them.

#### *Planned Urban Structure and Function*

The project also traverses and interacts with several existing residential, commercial, institutional, industrial and downtown communities as well as some significant future development parcels holdings located within the municipal land use designations targeted for future growth including *Central Area* and *Mixed-Use Centres*. The introduction of LRT to these areas will be important to their evolution. All *Mixed-Use Centres* will be subject to a community design process, the purpose of which is to translate the principles and policies of the Official Plan to a community scale. The City will work with surrounding communities, landowners, local businesses, school boards and other interested parties on community design plans that will be the backbone of any significant change in a community.

#### *Community and Neighbourhood Integration*

Construction will take place over a number of years, impacting different neighbourhoods and communities over the length of the project although Short term/localized disruptions, diversions through construction phase. The impacts are associated with heavy equipment for construction operations. Mitigation requirements will include a Public Communications Plan to inform communities of timing for construction, areas impacted and planned diversions. Construction Phasing Plans will be essential to minimizing the impacts.

#### *Land Ownership*

The majority of the DOTT alignment utilizes the existing BRT Transitway right-of-way. However, additional lands are required in some locations where the existing alignment may be realigned to accommodate LRT vehicles or for new or expanded stations and station accesses which includes;

- Tunney's Pasture Station
- Bayview Station and approaches
- LeBreton Station and approaches
- Downtown Stations and accesses
- Campus Station and approaches

- Hurdman Station and approaches
- Train Station
- Cyrville Station
- Blair Station Approach
- Maintenance and Storage Facility

Additional property requirements for some expanded transit stations, as well as temporary and permanent easements for tunnel, downtown stations and accesses will also be required.

Acquisition of public land will be by means of land purchase, land exchange or land lease. Private land acquisition will be in the form of land purchase or through land expropriation.

During the planning and design phase of the project, footprints outside of the existing Transitway right-of-way have been minimized. In the event of the requirement for expropriation, the objective is to ensure that individual rights are respected, protected, and fair compensation will be provided within the framework of the Expropriations Act for any property acquired or affected by the Recommended Plan. The acquisition process emphasizes negotiation and achievement of a mutually satisfactory agreement between the proponent and the land owner.

#### *Safety and Security*

Provision of life safety features and systems will be governed predominately by standards 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 fighters facilities, emergency lighting, and construction materials.

A centralized Operation Control Centre (OCC), to be housed within the Maintenance and Storage Facility, will be provided to support operation of the LRT system. The OCC will

communicate with, supervise, and coordinate all personnel and trains operating on the system during normal operations and be responsible for incident management in cooperating with Emergency Services personnel.

Urban design component of both street and station design will rely upon widely accepted frameworks such as Crime Prevention through Environmental Design (CPTED).

*Archaeology/Built Heritage Resources*

For the most part, the LRT alignment is within the present Transitway footprint and will not result in any ground disturbance. These areas do not have to be archaeologically assessed as no resources will be disturbed during construction. Moreover, it is suspected that many of the areas of the DOTT corridor, which are off of the current Transitway footprint, have been previously disturbed and may not require archaeological assessment beyond the Stage 1 level. Although areas of previous disturbance are unlikely to contain archaeological resources and have little archaeological potential, a formal Stage 1 Assessment must still be conducted to demonstrate this to the Ministry of Culture to support the recommendation that no further archaeological assessment is required for that specific area.

Along the DOTT corridor there are also a few areas of known archaeological potential which are likely to require further archaeological investigation. Depending upon the archaeological potential and resources in the area further mitigation that may be required include Stage 2, 3 and/or 4 level assessments, conservation of resources and/or monitoring the construction of some of the station access shafts. These recommendations will be determined based on the outcome of the Stage 1 Assessment.

The portion of the DOTT corridor of most interest is in the area surrounding the intersection of Elgin and Wellington Streets. Work within this area will require review and input from the following agencies: the Ministry of Culture, the National Capital

Commission, Parks Canada, the City of Ottawa and the Federal Heritage Building Review Office. Within this small area are several National Historic Sites, Federal Heritage Buildings/Designated Grade 1 Heritage Buildings, a National Monument, a designated cultural landscape, a heritage conservation district, known archaeological sites, a heritage bridge, and a Canadian Heritage River/UNESCO World Heritage Site.

*Noise, Air Quality and Vibration*

Varied construction activities along the LRT corridor are expected to create isolated short-term noise, vibration, and air quality impacts. The contractor will be required to develop a strategy for mitigating the effects according to good practices intended to satisfy, as far as technically feasible, the fugitive dust limits, noise limits, and ground vibrations. Tunnel construction works must also be preceded by pre-construction surveys for select buildings along the tunnel route.

A comparison of existing and future noise conditions revealed that, despite an increase in noise levels due to converting the BRT Transitway to LRT, noise levels at most receptors remain dominated by existing sources including Highway 417 and Scott Street. However, mitigation is necessary and recommended for houses and churches located along the north side of the Transitway between Parkdale Avenue and Merton Street. Adequate mitigation would be in the form of noise barriers installed adjacent to the property lines of the affected properties within the City’s right of way.

Noise from tunnel ventilation equipment and electrical substations will be mitigated to acceptable levels according to Certificate of Approvals regulated by the Ministry of the Environment and the City of Ottawa Environmental Noise Control Guidelines, following equipment selection during the detailed design phase of the project. In a similar way, noise from expanded operations at the terminal stations and from the Maintenance and Storage Facility would be evaluated during the

detailed design and implementation phase of the project according to the rules established by the Ministry of the Environment and City of Ottawa protocol.

The Transitway (BRT) conversion into an electric LRT system creates an overall improvement in ambient air quality, due to the elimination of diesel buses along the Transitway and reduced vehicle emissions across the fleet. Increased bus traffic at transfer hubs will be outweighed by improved vehicle emission technology over time, including hybrid and alternative fuel vehicles.

Potential impacts on air quality are also anticipated from ventilation shafts along the tunnel portion of the corridor under normal operational, maintenance, and emergency fire condition scenarios. Under normal operating conditions, the only anticipated emission is particulate matter from brake dust. Operation of diesel generators underground during night time maintenance operations, would release products of combustion similar to roadway vehicles. Simulation results indicated that concentrations of vehicle shaft emissions at all sensitive receptors fall below Ministry of the Environment standards. At two locations where violations of criteria exist, the detailed design of the building and its mechanical system will create the opportunity to mitigate any marginal air quality issues. Air quality monitoring during maintenance operations is recommended to establish policies for maintenance activities. Simulation of fire conditions in the tunnel indicates that smoke and other combustible products discharged from ventilation shafts can produce hazardous concentrations at fresh air intakes of nearby buildings. It is recommended that heat and smoke detectors for automatic damper control of fresh air intakes be installed at select buildings. The same analysis during fire scenarios indicates that station entrances remain free of harmful contamination levels, thereby allowing safe egress by patrons in an emergency.

Air emissions from the maintenance and storage facility, as well as from expanded operations at the terminal stations, will be assessed and controlled during the detailed design and implementation phases of the project according to MOE and City of Ottawa requirements.

Without mitigation, ground vibration levels and associated ground-borne noise will increase to perceptible levels along the full corridor, including the downtown tunnel section. However, implementation of appropriate mitigation measures would limit future ground vibrations to acceptable levels according to various building uses along the corridor. Although ground-borne noise is more difficult to attenuate along tunnel sections, the same mitigation features would satisfy the vast majority of noise issues affecting buildings in the downtown core. Recommended mitigation measures include:

- Track and sleeper isolation such as floating slab track, double-tie systems, or equivalent vibration attenuation techniques along the downtown tunnel section, the maintenance tunnel link, and the at-grade section from Tunney's Pasture to the Bayview Road crossing; and
- Use of track isolation such as resilient track fasteners alone, for the remainder of the corridor.

Further, use of continuously welded rail, as well as regular maintenance of train wheels and track, is recommended to ensure acceptable long term performance within vibration and noise limits. Short term monitoring of noise and vibration is recommended for the first six months of LRT operations at select basements of adjacent buildings, to evaluate the success of noted mitigation strategies.

*Municipal Services and Utilities*

In general, the alignment of the LRT corridor was designed to avoid major conflicts with existing utilities. Overall, the impacts to existing utilities are limited and temporary in nature.

Minor relocation of the Cave Creek Collector in the vicinity of the proposed Bayview Station is anticipated. The impact of this relocation is small in relation to the construction of the station itself. However, an increase in the extent and duration of construction in the vicinity of the station is anticipated, and mitigation will include minimization of the relocation length, appropriate management of contaminated soils, and a suitable landscaping plan. Service will need to be maintained during the relocation and will likely involve pumping of flows around affected area.

The Transitway surface must be lowered in the vicinity of Blair station impacting the existing storm sewer that currently serves this section of the Transitway. The sewer currently drains into the Cyrville drain, and lowering of the outlet itself is anticipated. Approximately 1,000 meters of existing sewers will be affected. An analysis will be required at the preliminary design stage to ensure that this part of the drainage system will provide the desired level of surface, considering changes to outlet conditions. A landscaping plan will also be required, in addition erosion and sediment control measures will need to be installed to protect receiving surface waters.

There are a number of existing utilities in the vicinity of Hurdman Station that will need to be reconstructed with stronger pipes to withstand the increased load from the future LRT embankment. A landscaping plan will also be required, in addition erosion and sediment control measures will need to be installed to protect receiving surface waters.

Temporary disruption and relocation of local services will be expected in some areas, in particular in the vicinity of the underground tunnel stations. A Public Communications Plan and temporary servicing will be required over the duration of construction.

Physical/Biophysical Environment

*Drainage and Stormwater Management*

The anticipated potential drainage impacts are largely related to construction activities which involve the exposure of soils, leading to erosion, transport, and deposition of sediment in downstream locations. The potential impacts are temporary in nature, and work could be carried out to mitigate impacted areas. Risks to fish habitat and surface water quality will be greatest for works carried out in the vicinity of surface water outlets. These locations include the Rideau River crossing, the Cyrville Drain crossing, and at two potential new drainage outlets that would be dedicated to drainage of the LRT Right-of-Way (ROW) in the vicinity of the East and West DOT portals. These drainage areas are less than 1 ha in area, and preliminary design process may determine that the associated drainage can be accommodated in existing outlets, thus reducing the risk to surface water values.

Erosion and Sediment Control Plans (ESCPs) must be prepared for every project phase and submitted to the City and the Rideau Valley Conservation Authority (RVCA). These plans will identify specific areas of soil exposure and measures needed to reduce erosion, and prevent the conveyance of sediment to the drainage system and surface water bodies. A multiple barrier approach is recommended to minimize residual impacts and provide redundancy in the event of failure of any one measure. All measures must be inspected and maintained throughout the construction period. While the plans will focus on the protection of aquatic habitat, they must also address protection of existing drainage systems.

Excavation work will require on-going dewatering due to groundwater infiltration. The ESCPs must address the management of sediment from dewatering activities to avoid associated potential discharge impacts. Protocols for management of construction related fuels and other potential contaminants is also required to limit risks associated with spills to drainage systems.

The project does not involve significant increases in impervious area. In fact, there may be an overall net reduction in impervious area. The project either follows, or closely follows the existing Transitway corridor, or is located underground. The most notable change will be at the Maintenance and Storage Facility (MSF), where there will be a net reduction in hard surfaces. In spite of the reduction in imperviousness, a stormwater management (SWM) facility has been proposed to treat the future drainage from this site, and the net impact will be an improvement to the existing runoff quality. The facility will also manage drainage from short sections of Maintenance and Storage Facility connecting tracks (most of the connecting tracks will be located underground). The Maintenance and Storage facility must provide a covered train cleaning facility, with drainage to the sanitary sewer system, in order to avoid abnormally high levels of stormwater contamination.

A potential need for new dedicated outlets has been identified for drainage to be intercepted and pumped at the East and West tunnel portals. While no significant change in impervious surface is anticipated in the vicinity of the portals, oil-grit separation chambers have been proposed to contribute to the mitigation of these potential outlets. Landscaping and local fish habitat improvements in the vicinity of the potential outlets are also proposed.

The addition of ballast to part of the existing Transitway surface will attenuate surface drainage from the corridor. While changes in runoff volumes will be small, peak runoff rates in drainage outlets are expected to be reduced as a result of the ballast slowing and temporarily storing the runoff.

Finally, the replacement of diesel buses with high capacity electric light rail trains is also expected to have a beneficial impact on stormwater runoff due to the elimination of bus related pollutants.

In terms of permanent drainage related impacts, the project is expected to result in a net benefit to drainage systems and surface water conditions due to:

- Limited change in imperviousness;
- Proposed SWM facilities at the Maintenance and Storage facility and portal drainage facilities;
- Runoff attenuation and storage effects associated with ballasted sections of track; and
- Replacement of diesel buses with electric trains.

*Aquatic Habitats*

The alignment includes crossing of the Rideau River near Hurdman Station using the existing Transitway bridge structure. The Sediment and Erosion Control Plan and Environmental Construction Management Plan should include measures to prevent sediment, construction vehicle fluids and other deleterious substances from entering the water during construction. No in-water works are proposed and therefore no fisheries timing restrictions are required. Sediment and Erosion Control Plans should also include detailed measures to prevent sediment from entering small tributaries located north of Highway 417 near Cyrville Station.

*Terrestrial Habitats*

The potential impact on the natural environment, in particular forest cover and open fields, is limited to Hurdman Station, Cyrville Station and Bayview Station. The impacts are limited to a loss of old field meadow habitat and possible impact to stands of trees and individual specimen trees. There were no significant natural features, vegetation species or community types identified within the alignment or station footprints.

To mitigate the potential for impacts to retained features in the vicinity of the construction envelopes at those stations, temporary construction fencing should be installed around the construction envelope. Treed areas near the Hurdman Station work area should be fenced at the drip-line of the stands prior to

any site preparation activities to prevent accidentally intrusion into the root zones by heavy equipment or damage to tree trunks. Landscaping Plans and Sediment and Erosion Control Plans will include measures to limit the construction impacts to these vegetated areas.

*Species-at-Risk*

Of these only three Species at Risk: milk snake, common snapping turtle and peregrine falcon have potential to be located within the proposed alignment and construction footprint.

The habitat for milk snake is primarily old field meadows. The fields surrounding the proposed Hurdman Station is the only potential habitat for this species. Restrictive fencing around the construction site will mitigate the amount of old field habitat disturbed and limit access to the construction zone. If a milk snake is found during the construction, the Ministry of Natural Resources, Kemptville District should be contacted.

The common snapping turtle is an aquatic species that inhabits the Rideau River. The species searches for nest sites in sandy areas in June and may wander into the construction zone. Silt fencing placed near the river as part of the sediment and erosion control program should prevent access to the construction zone by this species. If a snapping turtle is found during construction, the Ministry of Natural Resources, Kemptville District should be contacted.

The peregrine falcon has nested in downtown Ottawa for several years and hunts birds throughout the City of Ottawa. During the summer months (June-July) the young peregrines leave the nest and test their hunting and flying skills near the nest site. At this time the young birds have been known to land on the ground near or on roadways and near office buildings. If a peregrine is found in construction zones, the Ministry of Natural Resources or the Canadian Wildlife Service should be contacted.

*Geotechnical (Ground Movement/Groundwater)*

The potential impacts to surrounding areas are the result of changes in the soil and water media resulting from the construction project. These changes may typically result in the following broad effects:

- Ground movement, either due to increased stress (load) that exceeds the soil capability or loss of stability; and/or,
- Changes in groundwater level (either regional or local).

Ground movement may occur due to changes in the in-situ stress resulting from the placement of fill on the ground surface, lowering of the groundwater level, from building foundations or from excavation. These conditions can result in settlement of the ground and/or lateral displacement (such as what might occur adjacent to a shored excavation) that can result in damage to surrounding structures or utilities, depending on the magnitude of the ground movements.

While all soils will exhibit some movement as a result of stress changes, the silty clay soils in the Ottawa area are particularly sensitive to regional groundwater lowering. Lowering the groundwater level increases the stress on the silty clay, and if the stress increase exceeds the clay's capability to resist the imposed loads from overlying overburden and foundations, building settlements can occur. This effect requires some time (in the order of months or years) to result in ground settlements that can damage buildings.

Ground movements can also occur as a result of large changes in stress that ultimately lead to instability (such as when the excavation sidewall or the tunnel face collapses); instability resulting in failure will result in large deformations.

Ground movements can also occur as a result of excessive ground losses during excavation, particularly when tunnelling through overburden soils. In evaluating this impact, ground losses would be controlled using specific performance criteria or

prescribing the construction means and methods (i.e. earth pressure balance TBM, grouting).

The potential ground movements that can occur should be considered as unwanted effects that would be mitigated by proper design and construction of the proposed facility and are not considered to result in long-term impacts (i.e. it is assumed that the design will be carried out to avoid these impacts both during construction and during the life of the facility). The information provided in the assessment of environmental effects table assumes that the design and construction of the proposed facility will be carried out in a manner as to mitigate the potential for intolerable ground movements.

Changes in groundwater level can result in settlement, or may affect the regional groundwater level, groundwater flow or aquifers within the region. It has been assumed in the assessment of effects tables that the design and construction of the facility will be carried out to minimize these effects. Provided the facility is designed and constructed to minimize groundwater inflows, where required, it is not considered that the regional water regime will be significantly impacted.

Blasting for rock excavation is generally considered to be the most disruptive method of rock removal. This is considered a short-term construction concern for which the methods and techniques necessary to mitigate the impacts of this activity are well understood and in common use.

*Environmental Contamination*

The potential impacts to the project and surrounding areas are primarily related to the short term disturbance of contaminated soil and groundwater during construction, however, there may also be some longer term impacts when dealing with permanent installation adjacent to known contaminated sites. The majority of the identified impacts are related to contaminated soil and groundwater management which will be limited to on-site

construction works, however, there will be requirements for off-site disposal.

The preferred alignment crosses through, or in close proximity to, known contaminated sites such as waste disposal sites, LeBreton Flats, downtown Ottawa, the former rail corridor along the Rideau Canal and a former Coal Gasification Plant at Lees Avenue. During construction, specifically in these areas, the excess material generated during the construction may be contaminated from the former land uses. Excess material will need to be assessed and any unsuitable material will require off-site disposal at a licensed disposal site. To reduce delays to the project during construction and the volume of fill sent off-site for disposal, a reasonable level of pre-assessment and planning should be completed prior to construction.

In addition to excess soil, contaminated groundwater entering the excavations will require treatment and discharge or disposal off-site. Contaminated groundwater will require pre-treatment for disposal to the municipal sanitary sewer under a sewer use agreement with the City or removal and disposal at an off-site facility. Regular testing during construction should be completed to identify the quality of groundwater that is accumulating in excavations.

Localized groundwater lowering will influence the groundwater table around the point of groundwater taking. The degree of off-site influence will vary depending on the geology and magnitude of water taking. The effect of lowering the water table along the preferred alignment adjacent to contaminated sites will be to draw potentially contaminated groundwater towards the alignment. In some cases this may result in off-site groundwater contamination crossing multiple property boundaries while migrating towards the point of groundwater taking. In areas of known off-site groundwater contamination, efforts should be made to reduce the required groundwater taking. The requirements for off-site monitoring during water taking should be evaluated prior to construction.

Permanent occupied structures such as stations may be constructed over contaminated sites. It is expected that in some cases, contaminated soil or groundwater may remain below the stations. This residual contamination represents a potential exposure risk to future users of these stations. The magnitude of this risk should be evaluated prior to construction by means of investigation and risk assessment. There is also the potential that the City of Ottawa and or the Ontario Ministry of the Environment may request that a Record of Site Condition (RSC) be filed for stations located on contaminated sites as a means of managing risk. In order to complete an RSC an investigation followed by remediation and/or risk assessment would be required.

The proposed Hurdman station is located on top of a historical landfill. Closed landfills will generate landfill gas which can enter structures located on the landfill. The amount and type of gas generated is determined by the quantity, composition and age of the waste present. The build up of landfill gases represents a risk of explosion (methane) or toxic exposure (hydrogen sulphide) and can be mitigated by adequate ventilation. Prior to construction the risk of landfill gas at the site of the Hurdman station needs to be evaluated such that the station design can incorporate the appropriate gas management measures. It is understood that the existing Hurdman Bus Transitway Station may have a system in place to manage this issue and should be considered in the planning for the LRT station.

The site of the LRT maintenance yard is currently occupied by several industrial-commercial buildings. The age and nature of the operations at these buildings is not known, however, there is the risk that the operations at these locations may include things like former or existing fuel storage tanks and on-site handling and storage of hazardous wastes such as used lubricants and solvents. Depending on the age to the buildings, there is the potential for hazardous and designated substances to be present in the buildings. It is recommended that a Phase I Environmental Site Assessment of the existing buildings be

completed and it is also expected that a designated substance survey of the buildings will be required prior to building demolition.

Table 10-1: Assessment of Environmental Effects

Environmental Value		Gov. Interest			Project Activity/Environmental Interaction	Project Phase			Specific Location	Analysis of Environmental Effect	Required Mitigation Measures	Mitigation Resp.		Potential Residual Effect	Level of Significance after Mitigation	Monitoring Recommendation	Review Agency for: Comment/Approval
		Federal	Provincial	Municipal		Planning	Construction	Operation				Design	Contractor				
Human Environment	Emergency Services, Para Transpo, VIP Trips			✓	• Displacement of existing Transitway traffic during conversion from BRT to LRT.		✓	✓	• Entire corridor	• Conversion of the Transitway will displace emergency vehicles that currently use the facility.	• Traffic Management Plan and Emergency Response Plan to be completed prior to construction. • Potential to design Rideau Bridge to accommodate emergency vehicles.	✓	✓	None expected	Insignificant	None	City of Ottawa
	Transit Service		✓	✓	• Displacement of existing Transitway traffic during conversion from BRT to LRT.		✓		• Entire corridor	• Conversion of the Transitway will displace existing transit services currently using the facility.  • Local and bus rapid transit routes will be displaced during construction to adjacent road networks.	• Detailed operational plans to be developed prior to implementation. Traffic Management Plans to be developed to address impacts on the adjacent roadways and intersections during construction. • Potential use of Highway 417 corridor to accommodate bus priority measures.	✓	✓	None expected	Insignificant	None	City of Ottawa,  Ontario Ministry of Transportation
				✓	• Implementation of LRT.			✓	• East and West of surface transit locations.	• Regional and Para Transpo services will be permanently displaced to adjacent road networks.  • Local bus routes will be permanently displaced to adjacent road networks.	• Operational plans to be developed prior to implementation. Regional services could connect to LRT stations.  • Local bus routes will be redesigned to connect with LRT stations.	✓		None expected	Insignificant  Positive	None  None	City of Ottawa.  Private transit operators  City of Ottawa
	Pedestrian, Cycling and Recreational Pathways	✓		✓	• Disruption of Pedestrian/Cycling movements during construction.		✓	✓	• Stations and Station Accesses	• Localized disruption of pedestrian/cycling movements in proximity to active construction sites.  • Anticipated increase in connectivity to transit during operation.	• Traffic Management Plan to be completed prior to construction. • Public Communications Plan. • Station and Facility Design	✓	✓	None expected	Insignificant  Positive	None  None	City of Ottawa
	Road Network			✓	• Disruption to existing road network during construction.		✓		• LeBreton Station, Downtown Stations, Train Station	• Localized traffic detours and diversions will be required during construction of LeBreton Station, Downtown Stations and Train Station.	• Traffic Management Plan to be completed prior to construction. • Public Communications Plan.	✓	✓	None expected	Insignificant	None	City of Ottawa
				✓	• Implementation of LRT			✓	• Entire corridor	• Alignment is fully grade separated and will not have any negative operational effects on general traffic.	• None Required			None expected	Positive	None	City of Ottawa

Environmental Value		Gov. Interest			Project Activity/Environmental Interaction	Project Phase			Specific Location	Analysis of Environmental Effect	Required Mitigation Measures	Mitigation Resp.		Potential Residual Effect	Level of Significance after Mitigation	Monitoring Recommendation	Review Agency for: Comment/Approval
		Federal	Provincial	Municipal		Planning	Construction	Operation				Design	Contractor				
Human Environment	Planned Capital Character and Function	✓		✓	• Capital Arrivals and Scenic Entry Routes (including the Rideau Canal), Pathways and Parkways, National Cultural Institutions and Symbols, Federal Nodes, and Ceremonies and Festivals and their interaction with the construction / conversion of central area stations and station accesses.	✓	✓		• Tunney's Pasture (Federal Node). • Bayview Station (Capital Pathway and Trans-Canada Trail). • Rideau Station (Confederation Boulevard, Capital Parkway, Capital Pathway). • Campus Station (Capital Parkway, Capital Pathway). • Lees Avenue Station (Capital Arrival, Capital Pathway, Scenic Entry Route). • Train Station (Capital Arrival, Scenic Entry, Capital Pathway). • St. Laurent Station (Capital Arrival). • Cyrville Station (Capital Arrival, Scenic Entry Route Planned Capital Pathway). • Blair Station (Scenic Entry Route).	• Short term/localized disruptions, diversions through construction phase. • Enhancement opportunities by public and private proponents through design implementation <ul style="list-style-type: none"><li>Compatible designs</li><li>Potential opportunities for reclamation of green space (Campus Station)</li></ul>	• Design and Approvals (Federal and Municipal). • Public Communications Plan and Construction Phasing Plans.	✓		Short-term localized disruptions  None expected	Insignificant  Positive	None required  None required	National Capital Commission (Federal Land Use Approval)  Parks Canada  City of Ottawa (Site Plan Control Approval)
	Planned Urban and Structure and Function		✓	✓	• Introduction of higher order rapid transit service around strategic locations designated for intensification within the City.			✓	• <i>Mixed Use Centres</i> : Tunney's Pasture, Lees Avenue Station, Hurdman Station, Train Station, Cyrville Station, Blair Station. • <i>Central Area</i> : Bayview Station to Rideau Station • <i>General Urban Area</i> : Campus Station, St. Laurent Station.	• Intensification strategy within the City Official Plan directs growth to the designated <i>Central Area</i> , <i>Mixed-Use Centres</i> , <i>Employment Areas</i> , <i>Enterprise Areas</i> , <i>Developing Communities</i> and <i>Mainstreets</i> . These areas include locations that are centered on the Rapid Transit Network.	• Station Design, Community Design Plans, Zoning, Design and Approvals.	✓		None expected	Positive	None required	National Capital Commission (Federal Land Use Approval)  City of Ottawa (Site Plan Control Approval)
	Community Neighbourhood Integration			✓	• Disruption from construction activities in proximity to existing built form.	✓	✓		• Throughout corridor	• Temporary disruption to existing communities / neighbourhoods at existing station locations during conversion/construction of stations and station accesses, and construction of the Maintenance and Storage Facility. • Public/private opportunities to connect existing buildings/facilities to the LRT facility and stations.	• Public Communications Plan and access management through construction. • Design and Approvals processes	✓	✓	Short-term, localized disruptions.	Positive	None	Public Works and Government Services Canada  National Capital Commission (Federal Land Use Approval)  City of Ottawa (Site Plan Control Approval)

Environmental Value		Gov. Interest			Project Activity/Environmental Interaction	Project Phase			Specific Location	Analysis of Environmental Effect	Required Mitigation Measures	Mitigation Resp.		Potential Residual Effect	Level of Significance after Mitigation	Monitoring Recommendation	Review Agency for: Comment/Approval
		Federal	Provincial	Municipal		Planning	Construction	Operation				Design	Contractor				
	Community Neighbourhood Integration (cont'd)									<ul style="list-style-type: none"> <li>Removal of some visual impacts of existing stations by lowering (LeBreton Station, Campus Station).</li> <li>New views to Transitway facilities from increasing height from existing (Bayview Station, Hurdman Station, Maintenance and Storage Facility).</li> <li>Improvements to community connectivity, pedestrian street environment and public/private space interactions due to removal of Transitway facility at grade through the downtown.</li> </ul>							
Human Environment	Economic Activity / Business Vitality		✓	✓	<ul style="list-style-type: none"> <li>Disruption to businesses during construction of proposed downtown stations and station accesses.</li> <li>Employment generated through construction</li> <li>Introduction of new higher order transit system</li> </ul>		✓		<ul style="list-style-type: none"> <li>Downtown Stations and Station Accesses</li> <li>Regional</li> <li>Throughout System</li> </ul>	<ul style="list-style-type: none"> <li>Localized construction related impacts may include decreases in the amount of passing traffic, alteration to traffic access and/or visibility.</li> <li>New employment opportunities related to construction project.</li> <li>Improved services and accessibility.</li> <li>Possible impetus for intensification around transit stations.</li> </ul>	<ul style="list-style-type: none"> <li>Public Communications Plan.</li> <li>None required</li> <li>None required</li> </ul>		✓	Short-term, localized disruptions	Insignificant	None required	N/A
							✓							None expected	Positive	None required	
								✓						None expected	Positive	None required	
	Land Ownership	✓	✓	✓	<ul style="list-style-type: none"> <li>Temporary and permanent property acquisitions required to implement project and allow for construction.</li> </ul>	✓	✓		<ul style="list-style-type: none"> <li>Tunney's Pasture Station</li> <li>Bayview Station and approaches</li> <li>LeBreton Station and approaches</li> <li>Downtown Stations and accesses</li> <li>Campus Station and approaches</li> <li>Hurdman Station and approaches</li> <li>Train Station</li> <li>Cyrville Station</li> <li>Blair Station Approach</li> <li>Maintenance and Storage Facility</li> </ul>	<ul style="list-style-type: none"> <li>Additional property requirements for some expanded transit stations, as well as temporary and permanent easements for tunnel, downtown stations and accesses.</li> <li>Public (purchase, land exchange or lease)</li> <li>Private (purchase or expropriate).</li> </ul>	<ul style="list-style-type: none"> <li>Minimize footprints outside of the existing Transitway ROW.</li> <li>Compensation for required properties.</li> </ul>	✓		None	Insignificant	None	Public Works and Government Services Canada  National Capital Commission  City of Ottawa

Environmental Value		Gov. Interest			Project Activity/Environmental Interaction	Project Phase			Specific Location	Analysis of Environmental Effect	Required Mitigation Measures	Mitigation Resp.		Potential Residual Effect	Level of Significance after Mitigation	Monitoring Recommendation	Review Agency for: Comment/Approval
		Federal	Provincial	Municipal		Planning	Construction	Operation				Design	Contractor				
Human Environment	Safety and Security	✓		✓	• Site and worker safety during construction and user safety during operation of the facility.		✓	✓	• Active construction site and completed facility.	• Worker and public safety. Personal safety and security of staff and transit users.	• Occupational Health and Safety Plan. • Potential measures may include video surveillance, security fencing and a gates, controlled access, and security guards • Urban design component of both street and station design will rely upon wisely accepted frameworks such as Crime Prevention through Environmental Design (CPTED). • Provision for life safety features and systems including an Emergency Response Plan and a centralized Operation Control Centre designed to meet relevant Building Code and fire safety standards.	✓	✓	None	Negligible	None	N/A
	Potential for Archaeological Resources	✓	✓	✓	• Mining and Excavation, Filling and Staging.		✓		• Tunney's Pasture Station from Ross Avenue in the west to 100 m east of Holland and from Scott Street in the South to Yarrow Street in the North; • Station access and vent locations at: <ul style="list-style-type: none"><li>- 400 Albert Street</li><li>- 330 Albert Street</li><li>- Parking lot at N/E corner of Ken and Albert Streets</li><li>- 99 Bank Street</li><li>- 102 Bank Street</li><li>- 155 Queen Street</li></ul> • Rideau station access shafts at Elgin Street and Rideau Canal, the Government • Conference Centre and Rideau Mall and the Bay. (This area includes the following: Rideau Canal – a National Historic Site, World Heritage Site and Canadian Heritage River); • Confederation Boulevard – a Cultural Landscape which functions as a ceremonial route; • Confederation Square – a National Historic Site; • Plaza Bridge – a heritage bridge and known archaeological site;	• Potential for archaeological resources to exist in these areas, existing archaeological sites are already known to be in the vicinity of the Wellington and Elgin Street Intersections. • Construction in these areas including filling, excavation, staging and mining for: <ul style="list-style-type: none"><li>- Tunney's Pasture Station bus turn-around;</li><li>- Tunney's Pasture Station bus platform;</li><li>- Cut and cover station construction of Campus Station</li><li>- All station access tunnels and vent shafts</li><li>- East Portal</li><li>- Lees Station Platform</li><li>- Hurdman Station</li><li>- Rail Station</li><li>- Cut and cover excavation of the eastern and western connection to the maintenance yard</li></ul> • Any tracks that may exit the existing Transitway ROW.	• Stage 1 archaeological investigation is required for anywhere the facilities, staging or construction extend beyond the present Transitway ROW. • Further Archaeological investigations may also be needed depending upon the outcome of the Stage 1. The Stage 1 can combine all of the areas within the transportation corridor listed in the 'Specific Location' column into one report. All investigations must be completed prior to construction in order to receive approval from the Ministry of Culture.	✓		None	Negligible	Recommendation will be based on the outcome of further archaeological investigations and may include monitoring or the area may be cleared by the Ministry of Culture based on the results of the Stage 1 assessment.	Public Works and Government Services Canada,  National Capital Commission  Parks Canada  Ministry of Culture

Environmental Value		Gov. Interest			Project Activity/Environmental Interaction	Project Phase			Specific Location	Analysis of Environmental Effect	Required Mitigation Measures	Mitigation Resp.		Potential Residual Effect	Level of Significance after Mitigation	Monitoring Recommendation	Review Agency for: Comment/Approval
		Federal	Provincial	Municipal		Planning	Construction	Operation				Design	Contractor				
Human Environment	Potential for Archaeological Resources (cont'd)								<ul style="list-style-type: none"><li>• Campus Station at the University of Ottawa northwest of the Rideau Canal and south of the existing Transitway, 150 m west of Mann Avenue to the 417 off-ramp to Nicholas Street North;</li><li>• Lees Station, north of Lees Avenue</li><li>• Hurdman Station from where the LRT tracks exit the existing Transitway (approximately 100 m north of the west end of Hurdman Station to the intersection of the Transitway and Belfast Road);</li><li>• From the beginning of the western connection track 1 to the Maintenance and Storage facility; and</li><li>• From the Maintenance and Storage facility to the beginning of the eastern connection to track 1.</li></ul>								
	Potential for Archaeological Resources	✓	✓		• Excavation, Filling and Staging		✓		<ul style="list-style-type: none"><li>• From Bayswater Avenue in the west to Booth Street in the east, along the proposed corridor and from the intersection of the Transitway approximately 100 m east of LeBreton Station in the west to Bronson Avenue in the east and from the aqueduct in the north to Albert Street in the south, along the proposed corridor, and including the staging areas surrounding the west portal.</li></ul>	<ul style="list-style-type: none"><li>• There is known potential for archaeological resources to exist in these areas. Previous archaeological investigations, fire insurance plans and historic maps indicate the presence of archaeological remains in these areas.</li><li>• Construction of the Bayview Station, the new Preston Street overpass, the tracks where they exit the existing ROW and west portal (including filling, excavating and staging) could disturb or destroy archaeological resources.</li></ul>	<ul style="list-style-type: none"><li>• A stage 1/2 archaeological investigation is required for anywhere the facilities, tracks, staging or construction extend beyond the present Transitway footprint.</li><li>• Further archaeological investigations may also be needed depending on the outcome of the Stage 1/2 assessment. All investigations must be completed prior to construction in order to receive approval from the Ministry of Culture.</li></ul>	✓		None	Insignificant	Recommendation will be based on the outcome of further archaeological investigations and may include monitoring or the area may be cleared by the Ministry of Culture based on the results of the Stage 1 assessment.	National Capital Commission  Ministry of Culture
							✓		Maintenance and Storage Facility	Potential for archaeological resources to exist in the area. Construction of the buildings, landscape berm, tracks and parking lots, particularly at the boundaries of the Maintenance and Storage facility.	Stage 1 archaeological investigation is required for anywhere the facilities, staging or construction extend beyond the present development footprint. Further archaeological investigations may also be needed depending on the outcome of the Stage 1.	✓		None	Negligible	Recommendation will be based on the outcome of further archaeological investigations and may include monitoring or the area may be cleared by the Ministry of Culture based on the results of the Stage 1 assessment.	Ministry of Culture

Environmental Value		Gov. Interest			Project Activity/Environmental Interaction	Project Phase			Specific Location	Analysis of Environmental Effect	Required Mitigation Measures	Mitigation Resp.		Potential Residual Effect	Level of Significance after Mitigation	Monitoring Recommendation	Review Agency for: Comment/Approval
		Federal	Provincial	Municipal		Planning	Construction	Operation				Design	Contractor				
Human Environment	Heritage Conservation Districts/Built Heritage properties/Cultural Landscapes/National Historic Sites/World Heritage Sites/Canadian Heritage River/Federal Heritage Property	✓	✓	✓	• Excavating and mining, filling, staging and operation		✓	✓	<ul style="list-style-type: none"><li>• Sparks Street Heritage Conservation District</li><li>• Byward Market Heritage Conservation District</li><li>• Aqueduct from Preston Street to east of Booth Street, 25 m north of the existing Transitway (Grade 1 designated Heritage Property); Confederation Boulevard (Elgin Street and Wellington Street portions);</li><li>• Confederation Square and War Memorial (National Monument, National Historic Site, known archaeological site and Classified Federal Heritage Property;</li><li>• Rideau Canal at Elgin and Wellington Streets where the tunnel and station run beneath the canal and access shafts will be constructed immediately southwest of the canal (Cultural Landscape, World Heritage Site, Designated Canadian Heritage River);</li><li>• Government Conference Centre (National Historic Site, Federal Classified Heritage Building and a Grade 1 Designated Heritage Building); and</li><li>• University of Ottawa Main Campus (National Historic Site).</li></ul>	<ul style="list-style-type: none"><li>• The tunnel will run beneath the Sparks Street designated Heritage Conservation District. Disruption will be caused by excavating and mining and staging during the construction of:<ul style="list-style-type: none"><li>• Access shaft at O'Connor and Queen.</li><li>• Vent shaft at Queen between O'Connor and Elgin Streets.</li><li>• Access shaft at 73 Rideau Street.</li><li>• LeBreton Station and tracks, 25 m south of the Aqueduct.</li></ul></li><li>- Access shafts along Confederation Boulevard including the Government Conference Centre, Rideau Mall and adjacent to the Rideau Canal.</li><li>- Station access at the University of Ottawa.</li><li>• In addition to the construction related disruptions the cultural landscape, and possibly the function of the areas, will be temporarily disrupted by construction and may be permanently altered by the presence of the stations and station accesses. The heritage characteristics of some of the buildings may also be effected (buildings with interior or attached station accesses).</li></ul>	<ul style="list-style-type: none"><li>• A built heritage/cultural landscape assessment may be required to determine the effect of the access and vent shafts on the overall landscape and on the individual heritage property as well as the impact of the construction to overall function of the area to determine if any mitigation is required. This may include a review of the design principles of the above ground stations accesses by review agencies.</li><li>• Parks Canada must be consulted regarding the proposed construction and operation beneath the Rideau Canal.</li><li>• Parks Canada, the Federal Heritage Building Review Office, the Ministry of Culture and the National Capital Commission should be consulted during the design and construction of the Rideau Station and station accesses due to the high level of heritage resources in this area.</li></ul>	✓		The cultural landscape of the areas and the heritage characteristics of the building may be altered. Potential for enhancements is high.	Insignificant	Recommendation will be based on the outcome of the built heritage/cultural landscape impact assessment and consultation with review agencies.	National Capital Commission  Federal Heritage Building Review Office  Parks Canada Ministry of Culture  City of Ottawa
	Noise		✓	✓	• Operation of LRT			✓	<ul style="list-style-type: none"><li>• At grade sections from Tunney's Pasture Station to Blair Station, excluding tunnel segment.</li></ul>	<ul style="list-style-type: none"><li>• Noise levels from public transit will increase slightly in the future over most areas due to replacement of BRT with LRT. Since overall traffic along Scott Street and Highway 417 are major contributors to noise, impact will not be noticeable in most cases.</li></ul>	<ul style="list-style-type: none"><li>• Noise barrier along north side of Transitway from Parkdale Avenue to Merton Street Extension.</li><li>• Install continually welded rail and maintain track and train wheels to minimize noise and vibrations at source.</li></ul>	✓	✓	Noise would be mitigated as required to satisfy criteria as per City of Ottawa Noise Guidelines (ENCG).	Negligible	None	Ministry of the Environment

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		Federal	Provincial	Municipal		Planning	Construction	Operation				Design	Contractor				
Human Environment	Noise (cont'd)		✓	✓	• Operation of LRT (con't)			✓	• Tunnel – West Portal to East Portal.	• Audible noise levels in basements and lower floors of adjacent buildings.	• Install continually welded rail, as well as track and sleeper isolation over full distance. • Maintain track and train wheels to minimize vibration at source.		✓	Noise levels above the perception threshold may occur occasionally in the lowest floors of some buildings.	Negligible	Provide short-term noise monitoring at selected building basement for the first six months of operation	Ministry of the Environment
			✓	✓	• Operation of Maintenance and Storage Facility.			✓	• Maintenance and Storage Facility.	• Noise levels to nearby residences may exceed MOE NPC-205 limits for stationary sources in urban areas.	• Install noise barriers at selected locations. Position the building to screen operations from nearby residences.	✓	✓	Noise would be mitigated as required to satisfy criteria as per MOE NPC-205 and City of Ottawa Noise Guidelines (ENCG).	Insignificant	None	Ministry of the Environment
			✓	✓	• Operations of LRT Stations.			✓	• From at-grade stations: Bayview to Cyrville.	• Change in noise levels from the station's activities considered inaudible due to high background levels along the corridor.	• None	✓		None	Negligible	None	Ministry of the Environment
			✓	✓	• Operations of LRT Transfer Stations.			✓	• Tunney's Pasture, Blair and Hurdman Stations.	• Increased BRT traffic may cause a minor increase in above road noise levels.	• Station orientation and noise barriers may be required to protect nearest sensitive receivers.	✓		Noise would be mitigated as required to satisfy criteria per MOE NPC-205 and City of Ottawa Noise Guidelines (ENCG).	Negligible	None	Ministry of the Environment
					• Operations of Electrical Substations and Ventilation Shafts.				• Electrical Substations and Ventilation Shaft locations.	• Minor increase in noise levels. Imperceptible at most locations due to high levels of background noise.	• Station orientation and noise barriers may be required to protect nearest sensitive receivers.	✓		Noise would be mitigated as required to satisfy criteria per MOE NPC-205 and City of Ottawa Noise Guidelines (ENCG).	Negligible	None	Ministry of the Environment
			✓	✓	• Conversion of roadbed for LRT or construction of new rail bed. • Construction of LRT Stations or conversion from BRT stations at grade including Maintenance and Storage Facility.		✓		• Tunney's Pasture Station to West Tunnel Portal. • East Tunnel Portal to Blair Station.	• Noise levels will be limited to surface construction related to modifying the running surface from BRT to LRT, and construction of the stations. Local short term mitigation may be required at select sites.	• Operate and maintain construction equipment within MOE NPC-115 standards. Provide movable noise barrier as required. Limit primary working hours to daytime 7:00 AM to 11:00 PM.		✓	Minor and isolated disruption typical of other surface construction projects.	Insignificant	None	Ministry of the Environment
			✓	✓	• Start of Tunnel Boring at Portal.		✓		• West Portal and East Portal.	• Minor noise impacts to the environment during the entry phase of the boring operation.	• Operate and maintain construction equipment within MOE NPC-115 standards. Provide movable noise barrier as required. Limit primary working hours to daytime 7:00 AM to 11:00 PM.		✓	Isolated noise levels similar to construction projects in urban areas.	Insignificant	None	Ministry of the Environment

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		Federal	Provincial	Municipal		Planning	Construction	Operation				Design	Contractor				
Human Environment	Noise (cont'd)		✓	✓	• Tunnel Boring and underground station mining.		✓		• Tunnel – West Portal to East Portal.	• Noise impacts at grade level will be negligible. • Noise at adjacent buildings may be noticeable.	• Maintain all TBM equipment, especially the cutting heads, in optimal condition. Select appropriate boring speed. Advise adjacent property owners of schedule and possible impacts.		✓	Indoor noise would be audible to occupants of adjacent buildings in basement and lower floors. Impacts at specific locations will be short lived lasting approximately one week.	Insignificant	Provide noise monitoring at basements of sensitive buildings.	Ministry of the Environment
			✓	✓	• Construction of vent shafts, as well as cut and cover at Campus Station.		✓		• Tunnel – West Portal to East Portal	• Noise impacts at grade level would be similar to surface excavation for buildings.	• Install barriers around construction site. Ensure compliance with MOE construction noise guidelines NPC-115.		✓	Minor and isolated disruption typical of surface construction projects.	Insignificant	None	Ministry of the Environment
	Air Quality		✓	✓	• Operations of LRT.			✓	• Tunney's Pasture Station to Blair Station	• Air quality will improve or remain unchanged due to replacement of BRT with LRT and improved future technology of BRT and passenger vehicle emissions.	• None	✓		Air quality is expected to improve for future conditions.	Positive	None	Ministry of the Environment
			✓	✓	• Operations of LRT transfer stations.			✓	• Tunney's Pasture, Blair and Hurdman Stations.	• Air quality may degrade slightly in the short term, and then improve with vehicle emissions technology.	• None	✓		Air quality is expected to improve for future conditions, or remain similar to current conditions.	Negligible	None	Ministry of the Environment
			✓	✓	• Operations of LRT.			✓	• Tunnel – East to West Portal.	• Increased dust at vent shafts during daytime operation. • Occasional diesel fumes during night maintenance operations.	• Design ventilation shafts to comply with O. Reg. 419 Standards.	✓	✓	None.	Negligible	Provide air quality monitoring of maintenance operations to establish appropriate policies.	Ministry of the Environment
			✓	✓	• Operations of LRT during fire Scenario.			✓	• Tunnel – East to West Portal.	• Smoke and other combustion products may impact fresh air intakes of nearby surrounding buildings.	• Install heat and smoke monitors at fresh air intakes of building within one block radius of vent shafts to automatically shut dampers during emergency scenario.	✓		Risk of ingesting contaminated air into buildings during emergency scenario.	Insignificant	None	Ministry of the Environment
			✓	✓	• Operations of LRT during fire Scenario.			✓	• Underground Station entrances.	• Low probability of re-entrainment of smoke from vent shaft during fire scenario.	• Design to avoid re-entrainment.	✓		Low risk of re-circulating contaminated air into underground station.		None	Ministry of the Environment
			✓	✓	• Operation of Maintenance and Storage facility.			✓	• Maintenance and Storage facility.	• Air emissions from facility related to maintenance activates of LRT fleet, and operations of the building.	• Ensure design of Maintenance and Storage Facility is in compliance with O. Reg. 419, under the Certificate of Approval process.	✓	✓	None	Negligible	None	Ministry of the Environment

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		Federal	Provincial		Planning	Construction	Operation				Design	Contractor				
Human Environment	Air Quality (cont'd)		✓	✓	• Construction.		✓	• Various locations along corridor.	• Minor and isolated increases in dust and diesel emissions may occur due to operation of heavy equipment typical of surface construction works. Overall air quality will not be degraded.	• Operational controls: installing wind barriers, minimizing stock piles, covering stock piles and apply water suppression to meet O. Reg. 419 Standards.		✓	Air quality is expected to remain unchanged compared to current conditions created by local road traffic except for limited local effects.	Negligible	None	Ministry of the Environment
	Ground Vibrations		✓	✓	• Operations of LRT.		✓	• Tunney's Pasture to Bayview Road crossing. • Tunnel – West to East Portal. • Branch tunnel to Maintenance and Storage Facility.	• Ground vibrations at sensitive buildings adjacent to the tracks will increase to perceptible and potentially annoying levels due to LRT.	• Install track and sleeper isolation to achieve Ministry of the Environment vibration criteria at sensitive buildings. • Use continuously welded rail and maintain track and wheels to minimize vibrations at source. • Select LRT vehicles with soft primary suspension systems.	✓	✓	Minor ground vibrations may occasionally be perceptible to a small proportion of people occupying adjacent buildings.	Negligible	Provide vibration and noise monitoring at selected buildings for the first six months of operations, (i.e. SITE Building, CBC Radio Canada, and NAC).	Ministry of the Environment
			✓	✓	• Operations of LRT.		✓	• Bayview Road Crossing to West Portal. • East Portal to Blair Station.	• Ground vibrations at sensitive buildings adjacent to the tracks will increase to perceptible levels due to LRT.	• Install track isolation such as resilient track fasteners, or equivalent to achieve MOE vibration criteria at sensitive buildings. • Use continuously welded rail and maintain track and wheels to minimize vibrations at source. • Select LRT vehicles with soft primary suspension systems.	✓	✓	None	Negligible	Provide vibration and noise monitoring at selected buildings for the first six months of operations.	Ministry of the Environment
			✓	✓	• Operations of Maintenance and Storage Facility.		✓	• Maintenance and Storage Facility.	• Ground vibrations at dwellings to the north may increase to perceptible levels overnight.	• Perform a detailed vibration study, and install resilient track fasteners if necessary.	✓	✓	None	Negligible	Provide vibration and noise monitoring at selected buildings for the first six months of operations.	Ministry of the Environment
			✓	✓	• Conversion of roadbed for LRT or construction of new rail bed. • Construction of at-grade LRT Stations.		✓	• At grade construction sites.	• Ground vibrations from construction equipment will be noticeable from time to time but not disruptive to normal activities.	• Operational controls: Limit speeds of heavy vehicles around sites. Provide smooth access without abrupt changes in road surface.		✓	None	Negligible	None	Ministry of the Environment
			✓	✓	• Tunnel Boring and Station Mining.		✓	• Tunnel – East to West Portal.	• Ground-borne vibrations would be felt by occupants of nearby buildings, without structural implications.	• Maintain all TBM equipment, especially the cutting heads, in optimal condition. Select boring speed. Advise adjacent property owners of schedule and possible impacts. Design blasting to MOE NPC-119.		✓	Occasional vibration and ground borne noise may be perceptible from time to time in the nearest building basements and lower floors. Impacts at any specific location to last on the order of one week.	Insignificant	Provide vibration monitoring at selected building basement during construction period.	Ministry of the Environment

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Human Environment	Ground Vibrations (cont'd)		✓	✓	• Construction of vent shafts and cut and cover tunnel sections.		✓		• Tunnel – East to West Portal.	• Vibrations at grade and to surrounding buildings would be minor and similar to surface construction projects.	• None required, unless blasting is used. In this case provide engineered blast design to satisfy MOE NPC-119.		✓	Occasional vibration may be perceptible from time to time for the nearest buildings if blasting is used. Otherwise, no effect is anticipated.	Insignificant	Provide blast monitoring if necessary.	Ministry of the Environment
	Municipal Services (Storm, Water, and Sanitary Services)	✓	✓	✓	• Sewer relocation.	✓	✓		• Bayview Station. - 1200mm Cave Creek Collector (Watermain).	• Minor increase in extent and duration of construction works in proximity to relocation. Works would be located in brownfield area with no significant vegetation.	• Minimize length of relocation. • Contaminated soil management will likely be required, as for construction of Bayview Station. • Disturbed lands to be vegetated as per landscape plan.		✓	None Expected	Insignificant	None Expected	National Capital Commission  Ministry of the Environment  City of Ottawa
		✓	✓	✓	• Sewer lowering.	✓	✓		• Blair Station to Cyrville Drain: - 750 mm, 900mm, and 1050mm storm sewer parallel to alignment.	• 1 km of sewer must be lowered to drain new profile in vicinity of Blair Station. Increase in extent and duration of construction of LRT works. Localized impact in vicinity of Cyrville Drain outlet. Remainder of work is within existing paved corridor.	• Disturbed lands to be vegetated as per landscape plan. • Physical enhancement of aquatic habitat in vicinity of storm outlet. • Preparation of Erosion and Sediment Control Plan as per drainage impact assessment.		✓	None Expected	Insignificant	None required	National Capital Commission  Ministry of the Environment  City of Ottawa  Rideau Valley Conservation Authority
		✓	✓	✓	• Sewer reconstruction.	✓	✓		• Hurdman Station: - 1650mm Storm Sewer. - 1200mm Storm Sewer. - 1350mm Sanitary sewer.	• Reconstruction of existing alignment to resolve embankment loading. Increase in extent and duration of construction works in proximity to sewer works. Within Greenfield area with no significant vegetation.	• Minimize length of replacement. Disturbed lands to be vegetated as per landscape plan • Dust suppressant measures. Preparation of Erosion and Sediment Control Plan as per drainage impact assessment.		✓	None Expected	Insignificant	None required	National Capital Commission  Ministry of the Environment  City of Ottawa
				✓	• Temporary or permanent relocations of services.	✓	✓		• Downtown stations and various other determined through detailed design.	• Temporary disruption of services during construction of access stations and ventilation shafts.	• Public Communications Plan and provision of temporary services as needed.		✓	Potential temporary reduction in level of service in local areas	Insignificant	None Required	City of Ottawa
	Utility: Hydro			✓	• Cables, conduits and poles to be relocated. Excavation required.	✓	✓		• Transitway between Holland Avenue and Bayview Crossing. • Transitway between Booth Street and Wellington Street. • Transitway between Booth Street and Wellington Street.	• Accident and damage could possibly disrupt a service temporarily (e.g., Hydro), or cause personal injury to construction workers.  • Accident and damage could possibly disrupt a service temporarily (e.g., Hydro), or cause personal injury to construction workers.	• Construction/Engineering drawings will have approximate location of utilities on drawings. Contractor to have utilities located in the field. The contractor will be responsible for the integrity of all utilities. Appropriate utility providers will be contacted immediately in the event of uncertainty or accidents.	✓	✓	None expected	Negligible	None required	Hydro Ottawa

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		Federal	Provincial	Municipal		Planning	Construction	Operation				Design	Contractor				
Human Environment	Utility: Hydro (cont'd)								<ul style="list-style-type: none"><li>Bank Street between Queen Street and Albert Street (Downtown East Station).</li><li>Albert Street east of Bank Street (Downtown East Station).</li><li>Queen Street between Bank Street and Metcalfe Street (Downtown East Station).</li><li>O'Connor Street at Sparks Street. (Downtown East Vent).</li><li>Elgin Street between Queen Street and Wellington Street (Rideau Station Access).</li><li>Wellington Street west of Colonel By Drive (Rideau Station Access).</li><li>Rideau Street between Colonel By Drive and William Street (Rideau Station).</li><li>Transitway between Waller Street and Robinson Avenue (Campus Station).</li><li>Transitway at both Lees Station and Hurdman Station.</li><li>Transitway at Riverside Drive overpass.</li><li>Transitway at Train Station (Train Station).</li><li>Tremblay Road and Pickering Place.</li><li>Transitway from Tremblay Road to Lemieux Street overpass (St. Laurent Station).</li><li>Transitway at Cyrville Road overpass (Cyrville Station).</li><li>Transitway at Blair Road Station (Blair Station).</li><li>Belfast Road at Trainyards Drive (Maintenance and Storage Facility).</li></ul>								
Human Environment	Utility: Bell			✓	<ul style="list-style-type: none"><li>Cables, conduits and poles to be relocated. Excavation required.</li></ul>	✓	✓		<ul style="list-style-type: none"><li>Transitway at Bayview Crossing. Transitway between Booth Street and Wellington Street. Albert Street between Bay Street and Bank Street. (Downtown West Station). Bank Street between Queen Street and Albert Street. (Downtown East Station). Albert Street east of Bank Street. (Downtown East Station). Queen Street between Bank Street and Metcalfe Street. (Downtown East Station). O'Connor Street at Sparks Street. (Downtown East Vent).</li></ul>	<ul style="list-style-type: none"><li>Accident and damage could possibly disrupt a service temporarily (e.g., Bell), or cause personal injury to construction workers.</li></ul>	<ul style="list-style-type: none"><li>Construction/Engineering drawings will have approximate location of utilities on drawings. Contractor to have utilities located in the field. The contractor will be responsible for the integrity of all utilities. Appropriate utility providers will be contacted immediately in the event of uncertainty or accidents.</li></ul>	✓	✓	None expected	Negligible	None	Bell

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Human Environment	Utility: Cable			✓	<ul style="list-style-type: none"><li>Cables and conduits to be relocated.</li><li>Excavation required.</li></ul>	✓	✓		<ul style="list-style-type: none"><li>Albert Street between Bay Street and Bank Street (Downtown West Station).</li><li>Bank Street between Queen Street and Albert Street (Downtown East Station).</li><li>Albert Street east of Bank Street (Downtown East Station).</li><li>Queen Street between Bank Street and Metcalfe Street (Downtown East Station).</li><li>Belfast Road at Trainyards Drive (Maintenance and Storage Facility).</li></ul>	<ul style="list-style-type: none"><li>Accident and damage could possibly disrupt a service temporarily (e.g., Cable), or cause personal injury to construction workers.</li></ul>	<ul style="list-style-type: none"><li>Construction/Engineering drawings will have approximate location of utilities on drawings. Contractor to have utilities located in the field. The contractor will be responsible for the integrity of all utilities. Appropriate utility providers will be contacted immediately in the event of uncertainty or accidents.</li></ul>	✓	✓	None expected	Negligible	None required	Rogers
	Utility: Gas			✓	<ul style="list-style-type: none"><li>Pipes to be relocated and/or removed.</li></ul>	✓	✓		<ul style="list-style-type: none"><li>Transitway at Broad Street.</li><li>Transitway at Booth Street.</li><li>Transitway at Wellington Street.</li><li>Albert Street between Bay Street and Bank Street (Downtown West Station).</li><li>Bank Street between Queen Street and Albert Street (Downtown East Station).</li><li>Albert Street east of Bank Street (Downtown East Station).</li><li>Queen Street between Bank Street and Metcalfe Street (Downtown East Station).</li><li>Wellington Street west of Colonel By Drive (Rideau Station Access).</li><li>Rideau Street between Colonel By Drive and William Street (Rideau Station).</li><li>Transitway between Waller Street and Campus Station (Campus Station).</li><li>Transitway at Lees Station.</li><li>Tremblay Road and Pickering Place.</li><li>Belfast Road at Trainyards Drive (Maintenance and Storage Facility).</li></ul>	<ul style="list-style-type: none"><li>Accident and damage could cause a fire or explosion and possibly disrupt the service temporarily (e.g., Gas), or cause personal injury to construction workers.</li></ul>	<ul style="list-style-type: none"><li>Construction/Engineering drawings will have approximate location of utilities on drawings. Contractor to have utilities located in the field. The contractor will be responsible for the integrity of all utilities. Appropriate utility providers will be contacted immediately in the event of uncertainty or accidents.</li></ul>	✓	✓	None expected	Negligible	None required	Enbridge

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Human Environment	Utility: Traffic Plant			✓	<ul style="list-style-type: none"> <li>Cables and conduits to be relocated.</li> <li>Traffic lights relocated.</li> <li>Excavation required.</li> </ul>	✓	✓		<ul style="list-style-type: none"> <li>Transitway at Booth Street.</li> <li>Albert Street between Bay Street and Bank Street (Downtown West Station).</li> <li>Queen Street between Bank Street and Metcalfe Street (Downtown East Station).</li> <li>O'Connor Street at Sparks Street (Downtown East Vent).</li> <li>Elgin Street between Queen Street and Wellington Street (Rideau Station Access).</li> <li>Wellington Street west of Colonel By Drive (Rideau Station Access).</li> <li>Transitway at Campus Station.</li> <li>Transitway at Robinson Avenue.</li> <li>Tremblay Road and Pickering Place.</li> <li>Belfast Road and Trainyards Drive.(Maintenance and Storage Facility).</li> </ul>	<ul style="list-style-type: none"> <li>Accident and damage could possibly disrupt the service temporarily (e.g., Traffic lights), or cause personal injury to construction workers.</li> </ul>	<ul style="list-style-type: none"> <li>Construction/Engineering drawings will have approximate location of utilities on drawings. Contractor to have utilities located in the field. The contractor will be responsible for the integrity of all utilities. Appropriate utility providers will be contacted immediately in the event of uncertainty or accidents.</li> </ul>	✓	✓	None expected	Negligible	None required	City of Ottawa
	Utility: Streetlights			✓	<ul style="list-style-type: none"> <li>Cables, poles and conduits to be relocated.</li> <li>Excavation required.</li> </ul>	✓	✓		<ul style="list-style-type: none"> <li>Transitway at Bayview Crossing.</li> <li>Transitway from Preston Street to Booth Street.</li> <li>Albert Street between Bay Street and Bank Street (Downtown West Station).</li> <li>Queen Street between Bank Street and Metcalfe Street (Downtown East Station).</li> <li>O'Connor Street at Sparks Street (Downtown East Vent).</li> <li>Elgin Street between Queen Street and Wellington Street (Rideau Station Access).</li> <li>Wellington Street west of Colonel By Drive (Rideau Station Access).</li> <li>Rideau Street between Colonel By Drive and William Street (Rideau Station).</li> <li>Transitway between Waller Street and Lees Avenue Station.</li> <li>Transitway at Hurdman station.</li> <li>Transitway at the Ottawa train Station.</li> <li>Tremblay Road and Pickering Place.</li> <li>Transitway from St. Laurent Station to Lemieux Street overpass.</li> <li>Transitway at Cyrville Station.</li> <li>Transitway at Blair station.</li> <li>Belfast Road and Trainyards Drive (Maintenance and Storage Facility).</li> </ul>	<ul style="list-style-type: none"> <li>Accident and damage could possibly disrupt the service temporarily (e.g., Streetlights), or cause personal injury to construction workers.</li> </ul>	<ul style="list-style-type: none"> <li>Construction/Engineering drawings will have approximate location of utilities on drawings. Contractor to have utilities located in the field. The contractor will be responsible for the integrity of all utilities. Appropriate utility providers will be contacted immediately in the event of uncertainty or accidents.</li> </ul>	✓	✓	None expected	Negligible	None required	City of Ottawa

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Human Environment	Utility: Tele-communications			✓	<ul style="list-style-type: none"><li>Cables, poles, conduits and plant to be relocated.</li><li>Excavation required.</li></ul>	✓	✓		<ul style="list-style-type: none"><li>Transitway at Booth Street.</li></ul>	<ul style="list-style-type: none"><li>Accident and damage could possibly disrupt the service temporarily (e.g. Telecommunications), or cause personal injury to construction workers.</li></ul>	<ul style="list-style-type: none"><li>Construction/Engineering drawings will have approximate location of utilities on drawings. Contractor to have utilities located in the field. The contractor will be responsible for the integrity of all utilities. Appropriate utility providers will be contacted immediately in the event of uncertainty or accidents.</li></ul>	✓	✓	None expected	Negligible	None required	Telecom
	Existing drainage system performance			✓	<ul style="list-style-type: none"><li>Runoff discharge to existing outlets.</li></ul>			✓	<ul style="list-style-type: none"><li>All ballasted track locations.</li></ul>	<ul style="list-style-type: none"><li>Ballast will attenuate flows to existing outlets.</li></ul>	<ul style="list-style-type: none"><li>None</li></ul>			None expected	Positive	None Required	Ministry of the Environment City of Ottawa
				✓	<ul style="list-style-type: none"><li>Lowering of existing Transitway Sewer.</li></ul>	✓			<ul style="list-style-type: none"><li>Cyrville Drain to St. Laurent Drive.</li></ul>	<ul style="list-style-type: none"><li>Potential reduction in effective drainage capacity for this section of the corridor.</li></ul>	<ul style="list-style-type: none"><li>Additional analysis is required to assess impact and determine required mitigation measures as part of design.</li></ul>	✓		None expected	None	None Required	Ministry of the Environment City of Ottawa
	Surface Water Quality and Aquatic habitats		✓	✓	<ul style="list-style-type: none"><li>Drainage management during construction.</li></ul>		✓		<ul style="list-style-type: none"><li>All construction locations that will drain via existing ditches or sewers.</li></ul>	<ul style="list-style-type: none"><li>Potential increase in soil erosion and sediment load in stormwater runoff resulting in increased sedimentation in existing sewers and receiving stream, resulting in potential localized, short term degradation of receiving surface water conditions.</li></ul>	<ul style="list-style-type: none"><li>Preparation and implementation of Erosion and Sediment Control Plans (ESCP) that will minimize erosion and protect drainage outlets and watercourses from increased sediment loads.</li></ul>		✓	Risk of increased erosion and sediment load due to large rainfall events that are beyond capacities of erosion and sediment control plan measures. Potential for post-construction sewer cleaning needs. Potential localized, short term degradation of receiving surface water conditions	Insignificant	Erosion and Sediment Control measures to be monitored regularly during construction. Sediment to be removed and measures repair or adjusted as required.	City of Ottawa  Rideau Valley Conservation Authority
			✓	✓			✓		<ul style="list-style-type: none"><li>West Portal (proposed Tailrace Outlet).</li><li>Rideau River Crossing.</li><li>East Portal (proposed Rideau River Outlet).</li></ul>	<ul style="list-style-type: none"><li>Potential increase in soil erosion and sediment load in stormwater runoff discharging directly to receiving surface water features.</li></ul>	<ul style="list-style-type: none"><li>Preparation and implementation of Erosion and Sediment Control Plans (ESCP) that will minimize erosion and protect receiving surface water from increased sediment loads.</li></ul>		✓	Risk of increased erosion and sediment load due to large rainfall events that are beyond capacities of erosion and sediment control plan measures. Potential localized, short term degradation of receiving surface water conditions.	insignificant	Erosion and Sediment Control measures to be monitored regularly. Sediment to be removed and measures repair or adjusted as required.	City of Ottawa  Rideau Valley Conservation Authority
			✓	✓	<ul style="list-style-type: none"><li>Conversion from diesel buses to electric train.</li></ul>			✓	<ul style="list-style-type: none"><li>All stormwater outlet locations.</li></ul>	<ul style="list-style-type: none"><li>Reduction in runoff pollutants generated by transit operations due to the cleaner technology of electric trains.</li></ul>	<ul style="list-style-type: none"><li>None</li></ul>			Positive	Positive	None Required	N/A

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Human Environment	Surface Water Quality and Aquatic habitats (cont'd)		✓	✓	• Construction related fuel spills.		✓		• All construction locations.	• Localized, short-term decline in aquatic populations.	• Ensure refuelling to not take place within 30m of a surface water feature. • Preparation of an Emergency Response Plan.		✓	Potential localized, short-term decline in aquatic populations	Insignificant	None Required	N/A
			✓	✓	• Potential new runoff discharge outlets.	✓			• West Portal (proposed Tailrace Outlet). • East Portal (proposed Rideau River Outlet).	• Minor increase in drainage and redirection of existing runoff to new minor outlet with minor impacts on stormwater runoff quality.	• Installation of a SWM facility (oil-grit separation chamber) at each portal outlet	✓	✓	Water quality is likely to improve as a result of SWM Facility and diesel-electric conversion. Potential increase in flows is expected to be insignificant	Positive	SWM facilities must be inspected and maintained on a permanent basis	Ministry of the Environment  City of Ottawa
			✓	✓	• Runoff Discharge to existing outlets.	✓		✓	• Maintenance and Storage Facility. • Maintenance and Storage Facility connecting tracks.	• Improvement to discharge characteristics due to reduction in impervious surfaces. • Minor deterioration of runoff characteristics due to slight increase in imperviousness near MSF tunnel portals.	• Maintenance and Storage Facility Storm Water Management (SWM) Facility	✓	✓	None Expected	Positive		Ministry of the Environment  City of Ottawa
			✓	✓	• Drainage from Cleaning of trains at Maintenance and Storage Facility (M&S Facility).	✓		✓	• Maintenance and Storage Facility.	• Potential surface water quality impacts if discharged directly to storm outlets.	• Exterior cleaning of trains to be carried out in a cleaning shed using a serial cleaner with full fluid recovery. No discharge to storm drainage system.	✓		Potential localized, short-term decline in aquatic populations.	Negligible	None required	Ministry of the Environment  City of Ottawa
Biophysical	Terrestrial Habitats		✓	✓	• Loss of existing vegetation.				• Hurdman Station. • Bayview Station. • Cyrville Station.	• May be minor loss of old field habitat in new construction zone or edge of Transitway entrances • No significant species or sensitive habitats were identified.	• Landscaping of the stations and surrounding areas will be part of the detailed design • Installation of protective fencing around retained stands or specimen trees. • Delineation of construction envelope.	✓		None	Negligible	None	Rideau Valley Conservation Authority  Ministry of Natural Resources
	Aquatic Habitats		✓	✓	• Sediment and erosion.				• Hurdman Station near Rideau River and Rideau River crossing. • Ditches and small watercourse near Highway 417 and Cyrville Station.	• Potential sediment or other materials entering watercourses during construction from laydown areas, construction envelope, stockpiles and works areas.	• Measures to be included in Erosion and Sediment Control Plan and drawings.	✓	✓	None	Negligible	None	Rideau Valley Conservation Authority
	Species At Risk	✓	✓	✓	• Construction works including LRT to BRT conversion, Stations and Station accesses has potential to disturb milk snake, common snapping turtle and peregrine falcon.				• Queen at Lyon (Peregrine Falcon). • Rideau River (Common Snapping Turtle). • Hurdman Station (Milk Snake).	• Species at Risk identified have potential to be located within the proposed alignment and construction footprint.	• If Species At Risk observed during construction in the construction zone, the Ministry of Natural Resources or Canadian Wildlife Service to be contacted. • Silt/construction fencing installed as part of the sediment and erosion control plan along Rideau River and Hurdman Station construction envelope will prevent access by milk snake and snapping turtle into construction area.		✓	None	Insignificant	None	Canadian Wildlife Services  Ministry of Natural Resources

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Biophysical	Temporary Groundwater Lowering		✓	✓	• Excavation through overburden and into bedrock for approach into west tunnel portal results in temporary groundwater lowering that could affect the adjacent aqueduct.	✓	✓		• Between existing Transitway, east of the existing LeBreton Station, and Commissioner Street.	• Excavation will require temporary dewatering during construction that could affect the adjacent aqueduct.	• Design the vertical alignment to maintain the invert of the excavation above the elevation of the water in the aqueduct. • Contractor may employ groundwater reduction measures, such as grouting, to reduce the potential excavation inflows.	✓	✓	Negligible	Insignificant	Groundwater level monitoring should be carried out during construction to demonstrate that the aqueduct water levels are not being affected.	Ministry of the Environment Permit to Take Water  City of Ottawa (Discharge to City Sewers)
			✓	✓	• Tunnel and station mining may result in temporary groundwater lowering during construction.	✓	✓		• This could occur throughout the tunnel alignment within the downtown core between Commissioner Street and the Rideau Canal.	• Tunnel and station construction may require temporary dewatering that could impact regional water levels.	• Measures such as grouting or cut-off barriers will be used to limit inflows of water.	✓	✓	Negligible	Insignificant	The pumping rate should be monitored during construction to ensure that water inflows are limited to acceptable levels.	Ministry of the Environment (Permit to Take Water)  City of Ottawa (Discharge to City Sewers)
	Permanent Groundwater Lowering		✓	✓	• Permanent cut through overburden and into bedrock for approach into west tunnel portal may result in ongoing drainage that may affect adjacent aqueduct.	✓		✓	• Between existing Transitway and Commissioner Street.	• Permanent cut could result in ongoing groundwater drainage requirement.	• Design the vertical alignment to maintain the invert of the excavation above the elevation of the water in the aqueduct until the separation distance between the tunnel entrance and aqueduct is large enough to limit the inflows. • Design incorporates groundwater cut-off measures to limit groundwater inflows below volumes that might affect aqueduct.	✓		Some water inflows during the life span of the portal may be expected although these should not be sufficient to draw down the regional water level.	Insignificant	The pumping rates should be monitored during the first year following construction to demonstrate that the water inflows are within acceptable volumes.	Ministry of the Environment (Permit to Take Water)  City of Ottawa (Discharge to City Sewers)
			✓	✓	• Tunnelling and mining of stations through bedrock underlying downtown core may result in ongoing draw down (drainage).	✓		✓	• This could occur throughout the tunnel alignment within the downtown core between Commissioner Street and the Rideau Canal.	• Permanent tunnel could result in ongoing groundwater drainage requirement and affect regional water levels.	• The station design will incorporate linings, or other cut-off measures as required (i.e., such as grouting if significant jointing or faults are encountered), to limit the inflows of water.	✓		Some water inflows during the life span of the tunnel may be expected although these should not be sufficient to draw down the regional water level.	Insignificant	The pumping rates should be monitored during the first year following construction to demonstrate that the water inflows are within acceptable volumes.	Ministry of the Environment (Permit to Take Water)  City of Ottawa (Discharge to City Sewers)

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Biophysical	Ground Movement			✓	<ul style="list-style-type: none"> <li>Ground settlement, and therefore foundation movements, could occur, particularly for buildings with heavily loaded foundations supported on or within the shallow bedrock in the downtown core.</li> </ul>	✓	✓		<ul style="list-style-type: none"> <li>Major buildings within the downtown core (between Commissioner Street and Sussex Drive) that are within the immediate zone of influence of the tunnel or stations include: <ul style="list-style-type: none"> <li>Crowne Plaza Hotel (101 Lyon Street).</li> <li>Place De Ville complex (between Queen Street, Kent Street, Lyon Street and Albert Street).</li> <li>Heritage Place (155 Queen Street).</li> <li>Clarica Centre (99 Bank Street).</li> <li>Constitution Square (340-360 Albert Street).</li> <li>Government Conference Centre (old train station) on the east side of the Rideau Canal.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Ground settlement could occur during the tunnelling or mining operations for the stations. The highest risk for ground movement will be during the mining of the caverns for the stations.</li> </ul>	<ul style="list-style-type: none"> <li>Tunnel and stations must be designed to be at an adequate depth below building foundations to allow for the loads imposed by the buildings.</li> <li>Excavation sequencing must be designed such that excavation is advanced in a manner that allows for load transfer to remaining/ reinforced rock mass.</li> <li>Adequate rock reinforcement must be provided at the underground structures to allow the remaining rock mass to support the loads imposed by the buildings.</li> <li>Contractor must carry out the rock excavation and reinforcement to a high standard.</li> <li>Pre-construction surveys of the buildings must be carried out.</li> </ul>	✓	✓	None	Insignificant	Foundation and settlement monitoring of buildings with high foundation loads and that are nearest to the stations will be required. This monitoring should be designed to confirm that movements are not taking place and/or to provide warning of settlements, if they occur, so that remedial measures may be implemented.	City of Ottawa
				✓	<ul style="list-style-type: none"> <li>Ground settlement, and therefore foundation movements and movement of utilities could occur due to tunnelling through the deep overburden valley known to exist within the bedrock along Rideau Street.</li> </ul>	✓	✓		<ul style="list-style-type: none"> <li>This applies to buildings supported on shallow foundations, on or within the overburden, on the north side of Rideau Street, between about Sussex Drive and Nicholas Street. These potential ground movements could also affect utilities within the overburden along Rideau Street between Sussex and Nicholas. (Note: the Rideau Centre is generally supported on shallow foundations on bedrock or on piles supported on bedrock).</li> </ul>	<ul style="list-style-type: none"> <li>Ground settlement could occur during the tunnelling. The sandy soils below the water level within the bedrock trough at depth may lose strength, if unsupported, and could flow into the tunnel. This in turn could lead to sinkholes or large settlements at the overlying ground surface.</li> </ul>	<ul style="list-style-type: none"> <li>The selection and design of the Tunnel Boring Machine will account for the pressure of this ground condition thereby limiting the potential for excessive ground loss.</li> <li>The design and construction will also need to incorporate pre-support (such as fore-poling) and/or ground improvement (such as jet-grouting), or other means, to limit the potential for ground loss.</li> <li>Pre-construction surveys of the buildings will be carried out.</li> </ul>	✓	✓	Insignificant	Insignificant	Monitoring of the spoil removal in relation to the rate of tunnel advance will be required along this section to monitor the potential for ground loss.	City of Ottawa
				✓	<ul style="list-style-type: none"> <li>Ground settlement, and therefore foundation movements and movement of utilities could occur due to construction of the deep excavation for the Campus Station.</li> </ul>	✓	✓		<ul style="list-style-type: none"> <li>This applies to the University of Ottawa buildings immediately adjacent to the excavation (Vanier Hall, CAREG and Marion Hall) and to the Rideau Canal side slopes adjacent to the excavation (in the vicinity of the Corktown Bridge).</li> </ul>	<ul style="list-style-type: none"> <li>Lateral and vertical movement of the soils adjacent to the excavation could occur as a result of the deep excavation. These movements could affect adjacent utilities, particularly if relatively shallow relative to the depth of excavation and, if the movements are large enough, could potentially affect adjacent buildings or de-stabilize the canal side slopes.</li> </ul>	<ul style="list-style-type: none"> <li>The design and construction will need to incorporate shoring sufficiently robust to limit the potential ground movements.</li> <li>The shoring must be installed and maintained with sufficient care by the contractor during the construction period.</li> <li>Pre-construction survey of the structure and utilities.</li> </ul>	✓	✓	None	Insignificant	Monitoring of the lateral movement of the shoring and the ground surface elevation outside the shoring may be required.	None

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Biophysical	Ground Movement (cont'd)			✓	<ul style="list-style-type: none"><li>Ground settlement, and therefore foundation movements and movement of utilities could occur due to tunnelling through the sandy water-bearing overburden along Nicholas Street (from about Marie Curie Private at the University of Ottawa to the east portal just north of Highway 417).</li></ul>	✓	✓		<ul style="list-style-type: none"><li>This applies to the University of Ottawa buildings immediately adjacent to the tunnel alignment (MacDonald Hall, Colonel By Hall and the School of Information Technology) and to the Nicholas Street embankment side slopes and overpass structure adjacent to the tunnel alignment (at Greenfield Avenue). Utilities along this portion of the alignment could also be affected.</li></ul>	<ul style="list-style-type: none"><li>Ground settlement could occur during the tunnelling. The sandy water-bearing soils at depth may lose strength, if unsupported, and could flow into the tunnel. This in turn could lead to sinkholes or large settlements at the overlying ground surface.</li></ul>	<ul style="list-style-type: none"><li>The design and construction will need to incorporate techniques (such as an earth pressure balanced Tunnel and Boring Machine) and/or ground improvement measures to limit the potential for ground loss.</li><li>Pre-construction survey of building and utilities.</li></ul>	✓	✓	Insignificant	Insignificant	Monitoring of the spoil removal in relation to the rate of tunnel advance will be required along this section to monitor the potential for ground loss.	None
				✓	<ul style="list-style-type: none"><li>Ground settlement, and therefore foundation movements and movement of utilities could occur during the open cut excavations for the Maintenance and Storage Facility access tunnels.</li></ul>	✓	✓		<ul style="list-style-type: none"><li>This applies to the private homes immediately adjacent to the excavation (8 homes on west side of Avenue N and the 3 homes nearest to Belfast Road on the cul de sac at the end of Avenue O).</li></ul>	<ul style="list-style-type: none"><li>Lateral and vertical movement of the soils adjacent to the excavation could occur, depending on the type of shoring for the excavation. These movements could affect adjacent utilities, particularly if relatively shallow relative to the depth of excavation and, if the movements are large enough, could potentially affect adjacent buildings or roadways.</li></ul>	<ul style="list-style-type: none"><li>The design and construction will need to incorporate shoring sufficiently robust to limit the potential ground movements.</li><li>The shoring must be installed and maintained with sufficient care by the contractor during the construction period.</li><li>Pre-construction survey of the buildings.</li></ul>	✓	✓	None	Insignificant	Monitoring of the lateral movement of the shoring and the ground surface elevation outside the shoring may be required during construction.	None
	Public Comfort			✓	<ul style="list-style-type: none"><li>Rock excavation within the downtown core for the west portal (at Commissioner Street), tunnelling and mining of stations and for access and vent shafts (which will extend to the surface) could result in vibrations.</li></ul>		✓		<ul style="list-style-type: none"><li>This could occur throughout the tunnel alignment where it is in bedrock (extending from about Commissioner Street to the Campus Station at the University of Ottawa).</li><li>In addition, the west portal will be constructed extending from the ground surface and the vent and access shafts will extend from the tunnels and stations to the ground surface at the following locations:<ul style="list-style-type: none"><li>400 Albert Street</li><li>330 Albert Street</li><li>the parking lot at the northeast corner of Kent and Albert Streets</li><li>99 Bank Street</li><li>155 Queen Street</li><li>Elgin Street, north of the National Arts Centre</li><li>The Government Conference Centre</li><li>The Rideau Centre</li><li>The University of Ottawa</li></ul></li></ul>	<ul style="list-style-type: none"><li>Vibrations could occur due to the tunnelling operations through the rock, mining of the stations and during the excavations for the vent and access shafts. The latter could result in the most significant vibrations since they may be advanced using blasting, in addition to or instead of mechanical means. Humans are more sensitive to vibrations than structures and therefore react to vibrations (i.e., people experience discomfort and apprehension) at vibration levels that are safe for structures.</li></ul>	<ul style="list-style-type: none"><li>The tunnelling and the mining of the stations will occur deep within the rock underlying the tunnel alignment and will likely be tolerable for people on the surface. However, the excavations for the vents and access shafts will likely be advanced using large drilling equipment at surface and by blasting where feasible.</li><li>Acceptable vibration levels during excavation and blasting will be established and the contractor will adhere to those vibration limits by:<ul style="list-style-type: none"><li>predrilling the bedrock in advance of blasting and/or</li><li>limiting the size of charge per blast hole; and,</li><li>controlling the detonation sequence.</li></ul></li></ul>		✓	None	Negligible	Vibration monitoring will be carried out during rock excavation and tunnelling works, particularly during blasting, to demonstrate that the vibrations are being limited to tolerable levels.	None

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Biophysical	Loss of Bearing Capacity		✓	✓	<ul style="list-style-type: none"> <li>Tunnelling through the deep overburden valley known to exist within the bedrock along Rideau Street or mining of the adjacent Rideau station may lower the groundwater sufficiently during construction to induce settlement of buildings founded on the overlying sensitive silty clay.</li> </ul>	✓	✓		<ul style="list-style-type: none"> <li>This applies to buildings supported on shallow foundations, on or within the overburden, on the north side of Rideau Street, between about Sussex Drive and Nicholas Street. (Note: the Rideau Centre is generally supported on shallow foundations on bedrock or on piles).</li> </ul>	<ul style="list-style-type: none"> <li>The silty clay soils in the Ottawa area are sensitive to regional groundwater lowering. Lowering the groundwater level increases the stress on the silty clay, and if that stress increase exceeds the soils capacity to resist the imposed loads from overlying overburden and foundations, building settlements can occur. This effect requires some time (in the order of months) to result in ground settlements that can damage buildings.</li> </ul>	<ul style="list-style-type: none"> <li>The duration of temporary construction dewatering for tunnelling or station mining should be limited.</li> <li>Groundwater inflows into the tunnel and adjacent station (Rideau) should be limited during the life-span of the structures such that the regional groundwater level remains relatively unaffected.</li> </ul>		✓	None	Insignificant	Foundation and settlement monitoring should be carried out during construction and for 1 year following construction. This monitoring should be designed to confirm that movements are not taking place and/or to provide warning of settlements, if they occur, so that remedial measures may be implemented. The pumping rates should also be monitored during the tunnel and station life span to demonstrate that the water inflows are within acceptable volumes.	Ministry of the Environment (Permit to Take Water)  City of Ottawa (Discharge to City Sewers)
			✓	✓	<ul style="list-style-type: none"> <li>Excavating the overburden and bedrock along Nicholas Street for construction of the Campus Station may lower the groundwater sufficiently during construction to induce settlement of buildings founded on the sensitive silty clay in the area. Similarly, long term groundwater lowering during operation could result in settlement of adjacent ground, structures and utilities.</li> </ul>	✓	✓	✓	<ul style="list-style-type: none"> <li>This applies to buildings supported on shallow foundations, on or within the overburden, within the Sandy Hill neighbourhood east of the University (in the area bounded by about Rideau Street, Mann Avenue. and the Rideau River). The Sandy Hill neighbourhood is underlain by a deposit of sensitive silty clay. The Campus Station is located on Nicholas Street adjacent to the University of Ottawa Campus and will be constructed using “open cut” methods. A deep excavation will therefore extend from the ground surface, below the ground water level, into the bedrock at depths of about 16 metres below the surface.</li> </ul>	<ul style="list-style-type: none"> <li>The silty clay soils in the Ottawa area are sensitive to regional groundwater lowering. Lowering the groundwater level increases the stress on the silty clay, and if that stress increase exceeds the soils capacity to resist the imposed loads from overlying overburden and foundations, building settlements can occur. This effect requires some time (in the order of months) to result in ground settlements that can damage foundations and buildings.</li> </ul>	<ul style="list-style-type: none"> <li>The duration of temporary construction dewatering for the station excavation should be limited using cut-off barriers and grouting.</li> <li>Groundwater inflows into the station should be limited during the life-span of the structures such that the regional groundwater level remains relatively unaffected. This will require constructing the station using ‘watertight’ methods.</li> <li>Pre-construction survey of the structures and utilities.</li> </ul>	✓	✓	Insignificant	Insignificant	Foundation and settlement monitoring should be carried out in the Sandy Hill neighbourhood during construction and for 1 year following construction. This monitoring should be designed to confirm that movements are not taking place and/or to provide warning of settlements, if they occur, so that remedial measures may be implemented. The pumping rates and water levels should also be monitored for 1 year following construction to demonstrate that the water inflows are within acceptable volumes.	Ministry of the Environment (Permit to Take Water)  City of Ottawa (Discharge to City sewers)

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		Federal	Provincial	Municipal		Planning	Construction	Operation				Design	Contractor				
Biophysical	Loss of Bearing Capacity (cont'd)		✓	✓	<ul style="list-style-type: none"><li>Tunnelling through the sandy water-bearing overburden along Nicholas Street (from about Marie Curie Private at the University of Ottawa to the east portal) and construction of the east portal (just north of Highway 417) may lower the groundwater sufficiently during construction to induce settlement of buildings founded on or within the overlying sensitive silty clay. Similarly, long term groundwater lowering during operation could result in settlement of adjacent ground, structures and utilities.</li></ul>	✓	✓	✓	<ul style="list-style-type: none"><li>This applies to buildings supported on shallow foundations, on or within the overburden, within the Sandy Hill neighbourhood east of the University (in the area bounded by about Rideau Street, Mann Avenue and the Rideau River). The Sandy Hill neighbourhood is underlain by a deposit of sensitive silty clay.</li></ul>	<ul style="list-style-type: none"><li>The silty clay soils in the Ottawa area are sensitive to regional groundwater lowering. Lowering the groundwater level increases the stress on the silty clay, and if that stress increase exceeds the soils capacity to resist the imposed loads from overlying overburden and foundations, building settlements can occur. This effect requires some time (in the order of months) to result in ground settlements that can damage foundations and buildings.</li></ul>	<ul style="list-style-type: none"><li>The duration of temporary construction dewatering for the station excavation should be limited using cut-off barriers and grouting.</li><li>Groundwater inflows into the station should be limited during the life-span of the structures such that the regional groundwater level remains relatively unaffected. This will be accomplished using a gasketed, water-tight lining installed behind the Tunnel and Boring Machine as the tunnel is advanced.</li><li>Pre-construction survey of the structure and utilities.</li></ul>	✓	✓	Insignificant	Insignificant	Foundation and settlement monitoring should be carried out within the Sandy Hill neighbourhood during construction. This monitoring should be designed to confirm that movements are not taking place and/or to provide warning of settlements, if they occur, so that remedial measures may be implemented. The pumping rates should also be monitored during construction and for 1 year following construction to demonstrate that the water inflows are within acceptable volumes.	Ministry of the Environment (Permit to Take Water)  City of Ottawa (Discharge to City sewers)
	Contaminated material management and removal	✓	✓	✓	<ul style="list-style-type: none"><li>Construction activities along the alignment may encounter contaminated materials (soil and/or groundwater).</li></ul>	✓	✓		<ul style="list-style-type: none"><li>Bayview Station located northeast of the intersection of the existing O-Train corridor and the Transitway (soil).</li><li>West LeBreton Flats where Preston Street crosses the existing Transitway (soil).</li><li>LeBreton Station at the intersection of Booth Street and the existing Transitway (soil)</li><li>West Portal from the existing Transitway to Commissioner Street (soil and groundwater)</li><li>Tunnel station entry shafts and vent shelter excavations at the following locations:<ul style="list-style-type: none"><li>400 Albert Street.</li><li>330 Albert Street.</li><li>The parking lot at the northeast corner of Kent and Albert Street.</li><li>99 Bank Street.</li><li>155 Queen Street.</li><li>Elgin Street, north of the National Arts Centre.</li><li>The Government Conference Centre.</li></ul></li></ul>	<ul style="list-style-type: none"><li>Known or suspected contaminated sites and waste disposal sites exist along the project alignment, therefore, there is an increased risk of encountering contaminated soil and/or groundwater during excavation works at these locations. As a result, temporary stockpiling of contaminated soil may be required; excavated contaminated soil will require off-site disposal at a licensed waste disposal site; and, contaminated groundwater inflow will require disposal or treatment.</li><li>Significant contamination may result in the generation of odours and harmful vapours which will require increased health and safety precautions for the workers.</li></ul>	<ul style="list-style-type: none"><li>Establishment of a suitable soil stockpile location(s) for screening and testing of excess soils.</li><li>Testing and off-site disposal of contaminated soil and groundwater generated during excavations to licensed waste disposal site.</li><li>Use of an on-site groundwater treatment system to address contaminated groundwater. On-site treatment will require sewer discharge permitting from the City.</li><li>Use of construction methods reducing the amount of groundwater inflow in areas of groundwater contamination.</li><li>Worker health and safety measures will have to be implemented to protect the workers when working in areas of contaminated soil or groundwater.</li></ul>	✓	✓	Some testing and remediation of stockpile areas may be required following construction works. Permanent collection and treatment of groundwater may be required in the event that long term dewatering is required in the vicinity of contaminated sites.	Insignificant	A soil and groundwater testing program should be developed and implemented before construction (Phase II ESA).  A soil and groundwater screening, testing and management program should also be developed and implemented (compliance).	Ministry of the Environment and City of Ottawa input for excess material management  LeBreton Flats area is National Capital Commission land and may require federal input  City of Ottawa discharge permit for sewer discharge

Environmental Value		Gov. Interest			Project Activity/Environmental Interaction	Project Phase			Specific Location	Analysis of Environmental Effect	Required Mitigation Measures	Mitigation Resp.		Potential Residual Effect	Level of Significance after Mitigation	Monitoring Recommendation	Review Agency for: Comment/Approval
		Federal	Provincial	Municipal		Planning	Construction	Operation				Design	Contractor				
Biophysical	Contaminated material management and removal (cont'd)							<ul style="list-style-type: none"><li>• The Rideau Centre.</li><li>• The University of Ottawa.</li><li>• Campus Station located south of Nicholas Street between University of Ottawa and Rideau Canal (soil and groundwater).</li><li>• East Portal cut and cover excavation to Lees Station located South of Mann Avenue continuing 300 m south to Highway 417 (soil and groundwater).</li><li>• Hurdman Station located on the north side of Hurdman Bus Transitway Station (soil/waste)</li><li>• Maintenance Yard located on North side of Belfast Road, extending to the existing VIA Rail tracks.</li></ul>									
	Construction groundwater lowering		✓	✓	<ul style="list-style-type: none"><li>• Project works will require temporary lowering of the groundwater table for construction which may cause off-site groundwater contamination to migrate onto the site.</li></ul>		✓	<ul style="list-style-type: none"><li>• West Portal from the existing Transitway to Commissioner Street.</li><li>• Tunnel station entry shafts and vent shelter excavations at the following locations:<ul style="list-style-type: none"><li>• 400 Albert Street.</li><li>• 330 Albert Street.</li><li>• the parking lot at the northeast corner of Kent and Albert Streets.</li><li>• 99 Bank Street.</li><li>• 155 Queen Street.</li><li>• Elgin Street, north of the National Arts Centre.</li><li>• The Government Conference Centre.</li><li>• The Rideau Centre.</li><li>• The University of Ottawa.</li><li>• Campus Station located south of Nicholas Street between University of Ottawa and Rideau Canal.</li><li>• East Portal cut and cover excavation to Lees Station located South of Mann Avenue continuing 300 m south to Highway 417.</li></ul></li></ul>	<ul style="list-style-type: none"><li>• Temporary groundwater table lowering may be required for excavations below the watertable. This may result in mobilization of off-site groundwater impacts into the excavations and/or from one off-site property to another.</li></ul>	<ul style="list-style-type: none"><li>• Modification of construction techniques to minimize the dewatering effect and inflow volumes, such as reducing the length of open excavations, use of water tight construction methods and/or the use of recharge wells.</li></ul>		✓	Mobilization of groundwater impacts from off-site impacted groundwater plumes onto the site.	Insignificant	Development of a construction groundwater monitoring plan. Where required, installation of off-site monitoring wells to monitor mobilization of off-site impacts.	Ministry of the Environment (Permit to Take Water will likely be required for dewatering)	

Environmental Value		Gov. Interest			Project Activity/Environmental Interaction	Project Phase			Specific Location	Analysis of Environmental Effect	Required Mitigation Measures	Mitigation Resp.		Potential Residual Effect	Level of Significance after Mitigation	Monitoring Recommendation	Review Agency for: Comment/Approval
		Federal	Provincial	Municipal		Planning	Construction	Operation				Design	Contractor				
Biophysical	Construction over contaminated materials		✓	✓	• Stations and buildings may be constructed on contaminated materials that will not be removed during construction.	✓		✓	• Bayview Station, northeast of the intersection of the O-Train corridor and Transitway • LeBreton Station at the intersection of Booth Street and the existing Transitway • Lees Avenue Station located at Highway 417 to Lees Avenue at the site of the existing Lees Avenue bus station. • Hurdman Station located on the north side of Hurdman Bus Transitway Station. • Maintenance and Storage Facility located on North side of Belfast Road, extending to the existing Via Rail tracks.	• The Bayview Station will be constructed over or adjacent to a capped and closed landfill. The LeBreton Station may be constructed over contaminated fill. The Lees Avenue Station is located adjacent to a former contaminated coal gasification plant. The Hurdman Station is/will be constructed over a closed landfill and the Maintenance and Storage facility will be constructed over former industrial use properties. In each location, contaminated soil and or groundwater may remain on-site following construction.	• Completion of a Risk Assessment in areas of residual contamination to evaluate residual risk. A risk assessment may be required for stations where a Record of Site Condition is required. • Risk mitigation may be required to manage exposure risks.	✓		Continued monitoring and inspection of possible risk management measures such as membranes, clean fill layers, if required by the risk assessment.	Insignificant	A Phase II ESA investigation will be required to identify and classify contamination at the sites and to develop the risk assessment/risk management plan.	Ministry of the Environment review of risk assessment as part of Record of Site Condition Process  City of Ottawa review of risk assessment as part of Record of Site Condition Process
	Landfill Gas, Hurdman Station		✓	✓	• The planned construction and operation of subsurface or enclosed site features such as elevator shafts, enclosed platforms and underpasses may be impacted by the former waste disposal site at Hurdman Station.		✓	✓	• Hurdman Station located on the north side of Hurdman Transitway Station.	• Landfill gas generated from this closed waste disposal site may be present in the subsurface and enter into enclosed features such as elevator shafts, enclosed platforms and underpasses. Landfill gas build up can be toxic and/or explosive.	• Gas build up will be mitigated by ventilation and sealing the structures below ground.	✓	✓	Long term landfill gas management. This should be incorporated into any existing management plans for the Hurdman Station.	Moderate	Gas monitoring in at risk areas during construction and over the longer term.	MOE air discharge permit for ventilation systems  City of Ottawa approval for gas management design
	Building demolition and site redevelopment			✓	• Construction of the Maintenance and Storage Facility will require demolition of existing commercial-industrial buildings and redevelopment with new facilities.	✓	✓		• Maintenance and Storage Facility located on North side of Belfast Road, extending to the existing Via Rail tracks.	• The location of the proposed Maintenance and Storage facility is currently occupied by eight commercial-industrial buildings. Activities at these properties may have impacted the soil and groundwater at the location of the proposed Maintenance and Storage facility. These activities may include underground storage tanks, private fuel outlets and historical spills.	• Manage contaminated soil and groundwater as noted above for the remainder of the project alignment. • Abatement of hazardous building materials prior to demolition. This will include appropriate testing and disposal of any identified materials. • Decommission and remove any existing fuel or chemical storage tanks with soil and groundwater remediation and verification, as required.		✓	None expected	Insignificant	A Phase I ESA and designated substance and hazardous building material survey should be completed for the existing buildings prior to demolition. An intrusive soil and groundwater assessment (Phase II ESA) should be completed if required following the Phase I ESA.	City of Ottawa site plan approvals framework

Environmental Value		Gov. Interest			Project Activity/Environmental Interaction	Project Phase			Specific Location	Analysis of Environmental Effect	Required Mitigation Measures	Mitigation Resp.		Potential Residual Effect	Level of Significance after Mitigation	Monitoring Recommendation	Review Agency for: Comment/Approval
		Federal	Provincial	Municipal		Planning	Construction	Operation				Design	Contractor				
Biophysical	Building demolition and site redevelopment (cont'd)									Construction of the new facilities may encounter contaminated soil. Contaminated groundwater may be encountered in deeper foundations or basement levels. Groundwater management is expected to be minimal at this location. <ul style="list-style-type: none"><li>Depending on the age of the buildings, potential hazardous building materials such as asbestos and lead may be encountered during demolition of existing buildings.</li></ul>							

### 10.4 Cumulative Effects

The Canadian Environmental Assessment Act requires an assessment of cumulative environmental effects. In the Federal Environmental Screening Report, the proponent will consider the net environmental effects associated with the project in combination with the environmental effects of other past, present or future projects or activities to determine the potential for cumulative environmental effects. Cumulative effects are to be considered for those reasonably foreseeable projects and activities, the effects of which have the potential for overlapping in time and space with the environmental effects of the proposed project (construction and operation phases). These are projects occurring in the same general location and that have the potential to interact with the effects of the present proposal.

### 10.5 Accidents and Malfunctions

The Canadian Environmental Assessment Act requires consideration of the environmental effects of potential accidents and malfunctions resulting from the project (e.g. failure of a sediment trap, leaks and spills during construction and operation of the project, rail accidents such as derailments and crossing and trespassing accidents) that can reasonably be expected during the construction and operation phases of the project. The effects of accidents and malfunctions will be considered for each environmental element as well as the contribution to cumulative effects.

The Federal Screening Report will detail possible mitigation measures that will be taken to prevent, respond to and/or clean-up the potential effects of an accident/malfunction taking into account the environmental value found within the Study Area.

### 10.6 Municipal, Provincial, Federal or Other Approvals or Permits

Approval of the Environmental Project Report under the Ontario Environmental Assessment Act does not constitute approval under other legislation required to construct the project. Specific approvals will be required for many components of the project. The following is a list of approvals and permits that may be required during the design and construction of the project that will be the responsibility of the City of Ottawa as the proponent.

#### Municipal

- Planning Act Approvals (Site Plan Control, Re-zoning)
- Municipal Building Permit
- Rideau Valley Conservation Authority (Ontario Regulation 174/06 – Potential Development, Interference with Wetlands and Alterations to Shorelines and Watercourses in proximity to the Rideau River)
- Utilities Companies (Relocations)

#### Provincial

- Ministry of the Environment (Ontario Water Resource Act - Permit to take Water and Certificate of Approvals)
- Ministry of Culture (Ontario Heritage Act - Archaeological clearances)

#### Federal

- Public Works and Government Services Canada (Land acquisition or lease)
- Parks Canada (Land use agreement, such as a lease or easement issued by Parks Canada Agency in relation to the Rideau Canal National Historic Site of Canada)

- Fisheries and Oceans Canada (Fisheries Act - potential works in/near the Rideau River)
- Canadian Transportation Agency (Canadian Transportation Act - Potential for approval or authorization)
- National Capital Commission (National Capital Act - Land use approvals, design approvals and development associated with those and adjacent public lands)

Additional approvals and permits will be required at the construction phase and will be the responsibility of the contractor. Typical permits and approvals may include:

- Municipal Noise By-law Exemption
- Municipal Road-Cut Permit
- Municipal Encroachment Permit

#### 10.6.1 Modifying the Recommended Plan

The Environmental Project Report is intended to provide the City of Ottawa with approval to construct and operate a Light Rail Transit System from Tunney’s Pasture to Blair Station, via a downtown tunnel and includes an LRT Maintenance and Storage Facility on Belfast Road. The approval will include the right to make refinements to the project during future design phases.

The project has been developed to a functional design level of detail for the purposes of this Environmental Project Report. The functional design level does not provide the same level of detail that will be available during later stages of preliminary and detailed design. Nonetheless, the functional design does provide a sufficient level of detail to assess the environmental effects of the Recommended Plan. The effects identified in the environmental assessment are considered reliable for the Ministry of the Environment to base a decision regarding approval of the proposed project.

Some aspects of the Recommended Plan are subject to change as detailed plans are developed. Changes may arise in terms of study area conditions, the development of new technology or mitigation measures, or the identification of previously unknown information. The proponent will be responsible for assessing the significance of the proposed change(s) which will be reviewed by the Ministry of the Environment and will generally be based on further technical assessments and consideration of applicable policy as well as public and agency input as required. An assessment as to the significance of a proposed change will be based on consideration of the following issues:

- Are there any significant environmental issues?
- Are there any significant property issues?
- Is there a need to provide public documentation of any issues that have been identified?

All changes that are inconsistent with the Environmental Project Report require an addendum however not all changes require a Notice of Environmental Project Report Addendum. If the proposed change to the project is not anticipated to be significant, the change will be documented in a Design Construction Report which will be made available for public review. If a proposed change is considered significant, the proponent must publish a Notice of Environmental Project Report Addendum. The notice must also be provided to the Director and Regional Director of the Ministry of the Environment, every property owner within 30 metres of the site of the change, Aboriginal communities that were given a Notice of Commencement, and any other person the proponent determines may be interested in the change to the transit project. The process and timelines following the notice are the same as the process leading to the Notice of Completion.

#### 10.6.2 CEAA Determination

The Canadian Environmental Assessment Act is the legal basis for the federal environmental assessment process. A federal environmental screening report will be completed in order for

responsible authority(ies) to determine whether adverse environmental effects are likely to be significant. This determination governs whether the responsible authority can take action that will enable the project to proceed including providing funding, land, permits or other authorization.

#### 10.7 Future Commitments

As part of the environmental assessment and approvals process, the City of Ottawa is committed to consultation to keep all stakeholders and the general public informed of design and project implementation activities.

A Consultation Plan will involve coordinated communications with agencies, the public, property owners, First Nations and other stakeholders. Components of the future consultation plan include:

- Noise mitigation design;
- First Nation consultation during future design;
- Construction Management (work hours, truck routes, handling of contaminated soils, etc.);
- Traffic Management (detours/diversions for cars, trucks, buses, pedestrians and cyclists);
- Access Management (to ensure alternate access to any buildings impacted by construction activities); and
- Environmental Management (protection of natural environment, protocols for accidents, spills and malfunctions).

The City of Ottawa will undertake the following commitments to future action during the design and construction phases of the project:

- *Consultation* – The City is committed to consulting with all stakeholders, including First Nations, federal and provincial agencies, the business community and the public. A consultation plan will be developed to address the issues that arise and to meet the needs of the different stakeholder

groups and will use a variety of media to maintain contact and provide updated information.

- *Property Acquisition* – The City will proceed with the acquisition of temporary and permanent property needs, including temporary construction easements, as the design work proceeds and definitive property plans are developed. The process will include negotiation and expropriation for private properties as required. For provincial and federal lands, the City will follow the approved land acquisition processes, working cooperatively with the respective agencies to acquire property for the project.
- *Planning and Design Initiatives* – The City will work with its partners to apply the urban design and community planning policies and guidelines to all elements of the project including runningway, stations, access points, ventilation shafts, electrical substations and the maintenance and storage facility. Opportunities to limit impacts, improve pedestrian and cycling accessibility and to improve overall mobility will be actively sought and evaluated in the design process. The process will consider long range policy statements for the National Capital and the City, and focus on implementing a transit solution that works at the local and regional level.
- *Construction Issues* – The City will conduct further research and analysis for the construction of the project, actively seeking ways to reduce construction impacts and speed up construction. The project will require contractors to meet the requirements of all applicable provincial and federal legislation related to construction including:
  - control of noise and vibration;
  - dust, fumes and other air quality factors;
  - traffic management and monitoring for general traffic, transit vehicles, pedestrians and cyclists;

- groundwater control including permits to take water and dispose of it in the City's sewer system and settlement monitoring;
- utility services including both municipal and private utilities;
- emergency response planning to and around construction sites;
- designated substance surveys for buildings requiring demolition or alteration;
- building pre-condition surveys to document the state of buildings adjacent to the construction;
- erosion and sediment control plans;
- stray current protection (if and where applicable) and monitoring for pipelines and other utilities;
- manage brownfield sites in accordance with provincial regulations
- conduct environmental site assessments where warranted
- conduct archaeological investigations where warranted

- *Municipal Approvals* – The City will work internally to put all municipal approvals in place. The project will be reviewed by staff, with reports rising to several City committees for final approval by Council. This process mirrors the work done to date for the approval of the functional plan.

- *Permits and Approvals* – The City will secure all necessary permits and approvals for the implementation of the project including planning approvals, building permits and all permits required by any provincial or federal agency with jurisdiction over a portion of the project.
- *Noise and Vibration Protocols* – The City will undertake studies during the design process in accordance with MOE protocols.
- *Canadian Environmental Assessment Act Determination* – The City has been working with the federal family throughout the process to coordinate the provincial and federal processes. The EPR will form the foundation for a CEAA Screening Report, the scope of which is currently being set out by the federal family.